

Virginia Feldman

#331908 | June 24, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

i hope Council will put at the very top of its reconsideration of these amendments the City's Emergency Climate acknowledgment, and safety of us citizens, & not the business needs of Zenith & other fuel companies. We must immediately get into non-fossil fuels. Portlanders living or visiting around these terminals, & around all the transport zones required to bring fuels to storage, must be protected, rather than business interests which are not willing to transform themselves into safer energy businesses. Other countries have done this: we can too. As a physician, I know of he increased cancer, lung problems, as well as poorer childhood learning & development which occur in areas around such pollution. Please keep them safe & healthy.

Testimony is presented without formatting.

Kristin Edmark

#331909 | June 24, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Public Comment Fossil Fuel Terminal Zoning Amendment – June 30th City Council Hearing

Submitted by: Kristin Edmark, concerned citizen with children and grandchildren in Portland Please renew the Fossil Fuel Zoning Amendment. This amendment is essential for the health and safety of Portland residents, is in alignment with state goals and is in alignment with the concerns of Portland residents and those of us who are strongly affected by Portland policy. Foremost I am very worried about the climate crisis, worsening climate disasters, water supplies and the planet our grandchildren will inherit. My daughter-in-law's family lost a home in the 2020 Oregon fires. This month in at the Bonn Climate Talks countries are demanding financial assistance from wealthier countries to deal with devastating effects of climate. Passing the amendment is a large help toward the transition to clean energy and lessening greenhouse gas production. The amendment supports Portland's Climate emergency resolution and state policy. The resolution would help stop dangerous expansion of fossil fuels at the hub where an accident or earthquake would be disastrous for the Willamette and the surrounding communities including my son, daughter-in-law and grandchildren in the Arbor Lodge neighborhood. Please keep the amendment strong against new fossil fuel expansion. Demand transparency: the contents of all storage containers should be disclosed. Please treat biofuels and renewable fuels the same as all fossil fuels because they also burn to CO₂, slow the transition to 100% electricity, are just as dangerous/inappropriate for the site, and are not economically viable so increase fossil fuel infrastructure easily taken over by other fossil fuels. Thank you.

Testimony is presented without formatting.

Teresa DeLorenzo

#331910 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

These amendments are a necessary first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses a catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments help protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. The Portland City Council should not weaken the amendments in exchange for industry promises, or allow any expansion of fossil fuel storage. Fossil fuel terminal owners should retrofit their facilities to better withstand earthquake risk, but not in exchange for being allowed to further increase the risks to our communities and watersheds from reckless fossil fuel infrastructure expansion. The Portland City Council should strengthen the rule, closing potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. Renewable, or biofuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well.

Testimony is presented without formatting.

Tedd Ward Jr.

#331911 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

The Portland City Council should not weaken the amendments in exchange for industry promises, or allow any expansion of fossil fuel storage. Fossil fuel terminal owners should retrofit their facilities to better withstand earthquake risk, but not in exchange for being allowed to further increase the risks to our communities and watersheds from reckless fossil fuel infrastructure expansion.

Testimony is presented without formatting.

John Marshall

#331912 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

These stated amendments are a necessary first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses a catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments help protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These stated amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. The Portland City Council should not weaken the amendments in exchange for industry promises, or allow any expansion of fossil fuel storage. Fossil fuel terminal owners should retrofit their facilities to better withstand earthquake risk, but not in exchange for being allowed to further increase the risks to our communities and watersheds from reckless fossil fuel infrastructure expansion. The Portland City Council should strengthen the rule, closing potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. Renewable, or biofuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well.

Testimony is presented without formatting.

Mike Voss

#331913 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

For sake of our health and that of all future citizens, please pass this ordinance. Thank you

Testimony is presented without formatting.

Joan Sears

#331914 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

The city of Portland should definitely NOT allow any new or expanded bulk oil facilities here. We already have the problem of huge amounts of fuels unsafely stored near the river. What is being done about that? Neighborhoods are supposed to have earthquake preparedness plans....it's sheer madness to allow fossil fuel companies to endanger our citizens. The handwriting is on the wall, fossil fuel usage is no longer a viable option. We need to court renewable energy organizations and honor our alleged environmental commitments.

Testimony is presented without formatting.

marna herrington

#331915 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Continuing with fossil fuel expansion is too dangerous to allow. These amendments are a necessary first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses a risk of catastrophic spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. (Other unpredictable catastrophes could also trigger spills, explosions and fumes.) These amendments help protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure.

Testimony is presented without formatting.

Jeff Shay

#331916 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

As a life long Portlander I would like to urge, in the strongest possible terms, the Council to adopt the FFTZA under consideration. The council has the opportunity, or more accurately the responsibility, to act to protect the citizenry, the river, and ultimately the planet with these amendments. The Council also has the responsibility to resist the bogus corporate spin that the fossil fuel industry uses to greenwash and ultimately put the resources of the public at unnecessary risk. Again I urge to you pass the FFTZA.

Testimony is presented without formatting.

AARON ANDRADE

#331917 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I support this effort to protect our communities from fossil fuels pollution. The amendments are a necessary first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. They are in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. The Portland City Council should not weaken the amendments in exchange for industry promises, or allow any expansion of fossil fuel storage. Fossil fuel terminal owners should retrofit their facilities to better withstand earthquake risk, but not in exchange for being allowed to further increase the risks to our communities and watersheds from reckless fossil fuel infrastructure expansion. The Portland City Council should strengthen the rule, closing potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables.

Testimony is presented without formatting.

Michael O'Brien

#331918 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

The City of Portland already has a potential fossil fuel disaster. When the next major earthquake strikes, all the oil tanks currently built along the Willamette River are likely to rupture and cause a huge spill into the water. Adding any more storage facilities will only add to the scale of the problem. In addition, all the City's climate planning and policies call for reducing fossil fuels, so any new fossil fuel facilities would contravene critical goals.

Testimony is presented without formatting.

Virgene Link-New

#331919 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

These amendments are a necessary first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses a catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments help protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. The Portland City Council should not weaken the amendments in exchange for industry promises, or allow any expansion of fossil fuel storage. Fossil fuel terminal owners should retrofit their facilities to better withstand earthquake risk, but not in exchange for being allowed to further increase the risks to our communities and watersheds from reckless fossil fuel infrastructure expansion. The Portland City Council should strengthen the rule, closing potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables.

Testimony is presented without formatting.

Jill Turner

#331920 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

These amendments are a necessary first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses a catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments help protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are also important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals and the Governor's executive order on the climate crisis.

Testimony is presented without formatting.

Karen Fletcher

#331921 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I would like to testify in support of limiting the fossil fuel burden born by local entities. All efforts to minimize fossil fuel production must be supported. Please vote for the proposed FFTZ amendments.

Thank you.

Testimony is presented without formatting.

John Gastineau

#331922 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

With the existing climate emergency, any further investment in fossil fuel facilities is unwarranted. Use of what we have now will naturally fall off as other energy sources become more important. There's no need to take on the risk of new development when it will all be unused in the future.

Testimony is presented without formatting.

Jorge De Cecco

#331923 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Dear Portland City Council: These amendments are a necessary first step toward averting catastrophic impacts from the predicted magnitude 9.0 Cascadia Earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses a catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments help protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are also important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. The Portland City Council should not weaken the amendments in exchange for industry promises, or allow any expansion of fossil fuel storage. Fossil fuel terminal owners should retrofit their facilities to better withstand earthquake risk, but not in exchange for being allowed to further increase the risks to our communities and watersheds from reckless fossil fuel infrastructure expansion. The Portland City Council should strengthen the rule, closing potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. Renewable, or biofuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well. Thank you for your attention.

Testimony is presented without formatting.

Kelly Merrick

#331924 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Dear Portland City Council Members, I am writing you today in support of readopting the remanded ordinance that restricts bulk fossil fuel terminals. As a Portland resident I am very concerned about two aspects of the fossil fuel terminals. 1) Averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments are a necessary step to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. Every time I cross the river and see these terminals I am aware of what would happen should "the big one" happen, and am terrified by the idea. 2) These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. I fully support Portland's Climate Emergency resolution and ask that you keep this in mind while considering these amendments. Finally, I am writing to express my support for the Council to commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits, and requiring the phaseout of fossil fuel storage in line with reducing demand. Thank you. Sincerely, Kelly Merrick, Portland resident

Testimony is presented without formatting.

Mary Emerson

#331925 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Please readopt remanded Ordinance No. 189807 to restrict bulk fossil fuel terminals. It's the right thing to do for our communities, our safety and our future. Storing fossil fuels in a geologically unstable area is sheer lunacy. It is critical that we take this step towards saving the local communities of Portland, Linnton & Sauvie Island from the risks of spills, fires, explosions and toxic fumes. In line with global national, state and local goals towards reducing carbon consumption, we should not be building or expanding fossil fuel infrastructure. Our public and private investments should be focused on a sustainable zero-carbon future rather than on burning high-carbon dinosaurs. Anyone who suggests otherwise is gambling away our shared future on short-term profits. Respectfully, Mary Emerson Portland, OR 97214 activist@maryemerson.org

Testimony is presented without formatting.

Au Nguyen

#331926 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Readopt remanded Ordinance No. 189807 to restrict bulk fossil fuel terminals. These terminals put the community at risk of pollution from spills, fires and earthquakes. They are also incompatible with Portland's own Climate Emergency Declaration.

Testimony is presented without formatting.

Michael Madias

#331927 | June 27, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Portland must ban new or expanded bulk fossil fuel infrastructure. The risks and damage caused by this type of industry are too great: catastrophic results from a predicted 9.0 earthquake, the potential for spills, explosions, water pollution and toxic fumes. There should be no expansion of existing facilities and current facilities must be required to retrofit to better withstand earthquakes. There needs to be close monitoring and enforcement to ensure requirements have been met. And close potential loopholes

Testimony is presented without formatting.

Carole Most

#331928 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Urge you to adopt this zoning amendment. Storing fossil fuels in aging tanks in a geologically unstable area is potentially hazardous and is not in the best interests of Portland and the surrounding area residents. Thank you for your careful consideration.

Testimony is presented without formatting.

joana kirchhoff

#331929 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

The zoning for the fuel tank facilities is an opportunity to limit and improve fossil fuel storage at the Hwy 30 and NW Kittredge site. There will be testimony about the instability of the soil and the certainty of liquefaction during an earthquakes. There will be testimony about air quality concerns for all the supporting communities. There will be testimony about the danger to the ground water and the Willamette/Columbia/Pacific. There will be testimony about the unreliability of the corporations asking for permits and then ignoring the parameters of that permit. There will be testimony about climate catastrophe and fossil fuel dependency. Please listen to the testimonies. And require zoning that protects all of us in all these issues. Thank you Joana Kirchhoff

Testimony is presented without formatting.

Judy Romano

#331930 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Storing fossil fuels in aging tanks in a geologically unstable area is NOT in the best interests of any community in Portland, Linnton or Sauvie Island.

Testimony is presented without formatting.

Alice Shapiro

#331931 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Please extend the limitation on fossil fuel terminal/storage expansion. Stored fossil fuel already is a health threat with the toxic fumes that escape, as well as the methane leaks which contribute to climate change. There is money to seek alternative, renewable, safe energy. Portland must achieve its goals stated to prevent more climate disasters. Our city government has delayed effective, bold actions for too long!

Testimony is presented without formatting.

Marjorie Nafziger

#331932 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

This is a prime opportunity for City Council to exert leadership in protecting the people and environment along our waterways!

Testimony is presented without formatting.

Teresa McFarland

#331933 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I urge you to pass the the Portland Fossil Fuel Terminal Zoning Amendments (FFTZA). Do not allow fossil fuel promoters to weaken these amendments in any way if you care about the health of our residents and environment. Portland must continue to take strong action to reduce any use of fossil fuels in our city if we want to survive.

Testimony is presented without formatting.

Elsa Clements

#331934 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

These amendments are a necessary, first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments are a necessary step to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. Council should hold the line, and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds from reckless expansion. Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. This should be the beginning. Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits, and requiring the phaseout of fossil fuel storage in line with reducing demand. Renewable fuel, or biofuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well. Council should set a policy agenda of 100% electrification. The latest report from the International Energy Agency makes this point clear: to reach net zero emissions and a stable climate, transportation, heating, and industrial sectors must reach 100% electrification and cannot remain dependent on combustion. Deploying renewable fuels should serve this purpose in the interim, not hinder it.

Testimony is presented without formatting.

Rowan Everard

#331935 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Council should hold the line, and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds from reckless expansion. We need to do more to protect sensitive area from oil, especially during a potential future earthquake!

Testimony is presented without formatting.

Janet Michele

#331936 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Strengthen existing amendments and for once and for all say NO to fossil fuel storage. Thank you.

Testimony is presented without formatting.

Richard Freeman

#331937 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Fossil fuel continuance can ONLY benefit already extremely wealthy people. Transportation/storage of such can only destroy the downtown plus area of Portland, WHEN the next mega-earthquake happens.

Testimony is presented without formatting.

Carrie Tilton-Jones

#331938 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I strongly urge the Council to stand firm and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Industry promises are notoriously easy to abandon and there is no mechanism for accountability. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds from reckless expansion. I strongly urge the Council to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables.

Accountability, including consequences that are meaningful deterrents, is critical. This is a positive step, but it should be just the beginning. Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits and requiring the phaseout of fossil fuel storage in line with reducing demand. Renewable fuel, or biofuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well. I strongly believe that the Council should set a policy agenda of 100% electrification. The latest report from the International Energy Agency makes this point clear: to reach net zero emissions and a stable climate, transportation, heating, and industrial sectors must reach 100% electrification and cannot remain dependent on combustion. Deploying renewable fuels should serve this purpose in the interim, not hinder it. I have an 18-year-old kid and a 22-year-old niece. It is so painful to see how hopeless they get when they talk about the impact of climate change on their future. Please keep them in mind as you deliberate. Please keep all young people in mind. They deserve a better future, and we must do all we can to ensure it for them.

Testimony is presented without formatting.

Sandra Joos

#331939 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

The Fossil Fuel Terminal Zoning amendments are a necessary, first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments are necessary to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. Council should hold the line, and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds from reckless expansion. Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. This should be the beginning. Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits, and requiring the phaseout of fossil fuel storage in line with reducing demand. Renewable fuel, or biofuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well. Council should set a policy agenda of 100% electrification. The latest report from the International Energy Agency makes this point clear: to reach net zero emissions and a stable climate, transportation, heating, and industrial sectors must reach 100% electrification and cannot remain dependent on combustion. Deploying renewable fuels should serve this purpose in the interim, not hinder it.

Testimony is presented without formatting.

Ruth Tuttle

#331940 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I feel we are living in a huge diaster zone with the oil tank farm on hwy 30 located so close to the city of Portland residents and downtown. If an earthquake or terror attack shoud occur concerning the tank farm, there would be thousands of people killed instantly. This kind of activity should never have been sited so close to our densely populated neighborhoods. I would like to see the tank farm dismantled and moved elsewhere. I understand that we store all the jet fuel for the airport at this location also. Are we trying to make sure that we will all die if something happens?

Testimony is presented without formatting.

Before The City of Portland, Oregon

TO: Mayor Ted Wheeler and City Commissioners

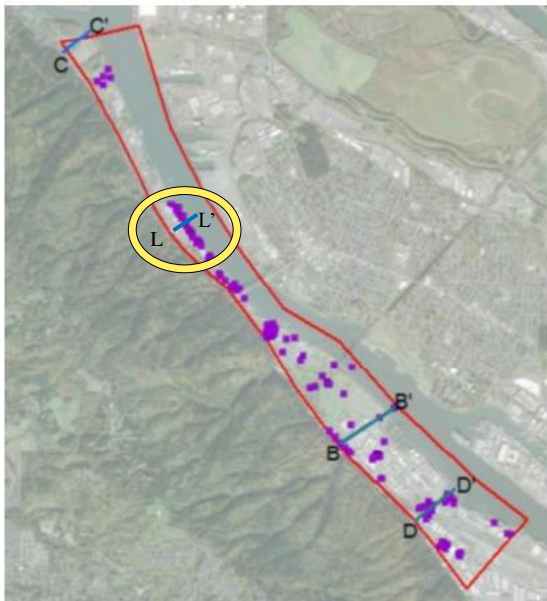
CC: PHMSA, Western States Petroleum Association, Willamette Riverkeeper, Columbia Riverkeeper, Linnton Neighborhood Association

SUBJECT: Fossil Fuel Terminal Zoning Amendments

Ref: [Critical Energy Infrastructure Hub: Seismic Hazard Mitigation Study of Fuel Facilities, Final PSU Report to Oregon Military Department, December 2021](#)

The referenced report provides modeled seismic characterization of wet sand soils along the west side of the North Willamette reach. This is of interest due to reliance on the CEI Hub for military and civic survivability after the predicted Cascade Subduction Zone event.

Main thing is the Linnton neighborhood is not examined by the PSU software modeling of a seismic event. This is because there is no cross section drawn on this map in PSU Study Figure 2-2 like the one that is added here to show the Linnton location L-L', even though borehole samples have been taken for DOGAMI Open-File report O-13-12 as shown by the purple squares.



To help discover the vulnerability of the Linnton neighborhood one can guess at the L-L' profile after checking out the C-C' Profile (PGE, Figure 2-4), the B-B' (Kinder Morgan, Figure 2-3) and the D-D' Profile (Shell, Figure 2-5). The Kinder Morgan profile in the PSU report is repeated here and describes the property well upstream from Linnton.

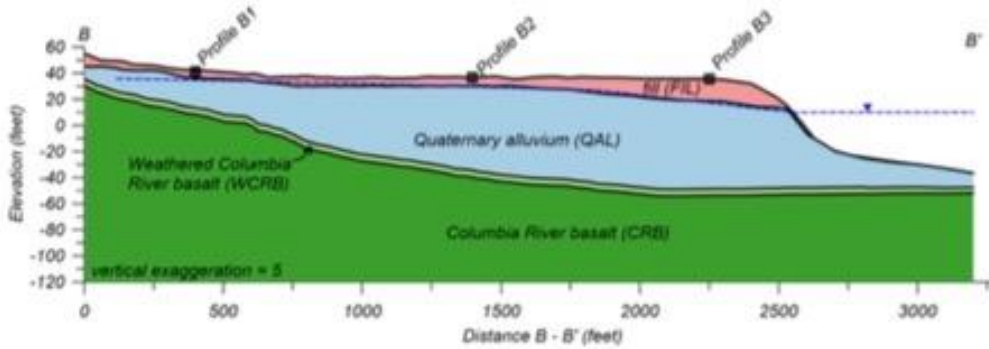
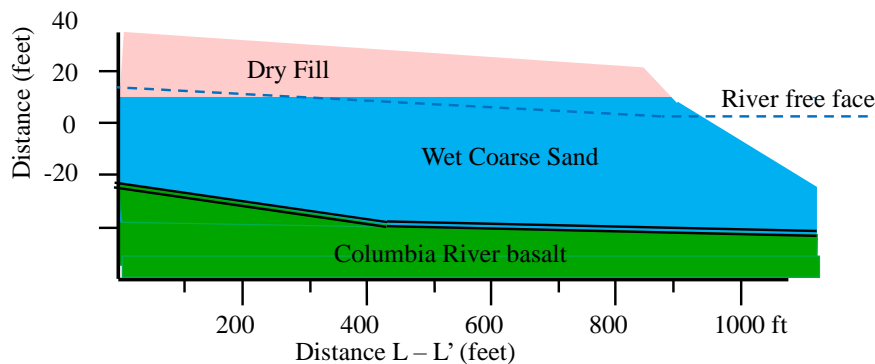


Figure 2-3. Generalized stratigraphy for B-B' profile.

During the next CSZ event what does lateral spread deformation look like in action? So far there is no known PSU video simulation, but you can visualize the slumping of the sandy bluff into the river suggested by the B-B' profile. This profile depicts the west bank of the Willamette upstream from Linnton with a broad layer of fill material on the way to the obvious promontory or bluff structure. The blue indicates up to 70 feet of coarse wet sand resting on basalt bedrock.

The approximate Linnton profile L – L' for the Nustar petroleum property down river from B-B' could easily appear approximately as depicted here if and when Western States Petroleum Association funds a PSU Re-Study of seismic hazards at Linnton. Or the Port of Portland could fund.

Approximated L – L' Profile



Best guess of the site profile for the Nustar property

Suggested Questions to Western States Petroleum Association (WSPA)

The referenced study stimulates many critical questions that to date have not been anticipated by nor answered by industry leadership. We note that the petro industry has established the most sophisticated technology in history in terms of advances in geology, geophysics, data analytics, 3D-modeling, graphics, seismic testing, hydrology, deep well mining, pipeline installation and maintenance, pump stations, offshore marine platform structures, compressor stations, ocean



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vessel design, blowout prevention, venting, flaring, the list goes on and on, but also includes skillful public misinformation and deception (you actually need to know what is right before you message against it).

Seismic Liquefaction

Lateral spread deformation that results from liquefaction is an interesting area of research that is just now being investigated. This is taking place after the CEI Hub was designed and built on riverside hydraulic fill deposited over coarse sand. The timing of the origins of this fuel infrastructure buildout leads to very poor optics. Build on wet sand then see what will happen.

This video demonstrates the significance of this neglected research for public safety:

<https://www.youtube.com/watch?v=4mXxRaKn0o8>

Q1 Across the 100-yr evolutionary timescale of the Above-ground Storage Tank (AST) buildout in the CEI Hub, what sound civil engineering analysis and design methods have been employed for each of the ASTs, including liquefaction-tolerant substructure and foundation design?

Q2 If the substructure and foundation design is now known to be non-existent or deficient, what after-the-fact retrofit design reports exist that defend the public interest in CEI Hub public safety?

What does public mean?

- On-site employees
- On-site visitors
- Local residents
- Passersby
- River vessel occupants

We know from correspondence with the Denver office of the Pipeline and Hazardous Materials Safety Administration (PHMSA) that their adopted storage tank seismic safety standard consists of an API steel tank design standard (API 650) that exempts industry from any seismic analysis or design responsibility.

Q3 We know that PHMSA exempts itself from answering to public interest in seismic safety. https://better-energy-llc.com/wp-content/uploads/2022/06/OSSPAC-Letter-5_23_22.pdf What can Western States Petroleum Association do to improve the due diligence of API and PHMSA such that the same superior attention given to sophisticated state-of-art extraction technology is also given to protecting public safety stemming from the proximity of CEI installations to private and public property and waterways?

Seismic Vulnerability

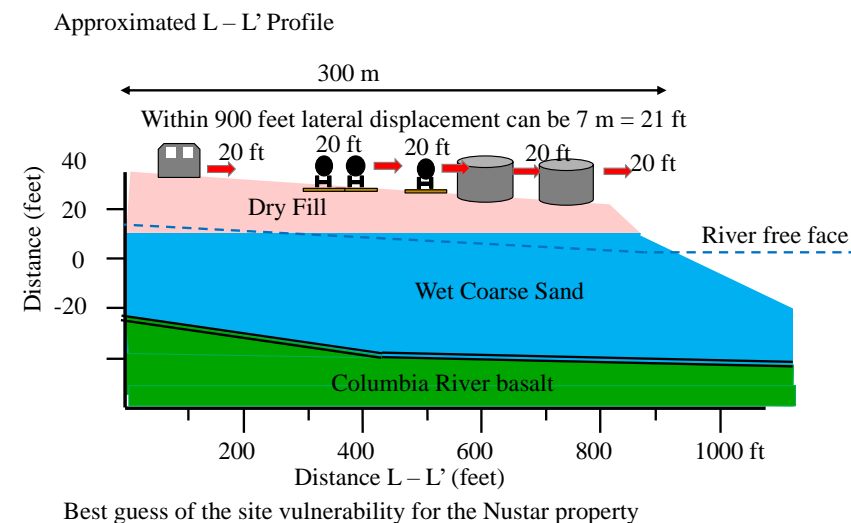
A preliminary assessment of seismic vulnerability can be accomplished with very little chance of contradiction, because of the significant accumulation of public information to date. This includes the referenced PSU report funded by the US Military concerned with national defense infrastructure vulnerability.

Key conclusions from the PSU report apply to the L-L' profile at Linnton:

1. Lateral deformation appears to be more significant than vertical displacement.
2. The lateral ground deformations were estimated of upward of 7m (23 ft) for certain scenarios.
3. The deformations are largest near the free face closer to the river.
4. Facilities within 300 m (1000 ft) of the river will be highly impacted.

These findings pertain to site vulnerabilities, not tank vulnerabilities, nor to pipeline vulnerabilities. It remains to be seen what 2021 SB 1567 “seismic vulnerabilities” will be reported by the Hub operators to DEQ in 2024: all vulnerabilities, or the least vulnerable ones. We can draw reasonable conclusions well before 2024.

For example, it is possible to depict the outcome of lateral deformation at the Nustar installation situated within 300m of Linnton property owners, by taking the 4 conclusions from the PSU Defense Department report and representing them graphically on the Linnton L-L' profile.



CEI Hub Risk

What risks can be discerned from this work?

Neighborhood homes – lateral displacement will open utility service lines like natural gas, water, sewer, heating oil, and breaking underground or overhead electric service connections, telephone and internet. Building inspectors can and will Red-tag damaged properties still standing and not damaged by fire. (Some Linnton homes are within 1000ft of rivers edge)



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Site structures – same as homes.

ASTs – those with low commodity volumes relative to their capacity will float on liquified soils and their buoyancy can result in displacement into the waterway. Tanks with high commodity levels can rupture due to side loads after tipping. These loads are due to side forces from inside the tank and simultaneous forces loading from outside the tipped tank. These commodities flow the existing North Willamette Superfund site that extends for 10 miles and can ignite from floating tank collision sparks or other sources such as power lines broken at pump stations. Tanks on vulnerable soils can be Red-tagged prior to the predicted lateral instabilities actually occurring.

NOTE

The condominium collapse in South Miami ([Champlain Towers South](#)) produced evidence that reinforced concrete construction fails after 40 years due to the rebar corrosion that forces concrete decomposition when exposed to a continuously wet environment.

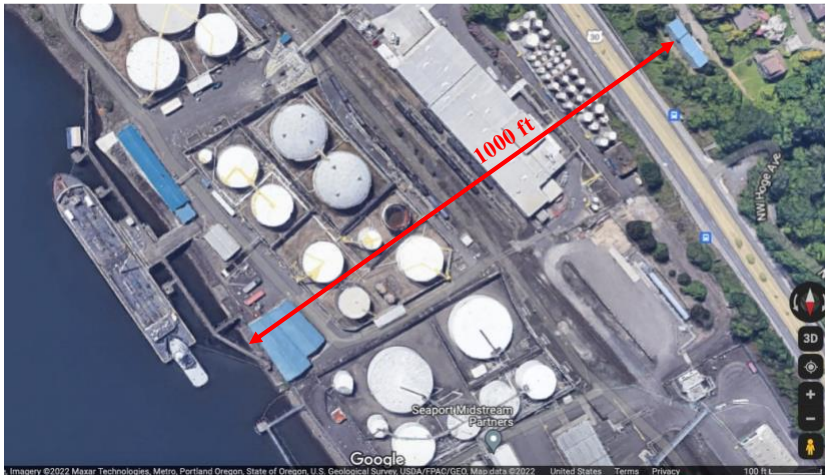
Q4 What CEI Hub tanks are reliant on reinforced concrete construction, for example, used in tank foundation design on wet sand?

Rail tank cars – same as ASTs but with less base stability.

Waterway – In addition to buoyant fuel commodities floating downstream on surface waters, which can ignite and deliver ignition sources downstream, floating tanks can wedge in the waterway forming a temporary river current diversion or possibly a dam. So long as a dam holds, backup impoundments will inundate neighboring sandy fill and erode into the flood plain. This will impede the possibility of escape on foot or in vehicles, from the operator's site or nearby neighborhoods. Same for emergency response vehicles. The possibility of emergency fire boats navigating this scene is not promising.



Compounding the waterway risk is the presence of river barges that can be wedged across the river when unmoored by dock collapse. So too the bulk carriers serving the Port.



Scale 100ft

Risk Management

With sufficient planning, commodities stored in ASTs can be kept to a maximum 30% of capacity, meaning that the AST is immediately and safely oversized for its structural use. This is a good thing. It's likely that any insufficiently designed foundation is immediately unloaded. Another good thing. This can be done short term, avoiding the delays imposed by



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funding and conducting of more studies, or designing and planning soil stability interventions as proposed in the PSU study.

The Western States Petroleum Association does not report operator site insurance indemnities, nor do the operator members.

The delay in finding and identifying a responsible CEI Hub operational safety office (no such office exists) with sufficient safety authority itself poses serious risk from the current unmanagement deficit. (You get unmanagement from a continuously unmanageable situation like the CEI Hub)

The best example of unmanagement is the deadly Deepwater Horizon accident when the blowout preventer with known unsafe failures was not maintained (possibly an unmanageable design at depth on the gulf bottom). The cleanup cost to operators was \$65B as of 2018.

Hub Assessment

Ref: Appendix to PSU Report to Military Department, p76

[Critical Energy Infrastructure Hub Assessment Report, Oregon Solutions | Summer 2021](#)

This referenced Oregon Solutions report states “When the Oregon Seismic Safety Policy Advisory Committee (OSSPAC) wrote their 2013 Oregon Resilience Plan, they were pointedly clear that when the next CSZ event happens, it will be the state’s “greatest challenge in history.””

Discerning the right actions to be taken prior to this event, that reduce the catastrophic outcomes to a routine and manageable resilience response, can be regarded itself as a comparable “greatest challenge,” because it deals with the other greatest challenge but in advance.

Whereas researchers believe there is a 33 to 37 percent likelihood of a significant subduction zone quake in the next 50 years, that does not necessarily mean that the event is scheduled 50 years from now, leaving 50 years to plan. Actually, it means total readiness in 25 years in case we find the probability estimates get more precise, and because dependency on the Hub will not decline as time goes on.

Here is an example of steps that can be taken for total readiness, reducing the disastrous event until it falls within conventional resilience capabilities. See Attachment A.

	Effort	Time
1	Determine 90% of essential science	Done
2	Identify CEI Hub Operators	Done
3	Identify ASTs within 1000ft of waterway	Done – All are
4	Determine PHMSA seismic safety requirements	Done – None
5	Determine API – WSPA seismic safety requirements	Done – None
6	Determine CEI Operator insurance protection	None known



7	Charter CEI Hub Public Safety Design Certification Authority	1 year
8	Identify Hub fuel “must-have” demand for military, Port, regional emergency vehicle fleets for 1 st day after CSZ event	1 year
9	Operators plan for max 30% AST fill	1 year
10	Identify site risks, tank risks, foundation risks	1 year
11	Identify waterway blockage risks (edge tanks, river width, river depth, seasonal flow rates, barge dimensions, ocean vessel dimensions)	1 year
12	Operators’ site retrofit funding plan to get risk mitigation actions certified by 2025	1 year
13	Complete all site CEI safety certifications	3 years
14	Establish Federal/State/Regional rules for 3 rd party verification of safe CEI Hub operations	1 year
		10 years

Recommended Fossil Fuel Terminal Zoning Amendments

Prime time for answers to the questions raised in this analysis is now. In the absence of credible answers, two amendments defend due diligence for essential CEI Hub public safety.

A1 Mandate that all operators of ASTs with capacity exceeding X gallons of hazardous materials are prohibited from loading tanks beyond 30% capacity at all times. This is because the CEI Hub is a High Public Risk Zone.

X = gallons.

Average tank capacity is = (350.6 million gallons/630 tanks) = 557,000 gallons according to [ECONW CEI Hub Feb 2 2022 \(1\).pdf](#)

Suggest X = 50,000 gallons

A2 Assign a single point of authority for total CEI Hub CSZ event readiness within Y years. This is because the CEI Hub is a High Public Risk Zone.

Y = 10 years, but you never know for sure.

Event readiness means the expected level of CSZ resultant damage is within routine conventional resilience capabilities.

ATTACHMENT A

Due diligence is required after the fact, but obviously it is so much more effective when performed before the fact. Taken from the [National Construction Safety Team](#).

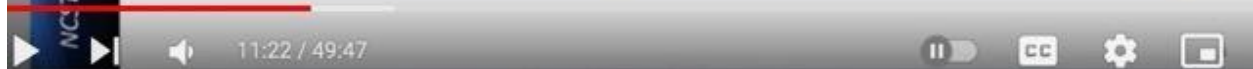


Failure Hypotheses

A *failure hypothesis* is an investigative supposition about where and how the failure occurred with likely contributing causes.

- Examination of failure hypotheses is a constant investigative activity
- Includes both initiation and progression of the failure
- Must find a single valid hypothesis and disprove the others
- Multiple potential causes and contributors
- Currently numerous active hypotheses
- We have ruled out nothing at this time

NCT Advisory Committee Meeting, June 8-9, 2022

A video player interface showing a progress bar at the bottom. The progress bar is a thin red line on a grey background, with a white playhead marker. To the right of the progress bar are icons for play/pause, volume, closed captions (CC), settings (gear), and full screen.

Tracy Farwell

#331941 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

TO: Portland City Council SUBJECT: Readopted remanded Ordinance No. 189807 to restrict bulk fossil fuel terminals (Ordinance; Amend Title 33, Planning and Zoning Reference: General Findings 20. "The Fossil Fuel Terminal Zoning ("FFTZ") amendments are a regulatory approach to limit the size of new fossil fuel terminals and prohibit the expansion of fossil fuel storage tank capacity at existing fossil fuel terminals, with limited exceptions, which will be an improvement compared to the current regulations that allow for unlimited growth in fossil fuel terminals. A recent report commissioned by the Oregon Military Department disclosed the likely liquefaction outcomes of the predicted Cascade Subduction Zone event based on state of the art seismic modeling conducted by Portland State Civil Engineering researchers. Better Energy LLC is offering two amendments for council consideration after a brief risk management assessment. We do not invoice for our work. The goal of this submittal is to provide justification for revised operational constraints that serve the interests of public safety that so far have not been anticipated by CEI Hub operators. Our fully referenced submittal to the Council can be accessed here:

<https://better-energy-llc.com/wp-content/uploads/2022/06/PDX-Commissioners-Amendment-June-2022.pdf>

This submittal is consistent with the need to respond to a declared emergency on time, while questioning widely-held assumptions after accessing new data.

Testimony is presented without formatting.

John Wood

#331942 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

No no no no no more carbon combustion infrastructure allowed in Oregon none. You have enough data and information to conclude that this is a bad move to make, so make the responsible move and deny this new expansion. Don't take any more "reasons" or money from the proponents.

Testimony is presented without formatting.

Hazel Sanger

#331943 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

We can't afford to have any more fossil fuel infrastructure in Portland! Instead of shutting things down and minimizing our impact on climate, I'm seeing the city do the opposite. Things like the I-5 freeway expansion is a death sentence for us young folk. And biofuels are not a solution! Council must set a policy agenda toward 100% electrification! Biofuel expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well. Council should avoid this possibility by moving toward full, citywide electrification—not more combustion. And besides, looking at the science, biofuels are not a substantially better solution, and like deforestation and logging, emitting CO₂, not sequestering it. Zenith must be shut down. If and when we have the big earthquake, the oil that will be spilled and the explosion that will happen will kill. People will die. Animals will die. Salmon, Orca, otters, animals that are already at risk will die. And ecosystems will collapse. Biofuel or not, the result will be the same. BOOM. The City Council should hold the line, and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds from reckless expansion. Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements to prevent more fossil fuel storage being created under the guise of renewables. Shut down Zenith. Do all that you can. Do not expand the freeway. We need a livable future, and City Council has a choice. Let us live, or condemn us to death. Do the right thing.

Testimony is presented without formatting.

Emily Herbert

#331944 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Thank you Portland Councilors for considering the strengthening of NO MORE Fossil Fuel Infrastructure in Pdx or readopt the remanded ordinance that restricts bulk fossil fuel terminals. We must move with all possible speed to electrification and the elimination of fossil fuels in our region. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. Thank you for your consideration and strengthening of the public will to halt the development of bulk terminals in our city.

Testimony is presented without formatting.

Gerritt and Elizabeth Baker-Smith

#331945 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

We are joining the Columbia Riverkeeper and allies in helping to push back against the fossil fuel industry's attempts to weaken the Fossil Fuel Terminal Zoning amendments. These amendments are a necessary first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses a catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments help protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. The Portland City Council should not weaken the amendments in exchange for industry promises, or allow any expansion of fossil fuel storage. Fossil fuel terminal owners should retrofit their facilities to better withstand earthquake risk, but not in exchange for being allowed to further increase the risks to our communities and watersheds from reckless fossil fuel infrastructure expansion. The Portland City Council should strengthen the rule, closing potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. Renewable, or biofuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well PLEASE do not give in to the fossil fuel industry's attempts to weaken the Fossil Fuel Terminal Zoning amendments.

Testimony is presented without formatting.

Jean Toles

#331946 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

The time for fossil fuel and all the harm it causes has come and gone.

Testimony is presented without formatting.

Veronica Poklemba

#331947 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables.

Testimony is presented without formatting.

Darian Todd

#331948 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I fully support the provisions of the FFTZA and appreciate the climate conscious actions of my elected leaders to help defend and preserve the health and well-being of our communities. Reducing our carbon footprint and telling big oil and other large corporate industries that the safety of our planet and sustainability of our actions matter. Corporate interests and quick-reward capitalist greed have no place in the values of our region and electorate.

Testimony is presented without formatting.

annie capestany

#331949 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

As a member of a Neighborhood Emergency Team, I am especially aware of the dangers in the CEI hub, dangers that won't be limited to that area if an earthquake strikes. Portland should be transitioning towards the quick elimination of fossil fuels, not accommodating the industry. But we are in danger even without an earthquake. At a minimum, the city should not allow any entity to expand storage at the CEI hub, not even renewable fuels, which can still be very carbon intensive and contribute to climate change. In addition, the council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements to prevent more fossil fuel storage being created under the guise of renewables.

Testimony is presented without formatting.

David Kelley

#331950 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

These amendments are a necessary, first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments are a necessary step to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. Council should hold the line, and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds from reckless expansion. Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. This should be the beginning. Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits, and requiring the phaseout of fossil fuel storage in line with reducing demand. Renewable fuel, or biofuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example,

Testimony is presented without formatting.

Howard Shapiro

#331951 | June 28, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

The City of Portland has been dealing with its' CEI policy, or lack of, for several years. The city and County commissioned a report and analysis by Eco northwest that outlines the problems in detail. It is incumbent on our city government to finally act on a policy that preserves the health and welfare of their constituency and not the fossil fuel polluters in the CEI. Please pay attention to the proven scientific facts in the study and not the fear of litigation! The possible safety, health and fortunes of Portlanders are in your hands. Make the right decision for them! The time for kicking the can down the road and pacifying conversation is long past.

Testimony is presented without formatting.

Jean M. Avery

#331952 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Thank you for the Portland Fossil Fuel Terminal Zoning Amendments (FFTZA): protecting communities from facilities like oil train terminals. We defeated a massive oil terminal in Vancouver. Let's stay strong and united against fossil fuel expansion.

Testimony is presented without formatting.

Robert Kugler

#331953 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I am pleased to see that the PCC is moving to approve the Fossil Fuel Terminal Zoning Amendments to limit the construction of new bulk fossil fuel infrastructure. This is an important step toward decarbonizing the regional economy. I encourage the council to pass the amendments and shape the city ordinance accordingly. With this move Portland will lead again in the region as we face the climate challenge head-on.

Testimony is presented without formatting.

Patrick O'Herron

#331954 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Dear Council Members, Please uphold and strengthen the City of Portland's Fossil Fuel Terminal Zoning Amendments. I am a physician and so the first thing I think of is public health impacts. The most dramatic example is the absolute disaster that Fossil Fuel Terminals will be in a Cascadia Subduction zone earth quake. Also when a company like Zenith is transporting crude oil that means oil trains and we have seen how dangerous that can be in the explosion in Mosier. Less dramatically, but no less importantly the everyday operation of Fossil Fuel Terminal is a public health disaster. This is due to both local air pollution associated with Fossil Fuel storage as well the fact that we have a climate crisis and need to be moving decisively and rapidly towards a low carbon future, not remaining entrenched in an oil soaked economy that locks us into unsustainable carbon emission and runaway planetary warming. Please take this opportunity to strengthen the law including making strong enforcement mechanisms, requiring disclosure of what is being stored, and requiring seismic retrofits. Rather than doubling down on fossil fuels we should be phasing out fossil fuel storage as we make the necessary move towards the near complete electrification of society that is already well underway.

Testimony is presented without formatting.

Diana Rempe

#331955 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I am a resident of North Portland and a community psychologist. As I walk through my neighborhood I can see the storage tanks of the critical fuel hub and hear the trains moving across the tracks. When they explode after the Cascade subduction zone earthquake, I and many of my neighbors will likely be killed. If we do survive the liquefaction and explosions, the health of the rivers and streams will be irrevocably compromised. And this devastation will simply occur more slowly if we do not take meaningful and immediate action to mitigate climate change. I am writing to urge you to uphold and strengthen zoning requirements on bulk fuel terminals. As you do this, it is imperative that you make these amendments even stronger, as companies will exploit any available loopholes. Now is the time to describe strong means of meaningful enforcement as well as safety mechanisms to ensure that as we are phasing out storage and moving toward 100% electrification, our communities are as protected as possible. This includes knowing exactly what is being stored in the tanks and that the tanks are as safe as possible, having been seismically retrofit. These actions alone will not solve the myriad challenges we face as a community, but they will profoundly help. And they will continue to be an example for other communities, across Oregon and Washington. Thank you, Diana Rempe PhD North Portland

Testimony is presented without formatting.

Mark Darienzo

#331956 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

These amendments are a necessary, first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. These amendments are a necessary step to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. Council should hold the line, and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds from reckless expansion. Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits, and requiring the phaseout of fossil fuel storage in line with reducing demand. Council must set a policy agenda toward 100% electrification. Renewable, or bio-fuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well. Council should avoid this possibility by moving toward full, citywide electrification—not more combustion.

Testimony is presented without formatting.

David Parker

#331957 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I encourage the City to pass the Fossil Fuel Terminal Zoning Amendments without loopholes to limit the catastrophic effects of the overdue cascadia earthquake on our city and it's residents, and as a small but important step to implement our goal of moving away from fossil fuels to do our share to mitigate the pending climate catastrophe. This is simple common sense, but will require dedicated work by the City to oppose those making money from continued use of fossil fuels.

Testimony is presented without formatting.

Gary Christensen

#331958 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

To whom it may concern: I am the founder and director of Christensen, Inc. a regional fuel and lubricants distributor with offices in Portland, Seattle and Eastern Washington. I am writing this letter in regards to the proposed fossil fuel ordinance proposing a storage capacity expansion ban of the terminals located in Portland which I ask you to oppose for the following reasons. 1. With the population growth in the region and the increasing demand for renewable fuels including bio diesel that require separate tanks and additional storage there is an ever increasing demand for terminal storage. 2. The demand for fuel that comes from Portland to Eastern Washington and Idaho is also increasing at a steady rate for several reasons. The % population increase in the Tri Cities area has been the strongest in the state of Washington for several years and the State of Idaho has led the U.S. in population growth the last several years. 3. The Tri Cities and Hermiston area of Eastern Washington and Oregon are conveniently located for regional distribution centers which also increases the demand for fuel. From these locations it is easy to supply goods to all of the major cities in the Northwest including Portland and Idaho. Some of these distribution centers are Wal Mart in Hermiston and Grandview, Auto Zone in the Tri Cities and Amazon just built their largest warehouse in the state of Washington in Pasco. 4. Although there are other sources of fuel supply for Eastern Washington, Eastern Oregon and Idaho there are challenges and disruptions with each source of supply. 5. Fuel from Portland is transported to Eastern Oregon, Eastern Washington and Lewiston, Idaho by truck and also barged up the Columbia River. Each spring the Columbia river is shut down for 3-4 weeks while maintenance is performed on the dams which require additional fuel storage in Portland as well as upper river terminals. 6. As population increases demand also goes up requiring additional fuel storage. If adequate fuel is not available from Portland then higher priced options have to be used which increase the cost to the consumer. It is also counter productive in fuel conservation if trucks have to transport fuel from inconvenient locations to satisfy the growing needs of the consumer. I ask that you oppose the proposed storage capacity ban of the terminals in Portland. Thank you, Gary Christensen Founder/Director Christensen, Inc.

Testimony is presented without formatting.



ASSOCIATED TAXPAYERS OF IDAHO

FACT FINDERS

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Mark Wynn

Lamb Weston, Eagle

June 29th, 2022

Mayor Wheeler and Portland City Council
City Hall
1221 SW 4th Avenue
Portland, Oregon 97204

Re: Portland Fossil Fuel Terminal Ordinance Will Hurt Idaho Taxpayers

Dear Mayor Wheeler and City Council Members:

For the greater part of the last century, the Associated Taxpayers of Idaho has proudly defended the interests of Idaho's taxpayers. We are an independent, nonpartisan, not-for-profit organization encouraging effective and responsible government through research and public education. Today we are writing to express our concern with the Portland Fossil Fuel Terminal Ordinance.

In just the last few years, Idaho has experienced unprecedented growth. In fact, our state has been the fastest growing of all states over the last five years. In order to sustain the economic activity that comes with such growth, we need the proper infrastructure, particularly fuel supply. Right now, 100 percent of our fuels come from out of state, making our business and economy reliant on the states with jurisdictions like yours that control the flow of these critical resources. In addition to supporting our growth, our state is also looking to increase our emergency fuel capacity. We are all too familiar with the economic crisis that has played out on the global stage in the aftermath of the Ukraine conflict. We should not be proactively limiting our domestic energy supply when we don't need to – especially when such plans would have a domino effect that stretches across state borders. We implore you not to just think about Portland business and infrastructure, think about ours.

Like in every state across the country, Idaho businesses are already on shaking ground, doing what they can to ride the waves of inflation and increasing energy costs. Fuel prices are a significant cost of business for many popular Idaho industries including agriculture, construction, manufacturing and mining. Creating more uncertainties for these businesses, creates uncertainties that will impact our communities, families and future.

On behalf of the Associated Taxpayers of Idaho, I ask you to reconsider the proposed Fossil Fuel Terminal Ordinance.

Sincerely,

Miguel Legarreta
President, Associated Taxpayers of Idaho

Miquel Legarreta

#331959 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

See attached

Testimony is presented without formatting.

Linda Wysong

#331960 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Dear Council Members, I am writing in support of readopting the remanded Ordinance No 189807 to restrict bulk fossil fuel terminals. With the forecast of a 9.0 magnitude earthquake in our near future, this is clearly a matter of life and safety for all Portlanders. A fuel spill or a fire on the Willamette River would be a catastrophe for all. Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Council must set a policy agenda toward 100% electrification. Renewable, or bio-fuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well. Council should avoid this possibility by moving toward full, citywide electrification—not more combustion. As a resident of the Kenton Neighborhood in North Portland, I am also concerned by the impacted of the transportation of fuel to the storage tanks by rail – expanding the danger and potential harm. Council should hold the line, and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Sincerely, Linda Wysong

Testimony is presented without formatting.

Laura Feldman

#331961 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I live in the Portsmouth neighborhood, in the "blast zone." Thanks to Portland activists' efforts and the County's willingness to really look at the CEI Hub, and DOGAMI's study of the seismic risks of the area the CEI hub is located in, we know that infrastructure like bulk fossil fuel terminals (FFTZ) cannot be located in this highly populated area. I think even the city knows this now. I urge the city to readopt the remanded ordinance that restricts bulk fossil fuel terminals (FFTZ). Sincerely, Laura Feldman 8515 N. Foss Ave. #C Portland, OR 97203

Testimony is presented without formatting.

Dana Weintraub

#331962 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

These amendments are a necessary, first step toward averting catastrophic impacts from the anticipated magnitude 9.0 earthquake. As the recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments are a necessary step to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. Council should hold the line, and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds from reckless expansion. Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. This should just be the beginning. Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits, and requiring the phaseout of fossil fuel storage in line with reducing demand.

Testimony is presented without formatting.

Sarah Farahat

#331963 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I support these amendments. We need to protect our river and our most vulnerable more than human kin. I believe that the City Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. This should be the beginning. Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits, and requiring the phaseout of fossil fuel storage in line with reducing demand. I also hope that these amendments will help to mitigate the risks posed by the inevitable earthquake.

Testimony is presented without formatting.

Jennifer Saunders

#331964 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Re-adoption of the remanded ordinance to restrict the use of bulk fossil fuel terminals along the North Reach of the Willamette River is the obvious right thing to do. These proposed amendments do not do enough to protect Portlanders or the environment but at least they make changes in the right direction. The existence of any size storage tanks containing flammable and explosive liquids on earthquake vulnerable land next to a major river, valuable forest land and people's homes is insanely reckless and our city council should do EVERYTHING it can to reverse that situation. Please enact these proposed zoning code changes immediately.

Testimony is presented without formatting.

Raymond Hogan

#331965 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Pumping, transporting, storing, and burning fossil fuels has caused and is accelerating catastrophic climate change. It is long past time to stop building the infrastructure that facilitates this catastrophe. We are in a climate emergency; the oil, gas, and coal is wrecking our lives. Stop this madness.

Testimony is presented without formatting.



Impacts of Fuel Releases from the CEI Hub Due to a Cascadia Subduction Zone Earthquake

EXECUTIVE SUMMARY

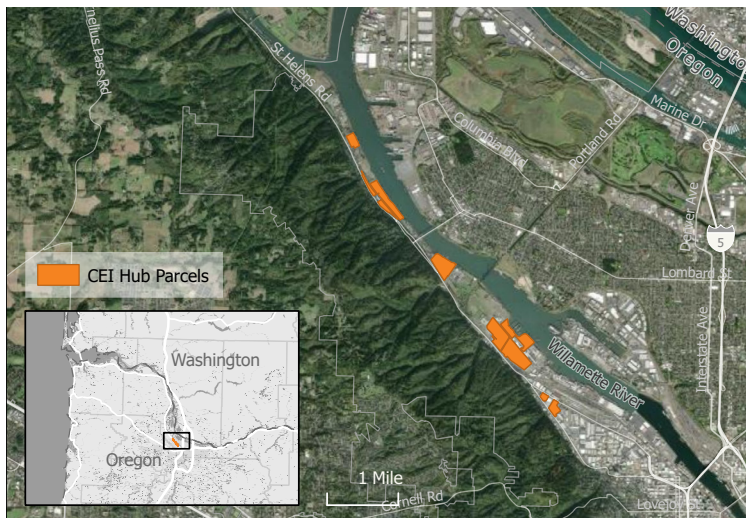
The purpose of this study is to identify the magnitude and extent of potential fossil fuel releases at the CEI Hub from a CSZ earthquake and to evaluate the resulting damages. ECONorthwest, Salus Resilience, and Enduring Econometrics prepared this report for the City of Portland and Multnomah County. For more information about this report, contact: Laura Marshall, Project Manager at marshall@econw.com.

WHAT IS THE CEI HUB?

The Critical Energy Infrastructure Hub (CEI Hub) is a six-mile area in Northwest Portland along the Willamette River (Figure ES-1). There are 10 companies on 31 properties located at the CEI Hub that vary in size from 0.1 to 31.27 acres for a total of 219.85 acres. The CEI Hub facilities are critical to Oregon’s fossil fuel infrastructure – over 90 percent of the state’s liquid fuel supply is transported through CEI Hub facilities, including gasoline and diesel. The CEI Hub supplies all the jet fuel to Portland International Airport. There are over **150 different types of materials** stored at the CEI Hub, most of which are petroleum-based. There are **630 tanks** of varying sizes throughout the CEI Hub holding a combined active storage tank capacity of at least **350.6 million gallons**.



FIGURE ES-1. Location of CEI Hub Properties



Source: Created by ECONorthwest.

WHAT IS THE RISK?

The CEI hub is located on unstable soils that are subject to liquefaction and lateral spreading in an earthquake, and the tanks are vulnerable to seismic activity because many were built prior to modern knowledge about earthquake risk. The proximity of the CEI hub to natural assets, like the Willamette River and Columbia River, and the dense urban core in the City of Portland, make the risk of accident, spill, or major failures due to a seismic event particularly concerning.

A magnitude 8 or 9 Cascadia Subduction Zone (CSZ) earthquake would impact the CEI Hub with ground shaking, liquefaction (soil softening and movement), lateral spread (horizontal soil movement), and landslides. The earthquake would disturb tanks and their contents and tanks that were not built to modern seismic design standards pose risk of failure. Additional fuel releases could occur due to connection failures and other incidental damages. There are containment walls in place on many CEI Hub properties,

however, in many cases, these containment structures will be insufficient to contain the potential cumulative volume of releases from multiple tank failures that would occur in a CSZ earthquake.

In total, 397 tanks could release stored materials as a result of the CSZ earthquake.¹ **The total potential releases from the materials stored in tanks at the CEI Hub range from 94.6 million to 193.7 million gallons** (Table ES-1). Approximately 57 percent of the total potential releases would be released onto ground and 43 percent have the potential to flow into the Willamette River. The estimates of fuel releases from the CEI Hub are the same magnitude as what was released in the Deepwater Horizon spill of 2010 — the largest oil spill in U.S. waters to date.

WHAT WILL HAPPEN IF FUELS ARE RELEASED?

Releases of fuel from the CEI Hub into the air, ground, and water would pose threats to the resources near, downstream, and downwind of the facilities. The fuel releases are likely to cause explosions and fires which pose immediate threats to people on-site at CEI Hub facilities and on adjacent properties. A petrochemical fire poses significant risk to the surrounding areas because containment and suppression may not be possible in the aftermath of the earthquake. If the fire spreads to other properties there are very large threats to human life, safety, physical structures, and natural resources. The fumes from fires and chemical materials will also create health hazards for those who are exposed. People who are in the immediate area as well as emergency responders and clean-up personnel are most at risk from high exposure levels.

The fuel that is released into the Willamette River will behave differently depending on the type of material released. Light and medium oils, such as gasoline and diesel, float in water and will travel downstream until they are contained or evaporate. Heavier fuels will sink and travel as sediment in the river. The further the fuels travel in water, the more environmental resources they will degrade, and more properties will be impacted by oiling. The Lower Willamette River and Lower Columbia River provide habitat to an abundance of species that could be affected by fuel releases. The rivers are also transportation channels, and fuel releases would cause closures for clean-up, which would result



“The total potential releases from the materials stored in tanks at the CEI Hub range from 94.6 million to 193.7 million gallons.”

in economic losses for the navigation industry as well as cut off supply chains from the river when they are critically needed after the earthquake. Harms to natural resources would also result in a loss of cultural resources that are of particular importance to Tribal populations for subsistence, transportation, commerce, and ceremonial purposes.

WHAT WILL BE THE DAMAGES AND COSTS OF FUEL RELEASES?

The minimum costs to society of potential fuel releases at the CEI Hub range from **\$359 million to \$2.6 billion** (Table ES-2). Because not all costs were monetized, this range of costs represents only a portion of the total costs likely to be imposed on society from fuel releases from the CEI Hub.

These costs do not include any costs caused by an inability to perform earthquake recovery efforts due to fuel shortages. To the extent that fuel scarcity impedes emergency response activities, there will be financial and non-financial costs, including injury

TABLE ES-1. Summary of Total Potential Releases by Location

Spill Location	Number of Tanks with 50–100 percent failure	Number of Tanks with up to 10 percent failure	Volume Released Min (gal)	Volume Released Max (gal)
Ground	269	21	53,882,252	111,183,900
Water (Including potentially in water)	96	11	40,751,753	82,503,352
Total	365	32	94,634,005	193,687,251

Source: Created by Salus Resilience (see Appendix B).

¹ This value excludes empty tanks from the active tanks that could release materials.


Category of Costs	Summary of Costs	Range of Monetized Costs for the Modeled Scenario
Direct Impacts to People	Assuming an explosion occurs, between 0 to 7 people could be killed and 2 to 80 people could be injured. The range of costs for mortality and morbidity are between \$49,000 to \$74.1 million, with an average cost of \$37.1 million.	\$49,000 to \$74.1 million
Impacts to Property	Assuming fuels in the water travel downstream to the Longview Bridge, the potential impact on residential property values is up to \$35.4 million. There is \$2.5 billion in total riverfront property value in the downstream area.	\$11.8 million to \$35.4 million
Impacts to Navigation	A one-week closure of the shipping channel between the I-405 bridge and Longview Bridge would result in additional operating costs for commercial vessels of between \$11.8 million and \$17.8 million.	\$11.8 million and \$17.8 million
Impacts to Fisheries	To the extent that fuel releases reduce reproduction or cause direct mortality to aquatic species there will be a reduction in income to the fishing industry, impacting owners, employees, and suppliers who rely on these funds. Increases in hatchery production would likely be needed, which would result in additional costs.	Not Monetized — Potential for significant mortality to commercial fisheries species and loss to commercial fishing entities
Impacts to Recreation	Average per-trip values of recreation for participants (i.e., consumer surplus) are between \$68 to \$130 per person per day. Recreationalists contribute spending to local economies at an average value of between \$98 to \$478 per trip. Canceled recreational trips due to fuel releases would reduce both value for the participant and economic activity for the businesses that rely on the recreational spending. A one-month closure of the Lower Columbia River and Lower Willamette River for salmonid fishing would result in a loss of consumer surplus of \$3.4 million and a loss of \$3.2 million in direct trip spending.	Not Monetized — Damage to recreational resources that cannot be easily rebuilt, such as fire damage to Forest Park, will result in long-term losses to recreation.
Impacts to Human Health	The health costs of exposure to toxins for nearby people and response workers is \$121 million to \$249 million for both acute and chronic conditions. The primary health costs are increased risk of heart attack, decreases in productivity, and lost workdays. Additional costs would be borne from evacuations and strains on emergency response services.	\$121 million to \$249 million — with potential for additional costs to mental health and non-documented physical health costs.
Impacts to Habitats and Species	Habitats and species would be harmed from fuel releases. The costs of habitat restoration as compensation for habitat injury would require between 175 and 418 acres of wetland to be restored. An additional 39 to 1,219 acres of constructed wetland could be needed to compensate for injuries to bird populations. There is also the potential for compensation needed for aquatic and mammal species that are injured by the event. The expected total costs for habitat restoration are between \$39.7 million and \$304.3 million, depending on whether the spill occurs in the summer or in the winter. Total damages from injury to habitats and natural resources and required compensation are expected to range between \$87 million to \$669 million, depending on whether the spill occurs in the summer or in the winter.	\$87 million to \$669 million
Cleanup Costs	Cleanup costs are projected to be between \$109 million to \$1.4 billion.	\$109 million to \$1.4 billion
Impacts to Cultural Values	Fuel releases in the Willamette River and Columbia River would harm cultural resources that are of particular importance to Tribal populations for subsistence, transportation, commerce, and ceremonial purposes. Impacts to this area would perpetuate historical inequities to a water resource already contaminated as part of the Portland Harbor Superfund.	Not Monetized — Impacts to waterways and aquatic species like salmon would result in large cultural losses.
Impacts to Fuel Prices	Releases of fuel from the CEI Hub would reduce the supply of fuels needed for transportation and commercial activity in Oregon. The effects of the earthquake on transportation infrastructure will alter the demand for fuels. A lack of fuel could constrain emergency response activities. The total economic cost to consumers of the higher fuel prices and reduction is between \$18.8 million and \$120.8 million. The lost value of consumption from fuel scarcity would be \$11.7 million for a three-day period.	\$18.8 million to \$120.8 million — with additional costs from loss of consumption and delays in recovery efforts
Total Monetized Costs		\$359 million to \$2.6 billion

Source: Created by ECONorthwest.

and loss of life. The costs to society also do not include fines, penalties, lost revenue, or equipment replacement costs borne by the CEI Hub operators. Not all costs are able to be monetized due to lack of data, uncertainty, confounding variables caused by the earthquake, and/or difficulty valuing the resource. The costs are based upon a multitude of assumptions and scenarios about the type and magnitude of fuel releases, emergency response actions and timelines, and natural phenomenon like air, water, and fire dispersion — these assumptions are detailed in the full report.

WHO WILL BE LIABLE AND HOW WILL COSTS BE PAID FOR?

The Oil Pollution Act of 1990 (OPA), passed by Congress and signed into law in the wake of the Exxon Valdez oil spill, is the established liability structure to recover damages from oil spills. Under OPA, “Responsible Parties” are liable for removal costs and damages that are attributable to their release of oil. Fuel releases from the CEI Hub could exceed the statutory liability limits established under OPA or deemed an “Act of God” (making the responsible party not liable). For these situations, OPA established the Oil Spill Liability Trust Fund to pay for any excessive or unfunded liabilities.

“Under OPA, onshore facilities like the CEI Hub have liability limits of \$672,514,900 PER SPILL for each responsible party.”



All damages and costs of fuel releases from the CEI Hub report are potentially recoverable under OPA, with the exception of personal injury/wrongful death, which would be potentially recoverable under separate civil action. However, what will actually be paid out to people who are harmed by fuel releases could be less than the full amount that would be required to compensate them for the damage due to transaction costs and inefficiencies. Uncompensated damages may be distributed inequitably across injured parties due to existing structural inequities in the legal system. Uncompensated damages are most likely to occur for claimants with damages that are more difficult to prove.

Impacts of Fuel Releases from the CEI Hub

due to a Cascadia Subduction Zone Earthquake

FEBRUARY 2022

PREPARED FOR



PREPARED BY



For over 40 years, ECONorthwest has helped clients make sound decisions based on rigorous economic, planning, and financial analysis. ECONorthwest works with public and private sector clients around the country answering questions through the lens of applied microeconomics. For more information about ECONorthwest, visit: www.econw.com.



Enduring Econometrics

Heather Carver

#331966 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I am a member of the Neighborhood Emergency Team, so I have learned a lot about possible impacts of the Cascadia Subduction Zone earthquake. Of course, we have no idea when that will happen, so we need to be prepared at all times. As the recent report from Multnomah County and the City of Portland makes clear, the Critical Energy Infrastructure Hub, located on liquefiable soil, presents threats of catastrophic risk of spills, explosions, and toxic fumes in the event of earthquake. These amendments are a necessary step to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. In addition, the recent IPCC report says substantial reduction in fossil fuel use is necessary in order to have a livable future. Therefore, Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits, and requiring the phaseout of fossil fuel storage in line with reducing demand.

Testimony is presented without formatting.

RICHARD LARSON

#331967 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

PLEASE PASS THIS ORDINANCE, AND ESTABLISH ADDITIONAL FUTURE PROVISIONS
RESTRICTING THE STORAGE AND PRODUCTION OF ALL FOSSIL FUELS IN PORTLAND.

Testimony is presented without formatting.

Rachel Gilmore

#331968 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I urge City Council to re-adopt the remanded ordinance that restricts bulk fossil fuel terminals. This is an absolutely imperative step towards our clean energy future. I applaud the actions taken this far on restricting FFTZ. Please finalize the restrictions with this ordinance and continue to take bold action to reduce greenhouse gas emissions in all sectors. Our children are depending on you. Thank you for the opportunity to submit testimony.

Testimony is presented without formatting.

Frann Michel

#331969 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I appreciate the opportunity to comment on the Portland Fossil Fuel Terminal Zoning Amendments. As a Portland city resident and homeowner, I consider these amendments an important move in the right direction--toward greater safety for the region. However, I call on the Council to go further to strengthen the amendments, to clarify potential loopholes, and to establish enforcement and safety mechanisms for renewable fuel storage. The Council should mandate seismic retrofits for all facilities in the hub and should require the phaseout of fossil fuel storage as we move toward 100% electrification. Terminal owners should be required to provide an emergency plan and a fund to cover the possible \$2.6 billion in damages in the event of a seismic event. Terminal owners should be required to state how they use their storage tanks and should not be able to free up space for more fossil fuels. Any renewable fuel storage development must come with mandatory reporting requirements so that more fossil fuel storage is not created under the guise of renewables. Renewable, or bio-fuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well. Council should avoid this possibility by moving toward full, citywide electrification—not more combustion. Please do not weaken the amendments in exchange for any industry promises, nor make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds. Thank you for your work to make Portland safer.

Testimony is presented without formatting.

Kathleen Boylan

#331970 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

These amendments are a necessary first step toward averting the catastrophic risk of spills, explosions, and toxic fumes from the forecasted magnitude 9.0 earthquake to our rivers and communities in Portland and Sauvie Island.

Testimony is presented without formatting.

Susi Hulbert

#331971 | June 29, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Perhaps you all need to do some research into all the rail accidents across the USA. The devastation for any and all near these areas have suffered lots from pollution , fires , loss of life, water. electricity interruptions and causing problems from that. Stop and think. We are closing down on fossil fuels , should have been by now. So why would you want to risk problems and cost for something that isn't needed. We all need to think of the future, not make more problems for the future. Susi Hulbert, Longview, Washington

Testimony is presented without formatting.

Ben Stickney

#331972 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Hello, My name is Ben Stickney. As a life-long resident of NW and now N Portland, my childhood home was across the street from the NW industrial area. Having lived with the effects of the extreme pollution at my house, and suffering from asthma as a child, I understand the current and future health risks posed by the continued operations of heavy industry at the CEI and throughout N and NW Portland. After reading the Council's findings on the Fossil Fuel Terminal Zoning Amendments I am pleased to know that the City is pursuing policy in line with its stated climate goals and out of concern for industrial fallout in the event of a catastrophic earthquake. Permanently stopping industrial expansion in the City and closing legal loopholes like those that have allowed Zenith, for example, to operate is a good first step. However, I am deeply concerned that the City lacks the policy tools and imagination to move past limit setting and to the implementation of a green energy transition for the CEI. Large scale fossil fuel operations at the CEI present a clear and immediate danger to the residents, a fact that City Council appears to understand. It also appears that the City Council recognizes the responsibility of local government to meet the necessary and ambitious climate goals established in past ordinances to avoid a complete ecological collapse in the coming decades. I ask that the City act by immediately engaging the State and Metro governments in creating policy to require seismic retrofits to existing infrastructure and, ultimately, a rapid phase out fossil fuel operations at the CEI. Thank you for your time.

Testimony is presented without formatting.

Landon Goldberg

#331973 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I strongly urge the city council to pass the FFTA amendments. The existing fossil fuel storage so close to the river is a huge risk of massive contamination, especially with the threat of earthquakes. We absolutely should not put more time bombs onto our river. Fossil fuels themselves are a threat to everyone's future, and should be minimized, not expanded. These amendments are the bare minimum of showing respect for this city.

Testimony is presented without formatting.

Cheryl Trosper

#331974 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

"Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables."

Testimony is presented without formatting.

Margaret Hawthorne

#331975 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I want a livable future for myself and my child. We must divest from fossil fuels and transition to renewables. These amendments are important public policy, in line with Portland's Climate Emergency Declaration, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. The City Council should hold the line, and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Thank you! Maggie

Testimony is presented without formatting.

Ann Turner

#331976 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Mayor Wheeler and City Commissioners, As a physician and member of Oregon Physicians for Social Responsibility's Healthy Climate Action Team, I strongly urge you to pass the Portland Fossil Fuel Terminal Zoning Amendments (FFTZA), banning new or expanded bulk fossil fuel infrastructure in Portland. Time is of the essence in mitigating the devastating impacts of climate change. Enacting these amendments follows the goals of Portland's Climate Emergency and Governor Brown's Executive order on the climate crisis. Climate change is the single greatest threat to public health. The amendments must not be weakened in response to requests by fossil fuel companies, but rather strengthened to assure accountability for what is being stored. Renewable fuel or biofuel must replace fossil fuels currently being stored rather than being added to them. At best, these fuels should only be an interim solution. We must electrify everything in order to meet our goals for lowering greenhouse gas emissions. Continuing to burn fossil fuels of any kind only adds to the problem. This policy is an excellent first step in moving us toward a health future for our community and our planet. Thank you for allowing me to comment. Ann Turner, MD

Testimony is presented without formatting.

Diana Meisenhelter

#331977 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Given the well-documented risks of spills, explosions, and toxic fumes from a seismic event, the Terminal Zoning amendment ban on expanding fossil fuel storage is a critical first step for ecosystem and community public health protections in line with state and local climate emergency goals. The City should in no way weaken limitations on fossil fuels or make allowances, and should move towards strengthening the amendments to limit renewable fuel storage as well. The City needs to increase enforcement, safety, and mandatory reporting policies so that fossil fuel storage cannot be hidden under the guise of renewables and the City must develop a full policy dealing with the complexity of renewable fuel products. Renewable fuels would still be of great risk to ecosystems and communities in the case of seismic events and the green washing about them being a low carbon alternative is at best problematic and often just plainly false. It is an incredibly complex issue that depends on so many variables--the feedstocks and carbon intensity of what goes into their production, the many limitations of the attributional or consequential modeling choices as well as the deficiencies of the GREET and GTAP models compared to GCAM models as local expert Richard Plevin has pointed out. There is no blanket guarantee that the carbon intensity is less than fossil fuels, much less at the outrageous rates claimed given the many subjective choices within the analyses as well as challenges in terms of reliable, current data and how indirect land use changes are considered or calculated. The belief that biofuels are more sustainable is at the least clouded in uncertainty and more likely in the majority of circumstances a falsehood except in some very limited, localized direct capture scenarios. Oregon adopted faulty California standards after heavy industry lobbying (corn ethanol in particular) and we do not want to encourage amplification of that mistake. We would encourage City to sit down with Plevin and other experts to fully understand the science before further development of renewable fuel policies. In terms of climate mitigation strategies, the City must push for 100% electrification except perhaps in some very localized emissions capture situations that generally will not require large storage of biofuels, especially in ecosystem sensitive areas. Furthermore, the City needs to be focusing on an overall transition strategy for the CEI Hub including the phase out of fossil fuel storage and decreasing demand. Climate scientists clearly state that to avoid the unthinkable, emissions need to begin a substantial downward trajectory by 2025 and be halved by 2030 so this must be the overarching goal of any City policy.

Testimony is presented without formatting.



June 27, 2022

Portland City Council
1221 SW Fourth Ave., Room 130 Portland, OR 97204

RE: Fuel Terminal Zoning Amendments on Remand

Honorable Mayor Wheeler and members of the City Council:

We are writing on behalf of the thousands of worker and employer members of the Columbia Pacific Building Trades Council, Portland Business Alliance, Working Waterfront Coalition and Oregon Business & Industry. Our organizations represent a broad diversity of businesses and organized labor in our city, region, and throughout the state of Oregon.

Our organizations are committed to working with the City of Portland and all stakeholders to develop real solutions to speed up our community's transition to cleaner fuels, and reduce emissions while ensuring we can meet the energy needs of our city and state today and in the future.

We write to express our concern with the city's decision to once again propose a flawed ordinance targeting fuel facilities. The proposal before you is a virtual carbon copy of the 2016 and 2019 ordinances, which the Land Use Board of Appeals (LUBA) declared legally defective on seven counts in 2017 and five counts in 2020.

We are aware that the new proposal contains additional "findings" purportedly to address the legal deficiencies of the 2019 proposal, but the official impact statement makes it clear that no substantive changes have been made.

Since the court's decision in 2020, the first substantive attempt to reach out to the organizations who have successfully challenged the both the 2016 & 2019 ordinance occurred on May 20, 2022. At this meeting, city staff expressed a desire for our organizations to provide possible amendment language that could avoid a third round of litigation. In response to this request, we authorized our attorney to provide redlines to the amendment that, if adopted, would address the ongoing deficiencies in these ordinances. These proposed amendments were provided to city staff, who declined to include them in the ordinance brought before you today.

This decision to bring back an ordinance that has already been rejected by LUBA and Oregon Court of Appeals multiple times, and the failure again to collaborate with the impacted

stakeholders, calls into question the stated rationale and goals of this ordinance. Not only could the current proposal result in another costly legal battle, if implemented, it would hurt the local economy and, in several ways, hinder the city's climate and safety goals.

We respectfully ask the mayor and council to reject the current redo of a legally deficient ordinance, and work with all stakeholders to develop a fact-based proposal that is legal and will support the city's climate action goals. A collaborative approach driven by facts, rather than ideological politics, would support vital infrastructure improvement projects that increase worker safety; reduce greenhouse gas emissions; and mitigate risks posed by earthquakes.

The current proposal plainly violates the City's climate policy on fossil fuel infrastructure in City Resolution No. 37168. Resolution No. 37168 specifies that the City's policy is to exempt needed fossil fuel infrastructure that:

1. Improves safety;
2. Provides service directly to end users;
3. Develops emergency backup capacity;
4. Enables recovery or reprocessing of petroleum products, or
5. Accelerates the transition to lower emission sources.

The proposed ordinance fails to provide exceptions for fossil fuel infrastructure projects that improve safety, develop emergency backup capacity, or accelerates the transition to lower emission fuel sources. The City and State of Oregon have separate plans developing to encourage seismic safety at the terminals, facilitate emergency backup capacity, and transition to lower carbon fuels. The draft ordinance contradicts these efforts and Resolution No. 37168.

In the spirit of collaboration and solution oriented advocacy we have provided the council a redlined version of the ordinance that, if adopted, could avoid further litigation and would actually allow the ordinance to go into effect. After seven years of wasted time and resources, we continue to be perplexed as to why the city refuses to seriously address the legal deficiencies identified by the courts.

We understand the political pressure on public and private sector leaders to take more urgent action to address the growing impacts of climate change. We call on the council to reject this ordinance, which is identical to what was successfully contested by business, industry and the trades in 2016 and 2019, and work with us to identify real solutions.

Proposed Revisions to Make Fossil Fuel Terminal Ordinance Consistent with Federal and State Clean Fuel Standards and Functional to Meet Regional Demand

Chapter 33.140: Employment and Industrial Uses

33.140.100 Primary Uses

B. Limited Uses. Uses allowed that are subject to limitations are listed in Table 140-1 with an "L". These uses are allowed if they comply with the limitations listed below and the development standards and other regulations of this Title. In addition, a use or development listed in the 200s series of chapters is also subject to the regulations of those chapters. The paragraphs listed below contain the limitations and correspond with the footnote numbers from Table 140-1.

Table 140-1 Employment and Industrial Zone Primary Uses						
Use Categories	EG1	EG2	EX	IG1	IG2	IH
* **						
Bulk Fossil Fuel Terminal	L [15]	L [15]	N	L [15]	L [15]	L [15]

15. Bulk Fossil Fuel Terminals. This regulation applies to all parts of Table 140-1 that have a [15].

a. Existing Bulk Fossil Fuel Terminals. Bulk Fossil Fuel Terminals that existed on January 13, 2017 are allowed, but the total amount of fossil fuel that can be stored on the site in storage tanks is limited to the fossil fuel storage tank capacity that existed on January 13, 2017, plus 10 percent. Total fossil fuel storage tank capacity on the site in excess of the that capacity that existed on January 13, 2017 is prohibited. Storing coal on the site is prohibited.

b. New Bulk Fossil Fuel Terminals are prohibited.

Chapter 33.910: Definitions

33.910.030 Definitions

The definition of words with specific meaning in the zoning code are as follows:

Fossil Fuel. Fossil fuels are petroleum products (such as crude oil and gasoline), coal, ~~methanol,~~ and gaseous fuels (such as natural gas and propane) that are made from decayed plants and animals that lived millions of years ago and are used as a source of energy. ~~Denatured ethanol and similar fuel additives with less than 5 percent fossil fuel content, biodiesel/renewable diesel with less than 5 percent fossil fuel content, and petroleum-based products used primarily for non-fuel uses (such as asphalt, plastics, lubricants, fertilizer, roofing, and paints) are not fossil fuels.~~ “Renewable fuel” are not included in the definition of fossil fuel:

Renewable Fuel. A fuel that qualifies as one or more of the following:

- *Biodiesel fuel:* a motor vehicle fuel consisting of mono-alkyl esters of long chain fatty acids derived from vegetable oils, animal fats, or other nonpetroleum resources, not including palm oil, designated as B100 and complying with American Society of Testing and Materials (ASTM) D6751.¹
- *Biomethane (Renewable Natural Gas):* refined biogas, or another synthetic stream of methane from renewable resources, that has been upgraded to a near-pure methane content product. Biomethane can be directly injected into natural gas pipelines or combusted in natural gas-fueled vehicles.²
- *Renewable Alcohol Fuels:* alcohol fuels such as denatured ethanol and methanol made from biomass or product other than petroleum or natural gas.
- *Clean hydrogen:* hydrogen that is produced in compliance with the federal standards established under 42 U.S.C. 16166.³
- *E85 motor fuel:* an alternative fuel that is a blend of ethanol and hydrocarbon of which the ethanol portion is nominally 75 to 85 percent denatured fuel ethanol by volume that complies with the most recent version of ASTM D5798.⁴
- *Renewable hydrocarbon diesel or renewable diesel:* a diesel fuel that is produced from non-petroleum renewable resources but is not a monoalkylester and which is registered as

¹ OAR 340-253-0040(16) (Oregon Clean Fuels Program): see similar definitions in RCW 19.112.010(3), incorporated by Tacoma Municipal Code 13.01.060.

² Definition for OAR 340-253-0040(19) (Oregon clean fuel program) and OAR 340-215-0020 (greenhouse gas reporting)

³ 42 U.S.C. § 16152(1).

⁴ RCW 19.112.010(6); Whatcom County Code: [20.97.340.4 Renewable fuel](#), and Tacoma Municipal Code 13.01.060.

a motor vehicle fuel or fuel additive under Title 40, part 79 of the Code of Federal Regulations. This includes the renewable portion of a diesel fuel derived from co-processing biomass with a petroleum feedstock.⁵

- *Renewable gasoline*: a spark ignition engine fuel that substitutes for fossil gasoline and that is produced from renewable resources.⁶
- *Renewable propane*: liquefied petroleum gas (LPG or propane) that is produced from non-petroleum renewable resources.⁷
- *Renewable naphtha*: naphtha that is produced from non-petroleum renewable resources.⁸
- *Sustainable aviation fuel*: fuel derived from renewable resources that meets the requirements of ASTM D756.
- *Similar and future fuels*: similar renewable fuels and fuels required by federal or state programs to reduce carbon and emission intensity.

Chapter 33.920: Description of Use Categories

33.920.300 Bulk Fossil Fuel Terminal

A. Characteristics. Bulk Fossil Fuel Terminals are establishments primarily engaged in the transport and bulk storage of fossil fuels. Terminal activities may also include fuel blending, regional distribution, and wholesaling. The firms rely on access by marine, railroad, or regional pipeline to transport fuels to or from the site, and ~~either have transloading facilities for transferring a shipment between transport modes, or~~ have storage capacity exceeding 2 million gallons for fossil fuels. There is minimal on-site sales activity with the customer present.

B. Accessory uses. Accessory uses may include retail sales of petroleum products, offices, food membership distribution, parking, storage, truck fleet parking and maintenance areas, rail spur or lead lines, and docks.

C. Examples. Examples include crude oil terminals, petroleum products terminals, natural gas terminals, propane terminals, and coal terminals.

D. Exceptions.

⁵ OAR 340-253-0040(96)

⁶ OAR 340-253-0040(98)

⁷ OAR 340-253-0040(99)

⁸ OAR 340-253-0040(100)

1. Truck or marine freight terminals that do not store, transport or distribute fossil fuels are classified as Warehouse And Freight Movement uses.
2. Truck or marine freight terminals that do not ~~have transloading facilities and~~ have storage capacity of 2 million gallons or less are classified as Warehouse And Freight Movement uses. However, multiple fossil fuel facilities, each with 2 million gallons of fossil fuel storage capacity or less but cumulatively having a fossil fuel storage capacity in excess of 2 million gallons, located on separate parcels of land will be classified as a Bulk Fossil Fuel Terminal when ~~two or more of the following factors are present:~~
 - a. The facilities are located or will be located on one or more adjacent parcels of land. Adjacent includes separated by a shared right-of-way; and
 - ~~b. The facilities share or will share operating facilities such as driveways, parking, piping, or storage facilities; or~~
 - c. The facilities are owned or operated by a single parent partnership or corporation.
3. Gasoline stations and other retail sales of fossil fuels are not Bulk Fossil Fuel Terminals.
4. Distributors and wholesalers that receive and deliver fossil fuels exclusively by truck are not Bulk Fossil Fuel Terminals.
5. Industrial, commercial, institutional, and agricultural firms that exclusively store fossil fuel for use as an input are not Bulk Fossil Fuel Terminals.
6. Uses that involve the transfer or storage of solid or liquid wastes are classified as Waste-Related uses.
7. The storage of fossil fuels for exclusive use at an airport, surface passenger terminal, marine, truck or air freight terminal, drydock, ship or barge servicing facility, rail yard, or as part of a fleet vehicle servicing facility are not Bulk Fossil Fuel Terminals.
8. Uses that recover or reprocess used petroleum products are not Bulk Fossil Fuel Terminals.
9. Blending tanks and related infrastructure that mix renewable fuel with fossil fuel to meet a federal or state fuel or emission standard are not Bulk Fossil Fuel Terminals.

33.920.340 Warehouse And Freight Movement

A. Characteristics. Warehouse And Freight Movement firms are involved in the storage, or movement of goods for themselves or other firms. Goods are generally delivered to other firms or the final consumer, except for some will-call pickups. There is little on-site sales activity with the customer present.

B. Accessory uses. Accessory uses may include offices, food membership distribution, truck fleet parking and maintenance areas, rail spur or lead lines, docks, and repackaging of goods.

C. Examples. Examples include separate warehouses used by retail stores such as furniture and appliance stores; household moving and general freight storage; cold storage plants, including frozen food lockers; storage of weapons and ammunition; major wholesale distribution centers; truck, marine, or air freight terminals; bus barns and light rail barns; parcel services; major post offices; grain terminals; and the stockpiling of sand, gravel, or other aggregate materials.

D. Exceptions.

1. Uses that involve the transfer or storage of solid or liquid wastes are classified as Waste-Related uses.

2. Miniwarehouses are classified as Self-Service Storage uses.

3. ~~Establishments that engage in the transfer or storage of fossil fuels, rely on access by marine, railroad or regional pipeline to transport fuels to or from the site, and either have transloading facilities or have storage capacity exceeding 2 million gallons for fossil fuels are classified as~~ Bulk Fossil Fuel Terminals uses.

Original code text from:

https://www.portland.gov/sites/default/files/code/140-ind-zones_0.pdf

<https://www.portland.gov/sites/default/files/code/910-definitions.pdf>

<https://www.portland.gov/sites/default/files/code/920-categories.pdf>

Amy Rathfelder

#331978 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Testimony is attached.

Testimony is presented without formatting.

Jennifer O'Connor

#331979 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

My name is Jennifer O'Connor and I am a citizen of Portland. I'm writing to request that the Portland City Council support the Portland Fossil Fuel Terminal Zoning Amendments as outlined in the proposed ordinance. I'm requesting that Portland City Council members should not only pass the proposed ordinance but go further to protect the citizens of its region by strengthening these amendments by mandating that the fossil fuel terminal owners be required to disclose to the City government how they are using their storage tanks. In addition, the City government should establish a requirement that any renewable fuel storage development must report what will be stored there. Additional fossil fuel storage should not be created under the guise of "renewables" I'm requesting that the Portland City Council pass the set of proposed amendments and continue to do what is necessary to meet the goals outlined in the Climate Declaration Emergency, signed by Mayor Wheeler in July 2020. Climate action is urgent.

Testimony is presented without formatting.



June 29, 2022

Mayor Wheeler and Portland City Council
Portland City Hall
1221 SW 4th Avenue
Portland, Oregon 97204

Subject: City of Portland Fossil Fuel Terminal Ordinance Hurts Idaho Employers by Undermining Their Fuel Supply

Dear Mayor Wheeler and Portland City Council Members:

The Idaho Association of Commerce and Industry represents about 300 Idaho employers of all sizes. We have members in such diverse fields as agriculture and food service, technology, accounting firms and banks, utilities, manufacturing and construction. We also represent chambers of commerce from Idaho's large and small cities and associations representing a wide variety of interests in our quest to shape policy for a bright economic future in the Gem State.

We write today to express concerns about the City of Portland's proposed Fossil Fuel Terminal Ordinance ("FFTO"). As you may be aware, several communities in western and northern Idaho receive fuel from barges and trucks that come from terminals in Portland.

Getting reliable fuel supplies at a reasonable price is a challenge for many of our communities, including those in western and northern Idaho. Fuel prices are a major cost of business, particularly for our agriculture, mining, and construction members in these areas. This is becoming more of a problem for many of our communities because they are growing rapidly and so need more fuel—Idaho is the fastest growing state in the Union.

The FFTO proposal, which would ban new and expanded fossil fuel terminals in Portland, would hurt commerce and industry in Idaho. We have no refineries in Idaho, so we must import all of our refined fuel. There are a limited number of ways to get fuel to some of our isolated communities. Much of our refined fuel comes from the Yellowstone Pipeline and the Northwest Products Pipelines, but these sources are not efficient for serving some of our western and northern communities, which have received fuel from Oregon sources for well over 50 years.

Most of our fuel from Portland terminals comes via barge to intermediary terminals in Pasco, Washington or Westport, Idaho, and is then put on fuel trucks to reach local Idaho communities. The emissions from these barge shipments is less than half of what they would be if shipped entirely by truck.

By prohibiting new and bigger fuel terminals, Portland is taking away the most efficient way to get fuel to several Idaho communities. Idaho's many mountain ranges and intense winter storms makes fuel distribution more difficult here. It is not reasonable for Portland to make sure it gets enough fuel, while blocking growing Idaho communities from the same resource.

Our fuel supply problem is growing quickly because Portland is not the only northwest jurisdiction trying to block fuel flowing to our western Idaho communities. The City of Spokane, City of Tacoma, City of Vancouver, King County, and Whatcom County have all passed or are developing proposals to restrict fuel supply. The combined impacts from these local ordinances is making it harder for small Idaho communities to reliably get fuel. This is a real problem here.

Given how fast Idaho is growing, we expect increased fuel demand in these communities and as a result will need increased fuel infrastructure. The FFTO would prohibit this needed infrastructure.

Please reconsider this misguided approach that would hurt Idaho employers and do not pass the FFTO.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Alex LaBeau', with a long horizontal flourish extending to the right.

Alex LaBeau
President

Alex LaBeau

#331980 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

See Attached

Testimony is presented without formatting.

June 30, 2022

Portland City Council
1221 SW Fourth Avenue
Portland, Oregon 97204
Submitted via Map App portal

RE: Testimony in Support of Re-Adopting Fossil Fuel Terminal Zoning Amendments

Dear Mayor Wheeler, Commissioners, and Staff:

Thank you for the opportunity to offer our comments on the proposed re-adoption of the City of Portland's Fossil Fuel Terminal Zoning Amendments ("Amendments"). These comments are submitted on behalf of Breach Collective, Columbia Riverkeeper, Portland Harbor Community Coalition, Willamette Riverkeeper, Oregon Physicians for Social Responsibility, Extinction Rebellion PDX, Oregon Conservancy Foundation, Cedar Action, Sunrise Movement PDX, Audubon Society of Portland, and 350 PDX. We appreciate and support the City's commitment to address the issues identified by the Land Use Board of Appeals and re-adopt the Amendments to reflect the intent of their passage in December 2016 with the adjustments proposed in the Remand Report. We offer the following comments in support and to reiterate the substantial public health and safety concerns that continue to motivate the Amendments' passage. We urge Council to stay strong and not grant any exemptions or allowances. We also offer Council suggestions for Amendments to clarify the ordinance and ensure our city is on course for substantial climate and seismic resilience, as well as deep emissions reduction through the agenda of rapid transition to clean energy and electrification.

I. These Amendments are critically important public policy, in line with ongoing commitments from the City of Portland and the State of Oregon to address public health issues, environmental inequity, and climate and seismic risk.

Since the Amendments original passage in 2016, the City of Portland and the State of Oregon have rightly acknowledged the enormous risks posed by the escalating climate crisis and imminent magnitude 9.0 Cascadia subduction earthquake, and in response, have made substantial commitments to protect public health, ensure equity, and build resilience. These Amendments directly support that agenda.

In 2019, Portland youth from across the city organized massive public demonstrations calling for climate accountability and immediate action from all levels of government to protect their future. As a result of these efforts, in 2020, Portland passed the Climate Emergency Declaration, Resolution No. 37494. Among its many ambitious goals, the declaration makes

substantial commitments to prevent expansion of fossil fuel infrastructure in the city, to reduce consumption of fossil fuels in the building and transportation sectors, to reduce community and environmental risk from existing fossil fuel infrastructure, and to encourage the adoption of renewable fuels and EV technology.¹ The terminal Amendments begin to put these commitments into practice. By restricting fossil fuel expansion to the most necessary uses, the Amendments protect communities and the environment from further risk, and create the opportunity and incentive for further policies to reduce consumption, promote resilience, and enable clean energy and renewable fuels development in industrial areas.

The Oregon legislature sent a clear signal about the importance of reducing the risks in the CEI hub with the passage of Senate Bill 1567, which includes a requirement for an assessment of current tanks by terminal operators.² The proposed terminal amendments are an important bulwark against worsening the problems identified in the City and County's report regarding the impacts of fuel releases from the CEI hub, even as the community begins to grapple with the existing fuel hub risks. Additionally, Governor Brown's Executive Order 20-04 demonstrates that Portland's Amendments fit into a larger context of climate action. The order cites an "urgent, moral obligation to set and achieve more ambitious GHG goals," including addressing the environmental injustices of current fossil fuel usage.

These Amendments are critically important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact similar restrictions on new fossil fuel infrastructure.³

II. These Amendments are a necessary, first step toward averting catastrophic harm from the forecasted Cascadia earthquake, and more action must be taken.

Multnomah County and the City of Portland's joint study of social and economic risk posed by the Critical Energy Infrastructure (CEI) hub lends incontrovertible proof to what neighbors and community members have long known: the existing 630 storage tanks on 31 properties along the Willamette river pose an immediate and catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia earthquake.⁴ Combined, these existing storage tanks hold a capacity of 350.6 million gallons of some 150 different chemical products, the majority of which are petroleum-based, toxic, and flammable. Of these, some 397 tanks could release between 94.6 million and 193.7 million gallons—equal in magnitude to the 2009

¹ Portland Or. Resolution No. 37494 (2020)

² 2022 Oregon Laws Ch. 99 (S.B. 1567)

³ Recent examples include Whatcom County and King County, Washington, and Vancouver, Washington.

⁴ Multnomah County and City of Portland, Impacts of Fuel Releases from the CEI Hub Due to a Cascadia Subduction Zone Earthquake 1 (2022).

Deepwater Horizon spill in the Gulf of Mexico, the largest oil spill ever in the U.S.⁵ At minimum, cleanup would cost \$2.6 billion. The true costs—of pollution from the river to the sea, ecosystem degradation, lost lives, trauma and community sickness, and cultural and treaty-protected resources irreparably damaged or extinguished—would be immeasurable, and no report could accurately quantify the extent of this harm.⁶

The lower Willamette and Columbia rivers are intertribal fisheries protected by federal treaties with numerous sovereign Tribal Nations. These waters have been sustainably used and protected since time immemorial by the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes and Bands of the Yakama Nation, the Confederated Tribes of Warm Springs Reservation of Oregon, the Confederated Tribes of Siletz Indians of Oregon, and the Confederated Tribes of the Grand Ronde Community, among others. Their reserved fishing rights have never been extinguished, and are a matter of federal trust responsibility. Tribal governments are also co-sovereigns in the cleanup of the Portland Harbor Superfund Site in the area of the CEI Hub. This cleanup process, and the ability for tribal members to gather cultural and subsistence resources would be directly impacted by a spill, leak, or explosion in the Critical Energy Infrastructure hub. In 2020, the City of Portland adopted Resolution No. 37528 which made affirmative commitments to respect Tribal sovereignty, support the federal trust responsibility, and improve relations with Tribal Nations in all City business.⁷ Portland has an obligation to protect the Tribal resources impacted by fossil fuel infrastructure in the CEI Hub.

These Amendments are therefore a necessary first step to protect the health of the Willamette and Columbia rivers and all its local communities by stopping the reckless expansion of dangerous fossil fuel infrastructure.

These Amendments are just the first step to addressing issues in the CEI Hub. While the Amendments do not do anything to improve the current issues in the CEI Hub, they take the necessary step to stop making them worse by prohibiting the unlimited growth of dangerous fossil fuel infrastructure. Implementation of the Amendments has been delayed for 6 years as a result of industry challenges. Once the Amendments are readopted, BPS and Council need to move forward on the next phase of code amendments to reduce the seismic and safety risks in the CEI Hub and transition the region away from fossil fuels. The Amendments do not address the current risk associated with the existing storage tanks as a result of a potential Cascadia Subduction Zone earthquake. The City needs to take immediate action, in partnership with Multnomah County, the State, and Tribal Nations to require seismic safety updates at existing high-risk infrastructure in the CEI Hub.

⁵ *Id.*, at 2.

⁶ *Id.*, at

⁷ Portland OR Resolution No. 375278

III. Council should strengthen the Amendments by clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage.

The proposed Amendments rightly clarify that the restriction requirements apply to fossil fuel uses while encouraging renewable fuel adoption as an important alternative. Council should also, however, further amend the renewable fuel development accommodations to encourage or authorize renewable fuels as a replacement for fossil fuel use and storage, so that as renewable fuels are more widely adopted, and so that overall fossil fuel storage in the CEI Hub does not remain stagnant or even intensified through expanded transloading or other activities. The simplest way for the City to encourage and plan for a transition away from fossil fuels and towards renewable fuels and greater seismic resilience would be to accommodate renewable fuel development as a replacement to existing fossil fuel storage. As the Remand Report demonstrates, Portland's fuel needs can readily be met with existing fossil fuel storage, pipelines, and transport. Renewable fuel storage should replace fossil fuel demand, not supplement it.

Further, with the proposed amendment to the limited use footnote (33.140.100.B.15.a), there needs to be some mechanism for the City to ensure that any new storage tank capacity that is allowed for renewable fuels storage is restricted to that use. If renewable fuel storage tanks are not classified as a limited use, then they will be allowed outright, with minimal City review or discretion. There is currently no way for the City to monitor or track what types of fuels are stored in which tanks, and terminal owners have no legal requirement to provide this information to regulators. The proposed amendment, therefore, creates a potential loophole where a terminal operator could propose new storage for renewable fuels but later shift operations and instead use those tanks for fossil fuels storage without the City or the public ever knowing. To mitigate this, Council should consider an additional provision in the Amendments that explicitly limits any new storage tanks for renewable fuels to that exclusive use, or otherwise prohibits those tanks from ever being used for fossil fuel storage. The City should also develop a monitoring and reporting mechanism to track which types of fuels are being stored in each facility's tanks.

Another area of uncertainty is whether existing storage tanks carrying non-fossil fuel products could be considered a fossil fuel storage tank for the purposes of accounting under the amendments. Council should clarify that existing storage tanks currently used for storage of petroleum-based products that are primarily for non-fuel uses (such as asphalt, plastics, lubricants, fertilizer, roofing, and paints) are not considered part of a facility's "fossil fuel storage tank capacity" under the proposed text for PCC 33.140.100.B.15.a. If these tanks were to be considered as existing fossil fuel storage tank capacity, this would create a potential loophole for a facility to increase its handling and storage of fossil fuels by converting the use of its tanks

from storing non-fuel petroleum-based products to storing petroleum products used for fuels. This is similar to what occurred at the Zenith facility when, under the previous owner, Arc Logistics, the terminal shifted operations from an asphalt plant to crude oil transport. Council should ensure that this type of shift in operations is not allowed under the Amendments.

IV. Council should decline to weaken the Amendments in exchange for industry promises.

Council should decline to consider any expansion allowance to incentivize seismic safety upgrades at existing terminals. To our knowledge, not a single facility has voluntarily upgraded its storage tanks in the 6 years since the Amendments were first proposed, while the Amendments have not been in effect and expansion of storage capacity would have been allowed. Thus, there is no indication that even a 10% expansion allowance would incentivize existing terminals to upgrade their tanks to current seismic safety standards. The Amendments already allow for voluntary seismic safety upgrades, but it is clear that the terminal operators will not implement those upgrades voluntarily, regardless of whether they are allowed to expand capacity. This is something that must be achieved through further regulation and should be an immediate priority for Council.

When considering gas pipeline and storage capacity, the City can recognize a growing body of evidence showing harmful health impacts of indoor fracked gas use⁸ and the climate impacts of the fracked gas industry more broadly, with methane leakage being an unsolved problem.⁹ To avoid these harms, it is reasonable for the City to anticipate that fracked gas use will decline, if the region is to meet its carbon reduction and public health goals. According to a report by the Regulatory Assistance Project,

“Efficiency gains and improved electric end-use technologies are constraining demand for gas. The urgency to address climate change is increasing, with the new U.S. national target to cut greenhouse gas emissions by more than half by 2030 adding to existing state-level decarbonization policies. Increased awareness of the health and safety risks of fossil gas is also accelerating the transition to other sources of energy. These shifts are happening as gas utility distribution systems in many places are aging — meaning that utilities may be seeking approval for major investments while the size of their customer

⁸ Sharon Udasin. Natural Gas Used in Homes May Contain Hazardous Air Pollutants. June 28, 2022. The Hill. <https://thehill.com/policy/equilibrium-sustainability/3539004-natural-gas-used-in-homes-may-contain-hazardous-air-pollutants-study/>

⁹ Steven Mufson. Oil and gas companies underreported methane leaks, new study shows. June 8, 2022. <https://www.washingtonpost.com/climate-environment/2022/06/08/oil-gas-methane-house-science-permian/>

base is poised to shrink...policymakers should start to consider whether broader structural changes will be necessary.”¹⁰

In support of these Amendments, the City has correctly determined that new fossil gas infrastructure is unnecessary, and it is helping to make a tangible change that can steer our future away from fossil fuel terminals, the risks they introduce, and locking in fossil fuel use. The City should therefore not allow for any reason exemptions or allowances for either petroleum storage or gas expansion.

V. Council should commit to further action to mitigate risk in the CEI Hub and advance citywide electrification.

Council should commit to pursuing further regulation of fossil fuel facilities and the risks posed by liquid fuel storage in the Portland CEI Hub. For the purposes of large-scale fossil fuel facilities, the risks of transloading operations will remain an ongoing issue and one that Portland should address in additional regulation. Although beyond the scope of these Amendments, Council should in the future consider additional regulations to address fossil fuel intensification activities. Currently, the proposed Amendments encompass transloading facilities as a limited-use facility prohibited from expanding storage capacity, but the amendments do not prohibit intensification from passthrough or transloading activities, the type of expansion that has occurred at the Zenith Energy facility over the past several years. With the construction of additional transloading infrastructure at its existing facility, Zenith was able to significantly increase its capacity to transload crude oil. The proposed Amendments would not prohibit this type of expansion of fossil fuel infrastructure, and this should be addressed through further action by BPS and Council.

Further, the addition of more liquid fuels, renewable or otherwise, to an area known to have seismic and soil liquefaction vulnerabilities complicates the City’s efforts to reduce spill risks in the CEI hub. Unless the addition of renewable fuels replaces and reduces fossil fuel storage in the CEI hub, the City will not make the desired progress in bolstering safety and spill avoidance in the event of a large earthquake. Renewable or biofuel expansion increases seismic-related spill risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy is again a case study for the type of terminal activities that future policy must address. According to Zenith’s mandatory emissions reporting to Oregon DEQ, in 2021 the terminal moved 312,226,754 gallons of crude oil—more than 80,000 gallons more than the

¹⁰ Megan Anderson, Mark LeBel and Max Dupuy. “Under Pressure: Gas Utility Regulation in a Time of Transition.” May 2021. Executive Summary, p. 6.
<https://www.raponline.org/wp-content/uploads/2021/05/rap-anderson-lebel-dupuy-under-pressure-gas-utility-regulation-time-transition-2021-may.pdf>

terminal's previous record high in 2020—even as Zenith began moving an additional 24,563,058 gallons of diesel and biodiesel.¹¹ This intensification of its crude oil business while adding renewable diesel throughput occurred in the same year that Zenith released press statements claiming that, by expanding renewable throughput, they would “assist the city in meeting its own goals for reduction in the use of fossil fuels in support of the Oregon Clean Fuels Program.”¹² Clearly, without further policymaking to restrict transloading and regulate renewables, the fossil fuel industry can benefit from public support for renewables without replacing or mitigating fossil fuel risks.

One way to avoid this outcome is to align renewable fuel development regulations with these Amendments' restriction on additional tank capacity, and ensure that renewable fuels in the CEI Hub replace—and do not add to—existing fossil fuel storage. The City should also work with the State to enact stricter building code standards for storage tanks, while developing a plan and timeline for replacement of high-risk infrastructure.

Broadly, Council must set a policy agenda of maximum electrification, recognizing the potential pitfalls of increasing reliance on liquid biofuels with varying pollution and public safety impacts. The latest report from the International Energy Agency makes this point clear: to reach net zero emissions and a stable climate, transportation, heating, and industrial sectors must reach 100% electrification.¹³ Deploying renewable fuels should serve this purpose in the interim, not hinder it.

Thank you for the City's diligent work in defending the ordinance through attacks by the fossil fuel industry, including the Western States Petroleum Association and others. Big Oil opposes the City's approach, but the health, safety, and resilience of our communities depend on the City implementing the amendments effectively.

Sincerely,

Elijah Cetas, Climate Law Fellow, Breach Collective

Dan Serres, Conservation Director, Columbia Riverkeeper

Cassie Cohen, Executive Director, Portland Harbor Community Coalition

Lindsey Hutchison, Staff Attorney, Willamette Riverkeeper

¹¹ See, *attached supporting documents*: 26-2025-TV-01 2020 Annual Report, p.21, https://www.deq.state.or.us/AQPermitsonline/26-2025-TV-01_AR_2020.PDF; 2021 Annual Report, p.18, https://www.deq.state.or.us/AQPermitsonline/26-2025-TV-01_AR_2021.PDF

¹²<https://www.prnewswire.com/news-releases/zenith-energy-announces-significant-increase-in-supply-of-renewable-fuel-for-the-pacific-northwest-301363768.html>

¹³ International Energy Agency, Net Zero by 2050: A Roadmap for the Global Energy Sector (2021)

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Ben Stevenson, Sunrise Movement PDX

Cathryn Chudy, Oregon Conservancy Foundation

Bob Sallinger, Conservation Director, Audubon Society of Portland

Appendix.

Supporting Documents – Fossil Fuel Terminal Zoning Amendments remand Climate coalition letter

1. Sharon Udasin. Natural Gas Used in Homes May Contain Hazardous Air Pollutants. June 28, 2022. The Hill. <https://thehill.com/policy/equilibrium-sustainability/3539004-natural-gas-used-in-homes-may-contain-hazardous-air-pollutants-study/>
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4. Zenith Energy, 26-2025-TV-01 2020 Annual Report, https://www.deq.state.or.us/AQPermitonline/26-2025-TV-01_AR_2020.PDF
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EQUILIBRIUM & SUSTAINABILITY

Natural gas used in homes may contain hazardous air pollutants: study

BY SHARON UDASIN - 06/28/22 6:00 AM ET

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Natural gas used for powering household stoves, furnaces and water may contain levels of cancer-linked compounds that are toxic to residents when leaked, a new study has found.

While sampling natural gas supplies in more than 200 homes, the authors detected varying concentrations of volatile organic compounds (VOCs) — known not only to be carcinogenic, but also to generate secondary air pollutants such as particulate matter and ozone.

Though most related research has focused on methane — the primary component of natural gas — and its impacts on climate change, the degree to which other air pollutants are present in natural gas at household “end use” remains largely unexplored, according to the study.

“When we talk about natural gas, we just talk about methane,” lead author Drew Michanowicz, a visiting scientist at the Harvard T.H. Chan School of Public Health, told reporters in a call prior to the study’s release.

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unit that is critical to understanding the potential health impacts of household exposure, according to Michanowicz, who is also a senior scientist at the PSE Healthy Energy research institute.

“Natural gas is mostly methane like pizza sauce is mostly tomatoes,” Michanowicz explained. “There’s other trace ingredients in pizza sauce. You need salt, oregano, pepper.”

From December 2019 through May 2021, Michanowicz and his colleagues collected 234 unburned natural gas samples from 69 kitchen stoves and building pipelines across the Boston region, according to the study.

Within these samples, they detected 296 unique chemical compounds — 21 of which are designated by the federal government as hazardous air pollutants.

“Historically, natural gas has been described as a clean or cleaner fossil fuel,” said co-author Zeyneb Magavi, co-executive director at the Boston-based Home Energy Efficiency Team.

“Now that we know there are small quantities of VOCs present in the gas supply in the Greater Boston area, it is reasonable to conclude that our gas supply is not as clean as we thought it once was,” Magavi said.

One VOC that the scientists found in 95 percent of the samples was benzene, which is classified by the National Toxicology Program as a known carcinogen. The wintertime concentration of benzene was nearly eightfold greater than that of the summertime, according to the study.

Several other VOCs that are considered “hazardous” by the Environmental Protection Agency also appeared in most samples. Among those compounds were hexane, found in 98 percent of samples; toluene, found in 94 percent; heptane, found in 94 percent; and cyclohexane, found in 89 percent.

“Benzene is concerning because it’s a known human carcinogen that affects white and red blood cells and leads to anemia and decreased immune function,” Michanowicz said.

“Because of that, it’s strongly regulated,” he added, acknowledging, however, that the benzene levels found in the samples were relatively low.

Michanowicz reiterated that their study focused on hazard identifications only and therefore did not assess human exposure or potential associated health effects.

“It’s really the first step,” he said. “There’s more research that needs to be done.”

Nonetheless, he stressed that any such effects would likely be mirror the known impacts already linked to the combustion of natural gas, such as the formation of nitrogen dioxide, particulate matter, carbon monoxide and formaldehyde.

“We think there probably is some risk, but that risk may be less than other really well-established environmental health hazards like tobacco smoke,” said co-author Curtis Nordgaard, an environmental health scientist at PSE Healthy Energy.

Adding up low-level leaks across a large metropolitan area like Boston could end up being significant, Nordgaard suggested. Also worth considering are those individuals exposed to higher concentrations of gas due to their occupations, such as commercial kitchen or pipeline workers, he said.

Even prior to determining the precise health impact of exposure, the authors stressed that there are proactive measures residents can take to minimize potential harm.

[Watchdog finds Granholm violated Hatch Act, issues warning](#)
[Norway hit with cyberattack, temporarily suspending service](#)

Increasing filtration and ventilation in buildings is an effective step, as is finding and fixing indoor gas leaks, Magavi explained.

“A fossil fuel pipeline literally ends where a kitchen begins,” Michanowicz said. “This is a direct conduit to a gas well, far away, deep underground.”

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Oil and gas companies underreported methane leaks, new study shows

The House Science Committee calls for tougher surveillance amid evidence of super-emitters and undetected leaks in the vast Permian Basin

By [Steven Mufson](#)

June 8, 2022 at 7:00 a.m. EDT

Big oil and gas companies have internal data showing that their methane emissions in the vast Permian Basin “are likely significantly higher than official data” reported to the Environmental Protection Agency, says [a new report](#) by the House Committee on Science, Space and Technology.

The companies should adopt tougher surveillance measures to detect and control methane leaks, especially [giant super-emitters](#) that contribute to the greenhouse gases that cause climate change, says the report.

“A very significant proportion of methane emissions appear to be caused by a small number of super-emitting leaks,” the report says, noting that a single leak experienced by one company may have accounted for more than 80 percent of the methane emissions that company reported to the EPA from its Permian oil and gas production in 2020.

The report was written by the committee’s Democratic staff using materials requested by Science Committee Chairwoman Rep. Eddie Bernice Johnson (D-Tex.) in a letter to 10 oil and gas companies on Dec. 2. Johnson said the United States could not achieve its goals for reducing methane emissions without a “swift and large-scale decline in oil and gas sector methane leaks.”

The companies were invited by name to provide information, but their results remained anonymous in the final report.

The committee, which will hold [a hearing](#) at 10 a.m. Wednesday on detecting and quantifying methane emissions in the oil and gas sector, zeroed in on the Permian Basin because it extends across 55 counties in West Texas and southeastern New Mexico and accounted for 42.6 percent of U.S. oil production and 16.7 percent of U.S. natural gas production in December 2021.

The committee report urged the companies to make greater and more accurate use of the leak surveillance equipment known as Methane Leak Detection and Repair, or LDAR.

“Oil and gas companies are deploying innovative LDAR technologies in a limited and inconsistent manner,” the report said. “Most deployments remain in the pilot phase with scopes that are too narrow to support emissions reductions on a timeline that meets the urgency of the climate crisis.”

One company told the committee that it relied on “lease operator training and in-person inspections (a.k.a. ‘boots-on-the-ground’ inspections),” which the committee report said could not be scaled up over a large area to solve the super-emitting problem.

Currently, the EPA requires oil and gas firms to inspect their facilities for leaks only twice a year.

“The point is brutally clear,” the report says. “The operator’s technology experts were warning that the technology’s biggest risk was not that it would fail, but rather that it would succeed — and in doing so, would find more methane leaks that the operator would then be responsible for, with all of the accompanying repair costs and reputational risks that might ensue.”

President Biden’s climate and social spending bill, formerly known as the Build Back Better Act, would establish a “methane emissions reduction program” to spur oil and gas companies to cut planet-warming pollution. But the measure has stalled in the Senate for months because of opposition from Republicans and Sen. Joe Manchin III (D-W.Va.).

Senate Environment and Public Works Committee Chairman Thomas R. Carper (D-Del.), whose panel has jurisdiction over the methane program, expressed optimism that Democrats could secure a deal with Manchin on the spending bill’s climate provisions before the August recess. “I’m hopeful it can provide a foundation on which a broader agreement can be had,” Carper told reporters Tuesday.

In November, the Biden administration also unveiled a sweeping set of domestic policies to cut emissions of methane from oil and gas operations across the United States. The proposals, announced at the [U.N. climate summit](#), represented one of the president’s most consequential efforts to combat climate change.

In addition, the EPA proposed rules that would establish standards for old wells, impose more frequent and stringent leak monitoring, and require the capture of natural gas that is found in association with oil and is often released into the atmosphere. The package marked the first time the federal government had sought to comprehensively tackle the seepage of methane from U.S. oil and gas infrastructure.

Apart from regulation, efforts to get major oil and gas companies to measure and capture methane emissions have been gaining support among companies and shareholders. A resolution at Chevron’s recent annual meeting called on the company to summarize its methane-detection efforts and inform investors if the measurements strayed from the company’s own published estimates of its emissions. Chevron’s board of directors supported the proposal, which passed with the support of 98 percent of shareholders.

Yet of the 10 operators that provided information to the House Science Committee, nine said that they lack any internal definition of a super-emitting leak, the report said. Two of them said they did not believe current technologies could accurately quantify emissions leaks.

“When it comes to the role of their own super-emitters in the Permian, all ten operators are in the dark,” the report said.

However, one company said that monitoring at scale was “realistic and achievable.”

And the scale can be daunting. Occidental Petroleum, for example, reported it had 14,929 wellheads in the Permian Basin. They released 2,107,191 metric tons of methane and other greenhouse gases equivalent to carbon dioxide.

Irving, Tex.-based Pioneer Natural Resources said in a letter replying to Johnson that it aims to achieve a 75 percent reduction of methane emissions intensity by 2030. That covers Pioneer's operations, but not the greenhouse gases emitted by its customers when they burn natural gas.

Pioneer said it also uses a wide variety of ground sensors and aerial technology developed by a company called Bridger Photonics for broad oil field surveys.

In 2020, Pioneer performed about 7,800 site surveys using a variety of advanced technologies at the company's wellheads, tank batteries and compressor stations. Those surveys revealed 914 confirmed leaks, which were repaired, Pioneer said.

A Science Committee staffer, who spoke on the condition of anonymity because of the committee hearing Wednesday, said that "just conducting aerial surveys is a simple first step" and "a snapshot in time," as is true for any detection technology. Pioneer and other companies needed to identify patterns, he said.

The committee staff recommended the creation of a "Methane Census" and the development of voluntary standards to help quantify data.

The companies that were asked by committee to produce materials included Admiral Permian Resources, Amererev II, Chevron, ConocoPhillips, Coterra Energy, Devon Energy, ExxonMobil, Mewbourne Oil, Occidental Petroleum and Pioneer Natural Resources.

Methane is the second-largest contributor to atmospheric warming, accounting for about 30 percent of global warming since the Industrial Revolution. It is about 85 times as potent as carbon dioxide over a 20-year period and more than 25 times as potent over an entire century.

At the November climate summit in Glasgow, Scotland, the United States led the drive for a Global Methane Pledge to reduce methane emissions by 30 percent by 2030. More than 100 countries signed on, but several major emitters, including Russia, did not.

Maxine Joselow contributed to this report.

CORRECTION

An earlier version of this article — quoting a report by the House Committee on Science, Space and Technology — said that Occidental Petroleum released 2,107,191 megatons of methane and other greenhouse gases equivalent to carbon dioxide in the Permian Basin in 2020. They released 2,107,191 metric tons.

Under Pressure: Gas Utility Regulation for a Time of Transition

By Megan Anderson, Mark LeBel and Max Dupuy



MAY 2021

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External review does not mean agreement with all of the paper's content and recommendations.

Abbreviations

Btu	British thermal unit(s)	LDC	local distribution company
CIAC	contribution in aid of construction	LMI	low- and moderate-income
EERS	energy efficiency resource standard	NPA	non-pipeline alternative
FERC	Federal Energy Regulatory Commission	O&M	operation and maintenance
GHG	greenhouse gas	RPC	revenue per customer
IRP	integrated resource plan/planning		

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Executive Summary

The way we use fossil gas as a fuel for heating buildings and other end uses is rapidly changing. Efficiency gains and improved electric end-use technologies are constraining demand for gas. The urgency to address climate change is increasing, with the new U.S. national target to cut greenhouse gas emissions by more than half by 2030 adding to existing state-level decarbonization policies. Increased awareness of the health and safety risks of fossil gas is also accelerating the transition to other sources of energy. These shifts are happening as gas utility distribution systems in many places are aging — meaning that utilities may be seeking approval for major investments while the size of their customer base is poised to shrink. Regulators and utilities that do not get ahead of these trends may face the need to impose unsustainable rate increases on customers, meaning high costs for those who can least afford it.

These changes mean that the current paradigm for gas utility regulation is coming under pressure. The good news is that preparing for the gas transition does not require inventing new regulatory mechanisms. Regulators can start with existing tools to anticipate changing circumstances and create paths to meet customer needs. Planning processes, efficiency and electrification programs, and rate-making reforms can all be deployed to manage the risks to consumers, utilities and the economy at large.

Preparing for the gas transition does not require inventing new regulatory mechanisms. Regulators can start with existing tools to anticipate changing circumstances and create paths to meet customer needs.

Building Blocks for a Changing Regulatory Framework

Our recommendations, summarized on the next page, offer a range of practical options for utility regulators to consider as they confront changing circumstances in gas regulation and risks to gas customers. Utility regulators may choose to use one or many of these strategies to build on their understanding of gas systems in their state, unlock cost savings and other benefits, and increase awareness of changes or evolving demands on the system. These recommendations can serve as building blocks to create a regulatory framework to facilitate the gas transition in a manner that is efficient and equitable.

The Road Ahead

Beyond reforms that are within the current powers of utility regulators, policymakers should start to consider whether broader structural changes will be necessary. These policies may require statutory changes to implement, such as new sources of funding for transition assistance and more fundamental changes to the structure of investor-owned gas utilities.

Strategies for Regulators Addressing the Gas Transition



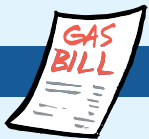
Revitalize Gas Utility Planning

- Set a solid foundation with a **robust and inclusive stakeholder process**, an outline of relevant goals and policies, and coordination with other planning efforts.
- Have the gas utility create a layered **system map** that illustrates and describes the current system, including existing infrastructure and its condition, customer base, and demand and supply.
- Require the development of **alternative scenarios** for meeting demand; analyze the scenarios for reliability, safety, cost, carbon impact, risk and resiliency; and consider other key transition issues.
- Create a short-term action plan and a **long-term transition plan**.



Enhance Energy Efficiency and Electrification Programs

- **Remove barriers to electrification** within energy efficiency program rules, such as prohibitions on fuel switching.
- **Expand and coordinate** energy efficiency and electrification programs to reduce costs and improve equity.
- Develop an approach for evaluating and implementing **non-pipeline alternatives**.
- Implement **geographic targeting of full-building electrification** as part of a gas distribution network transition strategy.



Reform Gas Rate-Making

- **Pay down rate base and lower the risk** of rate impacts.
 - Require **additional investment from new customers** for any gas system expansions.
 - **Accelerate depreciation timelines** for long-lived gas system assets.
- Update cost allocation and rate design to ensure **equitable and efficient outcomes**.
 - Abandon archaic minimum system analyses and adopt **flexible time-based allocation methods** for shared gas system costs.
 - Implement **rate designs that improve efficiency, while prioritizing affordable bills** for low-income customers.
- Better **align utility incentives** with customer objectives and public policy goals.
 - Adopt **decoupling methods that use overall revenue targets**, not revenue-per-customer targets.
 - Explore **performance-based rate-making** improvements to deemphasize capital investments and incentivize customer objectives and public policy outcomes.

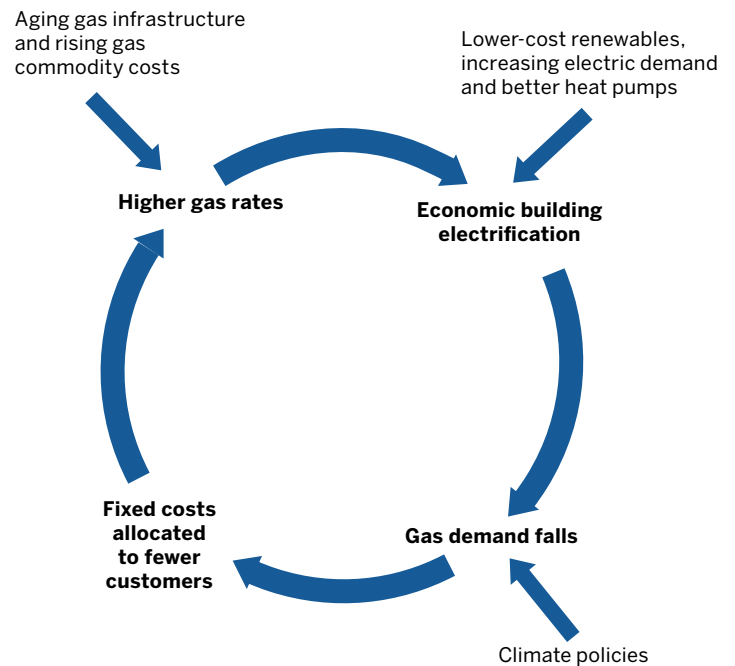
I. Introduction

The current paradigm for gas utility regulation is coming under pressure. Global energy systems are in a period of rapid transition. Utilities are rethinking how they deliver energy to customers, while technology is changing how we power our heating, cooling, cooking and other commercial and industrial needs. With these changes, we will see both increased integration of our energy systems and the need for thoughtful consideration of how to address the unique factors driving the transition in each of these sectors: buildings, transportation and industry.

As we reexamine how to meet the energy needs of customers most efficiently, the role of the gas system in meeting those needs will change. Several issues and trends point to the need for this transition:

- More efficient gas appliances and tighter building shells are lowering per-customer demand and gas throughput, changing the cost-effectiveness of typical gas delivery infrastructure.
- Electric end-use equipment, such as heat pumps and induction cooktops, is declining in price, increasing in efficiency and improving in quality and provides valuable flexibility benefits to the electric grid.
- Increasingly stringent economywide greenhouse gas (GHG) emissions policies require significant reductions in the combustion of fossil gas.
- Greater awareness of the safety and public health risks caused by fossil gas, from extraction to its use in homes, is raising levels of consumer concern.
- Alternative gases with potentially lower GHG impacts, such as renewable methane or green hydrogen, face significant economic hurdles. They also do not necessarily address key environmental, health and safety concerns, though they may be well suited to some hard-to-electrify sectors.

Figure 1. Factors creating a need for gas system transition



Source: Aas, D., Mahone, A., Subin, Z., Mac Kinnon, M., Lane, B., & Price, S. (2020). *The Challenge of Retail Gas in California's Low-Carbon Future: Technology Options, Customer Costs, and Public Health Benefits of Reducing Natural Gas Use*

- Continued investment to maintain, replace or add gas infrastructure may cause substantial rate increases for customers, particularly if that investment is coupled with a decrease in gas throughput.

Figure 1 illustrates how these factors combine to put pressure on the current gas system.¹

Many of the issues leading to a shift in the role of the gas system require coordinated attention and integrated efforts by all levels of government — local, state, federal and even international treaties — to build a modern energy system. State utility regulators can contribute to this work by reexamining the regulatory framework for gas utilities, also known as gas local distribution companies (LDCs), to facilitate a transition.²

1 Aas, D., Mahone, A., Subin, Z., Mac Kinnon, M., Lane, B., & Price, S. (2020). *The challenge of retail gas in California's low-carbon future: Technology options, customer costs, and public health benefits of reducing natural gas use*, p. 6. California Energy Commission. <https://ww2.energy.ca.gov/2019publications/CEC-500-2019-055/index.html>

2 This report focuses on regulation of gas utilities providing service for gas end uses on the distribution system and not on the use of gas as a fuel for electric generating stations.

Making equity integral to addressing a changing gas system

Regulators will need to take deliberate steps to ensure that changes to the gas system will not disproportionately affect low- and moderate-income (LMI) communities and customers. Throughout this paper, we recommend ways in which regulators might integrate these considerations into planning, programs and rate design. Here, we highlight several recommendations.

Planning

- Create robust and inclusive stakeholder processes to ensure that the voices of disadvantaged communities are being heard and their long-term needs are being met.
- Consider how targeted electrification may allow LMI customers to benefit from a lower energy burden.

Programs

- Expand weatherization and other energy efficiency

programs and orient programs toward low-income and disadvantaged communities to decrease energy burden and improve home resiliency.

- Develop incentives and dedicated programs for LMI electrification and ensure that those programs are known and accessible to LMI customers.

Rate-making

- Consider methods to lower rate base to avoid increases in rates that may affect customers remaining on a shrinking gas system.
- Look at customer class distinctions and analytical methods to ensure that costs are allocated efficiently and fairly.
- Design rates to ensure that low-income gas heating customers are not unfairly penalized throughout the transition.

Regulators can then anticipate new conditions and incorporate them into solutions, rather than leaving them to become challenges to meeting customer end uses.

In this report, we recommend and outline tools that regulators can use to refresh regulation of gas utilities ahead of coming changes. Our recommendations fall into three broad categories:

1. Revitalize **planning** efforts to ensure that regulators and utilities alike have the information they need to address new needs and attendant system changes, to avoid unnecessary gas system investments, and to meet the energy needs of all consumers equitably.
2. Enhance parallel **programs** that increase energy efficiency and electrification to ensure that modern technologies can be adopted in an efficient, affordable and equitable manner.
3. Revisit and reform **rate-making** to align changing circumstances with desired outcomes, by lowering the risk of long-term rate impacts, ensuring that customer rates are equitable and efficient, and removing incentives that obstruct utilities' willingness to consider reform.

Within each of these overarching recommendations, we include more specific tools from which regulators can choose to fit their current regulatory regimes and the particular circumstances in their states. Throughout this transition, regulators can ensure that the safety and reliability of the gas system is maintained, disadvantaged communities are supported, and no one loses crucial energy services.

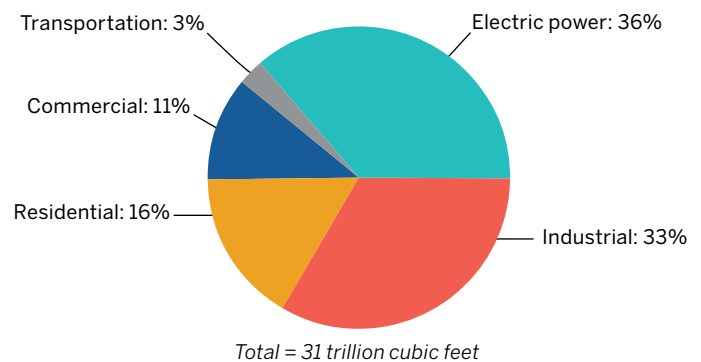
By recognizing and considering the coming challenges now, regulators and other policymakers can ensure that they are in a position to develop solutions that will result in a system that meets end uses more efficiently and equitably and in a manner consistent with carbon reduction policies. Conversely, if regulators delay, they will miss opportunities to design optimized solutions and will be facing a much more difficult challenge in coming decades. The tools outlined in this paper — planning, program design and rate-making — are not new to regulators but are powerful means to address a changing landscape.

II. Issues and Trends Affecting Gas Utilities

Since the middle of the 20th century, fossil methane extracted from the earth — one of several different fossil gases³ — has become one of the most prevalent energy sources in the United States. Gas utilities typically receive this gas through interstate transmission pipelines and then distribute it to about 70 million residential customers⁴ and 5.7 million commercial and industrial customers⁵ for space heating, water heating, cooking and other applications. Currently, the United States has 3 million miles of gas distribution and transmission pipeline, a combined length roughly equivalent to pipeline circumnavigating Earth 120 times, and is expanding by about 10,000 miles per year.⁶ The age and makeup of the gas pipeline system varies, but in some areas, it is more than 100 years old.⁷ In 2019, the industrial, commercial, residential and transportation sectors accounted for about two-thirds of the fossil methane gas consumption in the United States (see Figure 2).⁸

In an appendix to this report, we examine in more detail the history of the fossil gas system, technical basics

Figure 2. 2019 U.S. natural gas consumption by sector



Source: U.S. Energy Information Administration. (2020, November 30). *Natural Gas Explained: Use of Natural Gas*

of its operation and how its regulatory framework was built throughout the 20th century. But in the 21st century, the landscape in which gas utilities are operating is rapidly changing. In this section of our report, we identify six interrelated issues that will put existing utility practices and regulations under pressure.

3 The different kinds of gas that can provide energy services include methane, propane, butane, hydrogen and other heavier gases. Each of these gases can come from different sources or methods of creation. Throughout this paper, we use the term “fossil methane” where appropriate or more generally “fossil gas” for gases that are extracted from the ground or otherwise derived from another fossil fuel. When these gases are combusted, GHG emissions (primarily carbon dioxide) are a byproduct, as well as nitrogen oxides, carbon monoxide, formaldehyde and particulate matter, all of which can be hazardous to human health. Methane itself is also a potent greenhouse gas, and any percentage of methane that is not combusted (either as leakage through pipes or incomplete combustion) contributes to GHG emissions. For the past several decades, methane extracted from the ground has been typically referred to as “natural gas” in many contexts. We find the term “fossil methane” more accurate and illuminating.

4 U.S. Energy Information Administration. (2021a, January 29). *Number of natural gas consumers* (Data series: No. of residential consumers). https://www.eia.gov/dnav/ng/ng_cons_num_a_EPG0_VN3_Count_a.htm

5 There are 5.5 million commercial customers and roughly 183,000 industrial customers. See U.S. Energy Information Administration. (2021b, January 29). *Number of natural gas consumers* (Data series: No. of industrial consumers). https://www.eia.gov/dnav/ng/ng_cons_num_a_EPG0_VN7_Count_a.htm. Gas LDCs serve some large industrial customers; other large industrial customers are served directly from transmission pipelines.

6 U.S. Energy Information Administration. (2020, December 3). *Natural gas explained: Natural gas pipelines*. <https://www.eia.gov/energyexplained/natural-gas/natural-gas-pipelines.php#:~:text=The%20U.S.%20natural%20gas%20pipeline,and%20storage%20facilities%20with%20consumers;> Méndez, A., King, C. W., Greer, D., & Gülen, G. (2019, January). *Local distribution companies: Relationship between pipeline miles and number of customers, and different pipeline diameter sizes*. University of Texas at Austin Energy Institute. https://energy.utexas.edu/sites/default/files/UTAustin_EIoF_Pipeline_Miles_and_Customers_2019-02-21.pdf; and Rocky Mountain Institute. (2019). *The impact of fossil fuels in buildings: A fact base*. <https://rmi.org/insight/the-impact-of-fossil-fuels-in-buildings/>

7 U.S. Department of Energy, Office of Energy Policy and Systems Analysis. (2017). *Natural gas infrastructure modernization programs at local distribution companies: Key issues and considerations*, p. 5. <https://www.energy.gov/sites/prod/files/2017/01/f34/Natural%20Gas%20Infrastructure%20Modernization%20Programs%20at%20Local%20Distribution%20Companies--Key%20Issues%20and%20Considerations.pdf>; Payne, H. (2021, January). *The natural gas paradox: Shutting down a system designed to operate forever*. SSRN. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3584378#

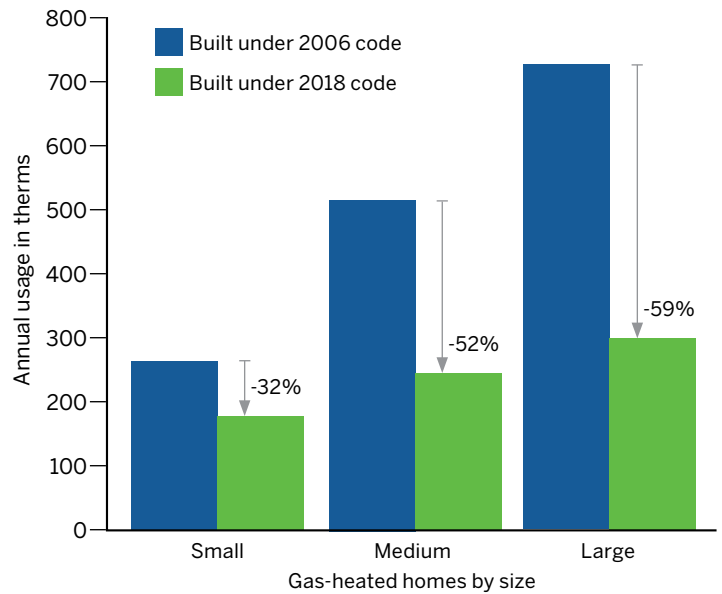
8 U.S. Energy Information Administration. (2020, November 30). *Natural gas explained: Use of natural gas*. <https://www.eia.gov/energyexplained/natural-gas/use-of-natural-gas.php>

Per-customer gas usage continues to decline.

Gas equipment, in part to compete with alternatives and in part because of public policy programs, has become increasingly efficient over time. In addition, building shells have become more efficient, particularly for new construction. As a result, while the number of residential and commercial customers went up nearly 47% from 1987 to 2019,⁹ gas consumption for these sectors increased only 26%.¹⁰ For example, a recent study of the impact of energy code changes in the state of Washington shows that new gas-heated homes use 32% to 59% less gas than those built to earlier codes (see Figure 3).¹¹

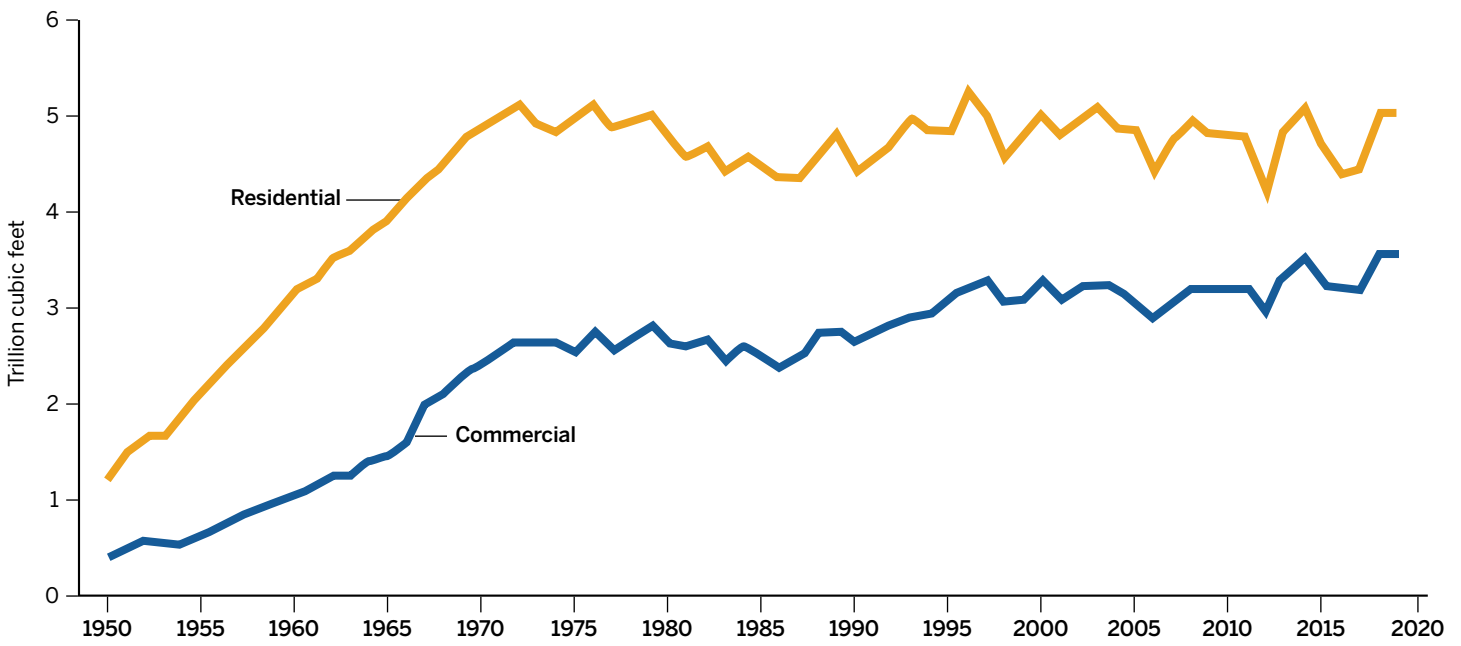
Figure 4 shows residential and commercial gas consumption.¹² Residential gas consumption was roughly flat from 1970 to 2019, while commercial gas consumption went up 46%.

Figure 3. Decline in home gas consumption under revised Washington state energy codes



Source: Based on Odum, H., Spielman, S., Banks, A., Kintner, P., Frankel, M., Reddy, D., & Peng, J. (2020, September). *Modeling the Washington State Energy Code: 2006 & 2018 Baseline Energy Consumption*

Figure 4. U.S. residential and commercial gas consumption



Source: U.S. Energy Information Administration. (2021, February 26). *Natural Gas: Natural Gas Consumption by End Use*

9 U.S. Energy Information Administration, 2021a.

10 U.S. Energy Information Administration. (2021c, February 26). *Natural gas: Natural gas consumption by end use*. https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm

11 Odum, H., Spielman, S., Banks, A., Kintner, P., Frankel, M., Reddy, D., &

Peng, J. (2020, September). *Modeling the Washington State Energy Code: 2006 & 2018 baseline energy consumption*, Appendix B. Washington State Department of Enterprise Services. https://sbcc.wa.gov/sites/default/files/2020-11/SBCC%20BaselineStudy%20Revised_inclusive%20Final_2020_Nov6.pdf

12 U.S. Energy Information Administration, 2021c.

Electric end-use equipment provides competitive alternatives to gas.

Electric end-use equipment that competes with gas equipment, such as heat pumps and induction cooktops, is declining in price, improving in quality and outpacing its gas-fueled counterparts in terms of efficiency and can provide important flexibility benefits to the electric grid.¹³ Heat pumps for space and water heating are capable of providing 1.5 to three times more heat energy than the heat value of the electrical energy they consume. Electric water heaters are flexible in that they can be charged and used at times other than when they are immediately needed, thus working like batteries to provide storage opportunities valuable for grid management. Induction stoves offer a more efficient and attractive alternative to gas for cooking than earlier, unpopular electric cooktop options.¹⁴

In certain segments, the technologies will require continued improvements to fully meet customer needs. Standard air-source heat pumps do not work as well in colder climates, but cold climate air-source heat pumps have been improving. Some customers in these regions may be able to install ground-source, or geothermal, heat pumps instead.¹⁵ Many industrial processes are not as amenable to electrification with current technology at current costs for the foreseeable future. Innovation will continue in all of these areas.

Greenhouse gas reduction targets are incompatible with status quo gas usage.

Many U.S. states have adopted targets and requirements for reductions in GHG emissions over time, aiming for

reductions over the next 25 to 30 years of at least 80% from individual baselines. Some more ambitious states have gone further, beginning to adopt net-zero GHG policies, and at the federal level, President Biden began his term by setting a national target of net-zero GHG emissions economywide by no later than 2050.¹⁶

The use of fossil gas causes GHG emissions during production, delivery and combustion, and the GHG emissions from fossil gas combustion are a substantial percentage of overall emissions. Combustion in the residential and commercial sectors constituted just over 9% of carbon dioxide emissions from energy in 2019.¹⁷ To meet longer-term GHG policies, these emissions must be reduced substantially or eliminated, and states with the greatest emissions from gas usage in buildings are among those that have committed to 80% decarbonization by 2050.¹⁸

Fossil gas has health, safety and environmental challenges.

In addition to GHG emissions, fossil gas causes other health, safety and environmental problems. Although hydraulic fracturing has allowed new gas deposits to be accessed, the downsides include significant water usage and wastewater management difficulties and increased seismic activity in areas where wastewater is reinjected into the ground.¹⁹ Methane leakage from production to delivery causes significant GHG emissions (see Figure 5 on the next page).²⁰ In the delivery system, these leaks pose a variety of potential problems, ranging from nuisances like killing trees²¹ to more serious

13 Shipley, J., Lazar, J., Farnsworth, D., & Kadoch, C. (2018). *Beneficial electrification of space heating*. Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/beneficial-electrification-of-space-heating/>; and Farnsworth, D., Lazar, J., & Shipley, J. (2019). *Beneficial electrification of water heating*. Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/beneficial-electrification-of-water-heating/>

14 See, for example, Northeast Energy Efficiency Partnerships. (n.d.). *Induction stoves: An option for new construction*. <https://neep.org/blog/induction-stoves-option-new-construction>

15 Shipley et al., 2018.

16 The White House. (2021, February 1). Tackling the climate crisis at home and abroad (Executive Order 14008). *Federal Register*, 86(19), 7619-7633. <https://www.govinfo.gov/content/pkg/FR-2021-02-01/pdf/2021-02177.pdf>

17 U.S. Energy Information Administration. (2021d, January 26). *Monthly energy review* (DOE/EIA 0035[2021/1]), tables 11.1 and 11.2. <https://www.eia.gov/totalenergy/data/monthly/previous.php>

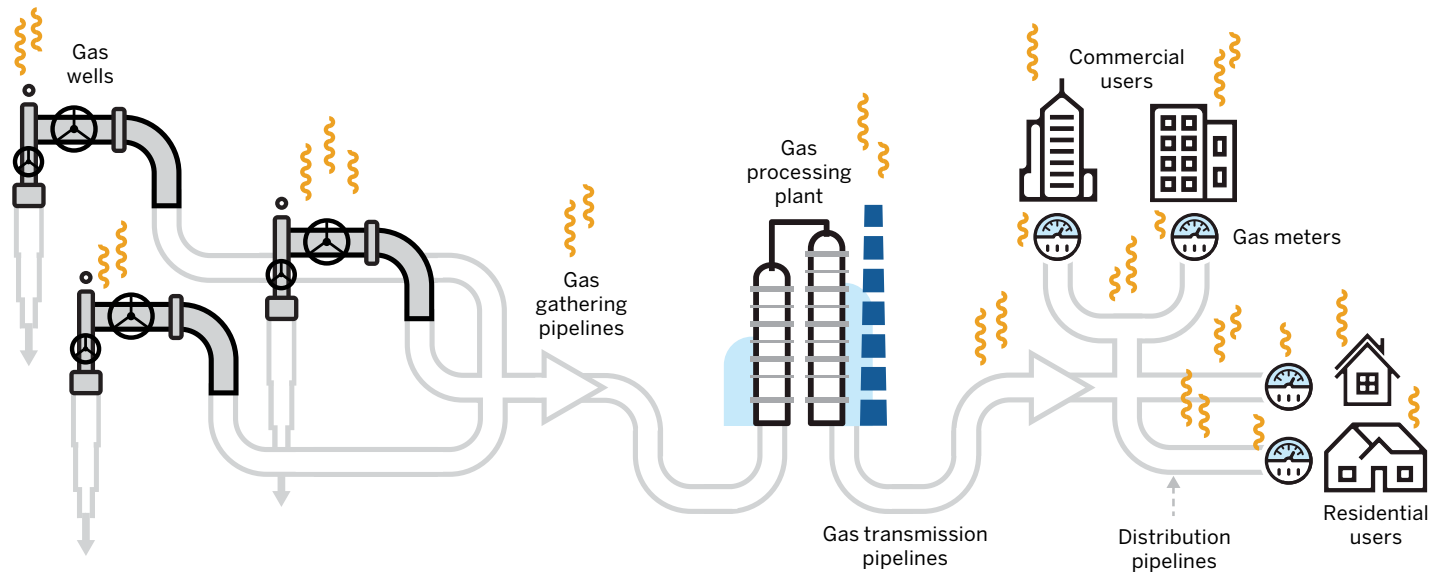
18 Ten states are responsible for 56% of building emissions nationally, and the top 10 states were responsible for 58% of direct building gas use in 2017. Rocky Mountain Institute, 2019.

19 Denchak, M. (2019, April 19). *Fracking 101*. Natural Resources Defense Council. <https://www.nrdc.org/stories/fracking-101>; U.S. Geological Survey. (n.d.). *What environmental issues are associated with hydraulic fracturing?* https://www.usgs.gov/faqs/what-environmental-issues-are-associated-hydraulic-fracturing?qt-news_science_products=0#qt-news_science_products

20 The Gas Index. (2020). *The United States' natural gas system has a serious problem: It leaks*. <https://thegasindex.org/>

21 Schollaert, C., Ackley, R. C., De Santis, A., Polka, E., & Scammell, M. K. (2020, August). Natural gas leaks and tree death: A first-look case-control study of urban trees in Chelsea, MA USA. *Environmental Pollution*, 263(Part A). <https://www.sciencedirect.com/science/article/pii/S0269749119376717?via%3Dihub>

Figure 5. Stages of the gas supply chain responsible for methane leakage



Note: Methane is colorless, but for purposes of illustration, leakage is represented in yellow.

Source: The Gas Index. (2020). *The United States' Natural Gas System Has a Serious Problem: It Leaks*

hazards to human health and safety.²² Finally, even the proper operation of gas equipment within homes, such as gas stoves, can degrade indoor air quality and impact health.²³

Alternative gases have major cost and availability challenges.

Alternative gases, such as green hydrogen and biogases (see the next page), may become a key part of a decarbonized economy for hard-to-electrify sectors such as aviation, shipping and heavy industry.²⁴ These alternatives are not, however, likely to replace the use of fossil gas, in particular in residential and commercial settings, for several reasons:²⁵

- It would take five times more wind or solar energy to create the hydrogen needed to heat a home than it would to heat the same home with a heat pump.
- Hydrogen's different chemical properties mean that it cannot be transported in the same pipelines as fossil gas except as a blend of gas containing a small percentage of hydrogen. Hydrogen alone can corrode older pipes and can leak more in newer pipes. It is highly flammable but currently undetectable when leaking. Moreover, meters, appliances or at least burner tips would need to be replaced to support hydrogen usage.
- Although green hydrogen is falling in price due to increased investment, it is currently relatively expensive. Demand for green hydrogen for residential and commercial uses could lead to decreased supply for hard-to-electrify uses where it is needed most.
- Investing heavily in hydrogen infrastructure and using blue hydrogen (which is extracted from fossil gas) until

22 Branham, D. (2018, February 27). What causes gas explosions? What can homeowners do to avoid them? *The Dallas Morning News*. <https://www.dallasnews.com/news/2018/02/27/what-causes-gas-explosions-what-can-homeowners-do-to-avoid-them/>

23 Seals, B., & Krasner, A. (2020). *Health effects from gas stove pollution*. Rocky Mountain Institute, Physicians for Social Responsibility, Mothers Out Front, & Sierra Club. <https://rmi.org/insight/gas-stoves-pollution-health>; and Seals, B. (2020, May 5). *Indoor air pollution: The link between climate and health*. Rocky Mountain Institute. <https://rmi.org/indoor-air-pollution-the-link-between-climate-and-health>

24 Fakhry, R., & Harding, R. (2020, August 6). "Green" hydrogen: Critical to powering a carbon-free future. Natural Resources Defense Council. <https://www.nrdc.org/experts/rachel-fakhry/green-hydrogen-critical-powering-carbon-free-future>

25 Rosenow, J. (2020, September 30). *Heating homes with hydrogen: Are we being sold a pup?* Regulatory Assistance Project. <https://www.raponline.org/blog/heating-homes-with-hydrogen-are-we-being-sold-a-pup/>

Types of alternative gases

Hydrogen is one alternative for limited end uses. Whether hydrogen provides a substantial decrease in GHG emissions and other pollution depends on how it is produced.²⁶

- **Brown and black hydrogen:** produced by transforming coal into gas at very high temperatures. Brown hydrogen comes from brown coal, or lignite; black coal comes from bituminous or hard coal. Black and brown hydrogen production creates carbon monoxide and carbon dioxide pollution.
- **Gray hydrogen:** extracted from fossil gas using thermal processes, such as steam methane reformation, which uses water to separate the hydrogen from the fossil gas carbon molecules. Most hydrogen produced today is gray hydrogen. Because steam methane reformation generates and releases excess carbon dioxide — about 9.3 kilograms per kilogram of hydrogen — gray hydrogen does not offer climate benefits.
- **Blue hydrogen:** extracted from fossil gas using thermal processes but with the carbon dioxide emissions captured and stored in industrial carbon capture and storage processes. Blue hydrogen has fewer carbon emissions than gray hydrogen, but 10% to 20% of the carbon emissions cannot be captured. Production of the fossil

gas from which the hydrogen is extracted also causes carbon emissions.

- **Green hydrogen:** produced through electrolysis, which splits water molecules into oxygen and hydrogen, using electricity generated by zero-emissions sources.

Biogases are also possible alternatives to the use of fossil gas, but constraints, including limited feedstocks for production, make widespread use infeasible.²⁷

- **Biogas:** produced from the anaerobic digestion of organic matter, which results in a mixture of methane, carbon dioxide and small amounts of oxygen. The precise composition of biogas depends on the feedstock and method of production, which include biodigesters, landfill gas recovery systems and wastewater treatment plants.²⁸
- **Biomethane:** a near-pure methane, sometimes known as renewable natural gas, created either by removing the carbon dioxide and other contaminants in biogas or through the gasification of solid biomass, which results in a mixture of gases (sometimes called syngas), followed by methanation, which causes a reaction between the component gases to produce methane.²⁹

green hydrogen decreases in price would only exacerbate the problems already facing the gas industry. Hydrogen infrastructure may very well also become a stranded asset if electric options are adopted based on current affordability and efficiency.

- Biogas and biomethane as alternatives face challenges because neither can be efficiently produced at the scale needed to replace current fossil gas usage.

Pairing growing investments with significant declines in gas throughput could drive up rates.

Gas systems require continuing maintenance and repair and sometimes pipe replacements, as well as investment in expansion if new customers are added to the system. Over the past decade, a number of jurisdictions have adopted special investment programs to address safety issues, reliability concerns and methane leakage.³⁰ Many of these programs

26 Giovannini, S. (2020, November 13). *50 shades of (grey and blue and green) hydrogen*. Energy Cities. <https://energy-cities.eu/50-shades-of-grey-and-blue-and-green-hydrogen/>

27 Nevzorova, T., & Kutcherov, V. (2019, November). Barriers to the wider implementation of biogas as a source of energy: A state-of-the-art review. *Energy Strategy Reviews*, 26. <https://www.sciencedirect.com/science/article/pii/S2211467X19301075>

28 International Energy Agency. (2020). *Outlook for biogas and biomethane:*

Prospects for organic growth. <https://www.iea.org/reports/outlook-for-biogas-and-biomethane-prospects-for-organic-growth/an-introduction-to-biogas-and-biomethane>

29 International Energy Agency, 2020.

30 Thanos, A., & Zitelman, K. (2020, January). *Natural gas distribution infrastructure replacement and modernization: A review of state programs*. National Association of Regulatory Utility Commissioners. <https://pubs.naruc.org/pub/45E90C1E-155D-0A36-31FE-A68E6BF430EE>

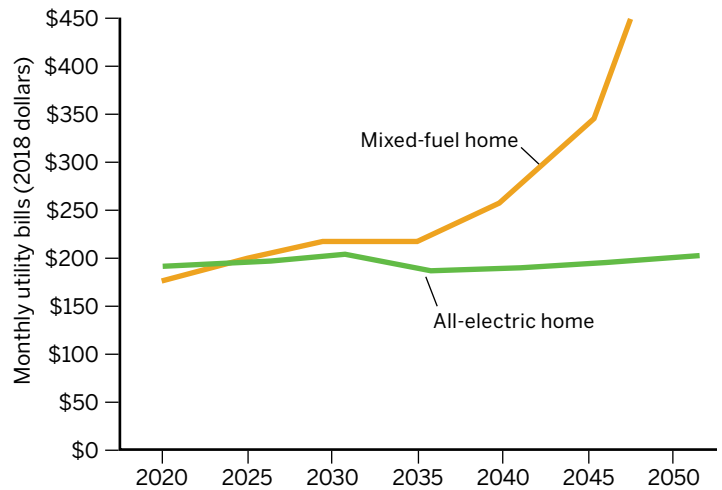
come with streamlined investment approvals and dedicated cost recovery mechanisms. This continuing investment in the system, while both the overall customer base and gas throughput are either flat or decreasing, will almost certainly drive up rates and bills.

While reliability for existing customers and safety should not be compromised, regulators need to scrutinize justifications for significant new long-lived investments. In some cases, repairs will solve the issue in a reasonable manner at a lower overall cost, which would either be expensed or involve lower levels of investment that could be paid off quickly. In other cases, some portions of the existing gas system could be retired responsibly, with support for remaining gas customers on that segment to affordably convert to modern and clean energy options.

The consulting firm Energy and Environmental Economics analyzed the effects on gas rates as demand for gas declines in several different scenarios for California, assuming shareholders are not asked to bear any additional burden of stranded assets and no alternative source of funding is found. In short, rates for residential gas customers are projected to increase dramatically with increased electrification and attendant decreases in gas demand, as shown in Figure 6.³¹

These potential impacts on rates would affect all gas customers, but the relative impacts to LMI customers would likely be much greater. Energy bills are a higher percentage of

Figure 6. Projected increase in gas consumers' bills under high electrification



Source: Aas, D., Mahone, A., Subin, Z., Mac Kinnon, M., Lane, B., & Price, S. (2020). *The Challenge of Retail Gas in California's Low-Carbon Future: Technology Options, Customer Costs, and Public Health Benefits of Reducing Natural Gas Use*

income for LMI customers, and under current policies, fewer LMI customers are likely to be early adopters of modern and clean alternatives to gas. At the same time, this magnitude of rate increases would likely trigger customers who can to switch away from gas equipment or exit the gas system entirely.

Gas system operations and regulation have developed and adapted over time. In the next sections of this paper, we outline recommendations that might facilitate the next changes in gas system evolution.

31 Aas et al., 2020.

Alternative ways to share cost burden beyond current and future gas customers

Policymakers may look to other sources of funding to ameliorate rate impacts on future gas customers. There is no silver bullet, as many sources come with significant complications. The following options for consideration could provide valuable longer-term certainty for regulated companies, their employees and other stakeholders.

- **General funds and taxes** could provide funding to assist with the gas transition. Direct funding from the state or federal government, as well as various forms of tax assistance, could be significant, although budgets are often constrained. Other possibilities could include incentives for electric companies to absorb gas utilities in their service areas or incentives for combination holding companies to merge electric and gas operations.
- **Securitization**, or refinancing remaining capital payments for certain assets with low-cost debt, can lower overall costs of capital and provide consumer savings. Refinancing does not eliminate these costs but can lower the interest rate below even the typical utility cost of debt by providing additional guarantees from ratepayers or even an ultimate backstop from the government. The utility and regulators may pass these savings directly to ratepayers or could apply the savings from refinancing to meet transition goals. This debt can still impact the books of the utility in question or, in limited circumstances, the government providing the final backstop, potentially impacting bond ratings.
- Utilities could impose **exit fees** for customers leaving the system, thus creating a source of revenue to assist remaining customers with increased costs. Exit fees are typically considered to be anti-competitive and may be contrary to the expectations of many customers. Such a policy would have the side effect of discouraging full electrification or adoption of other low- or zero-GHG technologies.
- Regulators could allocate certain program costs, as well as an increased share of administrative and general expenses for joint gas and electric utilities, to **electric customers**. This option raises questions about how core gas system costs are treated and whether such an allocation of such costs to electric customers is equitable.
- Regulators could authorize gas utilities to **change the scope of their services** by investing in other low- or zero-GHG technologies, such as district energy systems. By expanding their reach, gas utilities could gain additional customers at a time when the utility is otherwise shrinking, though such an expansion would not come without complexities. While this option may lower the burdens of existing gas customers, it is not clear that putting those costs on customers adopting new, clean technologies is justified, although there could be synergies with administrative and general costs.
- Often **gas utility shareholders** bear at least some of the costs for stranded assets that are no longer used and useful or otherwise do not provide meaningful value to the system. This type of risk has been reflected in the return on equity and market valuations over time, which can make it reasonable for shareholders to share in any burden.



III. Revitalize Gas Utility Planning

As noted earlier in this paper, climate policy, clean energy goals and an improving economic case for electrification are causing a transition away from fossil gas regardless of whether regulators, decision-makers and stakeholders are ready for this shift. Whether the transition is a graceful one depends on how regulators and others plan for and anticipate the coming challenges and opportunities. First among the tools available to regulators is the ability to require gas utilities to develop plans that anticipate these changes. This section outlines steps that regulators can take to revitalize and refresh gas planning requirements, with an eye toward creating a gas transition planning process that will allow regulators to plan for a future with fewer end uses served by fossil gas. A robust and data-driven planning process, informed by stakeholder input, will provide a guide for regulators and utilities alike as they navigate a changing landscape for gas utilities.

Following the trend in the 1970s and 1980s for electric utilities, the Energy Policy Act of 1992 instructed states to consider the adoption of integrated resource planning (IRP) for gas utilities, along with other measures to enhance energy efficiency programs and incentives.³² IRP for any type of utility is intended to rationalize and systematize many pieces of the planning process, including fair consideration of least-cost demand-side resources. Many states did not adopt these discretionary standards, but others do require some sort of IRP for gas utilities.³³ In some places, the requirements are similar to what may be included in the electric utility IRP process,

including stakeholder processes, information regarding the current system and customers, alternative scenario development and short- and long-term action plans.³⁴ In other states, less comprehensive analysis is required, or the outlines of the planning process have been developed through regulatory commission order or some combination of requirements.³⁵

Changing circumstances justify a fresh look at gas planning requirements to ensure that utilities are providing enough information for regulators, utilities and stakeholders to determine whether utility decision-making is prudent for customers and in line with state policy goals. Some states may need legislation or amendment to existing rules to allow regulators to obtain information for sufficient planning efforts.

The issues and trends discussed in Section II will have several consequences that will make information gathering and planning requirements more important moving forward: (1) the overall demand for fossil gas is likely to decrease; (2) the number of connected gas utility customers will decrease as a result of increasing electrification; and (3) as a result, the throughput on the gas distribution system will diminish. By requiring utilities to develop gas transition plans, regulators can ensure that regulators, utilities and stakeholders have the information they need to develop pathways that take into account policy goals, changing demand and potential impacts to customers.

Regulators can first revisit their gas planning requirements to determine whether the utility is providing sufficient

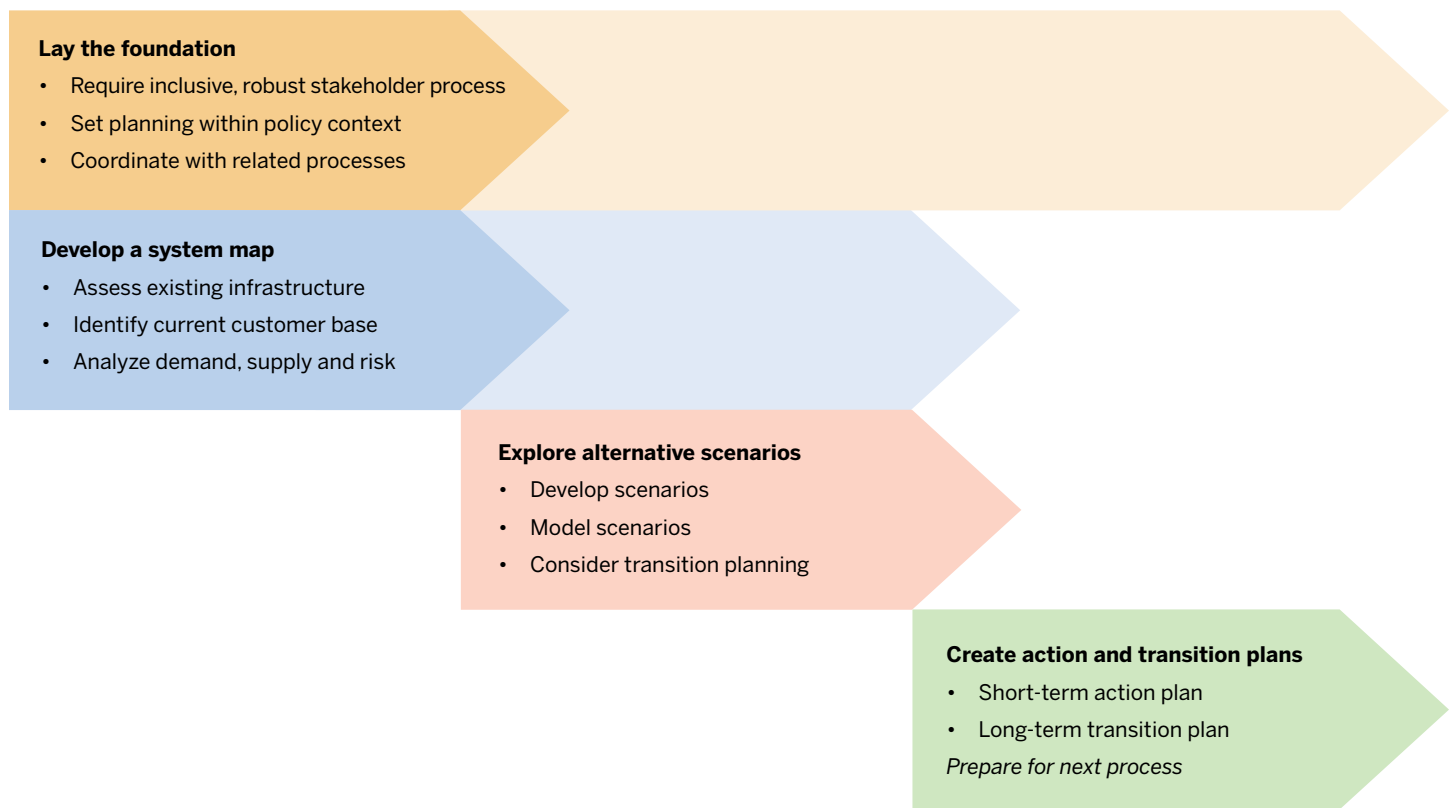
32 See 15 U.S.C. § 3203. Shortly afterward came the publication of two reports on the subject: Goldman, C. A., Comnes, G. A., Busch, J. F., & Wiel, S. (1993). *Primer on gas integrated resource planning* (Report No. LBNL-34144). Lawrence Berkeley National Laboratory. <https://emp.lbl.gov/publications/primer-gas-integrated-resource>; and Harunuzzaman, M., & Islam, M. (1994). *Integrated resource planning for local gas distribution companies: A critical review of regulatory policy issues* (Report No. NRRI 94-12). National Regulatory Research Institute. <https://pubs.naruc.org/pub/74F6F9EE-155D-0A36-31B0-9D798D1DD8CF>

33 Harunuzzaman & Islam, 1994. See, for example, NM Administrative Code 17.7.4; OR Administrative Rules 860-027-0400, Integrated Resource Plan Filing, Review, and Update; and RI General Laws § 39-24-2.

34 NM Administrative Code 17.7.4; RI General Laws § 39-24-2.

35 For example, in Idaho, IRP requirements are set in commission orders No. 25342, 27024, 27098, 32855, 33314 and 33997. In Oregon, administrative rule and commission orders set the IRP requirements: OR Administrative Rules 860-027-0400, commission orders No. 07-002, 07-047 and 08-339.

Figure 7. Gas planning process



information about its gas system and add requirements if more data is needed to fully assess the gas utility’s role in meeting end uses. Regulators may then want to require a gas utility to develop a gas transition plan, in which the utility outlines how its system and operations will change as gas ceases to be the predominant fuel for many end uses.

Figure 7 provides an overview of the entire gas planning process. The elements in this figure will be discussed in more detail below.

A. Lay the Foundation With Engagement, Context and Coordination

We recommend first that regulators ensure that their planning processes are grounded in a solid foundation of stakeholder input, relevant policies and goals and, to the extent possible, coordination with related planning processes. By establishing this shared context, regulators, utilities and stakeholders can move to planning for future needs with a common

understanding of potential challenges and opportunities. This information equips regulators with the information they need to address changes in the gas system, driven by the trends noted above.

Require an Open, Inclusive and Robust Stakeholder Process

Regulators can first ensure that planning requirements include an open, inclusive and robust stakeholder process. Stakeholder input is critical at the beginning of a gas planning process to ensure that regulators and the utility are not only hearing the perspective and ideas of the utility itself but are also hearing new input and points of view that add to the planning process, especially as technology and customers are evolving. In areas where gas planning has been limited, or where it has not been open to the public, greater emphasis and attention to developing the stakeholder process may be warranted.

Stakeholder processes are generally familiar to utilities, regulators or other traditional stakeholders. Regulators can

pull from electric IRP or other proceedings to design effective public advisory processes. Regulators may want to seek input from utilities and stakeholders about best practices to guide these processes. We recommend the following as critical elements for an effective stakeholder proceeding:

- The stakeholder process should begin at least one year prior to the filing date of the gas transition plan to ensure input into the development of the plan. Utilities should provide information about the process; time, date and location of the first meeting; an opportunity for stakeholders to notify the utility of their interest in the proceeding; and utility contact information.
- Because utility gas planning may be new to many states, the utility should be required to reach out to parties that normally intervene in other utility proceedings, including IRP processes on the electricity side.
- Meetings held as part of the process should be open to the public, noticed and scheduled on a regular basis, and set at times that allow for the maximum participation possible, with particular attention paid to the needs of stakeholders representing low- to moderate-income customers and underserved communities, who are often left out of or marginalized in such processes.
- Meetings should be facilitated by a neutral third party or by commission staff. Meeting notes should be kept and be made available online, along with attendance logs and any relevant meeting materials. Meetings should offer virtual participation for those stakeholders unable to attend in person.
- The utility should provide relevant and timely background information about its current system, including system maps, needs and upcoming demands or constraints, in advance of the first meeting. This information should track the information to be provided in the utility's gas plan; for subsequent planning processes, a copy of the previous gas plan, along with a nontechnical summary of the plan, may be sufficient.
- The utility should provide advance information about what will be discussed in each meeting, including background information and contact information for utility employees or consultants to whom stakeholders may direct questions or seek clarification before or after each meeting.
- The purpose of the stakeholder process will be to inform the gas plan before both its development and its filing. All feedback from stakeholders should be documented and reflected clearly throughout the process — noting areas of consensus and nonconsensus and noting which changes have been adopted or not. This documentation will help inform regulators of the process and the outstanding items they will need to consider as part of their decision-making about the filed plan.
- The utility will provide an explanation when it requests to keep information confidential or requires participants to sign nondisclosure agreements before viewing potentially confidential information. Regulators can provide a means by which stakeholders can contest the utility's confidentiality assertions to the regulators.
- The utility will design meetings around the topics and subject areas required in the gas plan, such as demand forecasts; existing and future supply; demand-side resources; modeling and risk assumptions; the cost and general attributes of potential new resources; assumptions, data and methods used to develop scenarios; scenario analyses; and rate design options, including how the plan may impact different classes of customers, particularly LMI customers.
- Consider having the utility provide funding³⁶ for participation of independent technical experts, vetted and approved by regulators, who can assist stakeholders to understand utility proposals and develop responses and input.
- Consider having the utility provide financial assistance for participation of stakeholders who can demonstrate need.

36 Regulators may determine that utility shareholders bear these costs, or they may allow some of this funding to flow from rates. Alternatively, where legislators have allocated funding for stakeholder participation in public

utility commission proceedings, funding may come from the commission itself or contributions that the commission and the utility make to a stakeholder fund.

Set Planning Within the Context of Relevant Policies and Goals

In addition to the opportunity for the stakeholder process to inform the context in which gas planning is occurring, regulators should further define the boundaries of the process by requiring an analysis of any policy goals that may constrain utility action or that may provide incentives for a utility to move toward an end goal in the short or long term. One prevalent example will be any carbon reduction targets that limit the amount of fossil fuels used in the state and that may set specific limitations on gas utilities. Other policies — such as requirements for minimization of system costs or for new construction to be all electric, or indoor air quality standards that limit gas appliances³⁷ — will affect gas demand projections and gas network expansion.³⁸ The gas plan should spell out these policies, including any expected changes, to ensure that they are woven into the planning process.

Coordinate Gas Planning With Related Planning Processes

As the trends affecting the gas industry are not limited to gas utility proceedings, regulators may want to consider coordinating or at least cross-referencing other planning processes that may affect gas utility decision-making. Consideration of electric utility plans, for example, may be important to determine whether gas and electric utilities are making similar assumptions about electrification and anticipating that as electrification proceeds, demand for gas will decrease and demand for electricity will increase. Both outcomes will need to be addressed and information about challenges and opportunities of those transitions shared.³⁹ Furthermore, as gas is phased out, plans to transition to electric alternatives are needed. The transition must be smooth

enough that customers are not caught in between systems. Regulators may want to consider other state agency planning processes that will affect demand for gas. Air quality agencies, for example, may be developing appliance standards that will affect gas demand. By having direct communication or coordination with other agencies with jurisdiction over gas utilization, utility regulators will improve their own planning processes.

There are numerous ways and degrees to which regulators could arrive at a more holistic view of the energy system through coordinated planning:

- Regulators could require combined gas and electric utilities to merge data from both the gas and electric systems to develop one integrated plan, an energy plan.
- Regulators could mandate that separate gas and electric utilities coordinate planning to arrive at one planning document. This outcome could be achieved through the use of an umbrella council that would develop the energy plan, informed by the gas and electric utilities.
- Regulators could instruct separate gas and electric utilities to coordinate a joint filing or to file plans on a parallel timeline that cross-referenced information from the coupled plan.
- Regulators could include a requirement in the planning process for utilities to reach out to agencies with related planning processes during the stakeholder process, to present during planning meetings to stakeholders and the commission, or to submit comments to the gas utility planning process that address overlap or concerns.

Coordinated planning may be done among regulatory bodies, agencies, utilities and stakeholders. Legislation could require such coordination, or regulatory or energy agencies could take the lead to develop a coordinated body with

37 See, for example, California Air Resources Board. (2020, November 19). *California Indoor Air Quality Program update* (Resolution 20-32). <https://ww3.arb.ca.gov/board/res/2020/res20-32.pdf>

38 Other states may be proposing more rigorous changes. Legislators in Washington, for example, have introduced a bill that would implement a new clean heat standard that would limit “the expansion of the natural gas system for residential and commercial space and water heating, and advancing the use of high-efficiency electric equipment, production and distribution of clean fuels, and the safe and equitable transition of the natural gas system.” It also addresses a gas company’s obligations regarding

service and shifts line extension costs to a new customer requesting service. Washington Legislature, HB 1084, 67th Legislature, 2021 Regular Session. <http://lawfilesexternal.wa.gov/biennium/2021-22/Pdf/Bills/House%20Bills/1084.pdf?q=20210126020523>

39 For example, an electric utility may have information about the relative cost to serve different customer load segments where the gas utility may be considering decreases in service. Having information about the ultimate costs of this transition, not just costs on the gas or electric side of the equation, may reveal opportunities for cost savings for customers or uncover challenges in meeting increased electric demand.

oversight over planning. An integrated planning body could come together to align goals⁴⁰ that may be set by regulators, municipalities and the state, ensuring that planning is occurring in a manner that moves toward action to meet those goals. An integrated planning body could provide a platform to facilitate data sharing and to ensure that planning efforts are transparent.

In any of these scenarios, regulators should watch out for efforts or plans that appear to be coordinated but that are ultimately parallel planning processes with some mention of the other.⁴¹ Awareness of other stakeholders' work does not automatically equal a coordinated effort.

B. Develop a System Map

With the context underlying the utility's planning firmly set, regulators can next examine the elements of the gas planning process itself to ensure that the process is leading to robust and data-driven outcomes. We recommend that regulators start by requiring utilities to build a system map made up of layers of information about the system, including infrastructure, customer base, demand and supply and the assumptions upon which the utility is operating.⁴² The system map would provide a map of on-the-ground information about the physical system, as well as layers of more dynamic information about the system that may be on the map itself or explained in supplementary information.

This information can inform several basic steps of system planning: first, the development of alternative plans to meet current and projected demand; second, analysis of

these scenarios to test them against considerations of cost, risk, equity and consistency with future planning; and third, future or transition planning that anticipates how immediate planning decisions sit within the context of a changing system. Regulators may want to think of these steps as more iterative than strictly sequential, as different alternatives are tested and stakeholders and others provide continuing input.

Utilities maintain a wealth of information about their operations that they can compile into layers in a system map. We recommend that regulators require utilities to perform the following evaluations. The outputs will serve as a foundation for a system map that provides regulators and stakeholders with a touchpoint for planning discussions.

Assess Existing Infrastructure

The basis of the system map will be the utility's service territory and existing infrastructure, including:

- Transmission, distribution and gas service infrastructure, including the length and diameter of pipelines, pipeline material and pipeline pressure. This description should include the condition of existing pipelines, including the age and condition of the pipes, the presence of Aldyl-A pipe,⁴³ leakage rates (number of leaks per mile) and depreciation status.
- Interconnects, gate stations, compressor stations and any storage facilities.
- Areas of constraint on or congestion in the system.
- Areas where maintenance or replacement of existing infrastructure may be needed and an explanation for why

40 See, for example, Valova, R., Hart, C., Bourgeois, R., & O'Brien-Applegate, J. (2020, July). *Zero net gas: A framework for managing gas demand reduction as a pathway to decarbonizing the buildings sector*. Pace Energy and Climate Center. <https://peccpubs.pace.edu/viewresource/fba9aef7758065f/Zero+Net+Gas%3A+A+Framework+for+Managing+Gas+Demand+Reduction+as+a+Pathway+to+Decarbonizing+the+Buildings+Sector>; Gridworks. (2021). *Gas resource and infrastructure planning for California: A proposed approach to long-term gas planning*. https://gridworks.org/wp-content/uploads/2021/01/CA_Gas_Resource_Infrastructure_Plan_Report_FINAL.pdf; and New York Public Service Commission, Case No. 20-G-0131, Proceeding on motion of the commission in regard to gas planning procedures, Order instituting proceeding, March 19, 2020. <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=20-G-0131&CaseSearch=Search>

41 Puget Sound Energy provides an example, with its integrated resource plan, of a utility that serves electric and gas customers combining its planning processes into one document. The plan does not take the next step of coordinating these processes, however, to consider, for example, how

electrification might decrease gas demand at the same time it increases electric demand. Puget Sound Energy. (2017). *2017 PSE integrated resource plan*. <https://pse-irp.participate.online/past-IRPs/2017>

42 See, for example, NM Administrative Code 17.7.4.10(e), Contents of the Gas IRP (requiring "a summary description of natural gas supply sources and delivery systems"); and Gridworks, 2021, Appendix 1.

43 Numerous federal safety advisories dating to 1998 have been issued for Aldyl-A plastic pipe, which was manufactured by DuPont before 1973, because of its history of cracking, resulting in explosions that have caused numerous fatalities. See Van Derbeken, J. (2011, September 26). Plastic natural gas pipe failure data kept secret. *San Francisco Chronicle*. <https://www.sfgate.com/news/article/Plastic-natural-gas-pipe-failure-data-kept-secret-2308629.php>. See also U.S. Pipeline and Hazardous Material Safety Administration. (2007, September 6). Pipeline safety: Updated notification of the susceptibility to premature brittle-like cracking of older plastic pipe. Docket No. PHMSA-2004019856. *Federal Register*, 72(172), 51301-51303. <https://www.govinfo.gov/content/pkg/FR-2007-09-06/pdf/07-4309.pdf>

these areas need attention, such as safety considerations or aging or damaged pipes.

Identify Current Customer Base

The next layer will describe the utility's existing gas system customer base. This information can be illustrated on the system map so that the map reveals the relationship between existing infrastructure and customer classes. The narrative section can include more detail about the makeup of the different classes. Minimum components include:

- The size of all customer classes, including residential, commercial, industrial and transportation customers.
- Firm versus interruptible customers.
- Density of service areas (number of customers and demand).
- Areas that the utility has considered for system expansion or contraction.
- Areas that the utility has identified as difficult to serve.
- Any additional detail about its customer base that might affect planning.

Analyze Demand

The next layer is an assessment of the utility's current and anticipated demand and its assumptions to reach those projections. This data is most useful when broken down by customer class, by season and by volumetric and peak requirements, based on current and historical delivery. Regulators might want the utility to include factors that it considers when assessing demand. These could include weather forecasting assumptions, current efficiency or demand-side management requirements or programs, and an analysis of the potential for electrification of gas end uses that may occur naturally, because of cost-effectiveness over the planning horizon, or with the assistance of programs that address inherent market barriers.⁴⁴

Once the utility has outlined current demand assessment practices and data, it can then outline factors it uses currently to forecast changes to demand. This analysis may include considerations of any areas where the utility is seeing changes in gas usage due to electrification, potential programs that might incentivize electrification or remove market barriers, or areas of increased gas usage. Requiring data on changes in customer base and differences in gas throughput will provide regulators a fuller picture of how gas demand may be changing.

Analyze Supply and Risk

The next layer consists of an assessment of the sources of supply that the utility uses to meet current and anticipated demand and how the utility hedges against changes in load and contingencies in the stability of its supply.

The utility can first outline current supply. This description may include sources of supply, supply contracts, including amounts and duration of the contracts, and any storage or contingency supply resources. Regulators can require the assessment to include any known or anticipated concerns about current sources of supply, such as anticipated price increases, previous delivery problems including any constraints due to weather or transmission limitations, potential changes in sources of supply and attendant considerations about possible needs for gas connection moratoria.⁴⁵ To the extent sources of supply can be represented on the system map itself, regulators might require the utility to do so.

Once the utility has laid out its sources of supply, it can conduct a risk analysis of these sources. The utility can outline both the risk of not maintaining supply reserves and redundancies and the cost of maintaining those reserves. The analysis can include a discussion of risks to the system from supply and delivery constraints, noting in particular how critical facilities may be affected. This analysis will be useful to later considerations of alternatives.

44 Consolidated Edison Company (ConEd) of New York, for example, is developing a Smart Solutions Program to reduce demand as a result of uncertainties around supply. With this program, ConEd is focusing on demand-side management, including non-pipeline alternatives, an enhanced energy efficiency program, a gas demand response program and a gas innovation program. Consolidated Edison Company of New York. (2019). *Gas long-range plan: 2019-2038*, pp. 23-24. <https://www.coned.com/-/media/files/coned/documents/our-energy-future/our-energy-projects/gas-long-range-plan.pdf>

45 New York's Consolidated Edison, for example, bases its planning "on the assumption that temporary moratoriums will be necessary in our service territory and will remain until more pipeline capacity becomes available or reduced demand is realized through non-traditional supply, demand side solutions and the use of alternative new technologies to meet customer needs." Consolidated Edison Company of New York, 2019, p. 6.

Regulators might require the utility to outline its current practices to address known or anticipated changes in supply. This discussion may include how the utility forecasts costs to meet continued or new demand and whether meeting demand will require investment in additional infrastructure to access new sources of supply. The plan can describe the utility's procurement practices for acquiring new or additional supply, including any limitations in competitive procurement.

By requiring a baseline system mapping exercise, regulators ensure that they have the information they need about the state of the utility's system, the customer base, current demand and supply, and demand and supply trends. This information will provide regulators, stakeholders and the utility itself with the baseline needed to then consider future planning.

C. Explore Alternative Scenarios

Once the gas utility has mapped its system and customer base, we recommend that regulators require the utility to develop alternative scenarios about what may be needed for the system in future years, to analyze those scenarios against defined metrics, and to consider scenarios that anticipate planning for a transitioning gas system.

Develop Scenarios

The alternatives section often constitutes the heart of a planning process because it provides the opportunity to compare the pros and cons of various options, including the status quo. In addition, the process of developing alternatives allows the utility, stakeholders and regulators to contribute to thinking about different ways that the utility might meet demand in a cost-effective and efficient manner. As a result, this section of the plan ensures that the status quo does not win the day merely because it has the tide of inertia behind it.

Regulators can require that utilities consider a wide range of alternatives that take into account changing circumstances and assumptions. We present some minimum considerations for alternative development here, but the development of scenarios need not be limited to strict guidelines. Rather, it is

an opportunity for regulators, utilities and stakeholders to put ideas on the table for discussion.

Elements that regulators may want to require in different scenarios include:

Varying demand levels: At a minimum, the utility may be required to forecast low, mid and high demand. The utility can outline the factors that would drive those scenarios and use that information to develop the levels of demand to model. Several factors may inform these scenarios: state decarbonization goals and whether those can be met with gas usage at current or even decreased levels; the likelihood of customers leaving the gas system or reducing demand as a result of increases in electrification; increased building efficiencies leading to decreases in demand for gas; and the utility's own energy efficiency programs. An analysis of increased electrification of current sources of gas demand may be informed by reference to electric utility forecasts of fuel switching and consequent increased electricity demand. Certain state or local regulations, such as appliance efficiency standards, indoor air quality rules or all-electric building codes, may further inform demand forecasts.

Varying supply levels: Regulators may want utilities to consider scenarios in which uncertain sources of gas supply are no longer available or contract terms cannot be renegotiated. Regulators can then ask the utility to build on these elements by considering how varying demand and supply levels affect how the gas system is used in the future. Here, we recommend that regulators require utilities to use the system map described above to investigate and illustrate data relevant to developing alternative scenarios.

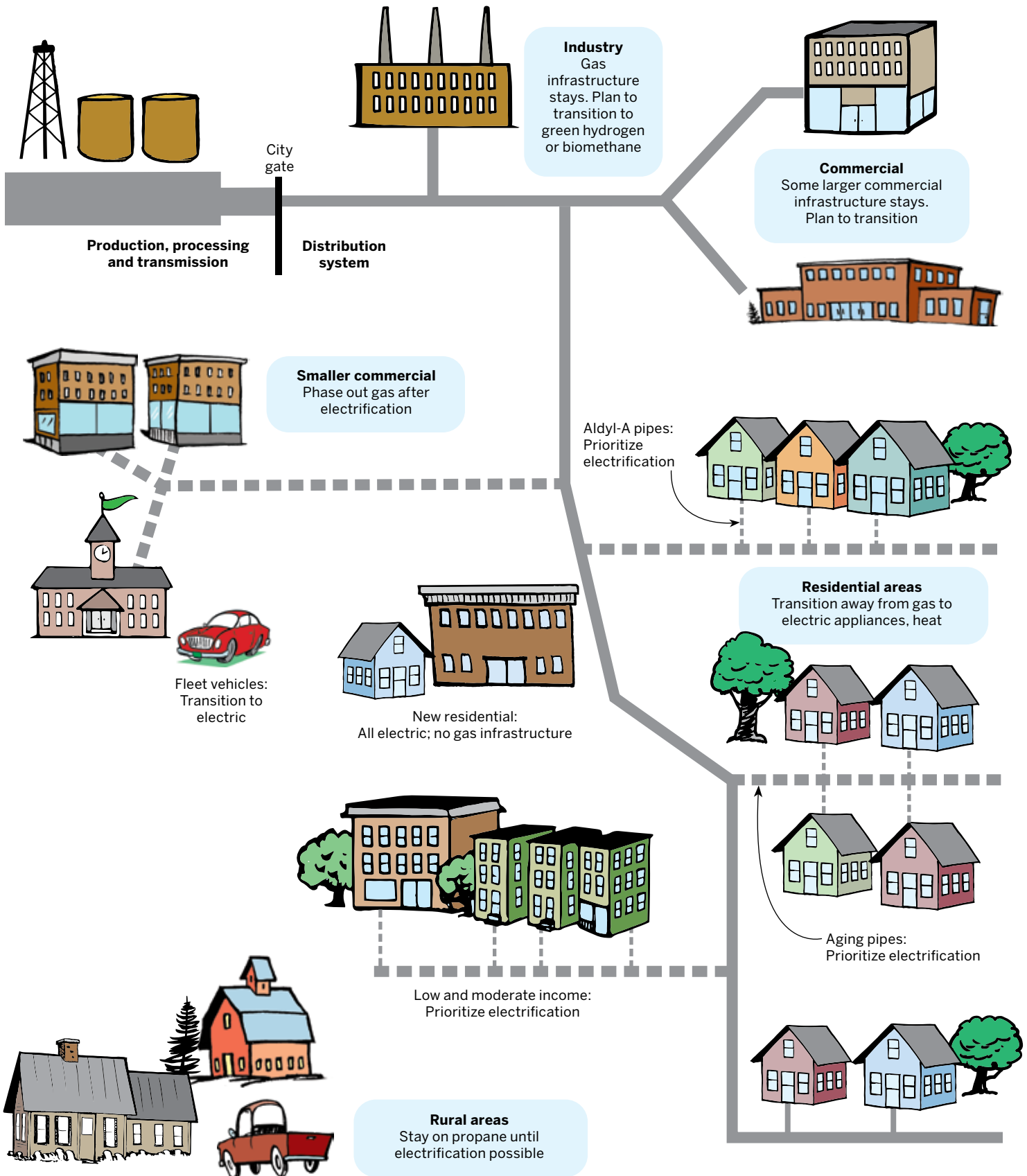
An example of how different scenarios might be layered onto a system map is illustrated in a very simplified system map in Figure 8. Regulators may ask utilities to consider:

Alternative solutions for areas where maintenance or infrastructure investment is needed to maintain reliable or safe service: In some areas, this maintenance may involve only small parts of the system, but in others, larger-scale replacements may be needed, exacerbating operation and maintenance (O&M) costs.⁴⁶

⁴⁶ Small maintenance issues can also lead to much larger projects. ConEd notes, for example, that because much of its "distribution system is low-pressure cast iron, and installation of these mains in the late 1800s and early 1900s

did not include isolation valves, much of [the] low-pressure system cannot be isolated without excavating to the main to cut and physically blocking the flow of gas." Consolidated Edison Company of New York, 2019, p. 37.

Figure 8. Illustrative alternative scenarios



Options to serve specific areas depending on demand trajectories: For example, in areas where demand is increasing due to augmented industrial development, the utility may want to consider maintaining infrastructure or adding infrastructure needed to support fossil gas alternatives. In other areas where demand is decreasing due to efficiency and electrification, the utility may consider retiring infrastructure instead of costly upgrades.

Analysis of customer base and how best to serve specific customer groups: Low- and moderate-income customers, in particular, may be burdened by rising gas costs or stranded assets and might benefit from more rapid electrification to decrease their energy burden.

Identification of areas where district energy systems might be employed: District energy, which involves providing heating or cooling to multiple sites from a large-scale source, could more efficiently serve customers and decrease utility expense.

Options for customers in less densely populated areas: Existing or new infrastructure in these areas likely has a lower use and may therefore be more costly to maintain.

Delineation of areas with all-electric building requirements: These areas may not need gas service in the first place or may become areas with more dispersed service that is less cost-efficient to maintain.

By asking utilities to illustrate and consider these various elements, regulators ensure that the utility builds scenarios that address current and changing circumstances. Providing information about the system in this manner can also facilitate discussion with stakeholders about building alternative scenarios to meet needs. For example, scenario analysis may help the utility identify areas where significant investment would be needed to continue safe and reliable service. In these cases, the utility may want to consider working to electrify whole neighborhoods and then retiring the gas distribution network,

rather than putting large amounts of capital into maintenance or upgrades that may become underutilized in the future.

Utilities with large areas of decreasing residential demand may see opportunities to focus on industrial service while phasing out increasingly expensive residential service. This type of scenario analysis will assist utilities and regulators to identify potential stranded costs before they are incurred, in particular as their impact may be felt by an even smaller customer base.⁴⁷

Exogenous factors may influence the utility's scenario building. For example, some jurisdictions are now requiring all new buildings to be all electric. Regulators can ask the utility to consider where it is expecting new builds and how it can limit expanding or upgrading infrastructure, which would almost certainly result in stranded costs in those areas. Regulators may want the utility to consider whether providing existing customers in those areas incentives to electrify would be more cost-effective than maintaining infrastructure for a decreasing customer base. The utility may also consider anticipated changes that may affect the economics or viability of its scenarios, including carbon pricing, increased GHG reduction requirements or more stringent appliance standards.

Model Scenarios

Once the utility has developed a wide range of scenarios, regulators can require the utility to model these scenarios for reliability, safety, cost, carbon impact, risk (including risk of stranded assets) and resiliency.⁴⁸ The scenario development, modeling and modeling results can be open and transparent to regulators and stakeholders. We recommend that regulators require gas utilities to accept input on the scenarios they have developed and to either model stakeholder-proposed scenarios or make modeling programs available to stakeholders to do so. The results of the scenario analysis will form the basis for the utility's action plan and long-term plan.

47 Existing incentives may run counter to utility proposals to reduce infrastructure and service to some areas. For example, the EPA's Natural Gas STAR Methane Challenge has the laudable goal of reducing emissions but does so by incentivizing the replacement of a certain percentage of pipeline in need of upgrade. U.S. Environmental Protection Agency. (2020, July 14). *Natural Gas STAR Methane Challenge Program: BMP commitment option technical document*. https://www.epa.gov/sites/production/files/2020-07/documents/mc_bmp_technicaldocument_2020-07.pdf. Regulators need

to ensure that utilities consider the big picture in decisions about pipeline replacement or maintenance.

48 Regulators will want to ensure that utilities are using models that can adequately address changing circumstances and assumptions. Regulators should ask utilities to explain their rationale for choosing a particular model and should seek input from outside experts and stakeholders about whether the model is adequate or the utility should consider other options instead.

Some broad trends can inform this analysis. Decreased demand will mean fewer customers on the utility's system with attendant challenges for sharing continued costs. Relatedly, increased electrification or electrification mandates may require a harder look at the utility's continued infrastructure investment in certain areas to reduce the possibility for stranded costs. Regulators might want to include specific requirements for utilities to consider in this analysis. For example, regulators might mandate that utilities consider investment in additional infrastructure on a level playing field with other alternatives, such as non-pipeline alternatives (NPAs) discussed in Section IV. Regulators can ensure that utilities consider whether scenarios meet both immediate (three to five years) and long-term (15 to 20 years) needs. In other words, utilities' analyses of alternative scenarios can address whether immediate steps are consistent with longer-term goals and conditions. The utility's scenario analyses can also include an assessment of system resiliency. As noted above, regulators may require the utility to outline any historical issues it has had with its system, such as delivery problems due to weather events or problems with either physical or cybersecurity. The utility can consider these historical problems and include anticipated risks. Extreme temperatures, humidity, storms, rising sea levels and combinations of these factors may affect gas systems in the future.⁴⁹ Supply itself may be limited due to insufficient water for gas production, weather events that affect delivery, or other changes that affect production. In addition to historical data regarding security issues, regulators can request the utilities to identify potential issues or vulnerabilities and the risk they pose to system resiliency.

Consider Transition Planning

Consideration and modeling of scenarios based on different conditions is important even if the utility does not anticipate making immediate changes based on these trends.⁵⁰ Even without significant exogenous factors, demand for gas is likely to be lower due to energy efficiency alone; one study notes that even in a scenario with no building electrification, energy efficiency will result in residential gas use decline of 25% by 2050.⁵¹ If widespread electrification occurs, residential gas use could decrease more than 90% by 2050.⁵² Other factors may have similar impacts or compound decreases in gas demand. Regulators need to have an understanding of what different circumstances will mean for the gas utility and its customers and available options to address those changes. To address this need, regulators can build on the gas utility's planning efforts by asking the utility to add layers of transition considerations to planning efforts. The analysis of alternative scenarios to meet changing demand may already include some of this work. In addition, regulators can ask utilities to consider other means by which the gas system may evolve, including meeting end uses in new ways, infrastructure contraction, and financial and funding tools to facilitate a transition.

Consideration of New Options for Meeting End Uses

In the face of climate science and attendant state and local government greenhouse gas reduction goals and policies, as well as customers' ability to choose from various options to meet needs, regulators might want to consider requiring utilities to use an end-use-oriented planning process. Utilities utilizing this approach would be able to more easily consider various options available to meet end uses, including

49 ConEd, for example, is "formally studying the risk that climate change poses to [its] energy-delivery systems, and is looking to identify ways to further enhance system resiliency." The company's study of climate change impacts will include considerations of "temperature, humidity, precipitation, sea level, major events and multi-hazards." Consolidated Edison Company of New York, 2019, p. 28.

50 Some gas companies are still forecasting at least modest increases in demand. See Intermountain Gas Co. (2019). *Integrated resource plan: 2019-2023*. https://www.intgas.com/wp-content/uploads/PDFs/commission_filings/IRP-Write-Up-Book-2019.pdf; and Cascade Natural Gas Corp. (2020). *2020 integrated resource plan*. <https://www.cngc.com/>

[wp-content/uploads/PDFs/IRP/2020/oregon/2020-Integrated-Resource-Plan.pdf](https://www.vermontgas.com/wp-content/uploads/PDFs/IRP/2020/oregon/2020-Integrated-Resource-Plan.pdf). By contrast, Vermont Gas Systems is "planning for loss of load and attrition while balancing the needs of current customers." Vermont Gas Systems. (2021). *Integrated resource plan*. <https://www.vermontgas.com/wp-content/uploads/2021/01/2021-01-15-VGS-Integrated-Resource-Plan-including-Attachments-00306267-2xE4196.pdf>

51 Gridworks. (2019). *California's gas system in transition: Equitable, affordable, decarbonized, and smaller*, p. 1. https://gridworks.org/wp-content/uploads/2019/09/GW_Calif-Gas-System-report-1.pdf

52 Gridworks, 2019, p. 1.

both gas and electricity, and contributions of demand-side management.⁵³

Although fossil gas service has never been universal⁵⁴ — fossil gas has faced competition from other fuels, such as electricity, propane, heating oil and wood⁵⁵ — where a utility has been given a utility franchise to serve a defined service area, it may have obligations to connect customers and to serve their energy needs.⁵⁶ By engaging in end-use-oriented planning, utilities could address areas where gas service is no longer competitive with alternative means to meet end uses or where customers desire other options. Changed circumstances, including climate change mandates, and decreased demand due purely to increased efficiencies, performance and health benefits of electrification require regulators and gas companies to reconsider the obligation to maintain a gas system that serves all customers. Instead, regulators and gas companies can develop transition pathways to ensure that the move away from widespread natural gas use is done in a manner that eases the transition for customers and utilities.

Transition pathways could guide the utility to serve customers with alternative fuels that do not require additional investment in infrastructure. The utility could design rates to disincentivize new customers, including declining to socialize the costs of service line extensions. Customers could be given assistance or other incentives to electrify in areas where it is no longer economical to conduct maintenance or upgrades on aging systems. Legislatures could also be called upon to clarify the gas company's role in light of other policy requirements.

Options for Infrastructure Contraction

Regulators can require utilities to consider options for contracting gas infrastructure. Utilities can begin to rethink their systems to align with changing demand in several ways.

First, utilities can use the information outlined in their scenario analyses to identify areas where gas distribution service can be reduced or eliminated. As noted above, areas that are seeing significant electrification or decreased gas demand due to efficiency measures may be candidates for complete electrification of end uses that currently use gas⁵⁷ and attendant retirement of gas service. Regulators may ask gas utilities to look for areas with increased electrification and areas where significant pipeline maintenance or replacement is needed, to determine where there are opportunities to decrease the size and cost of underutilized parts of the system by planning for a managed phase-out of gas service to those areas.

Second, utilities can delay the need for investment in infrastructure, and potential stranded costs, by taking measures to use the system more efficiently and by considering NPAs, discussed in Section IV. Transmission pipelines can be downrated to distribution pressures in areas where consumption has fallen, reducing future maintenance costs.⁵⁸ Aldyl-A, unprotected steel, cast iron and other leak-prone pipes slated for replacement are generally clustered in certain areas. Considering these areas as candidates for electrification will avoid the need for costly and disruptive pipeline replacement.⁵⁹ Regulators can call upon gas companies to include a section in gas plans that includes information about these needs and considers other methods to reduce investment in infrastructure. This section may include possibilities for immediate implementation or ideas for pilot projects to test new approaches.

Third, utilities and regulators can reconsider line extension policies, discussed in more detail in Section V on rate-making. Each extension requires the utility to expend capital to connect a new customer. That connection may be only a service line stemming from a main, along with the regulator and meter. Or, in the case of larger new

53 For a discussion of procurement best practices, see Shwisberg, L., Dyson, M., Glazer, G., Linvill, C., & Anderson, M. (2020). *How to build clean energy portfolios: A practical guide to next-generation procurement practices*. RMI. <https://rmi.org/how-to-build-ceps>

54 National Association of Regulatory Utility Commissioners. (2017). *Report of the NARUC task force on natural gas access and expansion*. <https://pubs.naruc.org/pub.cfm?id=8F38EF6F-D44F-80A0-578C-CF1610C47520>

55 National Association of Regulatory Utility Commissioners, 2017.

56 Bilich, A., Colvin, M., & O'Connor, T. (2019). *Managing the transition: Proactive solutions for stranded gas asset risk in California*. Environmental Defense Fund. https://www.edf.org/sites/default/files/documents/Managing_the_Transition_new.pdf

57 Where total electrification is not immediately possible, utilities might also consider providing propane service for limited uses.

58 Gridworks, 2019, pp. 3, 12.

59 Gridworks, 2019, pp. 3, 12.

developments or customers, the utility may need to extend the system significantly to include a network of mains and service lines.⁶⁰ Carbon reduction goals may render many of these investments stranded.

Analysis of Financial Tools and Funding to Ease the Transition

A utility plan considering these options must be accompanied by analysis of the financial impact on customers of different transition pathways, including tools to ease impacts to customers. Possibilities to address these impacts are discussed in more detail in Section V, which considers opportunities to use rate-making to facilitate the transition. This section addresses how bills are expected to change and how a utility's gas plan can respond to those changes.

A customer's bill includes charges for supply and delivery, along with taxes and fees. These costs vary depending on numerous factors, including customer base and service area. That said, fluctuations in the cost of supply affect only part of the bill,⁶¹ whereas cost of delivery makes up a significant part of a customer's bill. This charge includes O&M costs, capital expenditures to provide service and expenses required to run the gas company itself. Regulators can consider this impact when considering utility plans to upgrade or expand infrastructure. Taxes and fees, including gross receipts tax, sales tax, franchise fees and the company's income and property taxes, add to those expenses.⁶² In short, even if gas itself remains inexpensive, customer bills may be high when utilities are required to maintain or upgrade existing infrastructure. This impact will be exacerbated as customers electrify some end uses or exit the system altogether, as those infrastructure costs will need to be divided among fewer customers.

Regulators may therefore require that gas utilities include a discussion of mechanisms to alleviate the impacts to LMI customers in their planning processes. One step, as discussed above, is to consider areas where electrification or other zero- or low-carbon alternatives may benefit LMI customers and to provide incentives for those customers to leave the gas system first. In addition, regulators might ask utilities to consider programs to help LMI households that would otherwise face barriers to electrification, including the upfront expense of purchasing new appliances or transitioning to electric heat, related expenses of any electric system upgrades or lack of space in smaller homes or apartments for heat pumps or other alternatives.⁶³ Customers who do not own their homes or apartments also may not be able to make such upgrades without landlord approval, and landlords who are not paying the bills may not be incentivized to make such changes. To alleviate this burden, regulators could require utilities to employ energy transition coordinators who work specifically with LMI customers or seek funding for public utility commissions to provide similar assistance. The stakeholder process can provide valuable input for those considerations. That discussion will in turn be enriched where regulators ensure that the utility discloses potential impacts and provides data about system changes to stakeholders.

D. Create Short-Term Action and Long-Term Transition Plans

We recommend that regulators require two outputs of a gas transition plan: a short-term action plan (covering the next three to five years) that includes immediate next steps, and a long-term view (15 to 20 years) of the utility's system.

60 This expansion may involve costs beyond the pipelines themselves, including right-of-way costs. "NMGC's pipelines and facilities across the state must traverse public, private, and Native American jurisdictions. Based on historical experience, right-of-way (ROW) costs are one of the fastest growing costs of new gas facility construction. Access to facilities on public lands is also becoming increasingly difficult and conditioned with limitations that restrict necessary evaluation and maintenance activities and contribute to increased costs." New Mexico Gas Co. (2020), *2020 integrated resource plan*, p. 21. <https://www.nmgco.com/userfiles/files/2020%20IRP%20Report.pdf>

61 For example, in New York, these three segments of the bill can be

approximately divided into thirds: Delivery costs represented 37%; supply, 30%; and taxes and fees, 33%. Consolidated Edison Company of New York, 2019, p. 44.

62 Consolidated Edison Company of New York, 2019, p. 44

63 Sunderland, L., Jahn, A., Hogan, M., Rosenow, J., & Cowart, R. (2020, May). *Equity in the energy transition: Who pays and who benefits?*, pp. 46-49. Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/equity-in-energy-transition-who-pays-who-benefits/>

Both these plans can be informed by the results of the utility's scenario analysis; the utility can use that analysis to determine which course of action best meets its objectives at the least cost and risk for the utility and its customers. The action plan will then spell out steps the utility must take in the near term to begin to implement that course of action. The long-term plan can provide a longer vision of where the utility is headed to ensure that it does not take actions in the near term that are incongruent with long-term objectives. The utility can iterate and update both of these plans in its next planning cycle.

As regulators consider a changing energy system, planning is a "no regrets" tool that can ensure they have the information

they need to make decisions about utility gas filings. While no plan can predict the future, a sound plan will account for a reasonable array of prospective events and outcomes and assess tactics to best prepare for them. In addition, a gas planning process can provide regulators an opportunity to incorporate stakeholder perspective and input. Finally, regulators can design the planning process to require utilities to consider a range of transition pathways and attendant scenarios in an open and transparent process to ensure that the utility is moving forward with well-vetted and robust plans. Regulators can complement planning efforts through energy efficiency and electrification programs, which we discuss next.



IV. Enhance Energy Efficiency and Electrification Programs

Utility energy efficiency and electrification programs will be important elements of any gas transition strategy, and programs' design and details can help or hamper gas transition plans.⁶⁴ This section discusses several key aspects of these programs and recommends changes to ensure that these programs are operating in concert with and facilitating gas transition.

In many states, utilities or other administrators run energy efficiency programs, funded by ratepayers. Improving energy efficiency is often the least-cost option and brings substantial net benefits, which include not only cost savings from reduced energy use but also cost savings for the utility, as well as lower costs of compliance with environmental regulations and reduced social costs of pollution. Energy efficiency programs address market barriers and market failures that keep consumers from making cost-effective energy efficiency investments. These programs are required to be cost-effective, and utilities evaluate the programs based on screens for cost-effectiveness administered by regulators and often required by state law. These programs can bring substantial savings for customers and benefits to society, including health benefits associated with emissions reductions. In addition, they are critical complements to a transition away from gas. Energy efficiency programs can include measures for switching from gas equipment to more efficient electric equipment. They can also complement electrification efforts by improving the economics of electrification measures.

Because of the significant benefits of efficiency programs,

it makes sense to strengthen these programs, even in states that are not yet ready to consider developing a comprehensive gas transition plan. Strengthening energy efficiency programs can be thought of as part of a “no regrets” initial effort in states that are having trouble building consensus — or even starting a discussion — about gas transition. Later, these programs can be integrated into a gas transition plan. It should also be noted, however, that in many cases these programs are not only regulatory in origin but come from more specific statutory authorizations and mandates. In such cases, regulators may not have the authority to make certain revisions to the programs because doing so would require a change in statute.

In this section, we offer recommendations for strengthening energy efficiency and electrification programs in order to unlock the cost savings and other benefits such as reduced emissions. Figure 9 on the next page depicts one estimate of emissions reductions achievable with electrified heating in residential and commercial buildings, particularly when coupled with city and state clean energy commitments.⁶⁵

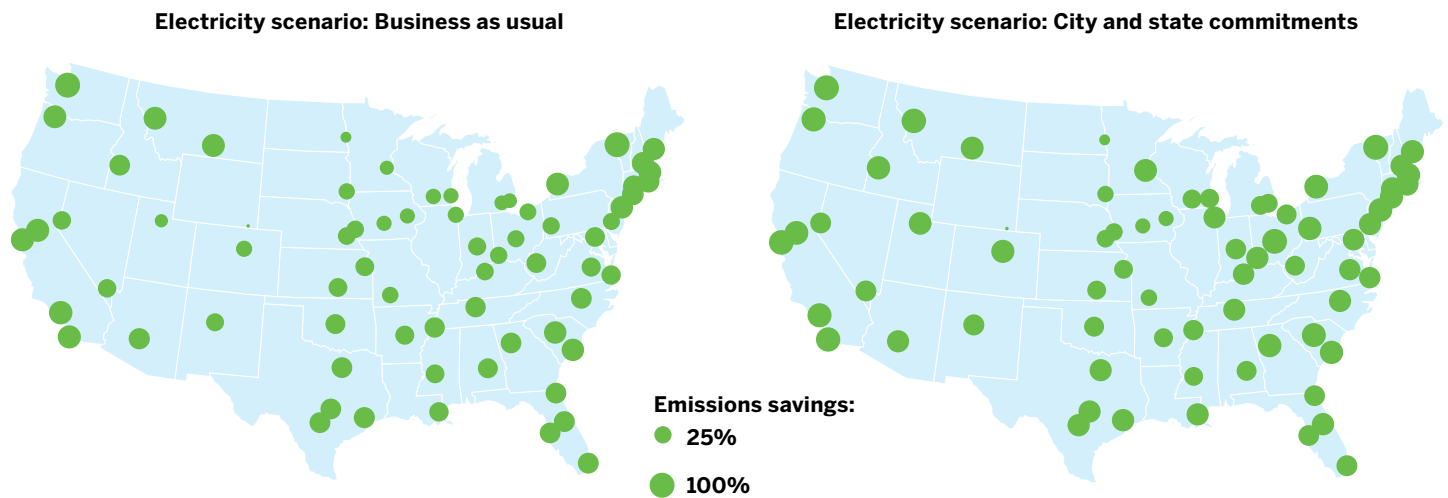
A. Reform Rules That Discourage Electrification

In many states, energy efficiency programs are governed by rules called energy efficiency resource standard (EERS) policies. As of mid-2019, 27 states had implemented an EERS policy for electricity, and a subset of 18 also had EERS policies for natural gas.⁶⁶ The policies require utilities (or, in some states,

64 This section draws on several previous RAP publications. For more detail and discussion, see Farnsworth et al., 2019; Shipley et al., 2018; and Shipley, J., Hopkins, A., Takahashi, K., & Farnsworth, D. (2021). *Renovating regulation to electrify buildings: A guide for the handy regulator*. Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/renovating-regulation-electrify-buildings-guide-handy-regulator/>

65 The Gas Index, 2020. For an interactive version of the maps in Figure 9, see The Gas Index. (n.d.). *Electrification: Building electrification scenarios*. <https://thegasindex.org/electrification/>

66 American Council for an Energy-Efficient Economy. (2019). *State energy efficiency resource standards (EERS)*. <https://www.aceee.org/sites/default/files/state-eers-0519.pdf>

Figure 9. Emissions savings of switching from gas heating to traditional electric heat pumps, amplified by clean electricity

Note: Percentages represent reductions in space heating-related greenhouse gas emissions in the cities studied, comparing a business-as-usual projection for the electricity system with a scenario that includes emissions savings from city and state clean electricity targets.

Source: The Gas Index. (2020). *The United States' Natural Gas System Has a Serious Problem: It Leaks*

designated program administrators) to implement programs that improve the energy efficiency of utility customers and include mandatory targets for these programs.

Energy efficiency programs have been very effective at mobilizing efficiency and associated cost savings and benefits. Some states, however, have problematic rules that prohibit or discourage these programs from supporting switching from gas equipment to electrified substitutes, even when beneficial to do so.^{67, 68} These prohibitive rules result in gas utility energy efficiency programs that focus on replacing old and inefficient gas equipment with new more efficient gas appliances, ignoring opportunities to unlock greater benefits from switching to electrified appliances. Such an approach made sense in earlier decades when gas space and water heating was more efficient and environmentally friendly than the electric alternative — which at that time usually meant electric

resistance heating drawing power from a coal-dominated electric grid.⁶⁹ But in recent years, electric heating technology has improved. Space and water heating can increasingly be done cost-effectively with highly efficient electric heat pumps that are powered by a decarbonizing grid.⁷⁰ In short, programs with fuel-switching prohibitions lose opportunities to support beneficial electrification.

We recommend that a first step is to remove any prohibitions on fuel switching. After that, ideally, program rules should set out principles for identifying and exploiting beneficial opportunities to switch away from gas to electrification.

More specifically, we recommend the following:

- Remove any EERS rules that explicitly prohibit or discourage fuel-switching measures.
- Implement a fuel-neutral EERS or energy savings goal,

67 For example, the policy of Energy Trust of Oregon effectively bars the program from promoting fuel switching. The program administrator states that it “does not intend its incentives to affect fuel choice.” Energy Trust of Oregon Inc. (n.d.). *4.03.000-P Fuel-switching policy*. <https://www.energytrust.org/wp-content/uploads/2016/11/4.03.000.pdf>

68 Here, the adjective “beneficial” refers to electrification that leads to positive net benefits for society. In a series of publications, RAP has proposed a working definition of beneficial electrification. Under this definition, electrification must satisfy at least one of the following conditions, without adversely affecting the other two: (1) saves consumers money over the long run; (2) enables better grid management; and (3) reduces negative environmental impacts. For more discussion, see Farnsworth, D., Shipley, J.,

Lazar, J., & Seidman, N. (2018, June). *Beneficial electrification: Ensuring electrification in the public interest*. Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/beneficial-electrification-ensuring-electrification-public-interest>

69 Farnsworth, D. (2018, June 11). *Fuel-switching: We just did this in 1990, so why are we doing it again?* Regulatory Assistance Project. <https://www.raponline.org/blog/fuel-switching-we-just-did-this-in-1990-so-why-are-we-doing-it-again/>

70 Although improving, the economics of heat pumps for space heating is still an issue for cold climates, particularly when a building is not well insulated.

denominated in primary energy (Btu) or greenhouse gas emissions, rather than in units of specific fuel savings.⁷¹ A goal defined in this way will allow utilities and program administrators to look for the most cost-effective ways to save total energy used (gas plus electricity), even if that may mean increasing the amount of electricity consumed.

- Allow gas utilities to count a portion of fuel-switching measures toward efficiency targets based on the primary energy savings. Implement requirements and guidelines regarding the types of electrification measures that can be considered beneficial and that can be counted toward efficiency targets. For example, the program could require a minimum level of efficiency for heat pumps.
- Consider setting requirements within the EERS policy specifying that only specific types of measures are beneficial and thus qualify toward the target. For example, the program could require heat pumps installed through the program to be highly efficient, as determined by an expert organization like Northeast Energy Efficiency Partnerships.⁷²
- Encourage accurate and comprehensive measurement of benefits of efficiency measures. Strengthen requirements and guidelines for utilities to measure the full “layer cake” of benefits associated with measures that involve electrification, including public health benefits, such as improved air quality.⁷³ This analysis should also include an estimate of the benefits associated with operating electrified end uses flexibly; that is, the benefits of supporting grid integration of variable energy supplies such as wind and solar.⁷⁴ In addition, many efficiency programs only evaluate (or heavily weight) electricity savings accomplished in the first year of a measure. However, cost-effectiveness of some relevant measures for electrification of gas end uses, such as heat pumps for space and water heating, may be apparent only if life-cycle savings are considered, including the avoided gas infrastructure renewal costs. Therefore, it is important that benefits should be calculated in a way that reflects the full life-cycle savings of electrification.
- Review prohibitions against electric utility programs that increase load. In earlier decades, these rules were useful as a tool (albeit somewhat blunt) to restrain electric utilities from pursuing increases in inefficient end uses. Now some of these rules may stand in the way of electrification objectives, and it is time they are replaced by more finely tuned policies to promote overall efficiency and emissions reductions.⁷⁵
- Consider prohibiting any new deployment of fossil gas equipment under these programs. Given the trends outlined in Section II and the diminishing case for gas relative to electrified end uses, there is a case for focusing all programs on measures that do one of the following: (1) switch from non-electric to electrified equipment; (2) improve the efficiency of already electrified end uses; and (3) complement electrification (e.g., improvements in building insulation to improve the economics of heat pumps). This decision to prohibit deployment of gas equipment under efficiency programs will depend on the characteristics of the jurisdiction and the evolving costs of heat pumps and other electric alternatives, among other factors. The case for prohibiting new gas equipment

71 New York, Wisconsin and Massachusetts have fuel-neutral targets in their EERS policies. For example, see Public Service Commission of Wisconsin, Docket No. 5-FE-101 (PSC Ref.#: 343909), Quadrennial Planning Process III, Final Decision, June 6, 2018. apps.psc.wi.gov/vs2015/ERF_view/viewdoc.aspx?docid=343909. New York state in 2018 adopted a statewide cumulative annual site energy savings target that is defined in Btu. See New York State Research and Development Authority & New York Department of Public Service. (2018). *New efficiency: New York*. www.nyserda.ny.gov/About/Publications/New-Efficiency; and Dennis, K., Colburn, K., & Lazar, J. (2016). *Environmentally beneficial electrification: The dawn of ‘emissions efficiency.’* Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/environmentally-beneficial-electrification-dawn-emissions-efficiency/>

72 See Northeast Energy Efficiency Partnerships. (n.d.). *CCASHP specification & product list*. <https://neep.org/ASHP-Specification>

73 See Lazar, J., & Seidman, N. (2019). *Value added: Measuring the health benefits of the “layer cake.”* Regulatory Assistance Project. <https://www.raponline.org/blog/value-added-measuring-the-health-benefits-of-the-layer-cake/>; and Lazar, J., & Colburn, K. (2013). *A layer cake of benefits: Recognizing the full value of energy efficiency.* Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/a-layer-cake-of-benefits-recognizing-the-full-value-of-energy-efficiency/>

74 New York and California now include time- and location-specific avoided costs in cost-effectiveness analyses for energy efficiency programs. Shipley et al., 2021.

75 Farnsworth et al., 2019.

deployment is clear in places where electrification clearly meets the criteria for being beneficial.⁷⁶ In some cases, electrification is not yet beneficial. For example, cost-effective electrification of space heating is still difficult in cold climates, where there may still be justification for continued replacement of old gas furnaces with new more efficient ones that use the same fuel. We suggest that regulators should keep a keen eye on these trends as costs of electrification continue to fall rapidly and capabilities improve.

B. Expand and Coordinate Programs in Order to Reduce Costs and Improve Equity

Regulators can use finance and incentive policies to align the beneficial outcomes of energy efficiency programs, building shell improvements and equitable electrification with efforts to move away from reliance on gas resources. First, regulators can structure energy efficiency programs and incentives to encourage building shell improvements that support efficient electrification. Second, regulators can design energy efficiency programs to target retirement of inefficient gas appliances.

Promote Building Shell Improvements in Coordination With Heating System Replacement

Investing in building shell improvements and coordinating that investment with heating system replacement can improve the economics of electrification measures so that additional investments in building heating systems can be more effective at lower cost.⁷⁷

Well-insulated and well-sealed buildings are easier to heat and can be served by smaller, less expensive heat pumps. In addition, because such buildings also retain heat, they can be preheated at off-peak times when renewable energy is available or when electricity is less expensive and thereby

produce lower emissions on the grid.

We recommend that regulators expand programs for building shell improvements, including weatherization, insulation and better sealing.

We also recommend coordination of building shell improvement with heating system replacement. Building owners may face difficulties in financing building improvements and electrification simultaneously. This situation may exacerbate equity concerns if LMI customers are unable to pursue weatherization in conjunction with electrification. For example, take the case of installing a heat pump (large enough to heat a poorly insulated house) for \$14,000. Suppose installation of \$2,000 in building shell improvements reduces the heat pump size requirement and lowers the heat pump cost to \$8,000. In this example, the combined efficiency measure plus heat pump costs \$4,000 less than the heat pump alone.

Coordinating these efforts will be especially important for LMI and multifamily properties that often have poor insulation and building shells in need of maintenance. For example, the California Low-Income Weatherization Program is a comprehensive retrofit program that packages electrification measures with energy efficiency and solar to help owners and tenants save money and reduce GHG emissions. On average, projects in this program have seen energy costs reduced 24%. In cold climates, weatherization of the building envelope may be essential to making a heat pump effective at both saving energy and maximizing comfort.

Design Energy Efficiency Programs to Target Retirement of Inefficient Gas Appliances

A major barrier to increasing building efficiency is that upfront costs for heat pumps and other electric appliances can keep customers from unlocking long-term benefits of those options. Even where it is in the consumer's own interest to replace old and inefficient gas equipment with more efficient

76 For more information on the concept of beneficial electrification, see footnote 68.

77 This section draws on Shipley et al., 2021.

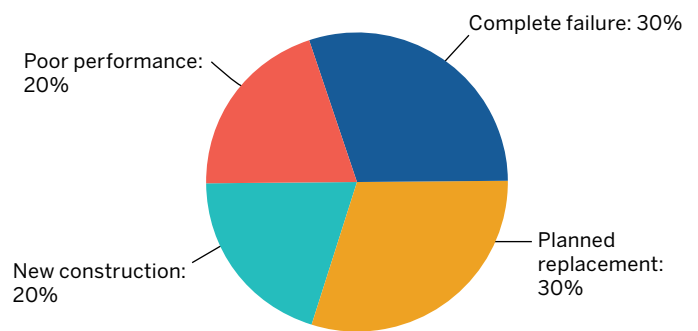
electric alternatives, often the costs are very front-loaded while the benefits accrue over many years.⁷⁸ LMI households often have older and less efficient appliances and lack financing options, financial flexibility and information. Renters generally do not have the time to recover investments or access to capital that owners might have.

Energy efficiency programs in different states offer various types of incentives, including financial incentives for customers to purchase certain types of products, appliances and equipment; building audits to identify cost-effective energy efficiency upgrades; help with installation costs for efficient equipment; training for third-party building engineers and contractors; and educational communication to customers to increase their knowledge of the benefits of energy efficiency. Incentives can come from utilities (in the form of rebates to consumers or upstream incentives to manufacturers or retailers), third-party energy efficiency providers or governmental agencies or programs (through rebates, loans or tax incentives). Policymakers and regulators should consider mobilizing additional resources to support targeted energy efficiency programs.⁷⁹

Several New England states have incentive programs to promote switching to heat pumps. Maine has incentives that target replacement of residential oil heating with electric heat pumps, providing residential and commercial customers with rebates to lower the upfront cost.⁸⁰ Massachusetts has had incentive programs for heat pumps since 2015.⁸¹

We recommend designing incentive programs to target retirement of gas equipment, with particular focus on

Figure 10. Reasons for purchasing a water heater



Source: U.S. Department of Energy. (2009). *New Technologies, New Savings: Water Heater Market Profile*

encouraging replacement before an existing gas furnace or water heater fails. In the case of water heaters, unplanned replacements due to poor performance or failure have been found to represent half of all purchases (see Figure 10).⁸² In an emergency situation, consumers often have little time or flexibility to investigate newer electrified options, including the electrical panel and circuit upgrades that may be required, and will simply install a new gas appliance as a replacement. Well-targeted early retirement programs for gas appliances would identify likely-to-retire opportunities based on age and level of efficiency and could be designed so that early retirements are done in shoulder seasons, when heating contractors, electricians and plumbers have time and capacity.⁸³ Such programs could help identify situations where electrical upgrades are also needed and ensure there is sufficient time for electric service upgrades.

78 Energy efficiency program designers have long grappled with similar problems. As a result, there is a significant amount of experience regarding possible solutions to mitigate upfront capital costs. Beyond utility and governmental incentives in the form of grants and rebates, there are other financing approaches, including on-bill financing, property tax financing (also known as property assessed clean energy financing, or PACE), performance contracting and energy efficiency mortgages. These types of programs can be particularly effective to unlock beneficial electrification measures for consumers who may balk at the upfront capital costs but otherwise have the ability to pay. See Hayes, S., Nadel, S., Granda, C., & Hottel, K. (2011). *What have we learned from energy efficiency financing programs?* (Report No. U115). American Council for an Energy-Efficient Economy. <https://www.aceee.org/research-report/u115>

79 These dedicated resources might come from a system benefits charge or revenue from a carbon emissions cap and trade program.

80 Rosenow, J., & Farnsworth, D. (2019). *Decarbonising heat in buildings: A comparison of policies in Germany and New England*. Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/decarbonising-heat-in-buildings-comparing-policies-germany-new-england/>

81 The Mass Save program is run by the utilities and overseen by the Department of Public Utilities and the Energy Efficiency Advisory Council.

82 U.S. Department of Energy. (2009). *New technologies, new savings: Water heater market profile*. https://www.energystar.gov/ia/partners/prod_development/new_specs/downloads/water_heaters/Water_Heater_Market_Profile_Sept2009.pdf. Although this particular survey is more than a decade old, it is still relevant: Consumer habits tend to change slowly when it comes to long-lived equipment.

83 For more discussion see Farnsworth et al., 2019.

C. Unlock Non-Pipeline Alternatives

Energy efficiency and electrification programs can be deployed to avoid unnecessary expansions or upgrades of gas infrastructure, such as new or bigger mains. For example, an expected increase in customer demand can potentially be met through building envelope improvements and installation of electric heat pumps in the premises of new and existing customers, instead of investments in expanded pipeline capacity. Doing so may result in lower costs and lower emissions, depending on local conditions. These non-pipeline alternatives are analogous to the non-wires alternatives in the power sector, where lower-cost measures such as energy efficiency substitute for expansion of distribution and transmission assets. In fact, the use of NPAs in the gas sector is currently being developed in New York, the same state that pioneered non-wires alternatives for electric utilities.⁸⁴

In New York, the interest in developing a framework for NPAs was partly in reaction to utility claims that supply constraints would prevent the utilities from being able to provide gas service to new customers.⁸⁵ In response, the New York Public Service Commission issued an order that requires gas utilities to develop a new framework for identifying, choosing and implementing NPAs and to formalize this framework as part of utility planning and operations. In New York, the interest in NPAs stems, in part, from a recognition that the costs of peak period gas supply are very high and that demand-side measures are likely to be very attractive in comparison.

Non-pipeline alternatives are good solutions to decrease dependence on gas and allow for opportunities for electrification. NPAs promise cost savings for consumers and utilities and benefits for society. NPAs can be part of a gas transition plan,

but the potential benefits make them worthy of consideration even for states that have not yet committed to a plan.

An initial small step would be to look for ways in which existing energy efficiency and electrification programs can help manage gas system infrastructure needs, on a case-by-case basis. As New York is finding, however, a more comprehensive framework is needed to take advantage of the potential benefits of NPAs. First, as part of the planning process, the utility should consider a full range of NPAs to meet any new demand or expected need for upgrades. Second, the utility should develop consistent criteria to evaluate different options for each specific case, allowing for comparison of the full societal benefits and costs of various traditional and NPA options. In the New York case, the commission called for the utilities to establish criteria “including reliability, practicality, environmental impact, avoided need for infrastructure investments, cost allocations over the appropriate time frame, emissions, and local community impacts.”⁸⁶ That process in New York is still under development as of the time of this writing.

D. Target Electrification Geographically to Enable Gas Infrastructure Retirement

As discussed above, states that commit to decarbonization and a gas transition planning process will likely arrive at plans that call for a gradual reduction in gas usage — and thus gas distribution network utilization. For example, a California Energy Commission report forecasts that the lowest-cost pathway to meet the state’s climate objectives will include high levels of building electrification and dramatically reduced gas consumption.⁸⁷ This outcome raises questions about how the size of the gas distribution network changes in coming decades. The California report points out that, at least in principle,

84 New York Public Service Commission, March 19, 2020.

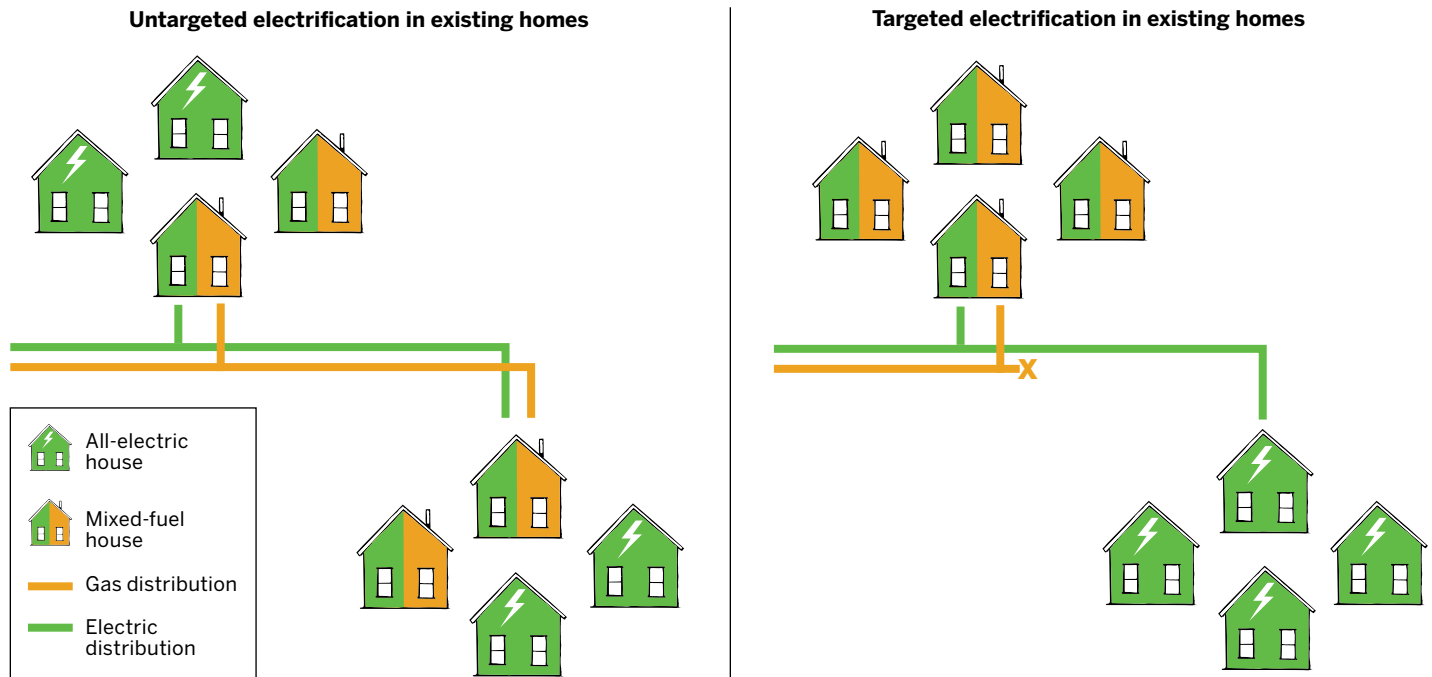
85 New York Public Service Commission, March 19, 2020.

86 New York Public Service Commission, March 19, 2020, p. 7. For discussion of how the utility can develop these types of criteria into a detailed screening

process for NPAs, see Hopkins, A., Napoleon, A., & Takahashi, K. (2020). *Gas regulation for a decarbonized New York: Recommendations for updating New York gas utility regulation*. Synapse Energy Economics, Inc. <https://www.synapse-energy.com/project/gas-regulation-decarbonized-new-york>

87 Aas et al., 2020.

Figure 11. Geographically targeted electrification to reduce gas infrastructure needs



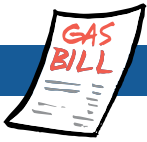
Source: Graphic concept inspired by Aas, D., Mahone, A., Subin, Z., Mac Kinnon, M., Lane, B., & Price, S. (2020). *The Challenge of Retail Gas in California's Low-Carbon Future: Technology Options, Customer Costs, and Public Health Benefits of Reducing Natural Gas Use*; graphic modified by RAP.

managing the transition carefully by targeting electrification efforts can lower the costs associated with the gas distribution system that remains in place during and after the transition. A smaller network should have lower O&M costs.

The main idea behind targeted electrification is to retire geographic areas of the distribution grid, area by area. First, an area of the distribution network is selected or targeted for retirement, and then an electrification program is implemented, with the goal of rapidly electrifying all gas usage in that particular area (see Figure 11⁸⁸), before moving on to the next area. Such an approach should allow a part of the distribution network to be retired, obviating the need for continued O&M spending in that area. In contrast, electrification efforts that proceed in a nontargeted, scattershot

fashion — with, say, neighboring buildings undergoing electrification in different years — will leave the distribution network in place at its current size for longer, with little reduction in O&M costs, despite the reduced gas throughput. This would leave fewer gas-using customers paying a greater share of system costs, creating upward pressure on rates. The California report suggests that a targeted approach could lead to substantial O&M savings and help manage the costs of a gas transition, although the authors caution that the cost savings will depend on careful study of suitable footprints for targeting. For that reason, states committed to gas transition should consider implementing targeted electrification and gas distribution retirement pilots early in the process.

88 Graphic concept inspired by Aas et al., 2020, Figure ES-2; graphic modified by RAP.



V. Reform Gas Rate-Making

Rate-making provides a distinct set of tools that regulators and utilities can use to manage the transition away from fossil gas. At the same time that gas planning provides an opportunity for regulators, utilities and stakeholders to take a broad and long view of a system in transition, and energy efficiency and electrification programs offer a way to facilitate that transition, rate-making can lower short-term barriers and enable an equitable and efficient long-term transition. This section provides background on gas utility rate-making, followed by recommendations for changes to current practices to (1) mitigate rate impacts in coming decades; (2) ensure costs are spread fairly and prices provide efficient customer incentives; and (3) reform the utility business model so that it relies less on continued capital expansion and more on customer objectives and public policy goals.

Rate-making for gas utilities follows the same high-level principles as rate-making for other utilities:

- Effective recovery of the revenue requirement, revenue stability and access to reasonably priced capital.
- Customer understanding and acceptance and bill stability.
- Equitable allocation of costs and avoidance of undue discrimination.
- Efficient forward-looking price signals to optimize usage.⁸⁹

These principles rarely all pull in the exact same direction and must be balanced appropriately and considered in the context of broader public policies. Furthermore, the overarching goal of economic regulation of natural monopolies is to mimic the pricing discipline imposed by competitive markets.

The application of these principles may be different for gas utilities because of issues that arise in the supply and delivery of gas. Technology and engineering constraints, as well as

resulting cost considerations, are naturally different than for other utilities, although there are frequent analogs. Both electric and gas utilities have peak capacities for every segment of the system: transformer limitations and line carrying capabilities for electricity; pipeline capacity for gas. Similarly, safe and effective operation requires that each system segment must stay within certain limits, measured by voltage and frequency for electricity and pressure for gas.

The steps of the rate-making process are the same for an investor-owned gas utility as for other investor-owned utilities:

1. Determine the revenue requirement.
2. Allocate costs to the different customer classes.
3. Design rates that customers ultimately pay.

Every jurisdiction has a long history behind the current rate-making practices for each of these steps for gas utilities. As with planning and program design, rate-making practices for gas utilities must be reexamined and reformed to deal with new realities.

A. Lower Rate Base and Decrease Risk of Rate Impacts

Lowering rate base, one of the key inputs to the capital payment portion of the revenue requirement, is a key way to prevent medium- and long-term rate impacts and reduce the risk of stranded costs. Doing so gradually in the next decade can prevent much bigger rate impacts in coming decades, while providing valuable regulatory flexibility and reducing the need to find outside funding sources.

Under traditional cost of service regulation, the revenue requirement for a gas utility is composed of many different

⁸⁹ A summary of the eight principles laid out in Bonbright, J. C. (1961). *Principles of public utility rates*, p. 291. Columbia University Press. <https://www.raponline.org/knowledge-center/principles-of-public-utility-rates/>

elements. At the highest level, this can be divided into three categories:

- Operation and maintenance expenses.
- The capital payment, composed primarily of depreciation expense and the return on investment.⁹⁰
- Taxes.

Of the components of the revenue requirement, the element of today's rates that has the biggest impact on medium- and long-term rates is the capital payment because of the way these payments are structured over long periods of time. Many utility capital investments are designed to last a long time, many decades, and cost recovery is typically spread over the asset's estimated useful life. In contrast, operating expenses are items that may change year to year, such as labor costs and fuel purchases.⁹¹ If a utility stopped its operations tomorrow, these are the costs that could be wound down relatively quickly, although certain expenses may be governed by contracts of various lengths. In contrast, utilities pay many different kinds of taxes, as well as franchise fees to local governments in many jurisdictions. Some of these taxes vary from year to year, such as sales and labor taxes associated with O&M expenses. Other taxes are linked to capital assets or land, such as property taxes, and income taxes are linked to annual net income, which is most strongly tied to the return on capital investments.

Several variables determine the total amount of the capital payment in an annual revenue requirement. Depreciation expense,⁹² sometimes called the return of a capital investment, is the estimated annual loss in value of the utility's capital investments. The return on a capital investment is determined by two major factors: the rate of return and the rate base. The rate of return is primarily defined by the interest rate on debt and the return on equity due to shareholders. The rate base is defined as the original cost of utility capital investments minus accumulated depreciation over the years that capital assets have been in service, often with other accounting adjustments.⁹³

In a typical gas utility rate case, many older capital assets will still be in rate base, although at a much lower net value than their original cost, since they have substantially depreciated. A utility may still be using assets that are fully depreciated for rate-making purposes, which add nothing to the capital payment but may have substantial maintenance costs or other issues because of their age. For new capital investments in the existing system (e.g., replacing an old main with a new state-of-the-art pipe), the entire cost of the investment, assuming it is approved by the regulators, goes into rate base.

For new extensions of the gas system, a portion of the new capital investment is frequently paid for by the newly connected customers, whether that is the service line for a specific customer or the distribution main that is most frequently shared among many customers. These terms are laid out in line extension tariffs. Any upfront payment from those customers is deducted from the original cost of the investment because the utility is not financing that portion of the investment. As a result, the size of those customer contributions directly influences the rate base. For these new extensions, the remaining portion of the capital investment does enter the rate base when the regulatory commission decides, implicitly or explicitly, that it meets the relevant criteria, such as "used and useful" or "prudent." This treatment of extensions allows the utility to put the depreciation expense and return on investment for that asset into rates, typically (but not always) in a rate case.

Investors then anticipate, based on an assessment of regulatory risk, that their investment will be paid off in full over the lifetime of the asset. Significant economic and policy shifts can change the expectations around these capital investments, and this risk is built into pricing returns on utility investments. When those circumstances result in an asset that is no longer of significant use to the system but is not yet

90 Although this terminology is complex, it can be analogized to a more typical loan or mortgage for everyday consumers. The depreciation expense is akin to the portion of a loan payment that goes to the principal, and the return on investment is the portion that goes into interest.

91 Maintenance expenses for capital assets can vary randomly and sometimes be deferred but never indefinitely unless a particular asset is no longer in service.

92 In part because of this terminology, depreciation expense is often categorized with other expenses, although that may be misleading for some purposes.

93 For more on this subject, see Lazar, J. (2016). *Electricity regulation in the US: A guide* (2nd ed.). Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/electricity-regulation-in-the-us-a-guide-2/>

fully depreciated, the assets can become stranded. An early retirement of a portion of the current gas system would almost certainly result in stranded assets, as discussed in previous sections. The stranded costs of that portion of the gas system are typically defined as the remaining book value of those assets, which is in turn defined as the original cost minus the accumulated depreciation of the assets over the years that the assets were in rate base. An asset need not be fully stranded to have an impact on ratepayers. As long as the capital payment for an asset or set of assets remains a part of the revenue requirement, it influences rates. If gas throughput goes down substantially, then mathematically either volumetric rates must go up or the remaining capital payment for those assets must be put in a different rate (e.g., customer charges).

Many different steps can be taken to lower rate base, thus mitigating long-term rate increases on gas customers who remain on the system in the coming decades and lowering the risk of stranded costs. For new investments, updated planning frameworks and improved programs, as discussed in the previous sections, can lower the total new investments made by a gas utility. If the level of new investment declines sufficiently, total rate base should start to trend downward. In addition, for any new gas system expansions, a utility can require additional contributions from new customers to lower the risk of future rate increases and stranded costs. Existing investments cannot be changed, but the remaining portion of those investments that is still in rate base represents a risk of future ratepayer impacts and stranded costs. Accelerating the timeline for depreciation is another significant option to pay off the costs of either existing or new investments more quickly. Taken collectively, these methods of lowering rate base should improve flexibility for regulators in coming decades and minimize rate impacts on future customers, as well as any need to seek alternative sources of funding.⁹⁴

Increase Customer Contributions to Line Extensions

One method that regulators can use to lower rate base, and thus mitigate rate impacts in coming decades, is to increase required payments for customers requesting new connections. These required payments should be calculated based on updated projections of expected customer gas usage and the likelihood of customer conversion away from gas, either partial or full, in the future.

As briefly discussed in Section III, every jurisdiction has rules for gas utilities that dictate the circumstances under which gas mains can be extended to provide service to new streets, new neighborhoods or new towns and a new customer can be added to an existing gas main. These rules provide a variety of terms and conditions that new customers must obey and limits on the amount of money that a gas utility can justify investing in new infrastructure.

These limits may often be rules of thumb but are generally dictated by the amount of gas that a utility can expect to sell to a new customer or set of customers.⁹⁵ Based on the new sales, the gas utility expects these new customers to contribute sufficiently to pay off a certain amount of new capital investment. By ensuring that new customers contribute to capital expenditures, the utility avoids unreasonable cross-subsidies from existing customers to new customers.

Extending the relevant gas infrastructure is typically allowed if it costs more than the relevant limits, as long as the potential new customers are willing to cover the remainder of the costs upfront. The simplest version of such a policy, aptly known as a contribution in aid of construction (CIAC), requires a new customer to pay for a portion of the line extension. The customer contribution to the infrastructure investment is deducted from the gas utility's rate base. CIAC policies have two important impacts. First, CIAC payments are an important cost allocation tool as they determine the cost split between the new and existing customers. Second, the size of CIAC payments can dictate whether potential customers

94 Securitization (discussed in the text box on Page 16) can remove a portion of rate base and convert it into low-interest debt guaranteed by ratepayers or potentially the government.

95 For some utilities, initial service contracts include minimum annual or average annual consumption requirements, which are another way of guaranteeing that a new customer is paying for the incremental costs and satisfying at least part of the assumptions behind the line extension policy parameters — if such a provision can be enforced.

ultimately choose to become gas utility customers at all.

A more complex version can take place when gas service is being introduced in a new area, where there are many potential customers but only one (or a small number) is connected initially. In such a scenario, the first customer in a new area may pay for the full cost of a system expansion but would receive a refund if and when additional customers connect to the system in that geographic area. This approach is called a customer advance and is also treated as a rate base reduction. As new customers join the system, the first customer gets a portion of their system prepayment back.⁹⁶ When such a policy applies, the first customer may be taking on a significant risk, betting that a sufficient number of other customers will connect to the system.⁹⁷

Yet another approach is a new customer rate surcharge for a certain number of years to cover the excess investment cost. Such an approach enables any new customers to avoid an upfront payment but also assumes that these customers will use sufficient gas for a long enough time to pay back those costs. These policies may come with contract commitments to that effect for those customers, which could lock in more gas consumption than otherwise necessary.

Given changing circumstances, there are two related issues that regulators may want to require gas utilities to reflect in updated calculations: (1) lower assumed gas usage and (2) a shorter assumed lifetime. Efficient gas appliances, improved building shells and the chances of conversion away from gas for one or more end uses all lower expected gas usage, and the probability that each customer will leave the gas system entirely is increasing with possibilities for electrification. Regulators considering these new realities may want utilities to consider higher CIAC payments and customer advances, as

well as the increased risk for customers who do give advances. Overall, such changes would likely result in somewhat fewer customers added to the gas system in the short term and additional customer contributions from those who are added. Such an outcome would result in constrained growth of the gas network, a lower rate base and lower potential rate impacts and stranded costs in coming decades.

Accelerate Depreciation Timelines

A second method regulators can use to lower rate base is to accelerate depreciation timelines. Accelerated depreciation timelines, for both previous and new investments, in the short term can greatly decrease the amount of remaining rate base in coming decades. In so doing, regulators can effectively allow for a modest rate increase today, over a large base of customers and usage, in exchange for lower rates in the future, when both the customer base and usage will likely be shrinking.

Many gas system capital investments are assumed to have extremely long asset lives, often 60 to 80 years for gas mains.⁹⁸ In other words, mains installed in the year 2000 are expected to be operational until at least 2060 and mains installed in 2020 to be operational until 2080 or 2100. These dates can be easily juxtaposed with GHG reduction policies that will require major reductions in the combustion of fossil gas between 2030 and 2050. The formulas used to recover these costs assume that the depreciation expense and return on investment can be recovered over the entire assumed life of the asset. The revenue requirement for any given year thus facilitates the recovery of a fraction of the cost of the asset.

This treatment is considered fair because all customers that use the asset over its lifetime will be paying for it, although current methods do typically frontload this cost

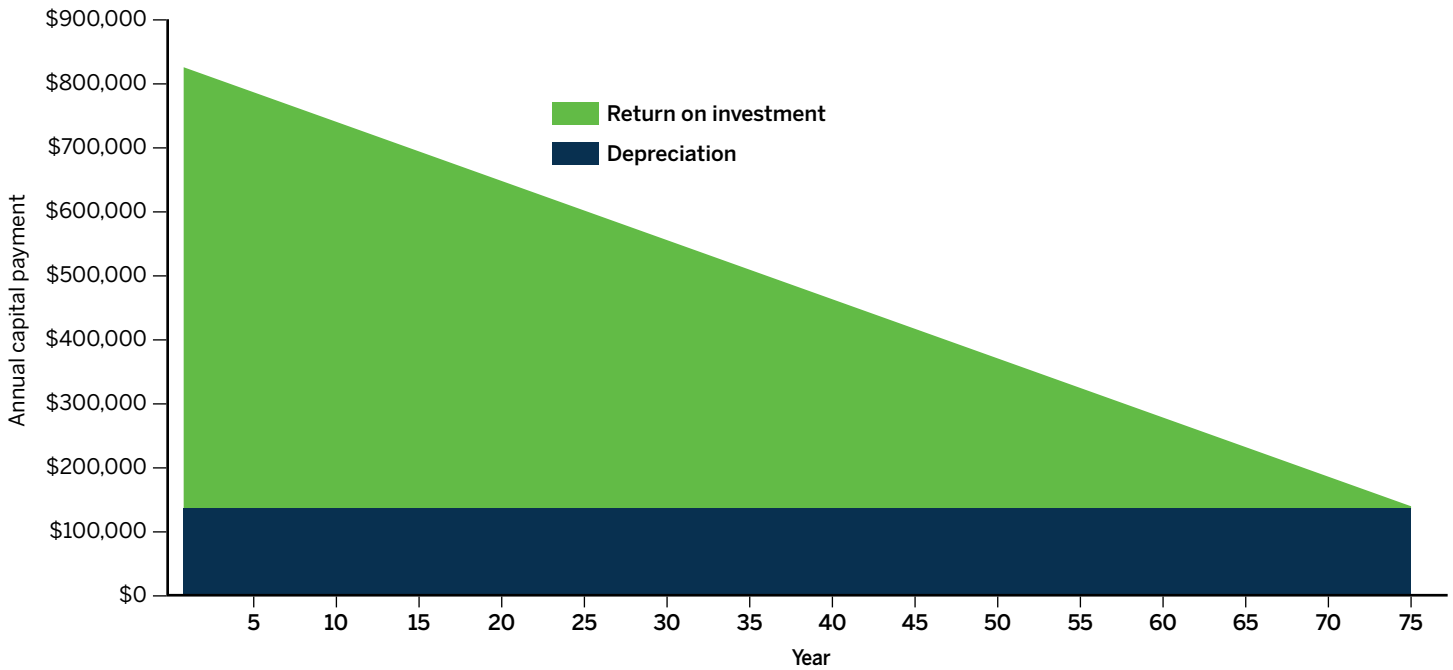
96 Some or all of that refunded advance may be contributed upfront by the additional new customers, or else the incremental consumption from those customers is estimated to cover that portion of the capital costs over time. In those two situations, the rate base ends up being slightly different. If the refunded advance is paid on a one-to-one basis by the additional new customer, utility rate base stays the same. But otherwise, utility rate base would increase.

97 In another variation, a whole group of customers (or a developer) is required to pay a customer advance to justify initial utility investment and risks. When the investment is completed and services are connected, the advances would be immediately refunded to the customers or the developer.

98 Southern California Gas Co. assumes 64 years for transmission mains and 68 years for distribution mains. Southern California Gas Co. (2017). *Revised*

SoCalGas direct testimony of Flora Ngai (depreciation). Before the Public Utilities Commission of the State of California, A.17-10-008, SCG-36-R. <https://www.socalgas.com/regulatory/documents/a-17-10-008/SCG-36-R%20Ngai%20Revised%20Direct%20Testimony.pdf>. Xcel Energy's Colorado subsidiary assumes 72 years for transmission mains, 72 years for metallic distribution mains and 68 years for plastic distribution mains. Alliance Consulting Group. (2016, September 30). *Public Service Company of Colorado gas technical depreciation update*. <https://www.xcelenergy.com/staticfiles/xcel-responsive/Company/Rates%20%20Regulations/Rate%20Cases/Attachment-MLO-7.pdf>. ConEd uses 70 years for cast iron mains, 90 years for tunnel mains and 85 years for all other mains. New York State Department of Public Service Case Nos. 19-G-0065 and 19-G-0066. Joint proposal, October 16, 2019, Appendix 11, p. 3. <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=19-G-0066&CaseSearch=Search>

Figure 12. Illustrative depreciation expense and return on \$10 million investment



recovery toward the beginning of the asset’s life because the typical practice in utility rate-making is to use straight line depreciation. Using this method, if an asset is worth its original cost in its first year in service and zero at the end of its useful life, annual depreciation expense is equal to the original cost divided by the number of years in the amortization period. Given that assumption, the payments for return on investment are relatively high at the beginning and decline linearly over time as the rate base is being paid down through the annual depreciation expense. Figure 12 illustrates typical trajectories for the annual depreciation expense and return on investment for a \$10 million investment that is amortized over 75 years at a 7% weighted average cost of capital.

In the modern world, where the gas system may need to change or shrink significantly, the physical capabilities of an asset like a gas main are no longer the only limitation to be considered. Obsolescence, due to technology, policy changes or changes in demand, is another typical factor in determining

an asset’s life for depreciation of a capital investment.⁹⁹ As a result, assumed lives for existing and new gas system assets may need to become significantly shorter for the purposes of depreciation. With straight line depreciation, there is a straightforward relationship between the amortization period and the depreciation expense. If the amortization period is cut in half, then the depreciation expense doubles.

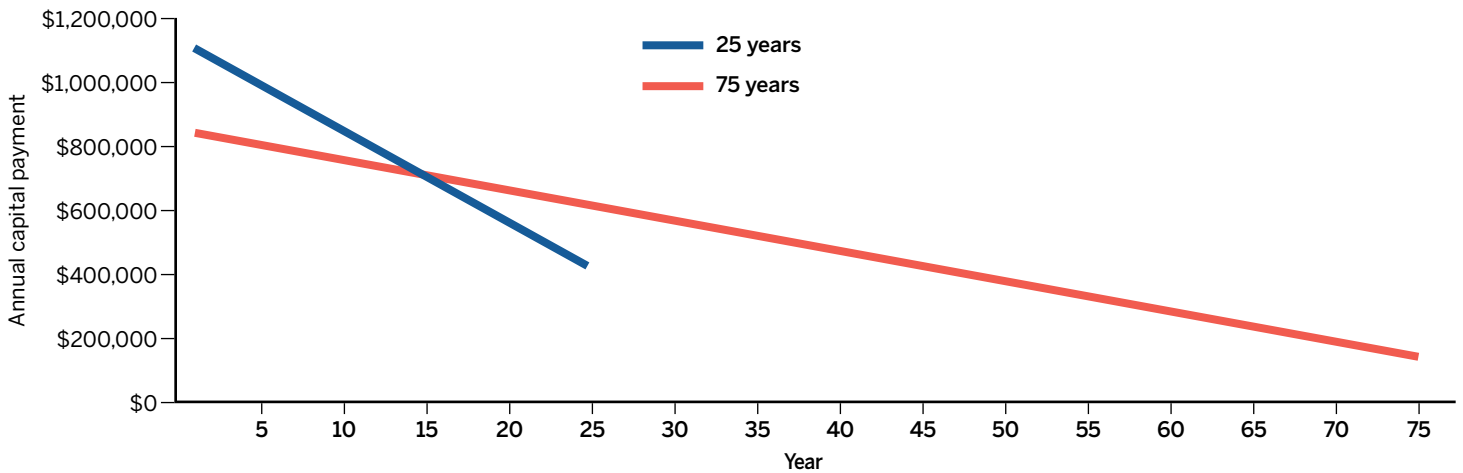
The change in depreciation expense is not the only change in the revenue requirement that takes place when the amortization period changes. The return on investment is based on net plant in service, which is defined as the gross original cost minus the accumulated depreciation.¹⁰⁰ As depreciation accumulates more quickly, the net plant in service goes down more quickly, reducing the amount of return on capital paid by ratepayers. This result is similar to a homeowner making an extra mortgage payment every year, which causes an additional upfront expense but can dramatically reduce the interest payments made over time and the debt duration.

99 The FERC Uniform System of Accounts for gas companies defines depreciation as “the loss in service value not restored by current maintenance, incurred in connection with the consumption or prospective retirement of gas plant in the course of service from causes which are known to be in current operation and against which the utility is not protected by insurance. Among the causes to be given consideration are wear and tear, decay, action of the elements, inadequacy, obsolescence, changes in the art, changes in demand and requirements of public

authorities, and, in the case of natural gas companies, the exhaustion of natural resources.” Uniform System of Accounts Prescribed for Natural Gas Companies Subject to the Provisions of the Natural Gas Act, 18 C.F.R. § 201, Definition 12.B.

100 This assumes zero net salvage costs, as do the quantitative examples in this section.

Figure 13. Illustrative trajectory of capital payments for two amortization periods



Considering the total capital payment (both depreciation expense and return on investment) collectively reveals a more complete picture. Figure 13 shows two different repayment trajectories, 75 years and 25 years, for a \$10 million capital investment at a 7% weighted average cost of capital. Shareholders should be equally well off with either of these payment trajectories.

Even though the depreciation expense is three times higher with a 25-year amortization period, the overall capital payment is only 32% higher in the first year. This gap between 25-year and 75-year capital payments shrinks steadily over time, and the overall capital payment is lower starting in

year 16 for the shorter amortization period.

Many capital investments in rate base, particularly long-lasting assets, are not new and have already been partially depreciated. Take, for example, a gas main put into service at the beginning of 1986 with an asset life of 75 years, meaning it would be fully depreciated and paid off in 2060. This asset has already been depreciating for 35 years and, at the end of 2020, has 40 years left on its expected life. This asset's expected remaining life could be shrunk to 25 years, meaning an expected retirement in 2045. Figure 14 shows this scenario, again for a \$10 million capital investment at a 7% weighted average cost of capital.

Figure 14. Illustrative capital payments with change in amortization period for partly depreciated asset

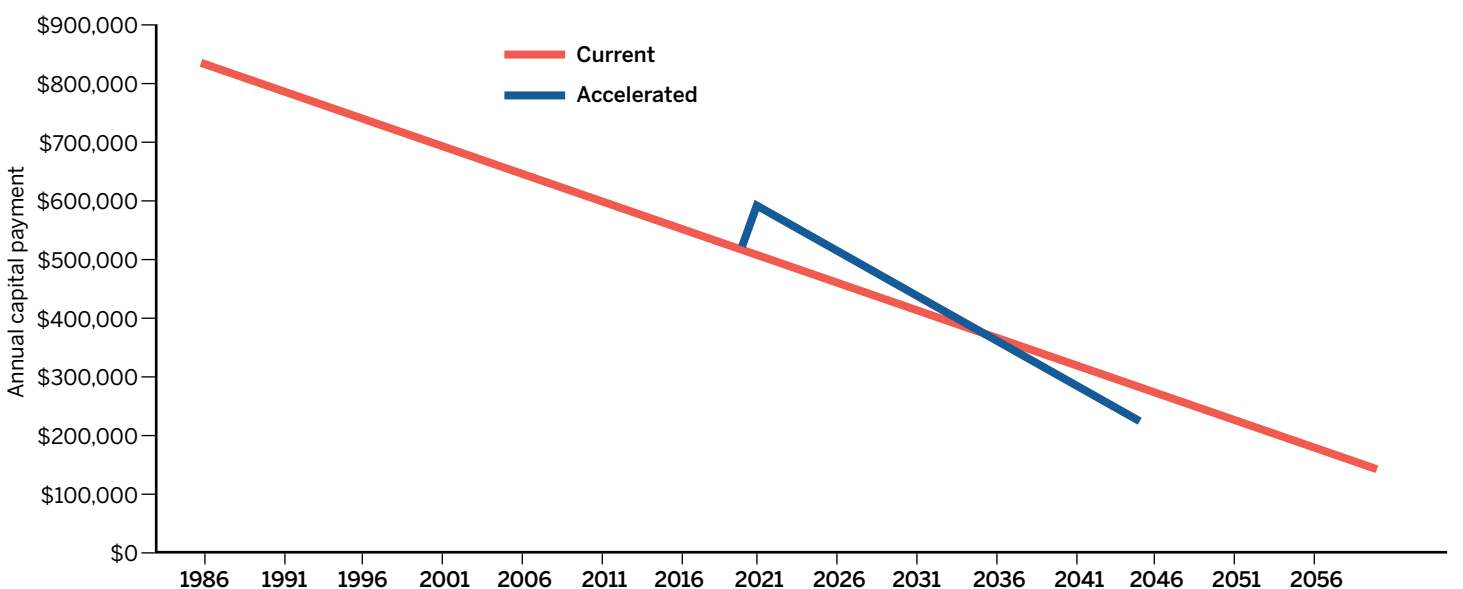
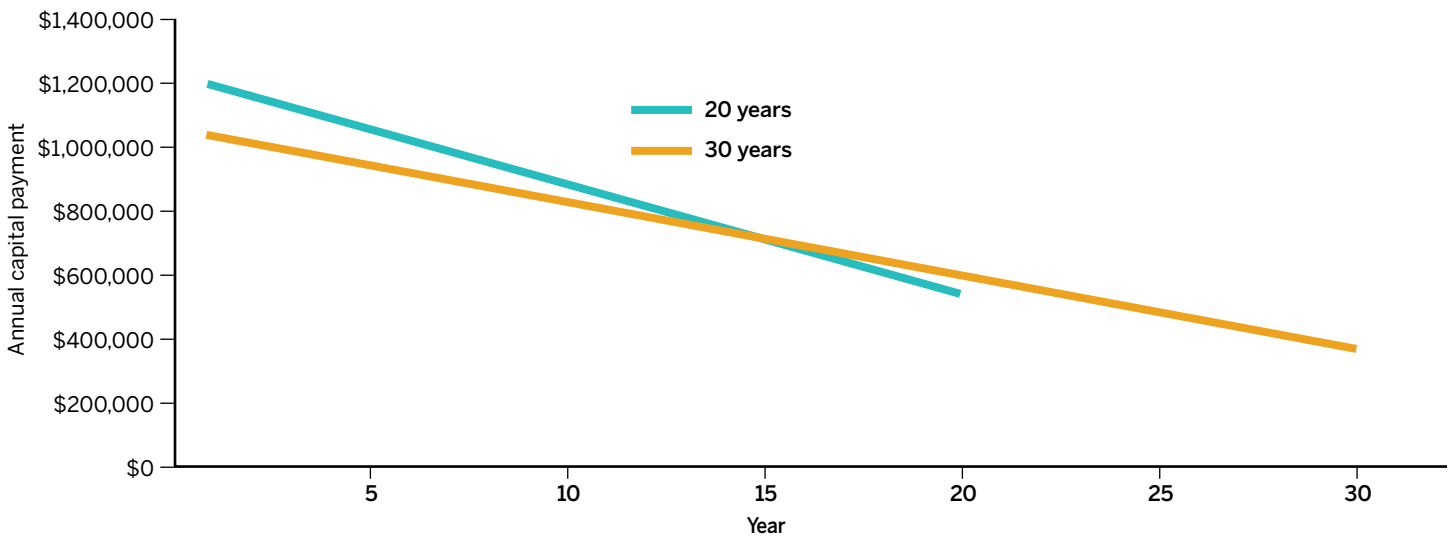


Figure 15. Illustrative capital payments for two amortization periods



This change results in a capital payment that is 17% higher in 2021 for this asset. Once again, however, the gap shrinks quickly, and ratepayer costs are lower starting in 2036 with the shorter amortization period.

Not all of the changes to capital amortization periods would need to be so substantial. Some shorter amortization periods may not need to change at all. Some assets with amortization periods of 20 to 40 years could be decreased to 15 to 30 years. Figure 15 shows different repayment trajectories, 30 years and 20 years, for a \$10 million capital investment at a 7% weighted average cost of capital.

Even though the depreciation expense is 50% higher with the 20-year amortization period, the overall capital payment is only 16% higher in the first year, and the gap shrinks over time in future rate cases.

When implemented in a rate case, changes to depreciation rates and amortization periods will reflect a mix of these different circumstances. A simplified illustrative scenario provides

some intuition about how this may work in the real world.

Table 1 shows four categories of illustrative capital investments.

Table 2 on the next page shows the difference in the capital payment for each category of capital investments, as well as the total. In this illustrative example, a significant acceleration of depreciation leads to a 19% increase in the capital payment in the first year (2021).

Such changes to the amortization period only affect a portion of the rate, meaning that the overall impact will be a significantly lower percentage. If the capital payment for the gas LDC represents only a third of overall annual gas bills, with the other two-thirds primarily represented by gas supply costs, delivery O&M costs and taxes, then the overall bill impact would be only an approximately 6% increase.

Other related changes would likely occur to the revenue requirement as a result of accelerated depreciation. The above illustrative analysis does not include any changes to the timing of net salvage costs. In some jurisdictions, gas pipe

Table 1. Illustrative capital investments undergoing accelerated depreciation

	In-service year	Original cost	2021 remaining book value	Amortization		
				Original end date	New end date	Change in length
Recently added long-term assets	2016	\$300,000,000	\$280,000,000	2090	2045	45 years
Older long-term assets	1986	\$500,000,000	\$266,666,667	2060	2045	15 years
Medium-term assets	2011	\$200,000,000	\$150,000,000	2050	2040	10 years
Short-term assets	2016	\$100,000,000	\$75,000,000	2035	2035	None

Table 2. Effect of accelerated depreciation on capital payment in first year

	Status quo capital payment	Accelerated depreciation capital payment	Percent change
Recently added long-term assets	\$23,600,000	\$30,800,000	31%
Older long-term assets	\$25,333,333	\$29,600,000	17%
Medium-term assets	\$15,500,000	\$18,000,000	16%
Short-term assets	\$10,250,000	\$10,250,000	0%
Total	\$74,683,333	\$88,650,000	19%

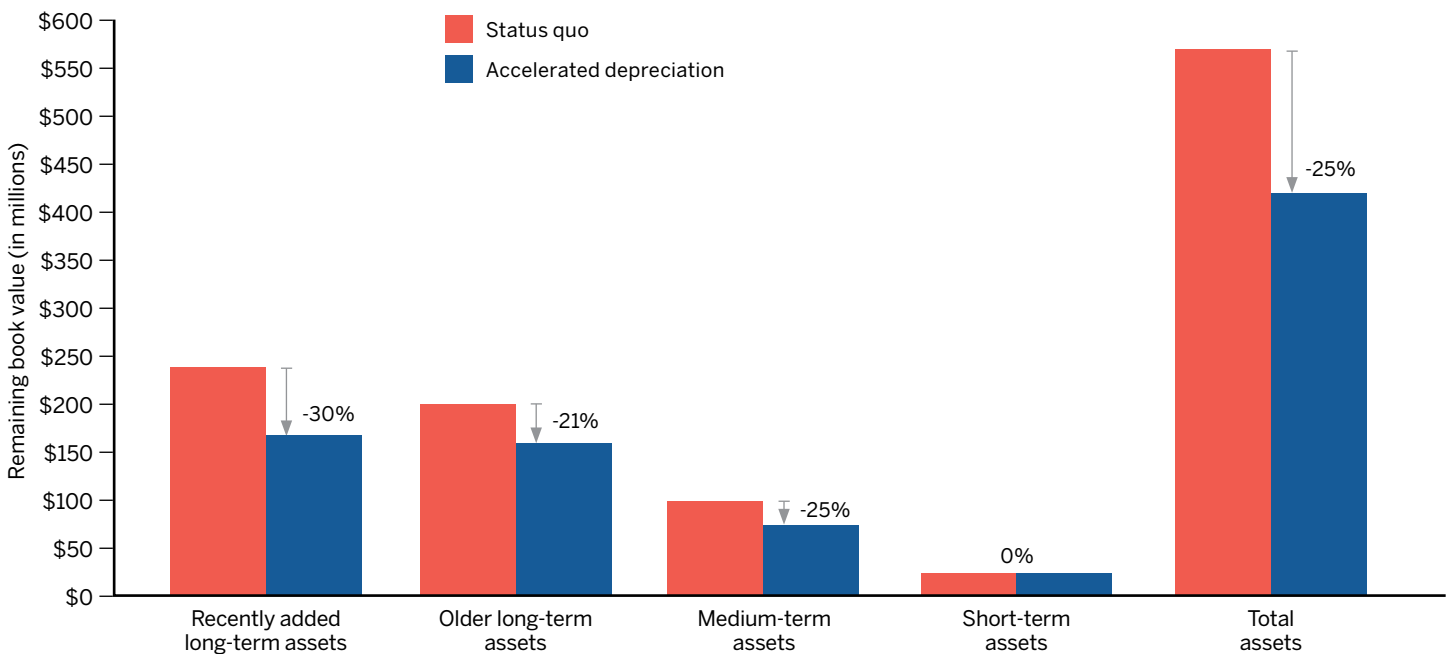
is abandoned in place, which means minimal salvage costs, although other governments may require removal for safety purposes. For any gas mains that are removed, the expense can be significant because of costs incurred digging up and removing the pipe and restoring the surface to its original condition. To the extent that removal is required sooner, those costs will have a higher net present value.

In the other direction, accelerated recovery of capital

assets should lower the uncertainty of capital recovery — thus lowering the risk that needs to be incorporated into the return on equity or allowing for a higher debt-to-equity ratio in the capital structure, either of which would lower the revenue requirement.¹⁰¹

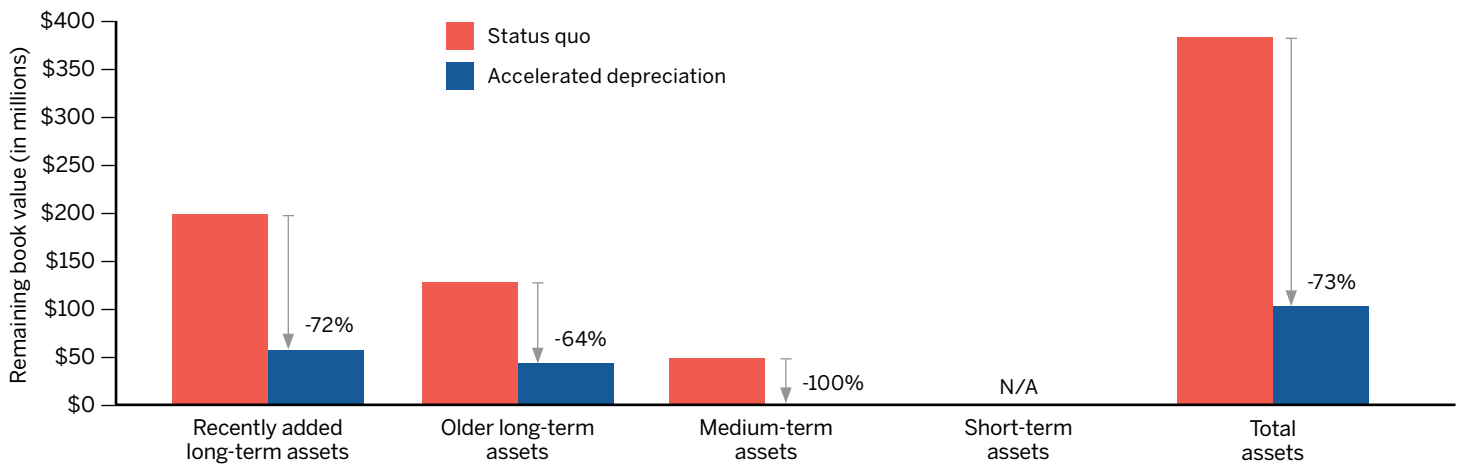
Using the illustrative scenario in Table 1, Figure 16 shows the remaining book value, one measure of potential stranded costs, in 2031 under accelerated depreciation. Although the

Figure 16. 2031 remaining book value for pre-2021 investments under two depreciation scenarios



101 Another complexity is a reduction in accumulated deferred income taxes over time for some utilities. In some jurisdictions, where the taxes included in rates are exactly those paid by the utilities, this consideration is not of concern. Many utilities take advantage of the tax code with accelerated tax depreciation, however, which allows deferral of income taxes — effectively a zero-interest loan from the government. These utilities then use longer depreciation timelines for defining the depreciation expense in the revenue requirement. This income tax deferral is accounted for in rates either as a reduction in the rate base or as zero cost capital for inclusion

in the weighted average cost of capital. Depending on the technique used, accelerated depreciation for rate-making purposes would be represented as either a partially countervailing increase in rate base or a reduction in zero cost capital. In either case, tax deferral, and its impact on rates, is a factor that should be analyzed for specific proposed changes for each utility. As an administrative matter, it would be quite simple if the accelerated tax depreciation rates for new investments were used as the book depreciation rates for rate-making.

Figure 17. 2041 remaining book value for pre-2021 investments under two depreciation scenarios

decrease in remaining book value varies by category, the overall reduction in remaining book value is 25%, approximately \$140 million.

Figure 17 shows the same scenario in 2041.

By 2041, 20 years of accelerated depreciation has a major impact on remaining book value, a reduction of 73%, or around \$280 million. By 2050, all these assets have been completely paid off in the accelerated depreciation scenario, but under status quo depreciation policies, there would still be \$240 million in potential stranded costs for these assets. If shareholders do not bear these costs, or another source of funding is not found, remaining ratepayers must bear them. If the number of remaining customers and sales have shrunk significantly, rates increase significantly because those costs are spread over lower billing determinants.

The major benefit of an accelerated depreciation approach would be to greatly lower the potential stranded costs for existing assets and risks of rate increases to remaining ratepayers from declining throughput and thus to increase regulatory flexibility over time. Existing assets can be paid off at a much faster rate, so the primary risk lies with new investments. Accelerated depreciation would also raise the bill impacts of new investments, although those investments can also be addressed through a reformed planning process and improved

programs as discussed earlier in this paper. Each jurisdiction, and potentially every utility, likely will need to analyze these issues in detail, since the existing regulatory requirements and the mix of capital assets involved will differ.

B. Adopt Efficient and Equitable Rate Structures

Rate structure encompasses two parts of the rate-making process: cost allocation and rate design. Collectively, these two steps determine how costs are shared across all gas utility customers and provide the prices that shape customer behavior over time. At a high level, improved cost allocation can ensure equitable contributions across customer classes, while rate design can help lower the need for new system capacity investments, equitably split costs within customer classes, and be a part of efficient customer incentives to switch from gas to cleaner alternatives. RAP has written extensively about cost allocation and rate design, primarily in the context of electric utilities.¹⁰² The principles for gas utilities are largely the same, but there are important differences in the engineering features of the gas system as well as the underlying structure of customer demand.

Reforms to cost allocation and rate design can help enable

102 See Lazar, J., Chernick, P., Marcus, B., & LeBel, M. (Ed.). (2020). *Electric cost allocation for a new era: A manual*. Regulatory Assistance Project. <https://www.raonline.org/knowledge-center/electric-cost-allocation-new-era/>; and Lazar, J., & Gonzalez, W. (2015). *Smart rate design for a smart future*. Regulatory Assistance Project. <https://www.raonline.org/knowledge-center/smart-rate-design-for-a-smart-future/>. In addition, cost

allocation is discussed at some length in NARUC Staff Subcommittee on Gas. (1989). *Gas distribution rate design manual*. National Association of Regulatory Utility Commissioners. <http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7B04381803-1D3A-4CD7-BBE3-64EDB16835C0%7D>

a gas transition in several ways. Existing cost allocation and rate design practices may already be leading to inequitable contributions to system costs and inefficient customer incentives. Reforming these techniques can remedy inequities in our current system. In addition, modern analytical techniques provide a range of more flexible and accurate tools that can affirmatively reduce system costs going forward and be accurately updated over time as the gas system and customer usage patterns change.

One important principle is that a substantial portion of system costs are driven by peak customer demand. For the gas system, peak is largely defined by the highest demand days, unlike the electric system, where it is typically defined by the highest demand hours. This difference is in part because more gas can be stored near customers on the gas distribution system, such as through linepack, wherein gas molecules are stored in the pipeline under high pressure, enabling it to contain a high volume of gas. With storage, the gas system does not need to react as quickly to changes in consumption as the electric system does. Conversely, in some ways the gas system cannot react as quickly as the electric system. In contrast to voltage and frequency changes, which are more or less instantaneous, the gas system's response to changes in consumption requires having the necessary supplies in the right locations. Taking full advantage of the gas system's attributes thus requires planning and efficient advance storage of gas in locations where it may be needed.

Many gas end uses are year-round, such as water heating, cooking and drying clothes; collectively these end uses have a high annual load factor. These uses are cheaper to serve per unit of consumption. In the winter season, significant additional heating demand is added on top of base usage. This winter heating usage has a lower annual load factor and is more expensive per unit of consumption.

The peak day or days for a gas utility typically come amid longer stretches of cold weather. Improved building shells can help retain heat and lower the need for lengthy peak consumption periods for individual customers, but these improvements do not necessarily change the basic pattern. In conjunction with the storage features of the gas system, load patterns dictate the much longer peak windows for the gas system.

Extremely cold days require provision of adequate gas supply, often from storage or liquified natural gas, and adequate distribution capacity, even though this capacity is needed only a few days of the year. This extreme weather usage is the most expensive to serve per unit of consumption.

In the broadest sense, the economic efficiency of a rate structure is reflected in customer responses to prices. As a result, regulators might want a system where customers' response to reduce their own bills is the same response that would minimize system costs. In this context, usage-based pricing provides an incentive to lower consumption, and time-varying pricing (to the extent that it is feasible) is an incentive to lower usage in particular time periods. In contrast, customer charges, fixed monthly fees that cannot be avoided without disconnecting from the system, provide a different incentive. To the extent that customers can adopt end uses that do not rely on delivered gas, higher customer charges encourage existing customers to disconnect or prospective new customers not to connect at all, especially if their usage levels are or would be low.

While equity in the allocation of costs is a core principle for both cost allocation (among rate classes) and rate design (within rate classes), bill impacts on LMI gas customers are a key dimension of equity as well. Regulators may want to avoid substantially adverse impacts on any LMI customers who cannot affordably convert to a zero-carbon alternative or even propane as a transition measure.

Cost Allocation Between Rate Classes

Many of the general principles for cost allocation are shared by both gas and electric utilities, so high-level recommendations are relatively similar. Good data collection forms the basis of good cost allocation practices, including customer usage data (either for all customers or sampled) and detailed cost data. Customers are sorted into classes ideally meant to distinguish them based on separate cost characteristics, which can be fairly translated into different rate structures and levels. In practice, customer classes often primarily reflect distinctions that are easily administered, such as residential versus commercial. Some customer class distinctions may be made based on the gas uses on-site,

such as a residential heating customer class.

In addition, some customer classes may reflect special customer characteristics, agreements or rate structures. For example, a customer class could be defined by interruptible service, where customers agree that their gas service can be shut off to provide for broader system needs. Customers on interruptible service typically have alternative fuel sources for the relevant end uses or are able to curtail their activities, so they are less reliant on gas delivered by pipe at any moment in time. In exchange for the agreement to be interrupted, these customers get lower rates because they are allocated fewer capacity costs, which reflects the fact that they get cut off at system peak times and thus do not drive peak costs. They do, however, use system capacity and are generally required to make a significant contribution to system costs over the course of a year.

In the traditional cost allocation process, the costs in the revenue requirement are functionalized and classified in separate analytic steps before final allocations are made to each customer class. The recommendations that follow lead to a fairer split of costs among classes than older methods and can also be used to underpin more efficient rate designs that properly reflect cost causation, thus leading to more efficient customer incentives.

We recommend the following:

- Customer-related costs should be determined using the basic customer method, where only the individual cost of connection (e.g., the service line and final regulator), billing and certain customer service expenses should be allocated on a per-customer basis. Furthermore, many of these costs will be more expensive for larger customers, so special cost studies can be warranted to determine the proper differentials.
- Shared capacity costs (transmission, distribution and storage) should be split between energy-related costs and peak-related costs, using the average-and-peak method — where the system load factor defines the percentage of shared capacity costs that is allocated on the basis of energy throughput, and the remainder is allocated based on a metric of peak demand — or more sophisticated time-based methods.

- Fuel commodity costs should be allocated based on time-based energy throughput methods. As a practical matter, the relevant cost causation basis for customers receiving gas supply from the local distribution company is the procurement process, which is often seasonal and reflects differences in costs across the procurement periods.
- Administrative and general costs should be apportioned across usage metrics based on revenue, or across all allocation metrics based on revenue.
- Program costs, such as efficiency and beneficial electrification programs, can be allocated based on the benefits provided by the investments. For example, the program costs that result in reduced needs for capacity investments can be allocated in proportion to the system benefits that accrue to each class. Program costs can also be allocated based on program participation. The costs of beneficial electrification programs can be fairly divided between gas and electric utility customers within a jurisdiction, since both sets of customers typically benefit. Such allocation is most easily administered if gas and electric service territories are strongly overlapping or if these programs are run by statewide third-party entities.

Many utilities and some analysts prefer to use either the minimum system or zero intercept methods, which include a substantial part of shared distribution capacity costs, to estimate customer-related costs. These methods overstate customer-related costs, however, because they do not properly reflect the costs of adding an additional customer. Adding one more customer on an existing main only incurs minimal costs for the connection to the customer and billing, which is calculated properly using the basic customer method. The decision to build the distribution system, guided by the line extension policy, is largely driven by expected sales, not by the number of customers or customers' willingness to shoulder additional costs themselves.

Once it is understood that each industrial customer drives significantly more shared system capacity costs than an individual residential customer, it is easy to see that the number of customers is not the key driver of system costs. Instead, the key drivers of shared delivery system costs are the overall patterns of usage across all customers and the geographic dispersion

of those customers. Cost differentials due to differing usage patterns of individual customers can be reflected in both cost allocation and pricing, to the extent metering and billing systems allow. Locational distinctions often cannot be reflected in rates because of the convention of postage stamp pricing, where the utility offers one rate to all customers in a class without any geographic distinctions.¹⁰³

In some jurisdictions, many costs, particularly shared capacity costs, are apportioned nearly entirely on the basis of the peak day demand. As a result, costs are heavily allocated toward customer classes with large winter heating usage, such as residential customers. Instead, as a substantial portion of capacity costs are incurred to provide year-round service, only the additional cost of upsizing capacity and certain storage facilities for peak demand should be allocated specifically to peak times. This reality dictates that time-based allocation methods are superior to methods that rely entirely on either peak demand or annual consumption. One simple time-based method is the aforementioned average-and-peak.¹⁰⁴ When applying this method, a strongly seasonal demand shape, with a lower overall system load factor, results in more costs allocated based on the peak. Sophisticated versions of time-based allocation methods are feasible with more complete load data enabled by improved metering where it is available, better system cost data and improved analytical tools. These methods better reflect cost causation, lead to fairer results and enable more efficient time-varying rate designs.

Bill impacts for different categories of customer can be considered in either the definitions of customer classes or various methods for allocating costs among classes. In some service territories, industrial customers are able to choose between gas service from the LDC or directly from the federally regulated transmission system. As a result, methods that increase cost allocations to industrial customers may not yield

their intended results because those customers could bypass the LDC instead.

In addition, bill impacts to LMI residential customers, particularly those who use gas heating and cannot affordably switch to another fuel, should be examined closely. Customers can be shielded from undue burdens in several ways, such as dedicated rate classes for either residential heating customers or LMI customers. Rate design, which we will discuss next, is another tool that can be used.¹⁰⁵

Rate Design

Each customer class has its own rate design and sometimes one or more subclasses with different rate designs. Within a customer class, sometimes one or more rates can be optional as well. The key is to move customers toward more efficient overall pricing structures while satisfying the related principles of customer understanding and fair bill impacts. There is an intertwined relationship among those three principles: Customers can respond to efficient prices only if they understand them, and a lack of understanding of new pricing structures can lead to unfair and unexpected bill impacts. Meeting these pricing principles should lead to more efficient customer behavior, thus helping to lower system costs and preventing unfair and inequitable bill impacts over the course of the transition.

As a result, regulators can take into account different levels of sophistication among customer types and offer bill protections of various kinds to less sophisticated customers. Gradualism in this respect can be crucial, with new kinds of rates introduced in a deliberate manner over a period of several years or over multiple rate cases, and customer education and outreach programs are also key. Larger commercial and industrial customers often have dedicated energy managers or can afford energy management technology to control the

103 Line extension policy often does dictate cost differentials based on location, of course, and there are other exceptions to this general rule.

104 See NARUC Staff Subcommittee on Gas, 1989, pp. 27-28. Many different jurisdictions use average-and-peak for allocation of distribution capacity costs. For example, regulators affirmed its use in a natural gas rate case for Consumers Energy Co. See Michigan Public Service Commission, Case No. U-18124, Order on July 31, 2017, pp. 113-14. <https://mi-psc.force.com/sfc/servlet.shepherd/version/download/068t0000001UUAgAAO>.

As of 2016, 20 states used either basic customer or the average-and-peak method, according to Minnesota regulators. See Minnesota Public Utilities Commission, Docket No. G-008/GR-15-424, Order on June 3, 2016, pp. 53-54. <https://www.edockets.state.mn.us/EFiling/edockets/searchDocuments.do?method=showPop&documentId={92AB0946-4F77-4A70-BF38-7D36F88AC979}&documentTitle=20166-121975-01>

105 Rate or bill discounts for LMI customers may not be allowed in all jurisdictions without statutory amendments.

usage of different end uses over time. Small customers cannot afford to pay dedicated staff, and many energy management technologies are cost-prohibitive as well, although this will likely change over time.

A key objective should be improved seasonal and monthly pricing variation for all customers, while keeping in mind that high-cost periods driven by system peaks are often the times of greatest usage for residential heating customers. This is simple enough for every jurisdiction and practically all types of customers.

Regulators should require increasingly granular pricing for sophisticated customers as allowed by utility metering and billing systems. Currently, larger businesses are most likely to fall into this category, but more granular pricing could be extended to smaller businesses and larger residential customers over time. Regulators can consider a number of options for more granular pricing for the highest demand days:

- Demand response programs.
- Critical peak pricing.
- Direct load control.
- Interruptible rates.

These options are interrelated. Direct load control, such as via smart thermostats, gives the gas utility the option to turn off or turn down individual end uses, whereas an interruptible rate gives the utility that option for all of the customer's usage. Similarly, a demand response program may only apply to one end use for a customer, whereas critical peak pricing applies to all customer usage when the system is under severe stress.

As above with cost allocation, a regulator should pay attention to the possibility that large customers will bypass the LDC to get service at the interstate transmission pipeline level. Relatedly, it could be an issue in some jurisdictions that the customer response to high peak gas pricing would be additional reliance on electricity from the grid. For example, a combined heat and power gas customer could reduce or stop its electricity generation in favor of taking electricity from the grid. In some jurisdictions, electricity rate designs (e.g., traditional demand charges) may discourage this type of short-term reliance on the electric system, and there may be tensions

between electric system needs and gas system needs.

Fair and efficient pricing for less sophisticated customers, particularly those who rely on gas for heating service, should almost certainly have a simpler structure. The major tension is that charging higher rates at times of system stress almost invariably would fall at times that heating demand is the highest — meaning long stretches of winter cold weather. Doing so would likely cause higher bills for customers who cannot afford to weatherize their homes or could tempt people on fixed incomes to keep the heat so low that it risks their health. Of course, improved energy efficiency and electrification programs can significantly ameliorate this impact, particularly if those programs are well designed for low-income and vulnerable populations. Rates for these customers should still have seasonal and monthly variations and could potentially have simpler time-based structures to shape residential gas demand, as well as peak-time rebates or direct thermostat controls. More sophisticated rates could be offered to these customers as an option, with, potentially, additional customer protections, such as a one-year hold-harmless provision after adoption.

Another measure to address related efficiency and equity concerns could be an inclining block structure, where the initial block of low-cost gas in the winter could be sized to cover the space heating needs for a moderately sized residence of average efficiency. A higher-priced tail block would still retain good efficiency incentives for larger and less efficient homes, as well as homes with gas usage beyond space heating. Regulators could build off this concept in different directions. A particular rate could be made available to a limited subset of residential customers, such as LMI customers or LMI gas space heating customers.

The rates charged by the Palo Alto municipal gas utility in California are an example of this type of design (see Table 3 on the next page).¹⁰⁶ For volumetric distribution pricing, there is a summer seven-month seasonal period with a modest initial block of 20 therms at a relatively low distribution price and a more expensive tail block rate. In the winter months, the initial block at a low price is much larger

106 City of Palo Alto. (n.d.). *Residential gas service: Utility rate schedule G-1*. <https://www.cityofpaloalto.org/Departments/Utilities/Customer-Service/Utilities-Rates/Residential-Rates>

Table 3. Residential distribution rates for municipal gas utility in Palo Alto, California

	Summer (April 1 to Oct. 31)	Winter (Nov. 1 to March 31)
First 20 therms	\$0.5038 per therm	N/A
First 60 therms	N/A	\$0.5038 per therm
Additional usage	\$1.288 per therm	\$1.288 per therm

Source: City of Palo Alto. (n.d.). *Residential Gas Service: Utility Rate Schedule G-1*

at 60 therms, with the same higher tail block price. Supply charges vary monthly based on market prices, with no tiering.

Last, discounts for LMI customers can be applied to the otherwise applicable rate designs, although such an approach may not be allowed in certain states. In other states, however, discounted or eliminated customer charges or percentage reductions based on the bill total are methods to ensure that LMI customers are not unduly affected by changed rate designs.

C. Change Utility Incentives

Another consistent feature of traditional cost of service regulation is the incentives provided to a utility and particularly the ways that management is able to increase shareholder value. In advance of a rate case, utility management can maximize shareholder value by adding more prudent capital investments, the explicit source of profit in the revenue requirement calculation. This is known as the Averch-Johnson effect.¹⁰⁷ Separately, there are two primary ways that utilities can earn additional net revenue between rate cases: increasing sales and cutting costs. In a situation where expansion of utility service is unambiguously socially desirable and there is little concern over external costs of production or consumption, this set of utility incentives can be workable, as with the expansion of electricity service in the 20th century.

These assumptions no longer describe the circumstances

of modern gas or electric utilities. This drive for continued capital expansion is fundamentally at odds with the coming trends that will impact gas distribution companies, as well as needed reforms to planning and programs. The incentive for increased gas sales or to add new customers is similarly problematic. Regulators should take steps to rein these incentives in. Over the past 40 years, numerous jurisdictions have changed significant elements of the traditional utility business model, particularly through (1) revenue regulation, also known as decoupling, and (2) broader reforms collectively referred to as performance-based regulation.

Adopt Decoupling Using Overall Revenue Target, Not Revenue Per Customer

In traditional rate-making, utility regulators are establishing rates for the utility, and the calculated revenue requirement is only an intermediate product that has little relevance going forward. The actual revenue the utility earns after the rate case is the rates multiplied by actual billing determinants. For gas utilities, the relevant billing determinants are primarily the number of customers and the amount of gas sold. Gas utility revenue could be higher or lower than the revenue requirement, depending on the evolution of actual sales between rate cases.¹⁰⁸ This provides a substantial incentive for utilities to increase profits by increasing sales. Revenue regulation, also known as decoupling, diminishes this incentive by turning the revenue requirement into a revenue target, which can be subject to many different types of adjustments over time. The intention of all types of decoupling is to dampen the link between a utility's earnings and profits and its overall sales levels, thus lowering a barrier to energy efficiency improvements. This reform can be a boon to efforts to slow gas sales growth or begin to shrink overall usage.

There are many varieties of decoupling, and they can create subtly different incentives for utility behavior. One common method for gas utility decoupling is known as the

107 Averch, H., & Johnson, L. T. (1962). Behavior of the firm under regulatory constraint. *American Economic Review*, 52(5), 1052-1069.

108 See Lazar, J., Weston, F., Shirley, W., Migden-Ostrander, J., Lamont, D., & Watson, E. (2016). *Revenue regulation and decoupling: A guide to theory and application (incl. case studies)*. Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/revenue-regulation-and-decoupling-a-guide-to-theory-and-application-incl-case-studies/>

revenue per customer (RPC) method.¹⁰⁹ As the name of this method indicates, the annual revenue target in between rate cases is adjusted to reflect changes to the number of customers. This particular method acts as a short-term barrier to electrification efforts as well as any measures necessary to slow the addition of new gas customers. In this method:

$$\text{Revenue per customer TEST PERIOD} = \frac{\text{Revenue requirement TEST PERIOD}}{\text{Number of customers TEST PERIOD}}$$

$$\text{Revenues ALLOWED} = \text{Revenue per customer TEST PERIOD} \times \text{Number of customers ACTUAL}$$

$$\text{Price ACTUAL} = \frac{\text{Revenues ALLOWED}}{\text{Units sold ACTUAL}}$$

As a result, an increase in the actual number of customers causes the revenue target to go up, and a decrease in customers causes the revenue target to go down. Such a method can be rational, particularly for steadily growing utilities, because new customers typically do mean new investments and expenses for a utility. RPC decoupling is one method of accounting for such growth between rate cases, which is one reason why gas utilities have been receptive to the concept.¹¹⁰

As long as the calculated revenue per customer is higher than marginal costs, there is a strong incentive built into RPC decoupling for utilities to increase profits by adding customers and to strongly resist policies that could mean losing customers. In the context of a future where many customers will likely switch from gas service to other low- and zero-GHG alternatives, RPC represents a barrier to needed planning reforms, as well as to any policies that promote fuel switching.

Numerous other methods to set the revenue target for decoupling do not strongly incentivize a gas utility to add customers or resist losing customers. Switching to a method that does not include a per-customer annual adjustment should still remove a short-term barrier to energy efficiency and beneficial electrification for gas customers between rate cases. The decoupling method can include either a flat revenue target over time (sometimes called true decoupling) or a method that adjusts yearly revenue for inflation, productivity improvements and other factors (also known as attrition decoupling).

Consider Performance-Based Regulation for Gas Utilities

While decoupling addresses a utility's incentive to sell more gas, that incentive is not the only bias built into traditional utility rate-making. In addition, there is a well-known phenomenon where utilities are likely to overinvest in capital because such investments are the main source of profit in a traditional revenue requirement. This incentive to overinvest in capital can undermine reforms to gas planning and programs that envision reduced gas utility investment. While increased regulatory scrutiny during rate cases (and the ability of a regulator to rule that certain capital investments were imprudent) can help address this issue, performance-based rate-making is another prominent method. Although there is no universally accepted definition of performance-based rate-making, key elements include multiyear rate plans and performance incentive mechanisms for the achievement of specified objectives.¹¹¹

109 Examples of revenue-per-customer decoupling for gas utilities include Massachusetts, Rhode Island and previously New York. See NSTAR Gas Co. (2019, November 8). *Direct testimony of William J. Akley and Douglas P. Horton*, pp. 79-81. Massachusetts Department of Public Utilities Docket No. 19-120. <https://fileservice.eea.comacloud.net/FileService.Api/file/FileRoom/11419982>. See also Rhode Island Public Utilities Commission Docket Nos. 4770 and 4780, Amended settlement agreement, August 16, 2018, pp. 81-82. <http://www.ripuc.ri.gov/eventsactions/docket/4770-4780-NGrid-Compliance%20Filing%20Book%201%20-%20August%2016.%202018.pdf>. In its most recent rate case, the gas decoupling mechanism for ConEd in New York was changed from an RPC model to an aggregate "revenue per class" model. As the Public Service Commission explained: "The gas [decoupling] modification is consistent with the Commission's recognition that incentives that reward utilities for expanding their gas customer base should be eliminated while we consider policy changes that may need to occur to address important environmental issues, including the promotion of cost-effective energy conservation, the increased use of renewable resources, and the decreased use of fossil fuels." New York Public Service Commission, Case No. 19-G-0066,

Order adopting the terms of joint proposal and establishing electric and gas rate plan, January 16, 2020, p. 23. <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterCaseNo=19-G-0066&CaseSearch=Search>

110 For many utilities, revenue-per-customer decoupling can be additionally attractive if the mix of new customers is denser and more efficient — and thus less costly — than old customers. Thus, using the historic average cost per customer overcompensates the utility for adding new customers. This can be adjusted for by using a lower average cost for newly added customers.

111 In the context of electric utilities, RAP has written extensively on these issues. See, for example, Littell, D., Kadoch, C., Baker, P., Bharvirkar, R., Dupuy, M., Hausauer, B., Linvill, C., Migden-Ostrander, J., Rosenow, J., Wang, X., Zinaman, O., & Logan, J. (2017). *Next-generation performance-based regulation: Emphasizing utility performance to unleash power sector innovation*. Regulatory Assistance Project: <https://www.raponline.org/knowledge-center/next-generation-performance-based-regulation-emphasizing-utility-performance-unleash-power-sector-innovation/>

Multiyear rate plans with a stay-out period, where the utility and commission have committed to avoid a new rate case for a specified number of years, can be a key element of performance-based regulation schemes. Multiyear rate plans, often packaged with decoupling, are now relatively common for both gas and electric utilities.¹¹² During a multiyear rate plan, the precommitment of the stay-out period provides a greater incentive for a utility to improve profits by constraining costs and operating efficiently. Ideally, these efficiencies are passed along to ratepayers in the next rate case because they show up as lower costs in the test year for the new rate case.

This incentive within a multiyear rate plan can, however, be undermined by the use of adjustment factors (often colloquially known as trackers) to update certain cost categories between rate cases. At a minimum, careful thought must be put into how tracker costs and costs in base rates are coordinated. There is a general risk in approving trackers that utilities only seek them for categories of costs that are increasing over time, while ignoring cost categories that may be decreasing. This is one of the reasons for the general presumption against single-issue rate-making because changes in costs may counteract one another. As a result, a general best practice is to limit the use of trackers to categories of costs that are not in the utility's control and are not correlated with other changes in utility costs.¹¹³ In addition, automatic cost recovery in a tracker presents an incentive for a utility to pursue qualifying expenses and investments. In particular, infrastructure replacement cost trackers, which are becoming more common for programs to replace gas distribution mains, are easy procedurally for utilities to recover costs and provide a substantial investor return on expensive additions to rate base. Reforming the planning framework and investment criteria is important in this context, but this utility business model issue should be addressed as well.

A potential downside to multiyear rate plans is that they can overincentivize cost cutting, at the expense of customer

service or other elements of utility performance. A best practice is to use service quality metrics, which often take the form of financial incentives that penalize a utility for poor reliability and customer service.

More generally, metrics and performance incentives — especially financial incentives — can help pivot a utility's business model away from continued capital expansion and toward more important public policy goals, including decarbonization, system efficiency and customer service.

Several different ways to set up a performance incentive scheme are being explored across the United States for electric utilities. Among the purposes for adopting a performance system of regulation are to better align the management of the utility and its outputs with public interest priorities and outcomes laid out by government and to promote innovation. One alternative is to set up a system of penalties and rewards while keeping most other rate-making features the same. Another alternative is to reduce the baseline return on equity built into the revenue requirement but to allow the utility to achieve a typical profit level with good performance — or even to exceed a typical profit level with excellent performance. Furthermore, reducing the baseline return on equity for capital investments has the related virtue of dulling the capital investment bias directly and should pass legal muster as long as the baseline return on equity is higher than the utility's actual cost of capital in the market.

The actual details of performance incentive schemes for gas utilities can be quite flexible. Some options include:

- Service quality incentives.
- Reliability and safety incentives.
- Methane leakage reduction incentives.
- Peak demand reduction or system load factor improvement incentives.
- Incentives for fair treatment of low-income ratepayers, such as enrollment in discount rates, prevention of disconnections or management of repayment plans.

112 Lowry, M. N., Makos, M., & Deason, J. (2017, July). *State performance-based regulation using multiyear rate plans for U.S. electric utilities*. Lawrence Berkeley National Laboratory. <https://emp.lbl.gov/publications/state-performance-based-regulation>

113 One example of cost correlation is infrastructure modernization trackers. If an older technology would normally be financed out of base rates, then investment in a newer technology through a tracker can be looked at as double counting until the next rate case. The utility avoids the traditional financing cost as well as receiving the new tracker revenue.

- Broad decarbonization incentives, either economywide or for the heating sector; specifically, such an incentive would induce a gas utility to take steps to lower the GHG emissions from its own system but also to be part of broader efforts within the state.

Across the country, we would expect significant variations based on different public policy priorities. Changing incentives for a gas utility can help lower opposition to key reforms and enlist the utility as a partner in important public policy efforts.

Alternative futures for the current gas utility

In this section, we have addressed the incentives that gas local distribution companies currently face. There is a broader range of potential structural reforms that utilities and the larger corporations that own most gas utilities may want to consider.

Potential futures for the corporation that is currently a gas LDC include the following.

Zero-carbon gas delivery: With appropriate handling of costs over time, the gas utility could perform the same gas delivery function but with a smaller footprint serving a limited number of customers with green hydrogen or renewable methane.

Fusion with an electric utility: Although many utilities currently operate both gas and electric utilities, these are currently managed and financed as two separate entities. As the gas side of this arrangement shrinks, there may be a natural pathway to deliberately and equitably merge these two entities. Such a solution may be simpler where the relevant gas and electric service territories largely overlap.

Expanded natural monopoly provision: In many service territories, a gas utility could add zero-carbon district energy systems with appropriate statutory permission and regulatory approvals. District energy systems are also a natural monopoly and include a related set of competencies of underground infrastructure development and maintenance. This new “energy delivery through pipes” company would have more viable expansion options and may have improved financial integrity and ability to attract capital. Regulators

would still need to answer key questions about rates and cross-subsidies across services provided by such an entity.¹¹⁴

Conversion to a public entity or cooperative: A new ownership model may be better suited to manage the transition with the broader public interest in mind. Such a conversion may also more fairly enable the usage of general taxpayer funding without the appearance of subsidizing shareholders.

Energy or heating services provider: A gas utility could be allowed to expand into areas that are not natural monopolies but rather related to general utility expertise in energy or heating services. This concept raises even harder questions about how customers pay for those services and fair treatment of existing businesses that compete in this space with unregulated capital. Such a transformation may be best accomplished by converting the regulated entity into an unregulated one, where cost recovery is no longer guaranteed but its considerable resources and expertise can be leveraged in new ways.

In addition, the conglomerates that typically own gas utilities are often diversified across different energy assets, including electric utilities. Although such a conglomerate would rarely welcome any business unit to consistently be a drain on its broader finances, losses in one area can be made up for in other areas. Management and shareholders in these broader conglomerates will have a more diverse array of interests and incentives.

114 This concept is being explored with pilots for district energy systems in Massachusetts. Gerdes, J. (2020, August 6). *Massachusetts pilot project offers gas utilities a possible path to survival*. Greentech Media.

<https://www.greentechmedia.com/articles/read/can-gas-companies-evolve-to-protect-the-climate-and-save-their-workers>

VI. Conclusion

Regulators are at the forefront of ensuring that utilities meet consumers' needs efficiently, equitably and fairly. This mission is made more complex by large shifts in the energy system driven by state and local greenhouse gas reduction targets and increasingly competitive technology innovations. Regulators can use familiar building blocks of solid utility regulation in new ways to prepare for and respond to changing circumstances and public expectations. In this report, we provided options and recommendations to create this consumer-oriented foundation, including outlining

a revitalized gas utility planning process, enhancements for energy efficiency and electrification programs, and means to reform rate-making to enable and promote equitable and efficient outcomes. By using these tools, regulators can augment regulation of gas utilities in general and specifically create an environment in which transition can occur. We offer this report as the initial framework for this new challenge. We will dive into more specific means of addressing this changing area in future reports on this topic.

VII. Appendix: Basics of Gas System Operation and Regulation

The history of methane combustion in the United States and its delivery through pipes underground dates back to the 19th century. Until the middle of the 20th century, most of this methane was manufactured gas, made from feedstocks such as coal (a process that led to substantial ground and water pollution). As the extraction of methane from underground became a bigger part of the industry, along with the necessary infrastructure to transport that gas, the term “natural gas” was used to distinguish extracted gas from manufactured gas. Extracted methane, even with the cost of long-distance delivery, was generally more economically competitive with electricity and oil than manufactured gas and was adopted widely in the middle of the 20th century.¹¹⁵ Where it was too hard to extend the interstate gas transmission network to a community served by manufactured gas, the gas distribution system was retired, and customers found other ways to meet their energy needs.¹¹⁶

Since that time, fossil methane has turned into a major national market with its own specialized federal and state regulatory frameworks. While much of the gas system has operated in the same manner for decades, the changing economic and public policy context is putting pressure on the existing regulatory framework. This appendix explains the basics of how the gas system operates and current regulations governing the system.

A. Basics of Gas System Operation

Methane, like all gases, travels based on pressure differentials: Molecules move from higher pressure toward lower pressure. Methane trapped underground at high pressure is looking for a way out. Conventional underground gas deposits often lie underneath a layer of rock and frequently can be found as associated gas alongside oil deposits. Since the beginning of the 21st century, advanced drilling techniques (e.g., horizontal drilling and hydraulic fracturing, or fracking) have allowed “unconventional” gas deposits to be accessed more easily.

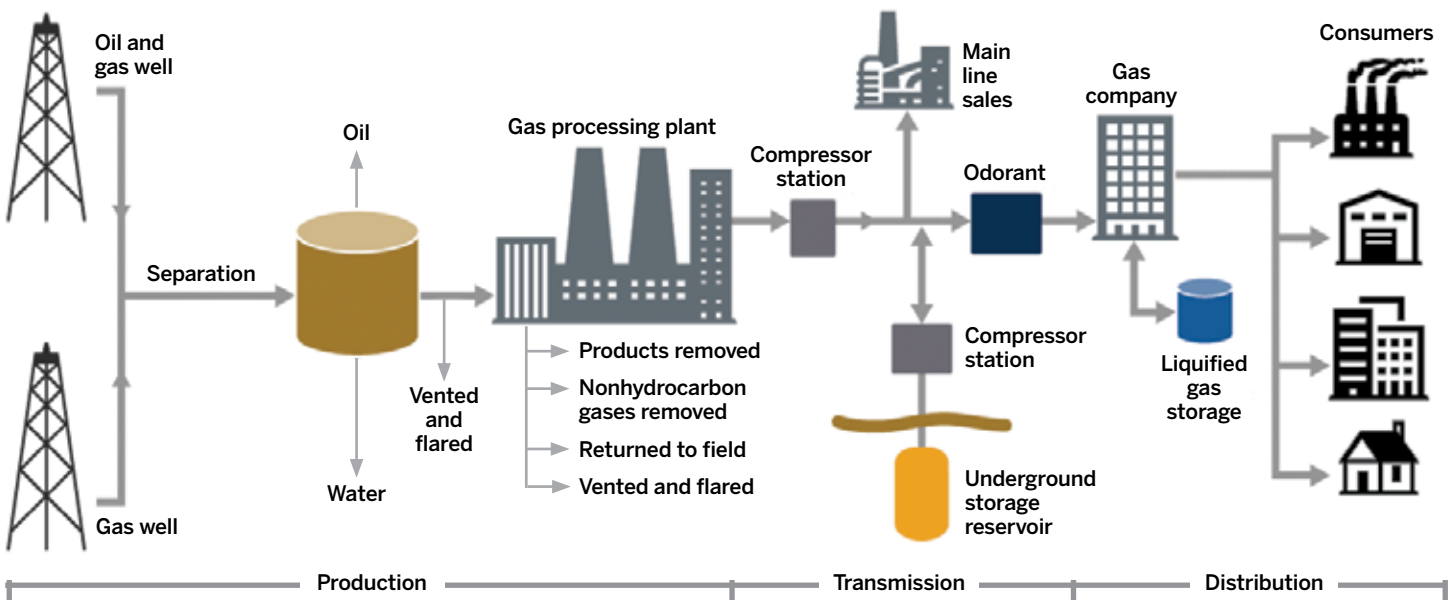
From the wellhead, extracted gas must be sent to processing plants to have impurities removed, and then it is ready for transportation. Gas is typically transported via large transmission pipelines, but it can also be liquified (in this form it is known as liquified natural gas) and transported by ship or truck. Many electric power facilities and large industrial customers are served directly by transmission pipelines; the remainder of the gas that flows through transmission pipelines is delivered to local gas utilities. The point of connection between the transmission system and the local distribution network is typically known as a gate station or city gate. At the city gate, the gas is odorized so that leaks can be detected, and then it is delivered to homes and businesses through smaller pipes. The shared distribution pipes that are often under streets are referred to as mains, and the final pipe that connects to an individual metered location is known as a service line or just a service. Figure 18 on the next page depicts the steps in gas production and delivery.¹¹⁷

115 Garfield, P., & Lovejoy, W. (1964). *Public utility economics*, pp. 167-169. Prentice Hall. Although both compounds were predominantly methane, there were some important chemical differences between manufactured gas and the extracted product. For the preexisting gas utilities, predominantly in major cities, this transition required some substantial improvements to their distribution infrastructure. In addition, customer appliances that had previously used manufactured gas had to be adapted to utilize methane extracted from the ground.

116 Hatheway, A. W. (2018, March 26). *Locations of gas plants and other coal-tar sites in the U.S.: The state of Vermont*. Former Manufactured Gas Plants. http://www.hatheway.net/state_site_pages/vt__main.htm

117 U.S. Energy Information Administration. (2020, November 30). *Natural gas explained: Delivery and storage of natural gas*. <https://www.eia.gov/energyexplained/natural-gas/delivery-and-storage.php>

Figure 18. Fossil gas production and delivery



Source: U.S. Energy Information Administration. (2020, November 30). *Natural Gas Explained: Delivery and Storage of Natural Gas*

The speed of gas flow can be observed and measured during this journey, often between 10 mph and 30 mph. Unlike fluctuations in the electricity system, changes to gas pressure take time to propagate through the system, and pressure must be maintained within certain bounds to ensure safe and reliable operation. Each segment of the gas transportation system is designed to handle different levels of pressure. Large transmission pipelines operate at much higher pressures than local distribution mains and services. If gas pressure becomes too high for a given segment, safety systems are designed to reduce the pressure; if those fail, disaster can result.¹¹⁸ Conversely, if the pressure goes too low in a section of the pipe that serves customers, the system typically needs to be shut down, and lengthy safety checks may be necessary to resume the flow of gas.¹¹⁹

Compressor stations, which typically use gas to power

their operation, pressurize the system to move gas over long distances. For efficient operation, such compressor stations are needed every 40 to 100 miles along a major transmission pipeline.¹²⁰ In addition, gas control stations of varying levels of sophistication are placed along a transmission line to monitor and control the flow of gas. Valve shutoffs are included every few miles along a pipeline.

At the distribution level, pressure also needs to be maintained within a certain range. Smaller compressor stations are sometimes used to ensure proper flow, and pressure regulators and relief valves are used along the system to ensure that pressure stays within the right bounds. In a modern gas system, many of these components are automated or operated remotely, but an older gas system may not have those capabilities. Shutoff valves are often installed every so often along a distribution main.

118 Commonwealth of Massachusetts. (2020, January). *Merrimack Valley natural gas explosions after action report: September 13-December 16, 2018*. <https://www.mass.gov/doc/merrimack-valley-natural-gas-explosions-after-action-report/download>

119 See State of Rhode Island Division of Public Utilities & Carriers. (2019, October 30). *Summary investigation into the Aquidneck Island gas service interruption of January 21, 2019: Investigation report*. http://www.ripuc.ri.gov/eventsactions/AI_Report.pdf. If pilot lights go out

because of a lack of gas, then resuming the flow can lead to a dangerous methane release, among other problems.

120 Messersmith, D. (with Brockett, D.). (2015, March 26). *Understanding natural gas compressor stations*. Penn State Extension. <https://extension.psu.edu/understanding-natural-gas-compressor-stations/>

There are risks of gas leakage from the point of extraction to the end use.¹²¹ During production, gas may accidentally leak or be deliberately vented or flared. Venting is when gas is simply released to the atmosphere. With flaring, a company will burn the gas on-site to eliminate excess, which converts the methane to carbon dioxide and water. Venting and flaring are used to control pressure, to eliminate excess gas when there is not sufficient infrastructure to capture or transport all of the gas extracted, or when the gas is a byproduct of oil extraction and gas prices do not warrant bringing it to market. Pipes transporting gas to processing plants and later to the distribution system may have additional leaks. A study published in *Science* demonstrated that methane emissions from the U.S. supply chain in 2015 constituted 2.3% of gross U.S. gas production, equivalent to the amount of gas supplied to fuel 10 million homes.¹²² A 2020 American Chemical Society study found that gas leakage in distribution lines is almost five times as much as the EPA estimates.¹²³

Distribution system leaks can present health and safety risks. The rate of leakage on the distribution system can be hard to quantify because few gas system locations have monitoring equipment to measure exact quantities, and the expense of such equipment makes it unlikely that it will be widely deployed without an affirmative requirement.¹²⁴ Finally, gas leaks, inefficiencies and combustion byproducts may occur at the point of end use, degrading indoor air quality and harming health.¹²⁵

Unlike in the electricity system, storage has long been a common feature of the efficient operation of the gas system. Underground rock formations or depleted oil or gas reservoirs are used for bulk storage. More local storage, which is often used as fuel to serve peaks in demand, can be in large metal tanks, either as pressurized gas or in liquid form. The network of gas pipelines also operates as a storage system, unlike the electric grid, which cannot retain reserves. Gas molecules can be stored in the pipes within the relevant pressure ranges. At a higher pressure, more gas molecules are being stored, so the different segments of the system can be controlled to provide in advance for higher (or lower) expected demands. This is generally known as linepack. As customers consume gas, the pressure in the system becomes lower unless additional supplies are moved into the relevant pipe segments. In other words, unexpectedly high gas consumption is one of the causes of low pressure in the distribution system and could require additional utility action to correct. Last, there are alternative ways to introduce gas into the distribution system, other than transmission pipelines or centralized LDC storage. Either liquified natural gas, compressed natural gas or propane can be shipped or trucked to certain points on the distribution system, appropriately converted and then stored or injected directly to ameliorate low pressure conditions or as a peak-shaving technique.

121 Methane, the primary component of piped gas, has a 20-year global warming potential at least 84 times that of carbon dioxide. Global warming potential is a measure used to compare the contribution of different greenhouse gases to global warming. Carbon dioxide, with a global warming potential of 1, is used as the baseline; the higher the global warming potential of other gases, the greater the impact over a set period of time. Methane has a shorter atmospheric lifetime than carbon dioxide, but its impact during that time is much greater than that of carbon dioxide. Intergovernmental Panel on Climate Change. (2013). *Climate change 2013: The physical science basis*, pp. 664-665, 714. (T. F. Stocker, D. Qin, G.-K. Plattner, M. Tignor, S. K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P. M. Midgley, Eds.). Cambridge University Press. <https://www.ipcc.ch/report/ar5/wg1/>

122 Alvarez, R. A., Zavala-Araiza, D., Lyon, D. R., Allen, D. T., Barkley, Z. R., Brandt, A. R., Davis, K. J., Herndon, S. C., Jacob, D. J., Karion, A., Kort, E. A., Lamb, B. K., Lauvaux, T., Maasakkers, J. D., Marchese, A. J., Omara, M., Pacala, S. W., Peischl, J., Robinson, A. L., ... Hamburg, S. P. (2018, July 13). Assessment of methane emissions from the U.S. oil and gas supply chain.

Science, 361(6398), 186-188. <https://science.sciencemag.org/content/361/6398/186>. See also Schwartz, J., & Plumer, B. (2018, June 21). The natural gas industry has a leak problem. *The New York Times*. <https://www.nytimes.com/2018/06/21/climate/methane-leaks.html>

123 Weller, Z. D., Hamburg, S. P., & von Fischer, J. C. (2020, June 10). A national estimate of methane leakage from pipeline mains in natural gas local distribution systems. *Environmental Science & Technology*, 54(14), 8958-8967. <https://doi.org/10.1021/acs.est.0c00437>. See also The Gas Index, 2020.

124 Gas leaks can also be monitored and estimated through a variety of techniques outside of the gas system. See, for example, Plant, G., Kort, E. A., Floerchinger, C., Gvakharia, A., Vimont, I., & Sweeney, C. (2019, July 19). Large fugitive methane emissions from urban centers along the U.S. East Coast. *Geophysical Research Letters*, 46(14), 8500-8507. <https://doi.org/10.1029/2019gl082635>

125 Seals & Krasner, 2020; Seals, 2020.

B. Creation of Current Regulatory Framework

State regulation of gas utilities began in the early 20th century, when most deliveries were of manufactured gas.¹²⁶ As with electric utilities, this regulation included the power to set just and reasonable rates for gas utilities, along with the regulation of other characteristics of gas service and tariffs. These rates have largely been based on cost of service principles, as they are for many other types of utilities.

The federal regulatory role in this area started with the Natural Gas Act of 1938, which gave jurisdiction over interstate gas pipelines to the Federal Power Commission (which later became the Federal Energy Regulatory Commission, or FERC).¹²⁷ Substantively, this jurisdiction originally included permitting interstate pipelines and the rates for those pipelines but later expanded to price regulation for commodity gas sold over those pipelines. The Natural Gas Policy Act of 1978, part of a broader package of legislation that included the Public Utility Regulatory Policies Act, made a number of changes to the federal regulatory scheme, including the addition of intrastate gas production to FERC's jurisdiction and a timeline to deregulate commodity prices for new wells. FERC took additional steps to allow industrial customers to purchase gas as a commodity and receive delivery over interstate pipelines, without the intermediary of a state-regulated gas utility. This change, which was voluntary, allowed pipeline operators to offer nondiscriminatory access to pipelines, marking the beginning of open access to gas transmission pipelines, as well as the creation of gas marketers. In 1989, another federal

law was passed to fully deregulate the first sale of commodity gas from all wells. In 1992, FERC issued Order 636, which completed the restructuring of the interstate gas pipeline industry, requiring pipelines to offer transportation service on a nondiscriminatory basis. It also separated pipeline entities, production entities and marketing entities into arm's-length affiliates.

Within this federal context, the state-jurisdictional gas utilities still offer bundled service, where they buy commodity gas and pay for it to be transported on behalf of their customers. Commodity gas can be purchased by utilities on a contract or spot basis, and costs can be managed over time. Nearly all LDCs have purchased gas adjustment clauses, through which supply costs, including transmission, storage and gas commodity costs, are flowed through to retail rates. Some jurisdictions allow retail choice, where the customer contracts with a gas marketer for gas supply. These customers still pay the relevant distribution rates for the gas utility as approved by the regulatory commission, which are frequently called transportation rates. It is important to clearly distinguish retail choice, where a customer is still served by a local gas utility and pays a distribution rate, from transmission-level open access policies, where the customer bypasses the local gas utility entirely.

Regulators will continue to make decisions to ensure that the regulation of gas utilities is aligned with the public interest and changing circumstances. As the usage of fossil gas wanes, the regulation of gas utilities will necessarily evolve. Regulators can use the tools and recommendations outlined in this report to write the next chapter of our gas systems.

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ZENITH ENERGY TERMINALS HOLDINGS LLC

3900 Essex Lane, Suite 700
Houston, Texas 77027

February 8, 2021

6/8

Air Permit Manager
Air Quality Division
Oregon Department of Environmental Quality
700 Multnomah Street
Suite 400
Portland, OR 97232

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED

FEB 16 2021

NORTHWEST REGION

RE: 2020 Title V Permit Annual Report
Permit No.: 26-2025 *TV*

Air Permit Manager:

Zenith Energy Terminals Holdings, LLC (Zenith Energy Terminals) is submitting for your review 2 copies of the 2020 Title V Permit Annual Report for Permit No. 26-2025. Permit No. 26-2025 is associated with the Zenith Energy Terminals Portland Facility located at 5501 NW Front Avenue, Portland, OR 97210. The report includes the following items specified in Permit No. 26-2025 Condition 68.

- Condition 68.a. – Second semi-annual compliance certification including forms:
 - Form R1002: Compliance Status
 - Form R1003: Summary of Permit Deviations
- Condition 68.b. – Emissions fee report which includes:
 - Form F1101: Total Emissions by Regulated Pollutant
 - Form F1102: Emissions by Source
- Condition 68.c. – Excess emissions upset logs if applicable.
 - Not Applicable - There were no upsets in 2020.
- Condition 68.d. – The compliance and monitoring data specified in Conditions 8, 11, 25, 28, 31, 34, and 58. The following items are attached to demonstrate compliance with Condition 68.d.
 - Highest vapor pressure stored in applicable FIXTANK (condition 8)
 - Summary of public complaints (condition 11)
 - Oil and water separator inspection results (condition 25)
 - VOC emitted from process unit turnarounds (condition 28)
 - Furnace temperature compliance verification results (condition 31)
 - Fourth quarter fugitive monitoring results (condition 34)
 - Highest annual and summary of annual emission rates (condition 58)

February 8, 2021

Title V Permit No. 26-2025 – Annual Report

Please contact me should you have any questions concerning the report.

Thank you,

A handwritten signature in blue ink, appearing to read "Andrew Danhof".

Andrew G. Danhof, Jr., P.E.
Manager, Environmental and Regulatory
Zenith Energy Terminals Holdings, LLC
(713) 395-6238
Email: andrew.danhof@zenithem.com

February 8, 2021

Title V Permit No. 26-2025 – Annual Report

ENCLOSURES

February 8, 2021

Title V Permit No. 26-2025 – Annual Report

2020 Second Semi-Annual Compliance Certification (Condition 68a)

- **Form R1002**
- **Form R1003**

Title V Operation Permit Program

Semi-annual Compliance Certification

FORM R1002
Answer Sheet

Permit Number:

Facility name:

1. Reporting period
2. Plan development/revision triggered [yes/no]

3. Compliance status:

a. Permit Condition #	b. Method of Determining Compliance	c. Compliance Status (C/I)	d. Emissions Unit(s)	e. Permit Deviation Type	f. Number of Deviations
4	Recordkeeping	C			
5	Recordkeeping	C			
6	Recordkeeping & Monitoring	C			
7	Recordkeeping	C			
8	Reporting	C			
9	Operation & Maintenance	C			
10	Recordkeeping	C			
11	Reporting	C			
12	Operation & Maintenance	C			
13	Operation & Maintenance	C			
14	Operation & Maintenance	C			
15	Operation & Maintenance	C			
16	Recordkeeping	C			
17	Reporting	C			
18	Operation & Maintenance	C			
19	Recordkeeping	C			
20	Operation & Maintenance	C			
21	Recordkeeping	C			

Title V Operation Permit Program

Semi-annual Compliance Certification

FORM R1002
Answer Sheet

Permit Number:

Facility name:

a. Permit Condition #	b. Method of Determining Compliance	c. Compliance Status (C/I)	d. Emissions Unit(s)	e. Permit Deviation Type	f. Number of Deviations
22	Reporting	C			
23	Inspections	C			
24	Recordkeeping	C			
25	Reporting	C			
26	Operation & Maintenance	C			
27	Recordkeeping	C			
28	Reporting	C			
29	Operation & Maintenance	C			
30	Recordkeeping	C			
31	Reporting	C			
32	Inspections & Maintenance	C			
33	Recordkeeping	C			
34	Reporting	C			
35	Floating Roof Construction, Operation, & Maintenance	C			
36	Inspections & Notifications	C			
37	Floating Roof Construction, Operation, & Maintenance	C			
38	Inspections & Notifications	C			
39	Floating Roof Construction, Operation, & Maintenance	C			

Title V Operation Permit Program

Semi-annual Compliance Certification

FORM R1002
Answer Sheet

Permit Number: 26-2025

Facility name: Zenith Energy Terminals

a. Permit Condition #	b. Method of Determining Compliance	c. Compliance Status (C/I)	d. Emissions Unit(s)	e. Permit Deviation Type	f. Number of Deviations
40	Inspections & Notifications	C			
41	Recordkeeping & Monitoring	C			
42	Recordkeeping	C			
43	Operation & Maintenance	C			
44	Operation & Maintenance	C			
45	Operation & Maintenance	C			
46	Operation & Maintenance	C			
47	Operation & Maintenance	C			
48	Inspections, Training, Operation & Maintenance	C			
49	Training	C			
50	Inspections & Training	C			
51	Not Applicable	C			
52	Not Applicable	C			
53	Emission Calculations & Recordkeeping	C			
54	Recordkeeping	C			
55	Recordkeeping	C			
56	Emission Calculations & Recordkeeping	C			

Title V Operation Permit Program

Semi-annual Compliance Certification

FORM R1002
Answer Sheet

Permit Number:

Facility name:

a. Permit Condition #	b. Method of Determining Compliance	c. Compliance Status (C/I)	d. Emissions Unit(s)	e. Permit Deviation Type	f. Number of Deviations
57	Emission Calculations & Recordkeeping	C			
58	Reporting	C			
59	Testing	C			
60	Testing	C			
61	Testing	C			
62	Recordkeeping	C			
63	Recordkeeping	C			
64	Recordkeeping	C			
65	Recordkeeping	C			
66	Reporting	C			
67	Reporting	C			
68	Reporting	C			
69	Reporting	C			
70	Reporting	C			
71	Reporting	C			
72	Reporting	C			
73	Reporting	C			
74	Reporting	C			
75	Reporting	C			
76	Reporting	C			
77	Not Applicable	C			
78	Not Applicable	C			
G3	Recordkeeping & Reporting	C			
G4	Recordkeeping & Reporting	C			

Title V Operation Permit Program

Semi-annual Compliance Certification

FORM R1002
Answer Sheet

Permit Number:

Facility name:

a. Permit Condition #	b. Method of Determining Compliance	c. Compliance Statuses (C/I)	d. Emissions Unit(s)	e. Permit Deviation Type	f. Number of Deviations
G5	Recordkeeping & Reporting	C			
G6	Training & Recordkeeping	C			
G7	Monitoring & Recordkeeping	C			
G8	Recordkeeping	C			
G9	Not Applicable	C			
G10	Recordkeeping	C			
G12	Recordkeeping & Reporting	C			
G13	Recordkeeping & Reporting	C			
G14	Recordkeeping & Reporting	C			
G15	Recordkeeping & Reporting	C			
G16	Recordkeeping & Reporting	C			
G17	Recordkeeping & Reporting	C			
G18	Recordkeeping & Reporting	C			
G19	Recordkeeping & Reporting	C			
G20	Not Applicable	C			
G22	Not Applicable	C			

Title V Operation Permit Program

Semi-annual Compliance Certification

FORM R1002
Answer Sheet

Permit Number:

Facility name:

Statement of Certification:

Based on information and belief formed after reasonable inquiry, the statements and information in this document and any attachments are true, accurate and complete. I also certify that all statements made concerning compliance, which are based on monitoring required by the permit but not required to be submitted to the Department, are true, accurate and complete based on information and belief formed after reasonable inquiry.

Shannon Caldwell
Name of Responsible Official


Signature of Responsible Official

Vice President of HSE and Regulatory
Title of Responsible Official

2/9/2021
Date

Emission Fee Report (Condition 68a)

- **Form F1101**
- **Form F1102**
 - **Reference #1 – Boiler Furnace Emission Summary**
 - **Reference #2 – Track Emission Summary**
 - **Reference #3 – Oil/W Emission Summary**
 - **Reference #4 – FGTVOC Emission Summary**
 - **Reference #5 – FW Emission Summary**
 - **Reference #6 – FIXTANK, EXTANK, and INTANK Emission Summary**
 - **Reference #7 – MLOAD Emission Summary**



DEQ

State of Oregon
Department of
Environmental
Quality

Total Emissions by Regulated Pollutant

FORM F1101

1. Reporting year: 2020	
2. Facility name: Zenith Energy Terminals Portland	4. Permit number: 26-2025
3. 3900 Essex Lane, Suite 700 Mailing street address or PO Box Houston, TX 77027 Mailing city, state and ZIP code	5. Andrew Danhof - Manager, Environmental and Regulatory Contact name and title (713) 395-6238 Phone number with area code
6. Emissions (in tons) by regulated air pollutant subject to fees for the reporting year:	
PM ₁₀ *	0.048
or PM	_____
or PM _{2.5}	_____
or TSP	_____
SO ₂	0.033
NO _x (as NO ₂)	1.9
VOC	25.2
* Report only one particulate category. If permit has a PSEL for PM ₁₀ , report emissions of PM ₁₀ . If permit has a PSEL for particulate matter (PM) and not PM ₁₀ , report emissions of PM. If permit has a PSEL for PM _{2.5} , and not PM ₁₀ or PM, report emissions of PM _{2.5} . If permit has a PSEL for total suspended particulate (TSP) and not PM ₁₀ , PM or PM _{2.5} , report emissions of TSP.	
7. Total emissions (in tons) of pollutants subject to fees for the reporting year: <u>28.8</u>	
8. Statement of certification:	
I have reviewed this report and all supporting documentation in their entirety and to the best of my knowledge, information, and belief formed after reasonable inquiry, the statements and information contained herein are true, accurate and complete.	
Shannon Caldwell Name of designated responsible official	VP of HSE and Regulatory Title of responsible official
	2/9/2020 ^{see} 2021
Signature of responsible official	Date



DEQ

State of Oregon
Department of
Environmental
Quality

1. Reporting year: 2020					
2. Facility name: Zenith Energy Terminals Portland			3. Permit number: 26-2025		
4. Emissions by emission source					
a. Group code (EU #, ES #, FS#, PS# or PSEL)	b. Device or process ID	c. Pollutant	d. Emissions (tons)	e. Method	f. Reference
PSEL		PM10	0.048	2	Title V Permit pages 24-27
		SO2	0.033	2	Title V Permit pages 24-27
		NOx	1.9	2	Title V Permit pages 24-27
		CO	1.6	2	Title V Permit pages 24-27
		VOC	25.2	2	Title V Permit pages 24-27
		H2S	0	2	Title V Permit pages 24-27
AIA		PM10	1	1	Title V Permit page 24
		SO2	1	1	Title V Permit page 24
		NOx	1	1	Title V Permit page 24
		CO	1	1	Title V Permit page 24
		VOC	1	1	Title V Permit page 24
		H2S	1	1	Title V Permit page 24
					5. Form F1102 page <u>1</u> of <u>1</u>

REFERENCE #1
ZENITH ENERGY TERMINALS - PORTLAND
2020 BOILER FURNACE EMISSION SUMMARY

Month	Year	Monthly Gas Usage		Rolling 12 Month Annual Usage		PM ₁₀			SO ₂			NO _x			CO			VOC		
						Emission Factor	Monthly Total	12-Month Total	Emission Factor	Monthly Total	12-Month Total	Emission Factor	Monthly Total	12-Month Total	Emission Factor	Monthly Total	12-Month Total	Emission Factor	Monthly Total	12-Month Total
		Therms	MMCF	Therms	MMCF	lb/MMCF	Tons	Tons	lb/MMCF	Tons	Tons	lb/MMCF	Tons	Tons	lb/MMCF	Tons	Tons	lb/MMCF	Tons	Tons
January	2020	29,163	2.92	381,332	38.1	2.5	3.65E-03	0.0477	1.7	2.48E-03	0.0324	100	0.146	1.91	84	0.12	1.60	5.5	8.02E-03	0.10
February	2020	41,727	4.17	383,650	38.4	2.5	5.22E-03	0.0480	1.7	3.55E-03	0.0326	100	0.209	1.92	84	0.18	1.61	5.5	1.15E-02	0.11
March	2020	40,336	4.03	387,514	38.8	2.5	5.04E-03	0.0484	1.7	3.43E-03	0.0329	100	0.202	1.94	84	0.17	1.63	5.5	1.11E-02	0.11
April	2020	31,535	3.15	383,181	38.3	2.5	3.94E-03	0.0479	1.7	2.68E-03	0.0326	100	0.158	1.92	84	0.13	1.61	5.5	8.67E-03	0.11
May	2020	13,044	1.30	362,307	36.2	2.5	1.63E-03	0.0453	1.7	1.11E-03	0.0308	100	0.0652	1.81	84	0.05	1.52	5.5	0.003587	0.10
June	2020	16,085	1.61	354,430	35.4	2.5	2.01E-03	0.0443	1.7	1.37E-03	0.0301	100	0.0804	1.77	84	0.07	1.49	5.5	0.004423	0.10
July	2020	13,742	1.37	341,598	34.2	2.5	1.72E-03	0.0427	1.7	1.17E-03	0.0290	100	0.0687	1.71	84	0.06	1.43	5.5	0.003779	0.09
August	2020	22,290	2.23	327,031	32.7	2.5	2.79E-03	0.0409	1.7	1.89E-03	0.0278	100	0.111	1.64	84	0.09	1.37	5.5	0.00613	0.09
September	2020	9,556	0.96	308,907	30.9	2.5	1.19E-03	0.0386	1.7	8.12E-04	0.0263	100	0.0478	1.54	84	0.04	1.30	5.5	0.002628	0.08
October	2020	15,850	1.59	292,001	29.2	2.5	1.98E-03	0.0365	1.7	1.35E-03	0.0248	100	0.0793	1.46	84	0.07	1.23	5.5	0.004359	0.08
November	2020	15,917	1.59	273,212	27.3	2.5	1.99E-03	0.0342	1.7	1.35E-03	0.0232	100	0.0796	1.37	84	0.07	1.15	5.5	0.004377	0.08
December	2020	13,832	1.38	263,075	26.3	2.5	1.73E-03	0.0329	1.7	1.18E-03	0.0224	100	0.0692	1.32	84	0.06	1.10	5.5	0.003804	0.07
12-Month Max/Total		263,075	26.31	---	38.8	---	---	0.0484	---	---	0.0329	---	---	1.94	---	---	1.63	---	---	0.107

Reference #2
Zenith Energy Terminals - Portland
Monthly and Annual Summary for 2020 Emissions Unit: TRACK
Biodiesel & Diesel Loading

	January	February	March	April	May	June	July	August	September	October	November	December	12 Month Total
	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	2020	
S ¹	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	--
M ²	130	130	130	130	130	130	130	130	130	130	130	130	--
P ³	0	3.51E-03	3.89E-03	4.59E-03	5.74E-03	7.01E-03	8.34E-03	8.21E-03	7.06E-03	5.27E-03	3.82E-03	3.21E-03	--
T ³ (°F)	38.9	43.2	46.0	50.4	56.7	62.5	67.7	67.2	62.7	54.3	45.5	40.9	--
T (°R)	499	503	506	510	516	522	527	527	522	514	505	501	--
L _L ⁴ (lb/1,000 gallons)	0	6.78E-03	7.48E-03	8.74E-03	0.0108	0.0131	0.0154	0.0151	0.0131	9.97E-03	7.35E-03	6.23E-03	--
Q _{Diesel} (barrels)	17,330	15,449	1,462	64,301	64,905	89.0	116,577	15.0	145	65,193	481	0	345,947
Q _{Bio} (barrels)	2,050	36.0	64.0	11,582	859	209	4,477	0	0	3,572	12.0	0	22,861
Q _{Total} (barrels)	19,380	15,485	1,526	75,883	65,764	298	121,054	15.0	145	68,765	493	0	368,808
Q _{Total} (1,000 gallons)	814	650	64.1	3,187	2,762	12.5	5,084	0.630	6.09	2,888	20.7	0	15,490
E _{VOC} ⁵ (lb)	0	4.41	0.479	27.9	29.8	0.163	78.2	9.54E-03	0.0800	28.8	0.152	0	170.0
E _{VOC} (Tons)	0	2.20E-03	2.40E-04	0.0139	0.0149	8.17E-05	0.0391	4.77E-06	4.00E-05	0.0144	7.61E-05	0	0.0850

Notes:

- 1) Submerged loading: dedicated normal service saturation factor (AP-42 Table 5.2-1).
- 2) Diesel and biodiesel assumed to have similar physical properties. Molecular weight of diesel obtained from AP-42 Table 7.1-2.
- 3) Vapor pressure and temperature from Tank 66 emission calculations.
- 4) Loading loss factor calculated using AP-42 Chapter 5 Equation 1.
- 5) Q = Monthly loading rack throughput.
- 6) Monthly loading emissions = Loading loss factor * monthly total throughput.

REFERENCE #3
ZENITH ENERGY TERMINALS PORTLAND
2020 OIL/W VOC EMISSION Tracking

Month	Year	Monthly Wastewater Discharge		12-Month Wastewater Discharge	VOC			
		Gallons	1,000 ft ³		Emission Factor	Monthly Total		12-Month Total
						Gallons	lb/1000 ft ³	
January	2020	889,810	119	13,050,960	0.2	23.8	0.0119	0.174
February	2020	1,943,780	260	13,228,210	0.2	52.0	0.0260	0.177
March	2020	419,510	56	11,415,630	0.2	11.2	0.0056	0.153
April	2020	299,940	40	8,960,780	0.2	8.0	0.0040	0.120
May	2020	626,020	84	9,390,870	0.2	16.74	0.0084	0.126
June	2020	0	0	9,223,820	0.2	0.00	0.0000	0.123
July	2020	489,570	65	9,713,390	0.2	13	0	0.130
August	2020	1,403,870	188	10,681,570	0.2	37.5	0.0188	0.143
September	2020	0	0	7,991,490	0.2	0.0	0.0000	0.107
October	2020	0	0	7,228,420	0.2	0.0	0.0000	0.097
November	2020	1,014,610	136	7,727,560	0.2	27.1	0.0136	0.103
December	2020	465,970	62	7,553,080	0.2	12.5	0.0062	0.101
12-Month Max/Total		7,553,080	1,010	13,228,210	---	---	---	0.177

Reference #4
Zenith Energy Terminals
Monthly and Annual Summary for 2020 Emissions Unit: FGTVOG

Component	Service	Total Components	Non-Leaking Components	Leaking Components	Emission Factors		Annual Hours of Operation		Annual Emissions			Total	
					Leaking Components	Non-Leaking Components	Leaking Components		Non-Leaking Components	Leaking Components	Non-Leaking Components	Total	
					(kg/hr-component)	(kg/hr-component)	(days/year)	(hours/year)	(hours/year)	(kg/yr)	(kg/yr)	(kg/yr)	(kg/yr)
Valves (V)	HL	110	108	2	0.00023	0.00023	105	2520	8,760	1.2	218	219	0.24
	LL	40	39	1	0.0852	0.0017	105	2520	8,760	215	581	795	0.87
	G	10	9	1	0.2626	0.0006	105	2520	8,760	662	47	709	0.78
Pump Seals (P)	HL	5	4	1	0.3885	0.0135	105	2520	8,760	979	473	1,452	1.6
	LL	2	1	1	0.437	0.0120	105	2520	8,760	1,101	105	1,206	1.3
Pressure Relief Valves (PRV)	G	1	0	1	1.691	0.0447	105	2520	8,760	4,261	0	4,261	4.7
Connectors (C)	All	260	256	4	0.0375	0.00006	105	2520	8,760	378	134	512	0.56

Annual VOC Emissions: 10.1

Notes:

Leakers were determined by taking the sum of one and one percent of the total components.

Leaking time period is determined by taking the number of days elapsed between quarterly monitoring periods (90 days),

adding the 15 day repair period and multiplying by the number of hours per day. Quarterly monitoring was chosen as a good "in-between" value.

Total components include marine loading components that came on-line in November 2018.

Month	Year	VOC Emissions	12 Month Total
		(tons/month)	
January	2020	0.86	10.1
February	2020	0.77	10.1
March	2020	0.86	10.1
April	2020	0.83	10.1
May	2020	0.86	10.1
June	2020	0.83	10.1
July	2020	0.86	10.1
August	2020	0.86	10.1
September	2020	0.83	10.1
October	2020	0.86	10.1
November	2020	0.83	10.1
December	2020	0.86	10.1
12-Month Maximum		—	10.1

Reference #5
Zenith Energy Terminals
Monthly and Annual Summary for 2020

Product Name	Product Density (lbs/gallon)	VOC Content	
		(%)	(lb/gal)
Citri-Kleen	8.09	50	4.05
Carboline Carboguard 890	14.5	12	1.81
Carboline Carbothane 134 HG	11.40	19	2.20
Misc. Maintenance Paint	9.35	37	3.50
Pro-Power II	6.42	100	6.42
Solvent 25	7.29	100	7.29
Solvent 33	7.41	100	7.41
Solvent 215	7.25	100	7.25
Solvent 365	6.55	100	6.55
Thinner 225	6.20	100	6.20

Monthly Usage	Citri-Kleen (gallons/month)	Carboline Carboguard 890 (gallons/month)	Carboline Carbothane 134 HG (gallons/month)	Misc. Maintenance Paint (gallons/month)	Pro-Power II (gallons/month)	Solvent 25 (gallons/month)	Solvent 33 (gallons/month)	Solvent 215 (gallons/month)	Solvent 365 (gallons/month)	Thinner 225 (gallons/month)	Total (gallons/month)	12-Month Total (gallons)
Jan-20	0	0	0	0.0	0	0	0	0	0	0	0.0	346.0
Feb-20	0	0	0	0.0	0	0	0	0	0	0	0.0	345.0
Mar-20	0	0	0	0.0	0	0	0	0	0	0	0.0	155.0
Apr-20	0	0	0	0.0	0	0	0	0	0	0	0.0	0.0
May-20	0	0	0	0.0	0	0	0	0	0	0	0.0	0.0
Jun-20	0	0	0	0.0	0	0	0	0	0	0	0.0	0.0
Jul-20	0	0	0	0.0	0	0	0	0	0	0	0.0	0.0
Aug-20	0	0	0	0.0	0	0	0	0	0	0	0.0	0.0
Sep-20	0	0	0	0.0	0	0	0	0	0	0	0.0	0.0
Oct-20	0	0	0	0.0	0	0	0	0	0	0	0.0	0.0
Nov-20	0	0	0	0.0	0	0	0	0	0	0	0.0	0.0
Dec-20	0	0	0	0.0	0	0	0	0	0	0	0.0	0.0
2020 Total	0	0	0	0	0	0	0	0	0	0	0	0

Monthly Emissions	Citri-Kleen (tons/month)	Carboline Carboguard 890 (tons/month)	Carboline Carbothane 134 HG (tons/month)	Misc. Maintenance Paint (tons/month)	Pro-Power II (tons/month)	Solvent 25 (tons/month)	Solvent 33 (tons/month)	Solvent 215 (tons/month)	Solvent 365 (tons/month)	Thinner 225 (tons/month)	Total (tons/month)	12-Month Total (tons)
Jan-20	0	0	0	0	0	0	0	0	0	0	0	0.316
Feb-20	0	0	0	0	0	0	0	0	0	0	0	0.316
Mar-20	0	0	0	0	0	0	0	0	0	0	0	0.158
Apr-20	0	0	0	0	0	0	0	0	0	0	0	0.000
May-20	0	0	0	0	0	0	0	0	0	0	0	0.000
Jun-20	0	0	0	0	0	0	0	0	0	0	0	0.000
Jul-20	0	0	0	0	0	0	0	0	0	0	0	0.000
Aug-20	0	0	0	0	0	0	0	0	0	0	0	0.000
Sep-20	0	0	0	0	0	0	0	0	0	0	0	0.000
Oct-20	0	0	0	0	0	0	0	0	0	0	0	0.000
Nov-20	0	0	0	0	0	0	0	0	0	0	0	0.000
Dec-20	0	0	0	0	0	0	0	0	0	0	0	0.000
Annual Maximum:												0.316

Reference #6
Zenith Energy Terminals Portland
2020 FIXTANK, EXTANK, and INTANK EMISSIONS

Month	Year	Contaminant	Monthly Emissions (tons/month)	Rolling 12 Month Total (tons/yr)
Jan	2020	VOC	0.670	9.84
Feb	2020	VOC	0.904	10.3
Mar	2020	VOC	1.11	10.6
Apr	2020	VOC	1.39	11.3
May	2020	VOC	1.41	11.9
Jun	2020	VOC	1.53	12.5
Jul	2020	VOC	1.61	13.1
Aug	2020	VOC	1.55	13.8
Sep	2020	VOC	1.33	14.0
Oct	2020	VOC	1.19	14.2
Nov	2020	VOC	0.978	14.4
Dec	2020	VOC	1.04	14.7
12-Month Max		VOC	---	14.7

Emissions calculated using AP-42 Chapter 7 equations

Reference #7-1
Zenith Energy Terminals - Portland
Monthly and Annual Summary for 2020 Emissions Unit: MLOAD

Date	AWB Crude Oil Throughput (gallons/mo)	Bakken Crude Oil Throughput (gallons/mo)	Total Crude Oil Throughput (gallons/mo)	AWB Marine Loading VOC Emissions (tons/mo)	Bakken Marine Loading VOC Emissions (tons/mo)	Total Marine Loading VOC Emissions (tons/mo)
January-20	15,207,784	1,963,995	17,171,779	0.00823	0.00126	0.00949
February-20	10,529,681	10,647,518	21,177,199	0.00583	0.00702	0.0129
March-20	11,192,772	16,979,576	28,172,348	0.00629	0.0114	0.0177
April-20	4,728,463	20,408,183	25,136,646	0.00273	0.0141	0.0169
May-20	5,341,548	7,255,574	12,597,122	0.00319	0.00524	0.00844
June-20	2,495,423	2,535	2,497,958	0.00154	0.00000	0.00155
July-20	12,877,268	9,470,773	22,348,041	0.00823	0.00740	0.0156
August-20	13,589,481	4,961,867	18,551,348	0.00866	0.00386	0.0125
September-20	1,591,880	2,413,238	4,005,118	0.000986	0.00182	0.00281
October-20	14,873,731	12,509,841	27,383,572	0.00877	0.00889	0.0177
November-20	6,151,093	5,187,780	11,338,873	0.00345	0.00347	0.00692
December-20	23,562,790	20,921,844	44,484,634	0.0129	0.0136	0.0265
12 Month Totals:	122,141,914	112,722,724	234,864,638	0.071	0.0781	0.149

Notes:

- 1) Emissions calculated using the crude oil ship and barge loading emission methodology found in AP-42 Chapter 5 (see equation 2, equation 3, and Table 5.2-3).
- 2) Marine crude oil loading operations allowed by Permit No. 26-2025 began on November 11, 2018.
- 3) Bakken crude oil marine loading operations began in March 2019.

Reference #7-2
 Zenith Energy Terminals - Portland
 Monthly and Annual Summary for 2020 Emissions Unit: MLOAD (AWB Crude Oil Loading)

Date	AWB Throughput (gallons/mo)	Arrival Emission Factor (lb/1,000 gal)	Liquid Bulk Temperature		Reid Vapor Pressure (psia)	True Vapor Pressure (psia)	Vapor Molecular Weight (lb/lb-mol)	Vapor Growth Factor	Generated Vapors Emission Factor (lb/1,000 gal)	Loading Loss Emission Factor (lb/1,000 gal)	Uncontrolled VOC Emissions (tons/mo)	Control Efficiency (%)	Actual VOC Emissions (tons/mo)
			(°F)	(°R)									
January-20	15,207,784	0.86	38.9	499	7.3	3.28	58	1.02	0.223	1.08	8.2	99.9%	0.0082
February-20	10,529,681	0.86	43.2	503	7.3	3.56	58	1.02	0.248	1.11	5.8	99.9%	0.0058
March-20	11,192,772	0.86	46.0	506	7.3	3.75	58	1.02	0.265	1.12	6.3	99.9%	0.0063
April-20	4,728,463	0.86	50.4	510	7.3	4.08	58	1.02	0.293	1.15	2.7	99.9%	0.0027
May-20	5,341,548	0.86	56.7	517	7.3	4.57	58	1.02	0.336	1.20	3.2	99.9%	0.0032
June-20	2,495,423	0.86	62.5	522	7.3	5.08	58	1.02	0.378	1.24	1.5	99.9%	0.0015
July-20	12,877,268	0.86	67.7	528	7.3	5.56	58	1.02	0.418	1.28	8.2	99.9%	0.0082
August-20	13,589,481	0.86	67.2	527	7.3	5.52	58	1.02	0.415	1.27	8.7	99.9%	0.0087
September-20	1,591,880	0.86	62.7	523	7.3	5.09	58	1.02	0.379	1.24	1.0	99.9%	0.0010
October-20	14,873,731	0.86	54.3	514	7.3	4.38	58	1.02	0.319	1.18	8.8	99.9%	0.0088
November-20	6,151,093	0.86	45.5	505	7.3	3.72	58	1.02	0.262	1.12	3.4	99.9%	0.0034
December-20	23,562,790	0.86	40.9	501	7.3	3.41	58	1.02	0.234	1.09	12.9	99.9%	0.0129

Notes:

- 1) Emissions calculated using the crude oil ship and barge loading emission methodology found in AP-42 Chapter 5 (see equation 2, equation 3, and Table 5.2-3).
- 2) Marine crude oil loading operations allowed by Permit No. 26-2025 began on November 11, 2018.

Reference #7-3
 Zenith Energy Terminals - Portland
 Monthly and Annual Summary for 2020 Emissions Unit: MLOAD (Bakken Crude Oil Loading)

Date	Bakken Throughput (gallons/mo)	Arrival Emission Factor (lb/1,000 gal)	Liquid Bulk Temperature		Reid Vapor Pressure (psia)	True Vapor Pressure (psia)	Vapor Molecular Weight (lb/lb-mol)	Vapor Growth Factor	Generated Vapors Emission Factor (lb/1,000 gal)	Loading Loss Emission Factor (lb/1,000 gal)	Uncontrolled VOC Emissions (tons/mo)	Control Efficiency (%)	Actual VOC Emissions (tons/mo)
			(°F)	(°R)									
January-19	0	0.86	38.9	499	10.2	5.36	58	1.02	0.423	1.28	0.0	99.9%	0.0000
February-19	0	0.86	43.2	503	10.2	5.78	58	1.02	0.459	1.32	0.0	99.9%	0.0000
March-19	307,460	0.86	46.0	506	10.2	6.06	58	1.02	0.484	1.34	0.2	99.9%	0.0002
April-19	3,520,365	0.86	50.4	510	10.2	6.55	58	1.02	0.525	1.38	2.4	99.9%	0.0024
May-19	2,933,505	0.86	56.7	517	10.2	7.27	58	1.02	0.586	1.45	2.1	99.9%	0.0021
June-19	8,985,585	0.86	62.5	522	10.2	8.00	58	1.02	0.646	1.51	6.8	99.9%	0.0068
July-19	8,678,017	0.86	67.7	528	10.2	8.70	58	1.02	0.703	1.56	6.8	99.9%	0.0068
August-19	7,548,572	0.86	67.2	527	10.2	8.64	58	1.02	0.698	1.56	5.9	99.9%	0.0059
September-19	10,513,119	0.86	62.7	523	10.2	8.03	58	1.02	0.648	1.51	7.9	99.9%	0.0079
October-19	10,320,836	0.86	54.3	514	10.2	6.99	58	1.02	0.562	1.42	7.3	99.9%	0.0073
November-19	11,794,748	0.86	45.5	505	10.2	6.01	58	1.02	0.479	1.34	7.9	99.9%	0.0079
December-19	17,809,022	0.86	40.9	501	10.2	5.55	58	1.02	0.439	1.30	11.6	99.9%	0.0116
January-20	1,963,995	0.86	38.9	499	10.2	5.36	58	1.02	0.423	1.28	1.3	99.9%	0.0013
February-20	10,647,518	0.86	43.2	503	10.2	5.78	58	1.02	0.459	1.32	7.0	99.9%	0.0070
March-20	16,979,576	0.86	46.0	506	10.2	6.06	58	1.02	0.484	1.34	11.4	99.9%	0.0114
April-20	20,408,183	0.86	50.4	510	10.2	6.55	58	1.02	0.525	1.38	14.1	99.9%	0.0141
May-20	7,255,574	0.86	56.7	517	10.2	7.27	58	1.02	0.586	1.45	5.2	99.9%	0.0052
June-20	2,535	0.86	62.5	522	10.2	8.00	58	1.02	0.646	1.51	0.0	99.9%	0.0000
July-20	9,470,773	0.86	67.7	528	10.2	8.70	58	1.02	0.703	1.56	7.4	99.9%	0.0074
August-20	4,961,867	0.86	67.2	527	10.2	8.64	58	1.02	0.698	1.56	3.9	99.9%	0.0039
September-20	2,413,238	0.86	62.7	523	10.2	8.03	58	1.02	0.648	1.51	1.8	99.9%	0.0018
October-20	12,509,841	0.86	54.3	514	10.2	6.99	58	1.02	0.562	1.42	8.9	99.9%	0.0089
November-20	5,187,780	0.86	45.5	505	10.2	6.01	58	1.02	0.479	1.34	3.5	99.9%	0.0035
December-20	20,921,844	0.86	40.9	501	10.2	5.55	58	1.02	0.439	1.30	13.6	99.9%	0.0136

12 Month Total: 0.0589

Notes:

- 1) Emissions calculated using the crude oil ship and barge loading emission methodology found in AP-42 Chapter 5 (see equation 2, equation 3, and Table 5.2-3).
- 2) Marine crude oil loading operations allowed by Permit No. 26-2025 began on November 11, 2018.

February 8, 2021

Title V Permit No. 26-2025 – Annual Report

Emissions and Compliance Monitoring Data

Permit Condition 68d – Emissions and Compliance Monitoring Data

Title V Permit Condition 68d specifies the emissions and compliance monitoring data for the following permit conditions must be included in the annual report. The applicable permit conditions are:

- Permit Condition 8 – Product with Highest Vapor Pressure Stored in FIXTANK
- Permit Condition 11 – Summary of Air Contaminant Nuisance Public Complaints
- Permit Condition 25 – Oil/W Inspection Results
- Permit Condition 28 – Process Turnaround Emissions
- Permit Condition 31 – F1B, F3, and F4/B6 Compliance Verification during Waste Gas Incineration
- Permit Condition 34 – Refinery Annual Leaking Component Summary
- Permit Condition 58 – Annual Emission Data

Compliance with these permit conditions are summarized below.

Permit Condition 8

The product with the highest vapor pressure stored in FIXTANK was biodiesel that was stored in FIXTANK. In July 2020, it had a maximum vapor pressure of 0.11 psia. A table showing the vapor pressures of the products stored in FIXTANK is provided as Attachment 68d-1.

Permit Condition 11

There were no public complaints of an air contaminant from any source causing a nuisance in 2020.

Permit Condition 25

A report summarizing the annual inspection of the facility's oil/water separator (Emission Unit ID Oil/W) is provided as Attachment 68d-2. As noted in the report, maintenance was not required in 2020.

Permit Condition 28

Permit Condition 26 requires specified refinery waste gases including VOCs contained in a process unit for turnaround to: *"be routed to and incinerated in F4/B1, F1B, or F3; or introduced to a closed refinery system"*. Condition 28 requires reporting the estimated quantity of VOCs emitted during process unit turnarounds. The refinery was not operated in 2020. Therefore, no process units were turned around and VOCs from turnarounds were not emitted.

Permit Condition 31

Permit Condition 30 states:

"The permittee shall monitor the operating temperature of F1B, F3, and F4/B6 when the asphalt blowing or refinery waste gases are being incinerated and continuously record the temperature on a strip/circular chart to show the compliance status with respect to the 1,400 F temperature limit specified in Condition 29."

Permit Condition 31 requires a monthly summary of the compliance verification results described above. Waste gas was not incinerated in the units listed above during 2020 and the distillation column referenced in Permit Condition 29b was not operated in 2020. Accordingly, there are no monthly compliance verification summaries to report for 2020.

Permit Condition 34

The refinery portion of the facility did not operate in 2020. Accordingly, none of the conditions or activities listed in Permit Conditions 34b – 34d applied or occurred in 2020.

Permit Condition 68d – Emissions and Compliance Monitoring Data

Permit Condition 58

The tables below list the 2020 annual emissions and throughputs specified in Condition 58a.

Attachment 68b-3 contains tables that reports the 12-month summary of plant site emissions.

BOILER/FURNACE (Condition 58.a.i)

Pollutant	Highest Annual Emissions Rate
PM ₁₀	0.048 tons
SO ₂	0.032 tons
NO _x	1.9 tons
CO	1.6 tons
VOC	0.11 tons
H ₂ S	0.00 tons
Type of Fuel Used	Fuel Usage
Natural Gas	26.31 MMCF
Diesel Fuel	0 gal
Residual Fuel Oil	0 gal
NCG	0 MMCF
Air Still Fumes	0 MMCF

Other Emission Units (Conditions 58.a.ii - v)

Emissions Unit	Highest Annual VOC Emissions Rate	Throughput
FIXTANK/INTANK/EXTANK	14.7 tons	218,557,757 gal/yr
TRACK	0.085 tons	15,489,941 gal/yr
FGTVOC	10 tons	--
OIL/W	0.18 tons	7,553,080 gal/yr
FW	0.36 tons	310 gal/yr
MLOAD	0.149 tons	234,864,638 gal/yr

Attachment 68d-1

Vapor Pressure Summary Table

**Zenith Energy Terminals
Portland, Oregon
2020 Tank Vapor Pressure Tracking**

Tank Number	Tank Contents	January 2020	February 2020	March 2020	April 2020	May 2020	June 2020	July 2020	August 2020	September 2020	October 2020	November 2020	December 2020	12-Month Maximum	Permitted Maximum	In Compliance with Vapor Pressure Limit?
		(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)		
EXTANK (External Floating Roof Tanks)																
EXTANK 105	AWB Crude	3.26	3.54	3.73	4.05	4.55	5.05	5.53	5.49	5.07	4.35	3.69	3.39	5.53	11.1	Yes
EXTANK 106	AWB/Bakken	3.26	3.54	3.73	4.74	7.24	7.96	8.66	8.60	7.99	6.95	5.98	5.52	8.66	11.1	Yes
EXTANK 120	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	11.1	Yes
INTANK (External Floating Roof Tanks)																
INTANK 63	Bakken Crude	5.33	5.75	6.03	6.51	7.24	7.96	5.53	5.49	5.07	4.35	3.69	3.39	7.96	11.1	Yes
INTANK 68	AWB Crude	3.28	3.59	3.82	4.19	4.74	5.27	5.80	5.71	5.22	4.43	3.73	5.56	5.80	11.1	Yes
INTANK 71	Av-Gas	1.88	2.09	2.24	2.51	2.91	3.30	3.71	3.64	3.26	2.69	2.19	1.96	3.71	11.1	Yes
INTANK 95	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	11.1	Yes
INTANK 104	OoS/Bakken	N/A	5.75	6.03	6.51	7.24	7.96	8.66	8.60	7.99	6.95	5.98	5.52	8.66	11.1	Yes
INTANK 114	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	11.1	Yes
INTANK 130	Bakken Crude	5.33	5.75	6.03	6.51	7.24	7.96	8.66	8.60	7.99	6.95	5.98	5.52	8.66	11.1	Yes
FIXTANK (Tanks with a rated capacity less than 39,000 gallons)																
FIXTANK 151	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	Yes
FIXTANK 152	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	Yes
FIXTANK 167	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	Yes
FIXTANK 168	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	Yes
FIXTANK 169	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	Yes
FIXTANK 177	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	Yes
FIXTANK 202	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	Yes
FIXTANK 209	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	Yes
FIXTANK 211	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	Yes
FIXTANK 213	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	Yes
FIXTANK 306	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	N/A	Yes
FIXTANK (Tanks with a rated capacity greater than 39,000 gallons)																
FIXTANK 66	Diesel	3.0E-03	3.6E-03	4.1E-03	4.9E-03	6.2E-03	7.6E-03	9.1E-03	8.8E-03	7.5E-03	5.5E-03	3.9E-03	3.3E-03	9.1E-03	1.50	Yes
FIXTANK 67	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 69	OoS/Diesel	N/A	N/A	N/A	N/A	6.2E-03	7.6E-03	9.1E-03	8.8E-03	7.5E-03	5.5E-03	N/A	3.3E-03	9.1E-03	1.50	Yes
FIXTANK 70	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 74	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 93	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 100	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 101	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 102	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 110	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 111	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 112	OoS/Diesel	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5.3E-03	3.8E-03	3.2E-03	5.3E-03	1.50	Yes
FIXTANK 113	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 121	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 122	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 123	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 124	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 125	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 126	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes

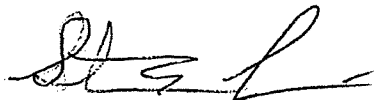
**Zenith Energy Terminals
Portland, Oregon
2020 Tank Vapor Pressure Tracking**

Tank Number	Tank Contents	January 2020	February 2020	March 2020	April 2020	May 2020	June 2020	July 2020	August 2020	September 2020	October 2020	November 2020	December 2020	12-Month Maximum	Permitted Maximum	In Compliance with Vapor Pressure Limit?
		(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	(psia)	
FIXTANK 127	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 128	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 129	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 140	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 141	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 142	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 143	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 145	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 146	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 147	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 148	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 149	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 150	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 157	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 158	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 170	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 171	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 172	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 173	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 174	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 176	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 181	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 182	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 183	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes
FIXTANK 184	Biodiesel	3.3E-03	4.0E-03	4.7E-03	5.9E-03	7.6E-03	9.4E-03	0.011	0.011	8.7E-03	6.1E-03	4.3E-03	3.5E-03	0.011	1.50	Yes
FIXTANK 185	Out of Service	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0	1.50	Yes

Attachment 68d-2

Oil/Water Separator Annual Inspection

Title V Annual OW Separator Inspection		
Date:	07-09-2020	Permit Holder: Zenith Terminals Permit #: 262025
Requirement:	Condition 24 Monitor and Record	Inspector: Steven Lewis
Location:	Oil/Water Separator	
Summary of Findings:	On 07-09-2020 the terminal's oil/water separator was inspected and found to be on good operating condition with no mechanical failures or deficiencies of operation. Forebay closed and sealed	
Corrective Action:	None required	



Steven E. Lewis SMS



Attachment 68d-3

12-Month Summary of Annual Emission Rates

Zenith Energy Terminals - Portland
PM₁₀ Plant Site Emission Summary
Summary Permit No. 26-2025
PSEL = 14 tons/year

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	Total Monthly PM10 (tons/mo.)	Rolling 12- month PM10 (tons/yr)
January	2020	3.65E-03						3.65E-03	0.0477
February	2020	5.22E-03						5.22E-03	0.0480
March	2020	5.04E-03						5.04E-03	0.0484
April	2020	3.94E-03						3.94E-03	0.0479
May	2020	1.63E-03						1.63E-03	0.0453
June	2020	2.01E-03						2.01E-03	0.0443
July	2020	1.72E-03						1.72E-03	0.0427
August	2020	2.79E-03						2.79E-03	0.0409
September	2020	1.19E-03						1.19E-03	0.0386
October	2020	1.98E-03						1.98E-03	0.0365
November	2020	1.99E-03						1.99E-03	0.0342
December	2020	1.73E-03						1.73E-03	0.0329
2020 Emissions									0.0484

Zenith Energy Terminals - Portland
SO₂ Plant Site Emission Summary
Summary Permit No. 26-2025
PSEL = 81 tons/year

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	Total Monthly SO ₂ (tons/mo.)	Rolling 12- month SO ₂ (tons/yr)
January	2020	2.48E-03						2.48E-03	0.0324
February	2020	3.55E-03						3.55E-03	0.0326
March	2020	3.43E-03						3.43E-03	0.0329
April	2020	2.68E-03						2.68E-03	0.0326
May	2020	1.11E-03						1.11E-03	0.0308
June	2020	1.37E-03						1.37E-03	0.0301
July	2020	1.17E-03						1.17E-03	0.0290
August	2020	1.89E-03						1.89E-03	0.0278
September	2020	8.12E-04						8.12E-04	0.0263
October	2020	1.35E-03						1.35E-03	0.0248
November	2020	1.35E-03						1.35E-03	0.0232
December	2020	1.18E-03						1.18E-03	0.0224
2020 Emissions									0.0329

Zenith Energy Terminals - Portland
NO_x Plant Site Emission Summary
Summary Permit No. 26-2025
PSEL = 99 tons/year

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	Total Monthly NO _x (tons/mo.)	Rolling 12- month NO _x (tons/yr)
January	2020	0.146						0.146	1.91
February	2020	0.209						0.209	1.92
March	2020	0.202						0.202	1.94
April	2020	0.158						0.158	1.92
May	2020	0.0652						0.065	1.81
June	2020	0.0804						0.080	1.77
July	2020	0.0687						0.069	1.71
August	2020	0.111						0.111	1.64
September	2020	0.0478						0.048	1.54
October	2020	0.0793						0.079	1.46
November	2020	0.0796						0.080	1.37
December	2020	0.0692						0.069	1.32
2020 Emissions									1.94

**Zenith Energy Terminals - Portland
CO Plant Site Emission Summary
Summary Permit No. 26-2025
PSEL = 99 tons/year**

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	Total Monthly CO (tons/mo.)	Rolling 12- month CO (tons/yr)
January	2020	0.122						0.1225	1.60
February	2020	0.175						0.175	1.61
March	2020	0.169						0.169	1.63
April	2020	0.132						0.132	1.61
May	2020	0.0548						0.055	1.52
June	2020	0.0676						0.068	1.49
July	2020	0.0577						0.058	1.43
August	2020	0.0936						0.094	1.37
September	2020	0.0401						0.040	1.30
October	2020	0.0666						0.067	1.23
November	2020	0.0669						0.067	1.15
December	2020	0.0581						0.058	1.10
2020 Emissions									1.63

Zenith Energy Terminals - Portland
H₂S Plant Site Emission Summary
Summary Permit No. 26-2025
PSEL = 9 tons/year

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	Total Monthly H ₂ S (tons/mo.)	Rolling 12- month H ₂ S (tons/yr)
January	2020	0.00						0.00	0.00
February	2020	0.00						0.00	0.00
March	2020	0.00						0.00	0.00
April	2020	0.00						0.00	0.00
May	2020	0.00						0.00	0.00
June	2020	0.00						0.00	0.00
July	2020	0.00						0.00	0.00
August	2020	0.00						0.00	0.00
September	2020	0.00						0.00	0.00
October	2020	0.00						0.00	0.00
November	2020	0.00						0.00	0.00
December	2020	0.00						0.00	0.00
2020 Emissions									0.00



ZENITH ENERGY TERMINALS HOLDINGS LLC

3900 Essex Lane, Suite 700
Houston, Texas 77027

February 14, 2022

Mr. George Yun
Oregon Department of Environmental Quality
Air Quality Program
700 Multnomah Street
Suite 600
Portland, OR 97232

DEPT OF ENVIRONMENTAL QUALITY
RECEIVED

FEB 15 2022

NORTHWEST REGION

**RE: 2021 Title V Permit Annual Report
Permit No.: 26-2025**

Mr. Yun:

Zenith Energy Terminals Holdings LLC (Zenith Energy Terminals) is submitting for your review 2 copies of the 2021 Title V Permit Annual Report for Permit No. 26-2025. Permit No. 26-2025 is associated with the Zenith Energy Terminals Portland Facility located at 5501 NW Front Avenue, Portland, OR 97210. The report includes the following items specified in Permit No. 26-2025 Condition 68.

- Condition 68.a. – Second semi-annual compliance certification including forms:
 - Form R1002: Compliance Status
 - Form R1003: Summary of Permit Deviations
- Condition 68.b. – Emissions fee report which includes:
 - Form F1101: Total Emissions by Regulated Pollutant
 - Form F1102: Emissions by Source
- Condition 68.c. – Excess emissions upset logs if applicable.
 - Not Applicable - There were no upsets in 2021.
- Condition 68.d. – The compliance and monitoring data specified in Conditions 8, 11, 25, 28, 31, 34, and 58. The following items are attached to demonstrate compliance with Condition 68.d.
 - Highest vapor pressure stored in applicable FIXTANK (condition 8)
 - Summary of public complaints (condition 11)
 - Oil and water separator inspection results (condition 25)
 - VOC emitted from process unit turnarounds (condition 28)
 - Furnace temperature compliance verification results (condition 31)
 - Fourth quarter fugitive monitoring results (condition 34)
 - Highest annual and summary of annual emission rates (condition 58)

ENCLOSURES
(Originals)

Title V Operation Permit Program

Semi-annual Compliance Certification

FORM
R1002
Answer
Sheet

Permit Number: 26-2025

Facility name: Zenith Energy

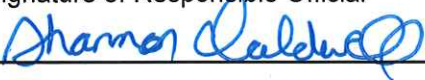
1. Reporting Period: July - December 2021
2. Plan development/revision triggered [yes/no]: No
3. Compliance status:

a. Permit Condition #	b. Method of Determining Compliance	c. Compliance Status (C/I)	d. Emissions Unit(s)	e. Permit Deviation Type	f. Number of Deviations
4	Recordkeeping	Continuous			
5	Recordkeeping	Continuous			
6	Recordkeeping & Monitoring	Continuous			
7	Recordkeeping	Continuous			
8	Reporting	Continuous			
9	Operations & Maintenance	Continuous			
10	Recordkeeping & Monitoring	Continuous			
11	Reporting	Continuous			
12	Operations & Maintenance	Continuous			
13	Operations & Maintenance	Continuous			
14	Operations & Maintenance	Continuous			
15	Operations	Continuous			
16	Recordkeeping	Continuous			
17	Reporting	Continuous			
18	Operations & Maintenance	Continuous			
19	Monitoring & Recordkeeping	Continuous			
20	Operations & Maintenance	Continuous			
21	Recordkeeping	Continuous			
22	Reporting	Continuous			
23	Inspections	Continuous			
24	Recordkeeping	Continuous			
25	Reporting	Continuous			
26	Operations & Maintenance	Continuous			
27	Recordkeeping	Continuous			
28	Reporting	Continuous			
29	Operations & Maintenance	Continuous			
30	Recordkeeping	Continuous			

a. Permit Condition #	b. Method of Determining Compliance	c. Compliance Status (C/I)	d. Emissions Unit(s)	e. Permit Deviation Type	f. Number of Deviations
31	Reporting	Continuous			
32	Inspections & Maintenance	Continuous			
33	Recordkeeping	Continuous			
34	Reporting	Continuous			
35	Floating Roof Construction, Operation, & Maintenance	Continuous			
36	Inspections & Notifications	Continuous			
37	Floating Roof Construction, Operation, & Maintenance	Continuous			
38	Inspections & Notifications	Continuous			
39	Floating Roof Construction, Operation, & Maintenance	Continuous			
40	Inspections & Notifications	Continuous			
41	Recordkeeping & Monitoring	Continuous			
42	Recordkeeping	Continuous			
43	Operations & Maintenance	Continuous			
44	Operations & Maintenance	Continuous			
45	Operations & Maintenance	Continuous			
46	Operations & Maintenance	Continuous			
47	Operations & Maintenance	Continuous			
48	Inspections, Training, Operations, & Maintenance	Continuous			
49	Training & Recordkeeping	Continuous			
50	Inspections & Training	Continuous			
51	Not Applicable	Continuous			
52	Not Applicable	Continuous			
53	Emission Calculations, & Recordkeeping	Continuous			
54	Recordkeeping	Continuous			
55	Recordkeeping	Continuous			
56	Emission Calculations, & Recordkeeping	Continuous			
57	Emission Calculations, & Recordkeeping	Continuous			
58	Reporting	Continuous			
59	Testing	Continuous			
60	Testing	Continuous			
61	Testing	Continuous			
62	Testing	Continuous			
63	Recordkeeping	Continuous			
64	Recordkeeping	Continuous			
65	Recordkeeping	Continuous			
66	Reporting	Continuous			

Statement of Certification:

Based on information and belief formed after reasonable inquiry, the statements and information in this document and any attachments are true, accurate and complete. I also certify that all statements made concerning compliance, which are based on monitoring required by the permit but not required to be submitted to the Department, are true, accurate and complete based on information and belief formed after reasonable inquiry.

Name of Responsible Official Shannon Caldwell
Signature of Responsible Official 

Title of Responsible Official Vice President of HSE and Regulatory
Date 2/14/2022

Emission Fee Report (Condition 68a)

- **Form F1101**
- **Form F1102**
 - **Reference #1 – Boiler Furnace Emission Summary**
 - **Reference #2 – Track Emission Summary**
 - **Reference #3 – Oil/W Emission Summary**
 - **Reference #4 – FGTVOG Emission Summary**
 - **Reference #5 – FW Emission Summary**
 - **Reference #6 – FIXTANK, EXTANK, and INTANK Emission Summary**
 - **Reference #7 – MLOAD Emission Summary**



DEQ

State of Oregon
Department of
Environmental
Quality

Total Emissions by Regulated Pollutant

FORM F1101

1. Reporting year: <u>2021</u>	
2. Facility name: <u>Zenith Energy Terminals Portland</u>	4. Permit number: <u>26-2025</u>
3. <u>3900 Essex Lane, Suite 700</u> Mailing street address or PO Box <u>Houston, TX 77027</u> Mailing city, state and ZIP code	5. <u>Andrew Danhof - Manager, Environmental and Regulatory</u> Contact name and title <u>(713) 395-6238</u> Phone number with area code
6. Emissions (in tons) by regulated air pollutant subject to fees for the reporting year:	
PM ₁₀ *	<u>15</u>
or PM	_____
or PM _{2.5}	_____
or TSP	_____
SO ₂	<u>82</u>
NO _x (as NO ₂)	<u>78</u>
VOC	<u>180</u>
* Report only one particulate category. If permit has a PSEL for PM ₁₀ , report emissions of PM ₁₀ . If permit has a PSEL for particulate matter (PM) and not PM ₁₀ , report emissions of PM. If permit has a PSEL for PM _{2.5} and not PM ₁₀ or PM, report emissions of PM _{2.5} . If permit has a PSEL for total suspended particulate (TSP) and not PM ₁₀ , PM or PM _{2.5} , report emissions of TSP.	
7. Total emissions (in tons) of pollutants subject to fees for the reporting year: <u>355</u>	
8. Statement of certification:	
I have reviewed this report and all supporting documentation in their entirety and to the best of my knowledge, information, and belief formed after reasonable inquiry, the statements and information contained herein are true, accurate and complete.	
<u>Shannon Caldwell</u> Name of designated responsible official	<u>VP of HSE and Regulatory</u> Title of responsible official
<u></u> Signature of responsible official	<u>2/14/2022</u> Date



DEQ

State of Oregon
Department of
Environmental
Quality

1. Reporting year: 2021					
2. Facility name: Zenith Energy - Portland			3. Permit number: 26-2025		
4. Emissions by emission source					
a. Group code (EU #, ES #, FS#, PS# or PSEL)	b. Device or process ID	c. Pollutant	d. Emissions (tons)	e. Method	f. Reference
PSEL		PM10	14	1	Permit pg.24
PSEL		SO2	81	1	Permit pg.24
PSEL		NOX	77	1	Permit pg.24
PSEL		CO	99	1	Permit pg.24
PSEL		VOC	179	1	Permit pg.24
PSEL		H2S	9	1	Permit pg.24
AIA		PM10	1	1	Permit pg.24
AIA		SO2	1	1	Permit pg.24
AIA		NOX	1	1	Permit pg.24
AIA		CO	1	1	Permit pg.24
AIA		VOC	1	1	Permit pg.24
		H2S	1	1	Permit pg.24
5. Form F1102 page ___ of ___					

REFERENCE #1
ZENITH ENERGY TERMINALS - PORTLAND
2021 BOILER FURNACE EMISSION SUMMARY

Month	Year	Monthly Gas Usage		Rolling 12 Month Annual Usage		PM ₁₀			SO ₂			NO _x			CO			VOC		
		Therms	MMCF	Therms	MMCF	Emission Factor lb/MMCF	Monthly Total Tons	12-Month Total Tons	Emission Factor lb/MMCF	Monthly Total Tons	12-Month Total Tons	Emission Factor lb/MMCF	Monthly Total Tons	12-Month Total Tons	Emission Factor lb/MMCF	Monthly Total Tons	12-Month Total Tons	Emission Factor lb/MMCF	Monthly Total Tons	12-Month Total Tons
January	2021	19,146	1.91	253,058	25.3	2.5	2.39E-03	0.0316	1.7	1.63E-03	0.0215	100	0.096	1.27	84	0.08	1.06	5.5	5.27E-03	0.07
February	2021	19,285	1.93	230,617	23.1	2.5	2.41E-03	0.0288	1.7	1.64E-03	0.0196	100	0.096	1.15	84	0.08	0.97	5.5	5.30E-03	0.06
March	2021	11,214	1.12	201,495	20.1	2.5	1.40E-03	0.0252	1.7	9.53E-04	0.0171	100	0.056	1.01	84	0.05	0.85	5.5	3.08E-03	0.06
April	2021	15,113	1.51	185,073	18.5	2.5	1.89E-03	0.0231	1.7	1.28E-03	0.0157	100	0.076	0.93	84	0.06	0.78	5.5	4.16E-03	0.05
May	2021	11,698	1.17	183,727	18.4	2.5	1.46E-03	0.0230	1.7	9.94E-04	0.0156	100	0.0585	0.92	84	0.05	0.77	5.5	0.003217	0.05
June	2021	13,024	1.30	180,666	18.1	2.5	1.63E-03	0.0226	1.7	1.11E-03	0.0154	100	0.0651	0.90	84	0.05	0.76	5.5	0.003582	0.05
July	2021	10,555	1.06	177,479	17.7	2.5	1.32E-03	0.0222	1.7	8.97E-04	0.0151	100	0.0528	0.89	84	0.04	0.75	5.5	0.002903	0.05
August	2021	8,490	0.85	163,679	16.4	2.5	1.06E-03	0.0205	1.7	7.22E-04	0.0139	100	0.042	0.82	84	0.04	0.69	5.5	0.002335	0.05
September	2021	7,060	0.71	161,183	16.1	2.5	8.82E-04	0.0201	1.7	6.00E-04	0.0137	100	0.0353	0.81	84	0.03	0.68	5.5	0.001941	0.04
October	2021	8,202	0.82	153,535	15.4	2.5	1.03E-03	0.0192	1.7	6.97E-04	0.0131	100	0.0410	0.77	84	0.03	0.64	5.5	0.002255	0.04
November	2021	15,260	1.53	152,878	15.3	2.5	1.91E-03	0.0191	1.7	1.30E-03	0.0130	100	0.0763	0.76	84	0.06	0.64	5.5	0.004197	0.04
December	2021	26,308	2.63	165,354	16.5	2.5	3.29E-03	0.0207	1.7	2.24E-03	0.0141	100	0.1315	0.83	84	0.11	0.69	5.5	0.007235	0.05
12-Month Max/Total		165,354	16.54	---	25.3	---	---	0.0316	---	---	0.0215	---	---	1.27	---	---	1.06	---	---	0.070

Reference #2-1
 Zenith Energy Terminals - Portland
 2021 TRACK Emissions
 Diesel & Biodiesel Loading

	January	February	March	April	May	June	July	August	September	October	November	December	12 Month Total
S ¹	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	--
M ²	130	130	130	130	130	130	130	130	130	130	130	130	--
P ³	3.02E-03	3.61E-03	4.07E-03	4.89E-03	6.20E-03	7.60E-03	9.12E-03	8.84E-03	7.46E-03	5.46E-03	3.90E-03	3.26E-03	--
T ³ (°F)	38.9	43.2	46.0	50.4	56.7	62.5	67.7	67.2	62.7	54.3	45.5	40.9	--
T (°R)	499	503	506	510	516	522	527	527	522	514	505	501	--
L _i ⁴ (lb/1,000 gallons)	5.89E-03	6.98E-03	7.83E-03	9.32E-03	0.0117	0.0141	0.0168	0.0163	0.0139	0.0103	7.50E-03	6.32E-03	--
Q _{diesel} (barrels)	71.2	9,794	13,177	285	0	2,397	3,329	820	205	317	2,827	2,209	35,433
Q _{diesel} (1,000 gallons)	2.99	411	553	12.0	0	101	140	34.4	8.59	13.3	119	92.8	1,488
E _{voc} ⁵ (lb)	0.0176	2.87	4.33	0.112	0	1.42	2.35	0.562	0.119	0.137	0.890	0.587	13.4
E _{voc} (Tons)	8.80E-06	1.43E-03	2.17E-03	5.59E-05	0	7.12E-04	1.17E-03	2.81E-04	5.96E-05	6.87E-05	4.45E-04	2.93E-04	6.70E-03

Notes:

- 1) Submerged loading: dedicated normal service saturation factor (AP-42 Table 5.2-1).
- 2) Renewable Diesel assumed to have similar physical properties to diesel. Molecular weight of diesel obtained from AP-42 Table 7.1-2.
- 3) Vapor pressure and temperature from Tank 66 emission calculations.
- 4) Loading loss factor calculated using AP-42 Chapter 5 Equation 1.
- 5) Q = Monthly loading rack throughput.
- 6) Monthly loading emissions = Loading loss factor * monthly total throughput.

Reference #2-2
Zenith Energy Terminals - Portland
2021 TRACK Emissions
Renewable Diesel Loading

	January	February	March	April	May	June	July	August	September	October	November	December	12 Month Total
S ¹	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	--
M ²	130	130	130	130	130	130	130	130	130	130	130	130	--
P ³	3.02E-03	3.61E-03	4.07E-03	4.89E-03	6.20E-03	7.60E-03	9.12E-03	8.84E-03	7.46E-03	5.46E-03	3.90E-03	3.26E-03	--
T ³ (°F)	38.9	43.2	46.0	50.4	56.7	62.5	67.7	67.2	62.7	54.3	45.5	40.9	--
T (°R)	499	503	506	510	516	522	527	527	522	514	505	501	--
L _i ⁴ (lb/1,000 gallons)	5.89E-03	6.98E-03	7.83E-03	9.32E-03	0.0117	0.0141	0.0168	0.0163	0.0139	0.0103	7.50E-03	6.32E-03	--
Q _{Renew} (barrels)	1,412	1,006	609	1,278	798	11,601	230,025	9,419	1,019	1,049	26,310	118,252	402,778
Q _{Renewal} (1,000 gallons)	59.3	42.2	25.6	53.7	33.5	487	9,661	396	42.8	44.1	1,105	4,967	16,917
E _{VOC} ⁵ (lb)	0.349	0.295	0.200	0.500	0.391	6.89	162	6.45	0.594	0.455	8.28	31.4	218.2
E _{VOC} (Tons)	1.75E-04	1.47E-04	1.00E-04	2.50E-04	1.96E-04	3.44E-03	0.0812	3.23E-03	2.97E-04	2.27E-04	4.14E-03	0.0157	0.109

Notes:

- 1) Submerged loading: dedicated normal service saturation factor (AP-42 Table 5.2-1).
- 2) Renewable Diesel assumed to have similar physical properties to diesel. Molecular weight of diesel obtained from AP-42 Table 7.1-2.
- 3) Vapor pressure and temperature from Tank 66 emission calculations.
- 4) Loading loss factor calculated using AP-42 Chapter 5 Equation 1.
- 5) Q = Monthly loading rack throughput.
- 6) Monthly loading emissions = Loading loss factor * monthly total throughput.

REFERENCE #3
ZENITH ENERGY TERMINALS PORTLAND
2021 OIL/W VOC EMISSION Tracking

Month	Year	Monthly Wastewater Discharge		12-Month Wastewater Discharge	Emission Factor	Monthly Total		12-Month Total
		Gallons	1,000 ft ³			lb	Tons	
January	2021	665,130	89	7,328,400	0.2	17.8	0.0089	0.098
February	2021	1,301,320	174	6,685,940	0.2	34.8	0.0174	0.089
March	2021	0	0	6,266,430	0.2	0.0	0.0000	0.084
April	2021	0	0	5,966,490	0.2	0.0	0.0000	0.080
May	2021	334,550	45	5,675,020	0.2	8.94	0.0045	0.076
June	2021	0	0	5,675,020	0.2	0.00	0.0000	0.076
July	2021	0	0	5,185,450	0.2	0	0	0.069
August	2021	0	0	3,781,580	0.2	0.0	0.0000	0.051
September	2021	0	0	3,781,580	0.2	0.0	0.0000	0.051
October	2021	0	0	3,781,580	0.2	0.0	0.0000	0.051
November	2021	662,760	89	3,429,730	0.2	17.7	0.0089	0.046
December	2021	781,160	104	3,744,920	0.2	20.9	0.0104	0.050
12-Month Max/Total		3,744,920	501	7,328,400	---	---	---	0.098

Reference #4
Zenith Energy Terminals
Monthly and Annual Summary for 2021 Emissions Unit: FGTVOOC

Component	Service	Total Components	Non-Leaking Components	Leaking Components	Emission Factors			Annual Hours of Operation			Annual Emissions			Total (kg/yr)
					Leaking Components (kg/hr-component)	Non-Leaking Components (kg/hr-component)	Leaking Components (days/year)	Leaking Components (hours/year)	Non-Leaking Components (hours/year)	Leaking Components (kg/yr)	Non-Leaking Components (kg/yr)	Total (kg/yr)		
Valves (V)	HL	110	108	2	0.00023	0.00023	105	2520	8,760	1.2	218	219	0.24	
	LL	40	39	1	0.0852	0.0017	105	2520	8,760	215	581	795	0.88	
Pump Seals (P)	G	10	9	1	0.2626	0.0006	105	2520	8,760	662	47	709	0.78	
	HL	5	4	1	0.3885	0.0135	105	2520	8,760	979	473	1,452	1.6	
Pressure Relief Valves (PRV)	LL	2	1	1	0.437	0.0120	105	2520	8,760	1,101	105	1,206	1.3	
	G	1	0	1	1.691	0.0447	105	2520	8,760	4,261	0	4,261	4.7	
Connectors (C)	All	260	256	4	0.0375	0.00006	105	2520	8,760	378	135	513	0.56	
											Annual VOC Emissions: 10.1			

Month	Year	VOC Emissions (tons/month)	12 Month Total
February	2021	0.77	10.1
March	2021	0.86	10.1
April	2021	0.83	10.1
May	2021	0.86	10.1
June	2021	0.83	10.1
July	2021	0.86	10.1
August	2021	0.86	10.1
September	2021	0.83	10.1
October	2021	0.86	10.1
November	2021	0.83	10.1
December	2021	0.86	10.1
12-Month Maximum		---	10.1

Notes:

- 1 - Leakers were determined by taking the sum of one and one percent of the total components. Leaking time period is determined by taking the number of days elapsed between quarterly monitoring periods (90 days), adding the 15 day repair period and multiplying by the number of hours per day. Quarterly monitoring was chosen as a good "in-between" value.
- 2 - Total components include marine loading components that came on-line in November 2018.
- 3 - LDAR was not performed because the refinery was not operating in 2021.
- 4 - Zenith is in the process of verifying the component count for future reporting purposes.

Reference #6
Zenith Energy Terminals Portland
2021 FIXTANK, EXTANK, and INTANK EMISSIONS

Month	Year	Contaminant	Monthly Emissions (tons/month)	Rolling 12 Month Total (tons/yr)
Jan	2021	VOC	1.45	15.5
Feb	2021	VOC	1.27	15.8
Mar	2021	VOC	1.55	16.3
Apr	2021	VOC	1.62	16.5
May	2021	VOC	1.93	17.0
Jun	2021	VOC	2.06	17.6
Jul	2021	VOC	2.40	18.3
Aug	2021	VOC	2.27	19.1
Sep	2021	VOC	2.03	19.8
Oct	2021	VOC	1.76	20.3
Nov	2021	VOC	1.67	21.0
Dec	2021	VOC	1.56	21.6
12-Month Max		VOC	---	21.6

Emissions calculated using AP-42 Chapter 7 equations

Reference #7-1
Zenith Energy Terminals - Portland
Monthly and Annual Summary for 2021 Emissions Unit: MLOAD

Date	AWB Crude Oil Throughput (gallons/mo)	Bakken Crude Oil Throughput (gallons/mo)	Diesel Throughput (gallons/mo)	Total Throughput (gallons/mo)	AWB Marine Loading VOC Emissions (tons/mo)	Bakken Marine Loading VOC Emissions (tons/mo)	Diesel Loading VOC Emissions (tons/mo)	Total Marine Loading VOC Emissions (tons/mo)
January-21	35,781,829	12,267,117	0	48,048,946	0.01938	0.00787	0	0.02724
February-21	19,456,881	4,570,448	1,573,404	24,027,329	0.01078	0.00301	0.00549	0.0193
March-21	0	32,370,903	0	32,370,903	0.00000	0.0217	0	0.0217
April-21	0	27,899,708	916,091	27,899,708	0	0.0193	0.0043	0.0236
May-21	0	22,882,776	2,520,650	22,882,776	0	0.01654	0.01472	0.03126
June-21	0	24,478,608	3,193,134	24,478,608	0	0.01843	0.02257	0.04101
July-21	0	21,756,588	0	21,756,588	0	0.01700	0	0.0170
August-21	0	21,235,830	2,348,703	21,235,830	0	0.01654	0.01916	0.0357
September-21	0	14,250,726	4,318,536	14,250,726	0	0.01075	0.02997	0.04071
October-21	0	11,834,172	3,400,157	11,834,172	0	0.00841	0.01755	0.0260
November-21	0	39,358,578	4,734,261	39,358,578	0	0.02635	0.01775	0.04410
December-21	0	24,082,590	1,558,123	24,082,590	0	0	0	0.0156
12 Month Totals:	55,238,711	256,988,043	24,563,058	312,226,754	0.03015	0.182	0.131	0.343

Notes:

- 1) Emissions calculated using the crude oil ship and barge loading emission methodology found in AP-42 Chapter 5 (see equation 2, equation 3, and Table 5.2-3).
- 2) Marine crude oil loading operations allowed by Permit No. 26-2025 began on November 11, 2018.
- 3) Bakken crude oil marine loading operations began in March 2019.

Reference #7-2
Zenith Energy Terminals - Portland
Monthly and Annual Summary for 2021 Emissions Unit: MLOAD (AWB Crude Oil Loading)

Date	AWB Throughput (gallons/mo)	Arrival Emission Factor (lb/1,000 gal)	Liquid Bulk Temperature (°F)	(°R)	Reid Vapor Pressure (psia)	True Vapor Pressure (psia)	Vapor Molecular Weight (lb/lb-mol)	Vapor Growth Factor	Generated Vapors Emission Factor (lb/1,000 gal)	Loading Loss Emission Factor (lb/1,000 gal)	Uncontrolled VOC Emissions (tons/mo)	Control Efficiency (%)	Actual VOC Emissions (tons/mo)
January-21	35,781,829	0.86	38.9	499	7.3	3.28	58	1.02	0.223	1.08	19.4	99.9%	0.0194
February-21	19,456,881	0.86	43.2	503	7.3	3.56	58	1.02	0.248	1.11	10.8	99.9%	0.0108
March-21	0	0.86	46.0	506	7.3	3.75	58	1.02	0.265	1.12	0.0	99.9%	0.0000
April-21	0	0.86	50.4	510	7.3	4.08	58	1.02	0.293	1.15	0.0	99.9%	0.0000
May-21	0	0.86	56.7	517	7.3	4.57	58	1.02	0.336	1.20	0.0	99.9%	0.0000
June-21	0	0.86	62.5	522	7.3	5.08	58	1.02	0.378	1.24	0.0	99.9%	0.0000
July-21	0	0.86	67.7	528	7.3	5.56	58	1.02	0.418	1.28	0.0	99.9%	0.0000
August-21	0	0.86	67.2	527	7.3	5.52	58	1.02	0.415	1.27	0.0	99.9%	0.0000
September-21	0	0.86	62.7	523	7.3	5.09	58	1.02	0.379	1.24	0.0	99.9%	0.0000
October-21	0	0.86	54.3	514	7.3	4.38	58	1.02	0.319	1.18	0.0	99.9%	0.0000
November-21	0	0.86	45.5	505	7.3	3.72	58	1.02	0.262	1.12	0.0	99.9%	0.0000
December-21	0	0.86	40.9	501	7.3	3.41	58	1.02	0.234	1.09	0.0	99.9%	0.0000
12 Month Total:												0.0302	

Notes:

- 1) Emissions calculated using the crude oil ship and barge loading emission methodology found in AP-42 Chapter 5 (see equation 2, equation 3, and Table 5.2-3).
- 2) Marine crude oil loading operations allowed by Permit No. 26-2025 began on November 11, 2018.

Reference #7-3
Zenith Energy Terminals - Portland
Monthly and Annual Summary for 2021 Emissions Unit: MLOAD (Bakken Crude Oil Loading)

Date	Bakken Throughput (gallons/mo)	Arrival Emission Factor (lb/1,000 gal)	Liquid Bulk Temperature (°F)	Liquid Bulk Temperature (°R)	Reid Vapor Pressure (psia)	True Vapor Pressure (psia)	Vapor Molecular Weight (lb/lb-mol)	Vapor Growth Factor	Generated Vapors Emission Factor (lb/1,000 gal)	Loading Loss Emission Factor (lb/1,000 gal)	Uncontrolled VOC Emissions (tons/mo)	Control Efficiency (%)	Actual VOC Emissions (tons/mo)
January-21	12,267,117	0.86	38.9	499	10.2	5.36	58	1.02	0.423	1.28	7.9	99.9%	0.0079
February-21	4,570,448	0.86	43.2	503	10.2	5.78	58	1.02	0.459	1.32	3.0	99.9%	0.0030
March-21	32,370,903	0.86	46.0	506	10.2	6.06	58	1.02	0.484	1.34	21.7	99.9%	0.0217
April-21	27,899,708	0.86	50.4	510	10.2	6.55	58	1.02	0.525	1.38	19.3	99.9%	0.0193
May-21	22,882,776	0.86	56.7	517	10.2	7.27	58	1.02	0.586	1.45	16.5	99.9%	0.0165
June-21	24,478,608	0.86	62.5	522	10.2	8.00	58	1.02	0.646	1.51	18.4	99.9%	0.0184
July-21	21,756,588	0.86	67.7	528	10.2	8.70	58	1.02	0.703	1.56	17.0	99.9%	0.0170
August-21	21,235,830	0.86	67.2	527	10.2	8.64	58	1.02	0.698	1.56	16.5	99.9%	0.0165
September-21	14,250,726	0.86	62.7	523	10.2	8.03	58	1.02	0.648	1.51	10.7	99.9%	0.0107
October-21	11,834,172	0.86	54.3	514	10.2	6.99	58	1.02	0.562	1.42	8.4	99.9%	0.0084
November-21	39,358,578	0.86	45.5	505	10.2	6.01	58	1.02	0.479	1.34	26.4	99.9%	0.0264
December-21	24,082,590	0.86	40.9	501	10.2	5.55	58	1.02	0.439	1.30	15.6	99.9%	0.0156
12 Month Total:												0.182	

Notes:
 1) Emissions calculated using the crude oil ship and barge loading emission methodology found in AP-42 Chapter 5 (see equation 2, equation 3, and Table 5.2-3).
 2) Marine crude oil loading operations allowed by Permit No. 26-2025 began on November 11, 2018.

Reference #7-4
Zenith Energy Terminals - Portland
Monthly and Annual Summary for 2021 Emissions Unit: MLOAD (Diesel & Biodiesel Loading)

	January	February	March	April	May	June	July	August	September	October	November	December	12 Month Total
S ¹	0.200	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	--
M ²	130	130	130	130	130	130	130	130	130	130	130	130	--
P ³	3.02E-03	3.61E-03	4.07E-03	4.89E-03	6.20E-03	7.60E-03	9.12E-03	8.84E-03	7.46E-03	5.46E-03	3.90E-03	3.26E-03	--
T ³ (°F)	38.9	43.2	46.0	50.4	56.7	62.5	67.7	67.2	62.7	54.3	45.5	40.9	--
T (°R)	499	503	506	510	516	522	527	527	522	514	505	501	--
L ₁ ⁴ (lb/1,000 gallons)	1.96E-03	6.98E-03	7.83E-03	9.32E-03	0.0117	0.0141	0.0168	0.0163	0.0139	0.0103	7.50E-03	6.32E-03	--
Q _{Diesel} (barrels)	0	37,462	0	21,812	90,067	81,056	15,849	70,265	110,848	81,303	113,000	37,148	658,810
Q _{Diesel} (1,000 gallons)	0	1,573	0	916	3,783	3,404	666	2,951	4,656	3,415	4,746	1,560	27,670
E _{VOC} ⁵ (lb)	0	11.0	0	8.54	44.2	48.1	11.2	48.1	64.6	35.2	35.6	9.86	316.5
E _{VOC} (Tons)	0	5.49E-03	0	4.27E-03	0.0221	0.0241	5.59E-03	0.0241	0.0323	0.0176	0.0178	4.93E-03	0.158

Notes:

- 1) Submerged loading: Ships (AP-42 Table 5.2-1).
- 2) Molecular weight of diesel obtained from AP-42 Table 7.1-2.
- 3) Vapor pressure and temperature from tank emission calculations.
- 4) Loading loss factor calculated using AP-42 Chapter 5 Equation 1.
- 5) Q = Monthly loading dock throughput.
- 6) Monthly loading emissions = Loading loss factor * monthly total throughput.

Reference #7-5
Zenith Energy Terminals - Portland
PM₁₀, SO₂, CO and NO_x Annual Summary for 2021 Emissions Unit: MLOAD (Diesel & Biodiesel Loading)

Pollutant	Hours Operated (hr/yr)	Loading Rate ¹ (bbl/hr)	Vapor Generated ² (ft ³ /bbl)	Vapor Heat of Combustion ³ (Btu/ft ³)	Heat Generated (MMBtu/yr)	Emission Factor ³ (lb/MMBtu)	Emissions (lb/yr)	Emissions (tons/yr)
PM ₁₀	636	12,000	5.614	1,200	51,417	0.0025	129	0.0643
SO ₂	636	12,000	5.614	1,200	51,417	0.0067	343	0.155
CO	636	12,000	5.614	1,200	51,417	0.2	10,283	4.66
NO _x	636	12,000	5.614	1,200	51,417	0.11	5,656	2.57

Notes:

- 1 - Ship and barge crude oil loading rate.
- 2 - Crude oil vapors captured during ship and barge loading.
- 3 - Crude oil vapor heat of combustion and emission factors from the Title V Permit No. 26-2025 Notice of Approval Application dated August 14, 2018.

Emissions and Compliance Monitoring Data

Permit Condition 68d – Emissions and Compliance Monitoring Data

Title V Permit Condition 68d specifies the emissions and compliance monitoring data for the following permit conditions must be included in the annual report. The applicable permit conditions are:

- Permit Condition 8 – Product with Highest Vapor Pressure Stored in FIXTANK
- Permit Condition 11 – Summary of Air Contaminant Nuisance Public Complaints
- Permit Condition 25 – Oil/W Inspection Results
- Permit Condition 28 – Process Turnaround Emissions
- Permit Condition 31 – F1B, F3, and F4/B6 Compliance Verification during Waste Gas Incineration
- Permit Condition 34 – Refinery Annual Leaking Component Summary
- Permit Condition 58 – Annual Emission Data

Compliance with these permit conditions are summarized below.

Permit Condition 8

The product with the highest vapor pressure stored in FIXTANK was biodiesel that was stored in Tank 184. In July 2021, it had a maximum vapor pressure of 0.009 psia. A table showing the vapor pressures of the products stored in FIXTANK is provided as Attachment 68d-1.

Permit Condition 11

There were no public complaints of an air contaminant from any source causing a nuisance in 2021.

Permit Condition 25

A report summarizing the annual inspection of the facility's oil/water separator (Emission Unit ID Oil/W) is provided as Attachment 68d-2. As noted in the report, maintenance was not required in 2021.

Permit Condition 28

Permit Condition 26 requires specified refinery waste gases including VOCs contained in a process unit for turnaround to: *"be routed to and incinerated in F4/B1, F1B, or F3; or introduced to a closed refinery system"*. Condition 28 requires reporting the estimated quantity of VOCs emitted during process unit turnarounds. The refinery was not operated in 2021. Therefore, no process units were turned around and VOCs from turnarounds were not emitted.

Permit Condition 31

Permit Condition 30 states:

"The permittee shall monitor the operating temperature of F1B, F3, and F4/B6 when the asphalt blowing or refinery waste gases are being incinerated and continuously record the temperature on a strip/circular chart to show the compliance status with respect to the 1,400 F temperature limit specified in Condition 29."

Permit Condition 31 requires a monthly summary of the compliance verification results described above. Waste gas was not incinerated in the units listed above during 2021 and the distillation column referenced in Permit Condition 29b was not operated in 2021. Accordingly, there are no monthly compliance verification summaries to report for 2021.

Permit Condition 34

The refinery portion of the facility did not operate in 2021. Accordingly, none of the conditions or activities listed in Permit Conditions 34b – 34d applied or occurred in 2021.

Permit Condition 68d – Emissions and Compliance Monitoring Data

Permit Condition 58

The tables below list the 2021 annual emissions and throughputs specified in Condition 58a.

Attachment 68b-3 contains tables that reports the 12-month summary of plant site emissions.

BOILER/FURNACE (Condition 58.a.i)

Pollutant	Highest Annual Emissions Rate
PM ₁₀	0.042 tons
SO ₂	0.022 tons
NO _x	1.3 tons
CO	1.1 tons
VOC	0.070 tons
H ₂ S	0.00 tons
Type of Fuel Used	Fuel Usage
Natural Gas	16.54 MMCF
Diesel Fuel	0 gal
Residual Fuel Oil	0 gal
NCG	0 MMCF
Air Still Fumes	0 MMCF

Other Emission Units (Conditions 58.a.ii - v)

Emissions Unit	Highest Annual VOC Emissions Rate	Throughput
FIXTANK/INTANK/EXTANK	21.6 tons	381,216,267 gal/yr
TRACK	0.116 tons	18,404,834 gal/yr
FGTVOC	10 tons	--
OIL/W	0.098 tons	3,744,920 gal/yr
FW	0.0 tons	145 gal/yr
MLOAD	0.343 tons	313,226,754 gal/yr

Attachment 68d-1
Vapor Pressure Summary Table

**Zenith Energy Terminals
Portland, Oregon
2021 Tank Vapor Pressure Tracking**

Tank Number	Tank Contents	Air Contaminant	Vapor Pressures												12-Month Max	Permitted Max
			January 2021 (psi)	February 2021 (psi)	March 2021 (psi)	April 2021 (psi)	May 2021 (psi)	June 2021 (psi)	July 2021 (psi)	August 2021 (psi)	September 2021 (psi)	October 2021 (psi)	November 2021 (psi)	December 2021 (psi)		
Floating Roof Tanks																
EXTANK 105	AWB/Bakken Crude	VOC	3.64	3.75	3.90	4.65	7.29	7.79	8.28	8.26	7.86	6.98	6.25	5.86	8.28	11.1
EXTANK 106	Bakken Crude	VOC	5.89	6.06	6.28	6.67	7.29	7.79	8.28	8.26	7.86	6.98	6.25	5.86	8.28	11.1
EXTANK 120	Out of Service	VOC	0	0	0	0	0	0	0	0	0	0	0	0	0	11.1
INTANK 63	Bakken Crude	VOC	5.87	5.99	6.19	6.53	7.10	7.59	8.05	8.06	7.70	6.89	6.21	5.83	8.06	11.1
INTANK 68	AWB/Bakken Crude	VOC	3.62	3.70	5.79	6.53	7.10	7.58	8.05	8.06	7.70	6.89	6.21	5.83	8.06	11.1
INTANK 71	Av-Gas	VOC	2.11	2.17	2.26	2.42	2.71	2.95	3.19	3.19	3.01	2.60	2.27	2.09	3.19	11.1
INTANK 95	Out of Service	VOC	0	0	0	0	0	0	0	0	0	0	0	0	0	11.1
INTANK 104	Bakken Crude	VOC	5.87	5.99	6.19	6.53	7.10	7.58	8.05	8.06	7.70	6.89	6.21	5.83	8.06	11.1
INTANK 114	Out of Service	VOC	0	0	0	0	0	0	0	0	0	0	0	0	0	11.1
INTANK 130	Bakken Crude	VOC	5.87	5.99	6.19	6.53	7.10	7.58	8.05	8.06	7.70	6.89	6.21	5.83	8.06	11.1
Fixed Roof Tanks																

Attachment 68d-2

Oil/Water Separator Annual Inspection

Title V Annual OW Separator Inspection**Date:** 11-12-2021 **Permit Holder:** Zenith Terminals **Permit #:** 262025**Requirement:** Condition 24 Monitor and Record **Inspector:** M. Clay Reese**Location:** Oil/Water Separator**Summary of Findings:** On 11-12-2021 the terminal's oil/water separator was inspected and found to be on good operating condition with no mechanical failures or deficiencies of operation. Forebay closed and sealed**Corrective Action:** None required

Attachment 68d-3

12-Month Summary of Annual Emission Rates

**Zenith Energy Terminals - Portland
PM₁₀ Plant Site Emission Summary
Summary Permit No. 26-2025
PSEL = 14 tons/year**

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	MLOAD	Total Monthly PM10 (tons/mo.)	Rolling 12-month PM10 (tons/yr)
January	2021	2.39E-03						5.36E-03	7.75E-03	0.0370
February	2021	2.41E-03						5.36E-03	7.77E-03	0.0395
March	2021	1.40E-03						5.36E-03	6.76E-03	0.0413
April	2021	1.89E-03						5.36E-03	7.25E-03	0.0446
May	2021	1.46E-03						5.36E-03	6.82E-03	0.0497
June	2021	1.63E-03						5.36E-03	6.98E-03	0.0547
July	2021	1.32E-03						5.36E-03	6.68E-03	0.0597
August	2021	1.06E-03						5.36E-03	6.42E-03	0.0633
September	2021	8.82E-04						5.36E-03	6.24E-03	0.0684
October	2021	1.03E-03						5.36E-03	6.38E-03	0.0728
November	2021	1.91E-03						5.36E-03	7.26E-03	0.0780
December	2021	3.29E-03						5.36E-03	8.64E-03	0.0849
2021 Emissions										0.0849

Zenith Energy Terminals - Portland
SO₂ Plant Site Emission Summary
Summary Permit No. 26-2025
PSEL = 81 tons/year

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	MLOAD	Total Monthly SO ₂ (tons/mo.)	Rolling 12-month SO ₂ (tons/yr)
January	2021	1.63E-03						0.0130	0.0146	0.0345
February	2021	1.64E-03						0.0130	0.0146	0.0455
March	2021	9.53E-04						0.0130	0.0139	0.0560
April	2021	1.28E-03						0.0130	0.0142	0.0676
May	2021	9.94E-04						0.0130	0.0140	0.0804
June	2021	1.11E-03						0.0130	0.0141	0.0931
July	2021	8.97E-04						0.0130	0.0139	0.106
August	2021	7.22E-04						0.0130	0.0137	0.118
September	2021	6.00E-04						0.0130	0.0136	0.130
October	2021	6.97E-04						0.0130	0.0137	0.143
November	2021	1.30E-03						0.0130	0.0143	0.156
December	2021	2.24E-03						0.0130	0.0152	0.170
2021 Emissions										0.170

**Zenith Energy Terminals - Portland
 NO_x Plant Site Emission Summary
 Summary Permit No. 26-2025
 PSEL = 99 tons/year**

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	MLOAD	Total Monthly NO _x (tons/mo.)	Rolling 12-month NO _x (tons/yr)
January	2021	0.0957						0.214	0.310	1.48
February	2021	0.0964						0.214	0.310	1.58
March	2021	0.0561						0.214	0.270	1.65
April	2021	0.0756						0.214	0.289	1.78
May	2021	0.0585						0.214	0.272	1.99
June	2021	0.0651						0.214	0.279	2.19
July	2021	0.0528						0.214	0.267	2.38
August	2021	0.0425						0.214	0.256	2.53
September	2021	0.0353						0.214	0.249	2.73
October	2021	0.0410						0.214	0.255	2.91
November	2021	0.0763						0.214	0.290	3.12
December	2021	0.132						0.214	0.345	3.39
2021 Emissions										3.39

Zenith Energy Terminals - Portland
CO Plant Site Emission Summary
Summary Permit No. 26-2025
PSEL = 99 tons/year

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	MLOAD	Total Monthly CO (tons/mo.)	Rolling 12-month CO (tons/yr)
January	2021	1.06						0.389	1.45	2.43
February	2021	0.969						0.389	1.36	3.62
March	2021	0.846						0.389	1.23	4.68
April	2021	0.777						0.389	1.17	5.72
May	2021	0.772						0.389	1.16	6.82
June	2021	0.759						0.389	1.15	7.90
July	2021	0.745						0.389	1.13	8.98
August	2021	0.687						0.389	1.08	9.96
September	2021	0.677						0.389	1.07	11.0
October	2021	0.645						0.389	1.03	12.0
November	2021	0.642						0.389	1.03	12.9
December	2021	0.694						0.389	1.08	13.9
2021 Emissions										1.63

**Zenith Energy Terminals Portland
VOC Plant Site Emission Summary
Summary Permit No. 26-2025
PSEL =179 tons/year**

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	MLOAD	Total Monthly VOCs (tons/mo.)	Rolling 12-month VOC's (tons/yr)
January	2021	5.27E-03	1.83E-04	0.0980	0.855	0	1.45	0.0272	2.44	26.1
February	2021	5.30E-03	1.58E-03	0.0894	0.773	0	1.27	0.0193	2.16	26.5
March	2021	3.08E-03	2.27E-03	0.0838	0.855	0	1.55	0.0217	2.51	27.0
April	2021	4.16E-03	3.06E-04	0.0798	0.828	0	1.62	0.0236	2.55	27.3
May	2021	3.22E-03	1.96E-04	0.0759	0.855	0	1.93	0.0313	2.90	27.9
June	2021	3.58E-03	4.16E-03	0.0759	0.828	0	2.06	0.0410	3.01	28.5
July	2021	2.90E-03	8.23E-02	0.0693	0.855	0	2.40	0.0170	3.42	29.4
August	2021	2.33E-03	3.51E-03	0.0505	0.855	0	2.27	0.0357	3.21	30.2
September	2021	1.94E-03	3.57E-04	0.0505	0.828	0	2.03	0.0407	2.95	31.0
October	2021	2.26E-03	2.96E-04	0.0505	0.855	0	1.76	0.0260	2.69	31.6
November	2021	4.20E-03	4.59E-03	0.0458	0.828	0	1.67	0.0441	2.59	32.4
December	2021	7.23E-03	0.0160	0.0501	0.855	0	1.56	0.0156	2.51	33.0
2021 Emissions										33.0

**Zenith Energy Terminals - Portland
H₂S Plant Site Emission Summary
Summary Permit No. 26-2025**

PSEL = 9 tons/year

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	Total Monthly H ₂ S (tons/mo.)	Rolling 12- month H ₂ S (tons/yr)
January	2021	0.00						0.00	0.00
February	2021	0.00						0.00	0.00
March	2021	0.00						0.00	0.00
April	2021	0.00						0.00	0.00
May	2021	0.00						0.00	0.00
June	2021	0.00						0.00	0.00
July	2021	0.00						0.00	0.00
August	2021	0.00						0.00	0.00
September	2021	0.00						0.00	0.00
October	2021	0.00						0.00	0.00
November	2021	0.00						0.00	0.00
December	2021	0.00						0.00	0.00
2021 Emissions									0.00

2021 Second Semi-Annual Compliance (Condition 68a)

- **Form R1002**
- **Form R1003**

Title V Operation Permit Program

Semi-annual Compliance Certification

FORM
R1002
Answer
Sheet

Permit Number: 26-2025

Facility name: Zenith Energy

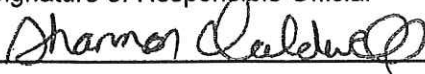
1. Reporting Period: July - December 2021
2. Plan development/revision triggered [yes/no]: No
3. Compliance status:

a. Permit Condition #	b. Method of Determining Compliance	c. Compliance Status (C/I)	d. Emissions Unit(s)	e. Permit Deviation Type	f. Number of Deviations
4	Recordkeeping	Continuous			
5	Recordkeeping	Continuous			
6	Recordkeeping & Monitoring	Continuous			
7	Recordkeeping	Continuous			
8	Reporting	Continuous			
9	Operations & Maintenance	Continuous			
10	Recordkeeping & Monitoring	Continuous			
11	Reporting	Continuous			
12	Operations & Maintenance	Continuous			
13	Operations & Maintenance	Continuous			
14	Operations & Maintenance	Continuous			
15	Operations	Continuous			
16	Recordkeeping	Continuous			
17	Reporting	Continuous			
18	Operations & Maintenance	Continuous			
19	Monitoring & Recordkeeping	Continuous			
20	Operations & Maintenance	Continuous			
21	Recordkeeping	Continuous			
22	Reporting	Continuous			
23	Inspections	Continuous			
24	Recordkeeping	Continuous			
25	Reporting	Continuous			
26	Operations & Maintenance	Continuous			
27	Recordkeeping	Continuous			
28	Reporting	Continuous			
29	Operations & Maintenance	Continuous			
30	Recordkeeping	Continuous			

a. Permit Condition #	b. Method of Determining Compliance	c. Compliance Status (C/I)	d. Emissions Unit(s)	e. Permit Deviation Type	f. Number of Deviations
31	Reporting	Continuous			
32	Inspections & Maintenance	Continuous			
33	Recordkeeping	Continuous			
34	Reporting	Continuous			
35	Floating Roof Construction, Operation, & Maintenance	Continuous			
36	Inspections & Notifications	Continuous			
37	Floating Roof Construction, Operation, & Maintenance	Continuous			
38	Inspections & Notifications	Continuous			
39	Floating Roof Construction, Operation, & Maintenance	Continuous			
40	Inspections & Notifications	Continuous			
41	Recordkeeping & Monitoring	Continuous			
42	Recordkeeping	Continuous			
43	Operations & Maintenance	Continuous			
44	Operations & Maintenance	Continuous			
45	Operations & Maintenance	Continuous			
46	Operations & Maintenance	Continuous			
47	Operations & Maintenance	Continuous			
48	Inspections, Training, Operations, & Maintenance	Continuous			
49	Training & Recordkeeping	Continuous			
50	Inspections & Training	Continuous			
51	Not Applicable	Continuous			
52	Not Applicable	Continuous			
53	Emission Calculations, & Recordkeeping	Continuous			
54	Recordkeeping	Continuous			
55	Recordkeeping	Continuous			
56	Emission Calculations, & Recordkeeping	Continuous			
57	Emission Calculations, & Recordkeeping	Continuous			
58	Reporting	Continuous			
59	Testing	Continuous			
60	Testing	Continuous			
61	Testing	Continuous			
62	Testing	Continuous			
63	Recordkeeping	Continuous			
64	Recordkeeping	Continuous			
65	Recordkeeping	Continuous			
66	Reporting	Continuous			

Statement of Certification:

Based on information and belief formed after reasonable inquiry, the statements and information in this document and any attachments are true, accurate and complete. I also certify that all statements made concerning compliance, which are based on monitoring required by the permit but not required to be submitted to the Department, are true, accurate and complete based on information and belief formed after reasonable inquiry.

Name of Responsible Official Shannon Caldwell
Signature of Responsible Official 

Title of Responsible Official Vice President of HSE and Regulatory
Date 2/14/2022

Emission Fee Report (Condition 68a)

- **Form F1101**
- **Form F1102**
 - **Reference #1 – Boiler Furnace Emission Summary**
 - **Reference #2 – Track Emission Summary**
 - **Reference #3 – Oil/W Emission Summary**
 - **Reference #4 – FGTVOC Emission Summary**
 - **Reference #5 – FW Emission Summary**
 - **Reference #6 – FIXTANK, EXTANK, and INTANK Emission Summary**
 - **Reference #7 – MLOAD Emission Summary**



State of Oregon
Department of
Environmental
Quality

Total Emissions by Regulated Pollutant

FORM F1101

1. Reporting year: 2021	
2. Facility name: Zenith Energy Terminals Portland	4. Permit number: 26-2025
3. 3900 Essex Lane, Suite 700 Mailing street address or PO Box Houston, TX 77027 Mailing city, state and ZIP code	5. Andrew Danhof - Manager, Environmental and Regulatory Contact name and title (713) 395-6238 Phone number with area code
6. Emissions (in tons) by regulated air pollutant subject to fees for the reporting year:	
PM ₁₀ *	15
or PM	
or PM _{2.5}	
or TSP	
SO ₂	82
NO _x (as NO ₂)	78
VOC	180
* Report only one particulate category. If permit has a PSEL for PM ₁₀ , report emissions of PM ₁₀ . If permit has a PSEL for particulate matter (PM) and not PM ₁₀ , report emissions of PM. If permit has a PSEL for PM _{2.5} and not PM ₁₀ or PM, report emissions of PM _{2.5} . If permit has a PSEL for total suspended particulate (TSP) and not PM ₁₀ , PM or PM _{2.5} , report emissions of TSP.	
7. Total emissions (in tons) of pollutants subject to fees for the reporting year: 355	
8. Statement of certification:	
I have reviewed this report and all supporting documentation in their entirety and to the best of my knowledge, information, and belief formed after reasonable inquiry, the statements and information contained herein are true, accurate and complete.	
Shannon Caldwell	VP of HSE and Regulatory
Name of designated responsible official	Title of responsible official
	2/14/2022
Signature of responsible official	Date



DEQ

State of Oregon
Department of
Environmental
Quality

1. Reporting year: 2021					
2. Facility name: Zenith Energy - Portland			3. Permit number: 26-2025		
4. Emissions by emission source					
a. Group code (EU #, ES #, FS#, PS# or PSEL)	b. Device or process ID	c. Pollutant	d. Emissions (tons)	e. Method	f. Reference
PSEL		PM10	14	1	Permit pg.24
PSEL		SO2	81	1	Permit pg.24
PSEL		NOX	77	1	Permit pg.24
PSEL		CO	99	1	Permit pg.24
PSEL		VOC	179	1	Permit pg.24
PSEL		H2S	9	1	Permit pg.24
AIA		PM10	1	1	Permit pg.24
AIA		SO2	1	1	Permit pg.24
AIA		NOX	1	1	Permit pg.24
AIA		CO	1	1	Permit pg.24
AIA		VOC	1	1	Permit pg.24
		H2S	1	1	Permit pg.24
5. Form F1102 page ___ of ___					

REFERENCE #1
ZENITH ENERGY TERMINALS - PORTLAND
2021 BOILER FURNACE EMISSION SUMMARY

Month	Year	Monthly Gas Usage		Rolling 12 Month Annual Usage		PM ₁₀			SO ₂			NO _x			CO			VOC		
		Therms	MMCF	Therms	MMCF	Emission Factor lb/MMCF	Monthly Total Tons	12-Month Total Tons	Emission Factor lb/MMCF	Monthly Total Tons	12-Month Total Tons	Emission Factor lb/MMCF	Monthly Total Tons	12-Month Total Tons	Emission Factor lb/MMCF	Monthly Total Tons	12-Month Total Tons	Emission Factor lb/MMCF	Monthly Total Tons	12-Month Total Tons
January	2021	19,146	1.91	253,058	25.3	2.5	2.39E-03	0.0316	1.7	1.63E-03	0.0215	100	0.096	1.27	84	0.08	1.06	5.5	5.27E-03	0.07
February	2021	19,285	1.93	230,617	23.1	2.5	2.41E-03	0.0288	1.7	1.64E-03	0.0196	100	0.096	1.15	84	0.08	0.97	5.5	3.30E-03	0.06
March	2021	11,214	1.12	201,495	20.1	2.5	1.40E-03	0.0252	1.7	9.53E-04	0.0171	100	0.056	1.01	84	0.05	0.85	5.5	3.08E-03	0.06
April	2021	15,113	1.51	185,073	18.5	2.5	1.89E-03	0.0231	1.7	1.28E-03	0.0157	100	0.076	0.93	84	0.06	0.78	5.5	4.16E-03	0.05
May	2021	11,698	1.17	183,727	18.4	2.5	1.46E-03	0.0230	1.7	9.94E-04	0.0156	100	0.0585	0.92	84	0.05	0.77	5.5	0.003217	0.05
June	2021	13,024	1.30	180,666	18.1	2.5	1.63E-03	0.0226	1.7	1.11E-03	0.0154	100	0.0651	0.90	84	0.05	0.76	5.5	0.003582	0.05
July	2021	10,555	1.06	177,479	17.7	2.5	1.52E-03	0.0222	1.7	8.97E-04	0.0151	100	0.0528	0.89	84	0.04	0.75	5.5	0.002903	0.05
August	2021	8,490	0.85	163,679	16.4	2.5	1.06E-03	0.0205	1.7	7.22E-04	0.0139	100	0.042	0.82	84	0.04	0.69	5.5	0.002335	0.05
September	2021	7,060	0.71	161,183	16.1	2.5	8.82E-04	0.0201	1.7	6.00E-04	0.0137	100	0.0353	0.81	84	0.03	0.68	5.5	0.001941	0.04
October	2021	8,202	0.82	153,535	15.4	2.5	1.03E-03	0.0192	1.7	6.97E-04	0.0131	100	0.0410	0.77	84	0.03	0.64	5.5	0.002255	0.04
November	2021	15,260	1.53	152,878	15.3	2.5	1.91E-03	0.0191	1.7	1.30E-03	0.0130	100	0.0763	0.76	84	0.06	0.64	5.5	0.004197	0.04
December	2021	26,308	2.63	165,354	16.5	2.5	3.29E-03	0.0207	1.7	2.24E-03	0.0141	100	0.1315	0.83	84	0.11	0.69	5.5	0.007235	0.05
12-Month Max/Total		165,354	16.54	---	25.3	---	---	0.0316	---	---	0.0215	---	---	1.27	---	---	1.06	---	---	0.070

Reference #2-1
Zenith Energy Terminals - Portland
2021 TRACK Emissions
Diesel & Biodiesel Loading

	January	February	March	April	May	June	July	August	September	October	November	December	12 Month Total
S ¹	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	--
M ²	130	130	130	130	130	130	130	130	130	130	130	130	--
P ³	3.02E-03	3.61E-03	4.07E-03	4.89E-03	6.20E-03	7.60E-03	9.12E-03	8.84E-03	7.46E-03	5.46E-03	3.90E-03	3.26E-03	--
T ³ (°F)	38.9	43.2	46.0	50.4	56.7	62.5	67.7	67.2	62.7	54.3	45.5	40.9	--
T (°R)	499	503	505	510	516	522	527	527	522	514	505	501	--
L _i ⁴ (lb/1,000 gallons)	5.89E-03	6.98E-03	7.83E-03	9.32E-03	0.0117	0.0141	0.0168	0.0163	0.0139	0.0103	7.50E-03	6.32E-03	--
Q _{diesel} (barrels)	71.2	9,794	13,177	285	0	2,397	3,329	820	205	317	2,827	2,209	35,433
Q _{diesel} (1,000 gallons)	2.99	411	553	12.0	0	101	140	34.4	8.59	13.3	119	92.8	1,488
E _{voc} ⁵ (lb)	0.0176	2.87	4.33	0.112	0	1.42	2.35	0.562	0.119	0.137	0.890	0.587	13.4
E _{voc} (Tons)	8.80E-06	1.43E-03	2.17E-03	5.59E-05	0	7.12E-04	1.17E-03	2.81E-04	5.96E-05	6.87E-05	4.45E-04	2.93E-04	6.70E-03

Notes:

- 1) Submerged loading: dedicated normal service saturation factor (AP-42 Table 5.2-1).
- 2) Renewable Diesel assumed to have similar physical properties to diesel. Molecular weight of diesel obtained from AP-42 Table 7.1-2.
- 3) Vapor pressure and temperature from Tank 66 emission calculations.
- 4) Loading loss factor calculated using AP-42 Chapter 5 Equation 1.
- 5) Q = Monthly loading rack throughput.
- 6) Monthly loading emissions = Loading loss factor * monthly total throughput.

Reference #2-2
Zenith Energy Terminals - Portland
2021 TRACK Emissions
Renewable Diesel Loading

	January	February	March	April	May	June	July	August	September	October	November	December	12 Month Total
S ¹	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	--
M ²	130	130	130	130	130	130	130	130	130	130	130	130	--
P ³	3.02E-03	3.61E-03	4.07E-03	4.89E-03	6.20E-03	7.60E-03	9.12E-03	8.84E-03	7.46E-03	5.46E-03	3.90E-03	3.26E-03	--
T ³ (°F)	38.9	43.2	46.0	50.4	56.7	62.5	67.7	67.2	62.7	54.3	45.5	40.9	--
T (°R)	499	503	506	510	516	522	527	527	522	514	505	501	--
L _t ⁴ (lb/1,000 gallons)	5.89E-03	6.98E-03	7.83E-03	9.32E-03	0.0117	0.0141	0.0168	0.0163	0.0139	0.0103	7.50E-03	6.32E-03	--
Q _{Renew} (barrels)	1,412	1,006	609	1,278	798	11,601	230,025	9,419	1,019	1,049	26,310	118,252	402,778
Q _{Renewal} (1,000 gallons)	59.3	42.2	25.6	53.7	33.5	487	9,661	396	42.8	44.1	1,105	4,967	16,917
E _{Voc} ⁵ (lb)	0.349	0.295	0.200	0.500	0.391	6.89	162	6.45	0.594	0.455	8.28	31.4	218.2
E _{Voc} (Tons)	1.75E-04	1.47E-04	1.00E-04	2.50E-04	1.96E-04	3.44E-03	0.0812	3.23E-03	2.97E-04	2.27E-04	4.14E-03	0.0157	0.109

Notes:

- 1) Submerged loading: dedicated normal service saturation factor (AP-42 Table 5.2-1).
- 2) Renewable Diesel assumed to have similar physical properties to diesel. Molecular weight of diesel obtained from AP-42 Table 7.1-2.
- 3) Vapor pressure and temperature from Tank 66 emission calculations.
- 4) Loading loss factor calculated using AP-42 Chapter 5 Equation 1.
- 5) Q = Monthly loading rack throughput.
- 6) Monthly loading emissions = Loading loss factor * monthly total throughput.

REFERENCE #3
ZENITH ENERGY TERMINALS PORTLAND
2021 OIL/W VOC EMISSION Tracking

Month	Year	Monthly Wastewater Discharge		12-Month Wastewater Discharge	Emission Factor	Monthly Total		12-Month Total
		Gallons	1,000 ft ³			lb	Tons	
January	2021	665,130	89	7,328,400	0.2	17.8	0.0089	0.098
February	2021	1,301,320	174	6,685,940	0.2	34.8	0.0174	0.089
March	2021	0	0	6,266,430	0.2	0.0	0.0000	0.084
April	2021	0	0	5,966,490	0.2	0.0	0.0000	0.080
May	2021	334,550	45	5,675,020	0.2	8.94	0.0045	0.076
June	2021	0	0	5,675,020	0.2	0.00	0.0000	0.076
July	2021	0	0	5,185,450	0.2	0	0	0.069
August	2021	0	0	3,781,580	0.2	0.0	0.0000	0.051
September	2021	0	0	3,781,580	0.2	0.0	0.0000	0.051
October	2021	0	0	3,781,580	0.2	0.0	0.0000	0.051
November	2021	662,760	89	3,429,730	0.2	17.7	0.0089	0.046
December	2021	781,160	104	3,744,920	0.2	20.9	0.0104	0.050
12-Month Max/Total		3,744,920	501	7,328,400	---	---	---	0.098

Reference #4
Zenith Energy Terminals
Monthly and Annual Summary for 2021 Emissions Unit: FGTVOOC

Component	Service	Total Components	Non-Leaking Components	Leaking Components	Emission Factors			Annual Hours of Operation			Annual Emissions			Total (ton/yr)
					Leaking Components (kg/hr-component)	Non-Leaking Components (kg/hr-component)	Leaking Components (days/year)	Leaking Components (hours/year)	Non-Leaking Components (hours/year)	Leaking Components (kg/yr)	Non-Leaking Components (kg/yr)	Total (kg/yr)		
Valves (V)	HL	110	108	2	0.00023	0.00023	105	2520	8,760	1.2	218	219	0.24	
	LL	40	39	1	0.0852	0.0017	105	2520	8,760	215	581	795	0.88	
Pump Seals (P)	G	10	9	1	0.2626	0.0006	105	2520	8,760	662	47	709	0.78	
	HL	5	4	1	0.3885	0.0135	105	2520	8,760	979	473	1,452	1.6	
Pressure Relief Valves (PRV)	LL	2	1	1	0.437	0.0120	105	2520	8,760	1,101	105	1,206	1.3	
	G	1	0	1	1.691	0.0447	105	2520	8,760	4,261	0	4,261	4.7	
Connectors (C)	All	260	256	4	0.0375	0.00006	105	2520	8,760	378	135	513	0.56	

Annual VOC Emissions: 10.1

Month	Year	VOC Emissions (tons/month)		12 Month Total
		Leaking Components	Non-Leaking Components	
January	2021	0.86	10.1	10.1
February	2021	0.77	10.1	10.1
March	2021	0.86	10.1	10.1
April	2021	0.83	10.1	10.1
May	2021	0.86	10.1	10.1
June	2021	0.83	10.1	10.1
July	2021	0.86	10.1	10.1
August	2021	0.86	10.1	10.1
September	2021	0.83	10.1	10.1
October	2021	0.86	10.1	10.1
November	2021	0.83	10.1	10.1
December	2021	0.86	10.1	10.1
12-Month Maximum		---	---	10.1

Notes:

- 1 - Leakers were determined by taking the sum of one and one percent of the total components, adding the 15 day repair period and multiplying by the number of days elapsed between quarterly monitoring periods (90 days).
- 2 - Total components include marine loading components that came on-line in November 2018.
- 3 - LDAR was not performed because the refinery was not operating in 2021.
- 4 - Zenith is in the process of verifying the component count for future reporting purposes.

Reference #6
Zenith Energy Terminals Portland
2021 FIXTANK, EXTANK, and INTANK EMISSIONS

Month	Year	Contaminant	Monthly Emissions (tons/month)	Rolling 12 Month Total (tons/yr)
Jan	2021	VOC	1.45	15.5
Feb	2021	VOC	1.27	15.8
Mar	2021	VOC	1.55	16.3
Apr	2021	VOC	1.62	16.5
May	2021	VOC	1.93	17.0
Jun	2021	VOC	2.06	17.6
Jul	2021	VOC	2.40	18.3
Aug	2021	VOC	2.27	19.1
Sep	2021	VOC	2.03	19.8
Oct	2021	VOC	1.76	20.3
Nov	2021	VOC	1.67	21.0
Dec	2021	VOC	1.56	21.6
12-Month Max		VOC	---	21.6

Emissions calculated using AP-42 Chapter 7 equations

Reference #7-1
Zenith Energy Terminals - Portland
Monthly and Annual Summary for 2021 Emissions Unit: MLOAD

Date	AWB Crude Oil Throughput (gallons/mo)	Bakken Crude Oil Throughput (gallons/mo)	Diesel Throughput (gallons/mo)	Total Throughput (gallons/mo)	AWB Marine Loading VOC Emissions (tons/mo)	Bakken Marine Loading VOC Emissions (tons/mo)	Diesel Loading VOC Emissions (tons/mo)	Total Marine Loading VOC Emissions (tons/mo)
January-21	35,781,829	12,267,117	0	48,048,946	0.01938	0.00787	0	0.02724
February-21	19,456,881	4,570,448	1,573,404	24,027,329	0.01078	0.00301	0.00549	0.0193
March-21	0	32,370,903	0	32,370,903	0.00000	0.0217	0	0.0217
April-21	0	27,899,708	916,091	27,899,708	0	0.0193	0.0043	0.0236
May-21	0	22,882,776	2,520,650	22,882,776	0	0.01654	0.01472	0.03126
June-21	0	24,478,608	3,193,134	24,478,608	0	0.01843	0.02257	0.04101
July-21	0	21,756,588	0	21,756,588	0	0.01700	0	0.0170
August-21	0	21,235,830	2,348,703	21,235,830	0	0.01654	0.01916	0.0357
September-21	0	14,250,726	4,318,536	14,250,726	0	0.01075	0.02997	0.04071
October-21	0	11,834,172	3,400,157	11,834,172	0	0.00841	0.01755	0.0260
November-21	0	39,358,578	4,734,261	39,358,578	0	0.02635	0.01775	0.04410
December-21	0	24,082,590	1,558,123	24,082,590	0	0	0	0.0156
12 Month Totals:	55,238,711	256,988,043	24,563,058	312,226,754	0.03015	0.182	0.131	0.343

Notes:

- 1) Emissions calculated using the crude oil ship and barge loading emission methodology found in AP-42 Chapter 5 (see equation 2, equation 3, and Table 5.2-3).
- 2) Marine crude oil loading operations allowed by Permit No. 26-2025 began on November 11, 2018.
- 3) Bakken crude oil marine loading operations began in March 2019.

Reference #7-2
Zenith Energy Terminals - Portland
Monthly and Annual Summary for 2021 Emissions Unit: MLOAD (AWB Crude Oil Loading)

Date	AWB Throughput (gallons/mo)	Arrival Emission Factor (lb/1,000 gal)	Liquid Bulk Temperature (°F)	(°R)	Reid Vapor Pressure (psia)	True Vapor Pressure (psia)	Vapor Molecular Weight (lb/lb-mol)	Vapor Growth Factor	Generated Vapors Emission Factor (lb/1,000 gal)	Loading Loss Emission Factor (lb/1,000 gal)	Uncontrolled VOC Emissions (tons/mo)	Control Efficiency (%)	Actual VOC Emissions (tons/mo)
January-21	35,781,829	0.86	38.9	499	7.3	3.28	58	1.02	0.223	1.08	19.4	99.9%	0.0194
February-21	19,456,881	0.86	43.2	503	7.3	3.56	58	1.02	0.248	1.11	10.8	99.9%	0.0108
March-21	0	0.86	46.0	506	7.3	3.75	58	1.02	0.265	1.12	0.0	99.9%	0.0000
April-21	0	0.86	50.4	510	7.3	4.08	58	1.02	0.293	1.15	0.0	99.9%	0.0000
May-21	0	0.86	56.7	517	7.3	4.57	58	1.02	0.336	1.20	0.0	99.9%	0.0000
June-21	0	0.86	62.5	522	7.3	5.08	58	1.02	0.378	1.24	0.0	99.9%	0.0000
July-21	0	0.86	67.7	528	7.3	5.56	58	1.02	0.418	1.28	0.0	99.9%	0.0000
August-21	0	0.86	67.2	527	7.3	5.52	58	1.02	0.415	1.27	0.0	99.9%	0.0000
September-21	0	0.86	62.7	523	7.3	5.09	58	1.02	0.379	1.24	0.0	99.9%	0.0000
October-21	0	0.86	54.3	514	7.3	4.38	58	1.02	0.319	1.18	0.0	99.9%	0.0000
November-21	0	0.86	45.5	505	7.3	3.72	58	1.02	0.262	1.12	0.0	99.9%	0.0000
December-21	0	0.86	40.9	501	7.3	3.41	58	1.02	0.234	1.09	0.0	99.9%	0.0000
12 Month Total:												0.0302	

Notes:
1) Emissions calculated using the crude oil ship and barge loading emission methodology found in AP-42 Chapter 5 (see equation 2, equation 3, and Table 5.2-3).
2) Marine crude oil loading operations allowed by Permit No. 26-2025 began on November 11, 2018.

Reference #7-3
Zenith Energy Terminals - Portland
Monthly and Annual Summary for 2021 Emissions Unit: MLOAD (Bakken Crude Oil Loading)

Date	Bakken Throughput (gallons/mo)	Arrival Emission Factor (lb/1,000 gal)	Liquid Bulk Temperature (°F)	Liquid Bulk Temperature (°R)	Reid Vapor Pressure (psia)	True Vapor Pressure (psia)	Vapor Molecular Weight (lb/lb-mol)	Vapor Growth Factor	Generated Vapors Emission Factor (lb/1,000 gal)	Loading Loss Emission Factor (lb/1,000 gal)	Uncontrolled VOC Emissions (tons/mo)	Control Efficiency (%)	Actual VOC Emissions (tons/mo)
January-21	12,267,117	0.86	38.9	499	10.2	5.36	58	1.02	0.423	1.28	7.9	99.9%	0.0079
February-21	4,570,448	0.86	43.2	503	10.2	5.78	58	1.02	0.459	1.32	3.0	99.9%	0.0030
March-21	32,370,903	0.86	46.0	506	10.2	6.06	58	1.02	0.484	1.34	21.7	99.9%	0.0217
April-21	27,899,708	0.86	50.4	510	10.2	6.55	58	1.02	0.525	1.38	19.3	99.9%	0.0193
May-21	22,882,776	0.86	56.7	517	10.2	7.27	58	1.02	0.586	1.45	16.5	99.9%	0.0165
June-21	24,478,608	0.86	62.5	522	10.2	8.00	58	1.02	0.646	1.51	18.4	99.9%	0.0184
July-21	21,756,588	0.86	67.7	528	10.2	8.70	58	1.02	0.703	1.56	17.0	99.9%	0.0170
August-21	21,235,830	0.86	67.2	527	10.2	8.64	58	1.02	0.698	1.56	16.5	99.9%	0.0165
September-21	14,250,726	0.86	62.7	523	10.2	8.03	58	1.02	0.648	1.51	10.7	99.9%	0.0107
October-21	11,834,172	0.86	54.3	514	10.2	6.99	58	1.02	0.562	1.42	8.4	99.9%	0.0084
November-21	39,358,578	0.86	45.5	505	10.2	6.01	58	1.02	0.479	1.34	26.4	99.9%	0.0264
December-21	24,082,590	0.86	40.9	501	10.2	5.55	58	1.02	0.439	1.30	15.6	99.9%	0.0156
12 Month Total:												0.182	

Notes:
 1) Emissions calculated using the crude oil ship and barge loading emission methodology found in AP-42 Chapter 5 (see equation 2, equation 3, and Table 5.2-3).
 2) Marine crude oil loading operations allowed by Permit No. 26-2025 began on November 11, 2018.

Reference #7-4
Zenith Energy Terminals - Portland
Monthly and Annual Summary for 2021 Emissions Unit: MLOAD (Diesel & Biodiesel Loading)

	January 2021	February 2021	March 2021	April 2021	May 2021	June 2021	July 2021	August 2021	September 2021	October 2021	November 2021	December 2021	12 Month Total
S ¹	0.200	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	0.600	--
M ²	130	130	130	130	130	130	130	130	130	130	130	130	--
P ³	3.02E-03	3.61E-03	4.07E-03	4.89E-03	6.20E-03	7.60E-03	9.12E-03	8.84E-03	7.46E-03	5.46E-03	3.90E-03	3.26E-03	--
T ³ (°F)	38.9	43.2	46.0	50.4	56.7	62.5	67.7	67.2	62.7	54.3	45.5	40.9	--
T (°R)	499	503	506	510	516	522	527	527	522	514	505	501	--
L _L ⁴ (lb/1,000 gallons)	1.96E-03	6.98E-03	7.83E-03	9.32E-03	0.0117	0.0141	0.0168	0.0163	0.0139	0.0103	7.50E-03	6.32E-03	--
Q _{Diesel} (barrels)	0	37,462	0	21,812	90,067	81,056	15,849	70,265	110,848	81,303	113,000	37,148	658,810
Q _{Diesel} (1,000 gallons)	0	1,573	0	916	3,783	3,404	666	2,951	4,656	3,415	4,746	1,560	27,670
E _{VOC} ⁵ (lb)	0	11.0	0	8.54	44.2	48.1	11.2	48.1	64.6	35.2	35.6	9.86	316.5
E _{VOC} (Tons)	0	5.49E-03	0	4.27E-03	0.0221	0.0241	5.59E-03	0.0241	0.0323	0.0176	0.0178	4.93E-03	0.158

Notes:

- 1) Submerged loading: Ships (AP-42 Table 5.2-1).
- 2) Molecular weight of diesel obtained from AP-42 Table 7.1-2.
- 3) Vapor pressure and temperature from tank emission calculations.
- 4) Loading loss factor calculated using AP-42 Chapter 5 Equation 1.
- 5) Q = Monthly loading dock throughput.
- 6) Monthly loading emissions = Loading loss factor * monthly total throughput.

Reference #7-5
Zenith Energy Terminals - Portland
PM₁₀, SO₂, CO and NO_x Annual Summary for 2021 Emissions Unit: MLOAD (Diesel & Biodiesel Loading)

Pollutant	Hours Operated (hr/yr)	Loading Rate ¹ (bbl/hr)	Vapor Generated ² (ft ³ /bbl)	Vapor Heat of Combustion ³ (Btu/ft ³)	Heat Generated (MMBtu/yr)	Emission Factor ³ (lb/MMBtu)	Emissions (lb/yr)	Emissions (tons/yr)
PM ₁₀	636	12,000	5.614	1,200	51,417	0.0025	129	0.0643
SO ₂	636	12,000	5.614	1,200	51,417	0.0067	343	0.155
CO	636	12,000	5.614	1,200	51,417	0.2	10,283	4.66
NO _x	636	12,000	5.614	1,200	51,417	0.11	5,656	2.57

Notes:

- 1 - Ship and barge crude oil loading rate.
- 2 - Crude oil vapors captured during ship and barge loading.
- 3 - Crude oil vapor heat of combustion and emission factors from the Title V Permit No. 26-2025 Notice of Approval Application dated August 14, 2018.

Emissions and Compliance Monitoring Data

Permit Condition 68d – Emissions and Compliance Monitoring Data

Title V Permit Condition 68d specifies the emissions and compliance monitoring data for the following permit conditions must be included in the annual report. The applicable permit conditions are:

- Permit Condition 8 – Product with Highest Vapor Pressure Stored in FIXTANK
- Permit Condition 11 – Summary of Air Contaminant Nuisance Public Complaints
- Permit Condition 25 – Oil/W Inspection Results
- Permit Condition 28 – Process Turnaround Emissions
- Permit Condition 31 – F1B, F3, and F4/B6 Compliance Verification during Waste Gas Incineration
- Permit Condition 34 – Refinery Annual Leaking Component Summary
- Permit Condition 58 – Annual Emission Data

Compliance with these permit conditions are summarized below.

Permit Condition 8

The product with the highest vapor pressure stored in FIXTANK was biodiesel that was stored in Tank 184. In July 2021, it had a maximum vapor pressure of 0.009 psia. A table showing the vapor pressures of the products stored in FIXTANK is provided as Attachment 68d-1.

Permit Condition 11

There were no public complaints of an air contaminant from any source causing a nuisance in 2021.

Permit Condition 25

A report summarizing the annual inspection of the facility's oil/water separator (Emission Unit ID Oil/W) is provided as Attachment 68d-2. As noted in the report, maintenance was not required in 2021.

Permit Condition 28

Permit Condition 26 requires specified refinery waste gases including VOCs contained in a process unit for turnaround to: *"be routed to and incinerated in F4/B1, F1B, or F3; or introduced to a closed refinery system"*. Condition 28 requires reporting the estimated quantity of VOCs emitted during process unit turnarounds. The refinery was not operated in 2021. Therefore, no process units were turned around and VOCs from turnarounds were not emitted.

Permit Condition 31

Permit Condition 30 states:

"The permittee shall monitor the operating temperature of F1B, F3, and F4/B6 when the asphalt blowing or refinery waste gases are being incinerated and continuously record the temperature on a strip/circular chart to show the compliance status with respect to the 1,400 F temperature limit specified in Condition 29."

Permit Condition 31 requires a monthly summary of the compliance verification results described above. Waste gas was not incinerated in the units listed above during 2021 and the distillation column referenced in Permit Condition 29b was not operated in 2021. Accordingly, there are no monthly compliance verification summaries to report for 2021.

Permit Condition 34

The refinery portion of the facility did not operate in 2021. Accordingly, none of the conditions or activities listed in Permit Conditions 34b – 34d applied or occurred in 2021.

Permit Condition 68d – Emissions and Compliance Monitoring Data

Permit Condition 58

The tables below list the 2021 annual emissions and throughputs specified in Condition 58a.

Attachment 68b-3 contains tables that reports the 12-month summary of plant site emissions.

BOILER/FURNACE (Condition 58.a.i)

Pollutant	Highest Annual Emissions Rate
PM ₁₀	0.042 tons
SO ₂	0.022 tons
NO _x	1.3 tons
CO	1.1 tons
VOC	0.070 tons
H ₂ S	0.00 tons
Type of Fuel Used	Fuel Usage
Natural Gas	16.54 MMCF
Diesel Fuel	0 gal
Residual Fuel Oil	0 gal
NCG	0 MMCF
Air Still Fumes	0 MMCF

Other Emission Units (Conditions 58.a.ii - v)

Emissions Unit	Highest Annual VOC Emissions Rate	Throughput
FIXTANK/INTANK/EXTANK	21.6 tons	381,216,267 gal/yr
TRACK	0.116 tons	18,404,834 gal/yr
FGTVOC	10 tons	--
OIL/W	0.098 tons	3,744,920 gal/yr
FW	0.0 tons	145 gal/yr
MLOAD	0.343 tons	313,226,754 gal/yr

Attachment 68d-1
Vapor Pressure Summary Table

**Zenith Energy Terminals
Portland, Oregon
2021 Tank Vapor Pressure Tracking**

Tank Number	Tank Contents	Air Contaminant	Vapor Pressures												12-Month Max	Permitted Max
			January 2021	February 2021	March 2021	April 2021	May 2021	June 2021	July 2021	August 2021	September 2021	October 2021	November 2021	December 2021		
Floating Roof Tanks																
EXTANK 105	AWB/Bakken Crude	VOC	3.64	3.75	3.90	4.65	7.29	7.79	8.28	8.26	7.86	6.98	6.25	5.86	8.28	11.1
EXTANK 106	Bakken Crude	VOC	5.89	6.06	6.28	6.67	7.29	7.79	8.28	8.26	7.86	6.98	6.25	5.86	8.28	11.1
EXTANK 120	Out of Service	VOC	0	0	0	0	0	0	0	0	0	0	0	0	0	11.1
INTANK 63	Bakken Crude	VOC	5.87	5.99	6.19	6.53	7.10	7.59	8.05	8.06	7.70	6.89	6.21	5.83	8.06	11.1
INTANK 68	AWB/Bakken Crude	VOC	3.62	3.70	5.79	6.53	7.10	7.58	8.05	8.06	7.70	6.89	6.21	5.83	8.06	11.1
INTANK 71	Av-Gas	VOC	2.11	2.17	2.26	2.42	2.71	2.95	3.19	3.19	3.01	2.60	2.27	2.09	3.19	11.1
INTANK 95	Out of Service	VOC	0	0	0	0	0	0	0	0	0	0	0	0	0	11.1
INTANK 104	Bakken Crude	VOC	5.87	5.99	6.19	6.53	7.10	7.58	8.05	8.06	7.70	6.89	6.21	5.83	8.06	11.1
INTANK 114	Out of Service	VOC	0	0	0	0	0	0	0	0	0	0	0	0	0	11.1
INTANK 130	Bakken Crude	VOC	5.87	5.99	6.19	6.53	7.10	7.58	8.05	8.06	7.70	6.89	6.21	5.83	8.06	11.1
Fixed Roof Tanks																

Attachment 68d-2

Oil/Water Separator Annual Inspection

Title V Annual OW Separator Inspection

Date: 11-12-2021 **Permit Holder:** Zenith Terminals **Permit #:** 262025

Requirement: Condition 24 Monitor and Record **Inspector:** M. Clay Reese

Location: Oil/Water Separator

Summary of Findings: On 11-12-2021 the terminal's oil/water separator was inspected and found to be on good operating condition with no mechanical failures or deficiencies of operation. Forebay closed and sealed

Corrective Action: None required

Attachment 68d-3

12-Month Summary of Annual Emission Rates

**Zenith Energy Terminals - Portland
PM₁₀ Plant Site Emission Summary
Summary Permit No. 26-2025**

PSEL = 14 tons/year

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	MLOAD	Total Monthly PM10 (tons/mo.)	Rolling 12-month PM10 (tons/yr)
January	2021	2.39E-03						5.36E-03	7.75E-03	0.0370
February	2021	2.41E-03						5.36E-03	7.77E-03	0.0395
March	2021	1.40E-03						5.36E-03	6.76E-03	0.0413
April	2021	1.89E-03						5.36E-03	7.25E-03	0.0446
May	2021	1.46E-03						5.36E-03	6.82E-03	0.0497
June	2021	1.63E-03						5.36E-03	6.98E-03	0.0547
July	2021	1.32E-03						5.36E-03	6.68E-03	0.0597
August	2021	1.06E-03						5.36E-03	6.42E-03	0.0633
September	2021	8.82E-04						5.36E-03	6.24E-03	0.0684
October	2021	1.03E-03						5.36E-03	6.38E-03	0.0728
November	2021	1.91E-03						5.36E-03	7.26E-03	0.0780
December	2021	3.29E-03						5.36E-03	8.64E-03	0.0849
2021 Emissions										0.0849

Zenith Energy Terminals - Portland
SO₂ Plant Site Emission Summary
Summary Permit No. 26-2025
PSEL = 81 tons/year

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	MLOAD	Total Monthly SO ₂ (tons/mo.)	Rolling 12-month SO ₂ (tons/yr)
January	2021	1.63E-03						0.0130	0.0146	0.0345
February	2021	1.64E-03						0.0130	0.0146	0.0455
March	2021	9.53E-04						0.0130	0.0139	0.0560
April	2021	1.28E-03						0.0130	0.0142	0.0676
May	2021	9.94E-04						0.0130	0.0140	0.0804
June	2021	1.11E-03						0.0130	0.0141	0.0931
July	2021	8.97E-04						0.0130	0.0139	0.106
August	2021	7.22E-04						0.0130	0.0137	0.118
September	2021	6.00E-04						0.0130	0.0136	0.130
October	2021	6.97E-04						0.0130	0.0137	0.143
November	2021	1.30E-03						0.0130	0.0143	0.156
December	2021	2.24E-03						0.0130	0.0152	0.170
2021 Emissions										0.170

**Zenith Energy Terminals - Portland
 NO_x Plant Site Emission Summary
 Summary Permit No. 26-2025
 PSEL = 99 tons/year**

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	MLOAD	Total Monthly NO _x (tons/mo.)	Rolling 12-month NO _x (tons/yr)
January	2021	0.0957						0.214	0.310	1.48
February	2021	0.0964						0.214	0.310	1.58
March	2021	0.0561						0.214	0.270	1.65
April	2021	0.0756						0.214	0.289	1.78
May	2021	0.0585						0.214	0.272	1.99
June	2021	0.0651						0.214	0.279	2.19
July	2021	0.0528						0.214	0.267	2.38
August	2021	0.0425						0.214	0.256	2.53
September	2021	0.0353						0.214	0.249	2.73
October	2021	0.0410						0.214	0.255	2.91
November	2021	0.0763						0.214	0.290	3.12
December	2021	0.132						0.214	0.345	3.39
2021 Emissions										3.39

**Zenith Energy Terminals - Portland
CO Plant Site Emission Summary
Summary Permit No. 26-2025
PSEL = 99 tons/year**

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	MLOAD	Total Monthly CO (tons/mo.)	Rolling 12-month CO (tons/yr)
January	2021	1.06						0.389	1.45	2.43
February	2021	0.969						0.389	1.36	3.62
March	2021	0.846						0.389	1.23	4.68
April	2021	0.777						0.389	1.17	5.72
May	2021	0.772						0.389	1.16	6.82
June	2021	0.759						0.389	1.15	7.90
July	2021	0.745						0.389	1.13	8.98
August	2021	0.687						0.389	1.08	9.96
September	2021	0.677						0.389	1.07	11.0
October	2021	0.645						0.389	1.03	12.0
November	2021	0.642						0.389	1.03	12.9
December	2021	0.694						0.389	1.08	13.9
2021 Emissions										1.63

**Zenith Energy Terminals Portland
VOC Plant Site Emission Summary
Summary Permit No. 26-2025
PSEL =179 tons/year**

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	MLOAD	Total Monthly VOCs (tons/mo.)	Rolling 12-month VOC's (tons/yr)
January	2021	5.27E-03	1.83E-04	0.0980	0.855	0	1.45	0.0272	2.44	26.1
February	2021	5.30E-03	1.58E-03	0.0894	0.773	0	1.27	0.0193	2.16	26.5
March	2021	3.08E-03	2.27E-03	0.0838	0.855	0	1.55	0.0217	2.51	27.0
April	2021	4.16E-03	3.06E-04	0.0798	0.828	0	1.62	0.0236	2.55	27.3
May	2021	3.22E-03	1.96E-04	0.0759	0.855	0	1.93	0.0313	2.90	27.9
June	2021	3.58E-03	4.16E-03	0.0759	0.828	0	2.06	0.0410	3.01	28.5
July	2021	2.90E-03	8.23E-02	0.0693	0.855	0	2.40	0.0170	3.42	29.4
August	2021	2.33E-03	3.51E-03	0.0505	0.855	0	2.27	0.0357	3.21	30.2
September	2021	1.94E-03	3.57E-04	0.0505	0.828	0	2.03	0.0407	2.95	31.0
October	2021	2.26E-03	2.96E-04	0.0505	0.855	0	1.76	0.0260	2.69	31.6
November	2021	4.20E-03	4.59E-03	0.0458	0.828	0	1.67	0.0441	2.59	32.4
December	2021	7.23E-03	0.0160	0.0501	0.855	0	1.56	0.0156	2.51	33.0
2021 Emissions										33.0

**Zenith Energy Terminals - Portland
H₂S Plant Site Emission Summary
Summary Permit No. 26-2025**

PSEL = 9 tons/year

Month	Year	BOILER FURNACE	TRACK	OIL/W	FGTVOC	FW	FIXTANK, EXTANK, INTANK	Total Monthly H ₂ S (tons/mo.)	Rolling 12- month H ₂ S (tons/yr)
January	2021	0.00						0.00	0.00
February	2021	0.00						0.00	0.00
March	2021	0.00						0.00	0.00
April	2021	0.00						0.00	0.00
May	2021	0.00						0.00	0.00
June	2021	0.00						0.00	0.00
July	2021	0.00						0.00	0.00
August	2021	0.00						0.00	0.00
September	2021	0.00						0.00	0.00
October	2021	0.00						0.00	0.00
November	2021	0.00						0.00	0.00
December	2021	0.00						0.00	0.00
2021 Emissions									0.00

ENCLOSURES
(Second Copy)

Elijah Cetas

#331981 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Dear Mayor Wheeler, Commissioners, and Staff: Thank you for the opportunity to offer our comments on the proposed re-adoption of the City of Portland's Fossil Fuel Terminal Zoning Amendments ("Amendments"). These comments are submitted on behalf of Breach Collective, Columbia Riverkeeper, Portland Harbor Community Coalition, Willamette Riverkeeper, Oregon Physicians for Social Responsibility, Extinction Rebellion PDX, Oregon Conservancy Foundation, Cedar Action, Sunrise Movement PDX, Audubon Society of Portland, and 350 PDX. We appreciate and support the City's commitment to address the issues identified by the Land Use Board of Appeals and re-adopt the Amendments to reflect the intent of their passage in December 2016 with the adjustments proposed in the Remand Report. We offer the following comments in support and to reiterate the substantial public health and safety concerns that continue to motivate the Amendments' passage. We urge Council to stay strong and not grant any exemptions or allowances. We also offer Council suggestions for Amendments to clarify the ordinance and ensure our city is on course for substantial climate and seismic resilience, as well as deep emissions reduction through the agenda of rapid transition to clean energy and electrification. Thank you, Elijah Cetas, Climate Law Fellow, Breach Collective Dan Serres, Conservation Director, Columbia Riverkeeper Cassie Cohen, Executive Director, Portland Harbor Community Coalition Lindsey Hutchison, Staff Attorney, Willamette Riverkeeper Samantha Hernandez, Climate Justice Organizer, Oregon Physicians for Social Responsibility Dineen O'Rourke, Campaign Manager, 350PDX Linn Handlin, Extinction Rebellion PDX Ben Stevenson, Sunrise Movement PDX Cathryn Chudy, Oregon Conservancy Foundation Bob Sallinger, Conservation Director, Audubon Society of Portland Cedar Action

Testimony is presented without formatting.

Marion Soprani

#331982 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

NO! to any expansion or additional fossil fuel tanks or any other storage. Please

Testimony is presented without formatting.

Devon Lawson-McCourt

#331983 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Dear Council, My name is Devon Lawson-McCourt and I am an upcoming High School Sophomore. These amendments are a crucial first step towards preventing devastating effects from the anticipated magnitude 9.0 earthquake. Portland's fossil fuel storage hub presents a catastrophic risk of spills, explosions, and toxic fumes in the case of the Cascadia Earthquake, according to a recent analysis from Multnomah County and the City of Portland. By putting a stop to the careless growth of hazardous infrastructure, these amendments are an essential step in safeguarding the health of the Willamette and Columbia rivers as well as our communities. This Council ought to adopt a fully electrified policy agenda. This is made abundantly obvious in the most recent International Energy Agency report: to achieve net-zero emissions and a stable climate, the transportation, heating, and industrial sectors must completely electrify and cannot rely on combustion. In the interim, using renewable fuels should help achieve this goal rather than getting in the way. This will get us a long way closer to being Oregon's greenest city. This is my testimony, and I sincerely hope you make the correct decision. Thank you.

Testimony is presented without formatting.

IDAHO GOVERNOR'S OFFICE OF ENERGY & MINERAL RESOURCES

BRAD LITTLE
Governor



304 N. 8th Street, Suite 250
P.O. Box 83720
Boise, Idaho 83720-0199

RICHARD STOVER
Administrator

(208) 332-1660
FAX (208) 332-1661

COMMENTS ON CITY OF PORTLAND FOSSIL FUEL TERMINAL ZONING AMENDMENTS

Submitted by the Idaho Governor's Office of Energy and Mineral Resources
Day Month Year

June 30, 2022

**Sent via US Mail and
City Map App Testimony Portal:**

<https://www.portlandmaps.com/bps/testify/#/fossil-fuel-zoning>

Mayor Wheeler and Portland City Council
City Hall
1221 SW 4th Avenue
Portland, Oregon 97204

Dear Mayor Wheeler and Portland City Council Members:

Thank you for the opportunity to provide comments on the City of Portland's proposed Fossil Fuel Terminal Zoning Amendments. Pursuant to its responsibilities set forth in Executive Order 2020-17, the Idaho Governor's Office of Energy and Mineral Resources (OEMR) provides the following comments on behalf of the State of Idaho:

The need for responsible and informed energy planning and policy development is vitally important. Indeed, for years western states have been actively researching, collaborating and coordinating on forward-looking energy planning and policy issues. Throughout these processes it has become clear that a regional approach to addressing our future energy needs is and will remain critically important. We are concerned that the proposed zoning amendments go the opposite direction, representing an isolationist, present-day approach that ignores its greater impact on the western region.

Specifically, the City's record regarding expected fuel consumption is limited to Portland region and acknowledges that – despite anticipated growth in fuel consumption – Portland should have just enough fossil fuel infrastructure to supply the Portland region until 2050 (if all the assumptions prove accurate). This approach ignores the fuel needs of neighboring Idaho, which is the fastest growing state in the nation. The record acknowledges that refined petroleum from the fuel terminals is ultimately used in Idaho. Like Portland, all of Idaho's refined petroleum is imported

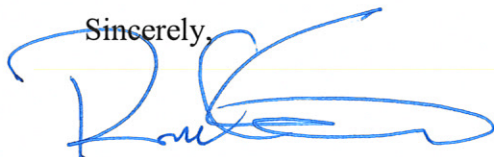
from other states. With Idaho's fast growth, there is no question that additional refined petroleum imports will be needed. By basing the amendments on current capacity in the fuel terminals and only Portland's anticipated fuel needs, the amendment's enactment would cause Portland to become a choke point in the national fuel distribution systems.

Perhaps more importantly, Idaho and Portland need to be prepared to accommodate in the event of emergency. Most of Idaho's liquid fuel is supplied by two pipelines – the Yellowstone Pipeline and the Northwest Products Pipeline. Ninety percent of Oregon's transportation fuel is delivered from out of state via the Olympic pipeline. In the event any of these pipelines are disrupted by a catastrophic event, we will need to look elsewhere for alternative fuel sources. As proposed, Portland's Fuel Terminal Ordinance would prevent the region from looking to Portland for alternative fuel sources in times of crisis. If Portland's policy approach were widely adopted across the region or nationwide, Portland could find itself without alternative fuel options in the case of emergency. This is a dangerous precedent and should be avoided.

In short, the Fossil Fuel Terminal Zoning Amendments are not forward-looking, are based on assumptions focused solely on Portland, and ignore the current and future energy needs of Portland's neighbors. This approach will destabilize fuel supply and undermine the region's ongoing efforts to address future energy needs while ensuring a stable fuel supply in the meantime. Idaho opposes this approach and would instead encourage Portland to engage in the numerous regional efforts with which we are involved to plan for future energy needs.

The State of Idaho appreciates the opportunity to submit these comments. Please feel free to contact me should you have any questions or need clarification.

Sincerely,



Richard Stover, Administrator
Idaho Governor's Office of Energy and Mineral Resources
(208) 332-1660

Richard Stover

#331984 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Please accept the attached letter from the Idaho Governor's Office of Energy and Mineral Resources.

Testimony is presented without formatting.



June 30, 2022

To: Portland City Council

From: State Representative Maxine Dexter, M.D., House District 33

Subject: Fossil Fuel Terminal Zoning

Dear Mayor Wheeler, Commissioners, Members of City Council,

For the record, my name is Dr. Maxine Dexter, state representative for HD-33, which in 2023 will encompass northwest and downtown Portland, including the western Willamette riverfront from the Hawthorne bridge to north of Linnton. This ordinance¹ is of particular importance to my district, which is at profound risk for extensive seismic-related damage and loss of life due to its inclusion of Oregon's primary liquid fuel storage facilities, the Critical Energy Infrastructure (CEI) hub. The CEI hub receives 90 percent of the state's liquid fuel supply either via pipeline or marine vessel. During the 2022 Session I was a Chief Sponsor of SB 1567, a bill that requires fuel storage facilities to assess their seismic vulnerability and implement mitigation plans to reduce risks to public safety and our economic resilience.

The majority of existing infrastructure for the CEI hub was constructed prior to adopting building codes that take into account seismic risks, informed by damage experienced by the Great Alaskan earthquake of 1964 and others that followed. Our region has historical evidence sufficient to be extremely concerned that such an event is likely to occur in our lifetimes. With such risk present currently and this recent legislation passed requiring seismic vulnerability assessments be submitted by June 1, 2024, the urgent focus for these facilities should be evaluating and mitigating current risk rather than creating any additional risk through further development. I strongly support the language of the remanded Ordinance No. 189807, notably the requirement for reporting from the Bureau of planning and Sustainability by December 31,

¹ Ordinance No. 189807, number 5.

2023 and the expectation for city bureaus to partner with state and local bodies to focus on developing policy options to require seismic upgrades to storage tanks, replacing the older, unsafe tanks. These city directives and policies work in alignment and synergistically with the legislative intent of SB 1567 and elevates this urgent need to a multi-jurisdictional level appropriate for the degree of risk our community faces.

As a legislator, a mother, and a pulmonary and critical care physician, I cannot over-emphasize the need for collaborative and urgent action to mitigate the potential health and safety risks we face in the event of a significant earthquake in our region. If we fail to act, it is anticipated that [94 to 194 millions gallons of fuel](#) and oil would be released into the ground and the Willamette river, rivaling the largest marine oil spill in history, the 2010 Deepwater Horizon oil spill.

A spill this size will have devastating environmental and public health impacts - fire's risk to people, Forest Park, businesses and homes; toxic smoke and fumes that will cause nearly immediate harm and even more over time; contamination of our groundwater, devastation to our river ecosystem - the list of harm goes on. The smoke and fumes that would be released would have immediate and severe, if not deadly, impacts on the health of the people who breathe in the toxic air, precipitating asthma attacks, strokes, pneumonia, heart disease and cancer. Your taking action today will not only reduce the risk of major public health impacts from earthquake activity², it will keep the city in line with the goals of the 2035 Comprehensive Plan. This plan outlines ways to reduce fossil fuel expenditure and create more sustainable forms of supporting energy consumption in our communities.

I will also elevate the historically-informed and extremely important concern raised by our local tribal communities as to the safety risks of fossil fuel infrastructure and the related threats to human health, cultural heritage, and environmental quality. Please refer to the testimonies cited in Remanded Ordinance No. 189807 from the Huu-ay-aht First Nation peoples and the Makah tribe in relation to the previous devastating impacts of the Cascadia earthquake of 1700.

One concern I wish to raise is in regard to an exemption cited in Section 28.b. The section refers to policy 6.48, which limits fossil fuel terminals to what is necessary to serve the regional market. Projections cited in this section suggest that there is expected to be an increased consumption of petroleum in 2050 largely related to increases in jet fuel and renewable fuels demand. Rather than plan for and accept a need to decrease our dependence on fossil fuels, this policy allows new storage tank capacity to be built through an exemption in the code amendments. This lacks the courage and conviction we must lead with to prioritize the health and safety of our city and the scientific realities of climate change. I ask that you consider amending city policies so that such exemptions are removed.

Once again, I am in strong support of the reinstatement of this City Ordinance, and I am hopeful for your emergency adoption of it. Your readiness to prioritize the health and safety of the people of our city over corporate interests and pressures is the kind of leadership I hope to see

² as per [Exhibit A](#) findings of the Fossil Fuel Terminal Zoning Amendments Project,

at all levels of government. Thank you for taking the time to reintroduce this measure and for reading my testimony on the matter.

Sincerely,

A handwritten signature in black ink, appearing to read 'Maxine Dexter', written in a cursive style.

Representative Maxine Dexter, M.D.

House District 33 (NW Portland and NE Washington County)

Maxine Dexter

#331985 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

June 30, 2022 To: Portland City Council From: State Representative Maxine Dexter, M.D., House District 33 Subject: Fossil Fuel Terminal Zoning Dear Mayor Wheeler, Commissioners, Members of City Council, For the record, my name is Dr. Maxine Dexter, state representative for HD-33, which in 2023 will encompass northwest and downtown Portland, including the western Willamette riverfront from the Hawthorne bridge to north of Linnton. This ordinance is of particular importance to my district, which is at profound risk for extensive seismic-related damage and loss of life due to its inclusion of Oregon's primary liquid fuel storage facilities, the Critical Energy Infrastructure (CEI) hub. The CEI hub receives 90 percent of the state's liquid fuel supply either via pipeline or marine vessel. During the 2022 Session I was a Chief Sponsor of SB 1567, a bill that requires fuel storage facilities to assess their seismic vulnerability and implement mitigation plans to reduce risks to public safety and our economic resilience. The majority of existing infrastructure for the CEI hub was constructed prior to adopting building codes that take into account seismic risks, informed by damage experienced by the Great Alaskan earthquake of 1964 and others that followed. Our region has historical evidence sufficient to be extremely concerned that such an event is likely to occur in our lifetimes. With such risk present currently and this recent legislation passed requiring seismic vulnerability assessments be submitted by June 1, 2024, the urgent focus for these facilities should be evaluating and mitigating current risk rather than creating any additional risk through further development. I strongly support the language of the remanded Ordinance No. 189807, notably the requirement for reporting from the Bureau of planning and Sustainability by December 31, 2023 and the expectation for city bureaus to partner with state and local bodies to focus on developing policy options to require seismic upgrades to storage tanks, replacing the older, unsafe tanks. These city directives and policies work in alignment and synergistically with the legislative intent of SB 1567 and elevates this urgent need to a multi-jurisdictional level appropriate for the degree of risk our community faces. As a legislator, a mother, and a pulmonary and critical care physician, I cannot over-emphasize the need for collaborative and urgent action to mitigate the potential health and safety risks we face in the event of a significant earthquake in our region. If we fail to act, it is anticipated that 94 to 194 millions gallons of fuel and oil would be released into the ground and the Willamette river, rivaling the largest marine oil spill in history, the 2010 Deepwater Horizon oil spill. A spill this size will have devastating environmental and public health impacts - fire's risk to people, Forest Park, businesses and homes; toxic smoke and fumes that will cause nearly immediate harm and even more over time; contamination of our groundwater, devastation to our river ecosystem - the list of harm goes on. The smoke and fumes that would be released would have

immediate and severe, if not deadly, impacts on the health of the people who breathe in the toxic air, precipitating asthma attacks, strokes, pneumonia, heart disease and cancer. Your taking action today will not only reduce the risk of major public health impacts from earthquake activity, it will keep the city in line with the goals of the 2035 Comprehensive Plan. This plan outlines ways to reduce fossil fuel expenditure and create more sustainable forms of supporting energy consumption in our communities. I will also elevate the historically-informed and extremely important concern raised by our local tribal communities as to the safety risks of fossil fuel infrastructure and the related threats to human health, cultural heritage, and environmental quality. Please refer to the testimonies cited in Remanded Ordinance No. 189807 from the Huu-ay-aht First Nation peoples and the Makah tribe in relation to the previous devastating impacts of the Cascadia earthquake of 1700. One concern I wish to raise is in regard to an exemption cited in Section 28.b. The section refers to policy 6.48, which limits fossil fuel terminals to what is necessary to serve the regional market. Projections cited in this section suggest that there is expected to be an increased consumption of petroleum in 2050 largely related to increases in jet fuel and renewable fuels demand. Rather than plan for and accept a need to decrease our dependence on fossil fuels, this policy allows new storage tank capacity to be built through an exemption in the code amendments. This lacks the courage and conviction we must lead with to prioritize the health and safety of our city and the scientific realities of climate change. I ask that you consider amending city policies so that such exemptions are removed. Once again, I am in strong support of the reinstatement of this City Ordinance, and I am hopeful for your emergency adoption of it. Your readiness to prioritize the health and safety of the people of our city over corporate interests and pressures is the kind of leadership I hope to see at all levels of government. Thank you for taking the time to reintroduce this measure and for reading my testimony on the matter. Sincerely, Representative Maxine Dexter, M.D. House District 33 (NW Portland and NE Washington County)

Testimony is presented without formatting.

Cathy Spofford

#331986 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

June 30, 2022 Portland City Council 1221 SW Fourth Avenue Portland, Oregon 97204 Submitted via Map App portal RE: Testimony in Support of Re-Adopting Fossil Fuel Terminal Zoning Amendments Dear Mayor Wheeler, Commissioners, and Staff: Thank you for the opportunity to offer comments on the proposed re-adoption of the City of Portland's Fossil Fuel Terminal Zoning Amendments. I am writing to support the City's commitment to re-adopt the amendments and to encourage the City Council not to weaken the amendments or make any allowance for further fossil fuel expansion. I have read the whole report, The CEI HUB Seismic Risk Analysis, jointly produced by the City of Portland and Multnomah County and it is a very sobering. It outlines how dangerous the 630 tanks currently at the CEI HUB are and the disastrous effects any spill or rupture would have on the community, on wildlife, on the Willamette River and Columbia Rivers, and the economic health of the region. The tanks which sit "on unstable soil subject to liquefaction and lateral spreading in an earthquake" would most likely rupture and explode if there were an earthquake Senator Michael Dembrow, Chief Sponsor of Senate Bill 1567, which requires energy terminal owners to submit comprehensive seismic vulnerability assessments and risk mitigation plans to the Oregon DEQ before June 2024, said any spill or explosion at the CEI Hub could be a disaster "on the order of Fukushima and Deepwater Horizon combined." These amendments are a crucial step in protecting the health and safety of our communities and the health of the Willamette and Columbia Rivers by stopping any expansion of dangerous fossil fuel infrastructure. The amendments however do not address the current risk associated with the existing storage tanks in the event of a Cascadia Subduction Zone earthquake. The City needs to take immediate action, along with Multnomah County and the State, to require seismic safety updates at existing high-risk infrastructure now, not in a few years. The City also must ensure that any new storage tank capacity that is allowed for renewable fuel storage is restricted to that use. The City must explicitly limit any new storage tanks for renewable fuels to that exclusive use. The proposed amendment has a potential loophole where a terminal operator could propose new storage for renewable fuels but later shift operations and instead use those tanks for fossil fuels storage. The proposed amendments also do not prohibit intensification from passthrough or transloading activities, the type of expansion that has occurred at the Zenith Energy facility over the past several years. With the construction of additional transloading infrastructure at its existing facility, Zenith was able to significantly increase its capacity to transload crude oil without building new tanks. Thank you for the City's work in defending the ordinance and prioritizing the health and safety of our community. Sincerely, Cathy Spofford Portland, OR

Testimony is presented without formatting.

Cathryn Chudy

#331987 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I live in Vancouver Washington and fully support these Fossil Fuel Terminal Zoning Amendments for issues of public health, environmental inequity, climate and seismic risk. These risks are shared across the boundaries of our River and two states - the catastrophic harm we risk puts us all in jeopardy and impacts us here in Vancouver, as well as all of the rail communities along our River, and your decision to uphold and strengthen these Amendments is vitally important to me and those who join me in asking you to protect people, rather than being swayed by fossil fuel industry promises that put their continued profiteering at our expense ahead of our health, safety and welfare. I appreciate the city's diligence in defending the ordinance and I urge you to wisely proceed to take the crucial next step to implement these Amendments as quickly and effectively as you can. The viability of our lives and the lives of our young people is in your hands. Please decide accordingly. Thank you for all you do to protect and safeguard our future.

Testimony is presented without formatting.

Suzanna Kassouf

#331988 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Hello, my name is Suzanna Kassouf, I'm a teacher at Grant High School and a volunteer with 350PDX. I'm speaking today because, like many of us, I'm worried about my future. I'm worried about my students' future, I'm worried about my childrens' future, and I'm worried about the future of Portland. I woke up this morning to news that The Supreme Court, which less than one week ago had stripped me of my bodily autonomy, has now essentially blocked any hope of climate action on a federal level by ruling that the EPA cannot regulate carbon emissions. So now, it's up to us. It is more important than ever that our cities take bold steps toward limiting, and ultimately dismantling, the fossil fuel industry. We cannot allow ourselves to be deceived by greenwashing campaigns - these corporations will stop at nothing to continue business-as-usual for their own personal gain, even when that business is destroying our hope of a livable future. Now is the time for cities to lead. City Council should boldly approve the Fossil Fuel Terminal Zoning Amendment, but should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. And, ultimately, should set a policy goal of 100% electrification. This is the only way forward to build the safe, healthy, and sustainable communities that Portlanders deserve. Please do the right thing. Thank you.

Testimony is presented without formatting.



June 30, 2022

Mayor Wheeler and Portland City Council
City Hall
1221 SW 4th Avenue
Portland, Oregon 97204

Re: Portland Fossil Fuel Terminal Ordinance Will Hurt Idaho Communities

Dear Mayor Wheeler and City Council Members:

The Idaho Petroleum Marketers & Convenience Store Association (IPM&CSA) represents the small businesses and station owners that provide fuel to Idaho and border communities and their residents. We provide the reliable fuels and energy needed to power economies in Idaho and neighboring states.

We are writing to urge you to OPPOSE the proposed Fossil Fuel Terminal Ordinance (FFTO). We believe the proposed ordinance would seriously harm our ability to provide adequate fuel supplies to consumers in Oregon, Idaho and Washington.

As you know, government mandates, regulations and growing consumer demand means that the Pacific NW region needs more fuel blends, and that they be available 24/7. Requirements for different types of fuels, including lower emissions fuels, means the fuel storage and distribution infrastructure is critical and must be enhanced to meet growing demand for the 21st Century. Adequate supply helps keep costs down and increases reliability, ensuring the economic stability of this region. Eliminating needed and critical storage in the years ahead, as the FFTO would do, will decrease the availability of fuel to consumers in Oregon, Washington, and Idaho, and will undoubtedly do economic damage to the region.

As part of the Pacific NW community, IPM&CSA is committed to support our economy as we work in partnership with others toward an improved environment. A reliable, affordable supply of energy, including diversity of fuels, is critical to our consumers, and to our region. This is especially true at a time when high inflation and increasing energy costs harms consumers and our ability to improve regional energy policy. Terminals in Portland play a critical role for our region, and they cannot be easily replaced, certainly not without causing new environmental challenges and harming the region's fuel transportation infrastructure.

We urge you to consider the entire Pacific Northwest region, and the states and communities that rely on the existing fuel terminal infrastructure. Please do not pass the FFTO proposal.

Thank you for your consideration.

Suzanne Budge

Suzanne Budge
Executive Director, IPM&CSA

Suzanne Budge

#331989 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

See Attached

Testimony is presented without formatting.

Jan Zuckerman

#331990 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Earlier this week I attended the kickoff for the heat week to commemorate the dozens of Portlanders who died last year, and the message was loud and clear. We need a unified response to the extreme weather caused by human induced climate chaos. Mayor Wheeler stated that we should have addressed this issue 20 years ago. I agree and the Fossil Fuel Terminal Zoning amendments voted on in 2019, should have been implemented, but here we are, again. It should come as no surprise that we are experiencing extreme weather, food and water shortages and that the air quality in the CEI Hub is unbearable, our Willamette River is sick and our youth are depressed. Each year that passes, presents us with greater challenges, clearly teaching us that we can't put off to tomorrow what we must address today. Enough studies have been done by experts in the field, to clearly show that the CEI Hub is an earthquake and fossil fuel disaster zone. It is up to our city's policies and implementation of those policies to change the course we are on before it is too late. We cannot wait until forest park goes up in flames and we lose our river. A few days ago, a youth activist shared with me that they had always thought our city was a leader on climate, until they started learning this past year, about city policies and decisions that pit trees against infrastructure, and support the expansion of freeways, when we should be setting yearly concrete goals to address the climate crisis. While we can't turn the clock back, we can act now on the Climate Emergency and support the strongest Fossil Fuel Terminal Zoning Amendments possible. If we are to meet our climate goals, we need to reduce emissions 10% each year, and not stand by while Zenith Energy moves more crude oil than ever while patting themselves on the back for moving biodiesel. Bio-fuel will not get us to 100% electrification. It will burden us with more dangerous infrastructure that our children in 20 years will have to clean up, while a future mayor will say that we should have done something 20 years before. On Sunday, Mayor Wheeler said that weather events have changed our way of thinking. I hope that this thinking becomes action by standing firm and holding the line on industry loopholes in the Fossil Fuel Terminal Zoning Amendments. We know from past experiences that fossil fuel industries are less than transparent and use greenwashing that confuses and endangers our communities. Therefore, our city must clarify the meaning of expansion, enforce safety mechanisms for all fuel storage, mandate seismic retrofits for existing tanks, and commit to transitioning away from all fossil fuels, including biodiesel and other biofuels that continue to harm our communities and ecosystem. According to Mayor Mark Gamba, National Geographic predicts that by 2048, we will have killed our oceans if we don't act now. He is right when he says that we cannot mitigate our way out of this- we must stop our insane foot dragging. Thank you

Testimony is presented without formatting.



Catherine Reheis-Boyd
President and CEO

June 30, 2022

Submitted By
City Map App Testimony Portal

<https://www.portlandmaps.com/bps/testify/#/fossil-fuel-zoning>

Portland City Council
Fossil Fuel Zoning Testimony
1221 SW Fourth Avenue, Room 130
Portland, Oregon 97204

Re: Western States Petroleum Association Comment on Fossil Fuel Terminal Ordinance

Dear Mayor Wheeler and City Council Members:

I am writing on behalf of Western States Petroleum Association ("WSPA"), a nonprofit trade association that represents companies engaged in petroleum exploration, production, refining, transportation, and marketing in the western United States. As we did in 2016 and 2019, we are again writing in opposition to the City's proposed amendments to its zoning code targeting fuel facilities (the "Proposed Amendments").

We ask the City to reject the Proposed Amendments because they and the policies they attempt to implement hinder the local economy, the transition to cleaner fuels, and implementation of potential safety upgrades. WSPA members have operated in the Critical Energy Infrastructure HUB in northwest Portland for decades. This corridor provides key energy and emergency infrastructure as recognized by various city, state, and federal documents. WSPA members remain concerned that the Proposed Amendments lock existing infrastructure in place, which prevents efficiency, environmental, and safety improvements.

If adopted, the Proposed Amendments would be a public policy failure because they create significant adverse impacts on local energy supply, transportation resources, safety, and the economy without achieving their purported objectives. Specifically, the Proposed Amendments would likely increase emissions by encouraging more fuel transport by truck and discourage seismic and safety improvements that typically occur with new infrastructure improvements.

The Proposed Amendments Will Have Significant Adverse Impacts on Regional Energy Supply, Clean Fuels Transition, and Safety.

The Proposed Amendments do more harm than good. They will inflict significant restraints on the ability to supply fuel and change fuel types as the region grows, technology advances, and fuel standards change. The Proposed Amendments freeze existing infrastructure in place by location and size. They would hinder improvements to fuel infrastructure.

Specifically, the Proposed Amendments would:

- Prevent and discourage terminal upgrades, including tank seismic upgrades, due to the business impacts of capping tank capacity, resulting in *fewer* upgraded tanks;
- Prevent and discourage equipment upgrades necessary to meet market demand or comply with federal and state clean fuel laws;
- Prevent and discourage the transition to newer lower-carbon-fuel sources in opposition to Oregon's low-carbon-fuel standards, Oregon's Renewable Fuel Standards, federal Renewable Fuel Standards, and similar laws;
- Fail to provide for sufficient facilities and tank capacity to serve future energy needs;
- Thwart future technologies that do not fit within the current infrastructure framework;
- Undermine the ability of Portland to serve downstream markets that are growing fast like the Tri-Cities area of Washington and Idaho;
- Not align with state and federal policy regarding siting energy infrastructure or transportation of fuels; and
- Encourage less efficient, higher emission, and potentially less safe transportation by truck over more efficient modes of transportation, such as pipeline.

In short, the Proposed Amendments would freeze current infrastructure in place. This infrastructure is insufficient for future fuel demand, by both quantity and type of fuel. If Portland had passed a similar ordinance 10, 20, or 30 years ago, the fuel infrastructure in Portland today would have a higher carbon footprint and be less safe.

Further, as the record shows, the City (and in fact no one) is able to accurately predict fuel consumption trends more than a few years into the future. The various fuel demand studies and forecasts that the City has provided in the record show material changes in forecasts over just a few years. Certain types of fuels such as diesel, transitional fossil fuels, and lower emission fuels mandated by the federal government will see demand increase. The City's analysis errs in assuming that it can forecast needs more than ten years in the future.

The Proposed Amendments will fail to deliver the intended benefits; they will not reduce greenhouse gases ("GHGs") or increase safety. While the Proposed Amendments will inflict clear negative impacts on the local, state, and regional economy, as well as the ability to transition energy resources, they will simultaneously fail to achieve some of these basic objectives. Most notably, they will not reduce GHG emissions.

The Proposed Amendments suffer from an incorrect understanding of how GHG emissions occur in the fuel supply chain. The Proposed Amendments do not limit the regional demand for fuel. Fuel is a classic example of a product with relatively inelastic demand. There are few to no supplements for most types of fuel, so consumers will continue to demand fuel, even if it must be delivered through less efficient modes with greater cost and emissions. As regional and downstream demand for fuel quantity grows and demand for types of fuel changes (including increased demand for fuel with less carbon), that fuel will have to be supplied through some delivery mechanism.

The Proposed Amendments, which prohibit new terminals, new intermodal links, and new fuel tanks in Portland, will likely result in increased fuel transport by truck. Moving fuel by truck costs more, clogs roads, and increases GHG emissions compared to transport by pipeline and vessels.

The Proposed Amendments undercut the City's goals. Specifically, the Proposed Amendments would:

- Prohibit construction of needed emergency backup capacity;
- Prohibit relocating fossil fuel tanks out of seismic liquefaction zones by only allowing fossil fuel terminals in mapped liquefaction areas in Portland;
- Prohibit siting newer, lower emission fuel facilities;
- Prevent and discourage efficiency upgrades that generally reduce GHG emissions;
- Prohibit new fuel tanks for blended fuels and transitional fuels that are federally and state mandated and help transition towards lower-carbon-fuel sources; and
- Encourage higher emission and potentially less safe transportation by truck over the more efficient modes of transportation, such as pipeline.

The Proposed Amendments unfortunately do not help—and in fact, significantly hinder—the City's goals of reducing GHG emissions and increasing facility safety, particularly as it relates to earthquake hazards.

Further, the Proposed Amendments violate the City's climate policy on fossil fuel infrastructure in City Resolution No. 37168. That resolution notes that the City's policy is to exempt needed infrastructure that:

1. Improves safety;
2. Provides service directly to end users;
3. Develops emergency backup capacity;
4. Enables recovery or reprocessing of petroleum products, or
5. Accelerates the transition to lower emission sources.

The Proposed Amendments violate Resolution No. 37168 because it fails to provide exceptions for fossil fuel infrastructure projects that improve safety, develop emergency backup capacity, or accelerate the transition to lower emission fuel sources. Specifically, the City and State of Oregon have independent efforts progressing to encourage seismic safety at the terminals, facilitate emergency backup capacity, and transition to lower carbon fuels. The Proposed Amendments conflict with and would materially undermine each of these initiatives.

Regarding transition to lower emission fuels, the Proposed Amendments pose a major obstacle to distribution of lower emission fuels by contradicting federal and state standards. Many fuels that are classified as renewable under the federal Renewable Fuel Standard and "clean fuels" in Oregon's Clean Fuel Standard are classified as fossil fuels under the Proposed Amendments. Fuel production and distribution is a national and international endeavor that does not lend itself to each city electing different and contradictory standards.

At a minimum, the City should modify its definitions of fossil fuel and renewable fuel to match the federal definition renewable fuel:

"Renewable fuel means a fuel which meets all of the requirements of paragraph (1) of this definition:

(1)(i) Fuel that is produced from renewable biomass.

(ii) Fuel that is used to replace or reduce the quantity of fossil fuel present in a transportation fuel, heating oil, or jet fuel.

(iii) Has lifecycle greenhouse gas emissions that are at least 20 percent less than baseline lifecycle greenhouse gas emissions, unless the fuel is exempt from this requirement pursuant to § 80.1403.” 40 C.F.R. 80.1401.

The City should similarly follow the federal code for what constitutes “renewable biomass” under 40 C.F.R. 80.1401 and allow for products like hydrogen or other fuels that meet the 20% lifecycle requirement in the renewable fuel standard above that are not derived from biomass (like “clean hydrogen not derived from biomass). The transition to lower emission fuels requires innovative and creative solutions, many of which do not fit into the asynchronous definitions in the Proposed Amendments.

We welcome any questions or comment you might have. If you have any questions or comments, please contact Holli Johnson at hjohnson@wspa.org or (360) 352-4506.

Sincerely,

A handwritten signature in blue ink, appearing to read "Cathy Boyd".

cc: Sophie Ellinghouse, WSPA
Holli Johnson, WSPA
Jessica Spiegel, WSPA

Catherine Reheis-Boyd

#331991 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**
see attached

Testimony is presented without formatting.

June 30, 2022

Portland City Council
1221 SW Fourth Avenue
Portland, Oregon 97204

Submitted via *Map App* portal

RE: Testimony in Support of Re-Adopting Fossil Fuel Terminal Zoning Amendments

Dear Mayor Wheeler, Commissioners, and Staff:

I am a retired public health and preventive medicine physician who has lived in Portland, Oregon for over 4 decades. I spent my career in research and evidence-based medicine, while raising my family here. I have dedicated time in retirement to working on climate health and justice through the Oregon Physicians for Social Responsibility and OHSU's Department of Family Medicine.

Here, I offer testimony in **strong support** of the City Council's adoption of the Portland Fossil Fuel Terminal Zoning Amendments, and **I request that you go even further to protect the health and safety** of the people, animals, plants, and waterways that are threatened by the storage of flammable fuels in a seismically vulnerable area as follows:

1. **Require retrofits to make existing storage safer.** We now know now that the Critical Energy Infrastructure Hub area was not a good choice for storing highly flammable materials. And, as has been well documented, the storage facilities themselves are aging and largely not reinforced to withstand a significant earthquake. You must also require that fossil fuel terminal industries immediately retrofit their existing storage units as current capacity remains a huge environmental and civic risk.
2. **Require companies profiting from these facilities to indemnify the City and invest in risk mitigation beyond seismic retrofits for existing storage tanks.** The companies profiting from these facilities are not currently financially responsible should there be a catastrophic spill, explosion, fire, or toxic emission event. While I don't believe damages to our ecosystem (locally and downstream), nor the loss of individual and corporate assets, could ever be adequately reclaimed, repaired, or replaced with money, it would be egregious for the City and its taxpayers to bear any additional financial burdens associated with such a devastating loss event. The City should also require that these companies begin to mitigate risk associated with their businesses now by paying for enhancing the City's emergency preparedness preparation and resources.
3. **Please don't be beguiled by the offer of more biofuels.** The City's best strategy is to move as quickly as possible to 100% electrification for every industry possible.

Any biofuel use must be seen as a temporary transition measure--as these put more carbon into the atmosphere, are flammable, and often are produced in ways that worsen our climate crisis. Any transitional biofuel storage must be required to be a replacement for fossil fuel storage and not in addition to it.

The amendments, as offered, are a necessary first step and must be adopted without any further dilution to prevent further expansion of this dangerous fuel storage infrastructure. You must additionally look for ways to indemnify the City against a potential disaster and strengthen the capacity for an adequate emergency response to a fossil fuel disaster by requiring the industries who are exposing us to this risk to take on more fiscal responsibility.

I thank you for your commitment and leadership during these challenging times. We must all exhibit the foresight and courage to do the right thing for the livability and sustainability of our region and the earth. Portland has been a leader in environmental and sustainability issues for a long time, and I thank you for continuing to stand for what is right—even when it is not easy.

Yours sincerely,
Evelyn P. Whitlock, M.D., M.P.H.

Evelyn P Whitlock

#331992 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

June 30, 2022 Portland City Council 1221 SW Fourth Avenue Portland, Oregon 97204 Submitted via Map App portal RE: Testimony in Support of Re-Adopting Fossil Fuel Terminal Zoning Amendments Dear Mayor Wheeler, Commissioners, and Staff: I am a retired public health and preventive medicine physician who has lived in Portland, Oregon for over 4 decades. I spent my career in research and evidence-based medicine, while raising my family here. I have dedicated time in retirement to working on climate health and justice through the Oregon Physicians for Social Responsibility and OHSU's Department of Family Medicine. Here, I offer testimony in strong support of the City Council's adoption of the Portland Fossil Fuel Terminal Zoning Amendments, and I request that you go even further to protect the health and safety of the people, animals, plants, and waterways that are threatened by the storage of flammable fuels in a seismically vulnerable area as follows: 1. Require retrofits to make existing storage safer. We now know now that the Critical Energy Infrastructure Hub area was not a good choice for storing highly flammable materials. And, as has been well documented, the storage facilities themselves are aging and largely not reinforced to withstand a significant earthquake. You must also require that fossil fuel terminal industries immediately retrofit their existing storage units as current capacity remains a huge environmental and civic risk. 2. Require companies profiting from these facilities to indemnify the City and invest in risk mitigation beyond seismic retrofits for existing storage tanks. The companies profiting from these facilities are not currently financially responsible should there be a catastrophic spill, explosion, fire, or toxic emission event. While I don't believe damages to our ecosystem (locally and downstream), nor the loss of individual and corporate assets, could ever be adequately reclaimed, repaired, or replaced with money, it would be egregious for the City and its taxpayers to bear any additional financial burdens associated with such a devastating loss event. The City should also require that these companies begin to mitigate risk associated with their businesses now by paying for enhancing the City's emergency preparedness preparation and resources. 3. Please don't be beguiled by the offer of more biofuels. The City's best strategy is to move as quickly as possible to 100% electrification for every industry possible. Any biofuel use must be seen as a temporary transition measure--as these put more carbon into the atmosphere, are flammable, and often are produced in ways that worsen our climate crisis. Any transitional biofuel storage must be required to be a replacement for fossil fuel storage and not in addition to it. The amendments, as offered, are a necessary first step and must be adopted without any further dilution to prevent further expansion of this dangerous fuel storage infrastructure. You must additionally look for ways to indemnify the City against a potential disaster and strengthen the capacity for an adequate emergency response to a

fossil fuel disaster by requiring the industries who are exposing us to this risk to take on more fiscal responsibility. I thank you for your commitment and leadership during these challenging times. We must all exhibit the foresight and courage to do the right thing for the livability and sustainability of our region and the earth. Portland has been a leader in environmental and sustainability issues for a long time, and I thank you for continuing to stand for what is right—even when it is not easy. Yours sincerely, Evelyn P. Whitlock, M.D., M.P.H.

Testimony is presented without formatting.

Therese Livella

#331993 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Dear council members, I urge you to develop very strong zoning laws for fossil fuel terminals and to require retrofits for existing terminals. In fact, this should extend to any industry that poses a serious threat to public health in the event of a catastrophic earthquake or other natural disaster. I might live in Washington but we all depend on our nations rivers. Please be a strong steward. Thanks for the work that you do.

Testimony is presented without formatting.

Dan Jaffee

#331994 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Dear City Council members and Mayor Wheeler: I am writing to comment on the proposed Fossil Fuel Terminal Zoning Amendments, to be considered at the June 30 Council meeting. These amendments are a necessary, first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. A recent report from Multnomah County and the City of Portland makes clear that Portland's fossil fuel storage hub poses catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments are a necessary step to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are also consonant with Portland's Climate Emergency resolution, Oregon's statewide planning goals, the Governor's executive order on the climate crisis, and recent state legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. The Council should hold the line, and not weaken the amendments in any way in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing the risk to our communities and watersheds from reckless expansion. Moreover, the Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. Finally, this should only be the beginning. Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits, and requiring the phaseout of fossil fuel storage in line with reducing demand. Renewable fuel, or biofuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well. The Council should set a firm policy agenda of 100% electrification, including banning methane gas hookups in all new residential construction, and a phase-out of existing gas connections (with incentives) in existing housing. The latest report from the International Energy Agency makes this point clear: to reach net zero emissions and a stable climate, transportation, heating, and industrial sectors must reach 100% electrification and cannot remain dependent on combustion. Deploying renewable fuels should serve this purpose in the interim, not hinder it. I appreciate your considering my comments. Sincerely,

Dan Jaffee

Testimony is presented without formatting.

Rory Cowal

#331995 | June 30, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

As the climate crisis intensifies and poses an increasing threat to our region, we must do everything possible to rapidly phase out fossil fuels and transition to renewable energy. These amendments are an important step towards that goal. The Portland City Council should strengthen the amendments to clarify potential loopholes, establish enforcement, protect the health of the land and water, and ensure the safety of our communities.

Testimony is presented without formatting.

Dena Turner
1122 SE 60th Avenue
Portland, OR 97215

June 23, 2022

Council Clerk
Fossil Fuel Terminal Testimony
1221 SW 4th Avenue, Room 130
Portland, OR 97204

To: Council Clerk

Subject: Fossil Fuel Terminal Zoning Amendments

I am submitting this letter in support of the proposed fossil fuel terminal zoning amendments.

The fossil fuel terminal zoning amendments are important public policy that are in line with Portland's Climate Emergency resolution, statewide goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from fossil fuel storage risks.

The Council should hold the line, and not weaken amendments in favor of the fossil fuel industry.

In addition, the Council should further strengthen amendments, clarifying loopholes, and establishing enforcement mechanisms, as well as strengthening renewable fuel storage reporting requirements in order that fossil fuel storage is not created under the pretense of being renewable.

It is vital for the future of our City, our State, and our public health that Council sets a policy goal of 100% electrification.

Thank you for consideration,



Dena Turner
1122 SE 60th Avenue
Portland, OR 97215
503-953-3109

Dena Turner

#331996 | July 1, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

See attached letter

Testimony is presented without formatting.

2146 NW Everett Street
Portland, OR 97210

Dear City Council:

I am writing regarding the Fossil Fuel Terminal zoning amendments.

I hope that the Council will commit to further action to prevent the potential catastrophe that our city faces due to the forecasted 9.0 earthquake in our region. The health of the Willamette and Columbia Rivers and Portland are in danger of spills, explosions, and toxic fumes.

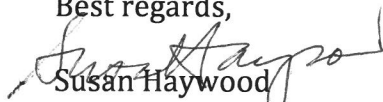
We must reinforce Portland's Climate Emergency resolution, statewide planning goals, and the Governor's executive order. Please hold the line and do not weaken the amendments in exchange for industry promises. There must be NO further fossil fuel storage expansion. The Council must identify potential loopholes and establish enforcement and safety mechanisms to give this legislation teeth.

As a NW resident, I would like the Council to commit to further action to prevent catastrophe in the fossil fuel hub. It feels very threatening to have degrading tanks so close to my home. Please mandate seismic retrofits and require the phase-out of fossil fuel storage as demand diminishes.

We must aim for 100% electrification using renewable energy. Combustible energy sources are just too risky in our area, and we see on the world stage how they are tied to war and political power plays.

Thank you for toughening the amendments for a greener Portland.

Best regards,


Susan Haywood
310-570-0824 (cell)

Susan Haywood

#331997 | July 1, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

See attached

Testimony is presented without formatting.

Jennifer Starkey

#331998 | July 1, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I'm gonna keep it short: we have to do everything possible at every scale to address the climate crisis, and limiting fossil fuel infrastructure in our region is critical. We are due for a GIANT earthquake. Fossil fuels stored in places with high risk soils that are prone to liquefaction, which seems like a recipe for catastrophic explosions, death, and widespread pollution. I urge city council to clarify and strengthen amendments and make it harder for corporations to manipulate and find loopholes. I urge city council to keep going and pushing our region toward 100% electrification and making it clear to industry that harm to our communities, watersheds, air, and land is not tolerated.

Testimony is presented without formatting.

Shawn Looney

#331999 | July 1, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I'm Shawn Looney. I've lived in Linnton for 23 years and I'm a former chair of the Linnton Neighborhood Association. Linnton is a Portland community that has the unique distinction of including upwards of 300 million gallons of combustible fuels, most of which are stored in old tanks. 91% of those tanks adhere to NO safety standards, having been constructed before 1993. As you might guess, I'm testifying in support of amendments banning new or expanded bulk fuel infrastructure. Most residents of Linnton understand the dangers of living near tank farms. We might even be a bit more prepared for our upcoming earthquake than other neighborhoods BECAUSE we live in an area ripe for a potential catastrophe. But we can only do so much. We have a river on one side of us and mountains on the other, with only one main ingress-egress through our community. We are depending on YOU to help protect us not only from the very real likelihood of an explosion or fire, but from the daily effects of poor air quality and the pollution caused by off-gassing of our fuel tanks and railroad cars. So, while the earthquake might take place after we die, the cancer-causing chemicals that we breathe daily might be our undoing. Please--set a policy agenda toward 100% electrification. It is truly the only safe course of action for the environment and for all living things, including your neighbors in Linnton.

Testimony is presented without formatting.

Katie Howard

#332000 | July 1, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I am writing in support of the Fossil Fuel Terminal Zoning Amendments. Portland and Oregon must move away from fossil (and biofuels) to create a liveable future for our children. I am the mother of a ten year old child. My child deserves to live in a future where nature, animal, and humans can thrive together. We should not prioritize short term gains that lead to long term loss. Allowing for the expansion of fossil fuel terminals makes a liveable future further out of reach than it already is. Portland must lead the way in creating a liveable future. We must stop investing in fossil fuel infrastructure. Fossil fuels poison our waters and increase the amount of carbon dioxide in the atmosphere. The time is now to stop wasting our resources on environmental devastation and start investing in moving towards a net zero infrastructure. By approving the Fossil Fuel Terminal Zoning Amendments, we can move closer to a liveable future. We must transition to sustainable power sources and 100% electrification of transportation and all other sectors. These amendments are an important step in the right direction. Thank you for taking the time to consider my testimony.

Testimony is presented without formatting.

Dena Turner

#332001 | July 1, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

These amendments are a necessary first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments are a necessary step to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure.

Testimony is presented without formatting.

Mark Leed

#332002 | July 2, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

As a resident of a neighboring community, I support Portland's Fossil Fuel Terminal Zoning Amendments. The amendments are a necessary first step toward preventing catastrophic impacts of the Cascadia subduction zone earthquake that will inevitably occur at some point. Stopping the expansion of infrastructure that stores, moves and processes toxic, flammable fossil fuels is crucial for protecting Portland and surrounding communities, and for protecting the Willamette and Columbia rivers. The amendments are important public policy that align with Portland's climate emergency resolution and Oregon's planning goals. Your ordinance has inspired other communities in the region to enact historic bans on new and expanded fossil fuel infrastructure. I encourage the city council to strengthen the rule, closing any potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Lastly, please don't weaken the amendments in exchange for industry promises, or allow any expansion of fossil fuel storage.

Testimony is presented without formatting.

Betsy Toll

#332003 | July 3, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Re: Fossil Fuel Terminal Zoning Amendments Dear Mayor and Council Members, I strongly urge your support of the proposed amendments to protect the city, the rivers, and the lives of our communities from the possibly devastating impacts that a major earthquake could impose on Portland's fossil fuel storage hub. Portland's leadership must stand firm against reckless, profit-driven proposals and pressure to expand dangerous fossil fuel infrastructure in the Portland the metro area. These plans would defeat the city's climate goals and increase risk for our children and families due to the escalating climate crisis. The dangers a major earthquake would pose, beyond a quake's rupture of our general infrastructure, would be multiplied times over by the volatility of additional fossil fuel storage here. Further, it is reasonable and prudent for Council to mandate seismic retrofits to upgrade safety of existing facilities, and beyond that, Council should set a clear policy agenda of 100% electrification. The latest report from the International Energy Agency is very clear that, to reach the net zero emissions that would help us maintain a stable climate, we cannot remain dependent on combustion fuels. Transportation, heating, and industrial sectors must reach 100% electrification to protect our children now and in the future. Portland's obligation and commitment to strong protections are more crucial by the day. With the SCOTUS's recent assault on EPA's authority and other reckless Biden administration actions, the risk is very high for increasing fossil fuel extraction across our country and many others. Let's lead in setting high bars that take climate danger, geologic instability, and our obligations to future generations seriously. Time is running out, and I urge you to rise to this moment when your actions can protect Portland and the planet.

Testimony is presented without formatting.

Dear Mayor Wheeler and City Commissioners,

Six years ago when the Portland Youth Climate Council (PYCC) testified in front of the city council in support of this resolution, it felt like an exciting step. *Six years ago*. And it is still not implemented. This is normally where we would say, “it’s disheartening how long this has taken” or “as youth, we are afraid for our future in the face of this inaction”, but after testifying time after time, we start to wonder if that means anything to you. It certainly hasn’t seemed to inspire meaningful action on your end.

The reality is, this is a small – but necessary – step we must take, especially considering the massive amounts of action we need to take to reach our city’s climate goals. As you consider this resolution again, it is extremely important to address our concerns about the inclusion of renewable fuel and the possibility of industry loopholes in the resolution.

Amendment #1 states, “adding storage tank capacity exclusively for renewable fuels or to comply with Renewable Fuel Standard is not considered an increase in capacity”. Because there is no requirement for reporting on how fuel storage facilities are used, industry has the ability to expand their facilities for biofuel, and then continue to use them for fossil fuels. Additionally, renewable fuels burn just as readily as fossil fuels, so increasing the amount brought through the city would increase the risk for combustion accidents.

Renewable fuels have long been considered “bridge fuels” but - as PYCC said six years ago when the resolution was first introduced - we cannot rely on bridge fuels to accomplish the necessary carbon reduction to preserve a livable planet. With a continued reliance on renewable fuels, we still have to deal with carbon emissions and exposure to dangerous fuels that could cause devastating damage in the case of an earthquake or otherwise-caused accident.

The city must reconsider allowance of renewable fuel and eliminate any loopholes for industry to expand their storage capacity. While the city may be afraid of lawsuits, being tied up in legal proceedings seems like a small price to pay when the alternative is risk to the health of people in Portland who would be affected by a fuel accident, and people all over the world facing the ever increasing realities of the climate crisis.

I think our support for this resolution is clear at this point, but we need it to be as strong as possible when it is finally implemented.

Best,
The Portland Youth Climate Council

Ella Shriner

#332004 | July 5, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

See attached pdf

Testimony is presented without formatting.

Karen Jacobson

#332005 | July 5, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I urge you to vote for the Fossil Fuel Terminal Zoning Amendments Ordinance to protect our city, rivers and communities as well as prevent further climate damage. These amendments are a necessary step to protect the health of our communities as well as the Willamette and Columbia rivers, especially in the case of a catastrophic earthquake. In addition, these amendments are important public policy. They are in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis. They will send an important message to our youth that Portland leaders care about their best interest and future over the profits of the fossil fuel industry.

Testimony is presented without formatting.

Dianne Ensign

#332006 | July 6, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

These amendments are a necessary first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. These amendments help protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. They are in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on climate chaos, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. The Portland City Council should not weaken the amendments in exchange for industry promises, or allow any expansion of fossil fuel storage. Fossil fuel terminal owners should retrofit their facilities to better withstand earthquake risk, but not in exchange for being allowed to further increase the risks to our communities and watersheds from reckless fossil fuel infrastructure expansion. The Council should strengthen the rule, closing potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables.

Testimony is presented without formatting.

Portland Fossil Fuel Terminal Zoning Amendments

Link to article: <https://stillwaterassociates.com/portland-fossil-fuel-terminal-zoning-amendments/>

The Portland City Council voted to adopt Fossil Fuel Terminal Zoning Amendments on December 18, 2019. These Amendments prohibit the development of new fossil fuel storage tanks citywide and prohibit the expansion of tank capacity at existing bulk fossil fuel terminals. Under the zoning amendments, although the existing bulk fossil fuel terminals in Portland are “limited uses” that can continue to operate, no new bulk fossil fuel terminals are allowed. This ordinance was subsequently appealed to the Land Use Board of Appeal (LUBA) by the Western States Petroleum Association, Portland Business Alliance, Oregon Business & Industry, Working Waterfront Coalition, and Columbia Pacific Building Trades Council.

LUBA found the Amendments as adopted did not comply with land use laws and remanded the case back to the City Council. The City’s Bureau of Planning and Sustainability has largely proposed that the Council readopt the same amendments that LUBA remanded, but with additional findings and analysis for the City Council to consider. [The Council will hold a public hearing on June 30 to hear testimony on the Amendments and findings and subsequently vote on the ordinance](https://www.portland.gov/tps/planning/fossil-fuel-zoning/about-fossil-fuel-terminal-project) (<https://www.portland.gov/tps/planning/fossil-fuel-zoning/about-fossil-fuel-terminal-project>). These changes will apply to ten petroleum terminals and one LNG terminal in the Portland area.

The zoning amendments restricting tank capacity citywide and at improvements to these terminals will have material impacts on petroleum and renewable fuels supplied throughout the Pacific Northwest, particularly at a time when this supply is in the process of transitioning to lower carbon sources. To better understand these impacts, let’s first describe how fuel is distributed in the Northwest.

PNW Fuel Supply Basics

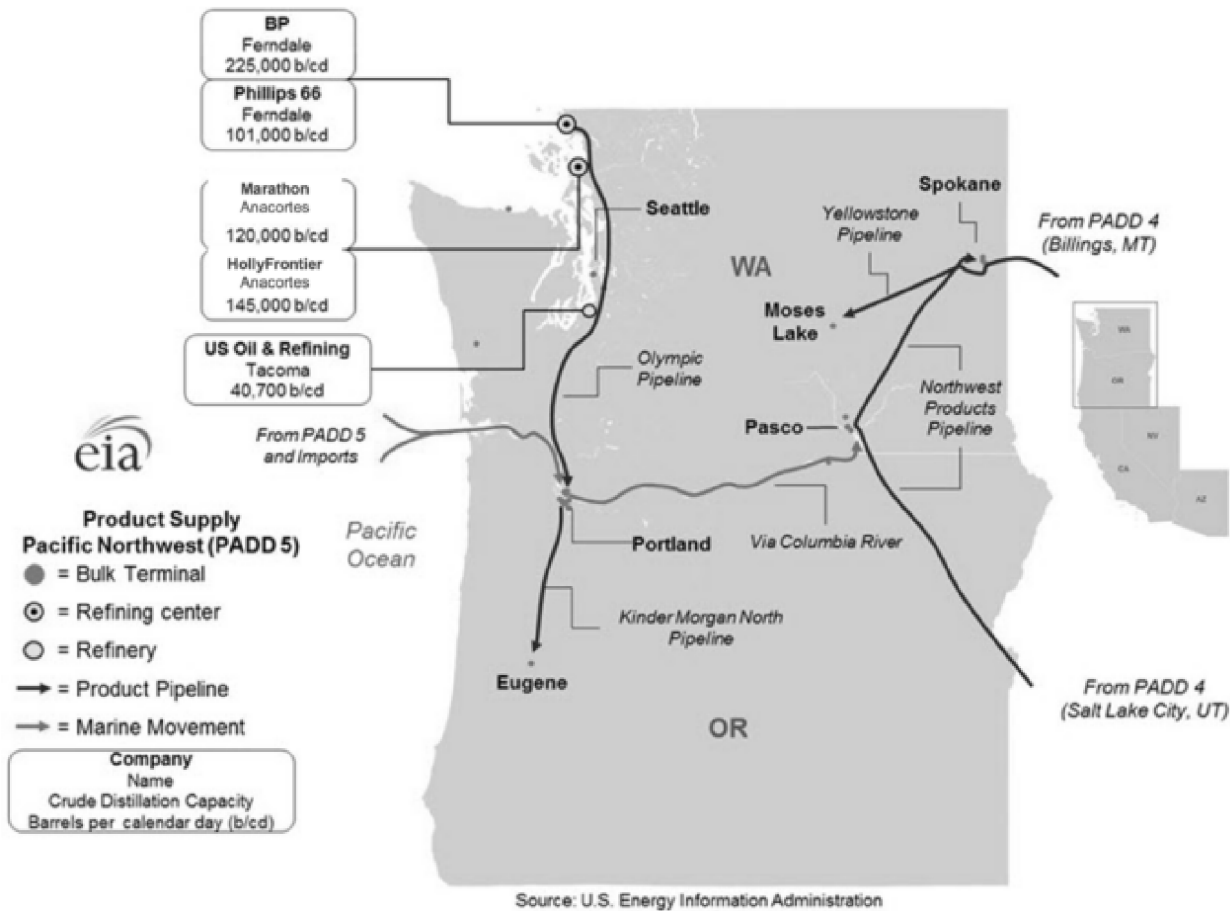
[The five refineries in Washington state have a combined crude distillation capacity of 649.7 kbd](https://www.eia.gov/petroleum/refinerycapacity/archive/2022/table1.pdf) (<https://www.eia.gov/petroleum/refinerycapacity/archive/2022/table1.pdf>) and produce about as much gasoline as is needed to meet current demand in Washington and Oregon. [According to the U.S. Energy](#)

Information Administration, the Washington state refineries also produce more than enough diesel and jet fuel to meet demand in the Pacific Northwest

(https://www.eia.gov/analysis/transportationfuels/padd5/pdf/transportation_fuels.pdf). Excess production from Washington refineries is exported to the global market and supplied to other regions within PADD 5.

Refined petroleum products are shipped from the Puget Sound refineries via the Olympic pipeline to supply the western regions of Washington and Oregon. The Olympic pipeline runs south from the Puget Sound refining centers to Seattle, WA, and Portland, OR. Product is shipped by marine vessel from the Puget Sound to supply global markets and other regions within PADD 5. Jet fuel is supplied via pipeline to Seattle-area airports, including Sea-Tac International Airport, and south to Portland International Airport. Volumes produced by Puget Sound refineries also supply the local southwest Washington region through terminals in the Port of Vancouver.

Just like in Oregon, there are no pipelines crossing the Cascade Mountain range in Washington. The only connection between the western and eastern regions of the state is marine transport along the Columbia River, between Olympic pipeline terminals on the west side of the mountains, and primarily Pasco, Washington, to the east. Eastern Washington and Oregon are supplied from terminals in Spokane and Pasco, which store products from PADD 4 refineries in Salt Lake City, Utah, and Billings, Montana. Refined products supplied from Billings are delivered to terminals near Spokane via the Yellowstone pipeline and then delivered to Pasco terminals via the Pasco-Spokane pipeline. Refined products supplied from Salt Lake City are delivered to Pasco terminals via the Boise-Pasco pipeline. Products also flow up the Pasco-Spokane pipeline supplying eastern Washington and Idaho, as shown in the figure below. (https://www.eia.gov/analysis/transportationfuels/padd5/pdf/transportation_fuels.pdf)



It is important to note that in order to overcome the geographic boundary of the Cascade Mountain range, products can be delivered from the Olympic pipeline by loading ships or barges at the Portland terminals and shipping up the Columbia River to Pasco terminals. From there, they can be delivered by trucks to retail sites. In addition, some of those products can be shipped via the Pasco-Spokane pipeline farther north to Spokane where, again, they are delivered by trucks to retail sites. Trucks from these two areas deliver products into eastern Washington and Oregon, as well as Idaho.

Expected Changes in Product Demand

The existing Oregon Clean Fuels Program (CFP) and developing Washington Clean Fuel Standard (CFS), combined with other greenhouse gas reduction initiatives, will transform the transportation fuels used in the Pacific Northwest over the next two decades. After sales of electric vehicles (EVs) and the necessary fueling structure are increased, we suspect demand for gasoline will peak and then decline. EVs will not displace demand for diesel fuel as quickly because the technology is not as amenable for heavy-duty demand, so demand for diesel will continue to increase if the economy continues to grow. However, the diesel pool can be significantly decarbonized by displacing diesel with renewable diesel (RD) and biodiesel (BD). In fact, with the large increase in RD production capacity coming online in the next two years, renewable fuels volumes could increase dramatically and quickly.

Since BD and RD have less energy per volume than diesel, and diesel demand is expected to increase while gasoline demand may stagnate for a couple of years due to the time required to begin turning over the light-duty fleet, fuel demand is very likely to increase somewhat in the short term. In addition, the transition from diesel to RD and BD potentially increases the need for terminal infrastructure in Portland for two reasons:

1. Delivery mode will likely change from the Olympic pipeline from Washington refiners to ship and rail from various RD production sites, and
2. Some degree of segregation between BD, RD, and diesel is required.

Expected growth in fuel volume, changes in delivery mode, and increased need for segregation all indicate an increased need for product terminal capabilities in Portland.

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Categories: [Uncategorized \(https://stillwaterassociates.com/category/uncategorized/\)](https://stillwaterassociates.com/category/uncategorized/)



Fueling the future of transportation energy with trusted industry experience

Stillwater Associates was formed in 1998 with the objective of providing services to clients with needs in mid-to-downstream transportation fuels markets. Our associates leverage decades of work at major oil companies to help clients navigate challenges with the highest level of industry knowledge, strategic thinking, operational expertise, market analysis, commercial optimization, policy insight, litigation support, and emerging technology strategies. Our clients include government agencies, petroleum and renewable fuels companies, trade associations, technology developers, private equity firms and law firms. Our Associates have lived in operations and executive roles – we understand the opportunities and pitfalls.

Our experience runs deep.

Our mission is to:

- Operate at the transition of petroleum and renewable transportation fuels.
- Create value for our clients by providing exceptional planning, analytic, and operating skills and leveraging our global network of transportation fuels industry contacts.
- Provide clients with the knowledge and tools to make good decisions with our collaborative style and insightful analysis.
- **Be nimble, succinct, and innovative, blending our talents and backgrounds, and pulling in resources to create new transportation fuels market opportunities.**

We see things others miss.

Our Leadership and Staff (<https://stillwaterassociates.com/about-us/leadership-and-staff/>)

Our Associates (<https://stillwaterassociates.com/about-us/our-associates/>)



Advising Lawmakers and Testing Policy

The transportation energy industry is complicated, and so are the policies that regulate the industry. We help policy makers understand how the business works and how the regulations they develop affect the supply, demand, distribution and price of energy. We apply our years of industry experience and our rich network of contacts to test and analyze developing policy. Stillwater Associates works to bring the energy industry and regulators together to develop effective energy policy.

Federal Policy Experts

Stillwater advises clients on Federal regulations like the Renewable Fuels Standard (RFS) and Clean Air Act (CAA). From the carbon intensity of crude oil to vehicle tailpipe emissions, these sets of regulations govern the way transportation fuels are refined, blended, and sold.

Under the RFS, gasoline and diesel importers, refiners, and marketers are obligated to blend renewable fuels with their product at a percentage set by the EPA. We are authorities on the RFS and have studied and consulted on all aspects of the standard including the compliance market and the credits used to meet compliance, Renewable Identification Numbers (RINs), available renewable fuel volume, cellulosic technology market readiness, the ethanol blendwall, and the Point of Obligation.

Under the CAA, all stakeholders in the transportation fuels industry are required to meet air quality emissions standards. These standards are variable by geographic location and are different for summer and winter blends. We are experts in air quality compliance areas and the market effects of seasonal gasoline blend transition.

California Regulatory Specialists

California leads the nation in clean air and climate change policy. California's smog reduction efforts have led to the most stringent air quality laws in the country. The enactment of AB32, the California Global Warming Solutions Act, launched the Low Carbon Fuel Standard (LCFS) and the Cap and Trade programs. These programs, administered by the Air Resources Board (ARB), are the models for greenhouse gas (GHG) reduction efforts around the country. Stillwater is a leading expert in California air quality and GHG reduction regulations. We have studied the development of the LCFS and Cap and Trade programs from their inception and consult on behalf of regulated parties and policy makers.

Once the LCFS was under way, we saw the need for regulated parties and policy makers to receive regular data and analysis on the credit market and the evolution of the LCFS. In 2015, we launched Stillwater Publications to host our [Stillwater LCFS Newsletter \(https://www.stillwaterpublications.com/\)](https://www.stillwaterpublications.com/), a subscription service dedicated to delivering our unique analysis of the California LCFS and LCFS-style standards under development around the country.

[STILLWATER PUBLICATIONS \(HTTPS://WWW.STILLWATERPUBLICATIONS.COM/\)](https://www.stillwaterpublications.com/)

Our experience runs deep

We understand these regulations and their impact on the transportation fuels market. Stillwater provides our industry clients with effective strategies to navigate the changing regulatory landscape. We provide our regulatory clients the transportation fuels expertise they need to create good policies.

Please [contact us \(http://stillwatdev.wpengine.com/contact/\)](http://stillwatdev.wpengine.com/contact/) to learn more about our policy services.

[CONTACT STILLWATER \(/CONTACT/\)](#)

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[How to Think About Climate Change in 1500 Words \(https://stillwaterassociates.com/how-to-think-about-climate-change-in-1500-words/\)](https://stillwaterassociates.com/how-to-think-about-climate-change-in-1500-words/)

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[Possible Market Implications of California's Efforts to Ban Internal Combustion Engines \(https://stillwaterassociates.com/possible-market-implications-of-californias-efforts-to-ban-internal-combustion-engines/\)](https://stillwaterassociates.com/possible-market-implications-of-californias-efforts-to-ban-internal-combustion-engines/)

- May 31, 2022 In accordance with California Governor Gavin Newsom's Zero-Emission By 2035 Executive Order, the California Air Resources Board...

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[Electric Vehicles: How California is helping to reduce petroleum demand in the face of the Ukraine conflict \(https://stillwaterassociates.com/electric-vehicles-how-california-is-helping-to-reduce-petroleum-demand-in-the-face-of-the-ukraine-conflict/\)](https://stillwaterassociates.com/electric-vehicles-how-california-is-helping-to-reduce-petroleum-demand-in-the-face-of-the-ukraine-conflict/)

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David Hackett —

Chairman of the Board

David Hackett has been a participant in all the recent developments in the transportation fuels industry. Leveraging a Supply and Trading background at Mobil, Dave started Stillwater Associates in 1998. Since then, Stillwater's work on issues like the MTBE phase out, gasoline price controls, corn ethanol distribution, biodiesel production, next generation renewable fuels implementation, price gouging, fuels infrastructure constraints, mergers and acquisitions, interstate commerce, petroleum logistics, and refining technology have helped to make the firm a leading force in the transportation fuels space.

With more than 30 years of experience in the downstream oil business, Dave has built a team of industry professionals who are skilled at creating value for our clients.

A frequent speaker, Dave has made presentations for American Fuel & Petrochemical Manufacturers (AFPM), the California Energy Commission, the Pacific Oil Conference, the California Independent Oil Marketers Association, the Society of Gasoline Marketers of America, and the Ohio Oil & Convenience Store Marketers Association.

Valued for his downstream transportation fuel business expertise, Dave is often asked to share his knowledge with policy groups. Dave is an Executive Fellow at the University of Calgary School of Public Policy. He is also a member of the California Energy Commission's Petroleum Market Advisory Committee (PMAC).

Policy makers and legal firms regularly seek out Dave's expertise on supply and logistics issues. He has testified before the U.S. Congress regarding gasoline pricing. Dave has also advised on and provided expert testimony for litigation in this space.

Dave is often asked to comment on current energy issues to the press. He has been interviewed by American Public Media, NBC, CBS, the Wall Street Journal, the Los Angeles Times, the Orange County Register, the San Diego Union Tribune, the Sacramento Bee, and the Honolulu Advertiser, among others.

Dave received his BS in Oceanography from the US Naval Academy in 1971. He earned a Masters in Education from California Lutheran University in 1975 and an MBA from the University of California, Irvine in 1997.

Christopher West

#332007 | July 6, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

The attached document from Stillwater Associates and information about the firm is submitted on behalf of Pac/West Communications clients to the City's formal record regarding the FFT Zoning Amendments, Ordinance.

Testimony is presented without formatting.

MEGAN C. BLANKSMA
DISTRICT 23
ELMORE, OWYHEE
& TWIN FALLS COUNTIES



HOME ADDRESS
595 SOUTH THACKER ROAD
HAMMETT, IDAHO 83627
(208) 366-7976
EMAIL: mblanksma@house.idaho.gov

House of Representatives State of Idaho

MAJORITY CAUCUS CHAIRMAN

July 6, 2022

Mayor Wheeler and Portland City Council
City Hall
1221 SW 4th Avenue
Portland, Oregon 97204

Re: Harmful Impacts of Portland Fossil Fuel Terminal Ordinance on Idaho Families & Businesses

Dear Mayor Wheeler and City Council Members:

I am a proud Representative for Idaho's 23rd District and Majority Caucus Chair and a resident of the Hammett valley where my family has lived and farmed for over 20 years. Both in my role serving the interests of my constituents and in my role nurturing our family-business, I am very familiar with the critical role affordable and reliable energy plays in lifting communities and businesses. I am writing you today to express my grave concern about the City of Portland's proposed Fossil Fuel Terminal Ordinance ("FFTO").

For many communities throughout our states, access to reliable fuel supplies at a reasonable price is a challenge and one that agribusiness communities are all too familiar with. Let me paint a picture for you. We have no refineries in Idaho, so we must import our fuels - sometimes over mountain ranges and harsh weather conditions that create delays and supply concerns. Any disruption to the already critical supply chain, like a ban on new and expanded fossil fuel terminals in Portland will have consequences on hard-working communities in both our states.

At a time when our state is growing at a faster rate than any other state in the country – increasing the demand for energy supply year after year --this proposed ordinance is another example of a concerning trend to restrict new and expanded fuel infrastructure. The cities of Spokane, Tacoma, and Vancouver, have all passed or are considering similar plans, each of which could create harmful impacts in many downstream communities, businesses, and families, like those in my District.

As our entire nation is feeling the crippling burdens of gas prices and inflation, please consider your neighbors. I implore you not to pass the FFTO.

Sincerely,

A handwritten signature in cursive script that reads "Megan C. Blanksma".

Representative Megan Blanksma
Idaho's 23rd District

Megan Blanksma

#332008 | July 6, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

See Attached

Testimony is presented without formatting.

Fossil Fuel Facilities Proposed Code Changes

VANCOUVER
CITY HALL

CITY OF
Vancouver
WASHINGTON

July 12, 2022

Planning Commission Workshop

Chad Eiken, CDD Director

Bryan Snodgrass, Principal Planner, CDD

Lisa Grueter and Jason Hennessy, BERK Consulting

Presentation Overview

- Fossil Fuel Moratorium Background
- Council Direction and Prior PC Review
- Overview of Fossil Fuel Sector – BERK Consulting
- Proposed Changes to VMC 20 VMC, Land Use and Development Code
- Proposed Next Steps
- Discussion

Fossil Fuel Facility Moratorium Background

- Enacted June 2020, most recently extended on June 6, 2022; set to expire November 6, 2022, unless extended
- Moratorium applies to new or expanded large-scale fossil fuel facilities engaged in:
 - Distribution, extraction, refinement, processing, transshipment and bulk storage (over 2 million gallons) of fossil fuels used for energy production
 - Includes coal, petroleum, natural gases (methane, propane, butane, etc.)
 - Does not apply to storage or use of petroleum for commercial sales or industrial processes (e.g. fertilizer or plastics manufacturing, asphalt plants, etc.), or maintenance or repair of existing facilities

Prior Council Direction

In order to promote public safety and environmental protection and implement climate-friendly policies, amend Title 20 VMC to:

- Prohibit new large-scale fossil fuel facilities in all zoning districts
- Provide definitions for regulated fossil fuels and large-scale facilities consistent with moratorium
- Consider whether expansion of existing large-scale fossil fuel facilities should be allowed and, if so, what standards should apply
- Desire for regulations to be as simple as possible

Prior Planning Commission Review

Planning Commission workshops held on:

- May 25, 2021
- July 27, 2021
- March 8, 2022

Introducing BERK Consulting

- BERK is an interdisciplinary consultancy integrating strategy, planning, and policy development; financial and economic analysis; and facilitation, design, and communications.
- BERK assisted Whatcom County and City of Tacoma in developing their fossil fuel use regulations
- Lisa Grueter, Principal, brings land use planning expertise including SEPA and code development
- Jason Hennessey, Senior Associate, brings expertise in financial policy analysis



Statewide Context

Oil Movement and Infrastructure in WA State

- Eastern WA has no refineries and is supplied by pipelines from Utah
- Western WA is primarily supplied by the state's five refineries or from marine tanker deliveries from other domestic and foreign sources.
- The state's refineries are supplied with crude oil by pipeline, rail, and marine vessels.
 - By marine: Alaska
 - By pipeline: Canada
 - By train: North Dakota, Wyoming, Canada
- In recent years, several proposed new oil facilities have been pursued and subsequently abandoned in Vancouver, Grays Harbor, and Anacortes in the face of public opposition.

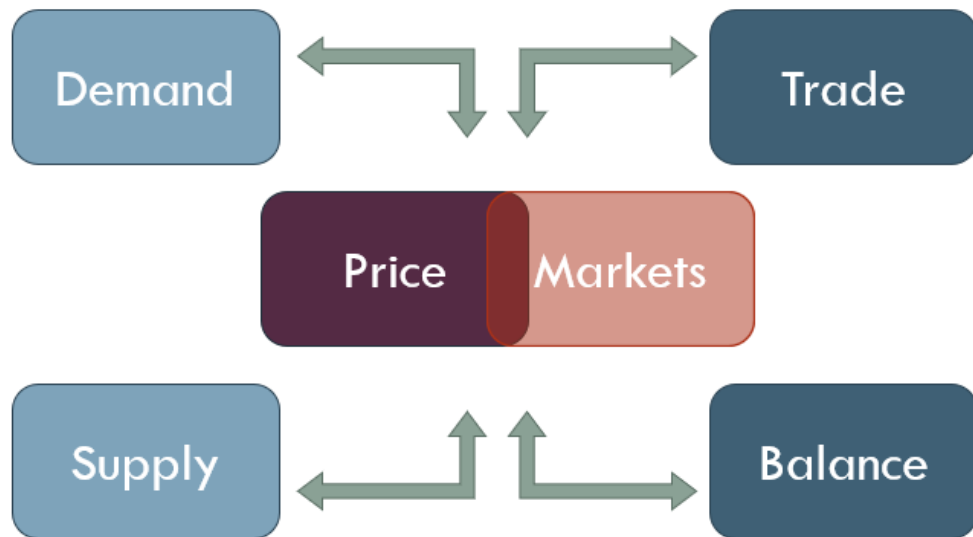


Note: The refinery located in Aberdeen is a biodiesel plant and not a petroleum refinery
Source: Department of Ecology, 2019.

Fossil Fuel Prices

Drivers

- **Demand:** Clear seasonal patterns
- **Supply:** The number of refineries has decreased in the U.S.
- **Markets:** Costs reflect both current demand and *expectations of future demand*
- **Trade:** The U.S. both imports and exports crude oil
- **Balance:** Refineries anticipate demand



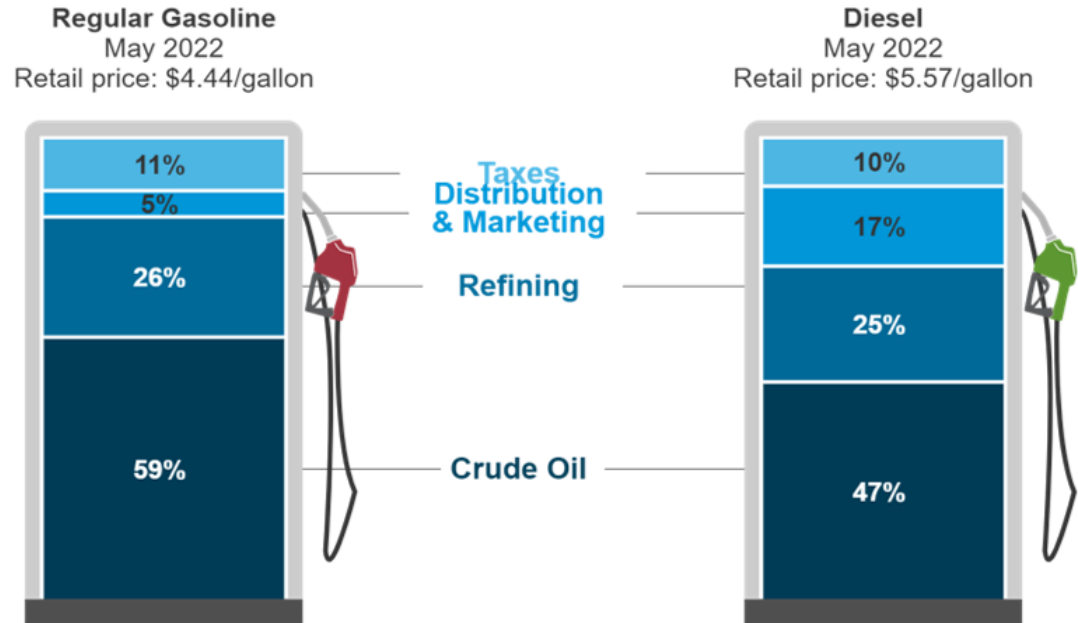
Source: BERK, 2022, Adapted from: U.S. Energy Information Administration (EIA), "What Drives Petroleum Product Prices," 2022.



Prices

What Makes Up Fuel Cost?

- Average May 2022 U.S. Costs
- Crude oil is the primary cost
- Taxes are collected at the local and Federal level
 - Washington's gas taxes are approximately 140% the U.S. average (4th highest)

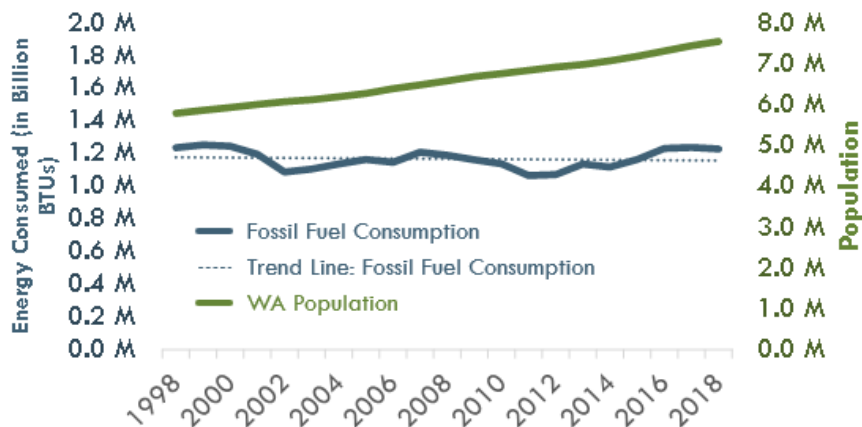


Source: U.S. Energy Information Administration (EIA), "[Gasoline and Diesel Fuel Update](#)," May 2022.

Statewide Context

Energy Use and Population Growth

- The Federal EIA projects a 6% increase in U.S. petroleum consumption from 2019-2050
- Washington State population is projected to grow by 30% over the same period
- On going per capita use decreasing over time



Expected Cost Effects of Code

- Supply could only be directly affected by additional refineries
 - Additional refineries are not expected because of overall expectations around petroleum consumption despite current high costs
- Restricting storage capacity could increase consumer fuel costs from additional transportation
- Any effects are expected to be relatively minor compared to global and national trends

Proposed Fossil Fuel Code Changes (VMC Title 20)

High Level Summary:

- New bulk fossil fuel storage and handling facilities, including oil, gas or coal storage or transshipment, would be prohibited
- Existing bulk facilities could be maintained and upgraded
- Existing facilities could be expanded slightly if converted to cleaner fuel and brought up to seismic standards, by conditional use permit
- 'Cleaner fuels' would be specifically defined
- Small fossil fuel storage and handling, intended for local markets, would be allowed by conditional use subject to new standards
- Coal and other solid fuel storage yards, and coal-fired electricity generating facilities would be prohibited

Proposed Fossil Fuel Code Changes (VMC Title 20)

Create three new land use categories:

1. “Bulk Fossil Fuel Storage and Handling Facilities” to include a range of liquid and solid petroleum products including coal, natural gases (e.g., methane, propane, and butane); would not include certain products derived from fossil fuels (e.g., plastics, fertilizer, asphalt, etc.)
2. “Cleaner Fuel Storage and Handling Facilities”: conversion of bulk fuel facility to liquid or gaseous fuels that have low or no emissions
3. “Small Fossil Fuel Storage and Distribution Facilities” include fuel storage tanks with cumulative storage of 60,000 gallons or less, for either local distribution to customers or accessory to support an onsite commercial, industrial, etc. use

Proposed Fossil Fuel Code Changes (VMC Title 20)

Bulk Fossil Fuel Storage and Handling

- Prohibit any *new* bulk fossil fuel storage and handling facility in all zoning districts, regardless of size
- Allow for maintenance and upgrades to existing facilities
- Allow for conversion of bulk facilities to cleaner fuels and possible minor expansion of capacity as “Cleaner Fuel Storage and Handling Use”

Proposed Fossil Fuel Code Changes (VMC Title 20)

Cleaner Fuels

Define as liquid or gaseous fuels produced from renewable sources that are low or no emissions, including:

- Carbon-free fuels that generate no carbon emissions including green hydrogen
- Any credit-generating fuel under WA State Low Carbon Fuel Standard
- Any biomass renewable fuels approved by federal Environmental Protection Agency
- Alcohol fuels meeting the requirements of RCW 19.112.010(1)
- Biodiesel fuels meeting the requirements of RCW 19.112.010(1)
- E85 (high-level ethanol) motor fuel meeting the requirements of RCW 19.112.010(1)
- Alternative fuels exclusively for propulsion of motor vehicles meeting RCW 19.112.010(1)

Proposed Fossil Fuel Code Changes (VMC Title 20)

Cleaner Fuels Storage and Handling Uses

- Prohibit construction of *new* facilities in all districts
- Allow conversion only of existing bulk fossil fuel facilities to cleaner fuels in the IH Heavy Industrial District as a limited use, subject to:
 1. Documenting conversion (type of fuel, date converted)
 2. Placing requirement that converted facility may not return to bulk fossil fuel storage and handling
 3. Approval of comprehensive spill prevention and fire response plans
- Allow such converted facilities to expand by up to 15%, subject to CUP and new development standards including seismic upgrades, spill and fire plans

Proposed Fossil Fuel Code Changes (VMC Title 20)

Small Fossil Fuel Storage and Distribution Facilities

- Allow in the IH Heavy Industrial District subject to:
 - Conditional use permit
 - Compliance with building standards related to seismic stability
 - Documentation of proposed fuels
 - Comprehensive spill containment and fire response plans
- Prohibit small fossil fuel storage and distribution in all other zoning districts

Proposed Fossil Fuel Code Changes (VMC Title 20)

Add new Special Use Standards at VMC 20.895.110

- Purpose: environmental protection; minimize impacts from fire or explosion; support transition to cleaner, renewable fuels
- Apply to all three new fuel-related use classifications
- Non-capacity improvements (maintenance, structural upgrades, etc.) to existing facilities must document baseline capacity
- Small Fossil Fuel or Cleaner Fuel Storage and Distribution Facilities must document baseline capacity, comply with seismic upgrades, and obtain approval of spill prevention and fire response plans

Proposed Fossil Fuel Code Changes (VMC Title 20)

Special Use Standards at VMC 20.895.110 (Continued)

- Conversion of existing Bulk Fossil Fuel Storage and Handling Facilities to Cleaner Fuels Storage and Handling Facilities must have an approved spill prevention and fire response plan, and once converted, may not later be used to store or transship petroleum-based fossil fuels
- Expansion of such converted facilities is allowed by up to 15%, subject to the above restrictions, plus seismic upgrades to existing facilities, a greenhouse gas assessment, proof of financial assurance in case of accidents, and an annual reporting requirement

Proposed Fossil Fuel Code Changes (VMC Title 20)

Other Code “Clean-up” Amendments

- Delete solid fuel (e.g., coal) storage yards from Industrial Services land use description
- Delete reference to coal-fired electricity generation facility as an example of major utility facilities
- Delete use category “bulk crude storage” to be replaced by bulk fossil fuel storage and handling facilities

Stakeholder Outreach To-Date

- Port of Vancouver and NuStar (tenant)
- Western States Petroleum Association (WSPA)
- Tidewater
- SW Washington Beyond Fossil Fuel Task Force
- Columbia Riverkeeper
- Washington Environmental Council
- Friends of the Gorge
- Physicians for Social Responsibility
- NW Natural

Proposed Next Steps

- July 13-31: Additional Stakeholder Outreach and SEPA Determination Issuance
- August 1: City Council Workshop (scheduled)
- September 13: Planning Commission Hearing (tentative)
- October 4: City Council Public Hearing (tentative)
- November 5: Ordinance takes Effect
- November 8: Moratorium Expires

Questions and Discussion

VANCOUVER
CITY HALL

Chad Eiken, Director of Community Development

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Bryan Snodgrass, Principal Planner

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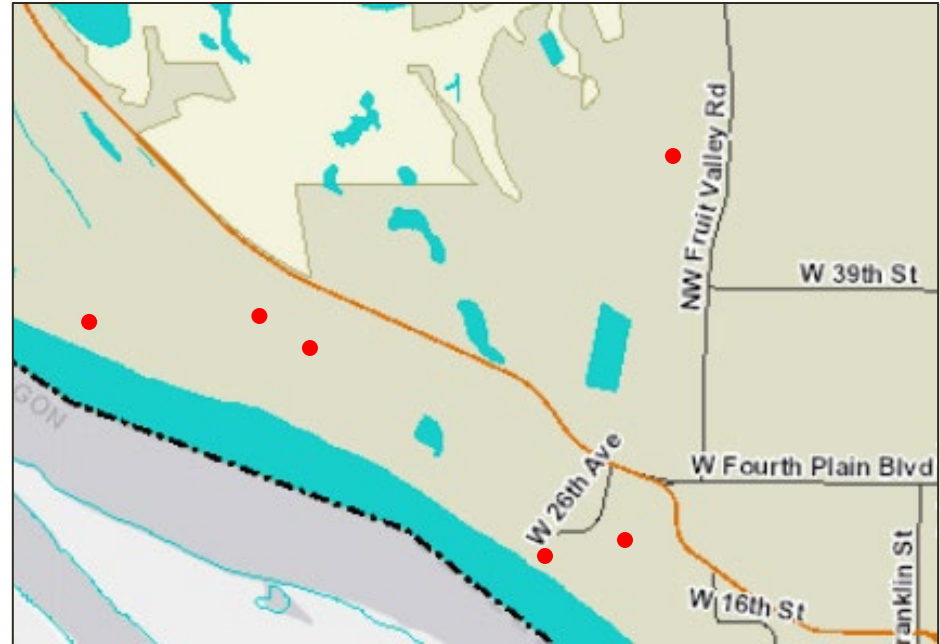
CITY OF
Vancouver
WASHINGTON

Fossil Fuel Facility Code Changes - 23

Slides Held in Reserve

Fossil Fuel Code Changes– Impacted Facilities

- 6 existing facilities identified, on lands with moderate to high liquefaction susceptibility in the event of an earthquake
- The facilities generally process, store, or transport propane, natural gas, and petroleum products



Fossil Fuel Code Changes– Impacted Facilities

Tidewater Barge Lines (Class 1)

- 1.3 M gallons tanks storing diesel fuel
- Miscellaneous fueling stations and tanks with lube oil, gasoline, diesel, and used oil totaling less than 20K gal



Fossil Fuel Code Changes– Impacted Facilities

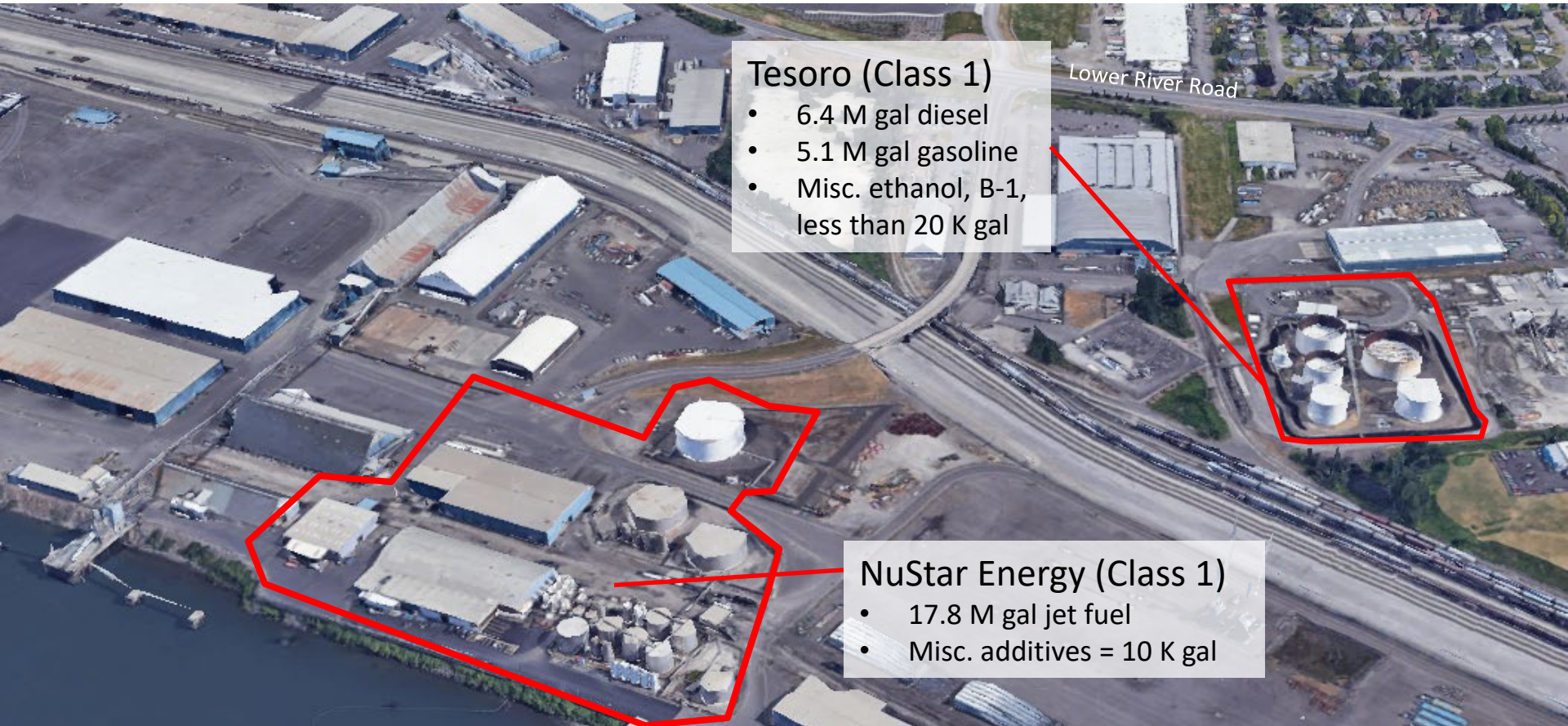


CPU River Road
Generation Plant

Tristar Fuel
Transfer Facility

NGL Energy
Partners

Fossil Fuel Code Changes– Impacted Facilities



Tesoro (Class 1)

- 6.4 M gal diesel
- 5.1 M gal gasoline
- Misc. ethanol, B-1, less than 20 K gal

NuStar Energy (Class 1)

- 17.8 M gal jet fuel
- Misc. additives = 10 K gal

Fossil Fuel Code Changes– Impacted Facilities

Trillium CNG (also referred to as NuStar Annex)
Fruit Valley Rd.
Compressed Natural Gas Facility



Proposed Fossil Fuel Use Related Code Changes – Planning Commission Version Revised July 5, 2022

Editor's Note: Text to be deleted is indicated with ~~strike-throughs~~, and new text is indicated with underlines. For purposes of brevity, this exhibit includes excerpts only of Title 20 VMC chapters proposed to be modified. For example, definitions of terms and development standards of each district which are not proposed to be modified are not shown. Also, there is no significance to the different colors of text, which will be fixed in a final version.

Chapter 20.150 DEFINITIONS

~~*Bulk Crude Storage.* Bulk crude storage and handling facility, means any structure, group of structures, equipment, or device that stores or transfers any naturally occurring liquid petroleum extracted from geological formations beneath the earth's surface which requires further refinement before consumer use, including but not limited to; conventional crude oil, extra heavy oil, and bitumen. The term does not include facilities that store and handle finished products derived from petroleum including but not limited to asphalt.~~

Cleaner Fuels. Liquid or gaseous fuels produced from renewable sources or that have low or no emissions, including the following:

- A. Carbon-free fuels that generate no carbon emissions including green hydrogen.
 - B. Any credit generating fuel under the Washington State Low Carbon Fuel Standard (HB 1091 2021-2022) as determined by the Washington State Department of Ecology.
 - C. Any biomass renewable fuels approved by the federal Environmental Protection Agency under the federal Renewable Fuel Standard (40 CFR Part 80).
 - D. Alcohol fuels meeting the requirements of RCW 19.112.010(1) as that statute exists or may hereafter be amended.
 - E. Biodiesel fuel meeting the requirements of RCW 19.112.010(3), and Renewable Diesel meeting the requirements of RCW 19.112.010(9), as those statutes exist or may hereafter be amended.
-

F. E85 motor fuel which meets the requirements of RCW 19.112.010(2) exclusively for the propulsion of motor vehicles upon the roads, or RCW 19.112.010(6) for other motors, as those statutes exists or may hereafter be amended.

G. Alternative fuels exclusively for the propulsion of motor vehicles upon the roads, which fuels meet the requirements of RCW 19.112.010(2) as that statute exists or may hereafter be amended. Provided that the restrictions on petroleum including in gaseous form, and petroleum fuel facilities, shall apply to such Alternative fuels and all references to hydrogen in this chapter are limited to green hydrogen.

Petroleum. Crude oil, gases (including natural gas), natural gasoline, and other related hydrocarbons, oil shale, and the products of any of such resources.

Utility Facilities, Major. Those facilities which have a substantial public impact, including but not limited to:

1. Administrative offices and operation centers;
2. Sewage treatment plants and lagoons;
3. Electric generation facilities including biomass and coal energy generating facilities; and
4. Essential public facilities as defined in Chapter 20.855 VMC, Essential Public Facilities.



Chapter 20.160

USE CLASSIFICATIONS

C. *Commercial use types.*

5. *Motor Vehicle Related.*

- a. *Motor Vehicle Sales/Rental.* Includes car, light and heavy truck, mobile home, boat and recreational vehicle sales, rental and service.
 - b. *Motor Vehicle Servicing/Repair.* Free-standing vehicle servicing and repair establishments including quick and general vehicle service, car washes and body shops not an accessory to new vehicle sales.
 - c. *Vehicle Fuel Sales.* Establishments engaging in the direct to consumer sale of gasoline, diesel fuel, and oil products for cars, trucks, recreational vehicles, and boats.
 - d. *Electric Vehicle (EV) Basic Charging Station.* A slow to medium level charging station for electric vehicles that is typically accessory to another use, such as single family residences, apartments, and businesses. Level 1 (120 volt AC) is considered slow charging. Level 2 (208 or 240 volt AC) is considered medium charging.
 - e. *Electric Vehicle (EV) Rapid Charging Station.* An industrial grade electrical outlet that allows for faster charging of electric vehicle batteries through higher power levels and that meets or exceeds any standards, codes, and regulations set forth by Chapter [19.28](#) RCW and consistent with rules adopted under RCW [19.27.540](#). Such stations are also known as Level 3 facilities and are considered fast or rapid charging (480-volt AC), and are generally available to the public.
 - f. *Electric Vehicle (EV) Battery Exchange Station.* A facility that will enable an electric vehicle with a swappable battery to enter a drive lane and exchange the depleted battery with a fully charged battery. Such exchange stations may use a fully automated process, which meets or exceeds any standards, codes, and regulations set forth by Chapter [19.27](#) RCW.
-

D. *Industrial use types.*

1. *Industrial Services.* Includes the repair and servicing of industrial and business machinery, equipment and/or products. Examples include welding shops; machine shops; sales, repair, storage, salvage or wrecking of heavy machinery, metal and building materials; towing and vehicle storage; auto and truck salvage and wrecking; heavy truck servicing and repair; tire recapping and retreading; truck stops; building, heating, plumbing or electrical contractors; exterminators; janitorial and building maintenance contractors where the indoor storage of materials is more than incidental to the office use (see subsection (C)(6)(a) of this section); ~~fuel oil distributions; solid fuel yards;~~ laundry, dry-cleaning and carpet cleaning plants; and photo-finishing laboratories.

8. *Major Utility Facilities.* Those facilities which have a substantial public impact, including but not limited to: sewage treatment plants and lagoons; electric generation facilities ~~including biomass and coal energy generation facilities;~~ and essential public facilities as defined in Chapter 20.855 VMC, Essential Public Facilities.

9. *Bulk Fossil Fuel Storage and Handling Facility.* Bulk fossil fuel storage and handling facility means any structure, group of structures, equipment, or device that stores or transfers any material derived from prehistoric organic matter and used to generate energy, including but not limited to; petroleum and petroleum products, coal, and natural gases, including without limitation methane, propane, and butane. The term does not include facilities that store and handle finished products derived from fossil fuels including but not limited to asphalt, plastics, fertilizers, paints, and denatured ethanol.

10. *Cleaner Fuels Storage and Handling Facility.* Means any structure, group of structures, equipment or device previously classified as bulk fossil fuel storage and handling that is converted to store or transfers any material derived from cleaner fuels, as defined in VMC 20.150.

11. *Small Fossil Fuel or Cleaner Fuel Storage and Distribution Facilities.* Means local distribution gas storage tanks with individual storage capacities of 30,000 gallons or less and cumulative storage of 60,000 gallons or less. Such tanks store fossil fuels or cleaner fuels

and are either for local distribution to customers or serve as an accessory facility necessary to support an onsite allowed primary commercial, industrial, educational, scientific, or governmental use and do not otherwise meet the definitions of Bulk Fossil Fuel Storage and Handling Facility in D.9, or Vehicle Fuel Sales in C.5.c.

20.400 ZONING DISTRICTS

Chapter 20.410

LOWER DENSITY RESIDENTIAL DISTRICTS

Sections:

20.410.010	Purpose.
20.410.020	List of Zoning Districts.
20.410.025	Lower Density Residential Zone Function and Location Criteria.
20.410.030	Uses.
20.410.040	Minimum and maximum densities.
20.410.050	Development Standards.

20.410.010 Purpose.

Preserve and promote neighborhood livability and protect the consumer's choices in housing. The Low-Density Residential Districts are primarily designed to preserve and promote neighborhoods of detached single dwellings at low intensities. Flexibility in housing type is promoted by allowing manufactured homes, duplexes, and planned unit developments under special conditions. Compatible nonresidential development, such as elementary schools,

churches, parks, and child care facilities are permitted at appropriate locations and at an appropriate scale. (Ord. M-3709 § 3, 06/20/2005; Ord. M-3643, 01/26/2004)

20.410.020 List of Zoning Districts.

A. R-2: Low-Density Residential District. The R-2 zoning district is designed to accommodate detached single dwellings with or without accessory residential units at a minimum lot size of 20,000 square feet and a density of 1.8 to 2.2 units/net acre. Some civic and institutional uses are permitted as limited or conditional uses. The R-2 zoning district was referred to as R1-20 zone prior to March 11, 2004.

B. R-4: Low-Density Residential District. The R-4 zoning district is designed to accommodate detached single dwellings with or without accessory residential units at a minimum lot size of 10,000 square feet and a density of 2.3 to 4.4 units/net acre. Some civic and institutional uses are permitted as limited or conditional uses. The R-4 zoning district was referred to as R1-10 zone prior to March 11, 2004.

C. R-6: Low-Density Residential District. The R-6 zoning district is designed to accommodate detached single dwellings with or without accessory residential units at a minimum lot size of 7,500 square feet and a density of 4.5 to 5.8 units/net acre. Some civic and institutional uses are permitted as limited or conditional uses. The R-6 zoning district was referred to as R1-7.5 zone prior to March 11, 2004.

D. R-9: Low-Density Residential District. The R-9 zoning district is designed to accommodate detached single dwellings with or without accessory residential units at a minimum lot size of 5,000 square feet and a density of 5.9 to 8.7 units/net acre. Some civic and institutional uses are permitted as limited or conditional uses. The R-9 zoning district is a new zoning district that combines what was referred to as R1-6 and R1-5 zones prior to March 11, 2004. (Ord. M-3643, 01/26/2004)

20.410.025 Lower Density Residential Zone Function and Location Criteria.

A. *General Criteria.* The Lower Density Residential designation is applied to areas that provide predominantly single-family structures (attached or detached) on individual lots. Application of individual zones to specific areas in the City should enhance and support the integrity of existing neighborhoods, provide for a range of choices in housing styles and cost, and encourage compatible infill development and redevelopment.

B. Lower Density Residential Zone (R-2, R-4, R-6, R-9) Location Criteria.

The Lower Density zone designations defined above can be appropriately applied and maintained in areas meeting one of the following criteria:

1. Blocks, intersection-to-intersection street segments, or areas with defined physical edges, which have at least eighty (80) percent of the existing structures in single-family residential use on lots whose average size falls within the minimum and maximum lot size standards of the zone to be applied. Half-blocks at the edges of single-family zones with more than fifty (50) percent single-family structures, or portions of blocks on an arterial with a majority of single-family structures, shall generally be included. This shall be decided on a case-by-case basis, but the policy is for inclusion.
 2. Blocks, intersection-to-intersection street segments, or areas with defined physical edges, which have less than eighty (80) percent of the existing structures in single-family residential use but in which an increasing trend toward single-family residential use can be demonstrated; for example:
 - a. The construction of single-family structures in the last five (5) years has been increasing proportionately to the total number of constructions for new uses in the area, or
 - b. The area shows an increasing number of improvements and rehabilitation efforts to single-family structures, or
 - c. The number of existing single-family structures has been very stable or increasing in the last five (5) years, or
-

d. The area's location is topographically and geographically connected to, and compatible with, existing single-family residential development, with physical edges (such as major arterials, topography, waterways, open space, existing natural or landscape screening, etc) that separate and buffer the area from Higher Density Residential, Commercial, and Industrial.

3. Areas with sensitive physical, environmental or natural resource characteristics that make lower intensity development advisable and appropriate.

4. Areas that meet the above criteria for designation as Lower Density Residential shall not be rezoned for nonresidential uses, except NC (Neighborhood Commercial), unless the change has been adopted as part of a sub-area planning study.

5. No vacant or underutilized land areas (per Vacant Buildable Lands Model criteria) within the City shall be rezoned R-2 or R-4 for new residential development. Land use and zoning designations for residential lands being annexed into the City shall be converted to City designations in accordance with VMC Table 20.230.030. (Ord. M-3946 § 6, 02/01/2010; Ord. M-3730, Added, 12/19/2005, Sec 9)

20.410.030 Uses.

A. *Types of uses.* For the purposes of this chapter, there are four kinds of use:

1. A permitted (P) use is one that is permitted outright, subject to all of the applicable provisions of this title.

2. A limited (L) use is permitted outright providing it is in compliance with special requirements, exceptions or restrictions.

3. A conditional use (C) is a discretionary use reviewed through the process set forth in Chapters [20.245](#) and [20.210](#) VMC, governing conditional uses and decision-making procedures, respectively.

4. A prohibited use (X) is one that is not permitted in a zoning district under any circumstances.

B. *Use table.* A list of permitted, limited, conditional, and prohibited uses in Low-Density Residential Districts is presented in Table 20.410.030-1.

Table 20.410.030-1. LOWER-DENSITY RESIDENTIAL DISTRICTS USE TABLE

USE	R-2	R-4	R-6	R-9
RESIDENTIAL				
Household Living	P ¹	P ¹	P ¹	P ¹
Group Living	P/X ¹	P/X ¹	P/X ¹	P/X ¹
Home Occupation	L ²	L ²	L ²	L ²
Medical Center Residential	L ²³	L ²³	L ²³	L ²³
HOUSING TYPES				
Single Dwelling, Attached	L ¹⁸	L ¹⁸	L ¹⁸	L ¹⁸
Single Dwelling, Detached	P	P	P	P
Accessory Dwelling Units	L ⁴	L ⁴	L ⁴	L ⁴
Duplexes ²²	L ²¹	L ²¹	L ²¹	L ²¹
Multi-Dwelling Units	X	X	X	X
Existing Manufactured Home Developments	L ⁵	L ⁵	L ⁵	L ⁵
Designated Manufactured Homes	L/X ¹⁹	L/X ¹⁹	L/X ¹⁹	L/X ¹⁹
New Manufactured Homes	L ²⁰	L ²⁰	L ²⁰	L ²⁰
CIVIC (Institutional)				
Basic Utilities	C	C	C	C
Colleges	C	C	C	C
Community Centers	X	X	X	X
Community Recreation	C ⁶	C ⁶	C ⁶	C ⁶

USE	R-2	R-4	R-6	R-9
Cultural Institutions	P/C ⁷	P/C ⁷	P/C ⁷	P/C ⁷
Day Care				
- Family Day Care Home	p ⁸	p ⁸	p ⁸	p ⁸
- Child Care Center	L/C ¹¹	L/C ¹¹	L/C ¹¹	L/C ¹¹
- Adult Day Care	L/C/X ⁹	L/C/X ⁹	L/C/X ⁹	L/C/X ⁹
Emergency Services (except ambulance services)	L/C ¹¹	L/C ¹¹	L/C ¹¹	L/C ¹¹
Ambulance Services	X	X	X	X
Medical Centers	X	X	X	X
Parks/Open Space				
- Neighborhood Parks	P	P	P	P
- Community Parks	P	P	P	P
- Regional Parks	C	C	C	C
- Trails	P	P	P	P
Postal Service	C	C	C	C
Religious Institutions	L/C ¹¹	L/C ¹¹	L/C ¹¹	L/C ¹¹
Schools	L/C ¹¹	L/C ¹¹	L/C ¹¹	L/C ¹¹
Social/Fraternal Clubs	X	X	X	X
Transportation Facility	C ¹²	C ¹²	C ¹²	C ¹²
COMMERCIAL				
Commercial and Transient Lodging	L/C/X ¹³	L/C/X ¹³	L/C/X ¹³	L/C/X ¹³
Eating/Drinking Establishments	X	X	X	X

USE	R-2	R-4	R-6	R-9
Entertainment-Oriented				
- Adult Entertainment	X	X	X	X
- Indoor Entertainment	X	X	X	X
- Major Event Entertainment	X	X	X	X
General Retail				
- Sales-Oriented	C ¹⁴	C ¹⁴	C ¹⁴	C ¹⁴
- Personal Services	C ¹⁴	C ¹⁴	C ¹⁴	C ¹⁴
- Repair-Oriented	X	X	X	X
- Bulk Sales	X	X	X	X
- Outdoor Sales	X	X	X	X
Motor Vehicle Related				
- Motor Vehicle Sales/Rental	X	X	X	X
- Motor Vehicle Servicing/Repair	X	X	X	X
- Vehicle Fuel Sales	X	X	X	X
- EV Basic Charging Stations (accessory only)	P	P	P	P
- EV Rapid Charging Stations (accessory only)	P	P	P	P
- EV Battery Exchange Stations	X	X	X	X
Office				
- General	X	X	X	X
- Medical	X	X	X	X
- Extended	X	X	X	X

USE	R-2	R-4	R-6	R-9
Non-Accessory Parking	X	X	X	X
Self-Service Storage	X	X	X	X
Marina	C	C	C	C
INDUSTRIAL				
Bulk Fossil Fuel Storage and Handling Facilities	X	X	X	X
Cleaner Fuel Storage and Handling Facilities	X	X	X	X
Small Fossil Fuel Storage and Distribution Facilities	X	X	X	X
Industrial Services	X	X	X	X
Manufacturing and Production	X	X	X	X
Railroad Yards	X	X	X	X
Research and Development	X	X	X	X
Warehouse/Freight Movement	X	X	X	X
Wholesale Sales	X	X	X	X
Waste-Related	X	X	X	X
Major Utility Facilities	X	X	X	X
OTHER				
Agriculture/Horticulture	P	P	P	P
Airport/Airpark	X	X	X	X
Animal Kennels/Shelters	X	X	X	X
Cemeteries	C ¹⁵	C ¹⁵	C ¹⁵	C ¹⁵
Detention & Post Detention Facilities	X	X	X	X

USE	R-2	R-4	R-6	R-9
Dog Day Care	X	X	X	X
Heliports	X	X	X	X
Recreational or Medical Marijuana Facilities	X	X	X	X
Medical Marijuana Cooperatives	X	X	X	X
Mining	X	X	X	X
Rail Lines/Utility Corridors	P	P	P	P
Temporary Uses	L ¹⁶	L ¹⁶	L ¹⁶	L ¹⁶
Wireless Communication Facilities	L/C/X ¹⁷	L/C/X ¹⁷	L/C/X ¹⁷	L/C/X ¹⁷

1 Residential Care Homes, state or federally approved, with six or fewer residents and any required on-site residential staff permitted by right; all larger group living uses prohibited.

2 Subject to the provisions of Chapter [20.860](#) VMC, Home Occupations.

4 Subject to the provisions of Chapter [20.810](#) VMC, Accessory Dwelling Units.

5 Subject to the provisions of Chapter [20.880](#) VMC, Manufactured Home Parks. Manufactured Home Developments established prior to July 1, 2005, are exempt from the standards of VMC [20.410.050\(F\)](#), Criteria for Placement of Manufactured Homes, and may continue to exist and expand within existing previously approved boundaries. An existing manufactured home in a development or subdivision may be replaced or may be relocated either to an approved manufactured home development or an approved manufactured home subdivision.

6 Subject to provisions in VMC [20.895.040](#), Community Recreation and Related Facilities.

7 Libraries only permitted outright; all other cultural institutions are conditional uses.

8 Family day care homes for no more than 12 children are permitted when licensed by the state.

9 Adult day care facilities for six or fewer adults allowed as limited uses subject to compliance with the development standards governing Home Occupations, per VMC [20.860.020\(B\)\(1\)](#) through [\(B\)\(7\)](#); facilities with seven to 12 adults allowed as conditional uses; and larger facilities are prohibited.

10 *Repealed by M-4289.*

11 Schools, religious institutions, government buildings, fire stations, child care centers, and emergency services facilities that meet all of the criteria contained in VMC [20.410.050\(D\)](#) are permitted by right; all others require conditional use approval. Child care centers permitted by right shall be consistent with Chapter [20.840](#) VMC, Child Care Centers, and be subject to Type II review pursuant to VMC [20.210.050](#).

12 Except bus, trolley and streetcar stops, including bus shelters, which are allowed by right.

13 One- and two-bedroom Bed-and-Breakfast facilities are permitted outright and three- to six-bedroom Bed-and-Breakfast facilities are allowed as conditional uses, with all Bed-and-Breakfast facilities subject to provisions of Chapter [20.830](#) VMC, Bed-and-Breakfast Establishments. No more than six bedrooms are allowed under any circumstances. All other commercial lodging is prohibited.

14 Retail commercial uses limited to 1,500 gsf per use to a maximum of 5,000 square feet in planned developments of 150 units or more. See VMC [20.260.020\(B\)\(1\)\(b\)\(2\)](#).

15 Subject to provisions in VMC [20.895.030](#).

16 Subject to provisions in Chapter [20.885](#) VMC, except sales of fireworks which is prohibited in residential zones.

17 Building-mounted antennas are allowed by conditional use on nonresidential buildings in single-family residential zones subject to requirements contained in Chapter [20.890](#) VMC, Wireless Communication Facilities.

18 Subject to VMC [20.260.020\(B\)\(1\)\(a\)\(2\)](#), planned development, VMC [20.910.050](#), Zero Lot Line Developments, and Chapter [20.920](#) VMC, Infill Development Standards.

19 A “designated manufactured home” is exempt from the development standards of VMC [20.410.050\(F\)](#) and may continue to exist and expand. An existing unit may be replaced or may be relocated either to an approved manufactured home development or an approved manufactured home subdivision. After July 1, 2005, only “new manufactured homes” that also meet the “designated manufactured home” criteria will be permitted on individual lots not part of an existing approved manufacturing home development or manufactured home subdivision. Except that a new manufactured home placed on an individual lot after July 1, 2005, may be relocated as permitted by this title if within five years of the date of the original placement.

20 Subject to VMC [20.410.050\(F\)](#), Development Standards – Criteria for Placement of Manufactured Homes.

21 Subject to Chapter [20.920](#) VMC, Infill Development Standards.

22 Existing duplexes built on lots meeting the minimum infill lot size standards of Table 20.920.060-1 shall be considered conforming uses even if not part of an infill development.

23 Medical Center Residential uses, as defined in VMC [20.160.020](#), are permitted outright if approved through a public facilities master plan per VMC [20.680.040](#).

(Ord. M-4325 § 3, 2020; Ord. M-4289 § 4, 2019; Ord. M-4255 § 6, 2018; Ord. M-4254 § 3(BB), 2018; Ord. M-4187 § 5, 2016; Ord. M-4071 § 7, 2014; Ord. M-4066 § 5, 2013; Ord. M-4035 § 2, 2012; Ord. M-4034 § 10, 2012; Ord.

M-4024 § 6, 2012; Ord. M-4002 § 5, 2011; Ord. M-3931 § 9, 2009; Ord. M-3922 § 19, 2009; Ord. M-3840 § 18, 2007; Ord. M-3709 § 4, 2005; Ord. M-3663 § 12, 2004; Ord. M-3643, 2004)

Chapter 20.420

HIGHER DENSITY RESIDENTIAL DISTRICTS

Sections:

20.420.010	Purpose.
20.420.020	Zoning Districts.
20.420.025	Higher Density Residential Zone Function and Location Criteria.
20.420.030	Uses.
20.420.040	Minimum and Maximum Densities.
20.420.050	Development Standards.
20.420.060	Commercial Development Restrictions.

20.420.010 Purpose.

Promote a range of housing choices while preserving neighborhood livability and protecting the consumer's choices in housing. These districts are designed to promote medium- to high-density residential neighborhoods. Housing types include manufactured homes, duplexes, rowhouses, and multi-unit structures. A mix of nonresidential uses, such as professional office and limited commercial, civic, and institutional uses, is permitted outright or conditionally subject to provisions to minimize adverse impacts, if any, on the residential character. However, the encouragement of mixed uses should not result in a predominance of business or commercial uses in areas designated for residential development by the Comprehensive Plan. (Ord. M-3709 § 6, 06/20/2005)

20.420.020 Zoning Districts.

A. R-18: Higher-Density Residential District. The R-18 zoning district is designed to accommodate attached homes such as duplexes and rowhouses, and garden-type apartments

at a minimum lot size of 1,800 square feet per unit. Professional office uses are permitted under certain circumstances. Some retail, civic and institutional uses are allowed conditionally. This zone consolidates the R-18 and OR-18 zones as of March 11, 2004.

B. R-22: Higher-Density Residential District. The R-22 zoning district is designed to accommodate rowhouses, garden-type apartments, and lower-density multi-dwelling structures at a minimum lot size of 1,500 square feet per unit. Professional office uses are permitted under certain circumstances. Some retail, civic and institutional uses are allowed conditionally. This zone consolidates the R-22 and OR-22 zones as of March 11, 2004.

C. R-30: Higher-Density Residential District. The R-30 zoning district is designed to accommodate multi-dwelling structures at a minimum lot size of 1,500 square feet per unit. Professional office uses are permitted under certain circumstances. Some retail, civic and institutional uses are allowed conditionally. This zone consolidates the R-30 and OR-30 zones as of March 11, 2004.

D. R-35: Higher-Density Residential District. The R-35 zoning district is designed to accommodate multi-dwelling structures at a minimum lot size of 1,200 square feet per unit. Professional office uses are permitted under certain provisions. Some retail, civic and institutional uses are allowed conditionally. (Ord. M-4034 § 11, 12/03/2012; Ord. M-3922 § 21, 07/06/2009; Ord. M-3730 § 11, 12/19/2005; Ord. M-3663 § 14, 08/02/2004; Ord. M-3643, 01/26/2004)

20.420.025 Higher Density Residential Zone Function and Location Criteria.

A. *R-18 (Higher Density Residential) Zone Location Criteria.* The R-18 designation is most appropriate in areas with the following characteristics and relationships to the surrounding area:

1. Areas occupied by a substantial amount of multifamily development, but where factors such as narrow streets, on-street parking congestion, local traffic congestion, lack of alleys and irregular street patterns restrict local access and circulation and make a lower intensity of development desirable.
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2. Areas where properties are well-suited to multifamily development, but where adjacent single-family developments or public open space make a transitional scale of development (height and bulk) desirable. There should be a well-defined edge such as an arterial, open space, change in block pattern, topographic change or other significant feature that provides physical separation from the single-family area. (This is not a necessary condition where existing moderate scale multifamily structures have already established the scale relationship with abutting single-family areas).

3. Properties must have access from collector or arterial streets, such that vehicular travel to and from the site is not required to use local access streets through lower density residential zones.

B. *R-22 (Higher Density Residential) Zone Location Criteria.* The R-22 designation is most appropriate in areas with the following characteristics and relationships to the surrounding area:

1. Areas already developed predominantly to the permitted R-22 density and where R-22 scale is well established.

2. Areas with close proximity and pedestrian connections to neighborhood services, public open spaces, schools and other residential amenities.

3. Properties that are adjacent to existing business and commercial areas with comparable height and bulk, or where a transition in scale between areas of larger multifamily and/or commercial structures and smaller multifamily development is desirable.

4. Areas well served by public transit and having direct access to arterials, such that vehicular traffic is not required to that pass through lower density residential zones; street widths must be sufficient to allow for two (2) way traffic and on-street parking in accordance with City street standards.

5. Areas with significant topographic breaks, major arterials or open space that provide a separation and transition to Lower Density Residential areas.

C. *R-30 (Higher Density Residential) Zone Location Criteria.* The R-30 designation is most appropriate in areas with the following characteristics and relationships to the surrounding area:

-
1. Areas that are already developed predominantly to the permitted R-30 density, or areas that are within an urban center, or identified in an adopted sub-area plan as appropriate for higher density multifamily housing.
 2. Properties in close proximity to major employment centers, open space and recreational facilities.
 3. Areas with well-defined edges such as an arterial, open space, change in block pattern, topographic change or other significant feature providing sufficient separation from adjacent areas of small scale residential development, or areas should be separated by other zones providing a transition in the height, scale and density of development.
 4. Areas that are served by major arterials, where transit service is good to excellent, and where street capacity could absorb the traffic generated by higher density development.
 5. Principal streets in the area shall be sufficient to allow for two (2) way traffic and parking on both sides of the street. Vehicular access to the area shall not require use of streets passing through lower density residential zones.
 6. Areas of sufficient size to promote a high quality, higher density residential environment with close proximity (and good pedestrian connections) to public open spaces, neighborhood oriented commercial services, and other residential amenities.

D. *R-35 (Higher Density Residential) Zone Location Criteria.* The R-35 designation is most appropriate in areas generally characterized by the following development characteristics of the area and relationship to the surrounding area:

1. Areas that are developed predominantly to the intensity permitted by the R-35 zone, or areas located within an urban center, or defined in a subarea plan adopted by the City as appropriate for higher density multi-family housing.
 2. Areas of sufficient size to promote a high quality, higher density residential environment with close proximity (and good pedestrian connections) to public open spaces, neighborhood oriented commercial services, other residential amenities, major employment centers, open space and recreational facilities.
 3. Properties adjacent to business and commercial areas with comparable height and bulk.
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4. Properties in areas along arterials where topographic changes either provide an edge or permit a transition in scale with surroundings.

5. Areas that are served by major arterials and where transit service is good to excellent and street capacity could absorb the traffic generated by high density development. (Ord. M-3730, Added, 12/19/2005, Sec 12)

20.420.030 Uses.

A. *Types of uses.* For the purposes of this chapter, there are four kinds of use:

1. A permitted (P) use is one that is permitted outright, subject to all of the applicable provisions of this title.
2. A limited (L) use is permitted outright providing it is in compliance with special requirements, exceptions or restrictions.
3. A conditional use (C) is a discretionary use reviewed through the process set forth in Chapters [20.245](#) and [20.210](#) VMC, governing conditional uses and decision-making procedures, respectively.
4. A prohibited use (X) is one that is not permitted in a zoning district under any circumstances.

B. *Use table.* A list of permitted, limited, conditional, and prohibited uses in Higher Density residential zones is presented in Table 20.420.030-1.

USE	R-18	R-22	R-30	R-35
RESIDENTIAL				
Household Living	P	P	P	P
Group Living	P	P	P	P
Home Occupation	L ³	L ³	L ³	L ³

**Table 20.420.030-1
Higher Density Districts Use Table**

USE	R-18	R-22	R-30	R-35
HOUSING TYPES				
Single Dwelling Units, Attached	P ⁴	P ⁴	P ⁴	X
Single Dwelling Units, Detached	P ⁴	P ⁴	P ⁴	X ⁵
Accessory Dwelling Units	P ¹	P ¹	P ¹	P ¹
Duplexes	P ⁴	P ⁴	P ⁴	P ⁴
Multi-Dwelling Units	P ⁴	P ⁴	P ⁴	P ⁴
Manufactured Home Developments	L ⁷	L ⁷ /X	L ⁷ /X	L ⁷ /X
Designated Manufactured Home	L/X ²³	X	X	X
New Manufactured Home	L ²³	X	X	X
CIVIC (Institutional)				
Basic Utilities	C	C	C	C
Colleges	C	C	C	C
Community Centers	C	C	C	C
Community Recreation	C ⁸	C ⁸	C ⁸	C ⁸
Cultural Institutions	P/C ⁹	P/C ⁹	P/C ⁹	P
Day Care				
- Family Day Care Home	P/C ¹⁰	P/C ¹⁰	P/C ¹⁰	P/C ¹⁰
- Child Care Center	L/C ¹⁴	L/C ¹⁴	L/C ¹⁴	L/C ¹⁴
- Adult Day Care	P/C ¹¹	P/C ¹¹	P/C ¹¹	P/C ¹¹
Emergency Services (except ambulance services)	C ¹²	C ¹²	C ¹²	C ¹²
Medical Centers	C	C	C	C

**Table 20.420.030-1
Higher Density Districts Use Table**

USE	R-18	R-22	R-30	R-35
Parks/Open Space				
- Neighborhood Parks	P	P	P	P
- Community Parks	P	P	P	P
- Regional Parks	C	P	P	P
- Trails	P	P	P	P
Postal Service	C	C	C	C
Religious Institutions	L/C ¹⁴	L/C ¹⁴	L/C ¹⁴	L/C ¹⁴
Schools	L/C ¹⁴	L/C ¹⁴	L/C ¹⁴	L/C ¹⁴
Social/Fraternal Clubs	C ⁶	C ⁶	C ⁶	C ⁶
Transportation Facility	P/C ¹⁵	P/C ¹⁵	P/C ¹⁵	P/C ¹⁵
COMMERCIAL				
Commercial and Transient Lodging	L/X ¹⁶	L/X ¹⁶	L/X ¹⁶	L/X ¹⁶
Eating/Drinking Establishments	L ¹⁷ /X	L ¹⁷ /X	L ¹⁷ /X	L ¹⁷ /X
Entertainment-Oriented				
- Adult Entertainment	X	X	X	X
- Indoor Entertainment	X	X	X	X
- Major Event Entertainment	X	X	X	X
General Retail				
- Sales-Oriented	L ¹⁷ /X	L ¹⁷ /X	L ¹⁷ /X	L ¹⁷ /X
- Personal Services	L ¹⁷ /X	L ¹⁷ /X	L ¹⁷ /X	L ¹⁷ /X
- Repair-Oriented	X	X	X	X

**Table 20.420.030-1
Higher Density Districts Use Table**

USE	R-18	R-22	R-30	R-35
- Bulk Sales	X	X	X	X
- Outdoor Sales	X	X	X	X
Motor Vehicle Related				
- Motor Vehicle Sales/Rental	X	X	X	X
- Motor Vehicle Servicing/Repair	X	X	X	X
- Vehicle Fuel Sales	X	X	X	X
- EV Basic Charging Stations (accessory only)	P	P	P	P
- EV Rapid Charging Stations (accessory only)	P	P	P	P
- EV Battery Exchange Stations	X	X	X	X
Office				
- General	L ¹⁷ /X	L ¹⁷ /X	L ¹⁷ /X	L ¹⁷ /X
- Medical	L ¹⁷ /X	L ¹⁷ /X	L ¹⁷ /X	L ¹⁷ /X
- Extended	X	X	X	X
Self-Service Storage	X	X	X	X
Non-Accessory Parking	X	X	X	X
INDUSTRIAL				
Bulk Fossil Fuel Storage and Handling Facilities	X	X	X	X
Cleaner Fuel Storage and Handling Facilities	X	X	X	X
Small Fossil Fuel Storage and Distribution Facilities	X	X	X	X
Industrial Services	X	X	X	X

**Table 20.420.030-1
Higher Density Districts Use Table**

USE	R-18	R-22	R-30	R-35
Manufacturing and Production	X	X	X	X
Railroad Yards	X	X	X	X
Research and Development	X	X	X	X
Warehouse/Freight Movement	X	X	X	X
Wholesale Sales	X	X	X	X
Waste-Related	X	X	X	X
Major Utility Facilities	X	X	X	X
OTHER				
Agriculture/Horticulture	P	P	P	P
Airport/Airpark	X	X	X	X
Animal Kennel/Shelters	X	X	X	X
Cemeteries	C ¹⁸	C ¹⁸	C ¹⁸	C ¹⁸
Detention & Post Detention Facilities	X	X	X	X
Dog Day Care	C ¹⁹	C ¹⁹	C ¹⁹	C ¹⁹
Heliports	X ²⁰	X ²⁰	X ²⁰	X ²⁰
Recreational or Medical Marijuana Facilities	X	X	X	X
Medical Marijuana Cooperatives	X	X	X	X
Mining	X	X	X	X
Rail Lines/Utility Corridors	C	C	C	C
Basic Utilities	P	P	P	P
Temporary Uses	L ²¹	L ²¹	L ²¹	L ²¹

Table 20.420.030-1
Higher Density Districts Use Table

USE	R-18	R-22	R-30	R-35
Wireless Communication Facilities	L/C/X ²²	L/C/X ²²	L/C/X ²²	L/C/X ²²

- 1** Subject to the provisions of Chapter [20.810](#) VMC, Accessory Dwelling Units.
- 2** The language for this footnote has been deleted.
- 3** Subject to the provisions of Chapter [20.860](#) VMC, Home Occupations.
- 4** Provided the minimum required residential density is met, on an overall project basis.
- 5** Single-family dwelling units legally established prior to March 11, 2004, shall be considered permitted uses.
- 6** Subject to the provisions of VMC [20.895.040](#), Community Recreation and Related Facilities.
- 7** Subject to the provisions of Chapter [20.880](#) VMC, Manufactured Home Parks. Manufactured Home Developments established prior to July 1, 2005 are exempt from the standards of VMC [20.420.050\(G\)](#), Criteria for Placement of Manufactured Homes, and may continue to exist and expand within existing previously-approved boundaries. An existing manufactured home in a development or subdivision may be replaced or may be relocated either to an approved manufactured home development or an approved manufactured home subdivision. Manufactured Home Developments in the R-22, R-30, R-35 zones are allowed as a Limited Use (L) only as part of a Chapter [20.260](#) VMC Planned Development that meets overall minimum density standards for the applicable zone.
- 8** Subject to the additional provisions in VMC [20.895.040](#).
- 9** Libraries permitted only; all other cultural institutions are conditional uses.
- 10** Family day care homes for no more than 12 children are permitted when licensed by the state. Child care centers are permitted as conditional uses, subject to the provisions of Chapter [20.840](#) VMC, Child Care Centers, unless part of a Planned Development, in which case they are approved subject to Chapter [20.260](#) VMC. All child care facilities must be licensed by the state.
- 11** Adult day care facilities with 12 or fewer clients are permitted outright; larger facilities are permitted as conditional uses.
- 12** The language for this footnote has been deleted.
- 13** *Repealed by M-4289.*
- 14** Schools, child care centers, and religious institutions that meet all of the locational criteria contained in VMC [20.420.050\(F\)](#) are permitted by right; all others require conditional use approval. Child care centers permitted by right shall be consistent with Chapter [20.840](#) VMC, Child Care Homes and Centers, and be subject to Type II review pursuant to VMC [20.210.050](#).

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- 15** Except bus, trolley and street car stops, including bus shelters, which are allowed by right.
- 16** Bed-and-breakfast establishments as limited uses subject to provisions of Chapter [20.830](#) VMC, Bed and Breakfast Establishments; all other commercial and transient lodging prohibited.
- 17** New commercial uses allowed as limited uses subject to special development restrictions in VMC [20.420.060](#). Existing commercial uses permitted if legally established prior to code effective date. However, alterations and expansions shall be subject to Chapter [20.245](#) VMC (Conditional Use Permits).
- 18** Subject to the provisions in VMC [20.895.030](#).
- 19** Subject to the provisions of Chapter [20.850](#) VMC, Dog Day Care.
- 20** Except as an accessory to a medical center.
- 21** Subject to provisions of Chapter [20.885](#) VMC, except sale of fireworks prohibited in residential zones.
- 22** Subject to the provisions of Chapter [20.890](#) VMC, Wireless Communication Facilities.
- 23** A “designated manufactured home” is exempt from the development standards of VMC [20.420.050\(G\)](#) and may continue to exist and expand. An existing unit may be replaced or may be relocated either to an approved manufactured home development or an approved manufactured home subdivision. After July 1, 2005, only “new manufactured homes” that also meet the “designated manufactured home” criteria will be permitted on individual lots not part of an existing approved manufacturing home development or manufactured home subdivision. Except that a new manufactured home placed on an individual lot after July 1, 2005, may be relocated as permitted by this title if within five years of the date of the original placement.

(Ord. M-4223 § 4, 12/04/2017; Ord. M-4187 § 6, 12/05/2016; Ord. M-4105 § 3, 11/17/2014; Ord. M-4071 § 8, 03/03/2014; Ord. M-4066 § 5, 12/16/2013; Effective 01/16/2014; Ord. M-4035 § 3, 12/03/2012; Ord. M-4024 § 7, 09/10/2012; Ord. M-4002 § 6, 12/05/2011; Ord. M-3959 § 25, 07/19/2010; Ord. M-3931 § 12, 11/02/2009; Ord. M-3840 § 20, 08/06/2007; Ord. M-3730 § 13, 12/19/2005; Ord. M-3709 § 7, 06/20/2005; Ord. M-3701 § 15, 05/02/2005; Ord. M-3663 § 15, 08/02/2004; Ord. M-3643, 01/26/2004)

20.420.060 Commercial Development Restrictions.

Commercial uses. General office, medical office, personal and sales-oriented retail services, eating and drinking establishments, and other nonresidential uses may be allowed in the Higher Density residential districts as part of a mixed use building or site pursuant to VMC [20.430.060](#). (Ord. M-4034 § 12, 12/03/2012; Ord. M-3730 § 16, 12/19/2005; Ord. M-3698 § 3, 04/03/2005; Ord. M-3643, 01/26/2004)

Chapter 20.430

COMMERCIAL AND MIXED USE DISTRICTS

Sections:

20.430.010	Purpose.
20.430.020	List of Zoning Districts.
20.430.025	Commercial Zone Function and Location Criteria.
20.430.030	Uses.
20.430.040	Development Standards.
20.430.050	Special Limitations on Uses.
20.430.060	Mixed Use Standards and District.
<i>20.430.070</i>	<i>Waterfront Mixed Use (WX) District.</i>

(Repealed by Ord. M-4289)

20.430.010 Purpose.

A. *Provide a range of commercial services for City residents.* One of the major purposes of the regulations governing development in commercial zoning districts is to ensure that a full range of retail and office uses are available throughout the City so that residents can fulfill all or most of their needs for goods and services within close proximity of their homes. The location of land within each commercial district must be carefully selected and design and development standards created to minimize the potential adverse impacts of commercial activity on established residential areas. At the same time, it is important to create more opportunities for mixed use, including residential, commercial and institutional activities in new and re-developing commercial areas.

B. *Facilitate economic goals.* Another purpose of these regulations is to ensure that there is a full range of economic activities and job opportunities within the City limits, in compliance with the economic goals of the City of Vancouver Comprehensive Plan. (Ord. M-3643, 01/26/2004)

20.430.020 List of Zoning Districts.

A. CN: Neighborhood Commercial District. The CN zoning district is designed to provide for small-scale, convenience commercial uses to serve adjacent residential neighborhoods. Convenience goods and services are those which are purchased frequently and do not require comparison shopping. Typical uses include, but are not limited to, convenience markets, personal services, restaurants, bakeries, and video rental shops. Above ground floor housing and some civic and institutional uses are allowed conditionally. The design and impact of these uses should be compatible with the surrounding neighborhood in size and scale and should generate minimal traffic. Because these uses primarily serve the immediate area, there are significant opportunities for walking, bicycle and transit trips that shall be encouraged and accommodated through building design, landscaping and access. The CN zoning district was referred to as Neighborhood Commercial (NC) prior to March 11, 2004.

B. CC: Community Commercial. The CC zoning district is designed to provide for retail goods and services purchased regularly by residents of several nearby neighborhoods. The zone also accommodates offices, institutions and mixed use housing. Because of the limited trade area, there are significant opportunities for walking, bicycle and transit trips that should be encouraged and accommodated through building/site design, landscaping and access.

C. CG: General Commercial. The CG zoning district is designed to allow for a full range of retail, office, mixed use and civic uses with a city-wide to regional trade area. Above ground floor housing is allowed. Some light industrial uses also are allowed, but limited so as not to detract from the predominant commercial character of the district. Development is generally expected to be auto-accommodating given the large service area but trips by alternative modes – walking, cycling and transit – should be encouraged through building/site design, landscaping and access. Because such areas generate more traffic than less-intense commercial zones, such developments should take their primary access from a street with at least the capacity of a Minor Arterial. The CG zoning district was referred to as General Commercial (GC) prior to March 11, 2004.

D. CX: City Center. The CX zoning district is designed to provide for a concentrated mix of retail, office, civic and housing uses in downtown Vancouver. The broad range of allowed uses is intended to promote Vancouver as the commercial, cultural, financial and municipal center of Clark County. Typical uses include, but are not limited to retail sales; hotels/motels; restaurants; professional offices; educational, cultural and civic institutions; public buildings; and

commercial parking. Ground floor residential is allowed with the exception of properties fronting Main Street between Sixth Street and Mill Plain. All of the property that has a CX zoning designation lies within the Downtown Plan District.

E. WX: Waterfront Mixed-Use. The WX zoning district is designed to provide for a significant level of mixed-use development and pedestrian access along the Columbia River while maintaining environmental and scenic resources and compatibility of uses. Permitted use categories include retail, office, institutional, residential, parks and civic uses. Limited warehouse and industrial uses, in addition to some regional scale facilities, are conditionally permitted.

F. CPX: Central Park Mixed-Use. The CPX zoning district is the base zone designation for all land located within the Vancouver Central Park Plan District that contains a number of existing parks and governmental, health, recreational, educational and cultural facilities. The CPX zone district also contains the Vancouver National Historic Reserve that includes Officers Row, Vancouver Barracks, Fort Vancouver and Pearson Air Park. The CPX zone district is designed to enhance and protect existing facilities and fulfill the vision and policies identified in the Central Park Plan. The CPX zoning district was referred to as Vancouver Central Park (VCP) in the previous zoning code.

G. MX: Mixed Use District. The Mixed-Use zoning district is intended to provide the community with a mix of mutually supporting retail, service, office, light industrial, and residential uses. It promotes physically and functionally coordinated and cohesive site planning and design which maximizes land use. It also encourages development of a high-density, active urban environment which is expected to:

1. Achieve the goals and objectives of the Community Framework Plan and the Vancouver Urban Area Comprehensive Plan;
 2. Fulfill the community vision identified through the Visual Preference Survey and other opportunities for public involvement;
 3. Enhance livability, environmental quality, and economic vitality;
 4. Maximize efficient use of public facilities and services;
 5. Provide a variety of housing types and densities;
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6. Reduce the number of automobile trips and encourage alternative modes of transportation; and

7. Create a safe, attractive, and convenient environment for living, working, recreating, and traveling.

H. *HX: Heights District.* The HX zoning district is envisioned as a vibrant neighborhood center that is sustainable, healthy, equitable, accessible and safe, and includes a mix of complementary uses, engaging public open space, diverse housing affordable to a wide range of community members and safe multimodal travel opportunities within the district and to transit and nearby neighborhoods. The purpose of the Heights Mixed Use (HX) Plan district is to implement the vision, goals, and policies of the Heights District Plan, and ensure future development is integrated, cohesive, context sensitive and contributes to the overall district vision. (Ord. M-4341 § 3 (Exh. B), 2021; Ord. M-4289 § 4, 2019; Ord. M-3891 § 4, 2008; Ord. M-3832 § 5, 2007; Ord. M-3730 § 17, 2005; Ord. M-3643, 2004)

20.430.025 Commercial Zone Function and Location Criteria.

A. *General Criteria.* Compact, concentrated commercial areas, or nodes, shall be preferred to diffuse, sprawling , or linear commercial areas. The preservation, improvement, and redevelopment of existing commercial areas shall be preferred to the creation of new business areas or districts. Areas meeting the location criteria for Lower Density designations (i.e. R-6, R-9) are generally not appropriate for conversion to commercial. The encroachment of commercial development into residential areas shall be discouraged, except for Neighborhood Commercial within the criteria defined below for CN.

B. *CN (Neighborhood Commercial) Location Criteria.* The CN (Neighborhood Commercial) zone designation, as defined in above, is most appropriate in areas that are generally characterized by the following:

1. Lower Density Residential areas surround the subject site;
 2. No physical edges (waterways, major arterial streets or freeways, ravines, cliffs, etc) separate the residential areas from the subject site;
 3. Access is through residential areas or from collector streets
-

4. Designated areas typically total less than 2 acres and are not contiguous with other commercial areas.

C. *CC (Community Commercial) Location Criteria.* The CC (Community Commercial) zone designation, as defined in above, is most appropriate in areas that are generally characterized by the following:

1. Both residential and commercial areas abut the subject site;
2. No physical edges (waterways, major arterial streets or freeways, ravines, cliffs, etc) separate the existing residential or commercial areas from the subject site;
3. The site is located to provide a transition between more intense General Commercial areas and surrounding residential areas; or is located along a major arterial where parcels are generally small or shallow, and are bordered by Lower Density Residential areas.
4. The site is located on streets with good capacity (major collector streets and minor arterials) and good pedestrian and bicycle connections to adjacent residential areas.
5. Areas where the total acres in a Community Commercial cluster or node can be limited to approximately 10 acres, with other zones providing separation between Community Commercial clusters or nodes.

D. *CG (General Commercial).* The CG (General Commercial) Zone designation, as defined above, is most appropriate in areas designated by an adopted sub-area plan or generally characterized by the following:

1. Existing shopping centers or shopping areas along arterials or major commercial nodes or strips characterized by heavy, nonretail commercial activity, often including a few major employers;
 2. Areas readily accessible from a principal arterial with sufficient capacity to support major commercial development and with good to excellent transit service;
 3. Areas adjacent to or abutting industrial zones;
 4. Areas with physical edges that buffer residential districts, such as changes in residential street or lot layout that orient residential uses away from the commercial site, dense
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vegetation or landscaping, topographical features (i.e. ravines, cliffs), and other natural buffers.

5. Areas with a predominance of large lots that could physically accommodate a wide range of commercial uses, including large uses.

E. *Additional Commercial Criteria.*

1. Proposals to expand or create designated commercial areas shall include a current market analysis which identifies the need for the new commercial area/center.

2. Proposals to expand or create designated commercial areas shall include a current land use analysis of commercially designated and zoned land in the market area of the proposed site that includes a discussion of why the amount or character of existing commercial lands are inadequate. (Ord. M-3931 § 15, 12/02/2009; Ord. M-3730, Added, 12/19/2005, Sec 18)

20.430.030 Uses.

A. *Types of uses.* For the purposes of this chapter, there are four kinds of use:

1. A permitted (P) use is one that is permitted outright, subject to all of the applicable provisions of this title.

2. A limited (L) use is permitted outright providing it is in compliance with special requirements, exceptions or restrictions.

3. A conditional use (C) is a discretionary use reviewed through the process set forth in Chapters [20.245](#) and [20.210](#) VMC, governing conditional uses and decision-making procedures, respectively.

4. A prohibited use (X) is one that is not permitted in a zoning district under any circumstances.

B. *Use table.* A list of permitted, limited, conditional, and prohibited uses in the commercial and mixed use zones is presented in Table 20.430.030-1.

Table 20.430.030-1. Commercial and Mixed-Use Districts Use Table

USE	CN	CC	CG	CX	WX	CPX ¹	MX ²	RGX ⁴⁴	HX ⁵¹
RESIDENTIAL									
Household Living	L ⁴	L ^{4,8}	L ^{4,8}	L ^{42,8}	L ^{5,8}		p ^{6,8}	p ⁸	p ⁸
Group Living	P/C ⁷	P/C ⁷	P/C ⁷	P/C ⁷	P/C ⁷		p ⁶	P	P
Home Occupation	L ¹⁰	L ¹⁰	L ¹⁰	L ¹⁰	L ¹⁰		L ¹⁰	L ¹⁰	L ¹⁰
HOUSING TYPES									
Single Dwelling Units, Attached	L ⁴	L ⁴	L ⁴	L ⁴²	L ⁴		p ⁶	P	L ⁴
Single Dwelling Units, Detached	X	X	X	X	X		p ⁶	P	X
Accessory Dwelling Units	X	X	X	X	X		p ⁶	P	P
Duplexes	L ⁴	L ⁴	L ⁴	L ⁴²	L ⁴		p ⁶	P	X
Multi-Dwelling Units	L ⁴	L ⁴	L ⁴	L ⁴²	L ⁴		p ⁶	P	L ⁴
Existing Manufactured Home Development	X	X	X	X	X		X	X	X
Designated Manufactured Home	X	X	X	X	X		X	X	X
New Manufactured Home	X	X	X	X	X		X	X	X
Affordable Housing Projects	X	L ⁸	L ⁸	L ⁸	L ⁸	L ⁸	L ⁸	L ⁸	P
CIVIC (Institutional)									
Basic Utilities	C	C	C	P	C		C	C	C
Colleges	X	C	C	P	C		P	P	P
Community Centers	X	C	C	C	C		C	C	C

USE	CN	CC	CG	CX	WX	CPX ¹	MX ²	RGX ⁴⁴	HX ⁵¹
Community Recreation	X	L ¹¹	L ¹¹	L ¹¹	L ¹¹		L ¹¹	L ¹¹	L ¹¹
Cultural Institutions	L ¹⁹	P	P	P	P		P	P	P
Day Care									
- Family Day Care Home	P/L ¹³	P/L ¹³	P/L ¹³	P/L ¹³	P/L ¹³		P/L ¹³	P/L ¹³	P/L ¹³
- Child Care Center	L ¹³	L ¹³	L ¹³	L ¹³	L ¹³		P/L ¹³	P/L ¹³	P/L ¹³
- Adult Day Care	P/C ¹⁴	P	P	P	P		P	P	P
Emergency Services	X	C	P	P	C		P	P	P
Medical Centers	X	C	C	P	C		C	P	C
Parks/Open Space									
- Neighborhood Parks	P	P	P	P	P		P	P	P
- Community Parks	P	P	P	P	P		P	P	P
- Regional Parks	X	P	P	P	P		P	P	P
- Trails	P	P	P	P	P		P	P	P
Postal Service	L ¹⁹	P	P	P	P		P	P	P
Religious Institutions	X	P	P	P	C		P	P	P
Schools (not truck driving schools)	C	P	P	P	P		P	P	P
Social/Fraternal Clubs	C	L ¹¹	L ¹¹	L ¹¹	L ¹¹		L ¹¹	L ¹¹	L ¹¹
Transportation Facility	P	P	P	P	P		P	P	P
Park & Ride Facilities									
- Surface	X	L ⁴⁸	L ⁴⁸	X	X	X	X	X	X
- Structure	X	L ⁴⁸	L ⁴⁸	L ⁴⁸	L ⁴⁸	L ⁴⁸	L ⁴⁸	X	L ⁴⁸
COMMERCIAL									
Commercial and	X	C	P	P	L ¹⁸ /C		L ¹⁸ /C	P	L ¹⁸ /C

USE	CN	CC	CG	CX	WX	CPX ¹	MX ²	RGX ⁴⁴	HX ⁵¹
Transient Lodging									
Eating/Drinking Establishments	L ^{19/20}	P	P	P	P		P	P	P
Entertainment-Oriented									
- Adult Entertainment	X	X	L ²³	X	X		X	X	X
- Indoor Entertainment	X	P/L ²⁴	P/L ²⁴	P/L ²⁴	P/L ²⁴		P/L ²⁴	P/L ²⁴	P/L ²⁴
- Major Event Entertainment	X	X	P	P	C		C	X	C
General Retail									
- Sales-Oriented	L ¹⁹	P	P	P ²⁵	P		P	P ^{25, 46}	P
- Personal Services	L ¹⁹	P	P	P	P		P	P	P
- Repair-Oriented	X	P	P	P	X		P	P	P
- Bulk Sales	X	P	P	P	X		P	C	P
- Outdoor Sales	X	C	P/L ²⁶	P/L ²⁶	X		P/L ²⁶	X	P/L ²⁶
Artisan and Specialty Goods Production	X	L ⁴⁰	L ⁴⁰	L ⁴⁰	X		X	X	L ^{40,52}
Motor Vehicle Related									
- Motor Vehicle Sales/Rental	X	L ²⁷	P	P	X		C ²⁷	X, L ⁴⁵	X
- Motor Vehicle Servicing/Repair (entirely indoors)	X	L ²⁸	L ²⁸	L ²⁸	X		C ²⁸	X	X
- Vehicle Fuel Sales	X	L ²⁸	L ²⁸	L ²⁸	C		C ²⁸	X	X
- EV Basic Charging Stations (accessory and standalone)	P	P	P	P	P		P	P	P

USE	CN	CC	CG	CX	WX	CPX ¹	MX ²	RGX ⁴⁴	HX ⁵¹
- EV Rapid Charging Stations (accessory and standalone)	P	P	P	P	P		P	P	P
-EV Battery Exchange Stations	X	P	P	P	X		X	P	X
Office									
- General	L ¹⁹	P	P	P	P		P	P	P
- Medical	L ¹⁹	P	P	P	P		P	P	P
- Extended	X	P	P	P	X		X	X	X
Marina (See also Chapter 20.760 VMC)	X	P	P	P	P		P	X	P
Non-Accessory Parking	X	C	C	C ⁴³	C		C	C ⁴³	X
Self-Service Storage	X	P ^{3, 50}	P ⁵⁰	X	X		X	X	X
INDUSTRIAL									
Bulk Fossil Fuel Storage and Handling Facilities	X	X	X	X	X	X	X	X	X
Cleaner Fuel Storage and Handling Facilities	X	X	X	X	X	X	X	X	X
Small Fossil Fuel Storage and Distribution Facilities	X	X	X	X	X	X	X	X	X
Industrial Services	X	C	C	X	X		X	C	X
Manufacturing and Production	X	C/X ³⁰	P/X ³¹	P/X ⁴¹	X		C/X ³²	P ⁴¹	C/X ³²
Railroad Yards	X	X	X	X	X	X	X	X	X
Research and Development	X	X	P	C	C		C	P	C

USE	CN	CC	CG	CX	WX	CPX ¹	MX ²	RGX ⁴⁴	HX ⁵¹
Warehouse/Freight Movement	X	X	X	X	X		X	X	X
Waste-Related	X	X	P ⁴⁷	X	X		X	X	X
Wholesale Sales	X	X	C	C	X		X	X	X
Major Utility Facilities	X	X	X	X	X		X	X	X
OTHER									
Agriculture/Horticulture	X	X	X	X	X		X	X	X
Airport/Airpark	X	X	X	X	X		X	X	X
Animal Kennel/Shelters	X	L ³³	L ³³	X	X		X	X	X
Cemeteries	X	C ³⁴	P ³⁴	C ³⁴	X		C ³⁴	X	C ³⁴
Detention & Post Detention Facilities	X	X	C/X ³⁵	C/X ³⁵	X		X	X	X
Dog Day Care	L ³⁶	L ³⁶	L ³⁶	L ³⁶	L ³⁶		L ³⁶	L ³⁶	L ³⁶
Heliports	X	X	X	C ³⁷	C ³⁷		C ³⁷	C ³⁷	C ³⁷
Medical Marijuana Cooperatives	X	X	X	X	X		X	X	X
Recreational Marijuana, Production or Processing	X	X	X	X	X		X	X	X
Recreational Marijuana Retail	X	L ⁴⁹	L ⁴⁹	X	X		X	X	L ⁴⁹
Mining	X	X	X	X	X		X	C	X
Rail Lines/Utility Corridors	C	P	P	P	C		C	P	C
Temporary Uses	L ²⁶	L ²⁶	L ²⁶	L ²⁶	L ²⁶		L ²⁶	L ²⁶	L ²⁶
Wireless	X	L/C/X ³⁹	L/C/X ³⁹	L/C/X ³⁹	L/C/X ³⁹		L/C/X ³⁹	L/C/X ³⁹	L/C/X ³⁹

USE	CN	CC	CG	CX	WX	CPX ¹	MX ²	RGX ⁴⁴	HX ⁵¹
Communication Facilities									

1 Refer to Vancouver Central Park Plan District, Chapter [20.640](#) VMC.

2 Refer to Mixed Use standards in VMC [20.430.060](#).

3 A single ground floor caretaker/security/manager residence is allowed if it is an integral part of a mini-storage building.

4 All or part of residential uses must be located above the ground floor of the structure as specified by VMC [20.430.060\(B\)\(2\)](#) with exception of Community Commercial (CC) zoned properties fronting Broadway Street and located within the Uptown Village District of the Vancouver City Center Subarea Plan (refer to VMC [20.430.020\(B\)](#)).

5 Must have a minimum density of 10 dwelling units/net acre.

6 Allowed pursuant to mixed use standards of VMC [20.430.060](#).

7 Residential Care Homes with six or fewer residents and any required on-site staff permitted by right in housing above the ground floor; all larger group home uses are permitted conditionally.

8 Eligible affordable housing projects must (a) demonstrate eligibility for Washington State Housing Finance Commission Low Income Housing Tax Credits by providing at least 40 percent of units affordable to households at 60 percent of Area Median Income or otherwise as demonstrated eligible for credits; (b) include a guarantee that the threshold is maintained for at least 30 years unless specified longer by the finance commission; and (c) be located on properties whose borders are within 1,000 feet of a bus rapid transit or other high capacity transit corridor, or transit corridors with existing weekday peak service frequencies of 35 minutes or less, as indicated in the C-Tran 2018-2033 Transit Development Plan.

9 The language for this footnote has been deleted.

10 Subject to the provisions of Chapter [20.860](#) VMC, Home Occupations.

11 Subject to provisions of VMC [20.895.040](#), Community Recreation and Related Facilities.

12 The language for this footnote has been deleted.

13 Family day care homes for no more than 12 children are permitted when licensed by the state. Child care centers (13 or more children) are Limited (L), subject to a Type II procedure in Chapter [20.210](#) VMC. Child care centers can also be approved as part of a Planned Development, Chapter [20.260](#) VMC. In all cases child care centers must meet the standards outlined in Chapter [20.840](#) VMC.

14 In the CN zone, adult day care facilities for six or fewer adults allowed outright in the CN zone, all other facilities are permitted as conditional uses.

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- 15** The language for this footnote has been deleted.
- 16** The language for this footnote has been deleted.
- 17** Transportation facilities are permitted except for large or land-intensive facilities such as park-and-ride lots and water taxi and ferry stations.
- 18** Bed-and-breakfast establishments are allowed as limited uses, subject to the provisions in Chapter [20.830](#) VMC, and all other lodging allowed as conditional uses.
- 19** Limited uses subject to the development standards in VMC [20.430.040\(D\)](#).
- 20** Eating and drinking establishments are permitted only in conjunction with another permitted use on site. Exclusively or predominantly drive-through eating and drinking establishments are prohibited.
- 22** Limited uses subject to the development standards in VMC 20.430.050(B).
- 23** Subject to provisions in Chapter [20.820](#) VMC, Adult Entertainment.
- 24** Provisions in VMC [20.895.060](#) apply to Indoor Target Shooting Ranges.
- 25** Pawnshops allowed in CX and CG Districts only. No more than four pawnshop establishments allowed in the CX District.
- 26** Subject to provisions in Chapter [20.885](#) VMC, Temporary Uses.
- 27** Sales/rental lots for motor vehicles only are subject to the following criteria: (a) the lot size is approximately 200 feet by 200 feet, or 100 feet by 100 feet if a corner lot, though smaller lots will be considered if shown to meet all other requirements; (b) reviewed and approved by the city transportation manager for on-site circulation, access, and parking plan; (c) located on a primary arterial with average traffic in excess of 10,000 vehicle trips per day; (d) employee/customer parking is provided at a rate of one space plus an additional space per each 5,000 square feet of lot area; (e) there is no vehicle display in setback areas, and all setbacks are landscaped rather than paved.
- 28** Subject to provisions in VMC [20.895.070](#), Motor Vehicle Fuel Sales and Repair.
- 29** The language for this footnote has been deleted.
- 30** Micro-breweries and manufacturing of optical, medical and dental devices, goods, and equipment allowed by conditional use; all others prohibited.
- 31** Micro-breweries, bakeries, printing, publishing, binding, lithography, repair shops for tools, scientific/professional instruments and motors, and manufacturing of optical, medical and dental devices, goods, and equipment allowed outright; all others prohibited.
- 32** Micro-breweries allowed by conditional use; all others prohibited.
- 33** Subject to provisions in VMC [20.895.020](#), Animal Kennel/Shelters.
- 34** Subject to provisions in VMC [20.895.030](#), Cemeteries.
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- 35** Secure Transition Facilities as per VMC [20.855.020\(B\)\(6\)\(a\)](#) are prohibited.
- 36** Subject to the provisions in Chapter [20.850](#) VMC, Dog Day Care.
- 37** Subject to provisions in VMC [20.895.080](#), Private Landing Strips and Heliports. Airpark related uses are permitted in Pearson Airpark and Evergreen Airport only.
- 38** The language for this footnote has been deleted.
- 39** Subject to requirements in Chapter [20.890](#) VMC, Wireless Telecommunications Facilities.
- 40** Subject to limitations in VMC [20.430.050\(A\)](#). Uses defined in VMC [20.160.020\(C\)\(10\)](#).
- 41** Printing, binding, lithography, repair shops for tools, scientific/professional instruments and motors, computer research or assembly, and manufacturing of optical, medical and dental devices, goods and equipment permitted outright; all others prohibited.
- 42** Ground floor residential is allowed within the CX zone with the exception of properties fronting Main Street between Sixth Street and Mill Plain.
- 43** Parking structures are permitted outright.
- 44** Allowed subject to provisions of Riverview Gateway Plan District Standards, Chapter [20.680](#) VMC, and associated Master Plan adopted for the area of proposed development.
- 45** Motor vehicle rental permitted where ancillary to another use.
- 46** Retail uses shall not exceed 50,000 square feet in total floor space unless included in a mixed use building with other uses accounting for at least 20 percent of floor space, and is in full compliance with Riverview Plan District Design Guidelines.
- 47** Neighborhood recycling and/or yard debris collection centers which are exempt from a state solid waste handling permit are permitted; all other waste-related uses prohibited. If a neighborhood recycling and/or yard debris collection center is handling organic materials, they shall not be stored on site for a period longer than seven days.
- 48** See VMC [20.430.040\(E\)](#), Park and Ride Facility Development Standards.
- 49** Subject to Chapter [20.884](#) VMC.
- 50** Subject to requirements and standards within the Miscellaneous Special Use Standards for Self-Service Storage, pursuant to VMC [20.895.100](#).
- 51** Allowed subject to the provisions of the Heights District Plan standards, Chapter [20.670](#) VMC.
- 52** Permitted in the HX Plan district where commercial uses are permitted.

(Ord. M-4341 § 3 (Exh. B), 2021; Ord. M-4289 § 4, 2019; Ord. M-4288 § 4, 2019; Ord. M-4255 § 8, 2018; Ord. M-4254 § 3(DD), 2018; Ord. M-4187 § 7, 2016; ACM dated 1/7/2016; Ord. M-4147 § 4, 2015; Ord. M-4071 § 4, 2014; Ord. M-4035 § 4, 2012; Ord. M-4034 § 13, 2012; Ord. M-4024 § 8, 2012; Ord. M-4002 § 7, 2011; Ord.

M-4002 § 7, 2011; Ord. M-3959 § 26, 2010; Ord. M-3931 § 16, 2009; Ord. M-3922 § 22, 2009; Ord. M-3911 § 5, 2009; Ord. M-3891 § 5, 2008; Ord. M-3865 § 3, 2008; Ord. M-3840 § 22, 2007; Ord. M-3832 § 6, 2007; Ord. M-3730 § 19, 2005; Ord. M-3709 § 9, 2005; Ord. M-3701 § 17, 2005; Ord. M-3698 § 5, 2005; Ord. M-3667 § 3, 2004; Ord. M-3663 § 17, 2004; Ord. M-3643, 2004)

Chapter 20.440

INDUSTRIAL DISTRICTS

Sections:

20.440.010	Purpose.
20.440.020	List of Zoning Districts.
20.440.025	Industrial Zone Function and Location Criteria.
20.440.030	Uses.
20.440.040	Development Standards.
20.440.050	Additional OCI Development Standards.

20.440.010 Purpose.

A. *Provide a range of industrial services for City residents.* One of the major purposes of the regulations governing development in industrial zoning districts is to ensure that a full range of job opportunities are available throughout the City so that residents can work close to home if they choose. The location of land within each industrial district must be carefully selected and design and development standards created to minimize the potential adverse impacts of industrial activity on established residential areas.

B. *Facilitate economic goals.* Another purpose of these regulations is to ensure that there is a full range of economic activities and job opportunities within the City limits, in compliance with the economic goals of the City of Vancouver Comprehensive Plan. (Ord. M-3643, 01/26/2004)

20.440.020 List of Zoning Districts.

A. OCI: Office Commercial Industrial. The OCI zoning district provides appropriate locations for office, light industrial and small-scale commercial uses (e.g., restaurants, personal services and fitness centers) either singly or in combination. Only those light industrial uses with no off-site impacts, e.g., noise, glare, odor, vibration, outdoor storage, or process visibility are permitted in the OCI zone. In addition to mandatory site plan review, design and development standards in the OCI zone have been adopted to ensure that developments will be well-integrated, attractively landscaped, and pedestrian friendly. The OCI zone combines two zones that were referred to as the Office Campus (OC) and Industrial Commercial (MC) zones prior to March 11, 2004.

B. IL: Light Industrial. The IL zoning district provides appropriate locations for combining light, clean industries including industrial service, manufacturing, research/development, warehousing activities, and general office uses and limited retail. These activities do not require rail or marine access and have limited outdoor storage.

C. IH: Heavy Industrial. The IH zoning district provides appropriate locations for intensive industrial uses including industrial service, manufacturing and production, research and development, warehousing and freight movement, railroad yards, waste-related and wholesale sales activities. Activities in the IH zone include those that involve the use of raw materials, require significant outdoor storage and generate heavy truck and/or rail traffic. Because of these characteristics, IH-zoned property has been carefully located to minimize impacts on established residential, commercial and light industrial areas.

D. ECX: Employment Center Mixed-Use. The ECX zoning district is designed to provide for a concentrated urban mix of office, light industrial and small-scale commercial uses (e.g., restaurants, personal services and fitness centers) either singly or in combination in the Section 30 Employment Center Plan District. Only those light industrial uses with no off-site impacts, e.g., noise, glare, odor, vibration, outdoor storage, or process visibility are permitted in the ECX zone. In addition, the ECX zoning district provides for optional Urban Neighborhood Overlay(s), allowing for two concentrated urban mixed-use commercial/residential neighborhoods. Mandatory master planning and development standards in the ECX zone have been adopted to ensure that developments will be well-integrated, attractively landscaped, and pedestrian friendly. (Ord. M-3930 § 6, 10/05/2009; Ord. M-3730 § 24, 12/19/2005; Ord. M-3643, 01/26/2004)

20.440.025 Industrial Zone Function and Location Criteria.

A. *General Criteria.* Increasing industrially zoned land shall be favorably considered when such action will provide additional opportunities for business expansion, retention of manufacturing and other industrial firms, or increased employment, especially employment that adds to or maintains the diversity of job opportunities.

B. *OCI (Office-Commercial-Industrial) Location Criteria.* The OCI (Office-Commercial-Industrial) zone designation is most appropriate in areas generally characterized by the following:

1. Areas with existing concentrations of technology-oriented, research and development, and professional service uses or close proximity to major institutions capable of utilizing or supporting new technology-oriented, research and development, and professional service businesses.
2. Existing light or heavy industrial areas which are undergoing a transition to predominantly office and/or mixed commercial and industrial activity.
3. Areas which are underutilized and could provide the type of environment attractive for new technology-oriented, research and development, and professional service office-style development.
4. Areas with access primarily along major highways and arterials, preferably well served by transit.

C. *IL (Light Industrial) Location Criteria.* The Light Industrial (IL) zone designation is most appropriate in areas generally characterized by the following:

1. Areas that are currently developed with a mix of industrial activity and related or limited commercial uses;
 2. Areas that, because of their size, isolation, or separation by another type of zone or major physical barrier (such as a topographic break, major arterial, waterway, or open space) can accommodate more industrial activity without conflicting with the function of nearby commercial and residential activity.
 3. Areas with adequate access to the existing and planned arterial street network, such that additional trips generated by increased industrial activity in the area can be
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accommodated without conflicting with the access and circulation needs of nearby commercial and residential activity.

4. Large parcels of land with generally flat topography;
5. Adequate water, sewer, and fire protection services are available.

D. *IH (Heavy Industrial) Location Criteria.* The IH (Heavy Industrial) zone designation, as defined above, is most appropriate in areas generally characterized by the following:

1. Areas with suitable water access for marine industrial activity and/or directly served by major freight rail lines serving industrial businesses;
2. A character established by existing industrial uses and related commercial activity including manufacturing use, warehousing, transportation, utilities, and similar activities;
3. Areas that, because of their size, isolation, or separation by a nonresidential zone or major physical barrier (such as a topographic break, major arterial, waterway, or open space) can accommodate more industrial activity without conflicting with the function of nearby commercial and residential activity.
4. Access by roads designed/developed to accommodate heavy load or high volume truck traffic, with minimal mixing with nonindustrial traffic.
5. Large parcels of land with generally flat topography;
6. Adequate water, sewer, and fire protection services are available. (Ord. M-3730, Added, 12/19/2005, Sec 23)

20.440.030 Uses.

A. *Types of uses.* For the purposes of this chapter, there are four kinds of use:

1. A permitted (P) use is one that is permitted outright, subject to all of the applicable provisions of this title.
 2. A limited (L) use is permitted outright providing it is in compliance with special requirements, exceptions or restrictions.
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3. A conditional use (C) is a discretionary use reviewed through the process set forth in Chapters [20.245](#) and [20.210](#) VMC, governing conditional uses and decision-making procedures, respectively.

4. A prohibited use (X) is one that is not permitted in a zoning district under any circumstances.

5. Uses may also be subject to restrictions and standards set forth in the Water Resource Protection Ordinance (VMC Title [14](#)).

B. *Use table.* A list of permitted, limited, conditional, and prohibited uses in the industrial zoning districts is shown in Table 20.440.030-1.

Table 20.440.030-1. Industrial Zoning Districts Use Table

USE	OCI ²⁰	IL ¹	IH	ECX ²⁷
RESIDENTIAL				
Household Living	L ²	L ²	L ²	L ²⁸
Group Living	P ²¹ /X	X	X	P ²¹ /X
Home Occupation	L ³	L ³	L ³	L ³
HOUSING TYPES				
Single Dwelling, Attached	L ²	X	X	L ²⁸
Single Dwelling, Detached	X	X	X	X
Accessory Dwelling Units	X	X	X	X
Duplexes	L ²	X	X	L ²⁸
Multi-Dwelling Units	L ²	X	X	L ²⁸
Existing Manufactured Home Developments	X	X	X	X
Designated Manufactured	X	X	X	X
New Manufactured Homes	X	X	X	X

USE	OCI ²⁰	IL ¹	IH	ECX ²⁷
CIVIC (Institutional)				
Basic Utilities	P	P	P	P
Colleges	X	X	X	C
Community Centers	P	X	P	P
Community Recreation	L ²⁴	P	X	L ²⁴
Cultural Institutions	X	P	X	P
Day Care				
- Child Care Center	L ⁴	L ⁴	X	L ⁴
- Adult Day Care	P	P	X	P
Emergency Services (except ambulance services)	P	P	P	P
Medical Centers	C	X	X	P
Parks/Open Space				
- Neighborhood Parks	P	P	P	P
- Community Parks	P	P	P	P
- Regional Parks	C	C	C	C
- Trails	P	P	P	P
Postal Service	X	P	P	X
Religious Institutions	X	X	X	X
Schools	X	X	X	X
Social/Fraternal Clubs	X	X	X	X
Transportation Facility	P/X ²⁶	P	P	P/X ²⁶
Park and Ride Facilities				
Surface	X	L ³¹	L ³¹	X

USE	OCI²⁰	IL¹	IH	ECX²⁷
Structure	L ³¹	L ³¹	L ³¹	L ³¹
COMMERCIAL				
Commercial and Transient Lodging	X	X	X	P
Eating/Drinking Establishments	L	L ⁵	L ⁵	L ⁶
Entertainment-Oriented				
- Adult Entertainment	X	L ⁷	L ⁷	X
- Indoor Entertainment	X	X	X	X
- Major Event Entertainment	X	X	X	X
Artisan Small Scale Manufacturing	X	X	X	P
General Retail				
- Sales-Oriented	L	L ⁶	L/C ⁶	L ⁶
- Personal Services	L	L ⁶	X	L ⁶
- Repair-Oriented	L	L ⁶	X	L ⁶
- Bulk Sales	X	X	X	X
- Outdoor Sales	X	X	P	X
Motor Vehicle Related				
- Motor Vehicle Sales/Rental	X	X	X	X
- Motor Vehicle Servicing/Repair	X	L ⁸	L ⁸	X
- Vehicle Fuel Sales	X	X	L ⁸	L ^{8, 29}
- EV Basic Charging Stations (accessory and stand-alone)	P	P	P	P
- EV Rapid Charging Stations (accessory and stand-alone)	P	P	P	P

USE	OCI ²⁰	IL ¹	IH	ECX ²⁷
- EV Battery Exchange Stations	P	P	X	P
Office				
- General	P	P	L/C ⁹	P
- Medical	P	P	X	P
- Extended	P	P	X	P
Marina (See also Chapter 20.760 VMC)	X	C	X	X
Nonaccessory Parking	C ¹⁰	L ¹⁰ /X	X	L ³⁰
Self-Service Storage	P ³⁵	P ³⁵	X	X
INDUSTRIAL				
Industrial Services	P	P	P	P
Manufacturing and Production	P	P ¹¹	P ¹¹	P
Railroad Yards	X	X	P	X
Bulk Fossil Fuel Storage and Handling Facilities	X ³⁴	X ³⁴	X/L/C ³⁴	X ³⁴
Cleaner Fuel Storage and Handling Facilities	X	X	C ³⁷	X
Small Fossil Fuel Storage and Distribution Facilities	X	X	C³⁷	X
Petroleum/Oil Refineries	X	X	X	X
Research and Development	P	P	C	P
Warehouse/Freight Movement	X	L ¹²	P	X
Waste-Related	X	X	P ²² /X	X
Wholesale Sales	P	L ¹²	X	X
Major Utility Facilities	X	X/P ³²	L ³³	X

USE	OCI ²⁰	IL ¹	IH	ECX ²⁷
OTHER				
Agriculture/Horticulture	X	P	P	X
Airport/Airpark	X	L ¹⁹	P	X
Animal Kennel/Shelters	X	L ¹⁷	L ¹⁷	X
Cemeteries	X	X	C	X
Detention and Post Detention Facilities	X	C/X ¹³	C ¹⁴	X
Dog Day Care	L ¹⁵	L ¹⁵	L ¹⁵	L ¹⁵
Heliports	C	C	C	C
Medical Marijuana Cooperatives	X	X	X	X
Recreational Marijuana Retail	X	X	X	X
Recreational Marijuana Growing or Processing	X	L ³⁶	L ³⁶	X
Mining	C ¹⁸	C ¹⁸	C ¹⁸	C ¹⁸
Rail Lines/Utility Corridors	P/X ²³	P	P	P/X ²³
Wireless Communication Facilities	L ¹⁶	L ¹⁶	L ¹⁶	L ¹⁶

1 Due to the unique character and combination of uses in the Columbia Business Center area, uses existing prior to March 11, 2004, on parcels zoned IL in the Columbia Business Center may be altered, expanded or replaced regardless of use limitations in Table 20.440.030-1.

2 In the OCI zone, multifamily housing allowed above ground floor only as specified by VMC [20.430.060\(B\)\(2\)](#). In all industrial zones, one caretaker residence permitted per use.

3 Subject to the conditions in Chapter [20.860](#) VMC, Home Occupations.

4 Child care centers allowed as a Limited (L) use, subject to a Type II procedure. Child care centers are permitted in order to provide service for those employees working in the IL district, subject to provisions in Chapter [20.840](#) VMC, Child Care Centers.

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- 5** If within an industrial building, these uses shall consume no more than 10 percent of the building's total gross square footage. If freestanding, they shall be considered together with the rest of the project and shall consume no more than 10 percent of the site's total gross square footage.
- 6** These limited uses, separately or in combination, may not exceed 20 percent of the entire building square footage within a development complex. No retail uses shall exceed 40,000 gross square feet (gsf) per building or business; retail uses greater than 40,000 gsf but less than 60,000 gsf require conditional use review.
- 7** Subject to provisions in Chapter [20.820](#) VMC, Adult Entertainment.
- 8** Subject to provisions in VMC [20.895.070](#), Motor Vehicle Fuel Sales and Repair.
- 9** Offices not accessory to a permitted use may not exceed 40,000 gsf; offices greater than 40,000 gsf but less than 60,000 gsf require conditional use review.
- 10** In the OCI zone, nonaccessory surface parking is conditionally permitted on brownfields where subsurface environmental constraints effectively preclude other uses, provided such development complies with applicable local, state and federal environmental standards. In the IL zone, nonaccessory surface parking is permitted, and nonaccessory structured parking is prohibited. In the ECX zone, nonaccessory structural parking only shall be permitted.
- 11** Electroplating and related uses not permitted.
- 12** Permitted as limited use provided all activities, except outdoor storage of materials, are wholly contained within building(s).
- 13** Secure Community Transition Facilities as per Chapter [20.150](#) VMC are prohibited.
- 14** In addition to other detention and post-detention facilities, Secure Community Transition Facilities are allowed by conditional use permit, subject to criteria set forth in VMC [20.855.020\(B\)\(6\)\(a\)](#).
- 15** Subject to provisions in Chapter [20.850](#) VMC, Dog Day Care.
- 16** Subject to requirements in Chapter [20.890](#) VMC, Wireless Telecommunications Facilities.
- 17** Subject to provisions in VMC [20.895.020](#), Kennels/Shelters.
- 18** Surface mining is only allowed by conditional use on sites of 20 acres or larger which are adjacent to existing mining operations. Reclamation activity for existing mining operations approved by the Washington State Department of Natural Resources is a permitted use in any nonresidential zoning district.
- 19** Allow airport/airpark related activities such as hangars, air cargo, and warehousing, pilot schools, aircraft sales and repairs, aviation clubs, and museum in the Light Industrial District (IL). New airports/airparks are prohibited.
- 20** All uses locating the OCI zone shall comply with the special use limitations of VMC [20.440.040\(C\)](#) and [20.440.050\(A\)](#). Development agreements in existence on the effective date of the ordinance codified in this section shall control the uses and development standards of the affected properties. In order to protect the
-

investments made in reliance upon such agreements, improvements made or site plans approved consistent with these agreements shall not be deemed nonconforming.

21 Existing legally established group living uses are permitted. New group living is prohibited.

22 Ten-day hazardous waste handling and transfer facilities, excluding facilities handling radioactive or high explosive materials, are allowed, provided such facilities: (a) do not repackage waste (except as necessary to address damaged or improper packaging); (b) are located at least 200 feet from any residential zoning district; and (c) do not store hazardous wastes (except for "universal wastes," as that term is defined in Code of Federal Regulations, Title [40](#), Part 273) for more than 10 days.

23 Prohibited within 200 feet of a residential zone.

24 Subject to provisions of VMC [20.895.040](#), Community Recreation and Related Facilities.

25 The language for this footnote has been deleted.

26 Transportation facilities are permitted except for large or land-intensive facilities such as water taxi and ferry stations.

27 All uses locating in the ECX zone shall comply with Chapter [20.690](#) VMC, Section 30 Employment Center Plan District. Development agreements in existence on the effective date of this ordinance shall control the uses and development standards of the affected properties, unless property owners choose differently as provided under VMC [20.690.030](#). In order to protect the investments made in reliance upon such agreements, improvements made or site plans approved consistent with these agreements shall not be deemed nonconforming.

28 In the ECX zone, multi-family housing is allowed above ground floor only; and one caretaker residence permitted per use.

29 Vehicle fuel sales is limited to one operation within the Section 30 Plan District

30 The language for this footnote has been deleted.

31 See VMC [20.430.040\(E\)](#), Park and Ride Facility Development Standards.

32 Major Utility Facilities are prohibited with the exception that sewer treatment plants and lagoons are allowed outright.

33 ~~Coal-fired electricity generating plants are prohibited in all districts.~~ Biomass and coal generating plants are prohibited on Heavy Industrial zoned properties within the Vancouver City Center Subarea and Hough Neighborhood Association boundaries located west of Lincoln Street and east of the Burlington Northern Sante Fe Railroad tracks.

34 New bulk fossil fuel storage and handling facilities are prohibited. Maintenance and safety improvements to existing bulk fossil fuel storage and handling facilities are allowed subject to compliance with requirements in VMC 20.895.110. Existing bulk fossil fuel storage and handling facilities including vested projects as of [\[insert date of ordinance\]](#), ~~are prohibited to~~ may convert to Cleaner Fuels and as part of such

conversion may expand the amount of storage by up to 15 percent of the baseline capacity subject to a Conditional Use Permit and compliance with the requirements of VMC 20.895.110. .

35 Subject to requirements and standards within the Miscellaneous Special Use Standards for Self-Service Storage, pursuant to VMC [20.895.100](#).

36 Subject to compliance with Chapter [20.884](#) VMC, Marijuana Businesses.

37 Subject to compliance with VMC 20.895.110.

Chapter 20.450

OPEN SPACE DISTRICTS

Sections:

20.450.010	Purpose.
20.450.020	List of Open Space Districts.
20.450.030	Uses.
20.450.040	Development Standards.
20.450.050	Special Provisions for Uses.

20.450.010 Purpose.

Generally. Open space districts are intended to protect, preserve, conserve, and enhance natural areas, greenways, and parks. Together, the open space districts are intended to provide a full range of passive and active uses as well as environmental protection and enhancement for the future use, understanding, and enjoyment of the City and its residents. (Ord. M-3643, 01/26/2004)

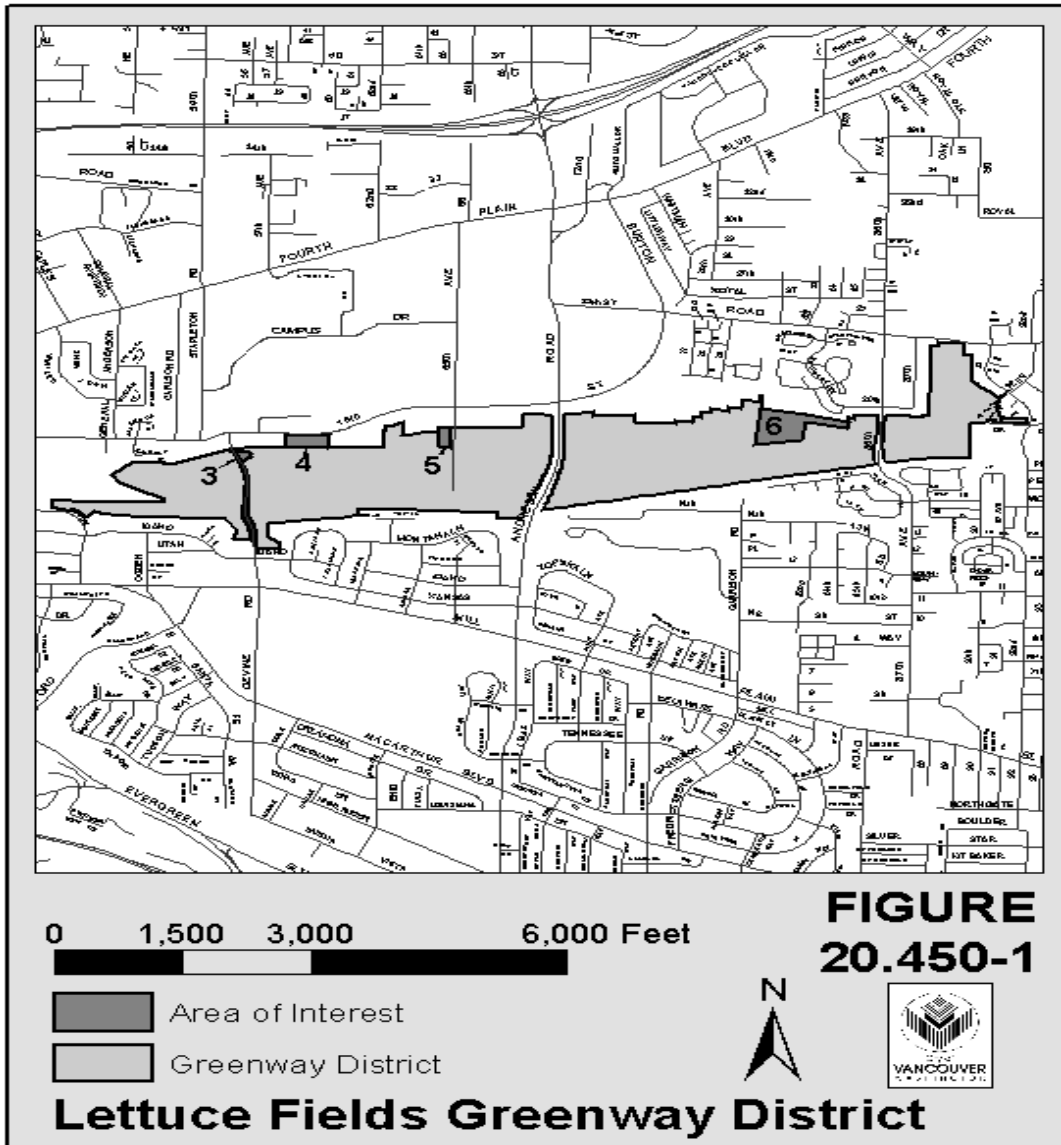
20.450.020 List of Open Space Districts.

A. NA: Natural Areas. The Natural Areas District is intended to protect and preserve properly functioning habitat conditions to support the natural ecosystem of an area. Uses and activities

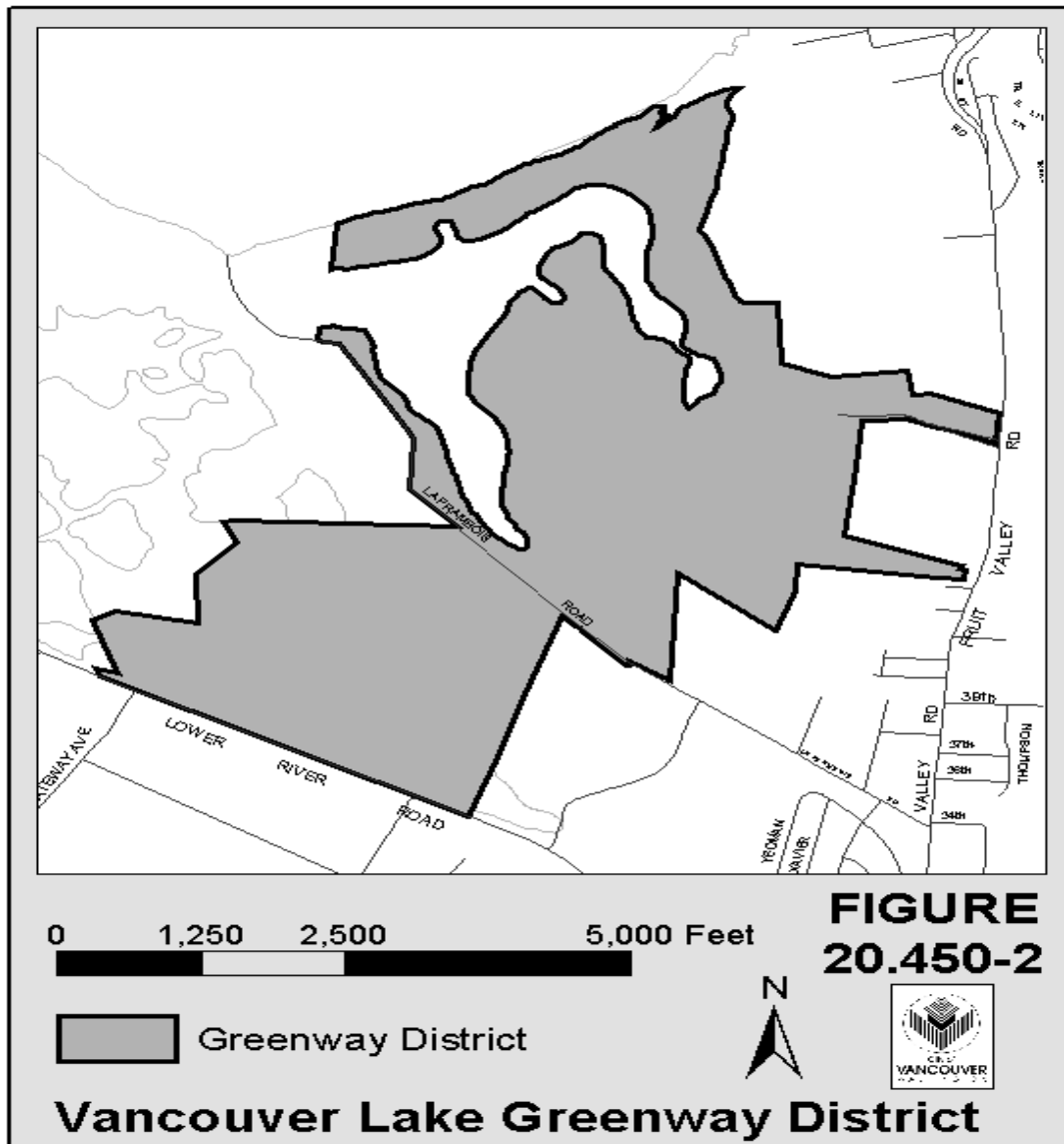
to maintain and/or enhance the ecosystem and passive uses and activities are appropriate for these areas.

B. GW: Greenway. The Greenway District is intended to preserve, conserve, and enhance natural features to support water quality, habitat, public access, and education, contributing to Vancouver' s quality of life. Passive and low impact, low-intensity uses and activities are appropriate for these areas. The Greenway District consists of a set of greenways. Some are regulated individually to achieve their special purposes.

1. GW-Lettuce Fields Greenway District (Figure 20.450- 1). The Lettuce Fields Greenway District implements the Lettuce Fields Subarea Plan. The Lettuce Fields Greenway District is intended to effect (1) establishment of a continuous greenway throughout the District and the preservation and enhancement of its open space character; (2) enhancement and maintenance of the environmental conditions of the district, including fish and wildlife habitat; (3) provision of physical as well as visual public access to the publicly-owned lands of the district, including development of a pedestrian and bicycle trail connecting to established or planned trails on the east and west; (4) provision of environmental education opportunities; (5) enhanced stormwater and flood plain management; and (6) other passive or low-intensity, low-impact uses which further the public interest as stated in this section.



2. GW-Vancouver Lake Greenway District (Figure 20.450- 2). The Vancouver Lake Greenway District is intended to encourage the preservation of agricultural and wildlife use on land which is suited for agricultural production, and to protect from incompatible uses agricultural areas that are highly valuable seasonal wildlife habitat. The district provides for activities which can be considered accessory only to agricultural, game, or wildlife habitat management, or recreational uses. Nothing in this chapter shall be construed to restrict normal agricultural practices.



3. GW: General Greenway District. The General Greenway District is intended to encourage preservation, conservation, and enhancement of natural areas in dispersed locations outside of the Lettuce Fields Greenway District or the Vancouver Lake Greenway District.

C. *Park*. The Park District is land that has been or is intended to be developed to provide for moderate- to high-intensity recreational activities in addition to passive or low-intensity recreational experiences. Environmental preservation, conservation, and enhancement are also objectives in the development and maintenance of park districts. Park districts will generally

consist of neighborhood, community, and regional parks as defined by the Vancouver Urban Parks, Recreation, and Open Space Plans. (Ord. M-3643, 01/26/2004)

20.450.030 Uses.

A. *Types of uses.* For the purposes of this chapter, there are four kinds of use:

1. A permitted (P) use is one that is permitted outright, subject to all of the applicable provisions of this title. Although permitted by right, most of these uses are still subject to the Site Plan Review, as governed by Chapter [20.270](#) VMC.
2. A limited (L) use is permitted outright providing it is in compliance with special requirements, exceptions or restrictions. Most uses also are subject to Site Plan Review, as governed by Chapter [20.270](#) VMC. If not subject to Site Plan Review, such a use may be subject to a Type I review, per the requirements in VMC [20.210.040](#).
3. A conditional use (C) is a discretionary use reviewed by the hearings examiner. The approval criteria and approval process are set forth in Chapters [20.245](#) and [20.210](#) VMC, governing conditional uses and decision-making procedures, respectively.
4. A prohibited use (X) is one that is not permitted in a zoning district under any circumstances.

B. *Use tables.* Lists of permitted, limited, conditional, and prohibited uses in Open Space Districts are presented in Tables 20.450.030-1 and 20.450.030-2. Specialized open space uses and activities are set forth in Table 20.450.030-1. Uses described in the Use Classification section (Chapter [20.160](#) VMC), are set forth in Table 20.450-2. Special limitations on uses are set forth in VMC [20.450.050](#).

Table 20.450.030-1 Specialized Open Space Uses/Activities					
		Greenway			
USE	Natural Area	Vancouver Lake	Lettuce Fields ¹	General	Park
OPEN SPACE/ PARKS AND					

**Table 20.450.030-1
Specialized Open Space Uses/Activities**

USE	Natural Area	Greenway			Park
		Vancouver Lake	Lettuce Fields ¹	General	
RECREATION					
Agricultural Related ²					
- Agriculture ²	X	L	L ³	X/ L ⁴	L ⁴
- Horticulture ²	X	L	L	X/ L ⁴	L ⁴
- Silviculture ²	X	C	L	X/ L ⁴	L ⁴
- Roadside Agricultural Stands/Sales ²	X	L	L	X/L ⁴	L ⁴
- Storage Structures ²	X	L	L	L ⁴	L ⁴
- Housing for Agricultural Employees ²	X	X/C ⁵	X	C	X
Environmental Management and Education ²					
- Environmental Education Activities	P	P	P	P	P
- Environmental Maintenance Projects and Activities	P	P	P	P	P
- Environmental Restoration, Rehabilitation, or Enhancement Projects and Activities	P	P	P	P	P
Fences ²	X	P	L	P	P
Fill ²	C	L	L	L	P
Flood Plain and Stormwater Management Projects	C	C	P	P	P
Wetland Banking	C	C	P	P	P
Wetland Mitigation	C	C	P	P	P
Wildlife Habitat	P	P	P	P	P

**Table 20.450.030-1
Specialized Open Space Uses/Activities**

USE	Natural Area	Greenway			Park
		Vancouver Lake	Lettuce Fields ¹	General	
Conservation, Maintenance, Rehabilitation, Restoration, Enhancement, and Education Projects					
Park Facilities					
- Interpretive Stations, Construction and Maintenance ²	C	P	P	P	P
- Playgrounds	X	X	X	P	P
- Restrooms ²	C	L	L	L	P
- Neighborhood Parks	X	X	X	P	P
- Community Parks	X	X	X	P	P
- Regional Parks	X	X	X	X	P
Recreational Facilities					
- Passive or Low-Impact, Low-Intensity Uses	P	C ⁶	P	P	P
- Moderate or High-Impact, High-Intensity Uses	X	X	X	C	P
Motorized Recreational Equipment including Off-Road Vehicles and All Terrain Vehicles	X ⁷	X ⁷	X	X ⁷	C ⁷
- Community Recreation Facilities	X	X	X	X	P
- Trails ²	L	L	L	L	P
- Parking ²	C	L	L	L	P
- Informational and Interpretative Signs ²	P	P	L/X	P	P

1 All uses in the Lettuce Fields Greenway District are subject to the special provisions for uses in VMC [20.450.050\(A\)](#).

2 The use is allowed (P, L, or C) subject to all applicable development standards set forth in VMC [20.450.040](#).

3 Agricultural practices existing on or before April 19, 2001, may continue. New agricultural uses must meet the standards of VMC [20.450.040](#).

4 Permitted uses of this classification or type are limited to those in existence on the date this ordinance was effective.

5 The prohibition on housing for agricultural employees in the Vancouver Lake Greenway District does not include a prohibition for a caretaker residence (see Table 20.450.030-2).

6 Subject to the development standards in VMC [20.450.040\(D\)\(2\)](#).

7 Not including motorized boats where permitted on Vancouver Lake and the Columbia River.

Table 20.450.030-2					
Permitted, Limited, Conditional and Prohibited					
Uses in Open Space District					
		Greenway			
USE	Natural Area	Vancouver Lake	Lettuce Fields²	General	Park¹
RESIDENTIAL					
Household Living	X	X/L ³	X/L ³	X/L ³	X/L ³
Group Living	X	X	X	X	X
Home Occupation	X	X	X	X	X
HOUSING TYPES					
Single Dwelling, Attached	X	X	X	X	X
Single Dwelling, Detached	X	X/L ³	X/L ³	X/L ³	X/L ³
Accessory Dwelling Units	X	X	X	X	X
Duplexes	X	X	X	X	X
Multi-Dwelling Units	X	X	X	X	X

Table 20.450.030-2
Permitted, Limited, Conditional and Prohibited
Uses in Open Space District

USE	Natural Area	Greenway			Park ¹
		Vancouver Lake	Lettuce Fields ²	General	
Existing Manufactured Home Development	X	X	X	X	X
Designated Manufactured Home	X	X	X	X	X
New Manufactured Home	X	X	X	X	X
CIVIC (Institutional)					
Colleges	X	X	X	X	X
Community Centers	X	X	X	X	X
Community Recreation	X	X	X	X	P
Cultural Institutions	X	X	X	X	P
Day Care					
Family Day Care Home	X	L ⁴	X	X	P
Child Care Center	X	C ⁴	X	X	X
- Adult Day Care	X	C	X	X	P
Emergency Services	X	X	X	X	X
Medical Centers	X	X	X	X	X
Postal Service	X	X	X	X	X
Religious Institutions	X	X	X	X	X
Schools	X	C	X	X	P
Social/Fraternal Clubs	X	X	X	X	X

**Table 20.450.030-2
Permitted, Limited, Conditional and Prohibited
Uses in Open Space District**

USE	Natural Area	Greenway			Park ¹
		Vancouver Lake	Lettuce Fields ²	General	
COMMERCIAL					
Commercial and Transient Lodging	X	X	X	X	X
Eating/Drinking Establishments	X	X	X	X	X
Entertainment-Oriented					
- Adult Entertainment	X	X	X	X	X
- Indoor Entertainment	X	X	X	X	X
- Major Event Entertainment	X	X	X	X	X
General Retail					
- Sales-Oriented	X	X	X	X	X
- Personal Services	X	X	X	X	X
- Repair-Oriented	X	X	X	X	X
- Bulk Sales	X	X	X	X	X
- Outdoor Sales	X	X	X	X	X
Motor Vehicle Related					
- Motor Vehicle Sales/Rental	X	X	X	X	X
-Motor Vehicle Servicing/Repair	X	X	X	X	X
- Vehicle Fuel Sales	X	X	X	X	X

**Table 20.450.030-2
Permitted, Limited, Conditional and Prohibited
Uses in Open Space District**

USE	Natural Area	Greenway			Park ¹
		Vancouver Lake	Lettuce Fields ²	General	
- Electric Vehicle Re-charging Station	X	X	X	X	X
Office					
- General	X	X	X	X	X
- Medical	X	X	X	X	X
- Extended	X	X	X	X	X
Non-Accessory Parking	X	X	X	X	X
Self-Service Storage	X	X	X	X	X
Marina	X	X	X	X	X
INDUSTRIAL					
Bulk Fossil Fuel Storage and Handling Facilities	X	X	X	X	X
Cleaner Fuel Storage and Handling Facilities	X	X	X	X	X
Small Fossil Fuel Storage and Distribution Facilities	X	X	X	X	X
Industrial Services	X	X	X	X	X
Manufacturing and Production	X	X	X	X	X
Railroad Yards	X	X	X	X	X
Research and Development	X	X	X	X	X

**Table 20.450.030-2
Permitted, Limited, Conditional and Prohibited
Uses in Open Space District**

USE	Natural Area	Greenway			Park ¹
		Vancouver Lake	Lettuce Fields ²	General	
Warehouse/Freight Movement	X	X	X	X	X
Wholesale Sales	X	X	X	X	X
Waste-Related	X	X	X	X	X
OTHER					
Airport/Airpark	X	X	X	X	X
Animal Kennels/Shelters	X	X	X	X	X
Cemeteries	X	X	X	X	C ⁵
Detention Facilities	X	X	X	X	X
Dog Day Care	X	X	X	X	X
Heliports	X	X	X	X	X
Landfills, Sanitary	X	X	X	X	X
Mining	X	X	X	X	X
Public Facilities and Utilities					
- Essential Utilities	X	P	L ⁶	L ⁷	L ⁷
- Major Utilities	X	X	X/C ⁶	C	C
- - Essential Public Facilities	X	X	C ⁶	C	C
- - Other Major Utilities	X	X	X	C	C
- Minor Utilities	X	C	L ⁶	C ⁷	C ⁷
- Public Utility Corridors	X	C	C ⁶	C	C

Table 20.450.030-2
Permitted, Limited, Conditional and Prohibited
Uses in Open Space District

USE	Natural Area	Greenway			Park ¹
		Vancouver Lake	Lettuce Fields ²	General	
- Transportation Facilities	X	C	C ⁸ /X	C	C
Rail Lines	X	X	X	C	C
Recreational or Medical Marijuana Facilities	X	X	X	X	X
Temporary Uses	X	X	X	X	X
Wireless Communication Facilities	X	C/L ⁹	X	C ¹⁰	C

- 1** Parks shall be developed in accordance with the standards set forth in VMC [20.450.040](#).
- 2** All uses in the Lettuce Fields Greenway District are subject to the special provisions for uses in VMC [20.450.050\(A\)](#).
- 3** Caretaker residence or existing dwellings are permitted. In the Lettuce Fields Greenway District, only existing dwellings are permitted. New dwellings, including guest houses, accessory dwelling units, bed and breakfast establishments, etc. are prohibited. In the Vancouver Lake Greenway District, single-family dwellings require a minimum of 160 acres each.
- 4** Family day care homes for no more than 12 children are permitted when licensed by the state. Family day care homes and child care centers (13 or more children) must meet the standards outlined in Chapter [20.840](#) VMC.
- 5** Subject to the provisions of VMC [20.895.030](#), Cemeteries.
- 6** Subject to the development standards of VMC [20.450.040\(B\)\(5\)](#).
- 7** Plans for the construction or extension of essential utility services are to be reviewed and approved by development review staff. Utilities shall be installed underground or screened as to not be visible within the Greenway or Park. No septic fields are allowed.
- 8** Only transit stops and shelters and bicycle parking integrated with automobile parking at trailheads are permitted by conditional use. Other transportation facilities are prohibited.
- 9** Permitted subject to the requirements of Chapter [20.890](#) VMC.

10 Permitted only as co-location and through the conditional use process.

(Ord. M-4071 § 6, 03/03/2014; Ord. M-3709 § 11, 06/20/2005; Ord. M-3643, 01/26/2004)

Chapter 20.895

MISCELLANEOUS SPECIAL USE STANDARDS

Sections:

20.895.010	Purpose.
20.895.020	Animal Kennels/Shelters.
20.895.030	Cemeteries.
20.895.040	Community Recreation and Related Facilities.
20.895.050	Domestic Animals and Livestock.
20.895.060	Indoor Target Shooting Ranges.
20.895.070	Motor Vehicle Fuel Sales and Repair.
20.895.080	Private Use Landing Strips for Aircraft and Heliports.
20.895.090	Temporary Storage Units.
20.895.100	Self-Service Storage.
20.895.110	<u>Fossil Fuel or Cleaner Fuel Storage and Handling</u>

20.895.010 Purpose.

Purpose. In addition to other standards and requirements imposed by this Title, all uses included in this Chapter shall comply with the provisions stated below. Should a conflict arise between the requirements of this Chapter and other requirements of this Title, the more restrictive provision shall control. (Ord. M-3643, 01/26/2004)

20.895.110 Fossil Fuel or Cleaner Fuel Storage and Handling

A. Purpose. The purpose of these standards is to minimize the risk of spill or discharge of fuels into groundwater or the waters of the state; to avoid and minimize impacts to nearby properties from fire or explosion; to support a reduction in greenhouse gas emissions and a transition to renewable fuel and energy production consistent with Federal, state and local targets; and to protect and preserve fish and wildlife habitat areas to ensure viable Tribal fisheries consistent with Treaty fishing rights.

B. Applicability. The standards in this section apply to:

1. Bulk Fossil Fuel Storage and Handling Facility
2. Cleaner Fuel Storage and Handling Facility
3. Small Fossil Fuel or Cleaner Fuel Storage and Distribution Facilities

C. Standards – Non-Capacity Improvements. The City may approve activities or structures for one or more of the following purposes as a limited use, provided there is no increase in baseline capacity:

1. Maintenance.
2. Improvement of the safety or security of the infrastructure, including seismic upgrades.
3. Decrease in air or water emissions.
4. Allow the facility infrastructure or buildings to meet new regulatory requirements.
5. Addition of accessory structures or activities that do not add to the baseline capacity of the facility.

The applicant for non-capacity improvements shall specify the baseline capacity for the facility as of the date of this ordinance per subsection E.2 below.

D. Standards for New or Expanded Small Fossil Fuel or Cleaner Fuel Storage and Distribution Facilities

1. The applicant shall document the existing baseline, and any proposed additional storage capacity and the fuel type(s) to be stored. Documentation shall be consistent with subsection E.2 below.

2. The Planning Official shall require seismic upgrades to existing facilities as a condition of the land use permit.

3. The applicant shall obtain approval of comprehensive spill prevention and fire response plans to the satisfaction of the Planning Official and Fire Marshal.

E. Standards for Bulk Fossil Fuel Storage and Handling Facilities – New or Capacity Expansion

1. New Facilities. New Bulk Fossil Fuel Storage and Handling Facilities are prohibited, regardless of size.

2. Baseline Established. The baseline for storage, transportation, and transshipment facilities is established by the following information available as of (insert the adoption date of this ordinance). Storage baseline capacity shall be established using Washington Department of Ecology industrial section permits and oil spill prevention plans or other verifiable documentation. Transshipment and transportation facility baseline is established through the most recent spill prevention plans approved by the Department of Ecology or where a local permit documenting such facilities has been approved more recently. If an existing facility does not have an established refining or storage baseline from a past industrial section permit or spill prevention plan, the baseline must be established as part of a permit application.

3. Expansion of Bulk Fossil Fuel Storage and Handling Facilities is allowed up to 15 percent increase above the baseline capacity if converted to Cleaner Fuels, as defined by VMC 20.150 Definitions, and subject to the requirements of Section F below.

F. Standards for Cleaner Fuels Storage and Handling Facilities – New or Expansion.

1. New Cleaner Fuels Storage and Handling Facilities are prohibited in all districts.

2. Existing Bulk Fossil Fuel Storage and Handling Facilities may be converted to Cleaner Fuels as defined by VMC 20.150 Definitions as a limited use, subject to the requirements of subsections 3 b, c, and d below.

3. Existing Bulk Fossil Fuel Storage and Handling facilities converted to Cleaner Fuels may be expanded, subject to approval of a conditional use permit and compliance with the following criteria:

a. Total or partial conversion of an existing fossil fuel storage and handling to cleaner fuel infrastructure is allowed. If a facility is converted the facility may be increased by up to 15 percent above the baseline capacity.

b. If a fossil fuel storage and handling facility is partially or fully converted to cleaner fuel infrastructure that portion shall not be later used for storage, transportation, or transshipment of petroleum-based fossil fuels.

c. Restrictions on petroleum including in gaseous form, and petroleum fuel facilities, shall apply to such alternative fuels that are defined as Cleaner Fuels in VMC 20.150, and all references to hydrogen are limited to green hydrogen.

d. The applicant shall provide a comprehensive spill prevention plan and fire response plan to the satisfaction of the Planning Official and Fire Marshal.

e. Seismic upgrades pursuant to current building code requirements shall be made to any existing fuel storage facilities.

f. GHG Assessment: Greenhouse gas emissions impacts shall be assessed for expanded facilities. The proponent is responsible to provide an expert evaluation by a qualified professional to the satisfaction of the Planning Official. The evaluation shall document baseline lifecycle greenhouse gas emissions from the facility, net increases in lifecycle greenhouse gas emissions, and mitigation of greenhouse gas emission increases. Lifecycle emissions shall be quantified as defined in 42 U.S. Code § 7545. The Planning Official shall require mitigation to address the project's direct greenhouse gas emissions and may require mitigation to address the project's indirect emissions. The assessment shall address mitigation, which may include, but is not limited to the one or more of following: onsite efficiency improvements, carbon capture and storage, purchase of carbon offsets from any carbon registry approved by the Vancouver Land Use Department or state agency, implementation of strategies in Vancouver's Climate Action Plan, or other measures approved by the Planning Official. The mitigation may concurrently satisfy any other requirements imposed by county, state or federal

governments. Mitigation shall be made conditions of approval, and shall be specific, identifiable, quantifiable, permanent; enforceable; and verifiable.

g. Financial Assurance in Case of Accidents. To ensure applicants are able to mitigate the consequences of accidents, proof of financial assurance (such as trust funds, letters of credit, insurance, self-insurance, financial tests, corporate guarantees, payment bonds or performance bonds) shall be provided sufficient to comply with the financial responsibility requirements set forth in any State and federal law applicable to their proposed project. If the applicant relies on an insurance policy for compliance with a State or federal financial assurance requirement, the applicant must add the City of Vancouver as an additional insured as a condition of permit issuance.

h. Annual Report. The applicant shall provide annual report to the Planning Official of the following:

i. A description of on-site storage capacity including the number of tanks, tank volumes, and products.

ii. The number of vessel transfers of fuel, both inbound and outbound from the site, the type and quantity of products transferred, and the product destination.

iii. The number of rail cars transporting fuels, both to and from the site, including a description of the product, volume, and destination.

iv. The number of trucks transporting fuels, both to and from the site, including a description of the product, volume, and destination.

v. Other Baseline monitoring. On an annual basis, the Planning Official will evaluate information from the U.S. Energy Information Administration, WA Department of Ecology, Southwest Washington Clean Air Agency, as well as from local permits, to ensure compliance with the requirements herein.

William Rasmussen

#332009 | July 6, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Attached is the City of Vancouver's proposed fossil fuel zoning code amendments.

Testimony is presented without formatting.

Emily Platt

#332010 | July 6, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

We are presently experiencing an existential climate crisis, and we need to rapidly curtail our use of fossil fuels. In addition, we are long overdue for a Cascadia subduction zone earthquake, which has the potential to cause catastrophic damage to the Willamette and Columbia rivers. For the reasons stated below I support strong Fossil Fuel Terminal Zoning Amendments. In addition, there should be no weakening of amendments because of industry "promises". Past evidence indicates that fossil fuels industries and supporters care only about money. These amendments are a necessary, first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments are a necessary step to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. Council should hold the line, and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds from reckless expansion. Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. This should be the beginning. Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits, and requiring the phaseout of fossil fuel storage in line with reducing demand. Renewable fuel, or biofuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude in 2021 as any year prior, even as it began moving biodiesel as well. Council should set a policy agenda of 100% electrification. The latest report from the International Energy Agency makes this point clear: to reach net zero emissions and a stable climate, transportation, heating, and industrial sectors must reach 100% electrification and cannot

remain dependent on combustion. Deploying renewable fuels should serve this purpose in the interim, not hinder it.

Testimony is presented without formatting.

John Nettleton

#332011 | July 6, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

These amendments are a necessary, first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments are a necessary step to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. Council should hold the line, and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds from reckless expansion. Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. This should be the beginning. Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits, and requiring the phaseout of fossil fuel storage in line with reducing demand. Renewable fuel, or biofuel, expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example,

Testimony is presented without formatting.

Thomas Karwaki

#332012 | July 6, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

The UPNA Board urges the City Council to approve the proposed Fossil Fuel Terminal Zoning Amendment Ordinance. The Ordinance as proposed will help reduce the damage caused by these facilities in the event of a major earthquake. The proposed ordinance is in line with state land use policy. The ordinance could be improved by including strict reporting requirements for renewable resource terminals or any facility expansions.

Testimony is presented without formatting.

Thomas Karwaki

#332013 | July 6, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

The UPNA Board urges the City Council to approve the proposed Fossil Fuel Terminal Zoning Amendment Ordinance. The Ordinance as proposed will help reduce the damage caused by these facilities in the event of a major earthquake. The proposed ordinance is in line with state land use policy. The ordinance could be improved by including strict reporting requirements for renewable resource terminals or any facility expansions.

Testimony is presented without formatting.

John Somdecerff

#332014 | July 6, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I support limiting any growth of fossil fuel infrastructure. I believe the science is clear that to avoid the worst affects of global warming we cannot build any more fossil fuel infrastructure, and, instead, must reduce the amount of fossil fuels we burn.

Testimony is presented without formatting.

Jean Miller

#332015 | July 6, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I join the many concerned citizens who urge the Portland City Council to readopt the Fossil Fuel Terminal Zoning Amendments. The threats posed to our city and its inhabitants, as well as to our precious Willamette River, by the aging and poorly sited fossil fuel tanks are well known. The proposed amendments would be a first measure toward mitigating the catastrophic harm which will result from the forecast level 9 Cascadia Earthquake. Further, the Council should require and enforce retrofitting of fuel tanks, as well as mandatory reporting of their usages. Also, I urge the adoption of a policy agenda of 100% electrification of the transportation, heating, and industrial sectors. Don't be dissuaded from acting in support of the mayor's stated goals in his 2020 Climate Emergency Declaration, by those who cite "economic" fallout from the proposed amendments; a bench at a Portland Streetcar stop in the Pearl District is incised with this anonymous quote: "The economy is a wholly owned subsidiary of the environment."

Testimony is presented without formatting.

Tania Neubauer

#332016 | July 6, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

We must never have another Zenith in Portland. The Willamette should be restored to health.

Testimony is presented without formatting.

Bonnie McKinlay

#332017 | July 6, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I was there when the Portland City Council unanimously adopted Resolution 37168 opposing expansion of fossil fuel infrastructure. The Council Chamber, its balcony and hallways were filled way beyond capacity. Community engagement was at a peak and we were peeking hopefully at a fossil fuel free city—”a model to the nation” everyone said. Today I watch the video recording of the June 30th Fossil Fuel Zoning Amendments, 2nd Remand Hearing. Much is different from that earlier uplifted Council meeting—now only a handful of testifiers in the Chamber, no Commissioners present. And yet, the sincerity of the 2022 speakers, whether testifying live or remotely, is as solid as when Mayor Hales, Commissioners Fritz, Fish, Novik and Saltzman responded with their ayes. Circumstances and a tragic lack of global action on climate has dulled some of the spirit. Commissioners, bring back that hopeful spirit, that commitment—vote for the future health and safety of our city.

Testimony is presented without formatting.

Walt Mintkeski

#332018 | July 7, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I strongly support these amendments which are a necessary, first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. As a recent report from Multnomah County and the City of Portland makes clear, Portland's fossil fuel storage hub poses catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments are necessary to protect the health of the Willamette and Columbia rivers and our communities by stopping the expansion of this dangerous fossil fuel infrastructure. The City Council should hold the line, and not weaken the amendments in exchange for industry promises, or make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should be made to retrofit their facilities. Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks, and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. Thank you for this opportunity to comment

Testimony is presented without formatting.

Theodora Tsongas

#332019 | July 7, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

To: Portland City Council Re: Re-adoption of the City of Portland's Fossil Fuel Terminal Zoning Amendments Via: Map App portal July 6, 2022 Dear Mayor and Councilors: Thank you for the opportunity to comment on this critically important public policy. These amendments are a necessary first step toward preparing the city to avert and reduce catastrophic harm from the forecasted Cascadia Subduction Zone earthquake, especially regarding the Critical Energy Infrastructure (CEI) Hub, by prohibiting the unlimited growth of dangerous fossil fuel infrastructure. But more action must be taken. The Council and the Bureau of Planning and Sustainability must move ahead on the next phase of the code amendments to reduce the seismic and safety risks in the CEI Hub and transition the region away from fossil fuels in partnership with Multnomah County, the State, and Tribal Nations, to require seismic safety updates at existing high risk infrastructure in the CEI Hub. Council should strengthen the amendments by clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Because Portland's fuel needs can be met with existing fossil fuel storage, pipelines and transport, renewable fuel storage should NOT supplement fossil fuel storage! Further, there needs to be a mechanism in place to ensure that new storage tank capacity that is allowed for renewable fuel storage is restricted to that use ONLY. Renewable fuel storage tanks must be classified as a limited use. An additional provision in the amendments is needed to explicitly prohibit those tanks from ever being used for fossil fuel storage. The City must also monitor and track which types of fuels are being stored in each facility's tanks. In addition, Council should clarify that existing storage tanks used for petroleum based products for non-fuel uses are NOT part of a facility's fossil fuel storage tank capacity, to avoid a loophole that would allow a facility to increase its handling and storage of fossil fuels by converting use of tanks from non-fuel to fuel uses. This is essential to avoid another Zenith travesty! Finally, Council should decline to weaken the Amendments in exchange for industry promises!!! No expansion can be allowed to incentivize seismic safety upgrades! The price is too high. Because terminal operators have shown that they will not implement upgrades voluntarily, it should be achieved through further regulation and should be an immediate priority for the Council. Further, the City should not allow any exemptions or allowances for either petroleum storage or gas expansion. Council should commit to further action to mitigate risk in the CEI Hub and advance citywide electrification. It is necessary to understand that the addition of more liquid fuels, renewable or otherwise, does not eliminate the seismic and soil liquefaction risks in the CEI Hub. The Council must recognize the potential pitfalls of increasing reliance on liquid biofuels that have pollution and public safety impacts. Deploying renewable fuels should serve to reduce emissions in

the interim, not hinder reaching net zero emissions. Thank you for your very hard work and for your attention to my comments and concerns. The health, safety, and resilience of our communities depend on the City implementing the amendments effectively. Theodora Tsongas, PhD, MS
Portland, Oregon

Testimony is presented without formatting.

Stephenie Frederick

#332020 | July 7, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Please do limit the size of new fossil fuel terminals and prohibit the expansion of fossil fuel storage tank capacity at existing fossil fuel terminals (with certain exceptions). We must take a stand.

Humanity has delayed too long!

Testimony is presented without formatting.

Jena Kain

#332021 | July 7, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Dear Commissioners & Mayor Wheeler: I am writing in support of the Fossil Fuel Terminal Zoning Amendment Agenda Item #603. As I tuned into last week's City Council meeting on the 30th at 2 pm, we heard from community members and activists in support of the FFTZA, who outlined the risks of the Critical Energy Infrastructure hub in NW Portland that are adjacent to two invaluable resources in the Pacific NorthWest and Portland, the Colombia River and Willamette in the likelihood of a Cascadia Subduction Zone Earthquake, that would be disastrous to the region given the aged storage facilities and spills that would result. The report by EcoNorthWest that was prepared for the Multnomah County Office of Sustainability outlines this risk unequivocally and should be taken in the most serious consideration to mitigate this future risk to residents, to the environment and to surrounding property. Portland's fossil fuel storage hub poses catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments are a necessary step to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. Council should hold the line, and not weaken the amendments in exchange for industry promises nor make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds from reckless expansion. Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. This is just the beginning. Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits and requiring the phaseout of fossil fuel storage in line with reducing demand. Council must set a policy agenda toward 100% electrification. Renewable, or bio-fuel expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude oil in 2021 as any year prior, even as it began moving biodiesel as well. Council should avoid this possibility by moving toward

full, citywide electrification—not more combustion. The importance of this ordinance and the beginnings of addressing the risks posed by the CEI Hub and preparing, retrofitting and limiting its expansion cannot be overemphasized. As a concerned citizen, I ask for your support to address this major risk in the city by passing this ordinance with the recommended changes above. You have an opportunity to leave a legacy of safety and sober consideration for the health & well-being of all Portlanders. Please take this opportunity to use your power for good to serve all of us in the City. Thank you so much. Jennifer Cho Kain Portland, OR

Testimony is presented without formatting.

Jennifer Cho Kain

#332022 | July 7, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

Dear Commissioners & Mayor Wheeler: I am writing in support of the Fossil Fuel Terminal Zoning Amendment Agenda Item #603. As I tuned into last week's City Council meeting on the 30th at 2 pm, we heard from community members and activists in support of the FFTZA, who outlined the risks of the Critical Energy Infrastructure hub in NW Portland that are adjacent to two invaluable resources in the Pacific NorthWest and Portland, the Columbia River and Willamette in the likelihood of a Cascadia Subduction Zone Earthquake, that would be disastrous to the region given the aged storage facilities and spills that would result. The report by EcoNorthWest that was prepared for the Multnomah County Office of Sustainability outlines this risk unequivocally and should be taken in the most serious consideration to mitigate this future risk to residents, to the environment and to surrounding property. Portland's fossil fuel storage hub poses catastrophic risk of spills, explosions, and toxic fumes in the event of the Cascadia Earthquake. These amendments are a necessary step to protect the health of the Willamette and Columbia rivers and our communities by stopping the reckless expansion of dangerous infrastructure. These amendments are important public policy, in line with Portland's Climate Emergency resolution, statewide planning goals, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. This ordinance has inspired local governments across the region to follow Portland and enact historic bans on new fossil fuel infrastructure. Council should hold the line, and not weaken the amendments in exchange for industry promises nor make any allowance for further fossil fuel storage expansion. Fossil fuel terminal owners should retrofit their facilities, but this should not come at the expense of further increasing risk to our communities and watersheds from reckless expansion. Council should go further to strengthen the amendments, clarifying potential loopholes and establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks and could potentially use this ambiguity to free up space for more fossil fuels. Likewise, any renewable fuel storage development must come with mandatory reporting requirements so more fossil fuel storage is not created under the guise of renewables. This is just the beginning. I ask that the Council commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits and requiring the phaseout of fossil fuel storage in line with reducing demand. I strongly recommend that the Council set a policy agenda toward 100% electrification. Renewable, or bio-fuel expansion increases seismic risks in the short and long term if it does not replace fossil fuel storage. Zenith Energy, for example, moved as much or more crude oil in 2021 as any year prior, even as it began moving biodiesel as well. Council should avoid this

possibility by moving toward full, citywide electrification—not more combustion. The importance of this ordinance and the beginnings of addressing the risks posed by the CEI Hub and preparing, retrofitting and limiting its expansion cannot be overemphasized. As a concerned citizen, I ask for your support to address this major risk in the city by passing this ordinance with the recommended changes above. You have an opportunity to leave a legacy of safety and sober consideration for the health & well-being of all Portlanders. Please take this opportunity to use your power for good to serve all of us in the City. Thank you so much. Jennifer Cho Kain Portland, OR

Testimony is presented without formatting.

Tara Kreft

#332023 | July 7, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I was part of an Americorps team that aided in clean up after hurricane Katrina in the gulf. A common slogan painted on totaled houses at that time was "damaged by Katrina, RUINED by Murphy Oil!" Because over 800,000 gallons of crude oil was spewed into a neighborhood in St. Bernard Parish when the hurricane hit. over 1700 homes were effected, a good portion of them permanently. We are one earthquake away from similar devastation. These amendments are an integral part of the survival of Portlanders -- both in the wake of a disaster, and in our long-term survival in the face of the climate crisis. Murphy oil didn't have to pay enough for the damage they caused. the cost of attempting to amend that disaster hasn't come close to being paid. We can't afford to weaken these amendments, and fossil fuel companies can afford to retrofit their facilities! We need to move forward with the goal of phasing out fossil fuels and moving to 100% electrification as soon as possible, and this is just the first step!

Testimony is presented without formatting.

Heather Larimer

#332024 | July 7, 2022

Testimony to on the **Fossil Fuel Terminal Zoning Amendments, Ordinance Draft**

I am writing to express my deepest support of the Amendments to Fossil Fuel Terminal Zoning. As a parent whose primary concern on the planet is climate change and its impacts on our kids' futures and the livability of Portland, I vehemently support these amendments. These amendments are a necessary, first step toward averting catastrophic impacts from the forecasted magnitude 9.0 earthquake. Portland's fossil fuel storage hub is dangerously located and would create massive life-threatening and irreversible conditions in the event of the Cascadia Earthquake. We cannot keep putting toxic infrastructure near crucial resources such as the Willamette and Columbia. These amendments are important public policy, in line with Portland's Climate Emergency resolution, the Governor's executive order on the climate crisis, and recent legislation to protect communities from risks posed by fossil fuel storage in Portland. I am begging you to stay firm and not weaken the amendments. We have all seen the industry's empty promises in their campaign to put profits over people so egregiously, that we now face an existential threat. And still they lobby and bargain unashamed. Council should go establishing enforcement and safety mechanisms for renewable fuel storage. Currently, terminal owners are not required to state how they use their storage tanks. This is a glaring loophole that could allow more fossil fuels. Council should commit to further action to prevent catastrophe in the fossil fuel hub by mandating seismic retrofits, and requiring the phaseout of fossil fuel storage in line with reducing demand. I implore the Council to set a policy agenda of 100% electrification. The latest report from the International Energy Agency reiterates that to reach net zero emissions all sectors must reach 100% electrification ASAP. We must be leaders in the state, the country and the world. Portland's influence is enormous. Please help our kids have a more stable and healthy future. Heather Larimer Concerned mom, creative director, and human being 100% dependent on stable climate, breathable air, and drinkable water

Testimony is presented without formatting.