Bureau of Planning and Sustainability
Innovation. Collaboration. Practical Solutions.

MEMO

DATE: June 1, 2022

TO: Mayor Ted Wheeler
Portland City Council

FROM: Tom Armstrong, Supervising Planner

SUBJECT: Fossil Fuel Terminal Zoning (FTTZ) Amendments
Regional Demand for Liquid Fossil Fuels

This memo is an update to a similar memo prepared in 2019. It documents the most recent information (2022 EIA Annual Energy Outlook, the April 2022 ODOT Revenue Forecast, the 2022 OEA Clean Fuels Forecast and 2020 Marine Cargo Forecast) related to the consumption of fossil fuels – specifically liquid petroleum products that are handled by 10 of the 11 fossil fuel terminals in Portland. This memo documents the trends and forecasts for liquid fossil fuels (petroleum). There is a separate memo that documents the natural gas infrastructure and consumption trends and forecasts. In addition to updates to federal and state forecasts, there are two new data sources: EIA Annual Energy Outlook forecasts for the Pacific Region and the Oregon Department of Energy Biennial Energy Report.

In considering whether the FFTZ amendments are equally or more supportive of the comprehensive plan as a whole, Council must consider Policy 6.48:

> **Policy 6.48 Fossil fuel distribution**. Limit fossil fuel distribution and storage facilities to those necessary to serve the regional market.

I. Summary Findings

The key changes between the 2019 memo and this memo are that the US EIA national and regional consumption forecasts show a modest growth in overall petroleum consumption, whereas the short-term forecast for the Oregon Clean Fuels program shows robust growth in

the consumption of renewable (non-fossil) fuels. These two trends are not in conflict with each other because to US EIA includes renewable fuels in their overall forecasts for motor gasoline and distillate fuel oil (diesel). These changes do not change the overall conclusion that **the existing fossil fuel storage tank capacity, with the allowed exceptions, at the existing fossil fuel terminals (FFTs) is sufficient to serve the regional demand for liquid fossil fuels out to a 2050 planning horizon based on the following findings**:

- Ten out of eleven Portland FFTs mainly handle liquid fuel (mainly petroleum and diesel) to serve Oregon and Southwest Washington.
- Transportation (motor) fuels make-up 87 percent of the petroleum consumed in Oregon.
- The US EIA national and pacific region energy consumption forecasts out to 2050 project a decline in gasoline consumption, with moderate increase in jet fuel, a flat demand for distillate fuel oil (diesel), and a slight increase in natural gas consumption.
- As documented in the BPS Regional Demand for Liquid Fossil Fuels memo, the BPS forecast for Oregon, based on the US EIA regional forecast, calculates an approximate 11 percent increase in total petroleum consumption to 390,000 billion BTU in 2050. However, petroleum consumption in Oregon peaked in 1999 at 395,000 billion BTU, which is less than the 2050 consumption forecast.
- The US EIA forecasts for petroleum includes the volumes of fuel ethanol and biodiesel blended with motor gasoline and distillate fuel oil, respectively. New storage tank capacity can be built to accommodate the increased consumption of renewable fuels under an exception in the code amendments.
- Most (66%) of the increased consumption of petroleum in 2050 can be attributed to the 25,000 billion BTU increase in jet fuel consumption. New storage tank capacity can be built to accommodate the increased consumption of jet fuel under an exception in the code amendments.
- Therefore, the fossil fuel storage tank capacity that exists today is adequate to serve future regional market.
- The April 2022 ODOT Revenue Forecast continues to forecast relatively flat sales of motor fuels through the year 2029. In the outer years, demand is expected to be relatively flat due to slow economic and vehicle registration growth, coupled with stronger fuel efficiency growth.
- The April 2022 ODOT Revenue Forecast expects trucking activity to decline from the current peak into 2024 as the consumer spending cools and new tax rates become effective January 2022 and 2024. In the outer years of the forecast, continued but slow population and economic growth lead to increased trucking activity
- The short-term forecast for the Oregon Clean Fuels program shows robust growth in the consumption of renewable (non-fossil) fuels, such as ethanol and biodiesel, that are added to fossil transportation fuels.

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

- The cargo forecast with the largest growth rate is the oldest (2012). The more recent cargo forecasts for the Portland Harbor project a modest growth (from 0.9% to 1.8% per year growth) in volumes of liquid bulks (most of which is petroleum). But those volumes do not exceed the historic peak volumes that were handled by Portland terminals. The most recent and most Portland specific marine cargo forecast documents a 2040 reference case with a declining annual growth rate that results in a total volume of petroleum products that is less than what flowed through the Portland terminals in 2010, which is the historic peak volume in the marine cargo forecasts.
- State, regional and local carbon reduction, land use, and transportation plans, policies and programs seek to reduce the consumption of fossil fuels.

The key changes between the previous 2019 memo and this memo are the following:

- The US EIA national and regional consumption forecasts show a modest growth in overall petroleum consumption. The 2020-2050 compound growth rate increased from -0.4% to 0.5%.
- The short-term forecast for the Oregon Clean Fuels program shows increasing robust growth in the consumption of renewable (non-fossil) fuels.
- The April 2022 ODOT revenue forecast shows flat to declining sales of motor fuels and increased trucking activity and weight-mile tax revenue growth. Both of these trends are similar to the trends in the 2019 forecast.
- The 2020 Portland Harbor Marine Cargo Forecast prepared by BST Associates is the most recent and most Portland specific marine cargo forecast. It documents a 2040 reference case with a declining annual growth rate that results in a total volume of 2.1 million metric tons of petroleum products, which is less than what flowed through the Portland terminals in 2010.

II. Policy Interpretation

There are two key phrases that must be considered in interpreting Policy 6.48. First, determine what is the regional market. Second, determine what is necessary, as in how much fossil fuel is needed by when (planning horizon year).

Oregon's land use planning statutes and administrative rules define a planning horizon as 20-years, which would be a 2042 planning horizon. The federal EIA produces energy forecasts out to 2050, for that reason this analysis will utilize the 2050 planning horizon.

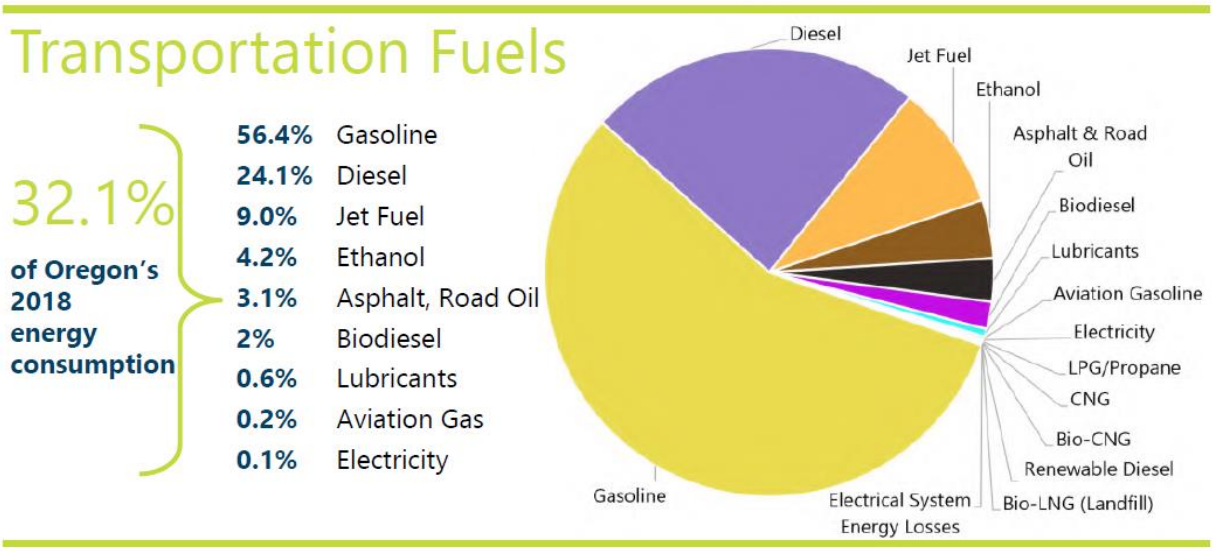
For this analysis, the "region" or "regional market" for fossil fuels is defined as the State of Oregon, with supplemental findings for the US as a whole, the Pacific region (Washington, Oregon, and California) and the State of Washington.

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

The City of Portland has ten FFTs that primarily handle liquid petroleum products, two-thirds of which is gasoline, diesel (distillate fuel oil), jet fuel, and ethanol (Figure 1). The Portland FFTs serve about 90 percent of the fossil fuels consumed by the State of Oregon. Petroleum refineries in the Puget Sound area supply nearly all the petroleum fuels consumed in Oregon and Southwest Washington, delivered primarily through the Olympic Pipeline, which terminates at the cluster of the existing petroleum terminals in Northwest Portland. Some liquid fuels are delivered via marine cargo vessels to FFTs with docks. From there, petroleum products are delivered to Oregon and Southern Washington markets via truck, pipeline and barge.

According to the US Energy Information Administration (US EIA) State Energy Data System (SEDS), in 2018, the transportation sector accounted for 87% of the petroleum products consumed in Oregon. This analysis will focus on gasoline, jet fuel, and distillate fuel oil (diesel) because these products accounted for 93 percent of the petroleum products consumed in Oregon.

Figure 1. Oregon 2018 Transportation Fuel Consumption



Source: Oregon Department of Energy, 2020 Biennial Energy Report

Data available is at the state, regional (Oregon, Washington and California) or national level. It is not possible to separate out Southwest Washington from the State of Washington data. Therefore, this analysis focuses on state level trends and forecasts, especially in comparison to historic peaks in consumption.

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

III. Distribution System Overview

According to the 2018 ODOE Biennial Energy Report, over 90 percent of the petroleum products delivered to and consumed in Oregon comes from refineries in the Puget Sound region in Washington state. Transportation fuels (refined petroleum) are delivered to Portland-area terminals via the Olympic Pipeline, by barge, and to a lesser extent by rail. These terminals receive, store, blend, and transfer petroleum products to the Portland region and western Oregon.

The Olympic Pipeline runs from the refineries on Puget Sound to Portland, and has distribution terminals located along the route, including Vancouver, Washington, as well as Portland. This line carries gasoline, diesel fuel and jet fuel. Annual throughput capacity of the Olympic Pipeline is approximately 4.6 billion gallons, and this capacity is allocated among the different terminals. The pipeline carries a relatively large share of the refined products shipped to the Portland area. In addition to distributing fuels by truck, the fossil fuel terminals in Portland ship petroleum products up the Columbia/Snake River system via barge, send jet fuel to Portland International Airport by via a separate pipeline, and ship fuels to a terminal in Eugene via another pipeline. The Eugene terminal serves southern, central, and eastern Oregon. Eastern Oregon is also served by distribution hubs in the Tri-Cities area, Moses Lake, and Spokane. Small amounts of petroleum products come by tanker from California and Pacific Rim countries.

IV. Trends Analysis and Forecasts

There are two types of forecasts that are considered in determining the future demand for fossil fuel storage facilities: 1) energy consumption or 2) marine cargo. There is a wide range of federal and state data and forecast information on the consumption of (demand for) fossil fuels. This memo presents data from four sources:

- US Energy Information Administration
- State of Oregon Clean Fuels Program
- State of Oregon Motor Fuels (Gas Tax) Revenue Projections
- State and regional commodity flow/cargo forecasts

There is uncertainty inherent in any forecast. In general, energy consumption is projected with greater accuracy than other measures, such as imports or energy prices, because energy consumption tends to change at a slower pace than other indicators.[1] In this situation, there is more uncertainty because there is limited data available on throughput capacity because fossil fuel terminals and pipelines are privately owned and not required to publicly disclose information on the amount or volume of product moving through their facilities.

[1] 2020 EIA AEO Retrospective Review

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

Key Findings

- Portland FFTs mainly handle liquid fossil fuels (gasoline, jet fuel and diesel).
- US energy forecast predicts a slight decline in gasoline consumption, with moderate increases in jet fuel, distillate fuel oil (diesel), and natural gas consumption.
- Oregon historic trends – gasoline consumption has been essentially flat (1990-2019), overall all petroleum product consumption is still below historic highs (2007). Washington has a similar trend.
- The Oregon Clean Fuels Program 2021 forecast shows increased consumption of non-fossil fuels, such as biodiesel, renewable diesel, electricity and biogas.
- Oregon gas tax revenue forecast indicates decreased fuel sales and flat revenue from fuel taxes out to 2029. The State of Washington does not have a similar forecast.
- The marine cargo forecasts for liquid bulks, which are mostly petroleum products, forecasted moderate growth, but the most recent forecast predicts a decline in volumes. The cargo forecast with the largest growth rate is the oldest (2012). The more recent cargo forecasts that project a modest growth in volumes do not exceed the historic peak volumes that were handled by the Portland terminals.

Federal Forecasts

The US EIA provides information at the national, regional and state level. The key finding is that although consumption of petroleum and other liquids has increased in recent years, the long-term projection anticipates declining consumption in the medium term with increases in the out years that brings the consumption back to current levels.

US EIA 2022 Annual Energy Outlook

https://www.eia.gov/outlooks/aeo/pdf/AEO_Narrative_2021.pdf

US Energy Information Administration produces the Annual Energy Outlook, which provides long-term energy projections. The 2022 report includes projections to 2050, and reflects current trends in energy production, delivery, and consumption technology, as well as economic and demographic trends (Table 1). It includes different assumptions regarding macroeconomic growth, world oil prices, and technological progress. A key takeaway is that the US energy intensity (energy consumed per dollar of GDP) continues to decline, even as the U.S. economy continues to expand.

Petroleum and other liquids remain the most-consumed fuel in the AEO 2022 Reference case. The transportation sector is the largest consumer of petroleum and other liquids, particularly motor gasoline and distillate fuel oil (diesel). The report finds that gasoline remains the dominant light-duty vehicle (LDV) fuel, but consumption does not return to pre-pandemic levels during the projection period out to 2050. Sales of conventional motor gasoline vehicles

decrease through the projection period because of increasing sales of battery-electric vehicles (BEVs), hybrid-electric vehicles (HEVs), and plug-in hybrid-electric vehicles (PHEVs).

Jet fuel consumption is expected to grow. This growth arises from increases in air transportation outpacing increases in aircraft fuel efficiency.

US EIA data does not report non-fossil biofuels, such as ethanol or biodiesel, separately. Total petroleum data includes the volumes of fuel ethanol and biodiesel blended with motor gasoline and distillate fuel oil, respectively.[2]

Figure 2. US Energy Consumption by Fuel Type, US EIA 2022 AEO

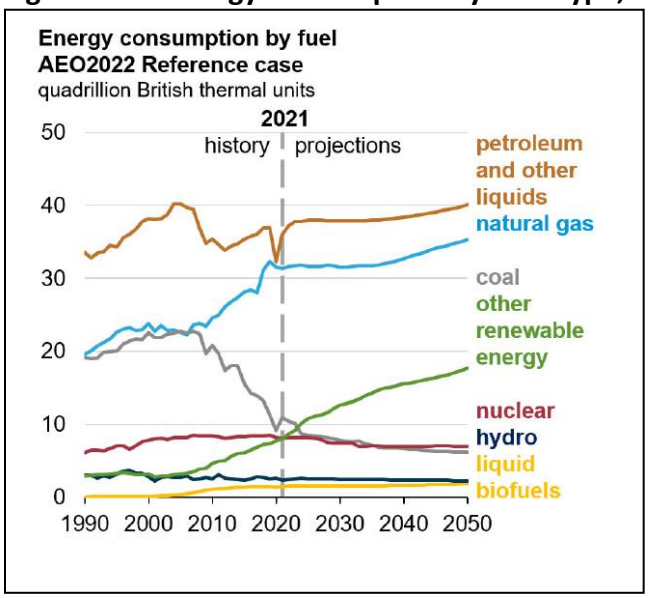


Table 1. US Total Energy Consumption, All Sectors, Selected Sources

Select Sources	2025	2035	2050	Compound growth 2021-2050
Gasoline	16.74	16.05	16.79	0.1%
Jet Fuel	3.56	3.96	4.67	1.7%
Distillate Fuel Oil	8.43	7.93	7.88	-0.2%
All Petroleum	37.95	37.93	40.12	0.4%
Natural Gas	31.61	31.70	35.27	0.4%
Total	**99.84**	**100.76**	**108.68**	**0.4%**

[2] U.S. Energy Information Administration, State Energy Data System (SEDS): Technical notes and documentation - updates for 2020, Section 4 Petroleum, page 91. https://www.eia.gov/state/seds/seds-technical-notes-updates.php?sid=US

Total US energy consumption, Reference Case, 2022 AEO Table 2
(quadrillion Btu per year)
https://www.eia.gov/outlooks/aeo/tables_ref.php

The US EIA divides the national forecast into regional forecasts, which provides another data point to compare consumption trends and forecasts that is closer to conditions in Oregon. The US EIA defines the Pacific region as Washington, Oregon, California, Alaska and Hawaii. The overall growth rate in total energy consumption in the Pacific region forecast is similar to the national forecast (Table 2). But, there is a slight decline in gasoline consumption and distillate fuel oil, with increases in jet fuel and natural gas. The Pacific region compound growth rate for distillate fuel oil is higher than the national rate. Whereas, the compound growth rate for gasoline declines and the natural gas growth rate is lower than the national rate.

Table 2. Pacific Region, Total Energy Consumption, All Sectors, Selected Sources

Select Sources	2025	2035	2050	Compound growth 2020-2050
Gasoline	2.40	2.29	2.30	-0.8%
Jet Fuel	0.89	0.99	1.18	1.6%
Distillate Fuel Oil	0.91	0.88	0.89	0.0%
All Petroleum	4.95	4.95	5.20	0.3%
Natural Gas	3.26	3.18	3.50	0.2%
Total	**11.15**	**11.13**	**12.18**	**0.4%**

Total energy consumption, Pacific region, Reference Case, 2022 AEO Table 2.9
(quadrillion Btu per year)
https://www.eia.gov/outlooks/aeo/tables_ref.php

BPS has forecasted the Oregon total energy consumption in 2050 by utilizing the forecasted growth rates for the Pacific region and applying them to the 2019 data in the US EIA State Energy Data System (Table 3).

Table 3. Oregon, Calculated Total Energy Consumption, All Sectors, Selected Sources

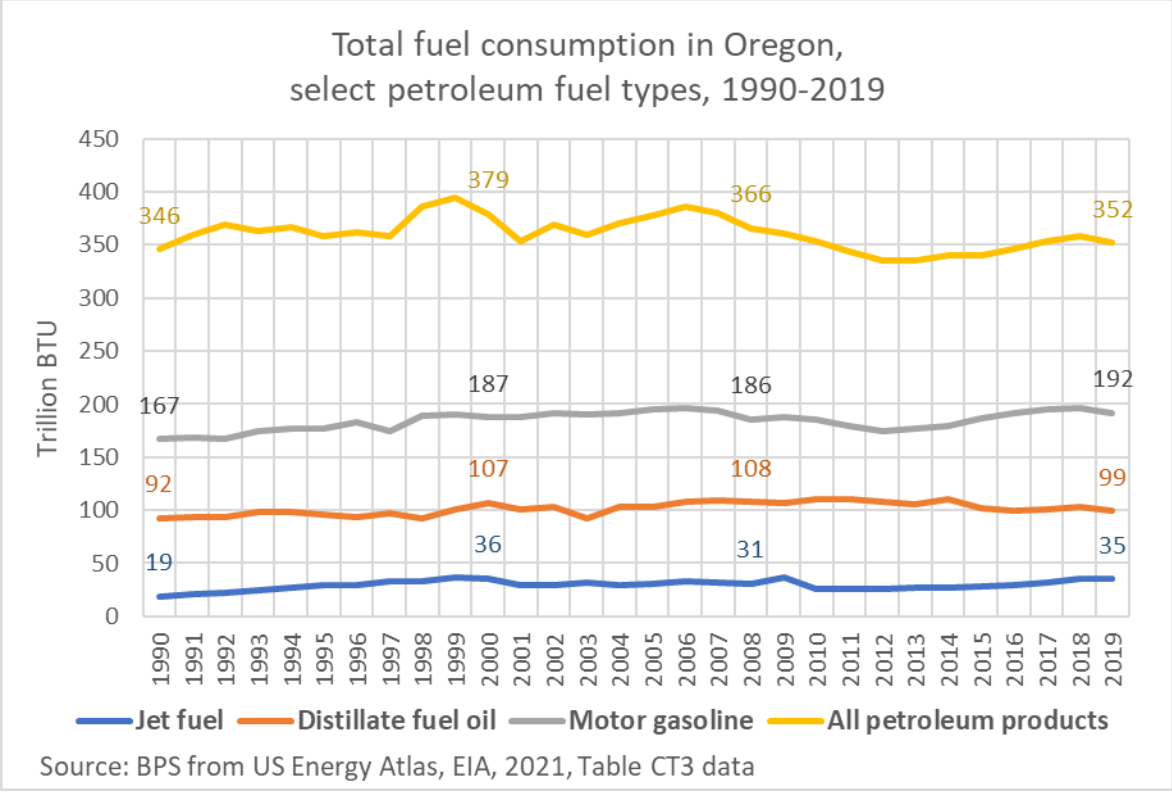
Select Sources	2019	2035	2050	Compound growth 2020-2050
Gasoline	.192	.170	.150	-0.8%
Jet Fuel	.035	.050	.060	1.6%
Distillate Fuel Oil	.099	.099	.099	0.0%
All Petroleum	.352	.370	.390	0.3%
Natural Gas	.151	.160	.170	0.2%
Total	**1.03**	**1.09**	**1.16**	**0.4%**

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

BPS calculation based on 2022 AEO Pacific Region Reference Case and US EIA 2021 State Energy Data System (SEDS)
(quadrillion Btu per year)
https://www.eia.gov/state/seds/sep_use/notes/use_print.pdf

US EIA state profile and energy estimates[3]
https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_use/tra/use_tra_OR.html&sid=OR
US EIA State Energy Data System (SEDS) is a comprehensive data set that consists of annual time series estimates of state-level energy use by major economic sectors, energy production and consumption data that are defined as consistently as possible over time and across sectors for analysis and forecasting purposes. For Oregon, the historic trend (back to 1990) shows that the energy consumption for all petroleum products is still below historic highs (Figure 2). Gasoline accounts for 55% of petroleum consumption, but since 1993 the energy estimates also include fuel ethanol blended into motor gasoline, which makes it difficult to determine the total fossil fuel content of that fuel type.

Figure 3. Oregon Petroleum Fuel Consumption



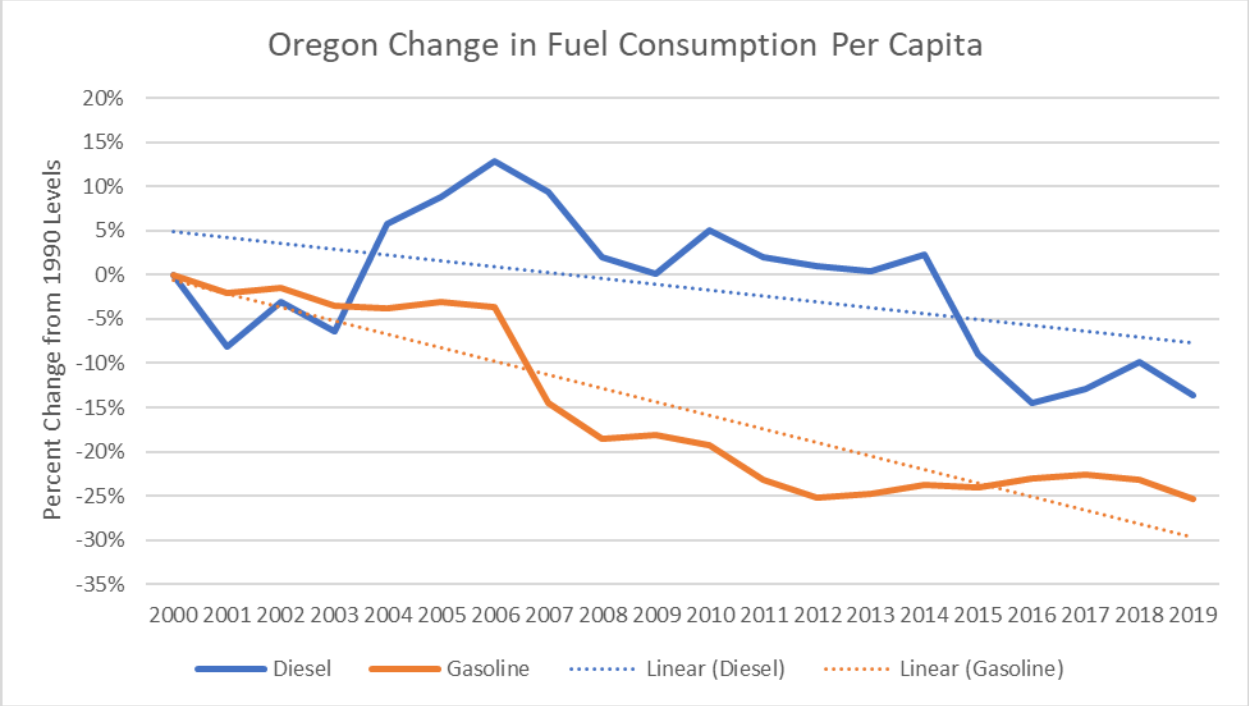
[3] U.S. Energy Information Administration, State Energy Data System (SEDS): 1990-2019, Consumption, Data Files, released June, 25, 2021. Accessed August, 2021. https://www.eia.gov/state/data.php?sid=OR

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

Petroleum consumption in Oregon peaked in 1999 at 395,000 billion BTU (Figure 4). The BPS forecast for Oregon, based on the US EIA regional forecast, calculates total petroleum consumption at 390, 000 billion BTU in 2050 (Table 3), which is less than the 1999 peak consumption. In addition, most (66%) of the increased consumption of petroleum in 2050 can be attributed to the 25,000 billion BTU increase in jet fuel consumption. New storage tanks can be built to accommodate the increased consumption of jet fuel under an exception in the code amendments. In addition, since 2004, 11 tanks, including five that hold petroleum products, have been built, which added 23 million gallons of storage capacity to the terminals.[4] Also, the 2050 forecast includes biofuels (see footnote #2 above), which additional storage is allowed under an exception in the code amendments. Therefore, the exceptions provide a buffer between future demand and the storage capacity based on past historic peaks.

The recent increase in total motor gasoline consumption is largely the result of more people moving to Oregon and driving vehicles. Per-person gasoline sales are down about 25% below 2000 levels (Figure 3).

Figure 4. Fuel Consumption Per Capita



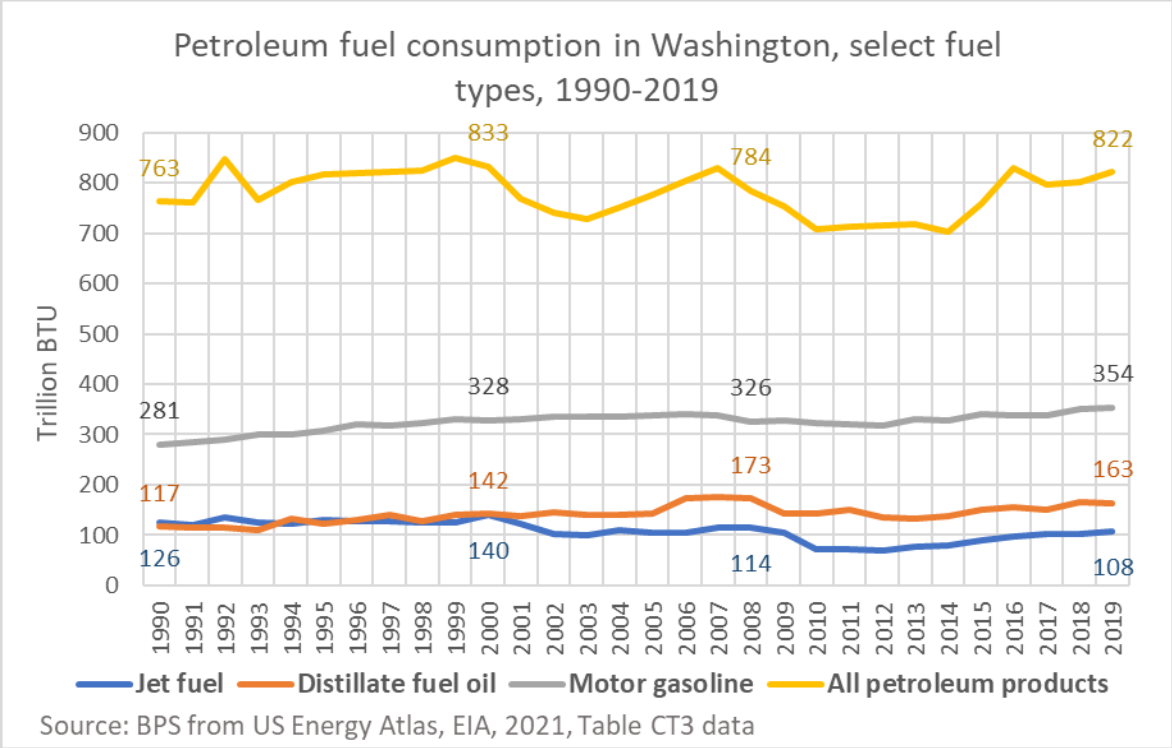
Source: BPS calculations from US EIA data

[4] ECONorthwest (2021) Impacts of a Cascadia Subduction Zone Earthquake on the CEI Hub, Appendix B.

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

For Washington, the historic trend (back to 1990) shows that the energy consumption for all petroleum products is still below historic highs and similar to the Oregon trends. Gasoline accounts for 43% of petroleum consumption (Figure 4).

Figure 5. Washington Petroleum Fuel Consumption



State Forecasts

Oregon Clean Fuels Program

https://www.oregon.gov/das/OEA/Pages/forecastcleanfuels.aspx

The Clean Fuels Program helps Oregon reduce its consumption of traditional petroleum fuels. Potential fuels that could be used to achieve the standard are ethanol, biodiesel, hydrogen, electricity, natural gas, propane, and biogas. The program goal is to reduce the average carbon intensity of Oregon's transportation fuels by 10 percent by 2025.

The Oregon Office of Economic Analysis (OEA), with assistance from the Department of Environmental Quality, produces annually a short-term (2-year) forecast on fossil and alternative fuel consumption. The forecast reports volumes of all regulated fuels in order to provide a complete picture of the program's viability in achieving mandated reductions in the carbon intensity of transportation fuels. This is a short-term forecast that uses available public

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

and program data to develop the estimates of low-carbon fuels available to Oregon and estimated consumption of fossil and alternative fuels in Oregon.

Figure 5 is Table 1 from OEA's 2022 Clean Fuels Forecast and is a summary of fossil and alternative fuel volumes. 1,424 million gallons of gasoline, including ethanol, were consumed in 2020, the most recent year of data available. This represented an 18.1 percent decrease from 2019 as the Covid-19 pandemic dramatically reduced light-duty vehicle miles traveled. Growth projections for 2022 show a recovery of gasoline consumption, but not to pre-COVID-19 pandemic levels. The passage of House Bill 3051, which allows for ethanol blends above 10 percent, results in a forecasted growth in the consumption of ethanol at 5.6 percent annual growth rate. The forecast expects a decrease in fossil diesel with increases in biodiesel and renewable diesel accounting for the overall increase in diesel consumption. The biodiesel blend rate is expected to rise from 9.0 percent in 2020 to 10.5 percent in 2022, which represents a 12.2 percent annualized growth rate. Similar to biodiesel, the forecast for renewable diesel is expected to increase from 2.4 percent in 2020 to 6.0 percent in 2022, which represents a 64.3 percent annualized growth rate. The forecast also projects increases in electricity for plug-in hybrid and battery electric vehicles that is the equivalent to 7.0 million gallons of gasoline.

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

Figure 6. Oregon Clean Fuels Program Summary of Fuel Volumes

Table 1: Summary of fossil and alternative fuel volumes

(Mil. gallons, percent)	2019	2020	2021F	2022F	annual %ch vs. 2020
Conventional Gasoline	1,565.4	1,282.0	1,403.7	1,407.2	4.8%
Ethanol	174.0	141.7	157.7	158.1	5.6%
Ethanol Blend Rate	*10.0%*	*10.0%*	*10.1%*	*10.1%*	
Blendstock	1,739.4	1,423.7	1,561.5	1,565.3	4.9%
Fossil Diesel	719.3	672.5	717.4	687.0	1.1%
Biodiesel	60.1	68.6	80.6	86.4	12.2%
Biodiesel Blend Rate	*7.5%*	*9.0%*	*9.8%*	*10.5%*	
Renewable Diesel	16.8	18.3	24.7	49.4	64.3%
Renew diesel Blend Rate	*2.1%*	*2.4%*	*3.0%*	*6.0%*	
Total Diesel	796.1	759.4	822.7	822.7	4.1%
Electricity (on-road)	2.9	3.7	5.2	6.9	37.3%
Electricity (off-road)	2.2	3.2	4.9	8.0	57.3%
Fossil Natural Gas	1.2	0.8	0.6	0.6	-10.6%
Biogas	2.2	2.9	4.0	5.6	38.8%
Biogas Blend Rate	*65.3%*	*78.9%*	*87.5%*	*90.0%*	
Total Natural Gas	3.4	3.7	4.6	6.2	29.9%
Liquified Petroleum Gas	2.1	1.5	2.2	3.8	59.7%
On-road electricity include calculation of residential charging.					

2022 ODOT Revenue Forecast
https://www.oregon.gov/odot/Data/Pages/Revenue-Forecasts.aspx
ODOT produces revenue forecasts two times per year. The April 2022 forecast factors in changes in motor vehicle ownership and useage due to the COVID-19 pandemic and more recent increases in the price of fuel. The April 2022 ODOT Revenue Forecast continues to forecast relatively flat sales of motor fuels through the year 2029 (Figure 7). In the outer years, demand is expected to be relatively flat due to slow economic and vehicle registration growth, coupled with stronger fuel efficiency growth. The April 2022 motor fuels sales forecast in 2029 (approximately 440 million gallons) is less than the 2019 forecast of approximately 450 million gallons in 2028.

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

Figure 7. May 2022 ODOT Motor Fuels Forecast

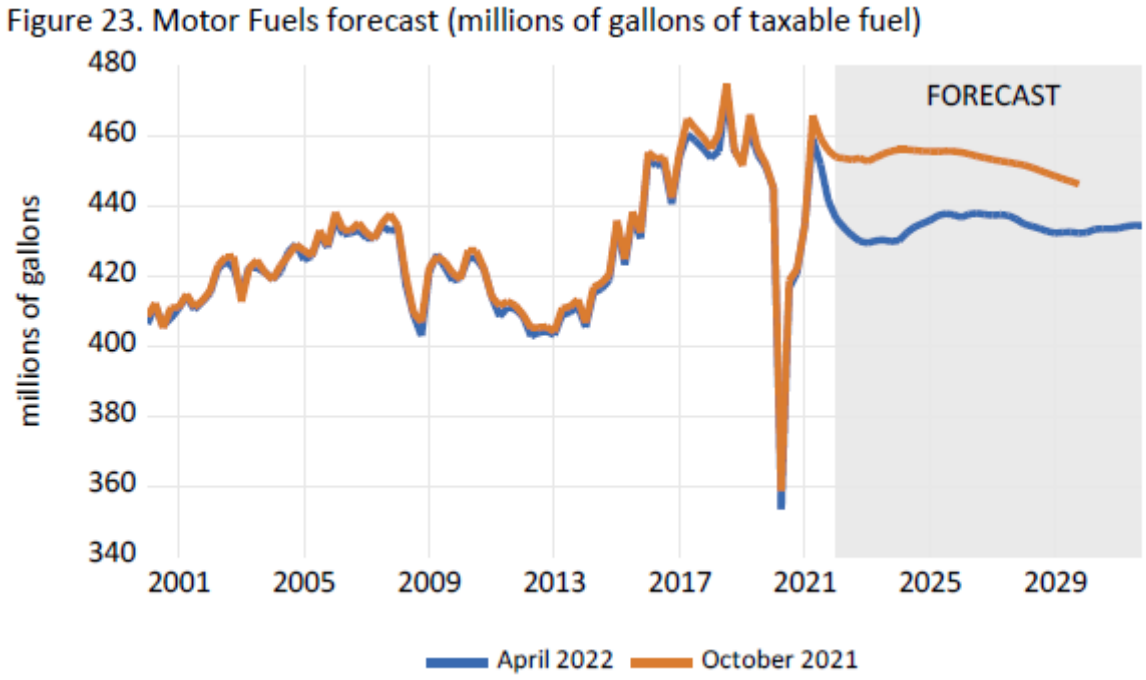


Table 2 of the April 2022 forecast shows key transportation indicators, including the sale of motor fuels, which is expected to begin declining in 2027 (Figure 8).

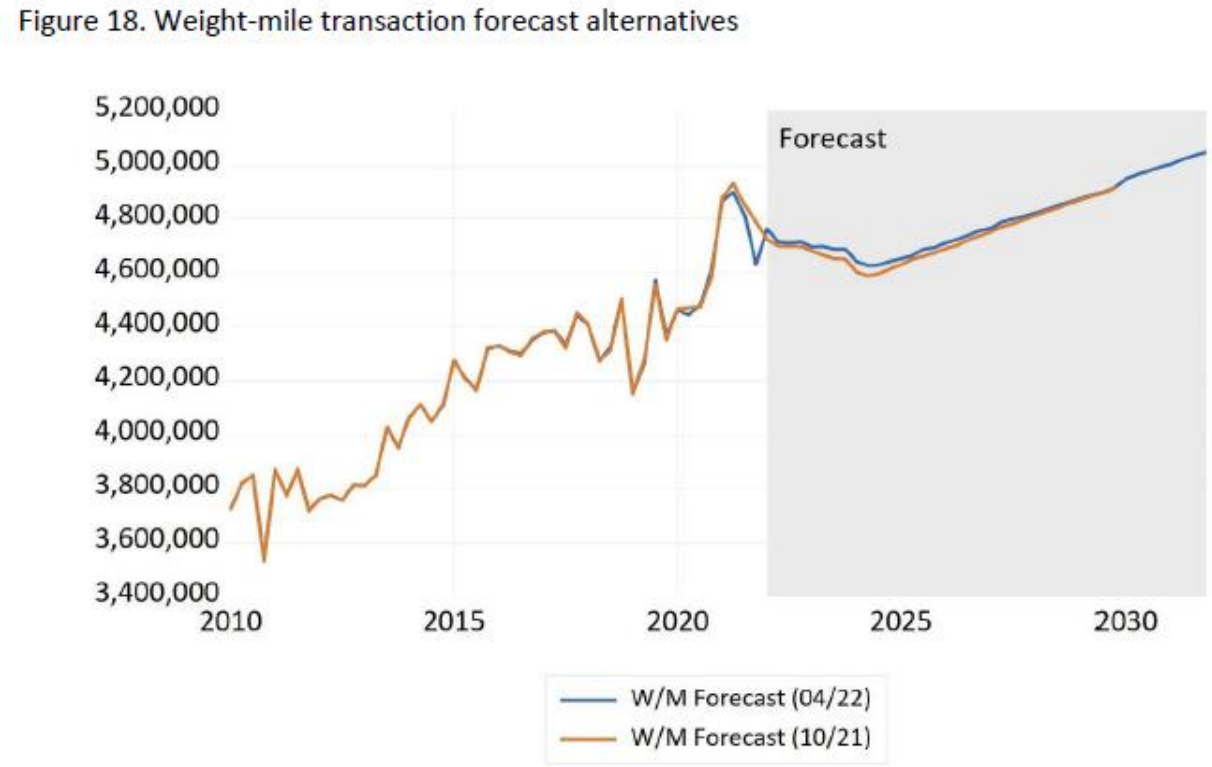
Figure 8. April 2022 ODOT Selected Key Transportation Indicators

Table 2. Percentage Change in Selected Key Oregon Transportation Indicators

	Actual		Forecast							
	CY 20	CY 21	CY 22	CY 23	CY 24	CY 25	CY 26	CY 27	CY 28	CY 29
MOTOR FUELS GALLONS (WITH TRIGGERS)	-10.2%	8.4%	-2.3%	-0.7%	0.7%	1.0%	0.1%	-0.1%	-0.7%	-0.3%
ORIGINAL CLASS C LICENSES	-34.5%	118.4%	-22.3%	-4.2%	0.4%	-0.2%	-0.7%	-0.2%	0.1%	0.7%
PASSENGER VEHICLE REGISTRATIONS	-16.6%	24.6%	-3.1%	1.4%	-1.7%	1.3%	-0.9%	0.9%	-0.3%	0.3%
TITLE TRANSFERS	-40.2%	70.0%	-1.6%	-1.2%	-1.6%	-0.1%	-2.0%	-0.4%	-1.2%	-0.9%
TRUCKING ACTIVITY (WEIGHT-MILE)	3.6%	7.1%	-2.3%	0.0%	-1.7%	1.3%	1.2%	1.2%	1.1%	1.1%

Trucking and the freight industry pay a weight-mile tax that is an indicator of diesel (distillate fuel oil) consumption. The forecast expects trucking activity to decline from the current peak into 2024 as the consumer spending cools and new tax rates become effective January 2022 and 2024. In the outer years of the forecast, continued but slow population and economic growth lead to increased trucking activity (Figure 9)

Figure 9. April 2022 ODOT Weight-Mile Transaction Forecast



There is not a similar gas tax revenue or motor fuel forecast for the State of Washington.

Commodity Flow/Cargo Forecasts

The commodity flow or cargo forecasts are estimates that are based primarily on the historic growth trends in each cargo type in the Pacific Northwest, the Portland Harbor market share, as well as regional, national, and domestic macroeconomic variables and trade patterns. The commodity flow forecasts include all modes of freight movement (air, marine, rail, truck and pipeline), whereas the marine cargo forecasts just account for the products moving through the Columbia River ports in Oregon and Washington, which only accounts for waterborne marine cargo (and do not include fossil fuels moving by pipeline, rail, or trucks).

The cargo/commodity flow forecasts for "liquid bulks", which are primarily petroleum products. These cargo forecasts are complicated by the fact that all the fossil fuel terminals in Portland are privately owned and operate on private land, which means cargo volumes and capacity data is not publicly available. The throughput capacity of these facilities to handle petroleum products is not known. The same is true of the Olympic Pipeline, of which there are only passing references in public documents to near capacity utilization but no data. Finally, each

forecast uses a different unit of measurement—metric tons, barrels, gallons, BTUs—which can make comparisons difficult.

- The 2011 Oregon Freight Plan has the highest growth rate of the available forecasts but is based on a core commodity forecast based on 2002 federal data and was not updated in 2017.
- The 2012 Portland and Vancouver Harbor Forecast Update has a high scenario of 0.7% annual growth rate and a low scenario of 0.3% annual growth rate to the year 2040. However, ECONorthwest (2012) found that these volumes could be accommodated without a new terminal because this forecast and analysis was for marine cargo only and in 2000, Portland terminals are estimated to have handled the 2040 volumes when the Olympic pipeline shutdown for an extended period of time.
- More recent cargo forecasts show lower growth rates.

2011 Oregon Freight Plan (revised 2017)
https://www.oregon.gov/ODOT/Planning/Documents/OFP-2017-Amended.pdf
https://www.oregon.gov/ODOT/Planning/Documents/OFP-Modeling-Analysis.pdf
The Oregon Freight Plan is based on the 2009 Oregon Commodity Flow Forecast (CFF), which is a county level commodity flow forecast for truck, rail, marine, air, and pipeline modes from 2002 to 2035 (Figure 10). The key data source for the Oregon CFF is the 2002 Freight Analysis Framework (FAF2), a national commodity flow forecast dataset published by the Federal Highway Administration (FHWA) national commodity flow forecast.

This forecast identifies three types of fossil fuel commodities:

- STCC #11 – coal
- STCC #13 – petroleum, natural gas
- STCC #29 – petroleum or coal products

Figure 10. 2009 Oregon Commodity Flow Forecast Selected Fossil Fuel Commodities

Exhibit 5: 2002-2035 Oregon Tonnage by Commodity (1000 tons, all modes)

	Tonnage (1000 tons)			Growth Rate
STCC	**2002**	**2010**	**2035**	**2002-2035**
11 Coal	15,458	14,771	30,131	2.0%
13 Crude petroleum, natural gas, and gasoline	5,017	5,074	8,767	1.7%
29 Petroleum or coal products	32,361	34,500	54,487	1.6%

Pipeline-delivered petroleum is imported to Oregon through the Olympic Pipeline from Washington via Portland (92%) and the Chevron Pipeline (8%) from Washington via Umatilla.

The Kinder Morgan pipeline distributes petroleum from Portland to the Willamette Valley via Eugene, Oregon. The forecast expected petroleum delivered by pipeline to Oregon to grow by less than 0.1% from 2002 to 2035.

The Oregon Freight Plan was revised in November 2017, but the revisions did not include an update to the commodity flow forecast data.

2012 Portland and Vancouver Harbor Forecast Update (BST)
This report provides a summary update of the marine cargo forecasts for the Portland-Vancouver area from the April 2010 report, "West Hayden Island Marine Cargo Forecasts & Capacity Assessment". This update considered potential new market opportunities that were evaluated by individual ports in Oregon and Washington. Two growth scenarios were considered. The high-growth forecast included all the market opportunities under consideration. The low-growth forecast included a portion of the market opportunities as well as baseline cargo volumes.

The liquid bulk trades in the Pacific Northwest are dominated by petroleum, including crude oil and refined petroleum products. Other important commodities include chemicals, fertilizers and other liquid bulk products. One significant change that is expected to impact the flow of liquid bulk products is a shift in the source of crude oil for the Puget Sound refineries. The refineries are expected to begin receiving less crude oil by tanker from Alaska and more by rail from North Dakota, which may impact waterborne volumes. New opportunities for liquid bulk cargo are also considered; most notably LNG imports and/or exports. The liquid bulk cargo forecast remains the same for the revised 2012 forecast and the April 10, 2010 forecast (Figure 11).

Figure 11. 2010 West Hayden Island Marine Cargo Forecasts

Table 1-6: Portland Harbor Liquid Bulk Forecast (1,000 Metric Tons)

	April 2010 Study			2012 Update	
	Low	**High**		**Low**	**High**
2008	6,378	6,378		6,378	6,378
2040	6,912	8,011		6,912	8,011
Compound Annual Growth Rate					
2008-2040	0.3%	0.7%		0.3%	0.7%

Source: BST Associates

Estimates of existing cargo capacity are difficult to obtain, particularly for privately owned marine terminals, like the fossil fuel terminals. ECONorthwest (2012) prepared an estimate based on historical data for total cargo volumes for the years 2000 and 2010 from the BST report and consultation with the Port of Portland to determine the estimated current capacity. For private marine terminals, the assumption was that existing facilities do not have significant

excess capacity, based on the assumption that recent historical peaks are a reasonable estimate of maximum capacity. Based on a 2000 report, BST estimated that there was 8.28 million metric tons of capacity for liquid bulks. Based on that capacity estimate, ECONW found that no additional land is needed for new liquid bulk terminals in Portland through the year 2040.[5]

2015 Port of Portland Commodity Flow Forecast
https://popcdn.azureedge.net/pdfs/Trade_Trans_Studies_LCR_Cmdty_Flw_Rpt.pdf
The key data source for this forecast is the federal Freight Analysis Framework 3 (FAF3) for the Portland-Vancouver region. 2040 forecast estimated the tonnage of gasoline and other fuels to increase at a 0.7% average annual growth rate. The forecast notes that future volume will be determined by the success or failure of domestic extraction and refining of oil, and growth of alternative fuels (e.g., natural gas).

2017 Marine Cargo Forecast and Rail Capacity Analysis (BST)
https://www.washingtonports.org/mcf
BST prepared a new cargo forecast for the Washington Public Ports Association that includes the Columbia River Ports in Oregon, including Portland. The study includes forecast of trade by commodity and cargo type for waterborne cargo moving through deep draft marine terminals from 2015 through 2035.

The 2017 Marine Cargo Forecast was developed for the Pacific Northwest as a whole, and then allocated to four sub-regions based on historical trends. Since the current analysis is an update of the 2017 forecast it uses the same methodology. For this analysis the Pacific Northwest is defined to include all ports on Puget Sound, the Washington Coast, and the Lower Columbia River; ports on the Oregon coast, primarily Coos Bay, were not included. The four sub-regions to which volumes were allocated include:

- Columbia River Oregon (primarily Portland, also includes Clatsop and Columbia counties),
- Columbia River Washington, (Vancouver, Kalama, and Longview),
- PSRC (ports in the Puget Sound Regional Council area, primarily Seattle, Tacoma, and Everett), and
- Other Puget Sound / Washington Coast.

These forecasts are unconstrained, which means they assume that the infrastructure needed to handle the projected volumes will be available when needed. For example, this includes marine terminals, rail infrastructure, etc. Projected volumes for the sub-regions are based on historical market shares. The limitation of using this method is that, if future volumes require the

[5] https://www.portlandoregon.gov/bps/article/408438

construction of a new terminal, it could significantly change regional market shares. The high case for each type of cargo includes cargo volumes related to projects that are currently in the permitting process, such as the Millennium Bulk Terminal in Longview, the northwest Innovation Works methanol plant in Kalama, and the Vancouver Energy terminal, among others. The high case is not so much a demand forecast, but reflects what the market sees as opportunities. The reference case and low case growth projections do not include the volumes from these proposed terminal projects.

Liquid bulk cargo is divided into three categories: crude oil, refined petroleum products, and other liquids (e.g. animal fats, chemicals and fertilizers). The summary finding for liquid bulk commodity is that crude oil accounts the majority of tonnage and waterborne volume is projected to be flat or to decrease slightly, unless crude-by-rail terminals are built.

The Lower Columbia Oregon region ports handled 3.4 million metric tons in 2015 and is projected to grow to 3.9 million tons by 2035 (0.8% per year growth). The Low case forecasts a decline (-0.6% per year growth). The High case includes new methanol facilities at St. Helens and crude-by-rail facilities in Portland and St. Helens and grows to 8.0 million tons (4.4% per year growth).

2020 Portland Harbor Marine Cargo Forecast (BST)
BST Associates developed a marine cargo forecast for the Portland Harbor for the Port of Portland. The forecast used the 2017 Marine Cargo Forecast growth rates as a starting point, and projected cargo volumes through 2040 using a base year of 2018. The updated forecast includes revised cargo growth projections and recalibration of historical cargo flows through the latest available year.

The cargo forecast is unconstrained, which assumes that the infrastructure will be in place to handle the projected volumes when needed. The forecast process involved projecting cargo volumes for the Pacific Northwest, and then allocating these volumes to four sub-regions (i.e. Columbia River Oregon, Columbia River Washington, central Puget Sound, and Other Puget Sound/Washington Coast) based on historical market shares. Forecasts were produced for six cargo handling groups (i.e. grain, other dry bulks, autos, breakbulks, liquid bulks, and containers). For each of the handling groups three forecasts are presented, including a reference case (i.e. base case), as well as a low and a high forecast. The high case for each handling type includes cargo volumes related to projects that are currently in the permitting process.

Waterborne liquid bulk traffic in the Lower Columbia River primarily consists of refined petroleum products, crude oil, and other liquid bulks (e.g. animal fats, vegetable oils, chemicals, and fertilizers). In 2010, Portland Harbor handled 2.29 metric tons of petroleum products.

Liquid bulks are projected to range between 1.8 million metric tons and 2.4 million metric tons in 2040:

- Low case: 1.8 million metric tons (-0.10% per year growth from 2018 to 2040),
- Reference case: 2.1 million metric tons (-0.33% per year growth),
- High case: 2.4 million metric tons (0.28% per year growth).

This forecast is a significant change from the 2017 forecast for the Lower Columbia River ports, which had a reference case compound annual growth rate of 0.8% per year to 2035.

The forecast also notes that shipments of petroleum products from Portland up the Columbia River to eastern Oregon and Washington must compete on price with products delivered by pipeline to terminals in Eastern Washington.

Crude oil movement of crude oil on the Lower Columbia River has varied widely. Crude oil was imported to Portland for manufacture of asphalt until 2006, with 85,000 tons and 200,000 tons imported annually. Asphalt production ended in 2006, which resulted in Portland waterborne crude oil imports disappearing entirely in 2007. Outbound shipments of crude oil from the Lower Columbia River started in 2011 and 2012, at first moving in very small volumes (i.e. 11,000 to 12,000 metric tons per year). Crude oil shipments began to surge in 2013 and 2014, reaching 808,000 metric tons in 2013 and peaking at 1.1 million metric tons in 2014, before falling to 251,000 metric tons in 2015 and 51,000 metric tons in 2016. All of this outbound crude arrived by rail at Lower Columbia River terminals, and was shipped coastwise to domestic oil refineries in Washington and California. A total of 2.3 million metric tons of crude oil were shipped from the Lower Columbia River from 2011 through 2016. Approximately 88% of this crude was shipped from Port Westward (near Clatskanie, OR), while Portland accounted for the remaining 12%, or 287,000 metric tons. No crude oil was shipped by water from the Lower Columbia River in 2017. Shipments from Portland resumed in 2018, and this included 32,000 metric tons of coastwise shipments as well as 196,000 metric tons of foreign exports (primarily moving to China and South Korea). Port Westward saw no waterborne movement of crude oil in 2018.

Zenith Energy, which acquired a Willamette River terminal in Portland (from Arc Logistics), ships crude oil (among other products) from its terminal. On the Lower Columbia River, several proposals to ship crude oil from other facilities have been cancelled, including the Vancouver Energy Terminal and the NuStar Terminal (both located at the Port of Vancouver). At Port Westward, Global Partners did ship crude oil from its terminal in the past, but it is unclear whether they will resume crude oil shipments in the future. As a result of this uncertainty, crude oil shipments are not included in the low, reference or high forecasts.

V. Policy Direction

Federal, state, regional and local policies and programs, such as the Oregon Clean Fuels program, Metro's Climate Smart Strategy, and TriMet's Non-Diesel Bus Plan, establish a framework to reduce the consumption of fossil fuels by shifting single-occupant vehicle travel to other transportation modes; encouraging more fuel-efficient vehicles and more zero emission vehicles; and providing more renewable fuels that can be expected to further reduce the demand for fossil fuels.

The State of Oregon's climate action goals call for a 75 percent reduction in greenhouse gas emissions by 2050, which cannot be achieved without a significant reduction in the consumption of fossil fuels. The City's reduction targets are a 50% reduction in carbon emissions by 2030 and net-zero carbon emissions before 2050. The following policies and plans help achieve these reduction goals.

Federal

The National Highway Traffic Safety Administration's (NHTSA's) Corporate Average Fuel Economy (CAFE) standards regulate how far vehicles must travel on a gallon of fuel. NHTSA sets CAFE standards for passenger cars and for light trucks (collectively, light-duty vehicles). On March 31, 2022, NHTSA adopt a final rule to require an industry-wide fleet average of approximately 49 mpg for passenger cars and light trucks in model year 2026, by increasing fuel efficiency by 8% annually for model years 2024 and 2025, and 10% annually for model year 2026.

State of Oregon

The Oregon State Legislature has established a goal of reducing greenhouse gas emissions 10 percent below 1990 levels by 2020 and 75 percent below 1990 levels by 2050.[6]

The Oregon Sustainable Transportation Initiative
https://www.oregon.gov/ODOT/Programs/Pages/OSTI.aspx
In 2018, the Oregon Transportation Commission adopted the Statewide Transportation Strategy, or STS, as part of the Oregon Transportation Plan. The STS, is a state-level scenario planning effort that examines all aspects of the transportation system, including the movement of people and goods, and identifies a combination of strategies to reduce greenhouse gas, or GHG, emissions. The STS identifies a variety of effective GHG emissions reduction strategies in transportation systems, vehicle and fuel technologies, and urban land use patterns. The STS Short-Term Implementation Plan identifies action items for Oregon Department of Transportation to implement in 2-5 years to help move Oregon towards achieving the STS

[6] ORS 468A.205 https://www.oregonlaws.org/ors/468A.205

vision. With a horizon year of 2050, implementing the STS will be an ongoing, long-term process that will likely include the development of mid-term and long-term implementation plans. The STS was developed as part of the Oregon Sustainable Transportation Initiative program.

Oregon Fuel Efficiency Standards
https://www.oregon.gov/ODOT/Data/Documents/December-2018-Revenue-Forecast.pdf
In 2007 legislation was passed establishing new fuel efficiency standards for light vehicles in a two-phase approach. Phase 1 impacts model year 2012-2016 vehicles setting a fuel efficiency target of 34.1 miles per gallon (MPG) by model year 2016. Phase 2 builds on this by continuing to expect improvements with each model year reaching a model year 2025 target of 54.5 MPG. The actual standard is expected to be 49.6 MPG by 2025, with the remaining 5 MPG equivalent reached through improvements in vehicle air conditioners. As the 54.5 MPG target is only required under ideal test conditions not fully representative of all driving conditions, the actual on-road average is expected to be closer to 38 MPG. Still, at a minimum this is an improvement of over 10 miles per gallon compared to the previous standards. The EPA will explore potential changes to the current standards and initiate a rulemaking process to develop new standards. Until any final rule is passed the current standards remain in place and the forecast for fuel efficiency is based on these standards.

While the new vehicle fuel economy is expected to increase rapidly over the next 10 years, fleet fuel efficiency will grow much more slowly. With Oregon's 3.6 million registered passenger vehicles, 150,000 new registrations a year, and an average vehicle age of almost 13 years, it will take time before these new, higher efficient vehicles replace the older, less fuel-efficient ones.

Oregon Clean Fuels Program
https://www.oregon.gov/das/OEA/Documents/Clean%20Fuels%20Forecast%202019.pdf
The Oregon Department of Environmental Quality (DEQ) is implementing the Oregon Clean Fuels Program, which requires a 10 percent reduction in average carbon intensity by 2025. Oregon DMV vehicle registration data shows that about 12,951 battery electric vehicles (BEVs) and 9,094 plug-in hybrid electric vehicles (PEVs) were registered in Oregon in June 2018. The Office of Economic Analysis (OEA) projects that those numbers will rise. By 2025, Oregon's forecasted annual PEVs sales are expected to be 21% of light-duty vehicle sales.[7]

Oregon Executive Order No. 17-21 Zero Emission Vehicles
https://www.oregon.gov/gov/Documents/executive_orders/eo_17-21.pdf
The Governor issued Executive Order 17-21 in November 2017 committing the State to the goal of achieving 50,000 or more registered electric vehicles by 2020.

[7] 2017 DEQ CFP Illustrative Compliance Scenarios
https://www.oregon.gov/deq/Rulemaking%20Docs/CFP2017Mtg6itemA.pdf

Oregon Executive Order No. 20-04 on Climate Action
https://www.oregon.gov/gov/Pages/carbonpolicy_climatechange.aspx
Governor Brown issued Executive Order Executive Order 20-04, which directs all state agencies to consider climate change in all their work and to accelerate the reduction of GHG emissions. Several of its directives focus on reducing emissions from transportation. The order calls for a rapid conversion of the state's fleet to zero-emission vehicles and expansion of charging infrastructure for public buildings, and incorporation of GHG emissions reduction performance metrics into the Statewide Transportation Strategy. It directed ODOT to evaluate the effect of transportation projects on emissions and use the results to inform its planning processes. In response, ODOT established a Climate Office to integrate climate change into transportation planning across the state.

The order directed the doubling of the clean fuel standard administered by DEQ, requiring reductions in average carbon intensity of transportation fuels used in Oregon of at least 20 percent (relative to 2015) by 2030, and of at least 25 percent by 2035. The order also directed DEQ and the Environmental Quality Commission (EQC) to develop and implement by January 1, 2022 a cap and reduce program for GHG emissions from large stationary sources; transportation fuels, including gasoline and diesel fuels; and other liquid and gaseous fuels, including natural gas.

2021 ODEQ Clean Trucks Rule
https://www.oregon.gov/deq/EQCdocs/111721_C_CleanTrucks.pdf
The Oregon Department of Environmental Quality (ODEQ) adopted two new rules to require manufacturers of medium and heavy-duty vehicles, like large pickup trucks, buses and tractor-trailer cabs, to sell a certain percentage of zero emissions electric vehicles starting with the 2025 model year. The Clean Trucks Rule adopts California's Advanced Clean Trucks (ACT) Rule and Heavy-Duty Engine and Vehicle Omnibus rules (HD Omnibus). Under the ACT Rule, Oregon requires medium- and heavy-duty vehicle manufacturers to sell zero-emission vehicles (ZEV) as a certain percentage of sales, beginning with the 2025 vehicle model year. Manufacturers must increase their zero-emission truck sales depending upon the class size of the truck. The HD Omnibus rules strengthen nitrogen oxides and fine particulate matter (PM2.5) emission standards for new truck engines (both diesel and non-diesel engines), in addition to other requirements for these engines.

Transportation accounts for approximately 40 percent of all statewide greenhouse gas emissions in Oregon. While heavy-duty trucks and buses, which typically are fueled by diesel, only account for four percent of vehicles on the road nationally, they are responsible for nearly 25 percent of total transportation sector greenhouse gas emissions nationally, and 23 percent in Oregon. Emissions from trucks are one of the fastest growing sources of greenhouse gas

emissions, and the number of truck miles traveled on the nation's roads is projected to continue to grow significantly in the coming decades.

The Advanced Clean Truck rule is foundational to reducing greenhouse gas emissions because it ensures the availability of medium- and heavy-duty ZEVs in Oregon. Additionally, ZEV trucks have no tailpipe emissions, which also results in localized reduction of NOx andPM2.5 emissions.

LCDC Climate Friendly Equitable Communities Rulemaking
https://www.oregon.gov/lcd/LAR/Pages/CFEC.aspx
Governor Brown's Executive Order 20-04 recognizes that transportation-related climate pollution has increased and if current trends continue, Oregon will not meet GHG emission reduction goals. This rulemaking focuses on significantly strengthening Oregon's administrative rules about transportation and housing planning, particularly for Oregon's eight urban areas with populations over 50,000 people (Albany, Bend, Corvallis, Eugene/Springfield, Grants Pass, Medford/Ashland, Portland Metro, Salem/Keizer). The rules direct how local governments develop comprehensive plans, including land use and transportation elements in order to reduce driving by reducing the number and length of driving trips by bringing land uses closer together; increasing the walkability of the built environment and mixing land uses; and offering more choices to take public transit, bike, or walk to get around.

State Legislation
In the 2021 Legislative Session, HB 2021 passed which requires electricity providers to reduce greenhouse gas emissions associated with electricity sold to Oregon consumers to 80 percent below baseline emissions levels by 2030, 90 percent below baseline emissions levels by 2035 and 100 percent below baseline emissions levels by 2040. This legislation effectively prohibits new and expanded power plants using fossil fuels, including natural gas.

During the 2019 and 2020 Oregon legislative sessions, legislation was passed that reduces GHGs by promoting clean energy resources and technologies and revising land-use regulations. Several of these bills work to decarbonize the transportation sector, including Senate Bill 1044, which created goals to promote use of zero-emission vehicles, electric school buses, and electric state fleets. House Bill 2007 established more stringent diesel emission standards in the Portland metropolitan area for medium- and heavy-duty trucks and buses—reducing emissions and harmful air pollutants. House Bill 2001 revised residential zoning to create more affordable housing options by allowing more dense development of housing, such as duplexes, four-plexes, etc. In most cases this could increase the use of public transportation and reduce the amount of vehicle miles traveled in communities.

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

2020 ODOE Biennial Energy Report

The Oregon Department of Energy (ODOE) develops a Biennial Energy Report to inform local, state, regional, and federal energy policy development and energy planning and investments. The report – based on analysis of data and information collected and compiled by ODOE – provides a comprehensive review of energy resources, policies, trends, and forecasts, and what they mean for Oregon.

Transportation Fuels

The report documents that gasoline, diesel and jet fuel account for 89% of Oregon's transportation fuel consumption. In 2018, petroleum-based products accounted for 93 percent of fuel consumed in the transportation sector; biofuels like ethanol, biodiesel, and renewable diesel accounted for 6 percent; and electricity, and natural gas accounted for 0.3 percent of the fuels consumed. Nearly all transportation-related sources of energy are imported from out of state for in-state use. In 2018, just 2 percent of transportation fuel used in Oregon was produced in the state, including 7.3 trillion Btu of biodiesel and fuel ethanol.

Low-carbon transportation fuels such as renewable diesel and electricity show great promise of increasing market share, but it has been a slow process to transition the transportation fleet and install the necessary infrastructure to enable increased adoption of these fuels. While petroleum-based fuels will continue to play a major role in the transportation sector, gasoline and diesel fuel's combined share of total transportation energy consumption in the U.S. is expected to decrease from 84 percent in 2019 to an estimated 74 percent in 2050.

About 90 percent of Oregon's transportation fuels are produced by the refineries in Washington and delivered via the Olympic pipeline and barge to seven Portland-area terminals. These terminals receive, store, blend, and transfer petroleum products. Most of the remaining ten percent is delivered by barge, and a very small amount by rail. Some of this product flows in a pipeline south to Eugene, and in another pipeline to the Portland International Airport. The Eugene distribution hub serves southern, central, and eastern Oregon. Additionally, over 240 towboats with tank barges carry refined petroleum products from the BP, the Chevron, and the Phillips 66 marine docks in the Portland area; and deliver it up the Columbia River to Pasco, Washington to service eastern communities in Washington, Oregon, and Idaho. An estimated 1,500 tanker trucks deliver fuel throughout the state to about 2,400 fueling locations.

Trucking Fuel Efficiency

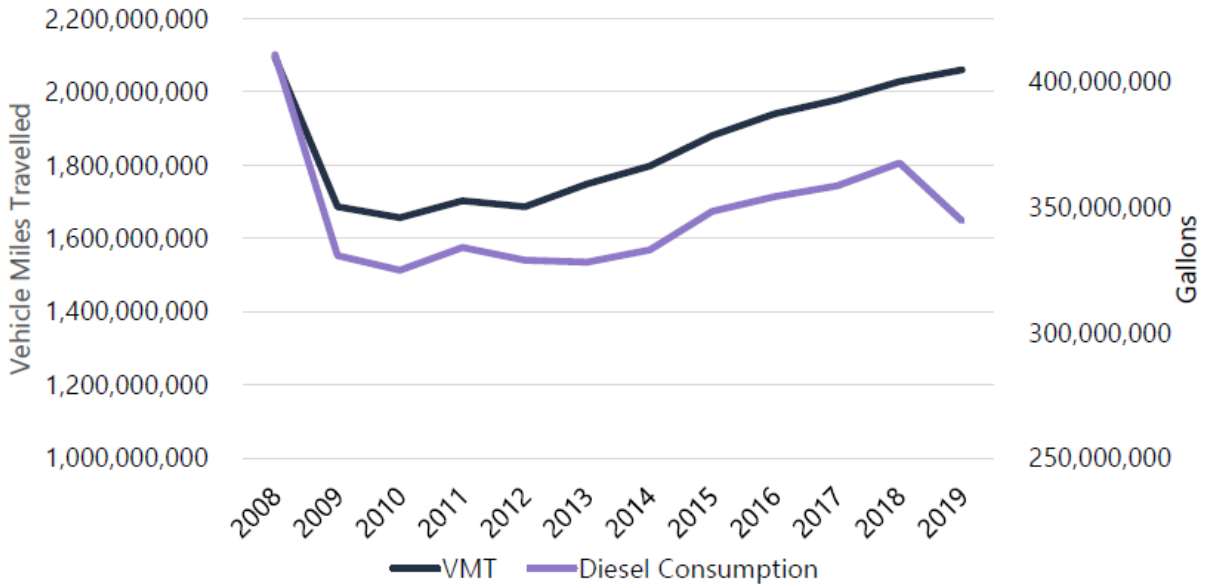
The 2020 Biennial Energy Report included a policy brief on using truck fuel efficiency to reduce fuel consumption. Opportunities to reduce fuel consumption and greenhouse gas (GHG) emissions in the transportation sector generally focus on three main areas: reducing vehicle miles traveled (VMT), improving overall fuel efficiency of vehicles, and increasing use of alternative fuels. Unlike the passenger vehicle sector, where VMT can be reduced by increased

focus on strategies like public transit, telecommuting, and increased ride-sharing, there are fewer alternatives for delivering freight. Alternative fuels offer opportunities. Freight trucks, trailers, wheels, auxiliary power units, refrigeration units, and engines have been getting more efficient, leading to reductions in fuel use.

In 2019, 70.7 percent of energy consumed on Oregon's highways was gasoline, primarily consumed by light-duty vehicles. Diesel, biodiesel, and renewable diesel are the second most consumed on-highway transportation fuels with a 29 percent share in 2019. Fossil fuel-based diesel accounts for 88 percent of diesel consumption and biodiesel and renewable diesel have an 11.7 percent share of diesel on-highway consumption. All other fuels added up to only 0.46 percent of Oregon's on-highway fuel consumption.

Heavy-duty freight trucks (class 8 vehicles of 34,000 pounds gross vehicle weight or more) consumed 55 percent of diesel in the on-highway sector. Vehicle miles traveled in Oregon for freight trucks over 34,000 pounds dropped by 19 percent from 2008 to 2009 due to the recession, but VMT climbed steadily since then back to pre-recession levels. Despite this increase in VMT, fuel consumption decreased by 16 percent due to a 14.7 percent increase in truck fuel efficiency over this same time period.

Figure 12. Oregon VMT and Fuel Consumption of Heavy Trucks (Greater than 34,001 Pounds)



Source: 2020 ODOE Biennial Energy Report

The U.S. Environmental Protection Agency (EPA) and National Highway Traffic Safety Administration (NHTSA) develop standards for clean vehicles, with reduced GHG emissions and

improved fuel use. In 2011, they set fuel economy standards for medium- and heavy-duty trucks manufactured in model years 2014-2018. The agencies estimate that the combined standards will reduce CO2 emissions by about 270 million metric tons and save about 530 million barrels of oil over the life of the vehicles. The Phase 2 standards for vehicles manufactured through 2027 will achieve up to 25 percent lower CO2 emissions and fuel consumption compared to phase one standards.

Alternative Fuels

The 2020 Biennial Energy Report policy brief assessed the potential for alternative fuels for medium-duty and heavy-duty vehicles. Alternative transportation fuels are generally defined as those used in place of petroleum-based fuels, namely gasoline and diesel. Alternative fuel use has been increasing in Oregon over the last 15 years. In 2019, nearly 9 percent of all on-highway transportation fuel consumption in Oregon came from alternative fuels. Support for increased adoption of cleaner fuels and cleaner vehicles is part of the Oregon Statewide Transportation Strategy and the Oregon Clean Fuels Program. Oregon is also a signatory to the Multi-state Medium- and Heavy-Duty Zero Emission Vehicle MOU, which created a task force to develop a multi-state action plan to encourage adoption of medium and heavy-duty zero-emissions vehicles. Part of the interagency Every Mile Counts program to support implementation of the Statewide Transportation Strategy includes an alternative fuel study lead by the Department of Environmental Quality (DEQ) in collaboration with ODOT and ODOE. This study will identify the fueling and infrastructure needs for medium- and heavy-duty trucks to be powered by electricity, hydrogen, renewable natural gas, or other lower carbon biofuels, and inform policy, incentives, and metrics to evaluate fleet changes and reduction in greenhouse gases, through adoption of cleaner fuels.

Metro

2014 Climate Smart Strategy

https://www.oregonmetro.gov/sites/default/files/2015/05/29/ClimateSmartStrategy-FinalVersion-2014.PDF

Metro Climate Smart Strategy aims to reduce the region's per capita greenhouse gas emissions from cars and light trucks at least 20 percent by 2035. The Climate Smart Strategy is a set of policies and actions to guide how the region moves forward to integrate reducing greenhouse gas emissions. The strategy relies on adopted local and regional land use and transportation plans and expected advancements in cleaner, low carbon fuels and more fuel-efficient vehicles.

2018 Regional Transportation Policy

https://www.oregonmetro.gov/regional-transportation-plan

The 2018 Regional Transportation Plan is a key tool for implementing the adopted Climate Smart Strategy and achieving a new 2040 target adopted by the Land Conservation and Development Commission in 2017. The RTP recognizes the importance of prioritizing

transportation investments that help reduce greenhouse gas emissions from cars and small trucks while making our transportation system safe, reliable, healthy and affordable.

By 2040, the plan, together with advancements in fleet and technology, is expected to reduce total annual greenhouse gas emissions from passenger cars and passenger trucks by 27 percent (compared to 2015 levels) and reduce annual per capita greenhouse gas emissions from passenger cars and passenger trucks by 46 percent (compared to 2015 levels).

Tri-Met

https://trimet.org/electricbuses/pdf/TriMet-Non-Diesel-Bus-Plan-September-2018.pdf

In 2018, TriMet's Board of Directors approved a plan for TriMet to have a clean-energy bus fleet by 2040. TriMet will use grants from the Federal Transit Administration's Low or No Emission Vehicle Program (Low-No program) and the Statewide Transportation Improvement Fund (STIF) for public transit, which can be used for the purchase of electric or natural-gas buses.

City of Portland Policy

Resolutions

Resolution 37168, adopted November 12, 2015, expressed the City Council's opposition to the "expansion of infrastructure whose primary purpose is transporting or storing fossil fuels in or through Portland or adjacent waterways." It also expressed the Council's intent not to restrict improvements in safety, efficiency, or seismic resilience; the provision of service directly to end users; or infrastructure that will accelerate the transition to non-fossil fuel energy sources. The City Council also expressed support for accelerating the transition to non-fossil fuel energy sources. As part of that transition, the Oregon Department of Environmental Quality (ODEQ) is implementing the Oregon Clean Fuels Program, which requires a 10 percent reduction in average carbon intensity by 2025. Fuels that could be used to achieve the standards include ethanol, biodiesel, electricity, hydrogen, natural gas, propane, and biogas, which may require additional storage capacity. In order to facilitate implementation of the Clean Fuels Program, non-fossil fuel storage tanks are not subject to the capacity limits.

Resolution 37289, adopted May 20, 2017, established a goal to meet 100 percent of community-wide energy needs, including transportation fuels, with renewable energy by 2050. It expressed the City Council's intent to collaborate with Multnomah County, Metro, and Tri-Met to reduce fares for low-income residents while significantly extending service miles and public transit access across City neighborhoods. It directed the City to work with and advocate for Tri Met to transition to electric bus and other renewable energy-powered public transit options as soon as practicable.

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

2015 Climate Action Plan
Goal: Reduce local carbon emissions 80 percent from 1990 levels by 2050, with an interim goal of 40 percent by 2030.

As described in Section 4, lower-carbon fossil fuels like natural gas and propane have the potential to replace higher-carbon fuels, but they do not approach the goal of an 80% reduction in carbon emissions by 2050 in Portland's Climate Action Plan or the State's 75% goal. Investments in major infrastructure typically take decades to recoup, and the transition to renewables needs to go much faster than that to stabilize global emissions. The adopted code changes are consistent with the 80% goal of the Climate Action Plan by restricting development of fossil fuel terminals.

2020 Climate Emergency Declaration
In June 2020, the City Council adopted the Climate Emergency Declaration (CED) (Resolution 37494) which recognized the accelerating climate emergency and acknowledged that it affects our community inequitably. The CED affirmed the need to reduce carbon emissions and amended the City's reduction targets to at least 50% reduction in carbon emissions by 2030 and net-zero carbon emissions before 2050. The CED contains many ideas, aspirations, directions, and goals., including 100% clean, renewable electricity, updating the renewable fuels standard, and supporting electrification in the transportation sector. It sets the City Council's expectation that PGE and PacifiCorp deliver 100% clean, renewable electricity to all Portland residents and businesses no later than 2030, and calls on NW Natural to fully decarbonize its gas pipeline no later than 2050. The CED further resolved that the City of Portland will adopt new policies and development standards to further prevent expansion of new fossil fuel infrastructure, reduce fossil fuel consumption, reduce the risk to the community and the environment, and encourage the adoption and use of clean, renewable fuels, including but not limited to updating the Renewable Fuel Standard.

End Notes

End-use sector:
The U.S. EIA definitions of end-use sectors.

> **Transportation**: Includes energy used by automobiles; trucks; buses; motorcycles; trains, subways, and other rail vehicles; aircraft; and ships, barges, and other waterborne vehicles whose primary purpose is transporting people and/or goods from one physical location to another. Vehicles whose primary purpose is not transportation (e.g., construction cranes and bulldozers, farming vehicles, and warehouse forklifts) are classified in the sector of their primary use. Also includes natural gas used in the operation of natural gas pipelines.

City of Portland, Oregon | Bureau of Planning and Sustainability | www.portlandonline.com/bps
1900 SW 4th Avenue, Suite 7100, Portland, OR 97201 | phone: 503-823-7700 | fax: 503-823-7800 | tty: 503-823-6868

Industrial: Includes energy consumed for manufacturing (NAICS codes 31-33); agriculture, forestry, fishing, and hunting (NAICS code 11); mining, including oil and gas extraction (NAICS code 21); construction (NAICS code 23); and combined-heat-and-power (CHP) generators that produce electricity and/or useful thermal output primarily to support the above-mentioned industrial activities.

Residential: Includes energy used for space heating, water heating, air conditioning, lighting, refrigeration, cooking, and running a variety of other appliances in the living quarters of private households.

Commercial: Includes energy consumed by businesses; federal, state, and local governments; other private and public organizations, such as religious, social, or fraternal groups; institutional living quarters; sewage treatment facilities; and CHP generators that produce electricity and/or useful thermal output primarily to support the activities of the above-mentioned commercial establishments.

Propane

Propane — sometimes known as liquefied petroleum gas, or LPG — is part of a group of fossil fuels called hydrocarbon gas liquids (HGLs). It is a gas normally compressed and stored as a liquid. Propane is most commonly used for space and water heating, for cooking, and as a transportation fuel for equipment such as forklifts. When used as vehicle fuel, propane is known as propane autogas.

Propane is primarily a byproduct of natural gas processing, though some propane is produced from crude oil refining. The fuel is distributed through a network of pipelines, railroad tank cars, tractor-trailers, and barges. The west coast region of the US is not served by HGL pipelines, so the propane is usually supplied via railroad in pressurized tankcars to wholesale and bulk purchasers. Consumer-grade propane is transported by truck to consumers.

The US Energy Information Administration classifies LPG as part of the Petroleum and Other Liquids category. The trends in the Pacific region forecast indicate that LPG represents approximately 2 percent on the petroleum product consumption with a forecasted a slight decline in consumption out to 2050. In Oregon, LPG consumption represented about 2.5 percent of petroleum product consumption in 2019.

Three propane distribution companies are located in the City of Portland – Suburban Propane, AmeriGas and Ferrellgas. These facilities are relatively small with storage tank capacity of 30,000 to 60,000 gallons, which is less than the 2 million gallon threshold for the definition of a bulk fossil fuel terminal.