ENVIRONMENTAL, ECONOMY, AND ALTERNATIVE ENERGY COMMITTEE QUESTIONS AND ASSESSMENT TOOL

Questions and Situation

Situation: An earthquake occurs in Portland; energy resources are unavailable for one week.

Responses to all questions are due to Tricia Sears on December 1, 2010.
We will provide you with electronic copies of this document and the response form.

1) If an emergency situation occurs and we do not have the usual amount and type of energy available:
   - Who are the priority users that need to get the available energy resources? E.g. fire, police, hospitals, etc. Identify your top five priority users.
   - What steps would your organization need to take first? E.g. secure buildings, check back up energy sources, find transportation routes etc.

2) What information can be shared by your organization with Portland LEAP participants and others, and what information is proprietary? Are you willing to acknowledge the existence of information you have even if you are not able to share the information itself with us? Are you willing to acknowledge what information you don't have?

3) Do you have an emergency action plan or contingency operations plan for your organization? Do you exercise those plans? Do your employees know about the plans? Do you have existing agreements with other organizations to provide supplies or services during an emergency? If so, with whom? Do you revisit those agreements from time to time to update them? If so, how often?

4) Are you able to share information about your organization's vulnerabilities? Can you identify gaps in information that you have in your organization? Are you able to take steps to obtain the missing information?

5) What opportunities do you see for sharing information and resources with Portland LEAP participants?

6) What are your concerns about working with the City of Portland and others on this emergency management planning effort? What other comments do you want to share with us? Any suggestions on other people or organizations you recommend we include in the Portland LEAP?

7) What do we need to do to continue to have an energy source that keeps government response agencies functioning, hospitals working and citizens safe?

8) What steps would you include for developing a strategic investment plan for items identified – such as maintaining existing infrastructure, updating existing infrastructure, and purchasing or building new infrastructure - in the Portland LEAP?

9) What is the role of alternative energy in energy assurance? Does it reduce the impact of a disaster? If so, how and to what extent?

10) How to do we finance alternative energy systems? Do we need incentives? How do we get money to organizations who are interested in hardening their systems (e.g. making a structure stronger) and or are making them more resilient (e.g. buy a generator).

Assessment Tool Information and Explanation

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The Oregon Department of Energy and the Oregon Public Utilities Commission

Oregon's Revised Statutes authorize the Oregon Department of Energy (ODOE) to implement the Fuel Allocation Program for motor fuels. The Fuel Allocation Program is designed to ensure emergency fuel goes to priority users performing life saving functions, restoring Oregon's critical infrastructure, and preventing community hardships. A more detailed description of the Fuel Allocation Program is provided in the *Oregon Petroleum Contingency Plan*.

As described in the *Oregon Petroleum Contingency Plan*, ODOE uses a three-tiered approach for allocating fuel to these priority users. Tier 1 covers the state's emergency services providers. Tier 2 covers the state's essential services providers. Tier 3 allows for a community to request fuel supplies from the state set-aside. A community must show an emergency or hardship caused by a shortage of fuel or show that the community is receiving relatively less than other areas of the state.

Priority Fuel Users	
Tier 1 – Emergency Services Sector	Law Enforcement Fire Services Medical Services (Ambulances, Air Transportation, and Hospitals)
Agencies and Organizations Performing Life Saving Functions	
Emergency fuel requests from emergency services providers will be immediately reviewed and approved by ODOE.	
Tier 2 – Essential Services Sector	Agriculture Production and Distribution Energy Production (Utilities) Public Transit Public Works (Sewer and Water) Telecommunications Transportation (Highways, Roads, Bridges)
Agencies and Organizations Performing Critical Functions to Restore Oregon's Fuel Supply and Distribution System and Other Critical Infrastructure	
Emergency fuel requests from essential	

services providers will be reviewed by ODOE on a case-by-case basis. Approval will depend on fuel availability and event conditions.	Sanitation Other Sectors as Appropriate
Tier 3 – Community Hardship	City County Other Sectors as Appropriate
Cities and Counties Experiencing Hardships Cause By a Shortage of Fuel	
Emergency fuel requests from communities will be reviewed by ODOE on a case-by-case basis. Approval will depend on fuel availability and event conditions.	

The Oregon Department of Energy is responsible for petroleum and the publicly-owned utilities portion of the electric grid; e.g. municipalities, electric cooperatives, and public utility districts. The Oregon Public Utilities Commission (PUC) is responsible for natural gas and the Investor Owned Utilities (IOUs) portion of the electric grid.

ODOE has copies of the emergency plans of each company in the petroleum industry; but ODOE cannot share that information due to "non-disclosure" agreements. The Oregon Public Utilities Commission has copies of the emergency plans from the natural gas companies on file. The PUC does not regulate those plans but makes sure the companies have the plans in place, and retains copies of the plans because the Federal government requires each company to submit those plans to the PUC. The PUC does not have copies of the emergency plans from the electric companies.

Definitions of Terms in this Assessment Tool

Several definitions are included to provide background and clarity to the participant for answering the questions and using the assessment tool. The definitions of hardening and resiliency are from the document *Hardening and Resiliency: U.S. Energy Industry Response to Recent Hurricane Seasons: August 2010*. The definition of critical infrastructure is from the *Critical Infrastructure Protection Plan Portland/Vancouver Urban Area*.

Mitigation: Mitigation is comprised of strategies and actions to lower or lessen the impacts of an energy-related disruption or disaster. These strategies and actions occur before and after a disaster.

Vulnerability: Vulnerability is the degree to which people, property, resources, systems, and cultural, economic, environmental, and social activity is susceptible to harm, degradation, or destruction. We can reduce our vulnerability by taking mitigating actions now that can lessen the impacts of a disaster.

Hardening: Refers to physically changing the infrastructure to make it less susceptible to damage from extreme flooding, or flying debris. Hardening improves the durability and stability of energy infrastructure, making it better able to withstand the impacts of hurricanes and weather events without sustaining major damage.

Resiliency: Refers to the ability of an energy facility to recover quickly from damage to any of its components or to any of the external systems on which it depends. Resiliency measures do not prevent damage; rather they enable energy systems to continue operating despite damage and/ or promote a rapid return to normal operations when damages/ outages occur.

Critical infrastructure: Critical infrastructure is the publicly and privately controlled systems and assets, including the built and natural environments and human resources, essential to the

sustained functioning of the Portland/Vancouver metropolitan area including the counties of Clackamas, Columbia, Multnomah, and Washington in Oregon and Clark County in Washington. Such systems and assets specifically include those necessary to ensure the continuity of security, safety, health, and sanitation services, support the area's economy, and/ or maintain public confidence. Incapacitation or destruction of any of these systems or assets would have a debilitating impact on the area either directly, through interdependencies, and/or through cascading effects.

Overview of Energy Assurance Plan Steps

The *Local Government Energy Assurance Guidelines* document is a tool with which to develop a comprehensive energy assurance plan. Much of the information in this committee questions and assessment tool document, from this point forward, is excerpted and modified from the *Local Government Energy Assurance Guidelines.* Herein, the term energy will be used to refer to electric power and all types of fuel whether they are natural gas, diesel, fuel oil or other, and whether or not they are used directly or converted to electricity for power to maintain operations. The term city is used as an all-inclusive term to mean local government.

Energy Assurance Plan Steps

These energy assurance steps are not one-size-fits-all. The steps should be performed in sequence, but if another approach works better for a unique situation, it will not disrupt the final outcome. Every effort has been made to assure that each step builds on the previous one and that there are no gaps or redundancies.

The Energy Assurance Plan Steps are essentially described in three sections which include checklists: Checklist A: Facility Analysis, Checklist B: Fuel Supply, and Checklist C: Personnel Training and Education. Although the steps are facility neutral (they can be applied to any facility), they do need to be taken with a certain facility in mind. Each of the steps in the checklists is explained. In most cases, there are simple sample tables included below that can be adapted and utilized to fit the organization and facilities under discussion.

Checklist A: Facility Analysis

Step #	Task	Done?
A1	Inventory facilities	
A2	Indentify facility ownership and management	
A3	Determine facility criticality by identifying its functions and impacts: communication, life saving, life sustaining, maintaining orderly functioning	
A4	Prioritize facilities based on their functions and impacts	
A5	Identify required operations for critical and essential facilities	
A6	Identify energy sources for required operations	
A7	Calculate energy demand for required operations	
A8	Identify no-cost and low cost alternatives to reduce demand	
A9	Estimate energy demand reduction for alternatives	
A10	Identify demand reduction options	
A11	Estimate energy demand reduction from options	
A12	Identify current back-up systems, locations (stationary or mobile/roll-up) for each facility and record their energy output	
A13	Calculate energy shortfall for each facility	
A14	Identify and evaluate opportunities for meeting this shortfall including costs, benefits from renewables (e.g. emissions) etc	
A15	Develop a strategic investment plan to stage facility hardening	

A1. Inventory Facilities

There are two aspects to assembling the necessary information on facilities. The **first** is the name of the facility and the **second** is its address. The inventory needs to include city facilities and any non-city facilities that may be important in maintaining essential or required city services. The city may not own or operate such facilities. Note that step A2 requests information on which entity owns or manages the facilities in the inventory; this allows the city to declare that although a facility may be deemed a key asset, it may not have responsibility for its energy assurance and thus may not be investing limited capital into its hardening. If non-city key facilities are not listed here as part of step A1, there will be a lost opportunity in pointing out that such a facility needs to be hardened in order to assure key public services are maintained.

Step A1.a	**Step A1.b**
Facility Name	**Facility Address**
Emergency operations command center	
Primary data center and primary internet	
Secondary data center and primary voice trunks	

A2. Identify Ownership and Management

Identify the entity having primary responsibility for each key facility in an emergency. Identify the city-owned and operated facilities, and any other non-city facilities such as a regional hospital, or a private sector entity from whom the facility is being leased. The city may need to work with the responsible party to implement the hardening. The information will be important in step A14 when investment strategies are being contemplated (for example, financing and staging of investments, developing partnerships, determine lead roles etc).

A3. Determine Facility Criticality by Identifying its Functions and Impacts: Communication, Life Saving, Life Sustaining, Maintaining Orderly Functioning

Once the key facilities have been identified and the owner/manager noted, an assessment of the impacts on city operations and the public can occur next. This can be accomplished by looking at the functions that each facility performs and the associated impacts were these functions to become compromised. There are four functional areas in need of consideration: a) insuring communications; b) saving lives; c) sustaining lives; and d) systems rehabilitation to maintain orderly functioning.

Communication services are those which allow systems and individuals to freely communicate.
Public health and safety: Life saving services would be those where the loss of electricity or other fuel (natural gas, heating oil etc) would aversely affect the ability to save lives. Examples would include emergency room operations and some police and fire services (EMT operations).
Public health and safety: Life sustaining services are those which are not likely life threatening but necessary for life support. Examples are police and fire stations, hospitals, nursing homes, water pumping stations, railroad crossings, and industrial facilities that handle hazardous materials.
Systems rehabilitation to maintain orderly functioning includes bringing key facilities back on-line to re-establish normal operations and order. Examples include restoring traffic intersection operations, assuring elevators serving high rise buildings are operational and seeing that security alarms are functional.

Other functional categories should be discussed and included as necessary. It is left up to the city as to how these functions as they relate to a specific facility are recorded.

Step A1 Facility Information		**Step A2**	**Step A3 Functions**			
Step A1a	**Step A1b**		**Step A3a**	**Step A3b**	**Step A3c**	**Step A3d**
Facility name	Facility address	Responsible party/ownership	Communications	Public health and safety: life saving	Public health and safety: life sustaining	Systems rehabilitation to maintain orderly functioning

Whatever method is chosen, the next step, step A4, will involve prioritizing the facilities based, in part, on this functional assessment.

A4. Prioritize Facilities Based on the Functions/Impacts

To effectively cost allocate scarce resources to maximize local government energy assurance, the identified key facilities need to be prioritized so that investments can be staged. It is recommended that a five level system be used: critical, essential, important, moderate and low. The priority ranks are in parentheses.
Critical (1): Failure may result in death, injury, severe financial loss or legal liability; impossible or impractical to work around.
Essential (2): Cannot fail for an extended period of time; cumbersome or unlikely to work around.
Important (3): Needed and will be evaluated and addressed depending on the event.
Moderate (4): Can be postponed pending assessment.
Low (5): Would result in an inconvenience.

These rankings should be assessed without regard to cost; cost will be factored in later. Other factors that the city or organization determines it needs to include in this ranking process should be fully considered here. In reality, it is likely that only the two highest priorities (critical and essential) will receive funding and attention so it is important to get the priorities right such that a key asset (facility, component or system) is not left off the list.

Step A4 Priority Ranks	
Key Facilities	**Rank**
Hospitals	1
Grocery stores	3
Gas stations	2

A5. Identify Required Operations for Critical and Essential Facilities

For each critical and essential facility, identify the operations that would be required to be functional in the first 72 hours of an emergency. These operations should be only those that rely on energy for their function. For example, automatic doors require energy whereas manually-operated doors do not. These operations would be first-in-time to receive back-up energy in an emergency.

If not all operations listed are required, the facility manager may need to adopt and enforce policies and procedures to limit the load to required operations.

Another way to look at this process is to determine which loads absolutely need to be kept "on-line" in an emergency. Such a determination should be reviewed at least annually to assure that it is up to date. This will recognize changes in priorities and staff.

Step A5
Energy dependent operations during the first 72 hours of an emergency?
Kitchen appliances and showers
Fire trucks
Heating and cooling
Pumping water
Computers

A6. Identify Energy Sources for Required Operations

ID current energy source/type for the listed required operations. In many instances, numerous operations rely on the same energy source (e.g. electricity) for their energy needs. A proposed response would look something like: electricity for lights, automatic doors, and elevators, and so on. This is the bottoms up approach and is most time consuming. The top down approach could be used such as the entire building uses 50 kW. The short coming to the top down approach is that some non-required operations may get factored in.

Step A6
Identify existing energy sources for required ops
Natural gas
Diesel, biodiesel
Natural gas, electricity
Electricity

A7. Calculate Energy Demand for Required Operation

This calculation can be based on historical use, or name plate rating of a component or system. For example, assuming the operation of the showers and dishwasher with hot water uses natural gas, the hot water heater input in BTUs would be included here (e.g. 40,000 BTU/hr). Some of this information could be available if a prior facility energy load calculation has been completed. If not, going through this calculation could provide information to properly size an energy back-up generator. For example, how much of the required load would a 125 kW generator satisfy? Although typically fleet vehicles are fueled at a central location, if the city or organization determines that back-up fuel is desired on-site, the city or organization needs to know the fuel tank capacity of all vehicles kept on-site and size a tank accordingly whether it is diesel or gasoline. The size of that tank would be entered in step A10, such as 10,000 gallons.

Step A7
Energy demand required for operation
40,000 BTUs/hr
10,000 gallons

A8. Identify Low Cost and No Cost "Alternatives" to Reduce Energy Demand

List ways the energy demand for the required operations could be met or minimized other than through back-up systems such as cycling systems on and off, limiting or ceasing energy flow to "other" non-required operations, etc. For example, the automatic doors can be placed on manual override to save energy. Or, multiple facilities could be consolidated to fewer facilities to centralize operations and reduce the cost of maintaining multiple locations.

Another example: If incandescent lights are currently in use, they could be switched to compact fluorescents or LEDs to decrease their load. This could be combined with, for example, changing the set point for the heater and air conditioning systems during an emergency could result in substantial savings. A thorough discussion of all the potential conservation and other low cost, no cost opportunities needs to occur as each unit of energy reduction will reduce the size of the back-up systems that needs to be installed.

Step A8
Low cost and no cost alternatives to reduce energy demand for these operations
Switch automatic doors to manual
Switch lights to LEDs
Change heating set point from 70F to 65F
Change cooling set point from 68F to 72F
Consolidate 5 fire station operations into 1 central location
Partnerships

A9. Estimate Energy Demand Reduction for Alternatives

The task now becomes estimating the net reduction in energy use/demand that these non-technology measures offer. There is a limit in terms of how precise this process can be, and therefore, the resulting level of accuracy. Yet, it is important to be as detailed and accurate as possible. One approach is to provide a range of energy saving numbers such as "8-9 kW for each alternative or to express a level of confidence in any number derived from such as "9kW" with a 10% uncertainty factor.

The rationale for going through this process in the face of a limited budget is at least two-fold. First, one never knows when a situation such as policy, politics or budget priorities will shift and the city or organization will need a quick turnaround on which facilities are required and the most vulnerable to an emergency and what the costs are to harden it. Second, when priorities do shift, the energy /facilities manager will be able to capitalize on the opportunity by being prepared and armed with accurate information positioning him /her to take advantage of the funds available.

Step A9
Estimate the energy
1 kW
2 kW (90% savings)

A10. Identify Demand Reduction Options

For each high priority facility, the mission critical operations should be evaluated by identifying energy back-up gaps and needs (e.g. technology) that are capable of meeting any residual energy load. This information will be used during the strategic planning step.

The options should be categorized into: a) renewable technologies, b) conventional options, and c) energy efficiency measures. Soft energy paths can well serve to harden city and other facilities. They are especially well-matched for decentralized and remote applications. Conservation and operational policies and procedures should have been addressed under step A9 as low cost and no cost alternatives. Be reminded that all of these options are to only address the energy demand for mission critical operations (to minimize fiscal impact) and can therefore be termed back-up power. As such, both a) and b) should be de-centralized by definition and are energy supply options whereas c) is a demand reduction technique.

A11. Estimate Energy Demand Reduction from Options for Each Facility

This step should be executed with more precision, and thus result in a higher level of accuracy than step A9 where the "alternatives" were estimated. These figures should be quantitatively derived, whereas the alternative might be better suited to a qualitative analysis.

A12. Identify Current Back-Up Systems and Locations and Record their Energy Output

Any back-up system needs to be able to meet the energy demand for the required operations for a minimum of 72 hours. If the system is a roll-up generator, enter that in the "location" column. Be careful not to use the same roll-up generator more than once.

To assure that any back-up system has an adequate supply of energy for a minimum of 72 hours, an energy supply analysis needs to be conducted. To make conducting this analysis as simple as possible, a fuel supply assurance checklist has been developed.

A13. Calculate Energy Shortfall for Each Facility

This step should be executed by taking the energy demand for each facility and subtracting the demand reduction from the alternatives (step A9) and options (step A11) and then the energy contribution from any existing back-up generating devices (step A12). This is the unmet energy need for each facility to keep power going to the identified critical operations. Step A14 takes these energy gaps and recommends that a plan be developed to address the need.

A14. Identify and Evaluate Opportunities for Meeting any Shortfall (A12) including costs, benefits from renewables (e.g. emissions) etc

The required operations should be evaluated by identifying energy back-up gaps and needs (technology, partnerships, etc) that are capable of meeting any residual energy load. These opportunities should be categorized into: a) renewable technologies, b) conventional options, and c) energy efficiency measures. Soft energy paths can well serve to harden city facilities. They are especially well-matched for de-centralized and remote applications. Conservation and operational policies and procedures should have been addressed under step A8 as low cost: no cost alternatives. Be reminded that all of these opportunities are to only address the energy demand for required power (minimize the fiscal impact) and can therefore be termed back-up power. As such, both a) and b) should be de-centralized by definition and are energy supply options whereas c) is a demand reduction technique.

Costs need to include installation and operation and maintenance costs. Most of the information for traditional back-up systems should be readily from the local utility or vendors and therefore

be familiar to cities. The costs for renewable and green technologies as well as conservation techniques will need to be gathered or estimated.

A15. Develop a Strategic Investment Plan to Stage Facility Hardening

The city or organization should consider developing short term (12 months), medium term (12 months to three years), and long term (three to five years) strategies for these high priority facilities to "harden" them over time. Strategies could include: stating investment opportunities over multiple years; developing mutual aid agreements; training staff to power down certain non-required operations; developing policies and procedures to maintain continuity of operations followed by exercises to assure precision and expediency so that operations can be maintained for the 72 hour period.

Checklist B: Fuel Supply

Unlike Checklist A, Checklist B does not need to be addressed in any specific order. It can be added to or deleted from at will depending on the nature of the emergency and concerns of the city or organization. The personnel aspects of these items are presented and discussed in Checklist C.

Item	Task	Done?
B1	On-site generators are routinely exercised, fueled, and in stand-by mode	
B2	Fuel storage capacity (diesel and gasoline) for multiple days for required operations	
B3	Numerous storage facilities located strategically around the city are regularly consumed and refreshed	
B4	Capability to deliver fuel citywide via numerous tanker vehicles	
B5	Refueling routes in place and current	
B6	Identified personnel (primary and alternate) to operate the refueling equipment and trucks	
B7	Inventory of roll-up generators with fuel are routinely exercised	
B8	Fuel Reserve Sensors in place to automatically alert suppliers and city personnel of impending needs	
B9	Facilities with required operations have uninterruptible power supply (UPS)	
B10	Required operations fuel priority decisions are in place	
B11	Diverse portfolio of back-up energy technology in place (renewables etc)	
B12	Plans for all energy emergency operations are in place and staff is aware of these alternative work sites	
B13	Communication plans for all energy emergency operations are in place	
B14	Emergency purchase authorizations are in place for fuel acquisition	
B15	Contracts with fuel suppliers address that the city gets top priority, tankers can be located on-site, and fuel for a minimum of 72 hours is mandatory	

B1. On-site Generators are Routinely Exercised, Fueled and in Stand-by Mode

Generators are key aspect of energy assurance and would be used as the delivery mechanism for back-up power. However, they need to be routinely exercised to assure they maintain their readiness. To accomplish this routine, they need to maintain adequate (full) fuel levels so that they can run for the maximum time possible before being refueled. Assurance also needs to be in place that the stand-by mode is operational.

B2. Fuel Storage Capacity (Diesel and Gasoline) for Multiple Days for Required Operations

Each city needs to have adequate storage (topped off) to insure that its key facilities have ample fuel to sustain the required operations for at least 72 hours.

B3. Numerous Storage Facilities Located Strategically Around the City are Regularly Consumed and Refreshed

Storage capacity (B2) needs to be located such that reserves can be delivered to their destination with assurance and at notice. To maintain the quality of the fuel, it needs to be refreshed as necessary (may require testing) and/or have fuel stabilizer added.

B4. Capability to Deliver Fuel Citywide via Numerous Tanker Vehicles

Even if quality control of the fuel is assured and kept at convenient locations, the demand for fuel at these various locations may exceed the ability to deliver it in a timely manner. As such, a determination needs to be made as to how many tanker trucks would be necessary under a worse case scenario. The city needs to have this many vehicles on hand either through outright purchase, mutual aid agreements, contract or the like.

B5. Refueling Routes in Place and Current

To assure that fuel gets to its intended location as quickly as possible; the routes that drivers take need to be explicit and kept up to date. Considerations include the likelihood of any given route being blocked due to unforeseen circumstances during an emergency, unanticipated congestion, railroad crossing schedules and avoidance, optimized routing to numerous locations, and factors of distance, road conditions and the like.

B6. Identified Personnel (Primary and Alternative) to Operate the Refueling Equipment and Trucks

Required personnel need to be identified in advance and trained (see Checklist C1).

B7. Inventory of Roll-Up Generators with Fuel are Routinely Exercised

If roll-up generators are to be used to assure energy continuity, the same issues that pertain to checklist item B1 pertain to this item as well. In addition, the city or organization needs to assure that the roll-up generator is capable of being transported to the desired location.

B8. Fuel Reserve Sensors in Place to Automatically Alert Suppliers and City Personnel of Impending Needs

Fuel reserve sensors are typically located in the fuel tanks so that fuel levels can be monitored and fuel ordered as necessary. It is critical that these sensors be maintained and are sending accurate information to the fuel supplier.

B9. Facilities with Mission Required Operations have Uninterruptible Power Supply (UPS)

Facility managers rely on their back-up energy source (generator) to come online in the event of an energy emergency. What is sometimes forgotten is that there is usually a downtime before these back-up systems become fully operational. During these times, it is probable that important mission critical functions will not be maintained (communications, data, etc). To preserve these important functions, the value of an uninterruptible power supply should be considered.

B10. Required Operations Fuel Priority Decisions in Place

It is quite probable that not all facilities – even those that are critical – are equal. That is, some critical operations are higher priority than others. For those situations where fuel is limited due to competing needs or extremely high demand (either locally or regionally), a priority list should be developed, published, and communicated. This list should not only be available to city personnel but to fuel suppliers and the local utilities as well. Importantly, there should be a city-only list and a regional list. Partnerships and plans need to be developed and priorities agreed upon.

B11. Diverse Portfolio of Back-Up Energy Technology in Plan (Renewables, etc)

It is prudent and probably wise to secure a diverse portfolio, given:

- the vagaries of the fuel market
- the precipitous rise in fuel costs
- concerns about global warming
- deteriorating air quality; and
- the issues raised in item B10 concerning the likely competition for limited fuel in the face of an emergency.

In ecosystems, it is a well documented fact that diverse systems are inherently more stable (will better survive adverse conditions) than simple systems. When adverse conditions like extreme temperatures, toxic chemicals, predators and so on present themselves, a diverse colony of organisms will likely survive whereas a simple system of a fewer organisms will become extinct. Likewise, a diverse portfolio of investments is one of the better hedges against fluctuations in the economy and the stock market.

B12. Plans for Facility Consolidation are in Place and Staff is Aware of these Alternate Work Sites

As presented under step A8, one low cost and no cost alternative may be to consolidate operations from multiple facilities to fewer facilities. This strategy would likely result in the need for fewer essential personnel during the emergency, simplify communications and reduce the amount of fuel needed to maintain facility operations. There are other benefits as well. A prime example might be to name a primary fire station for every three that exist. Whatever the

consolidation goal, plans need to be developed among and between these facilities and their personnel in such areas as primary responsibilities, chain of command, reporting, and so on.

B13. Communication Plans for all Energy Emergency Operations are in Place

Without an adequate communication plan, fuel may be available, but the need for additional fuel, or necessary re-routing of tanker trucks and the like prevent the fuel from reaching its intended destination, or at the very least, arriving too late.

B14. Emergency Purchase Authorizations /Contracts are in Place for Fuel Acquisition

Emergency purchase authorizations are a very important aspect of assuring adequate fuel supply in an emergency. Some cities have a primary contract and one or two additional secondary contracts in the event the primary contract is insufficient. These authorizations or contracts need to be put in place as soon as practicable. It would be wise to assure what other agreements contractors/suppliers have with other entities. This task is similar to B10, but extends the reach of energy assurance to multiple suppliers. To the extent the city and other organizations have a diverse portfolio of energy technologies – especially renewables – this task becomes easier. The more efficient the technologies are at converting fuel to power, the less fuel will be needed.

B15. Contracts with Fuel Suppliers Address that the City gets Top Priority, Tankers can be Located On-site, and Fuel for a Minimum of 72 Hours of Operation is Mandatory

This task is a subset of B10 and B14; it is broken out for the purpose of this checklist because of its importance. Any agreement with fuel suppliers needs to contain specific language which addresses these issues: priority; that tankers can occupy space on city property to deliver fuel and remain there as necessary, and that each site will receive an amount of fuel – spelled out on the contract – to maintain operations for a minimum of 72 hours.

Checklist C: Personnel Training and Education

Step	Task	Done?
C1	On-site generators are routinely exercised including fueling, start-up, checking for functionality of stand-by mode	
C2	Plans are in place and practiced to deliver fuel citywide (e.g. numerous tanker vehicles, adequate number of trained personnel etc)	
C3	Refueling routes are in place, current, known and practiced if necessary	
C4	Primary and alternate personnel have been identified to operate the refueling equipment and trucks	
C5	Personnel routinely exercise inventory of roll-up generators if available	
C6	Personnel are aware of what fuel reserve sensors are and how they function	
C7	Personnel are aware of how required operations fuel priority decisions are made	
C8	Plans for facility consolidation are in place and staff are aware of these alternative work sites	
C9	Communication plans for all energy emergency operations are	

	in place and personnel regularly review and exercise these plans	

C1. Exercising of On-Site Generators

These generators need to be routinely exercised including fueling, start-up, checking for functionality of stand-by mode etc. It is not common practice to routinely have responsible personnel perform these functions. As is commonly known, unless knowledge is kept current through continuing education and practice, skill levels deteriorate and mistakes occur. Each city needs to decide the frequency and depth of these functions but it is recommended that they be included in agency standard operating procedures.

C2. Fuel Delivery

Plans need to be in place and practiced to deliver fuel citywide (i.e. numerous tanker vehicles, adequate number of trained personnel, etc). These plans need to include which drivers fill up which trucks at which sites and where the fuel is to be delivered. Drivers also need do know how to load and dispense fuel. Realistically, the city may not have the capability to pick-up and deliver all necessary fuel. In such cases, contracts and/ or agreements would be in place to augment city personnel. These contacts need to specify on-going training similar to that being offered by the city. The need for these contracts is discussed in B4, B10, and B14.

C3. Refueling Routes

Routes need to be identified, current, known and practiced. In addition, drivers need to know which routes to take from their primary work location to the place where the trucks are located. Truck drivers need to periodically drive the routes that have been selected to pick up and deliver fuel to designated locations. These designated locations should ideally be the same as the identified critical and essential facilities that were chosen using Checklist A. The alternative routes should also be practiced so that if a primary route is blocked or otherwise not passable (e.g. snow, rain, traffic etc), the drivers would not be unduly delayed in retrieving and delivering the necessary fuel to the correct locations.

C4. Operation of Fueling Equipment and Trucks

Primary and alternate personnel need to train on all fueling operations whether they are city or contractor facilities.

C5. Roll-up Generators

Some cities may use roll-up generators for flexibility and economic reasons. These portable units have some different training requirements than stationary units. They often have to be on-and-off loaded, tend to be smaller in scale, may run on a variety of fuels, may or may not have fuel tanks aboard and so on. Most importantly, they will need to be "connected" to their load as differentiated from facility-dedicated units. Training must be customized to account for these differences.

C6. Fuel reserve sensors

Personnel need to know what fuel reserve sensors are and how they function. They need to know how to read the gauges accurately and the mechanics of ordering fuel when necessary.

C7. Fuel Priority Decisions

All involved personnel need to be aware of the fuel priority decisions, how they were made and why. This knowledge will build a better emergency response team and limit mistakes. This will likely only be a one-time session repeated for new members of the team.

C8. Facility Consolidation

Facility Consolidation, if a part of the energy assurance plan, resulted from Section III. A8. The premise behind consolidating operations is to make emergency response more streamlined and to put into place a cost-effective means to reduced back-up energy requirements. Staff involved in energy assurance need to be clear where to report to work if an alternative work site has been identified. They also need to be accommodated in the alternative work site so they can perform their assigned functions efficiently and effectively.

C9. Communication Plans

Communicating is not only the most important energy assurance tasks it is also one of the more daunting ones. Not only are there many forms of communications (e.g. verbal, face-to-face meetings etc) but there are many communication devices as well (cell, phone fax, 800 MHz, walkie talkie, email, face-to-face meetings, etc). Personnel need to be trained in the use of as many of these devices as practicable and re-trained on a regular time table. The staff who does not regularly use an 800 MHz radio, for example, can easily forget how it operates if not trained at least monthly. Training updates need to be tracked, practiced and documented.

Acknowledgment:
This material is based upon work supported by the Department of Energy under Award Number DE-OE0000318.