OREGON ENERGY SECURITY PLAN

Submitted to the

U.S. Department of Energy

OREGON DEPARTMENT OF ENERGY

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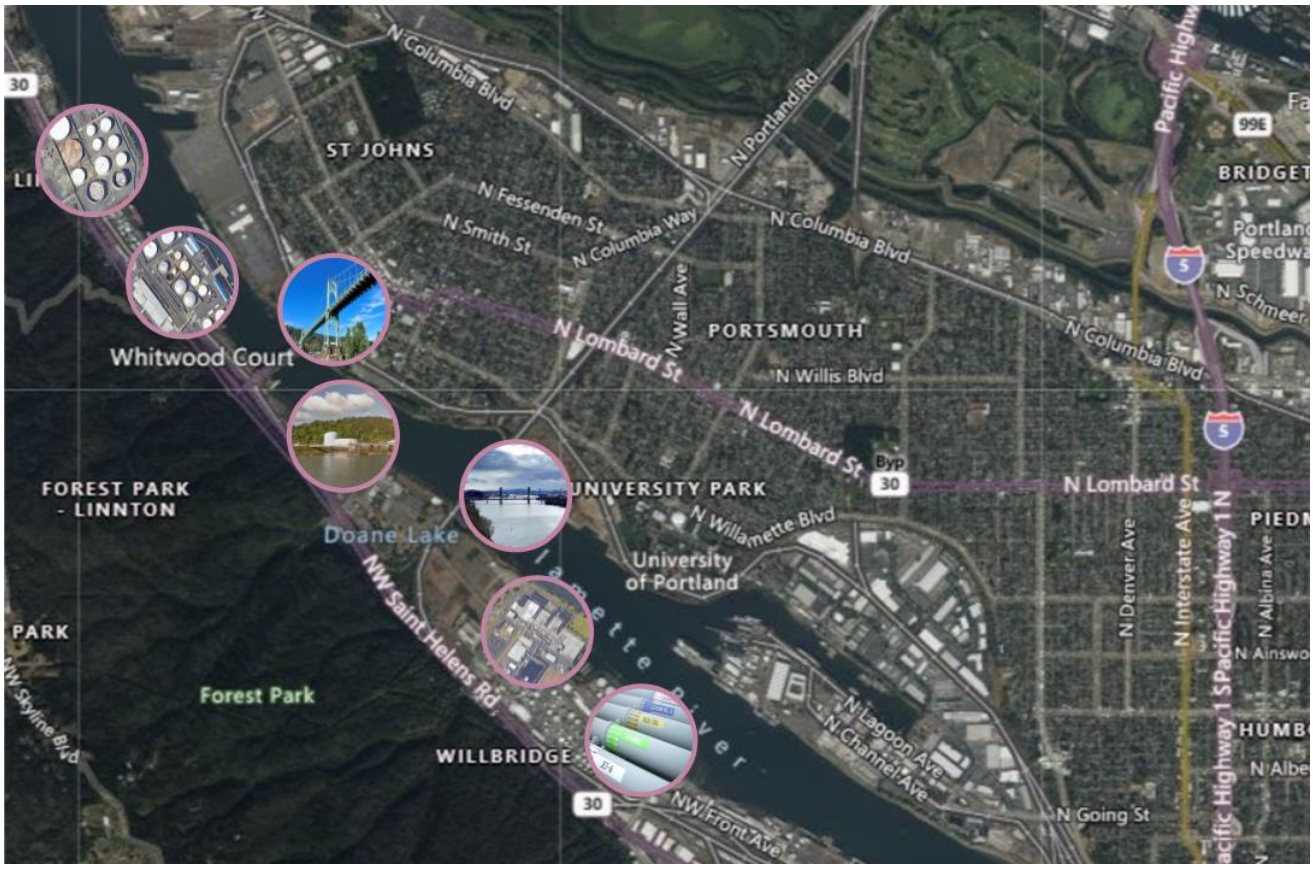
I. INTRODUCTION

Oregon's energy sector consists of electricity, liquid fuels, and natural gas assets that are geographically dispersed and connected by systems and networks. The energy sector is uniquely vital, as all other critical infrastructure and lifeline services depend on power and liquid fuels to operate – electricity to power hospitals or fuel for fire trucks, for example. A disruption to Oregon's critical energy infrastructure can directly affect the security and resilience of other aspects of the energy sector, such as a disruption of natural gas supply that restricts power plant operations, or an electric outage affecting the ability of a gas station to pump fuel. In addition, disruptions to our energy systems can have a cascading effect on other critical infrastructure systems – such as transportation, communications, or water – threatening public health and safety, the environment, the region's economy, and even our national security.



Elements of the Critical Energy Infrastructure Hub in North Portland

Oregon's energy infrastructure and delivery systems are vulnerable to a variety of hazards, including natural disasters (flooding, wildfires, earthquakes, etc.), systems and infrastructure failures, pandemics, deliberate physical or cyber-attacks, and other events. Whatever the cause, when the demand for energy is greater than the available supply as a result of an interruption to an energy system, energy insecurity is created.

Typically, market forces and swift actions by energy providers will stabilize disruptions or imbalances. However, due in no small part to climate change, natural hazards are intensifying in frequency and magnitude. New threats — including cyber security risks and domestic and international terrorism —

also pose increased pressure on energy systems in Oregon and beyond. As a result, governments are more often called to assist during energy disruptions to ensure the protection of the health and well-being of their residents. In addition, Oregon and the Pacific Northwest face a potential massive earthquake from the Cascadia Subduction Zone that will strain or destroy even the most robust/resilient energy systems in the western areas of our state.

Securing and improving the resilience of energy infrastructure in the face of both man-made and natural disasters is a priority and vital to the state's overall health. Maintaining Oregon's energy security is an ongoing effort that requires continued vigilance, contingency planning, public-private sector partnerships, regional coordination, public awareness, and training.

The Oregon Energy Security Plan (OR ESP) is a product of the Oregon Department of Energy (ODOE) in collaboration with many partners. The OR ESP assesses the state's critical energy infrastructure and assets along with those in the region that support Oregon's needs. The OR ESP also quantifies the threats and hazards that may cause energy insecurity and proposes a series of mitigation measures and actions that the state and other partners can implement to reduce risk and improve energy stability.

It's important to note that many low-income Oregonians already experience barriers to energy security in their daily lives. This includes being unable to afford the necessary energy to live a comfortable and productive life, such as affording enough fuel to drive where needed, pay electric bills, or sufficiently heat and cool homes. The OR ESP also addresses this type of energy insecurity and risk at the neighborhood level, including proposed mitigation measures. This analysis ODOE's analysis of all threats will be included in the 2024 OR ESP and will rely upon input from Oregonians collected after submittal of this draft 2023 plan.

Defining Energy Security

There are many ways to describe energy security. Some commonly used definitions include:

> *"Uninterrupted availability of energy sources at an affordable price."*[1]
>
> *"Ability to maintain energy services at global, national, or local levels against disruption from natural or human sources."*[2]
>
> "*Having enough energy to meet demand and having a power system and infrastructure that are protected against physical and cyber threats."*[3]

These definitions show that energy security encompasses many aspects: availability, accessibility, affordability, and reliability. Short-term energy security focuses on the ability of the energy system to react promptly to sudden changes in the supply-demand balance. Long-term energy security primarily deals with timely investments to supply energy in line with economic developments and environmental needs. Affordability of energy is a critical component of energy security at the individual and household level – even if sufficient supply of energy is available, affordability can affect the well-being of Oregonians.

The **Oregon Energy Security Plan** is intended to help the state to plan for, respond to, and recover from events that disrupt the energy supply (electricity, natural gas, and liquid fuels). Through efforts to quantify and mitigate risks to energy infrastructure, we hope to ensure a reliable and resilient supply of energy at an affordable price.

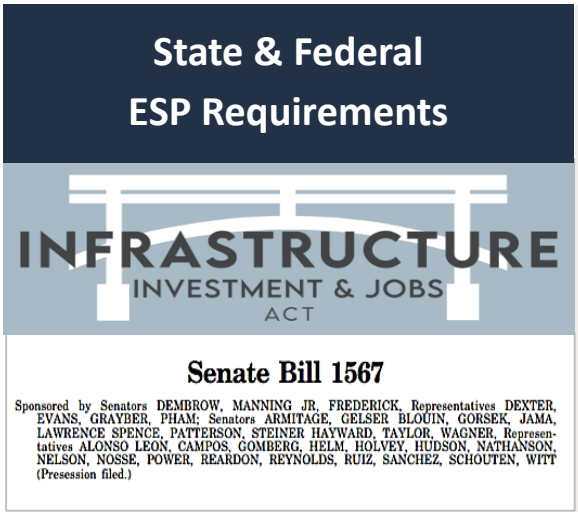
Energy Security Requirements

The federal government and Oregon state leadership recognize the importance of energy security for our state, and have provided the direction, funding, and technical assistance necessary to move this plan forward.

The Infrastructure Investment and Jobs Act (IIJA) was enacted in November 2021, authorizing the U.S. Department of Energy (USDOE) to provide financial and technical assistance for state energy offices to develop what is now called a State Energy Security Plan (SESP). The IIJA requires that SESPs include an assessment of potential hazards to all energy sectors and cross-sector interdependencies, as well as proposed methods to strengthen the state's ability to have reliable, secure, and resilient energy infrastructure. The federal law also requires states to engage in regional coordination and provide an annual letter of certification from the Governor to USDOE to ensure SESPs comply with federal requirements. Finally, the federal government is providing direct funding to states to support development of SESPs through the IIJA as well as other existing funding sources to state energy offices like ODOE.

Likewise, Oregon legislators passed a bill in the 2022 session with similar energy security provisions. Senate Bill 1567 (SB 1567) directs ODOE to develop an Oregon Energy Security Plan (OR ESP) that aligns with federal IIJA requirements.

Figure 1: Oregon Energy Security Plan Requirements



1. Address all energy sources *(regulated & unregulated providers)*
2. Provide state energy profile
3. Address energy sector hazards & vulnerabilities *(physical/cyber)*
4. Assess risks to energy sectors & cross-sector interdependencies
5. Provide risk mitigation approach *(enhance reliability & end-use resilience)*
6. Address multi-state & regional coordination, planning, and response *(Tribal coordination and mutual assistance in response plans)*

SB 1567 also directed ODOE to evaluate strategies to increase fuel storage capacity throughout the state to provide a safety net for local communities following major disasters. ODOE's ongoing planning with federal agencies shows that the greatest challenge following a Cascadia Subduction Zone earthquake and tsunami event will be the widespread damage to the state's transportation systems. This will limit the ability to deliver fuel to affected communities in western Oregon. It could take weeks or even months to deliver fuel to some communities due to the lack of access, and will likely take longer in the more remote areas of the state. The concept is that if relatively small quantities of additional fuel could be stored in less seismically active regions of the state, and storage tanks themselves were seismically-sound, then the area would have additional supply-ready fuel to use for emergency response purposes. This evaluation will primarily consider locations that already have bulk fuel tanks, such as public works yards, motor pools, utility maintenance yards, local airports, or other similar types of facilities.

About the Oregon Department of Energy

The Oregon Department of Energy was created in 1975, two years after the international oil crisis that led to a nearly 300 percent increase in gasoline prices, changed our daily lives, and influenced global politics and economies for years. [4] ODOE began collaborating with federal partners, other state energy offices, and the private sector to implement strategies to control traffic congestion and reduce panic buying at the pumps resulting from the supply shortages nationwide.

Fuel Resilience Planning

Since the 1970s, the agency has adapted fuel policies and procedures to keep up with the changing threats to the region's petroleum supply and distribution system. In 2017, ODOE released the Oregon Fuel Action Plan, which details how the state will respond to an event that causes severe shortages of liquid fuels. ODOE developed the Fuel Action Plan pursuant to Oregon Revised Statutes (ORS) 175.750-785 to ensure that adequate fuel supplies will be provided to the state's emergency and essential service providers in the event of a severe or long-term fuel disruption or shortage.

The Fuel Action Plan addresses all hazards resulting in liquid fuel supply concerns and is a working document to be updated as needed. This ensures that all response strategies remain current and in sync with those of our federal, Tribal, military, state, local, and industry partners.

Past Energy Security Planning

Supported by federal stimulus funding in 2009, ODOE and the Oregon Public Utility Commission developed the Oregon Energy Assurance Plan.[5] The plan provided an overview of the state's energy infrastructure and overall energy profile. At a high level, the Energy Assurance Plan evaluated the role of renewables and smart grid technologies in energy assurance planning. The plan also described different types of energy emergencies that could occur in Oregon and explained how the state would respond to energy emergencies.

About the Oregon Energy Security Plan

ODOE is taking the opportunity presented by IIJA funding to develop a new comprehensive State Energy Security Plan. The last significant revision to the state's Energy Assurance Plan occurred in 2012 under the American Recovery and Reinvestment Act funding. While the EAP served the state well, this new OR ESP is a more comprehensive and actionable document.

Since 2012, key materials have been developed that will inform this Oregon Energy Security Plan. This includes, but is not limited to, information contained in the agency's Biennial Energy Reports, Oregon Fuel Action Plan, State of Oregon Emergency Operations Plan, Earthquake Risk Study for Oregon's Critical Energy Infrastructure Hub, Western Petroleum Shortage Response Framework, Resiliency Assessment: Oregon Transportation Systems, and Oregon's Cyber Disruption Response and Recovery Resource Guide.

Also, our knowledge base and experience in responding to real world events has grown. The state has experienced devastating effects from emergencies at an increased rate of occurrence. In the past five years, Oregon governors issued 131 emergency declarations and executive orders requiring statewide response to wildfires, severe winter storms, flooding, droughts, cyber-security threats, and a pandemic.

In the past five years, Oregon governors have issued 131 emergency declarations and executive orders.

Table 1: Oregon Emergency Declarations Issued by Type and Year

Year	Floods	Wildfires	Confla-grations	Severe Weather	Landslides	Droughts	Pandemic Other	Total
2019	1	-	-	1	-	-	-	**2**
2020	1	3	16	-	-	7	32	**59**
2021	-	1	9	6	-	10	11	**37**
2022	-	1	5	1	1	7	4	**19**
2023*	-	-	2	3	-	6	3	**14**
Total	**2**	**5**	**32**	**11**	**1**	**30**	**50**	**131**

* Table 1 lists emergency declarations and executive orders issued for the first six months of 2023.

Even as our knowledge and experience have expanded, to date planning progress has not been compiled in an intentional way, and data gaps remain. There is currently no single plan or document in the state that brings together all relevant energy information to accurately assess Oregon's energy security status and provide a roadmap to achieving energy security and resilience over time.
ODOE's vision for the OR ESP is to develop a living resource, which compiles all relevant energy information. This information is used to improve the state's energy security outlook by guiding development of an ongoing strategic mitigation approach to strengthen the energy systems to better withstand and recover from extreme weather events, natural disasters, man-made threats, or issues of energy affordability.

The OR ESP is not intended to be an energy emergency response plan. The OR ESP will provide links to stand-alone emergency response plans for electricity, liquid fuels, natural gas, and cybersecurity emergencies.

Plan Development Process

ODOE is collaborating with multiple state, local, and Tribal governments, as well as using resources provided by the federal government. Collected data will be included in the final OR ESP to be submitted to USDOE **September 30, 2024**. Below is a description of our plan development process.

ODOE will oversee all aspects of OR ESP development and has authority over the final product. This includes ensuring plan compliance with state and federal requirements as well as managing the project scope, content, quality, and schedule. However, developing the plan requires close partnerships with state agencies, federal partners, Tribal governments, utilities, private sector companies, and contractor support.

ODOE will work closely with the Oregon Public Utility Commission (OPUC) on plan development. ODOE and OPUC are the designated primary state agencies for planning, preparedness, response, and recovery to energy emergencies – Emergency Support Function (ESF) 12: Energy – that have potential impacts to Oregonians. OPUC is responsible for developing and maintaining emergency response plans for electricity and natural gas emergencies. ODOE is responsible for developing and maintaining a fuel sector emergency response plan and statewide energy security planning. An interagency agreement was established between ODOE and OPUC for technical assistance specific to the electricity and natural gas sectors. OPUC will coordinate and facilitate engagement with the utilities and provide subject matter expertise on plan sections involving the electric and natural gas sectors.

ODOE will also engage partners at the Oregon Department of Emergency Management and other state agencies involved in disaster planning, recovery, and mitigation efforts related to energy issues. The agency will participate in the Department of Land Conservation and Development's update to the state's Natural Hazard Mitigation Plan to ensure the energy perspective is addressed, and to advocate for funding opportunities on energy mitigation projects. ODOE is also collaborating with the Oregon Department of Human Services to provide technical assistance on energy needs at resilience hubs to be established around the state that will serve as cooling, heating, and clean air centers to improve disaster resilience.

ODOE will offer each of the nine federally recognized Tribal governments an in-person meeting to better understand specific energy security issues and work together to develop mitigation actions that can reduce energy insecurity for their nations.

In support of the OR ESP development process, USDOE conducted a Pacific Northwest Critical Energy Infrastructure Study. The PNW CEI Study identifies key and support assets in Oregon and Washington in the electricity network, liquid fuels infrastructure, and natural gas systems. Key assets are facilities and systems that, if compromised, would have a major effect on the state's energy supply and/or on the overall reliability of the region's energy system. Supporting assets include substations, power lines, and pipelines that provide energy supplies or are otherwise essential to the continued operation of the key energy assets. ODOE will use the results of the study to inform the energy infrastructure risk assessments and risk mitigation strategies in the OR ESP.

As part of OR ESP development, ODOE will enlist the support of contractors. One will support ODOE specifically with stakeholder engagement and facilitation services, and the second will conduct the technical analysis in the OR ESP, primarily the risk assessment and proposed mitigation measures. ODOE staff will remain responsible for the final product.

Stakeholder Engagement

ODOE is engaging federal, state, local, Tribal, underserved communities, and private sector stakeholders as part of the development of the OR ESP. Highlights, key takeaways, and a completed stakeholder engagement report will be included in the final OR ESP to be submitted to USDOE **September 30, 2024**. Below is a description of our intended stakeholder engagement process.

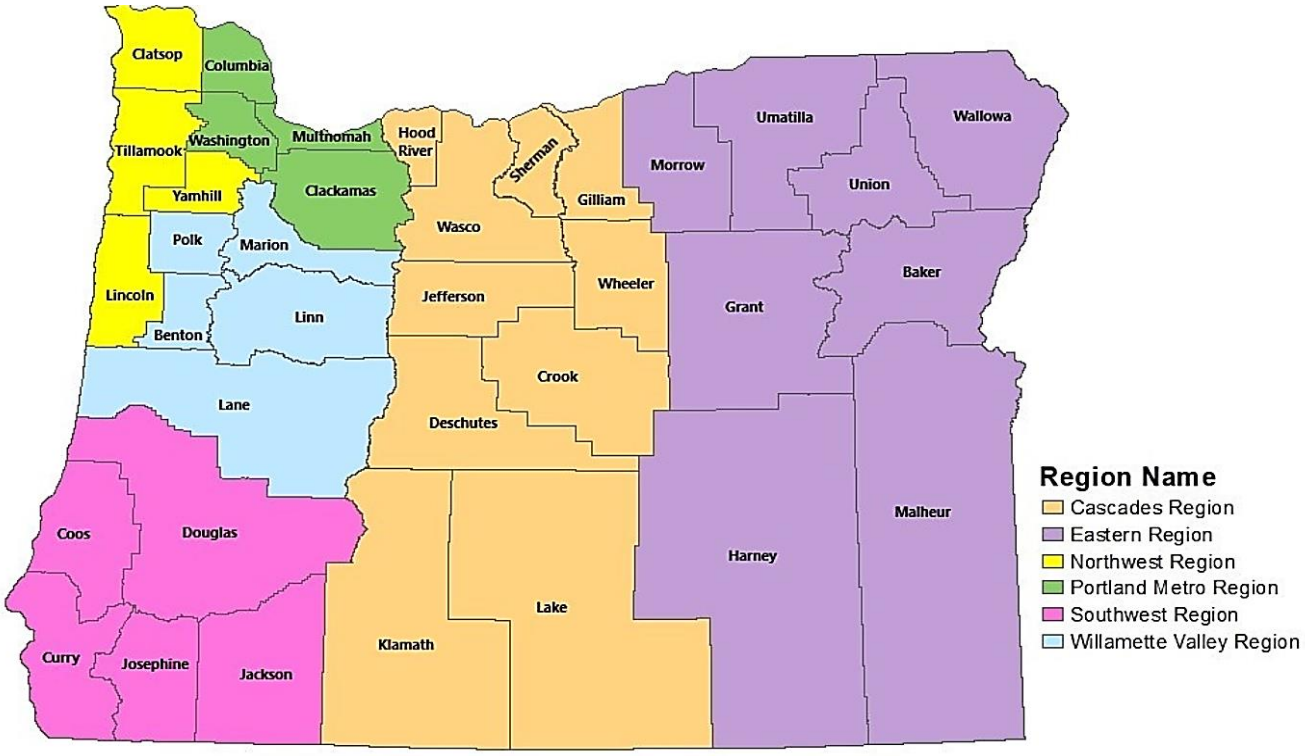
ODOE values openness, transparency, and good governance and is determined to ensure all stakeholders can participate in the development of the OR ESP. ODOE will organize a series of hybrid and virtual meetings across the state to promote dialogue and seek feedback from stakeholders throughout the project.

ODOE will conduct a hybrid meeting with all stakeholders to kickoff engagement activities by providing an overview of the project scope and timeline. The goal is to seek input on available energy data sources, hear about personal experiences with energy insecurity, and identify data gaps.

Regional meetings will be organized to dialogue and collect feedback on energy system data specific to the region. This includes seeking input on threats to the energy sectors to inform a risk assessment of the electricity network, liquid fuels infrastructure, and natural gas system in the state. Stakeholders will have the opportunity to provide feedback on the quantified risk assessments and help identify and prioritize mitigation strategies to reduce risks.

A final virtual project wrap-up meeting will be conducted to present the final OR ESP.

Figure 2: Map of Regions Established by the Oregon Department of Emergency Management



Specific opportunities will be provided to environmental justice communities to share their unique insight into energy insecurity, to discuss consequences to the vulnerable and/or underserved populations resulting from energy insecurity, and weigh in on all aspects of the ESP. ODOE encourages diverse views and promotes respectful discussions that incorporate listening and embracing different perspectives.

ODOE intends to build stakeholder capacity to understand threats and hazards to Oregon's energy systems and their impacts to communities by region. By understanding the threats and hazards, stakeholders can advise the agency on viable mitigation options to reduce risks by region, with the goal of improving the state's overall energy resilience.

An OR ESP webpage will capture additional stakeholder and public comments throughout the project. All stakeholder input will be summarized in a report and be used to steer the development and implementation of the OR ESP.

REFERENCES

[1]International Energy Agency. “Emergency Response and Energy Security”. (2023). https://www.iea.org/about/emergency-response-and-energy-security

[2]NREL Transforming Energy. “Strategic Energy Security”. (2023). https://www.nrel.gov/security-resilience/strategic-energy-security.html#:~:text=NREL's%20work%20in%20strategic%20energy,from%20natural%20or%20human%20sources

[3]U.S. Department of Energy. Office of Energy Efficiency & Renewable Energy. “Energy Independence and Security”. (2023). https://www.energy.gov/eere/energy-independence-and-security

[4]Biennial Energy Report. *“Chapter 5: Resilience”.* (2018). https://www.oregon.gov/energy/Data-and-Reports/Documents/BER-Chapter-5-Resilience.pdf

[5]Oregon Department of Energy. “Oregon State Energy Assurance Plan”. (2012). https://www.oregon.gov/energy/Data-and-Reports/Documents/2012%20Oregon%20State%20Energy%20Assurance%20Plan.pdf

II. ENERGY SECURITY PLANNING AUTHORITIES

Many state and federal agencies have critical roles in energy security planning. These roles include:

- Setting standards and regulations related to energy sector safety and security.
- Providing baseline energy information and situational awareness during emergencies.
- Assisting energy system operators in emergency preparedness, response, and recovery activities.
- Coordinating activities with federal, state, local and Tribal officials.

This section identifies the primary state and federal agencies that lead and support energy security planning. Many of these agencies have roles and responsibilities that extend beyond the energy sector. Also included are agencies that safeguard cybersecurity and physical security of the energy infrastructure. The role of local governments and Oregon's nine federally recognized Tribal Nations in energy security planning are discussed in this section.

Emergency Support Function 12: Energy

Oregon, like the federal and other state governments, organizes our response resources and capabilities under the Emergency Support Functions (ESF) construct as described in the National Response Framework. ESFs provide the structure for state and federal coordination in an incident response. Each ESF has a designated lead federal agency and state agency, with other identified supporting agencies. Federal and state ESF- 12 lead agencies are responsible for all aspects of the energy ecosystem, including security planning, response, recovery, and long-term mitigation to reduce risks. A more detailed description of agencies included in Oregon's ESF construct is presented in Section 3 of this plan.

USDOE is the lead federal agency for ESF-12. In Oregon, the role is divided into two leads, the Oregon Department of Energy and the Oregon Public Utility Commission. ODOE is responsible for statewide energy security planning and emergencies affecting liquid fuels and propane. OPUC has the lead for the electricity and natural gas sectors. ODOE and OPUC work closely with USDOE to ensure the federal ESF 12 plans align with state strategies. This coordination assists in preparation for responding to and recovering from energy disruptions affecting Oregon.

Oregon's leading ESF 12 agencies are the Oregon Department of Energy and Oregon Public Utility Commission.

State Agency Authorities, Roles, and Responsibilities

Governor's Office

As the state's chief executive, the Governor directs the state's response to emergencies affecting the health and welfare of Oregonians. Oregon Revised Statute (ORS) 401 grants the Governor broad authority to protect the public by declaring a State of Emergency when a disaster occurs. During a State of Emergency, if the Governor determines and declares that strict compliance with the provisions of the order or rule would in any way prevent, hinder, or delay mitigation of the effects of the emergency, they have the authority to suspend provisions of any order or rule of any state agency. The Governor may direct any agency in state government to employ personnel, equipment, and facilities to prevent or alleviate actual or threatened

damage from the emergency. The Governor is also authorized to direct state agencies to provide supplemental services and equipment to local governments to restore any services to provide for the health and safety of the citizens in the affected area(s).

ORS 401.188 provides additional powers to the Governor to control, restrict, or regulate the use, sale, or distribution of fuel and other commodities to support the state's response and recovery activities.

Oregon Department of Emergency Management

The mission of the Oregon Department of Emergency Management (OEM) is to execute the responsibility of the Governor to establish, maintain, and implement an emergency services system in Oregon during emergencies. ORS 401.052 authorizes OEM as the lead agency for emergency prevention, preparation, response, and recovery.

OEM developed, maintains, and implements the State of Oregon Emergency Operations Plan. During state-declared emergencies with impacts to the energy infrastructure, OEM establishes and maintains a statewide structure for emergency operations. OEM may activate the State Emergency Coordination Center to support multi-jurisdictional emergencies or disasters and serve as a communications hub to ensure the coordination of all participating response agencies. OEM supports 18 state Emergency Support Functions and more than 50 county, city, and Tribal local emergency management offices around the state.

Oregon Department of Energy

As directed by Oregon SB 1567 and the federal Infrastructure Investment and Jobs Act, ODOE is responsible for statewide energy security planning to harden Oregon's energy infrastructure against all hazards. ODOE will maintain the Oregon Energy Security Plan (OR ESP), which brings together all relevant energy information to assess the state's ability to recover quickly from natural disasters and manmade threats, including cyber risks, to Oregon's energy sectors. The OR ESP describes the state's energy profile and supply and delivery systems, quantifies and mitigates risks to the state's energy infrastructure, and highlights energy plans to prepare, respond, and recover from events that disrupt energy supply in Oregon. ODOE collaborates with state, local, and Tribal governments, the private sector, and federal agencies to develop and maintain the OR ESP.

ODOE is also responsible for ensuring fuel resilience. ORS 176.750-820 authorizes ODOE to develop and maintain a statewide contingency plan in response to liquid fuels disruptions or shortages that affect Oregon. The Oregon Fuel Action Plan identifies measures and strategies to ensure adequate fuel supplies are available to maintain emergency services, transportation systems, and other critical lifelines and services to protect public health and safety during and after an emergency. The plan was developed in coordination with state and federal agencies, counties and local jurisdictions, Tribal governments, and the private sector.

Under ORS 176.775, ODOE's Director may recommend the Governor declare an Energy Resource Emergency in the event of a severe or long-term liquid fuels disruption or shortage. An Energy Resource Emergency may be declared if emergency and essential service providers are unable to obtain fuel at any price and/or market forces and fuel conservation measures have failed to provide for adequate and equitable distribution of fuel. An Energy Emergency Declaration allows ODOE to implement strategies in the Oregon Fuel Action Plan and work with fuel providers to resolve the supply disruption or shortage.

Oregon Public Utility Commission

OPUC is the rate regulator for the state's investor-owned electric and natural gas utilities, as outlined by ORS 757. Further, the OPUC is responsible for safety regulation as directed in ORS 757.035(1), which is carried out by the Safety Division of the OPUC. It relates to all operators of electric and telecommunications facilities as outlined in Oregon Administrative Rules (OAR) 860-024, 028 and 300.

In addition, the OPUC Safety Division acts as an agent for the Pipeline Hazardous Materials & Safety Administration branch of the Federal Department of Transportation to safely regulate the state's natural gas pipeline systems. OPUC also serves as the liaison within the state's ESF to all energy utilities and coordinates efforts for the response and restoration of impacted electric and natural gas infrastructure during an incident or event through ESF-12, while also working with commercial telecommunications operators as ESF-2 on communications. OPUC works with utility partners to evaluate needs and coordinate assets and capabilities to address actions that could relate to resource shortages or system outages.

OPUC communicates and coordinates with interstate partners to address ingress and egress amongst neighboring states and works with federal partners to maintain situational awareness when an incident impairs interstate services. OPUC works with utilities to ensure adequate emergency preparedness plans are in place, and evaluates situational awareness when it becomes aware of potential threat events. OPUC also works with electric and natural gas utilities to facilitate the coordinated recovery of systems and applications from cyber-attacks.

Oregon Department of Environmental Quality

The Oregon Department of Environmental Quality (DEQ) is responsible for developing and implementing a Fuel Tanks and Seismic Stability Program that evaluates the vulnerability of fuel tank systems to earthquakes and requires facilities to develop and deploy a plan to minimize risk. This applies to 20 facilities that manage over two million gallons of liquid fuels in the state at any given time. The facilities' plans will include actions to protect public health, life safety, and environmental safety within the facility and surrounding communities that may be affected by damage to the facility. The plans must consider the potential consequences and the resources needed to respond to a magnitude 9.0 Cascadia Subduction Zone earthquake. DEQ is developing this program in consultation with the Oregon Department of Geology and Mineral Industries and ODOE.

During state declared emergencies affecting the liquid fuels sectors, DEQ coordinates with ODOE to temporarily lift environmental waivers to ensure adequate fuel supplies are available to support the state's emergency and essential services providers. This includes, but is not limited to: Vapor Recovery and Fuel Transfer, Loading, and Storage restrictions; Reid Vapor Pressure limits; and Biofuel Blending Waivers. All waivers are listed in Appendix G of the Oregon Fuel Action Plan.

DEQ also manages the state's Oil Spill Contingency Planning Program. The agency reviews emergency response plans from petroleum facilities, pipelines, commercial ships larger than 300 gross tons and high hazard railways. DEQ also conducts and participates in exercises to ensure federal, state, local, Tribal, and private sector partners are prepared to respond to oil spills. DEQ is the primary state agency serving the ESF-10 role. ODOE shares responsibility for ESF-10 as it relates to radioactive materials.

Oregon Department of Transportation

The mission of the Oregon Department of Transportation (ODOT) is to provide an efficient and safe transportation system to support economic opportunity and livable communities for Oregonians. ODOT provides essential assistance to the state in emergencies where public infrastructure is affected. ODOT developed and maintains an agency Emergency Operations Plan (EOP) that describes ODOT's preparedness and response to emergencies affecting the state's transportation system. The ODOT EOP also details what ODOT will do to assist local governments and state agencies during emergencies. This includes, but is not limited to, identifying critical routes and providing escorts to support fuel deliveries and utility crews working in impacted areas, and debris removal to clear roads for fuel trucks and utilities crews.

ODOT also sets safety requirements for intrastate commercial drivers. This includes hours of service requirements limiting how long drivers can be on the road before a mandatory break and weight restrictions on the maximum allowable for trucks that travel on Oregon highways. During energy emergencies, ODOT can waive Driver and Motor Carrier Safety requirements to facilitate the delivery of specific energy products, most often liquid fuels. ODOT can also facilitate the movement of utility crews, trucks, and other resources involved in the restoration of electric power.

Additionally, ODOT oversees Oregon rail operations through the agency's Rail Safety Programs to ensure structural safety of railroad cars, equipment, track, crossings, and signals. Acting as an agent for the Federal Railroad Administration, ODOT inspects track, railroad equipment and cars, hazardous materials, and operating practices.

Oregon Department of Administrative Services

The Department of Administrative Services (DAS) is the central administrative agency of Oregon state government. ORS 184.305 authorizes DAS to work with private enterprise, citizens, and other government entities to develop an efficient service delivery system under normal conditions that can be employed during state declared emergencies through the agency's lead role for ESF 7 resource support. This includes providing centralized contracting and emergency procurement services. DAS also provides network services to state agencies, which includes managing the state data center and coordinating Geographic Information Systems data.

DAS directs and facilitates the Governor's Disaster Cabinet (GDC). When activated, the GDC provides policy direction and advises the Governor on statewide priorities and the allocation of resources to support response and recovery efforts. ODOE's Director and OPUC Commission Chair (or their delegates) are members of the GDC and advise the Governor and state leadership on energy policy and priorities during emergencies.

DAS also works with the Oregon Department of Justice to lead the state's ESF 17 responsibilities over cybersecurity planning efforts.

Oregon Department of Justice: Oregon Titan Fusion Center

The mission of the Oregon TITAN Fusion Center (OTFC) is to protect Oregon citizens from terrorist and criminal activity by providing an all-crimes criminal information clearinghouse. OTFC and DAS co-lead ESF 17 on Cyber and Critical Infrastructure Security. OTFC manages Oregon's Critical Infrastructure and Key Resources Program, which hosts a bi-monthly coordination call with Oregon's Infrastructure Coordination

Group (OICG). State and federal partners with vested interests in the security and resilience of Oregon's critical infrastructure, from an all-hazards perspective, make up the OICG.

OICG provides a platform for information sharing and discussions on infrastructure operations and concerns, agency priorities, planning needs, training opportunities, and other topics of mutual interest. OICG promotes cross-talk, coordination, and collaboration between partner agencies. ODOE and OPUC represent ESF 12 on the OICG and report on and collaborate with agencies on potential or existing concerns surrounding the liquid fuels infrastructure, electricity network, and natural gas systems and cross sector interdependencies.

Oregon Military Department

ORS 396.305 authorizes the Oregon Military Department (OMD) to administer, house, equip, and train the Oregon National Guard (ORNG) to support the Governor during natural disasters and times of civil unrest. The ORNG is a reserve force of the United States Air Force and Army. As lead agency for ESF 18 on military support, OMD coordinates, employs, and controls ORNG forces and military resources to assist civil authorities with the protection of life and property, and to maintain peace, order, and public safety. OMD advises the Governor and OEM on ORNG capabilities and resources, ongoing mission status, troop numbers, estimated daily costs, and legal considerations.

OMD also mobilizes and stages personnel and equipment to restore and preserve law and order, and to provide support to other ESFs as directed by the State Emergency Coordination Center. In addition, OMD coordinates with the active federal military to ensure mutual support during federal disaster relief operations.

The role and responsibilities of the **Oregon Department of Aviation** in support of energy security is in progress and will be included in the Oregon Energy Security Plan to be submitted to DOE September 30, 2024.

Summary of State Energy Security & Emergency Response Roles

The table below provides an overview of the state agencies that play a role in energy security. Each agency's energy-related activities have been categorized by sector including cyber and physical security.

Agencies' energy security activities may involve:

- **Energy emergency preparedness and response**, including hosting and participating in preparedness planning and exercises, and deploying responders or resources during an emergency event.
- **Information sharing and situational awareness,** including publishing data and threat information, and issuing situation reports during emergency events.
- **Development and enforcement of standards and regulations** for energy industry safety and security. During emergency events some of these standards and regulations may be waived to facilitate faster response and restoration.

Table 2: State Authorities in Energy Security

Department or Agency	Sector	Preparedness & Response	Situational Awareness	Standards & Regulation
Governor's Office *Lead State Emergency Operations*	⚡ ⛽ 🔥 🔒	✓	✓	✓
OEM *Lead State Emergency Operations & support ESF 12*	⚡ ⛽ 🔥 🔒	✓	✓	
ODOE *OR ESP Lead and co-lead ESF 12 liquid fuels*	⚡ ⛽ 🔥	✓	✓	
OPUC *Co-lead ESF 12 electricity and natural gas*	⚡ 🔥 🔒	✓	✓	✓
DEQ *Lead ESF 10 HazMat & Support ESF 12*	⛽	✓	✓	✓
ODOT *Lead ESF 1 & support ESF 12*	⚡ ⛽ 🔥	✓	✓	✓
DAS *Co-lead ESF 17 & support ESF 12*	🔒	✓	✓	✓
OTFC *Co-lead ESF 17 & support ESF 12*	🔒	✓	✓	✓
OMD *Lead ESF 18 & support ESF 12*	⚡ ⛽ 🔥	✓	✓	✓

⚡ Electricity ⛽ Liquid Fuels 🔥 Natural Gas 🔒 Cyber & Physical Security

Local Government Authorities

ORS 401.305 to 401.335 authorizes county and city governments to establish an emergency management agency to prepare county and local jurisdiction for emergencies and disasters. This includes managing and maintaining emergency operations centers. County and city governments are required to develop emergency operations plans and coordinate emergency planning activities. City officials have primary responsibility for the safety and welfare of their citizens and maintain oversight of resources and operations within their jurisdictions. City plans are to work in conjunction with county emergency operations plans. Local plans are to be compliant with FEMA's National Incident Management System (NIMS).

ORS 401.309 also gives counties and cities authority to declare that a state of emergency exists within the county or city boundaries and to implement emergency measures as detailed in local emergency operations plans.

Tribal Nations Authorities

Similar to the process outlined for cities and counties, ORS 401.305 also authorizes the Oregon's nine federally recognized Tribes to establish emergency management programs to prepare their members to respond and recover when disasters strike. This includes developing a Tribal Emergency Operations Plan, maintaining an emergency operations center where Tribal officials coordinate emergency response and recovery activities, establishing an incident command structure for managing emergencies, and coordinating with local, state, and federal agencies consistent with NIMS. Like the local governments, ORS 401.309 also allows the Tribal Governments to issue Tribal emergency declarations when their capabilities to respond to the event are exhausted.

However, unique to the Tribes are authorities provided them from the Sandy Recovery Improvement Act of 2013 (SRIA). SRIA amended the Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) to provide federally recognized Tribes the option to request a Presidential Emergency Declaration through FEMA independent of actions taken by surrounding counties and request direct federal assistance as described in the Tribal Declarations Pilot Guidance. When approved, FEMA would process Tribal declaration requests using state declaration regulations.

Federal Agencies Authorities, Roles, and Responsibilities

White House

The President may exercise the authority to issue a national emergency declaration when a crisis or situation exists and threatens the country, requiring an immediate response under the National Emergencies Act of 1976. The President will consult the Governor of an affected State to determine whether such an emergency exists, if practicable.

U.S. Department of Homeland Security

- Federal Emergency Management Agency – FEMA coordinates federal incident response and recovery activities. FEMA's duties during an event include assisting the President in carrying out the Stafford Act, operating the National Response Coordination Center (NRCC), supporting all Emergency Support Functions (ESFs) and Recovery Support Functions (RSFs). FEMA's mission assigns the Defense Logistics Agency (DLA) to provide fuel support to federal responders and, if requested, SLTT responders and critical infrastructure. FEMA administers Public Assistance (PA) disaster funds, hazard mitigation projects through the Building Resilient Infrastructure and Communities (BRIC) Program, the Hazard Mitigation Grant Program (HMGP), and others.
- Cybersecurity Infrastructure Security Agency – CISA leads the national effort to understand, manage, and reduce risk to cyber and physical infrastructure. CISA manages the Pipeline Cybersecurity Initiative, and publishes best practices for cybersecurity protection. During a cyber incident, CISA coordinates the national response to significant cyber events, and assists in recovery and investigation efforts.

- U.S. Coast Guard – USCG is the principal federal agency responsible for maritime safety, security, and environmental stewardship in U.S. ports and inland waterways used for the movement of energy products, including petroleum, natural gas, and coal. The Coast Guard reviews and approves vessel and terminal security assessments and security plans, and inspects terminals for compliance with security requirements.
- U.S. Customs & Border Protection – CBP is the primary federal agency tasked with ensuring the security of the nation's borders. CBP is responsible for enforcing and administering laws and regulations to control and oversee vessel movements in and out of U.S. ports. CBP enforces the Merchant Marine Act of 1920, also called the Jones Act, which prohibits the transportation of merchandise between two U.S. ports in any vessel not built and owned by citizens of the United States. Applications may be made to CBP for the Secretary of Homeland Security to grant a Jones Act waiver, which can help facilitate the delivery of fuel and equipment during energy shortages.

U.S. Department of Energy

- Cybersecurity, Energy Security, and Emergency Response – CESER's mission is to enhance the security of U.S. critical energy infrastructure to all hazards, mitigate the impacts of disruptive events and risk to the sector overall through preparedness and innovation, and respond to and facilitate recovery from energy disruptions in collaboration with other federal agencies, the private sector, and State, local, Tribal, and territory governments (SLTT). CESER's preparedness and response activities include SLTT capacity building, energy security and resilience planning, hosting energy emergency exercises and deploying ESF-12 responders to impacted regions during emergencies. CESER facilitates interagency coordination, shares situational awareness products, and provides emergency response support to SLTT governments, and CESER advances research, development, and deployment of technologies, tools, and techniques to reduce risks to the nation's critical energy infrastructure posed by cyber and other emerging threats. CESER administers programs that can be used to mitigate impacts to energy infrastructure and energy supply, and to provide resources during energy emergencies:
    - The Federal Power Act Section 202(c) grants USDOE the power to temporarily order connections of facilities, and generation, delivery, interchange, or transmission of electricity during grid emergencies.
    - The Strategic Petroleum Reserve is a federally owned emergency supply of crude oil. Volumes can be released to mitigate the impact of crude supply disruptions.
- Office of Electricity – OE provides national leadership to ensure that the nation's energy delivery system is secure, resilient and reliable.
- Office of Enterprise Assessments – OEA oversees four federal Power Marketing Administrations (PMAs), including the Bonneville Power Administration (BPA), that operate electric systems and sell the electrical output of federally owned and operated hydroelectric dams in the Pacific Northwest.
- Energy Information Administration – EIA collects, analyzes, and disseminates independent and impartial energy information to promote sound policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment. EIA publishes state energy profiles, data products related to energy supply, demand, infrastructure, and prices, as well as GIS maps, which can be used in energy security planning and energy emergency response activities.

- Federal Energy Regulatory Commission – FERC is an independent agency that regulates the interstate transmission of electricity, natural gas, and oil. FERC's role includes oversight of the transmission and wholesale sale of electricity in interstate commerce, as well as transportation of oil by pipeline in interstate commerce. During energy emergencies, FERC has emergency authority under the Interstate Commerce Act to direct companies to provide preference or priority in transportation, embargoes, or movement of traffic. This authority can be used to direct interstate pipeline operators to prioritize shipments of specific fuels to address shortages.

U.S. Department of Transportation

- Federal Motor Carriers Safety Administration – FMCSA sets safety requirements for interstate commercial drivers, such as hours of service requirements. During energy shortages, FMCSA can waive these requirements for delivery of specific energy products, most often liquid fuels, or to facilitate the movement of utility crews, trucks, and other resources involved in the restoration of electric power.
- U.S. Pipeline and Hazardous Materials Safety Administration – PHMSA regulates pipelines and rail tank cars to advance the safe transportation of petroleum, natural gas, and other hazardous materials. The agency establishes national policy, sets and enforces standards, educates, and conducts research to prevent incidents. The agency also prepares the public and first responders to reduce consequences if an incident does occur. During pipeline incidents (explosions or spills), PHMSA investigates and issues corrective action orders to pipeline operators before pipeline service can resume. During energy shortages, PHMSA can issue emergency special permits and waivers of certain regulations to facilitate the pipeline supply of fuel to the affected region. PHMSA also regulates rail tank cars that carry petroleum, biofuels, or liquefied natural gas.

U.S. Environmental Protection Agency

EPA sets standards for certain fuels, including regulating the vapor pressure of gasoline, requiring reformulated gasoline in certain markets, and specifying the sulfur content in diesel fuel. These fuel specifications can be waived during emergencies to facilitate the supply of fuel into the affected region, or to provide fungibility of available supply within the affected region. EPA also regulates air emissions from energy infrastructure. During events, EPA may choose not to enforce these regulations to facilitate power supply and fuel supply in the affected region.

U.S. Army Corps of Engineers

USACE assists FEMA during disaster response, including installing generators and delivering generator fuels in communities through its Temporary Emergency Power Mission and sending responders to assist in disasters and provide situational awareness.

Federal Bureau of Investigation

FBI leads investigations into cyber attacks and intrusions. The FBI collects and shares intelligence and engages with victims while working to unmask those committing malicious cyber activities.

Bureau of Safety and Environmental Enforcement

BSEE has responsibility for the safety of the environment and conservation of offshore resources. BSEE administers the Oil Spill Preparedness Program and provides support for oil spill response efforts. BSEE leads the development of workplace safety and environmental compliance strategies for offshore renewable energy projects on the Federal Outer Continental Shelf.

Summary of Federal Energy Security & Emergency Response Roles

The following table provides an overview of the many federal departments and agencies that play a role in energy security.

Table 3: Federal Authorities in Energy Security

Department or Agency		Sector	Preparedness & Response	Situational Awareness	Standards & Regulation
White House		Electricity, Liquid Fuels, Natural Gas, Cyber & Physical Security	✓	✓	
DHS	FEMA	Electricity, Liquid Fuels, Natural Gas	✓	✓	
	CISA	Cyber & Physical Security	✓	✓	
	Coast Guard	Liquid Fuels, Natural Gas	✓		✓
	CBP	Electricity, Liquid Fuels, Natural Gas			✓
DOE	CESER	Electricity, Liquid Fuels, Natural Gas, Cyber & Physical Security	✓	✓	
	OE	Electricity		✓	✓
	OEA	Electricity			✓
	EIA	Electricity, Liquid Fuels, Natural Gas		✓	
	FERC	Electricity, Liquid Fuels, Natural Gas			✓
DOT	FMCSA	Electricity, Liquid Fuels			✓
	PHMSA	Liquid Fuels, Natural Gas	✓		✓
EPA		Electricity, Liquid Fuels, Natural Gas			✓
DOD	USACE	Electricity, Liquid Fuels, Natural Gas	✓		✓
DOJ	FBI	Cyber & Physical Security	✓		
DOI	BSEE	Liquid Fuels, Natural Gas		✓	✓

Electricity · Liquid Fuels · Natural Gas · Cyber & Physical Security

III. ENERGY EMERGENCY PREPAREDNESS AND RESPONSE

Energy supply disruptions can occur anywhere and any time. Each year, Oregon faces energy disruptions from a number of causes. Most of these disruptions are limited in scope and quickly resolved by energy providers without government intervention. Other times, outages are more severe and affect larger segments of communities, or last longer. The magnitude and duration of disruption determines whether government should assist in stabilizing energy supply chains and systems to protect the health and safety of Oregonians.

Government intervention should be as minimal as possible, relying on market forces and direct response by energy asset owners and operators for energy system restoration. The state's role in managing any energy emergency is one of coordinator, working with energy providers, state agencies, counties, Tribes, and federal partners to find the least intrusive solution possible to address and resolve energy disruptions.

This section provides an overview of the state's emergency management structure for all emergencies in Oregon. This section also provides a summary of energy emergency plans and strategies to prepare for, respond to, and recover from energy emergencies, that could affect Oregon. The Oregon and Federal emergency response structure is organized by resource and support services, all of which play a role in any major emergency response. These resources are termed Emergency Support Functions or ESF. Energy is assigned as ESF-12, and in Oregon, energy is divided into the liquid fuels, propane, electricity, and natural gas sectors.

The OR ESP is intended to summarize and reference stand-alone electricity, liquid fuels, natural gas, and cybersecurity emergency response plans. The plans are updated regularly by the lead response agencies for each resource.

Energy Emergency Preparedness Overview

Oregon's energy systems are vulnerable to a variety of hazards, including wildfires, severe storms, flooding, earthquakes and tsunamis, infrastructure failures, pandemics, deliberate physical and cyberattacks, and other high-impact/low-frequency events. All energy emergencies regardless of the cause or magnitude can lead to a supply or distribution crisis.

Because every event is unique, it would be impossible to plan for every contingency. Managing energy emergencies is a continuous cycle of preparedness, response, recovery, and mitigation. Successful emergency management requires ongoing monitoring, information gathering, assessing actual or potential consequences of an incident, communicating critical information, facilitating system restoration, and mitigating impacts to energy systems to reduce the risk of recurrence. This process is repeated over the course of an emergency with adaptive response actions as the situation evolves.

Energy Event Escalation Levels

Oregon adopted and implemented FEMA's Community Lifelines construct for the state's response framework. The community lifelines enable the continuous operation of critical government and business functions and are essential to human health and safety and economic security. Community lifelines increase effectiveness in disaster operations and better position agencies to respond to a catastrophic event. The Oregon Department of Emergency Management (OEM) serves as the lead emergency management coordination agency for Oregon. Responsibilities for ESF-12 energy emergencies in Oregon are shared by the Oregon Department of Energy (ODOE) for liquid fuels and

propane and the Oregon Public Utility Commission (OPUC) for electricity and natural gas. The Community Lifelines construct allows Oregon's ESF-12 agencies to:

- Rapidly determine the scale and complexity of a disaster.
- Identify the severity, root causes, and interdependencies of impacts to critical lifesaving and life-sustaining services within affected areas.
- Develop operational priorities and objectives that focus response efforts on the delivery of these services by the most effective means available.
- Communicate disaster-related information across all levels of public, private, and non-profit sectors using a commonly understood language. Guide response operations to support and facilitate their integration across mission areas.

In coordination with OEM, ODOE and OPUC established three event escalation levels for the Energy Community Lifeline.

Table 4: Energy Event Escalation Levels

Level 1: Readiness	**Steady State Operations** – Steady State Operations are normal conditions defined by a lack of identified emergency. ESF-12 lead agencies monitor energy markets and systems, engage in preparedness activities including training, exercises, and plan review to ensure continual program readiness.
	Credible Threat – Credible threats are events characterized by impacts to energy supply chains that are largely remediated by energy providers. ESF-12 agencies establish communications with providers to assess each threat for potential service impacts, provide situational awareness, and determine whether additional actions are needed.
Level 2: Response Operations	**Activation and Immediate Response** – When a credible threat is ongoing and is affecting energy infrastructure and systems, ESF-12 agencies will activate and prepare for immediate response. Multi-faceted events may result in a State Emergency Declaration and the activation of the State Emergency Coordination Center (ECC) to facilitate the overall response. ESF-12 coordinates with federal, state, local, and Tribal partners to assess impacts, provide situational awareness, and determine the appropriate actions to take.
	Note: Major disasters may also result in a Federal Emergency Declaration.
	Community Stabilization – Following the Immediate Response phase, ESF-12 continues to coordinate with federal, state, local, and Tribal partners to assess impacts and address mission requests. The Governor's Disaster Cabinet (GDC) may be convened. ESF-12 agencies on the GDC provide policy guidance, establish statewide response priorities, and recommend resource allocations. Stabilization is achieved when temporary measures effectively prevent further degradation of energy systems.

	Sustained Operations – As the event continues, ESF-12 agencies work with energy providers to identify and resolve barriers to restoring service to affected areas.
Level 3: Recovery Operations	**Recovery Operations** – When Community Lifelines are stabilized, the threat response is terminated. ESF-12 transitions to longer term recovery activities as needed, which could include returning energy infrastructure to pre-disaster or more resilient operational conditions.

The three phases allow Oregon's ESF-12 agencies to determine energy event conditions and impact, identify objectives and strategies to resolve energy disruptions, and implement actions to restore service and return energy systems to steady state conditions.

Readiness

When no emergency is ongoing, also known as "blue sky days," ODOE and OPUC routinely monitor energy markets and systems to stay informed on the region's baseline supply and distribution system. Knowing the region's typical energy needs helps ODOE and OPUC better anticipate problems that might disrupt the Pacific Northwest energy infrastructure. Additional information on Oregon's energy landscape can be found in Section 5 of this plan.

USDOE and the U.S. Energy Information Administration (EIA) support ESF-12 lead agencies like ODOE and OPUC by providing information-gathering and situational awareness tools for monitoring and/or responding to electricity, liquid fuels, and natural gas emergencies.

Table 5: Information Gathering and Situational Awareness Tools

Tool	Power	Liquid Fuels	Natural Gas
USDOE Emergency Situation Reports	Customer outages and summaries of electric system damage and estimate restoration timelines. Level of resources committed for restoration.	Refinery status, capacity, and output, petroleum terminal status, regional product inventories, offshore crude oil production impacts.	Natural gas pipeline status, gas utility customer outages, onshore and offshore natural gas production impacts.
USDOE EAGLE-1	Power outages by utility and by county in near real time.	Refinery process unit status alerts.	Natural gas pipelines critical notices.
USDOE Estimated Customer Power Outages (sent by CESER via email to affected states)	Predicted customer outages based on strength and track of hurricane or major storms.	Can be used to identify the critical petroleum infrastructure that may be impacted by the storm or by power outages.	Predict the degree that electrically powered compressors, if used, may be affected.

EIA Energy Atlas	Electricity infrastructure: power plants, substations, transmission lines, electric rail service territories.	Liquid fuels infrastructure: oil wells, platforms, pipelines, biofuel plants, terminals, refineries (locations and capacities).	Natural gas infrastructure: gas wells and platforms, pipelines, natural gas processing plants, underground storage.
EIA Hourly Grid Monitor	Hourly electricity generation by fuel type, interchange, and day-ahead demand forecasts.	Hourly oil-fired generation.	Hourly natural gas-fired generation.
EIA Weekly Petroleum Status Report	-	Weekly supply, demand, inventory, and import data.	-
EIA Winter Heating Fuels	Electric generation and prices.	Propane and heating oil inventories and prices.	Natural gas inventories and gas prices.
EIA SHOPP	-	State weekly residential heating oil and propane prices.	-
EIA Natural Gas Storage Dashboard	-	-	Evaluate natural gas storage activity, consumption by sector, exports, and prices.
EIA Daily Prices	Daily electricity prices.	Daily crude, gasoline, diesel, and propane prices.	Daily natural gas spot prices.

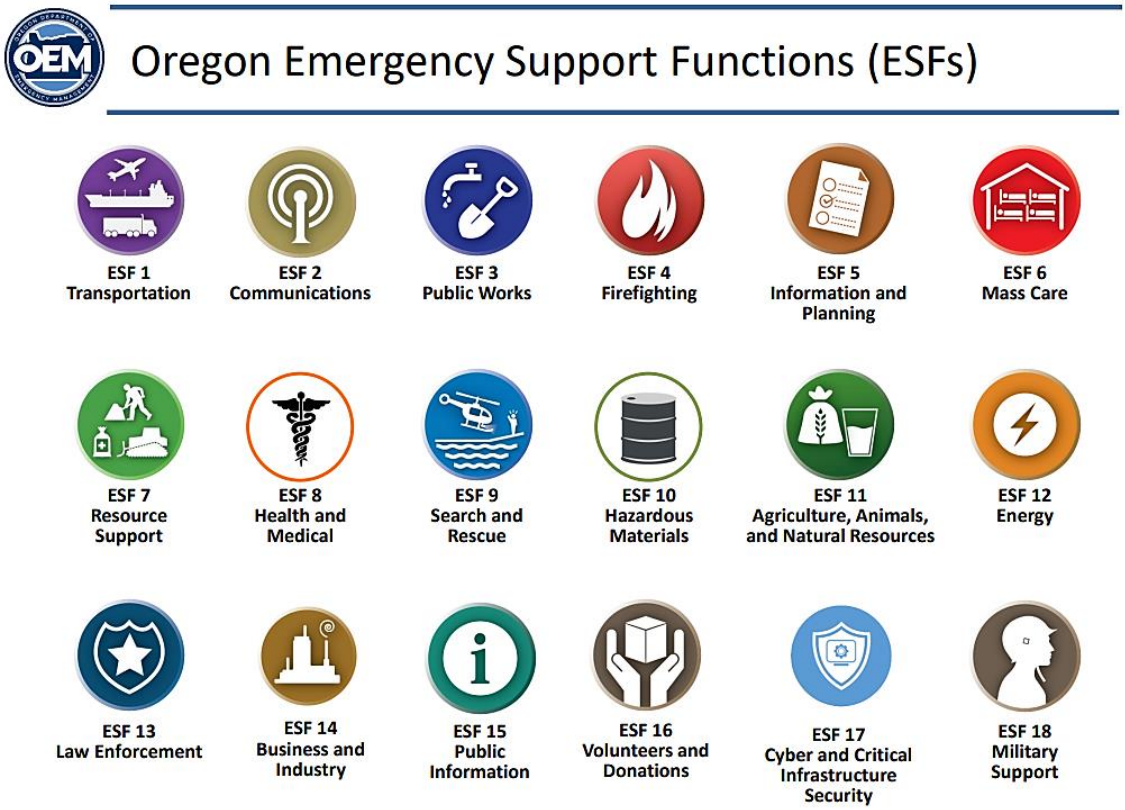
Phase 2 *Response Operations*

When natural or man-made emergencies occur in the state that threaten the health and safety of Oregonians, the Governor may issue a State Emergency Declaration. OEM is responsible for coordinating response and recovery activities with state agencies, local emergency management, and Tribes when an event involves multiple Emergency Support Functions.

Emergency Support Functions

Oregon uses a coordinated response structure identifying 18 ESFs that ensure if critical lifelines and services are disrupted, vital capabilities and resources can be provided by emergency response agencies.

Figure 3: 18 Oregon ESFs



Oregon's structure is similar to the federal ESF framework with ESF-12 addressing the energy sectors. At the federal level, FEMA designated USDOE to lead ESF-12. At the state level, OEM designated ODOE and OPUC to co-lead ESF-12. In addition to leading the development of the OR ESP, ODOE is responsible for planning and preparing for, responding to, and recovering from emergency events related to supply or distribution of liquid fuels, while oil spill response and environmental cleanup is the responsibility of Department of Environmental Quality. OPUC has the lead for electricity and natural gas preparedness, response, and recovery actions.

Oregon's ESF-12 agencies work closely with USDOE, the federal lead for ESF-12, and other federal partners to ensure state energy policy, plans, procedures, and tactics complement federal strategies. The goal is to enhance federal-state coordination and collaboration to gain situational awareness, minimize impacts, and rapidly recover when energy emergencies occur in Oregon, neighboring states in the region, or during events affecting the U.S. energy infrastructure.

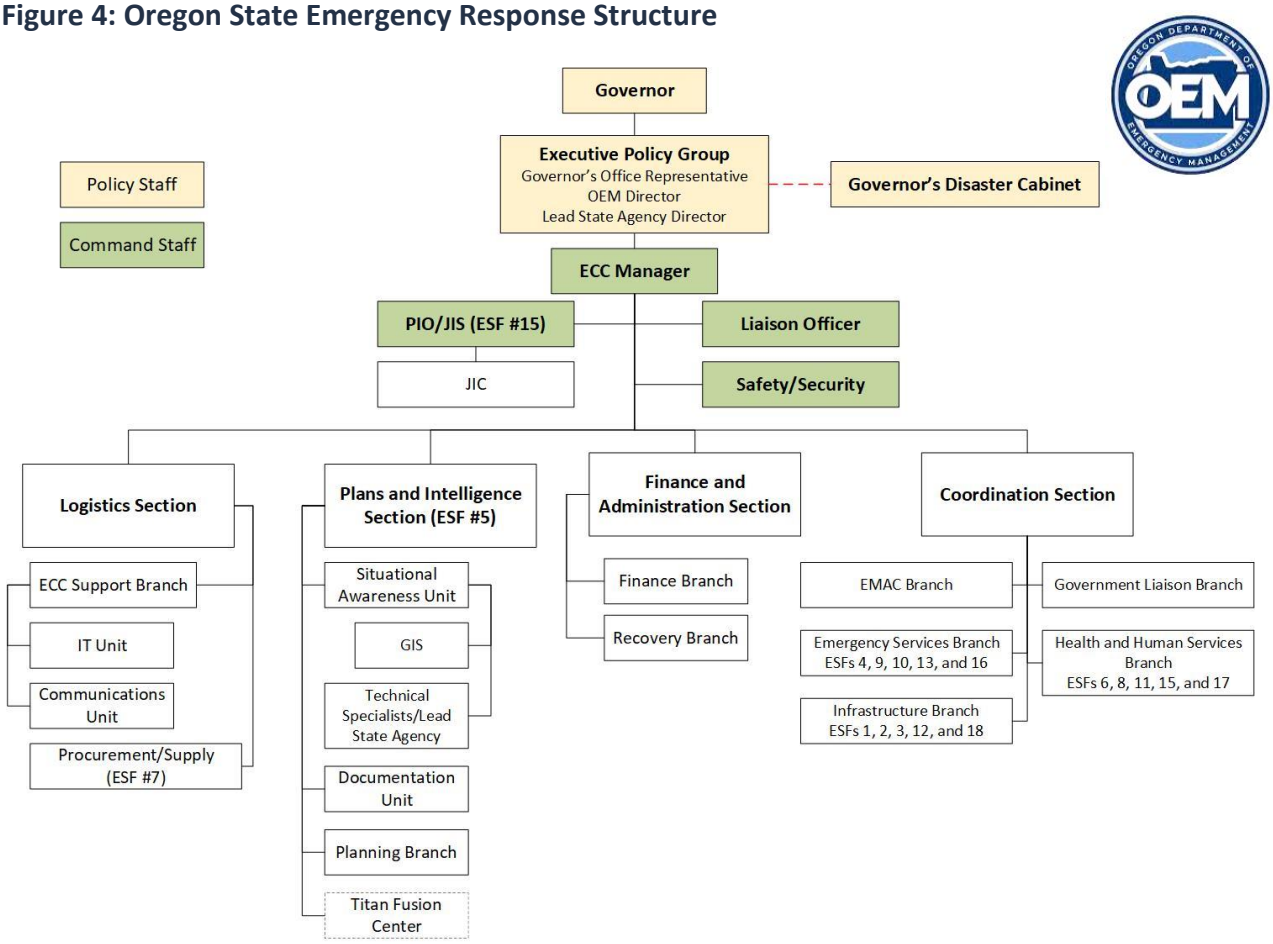
State Declared Emergencies

During state-declared emergencies, OEM may activate the State Emergency Coordination Center (ECC) to direct and coordinate the state's overall response to an event. During State ECC activations, all Oregon Emergency Response System Council agencies, including ODOE and OPUC, report to the State ECC virtually or in person to support Oregon's overall response and recovery effort.

- ODOE's Director and OPUC Commission Chair or their delegates report to the Governor's Disaster Cabinet (GDC) to guide and advise state leadership on policy issues, energy response priorities, and energy resource allocations.

- ODOE and OPUC emergency preparedness staff report to the ECC to:
    - Coordinate with federal, state, local, and Tribes to identify and address interdependencies among all critical lifeline services and mission requests.
    - Work with energy providers to assess the severity of supply disruptions, determine risks to public health and safety, and identify solutions to support supply and distribution.
    - Respond to mission and resource requests from state, local, and Tribes and energy providers.
- ODOE and OPUC Public Information Officers develop and disseminate energy emergency information, issue protective action instructions, and provide support to the state's Joint Information Center.

Figure 4: Oregon State Emergency Response Structure



Phase 3 *Recovery Operations*

In the days and weeks after a disaster, the state transitions to recovery operations to rebuild stronger, smarter, and safer. Consistent with the National Disaster Recovery Framework, Oregon moves from operating under 18 ESFs to operating under seven State Recovery Functions (SRF). ESF-12 Energy shifts to SRF 6 under Infrastructure Systems under the Oregon Disaster Recovery Plan.

Table 6: State Recovery Functions

Section/Annex	Coordinating Agency or Team
Basic Plan	**Office of Emergency Management**
State Recovery Function (SRF) Annexes	
SRF 1 Community Planning and Capacity Building	Oregon Department of land and Conservation Development
SRF 2 Economic Recovery	Business Oregon
SRF 3 Health Services	Oregon Health Authority
SRF 4 Social Services	Oregon Department of Human Services
SRF 5 Disaster Housing	Oregon Housing and Community Services
SRF 6 Infrastructure Systems	Oregon Department of Administrative Services Oregon Department of Energy Oregon Department of Transportation Oregon Public Utility Commission
SRF 7 Natural and Cultural Resources	Oregon Department of Environmental Quality

Under SRF 6, ODOE and OPUC focus on working with energy providers to restore and sustain the electricity, liquid fuels, and natural gas services to pre-emergency or more resilient conditions for maintaining community functionality. Primary responsibilities include:

- Coordinating state resources in support of the recovery of affected energy infrastructure systems.
- Participating in the state-level coordination of damage and community needs assessments to ensure that energy infrastructure considerations are integrated into the post-disaster community planning process.
- Working with local, Tribal, federal, and private sector partners to leverage available financial and technical assistance from governmental and nongovernmental sources to execute the community's Infrastructure Systems Recovery Action Plan.
- Promoting rebuilding infrastructure in a manner that will reduce vulnerability to future disaster impacts.
- Reviewing and identifying codes, building permits, and waivers to support energy sector recovery efforts.

Overview of Energy Emergency Response Plans

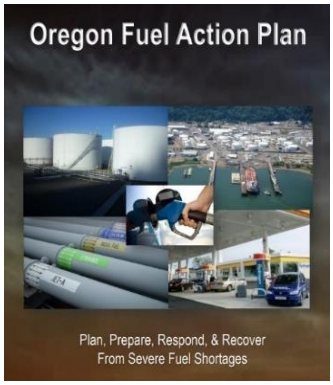
Energy Emergency Response Plans can be used anytime, but primarily during Phase 2 Emergency Operations. ODOE and OPUC developed and maintain stand-alone emergency response plans for the electricity, liquid fuels, and natural gas sectors. This section provides a high-level overview of the emergency response plans for each sector, which includes key responsibilities, actions, and priorities for plan activations. Also included is an overview of the state's cybersecurity plan.

Oregon Fuel Action Plan

As the designated state lead for ESF-12 overseeing petroleum emergency preparedness, planning, response, and recovery, ODOE developed the Oregon Fuel Action Plan in 2017. The plan identifies priority actions the agency would take to direct the state's overall response to petroleum disruptions. This includes establishing scalable procedures for:

- Plan activation and notifications within ODOE and to external partners and key stakeholders.
- Monitoring and assessing the severity, scope, and other consequences of supply shortages and distribution problems.
- Federal, state, local, Tribes, and petroleum industry collaboration and coordination in emergencies.

- Issuing voluntary and mandatory fuel conservation measures.
- Securing applicable waivers to ensure timely fuel deliveries.
- Developing and disseminating fuel information and protective actions to the public and news media.
- Fuel allocation to emergency and essential services providers when supplies are limited.
- Designating distribution sites for receiving emergency fuel supplies.
- Coordinating and implementing regional response measures with western states if event conditions warrant joint state actions.



In catastrophic disasters, ODOE actions can include working with federal agencies and the petroleum industry to create new temporary fuel supply chains and delivery systems into Oregon until the region's petroleum infrastructure is restored. This could include bringing fuel into staging areas in central Oregon, likely at the Redmond and Klamath Falls airports, before moving the product into communities along the I-5 corridor when possible. Small amounts of fuel could also be transported by air, but these missions would be limited. To support coastal communities, fuel supplies could be delivered by tanker ships if roads and bridges are severely damaged and coastal communities are inaccessible for overland delivery.

The Oregon Fuel Action Plan was developed in coordination with federal, state, local, Tribes, and petroleum industry partners. Each strategy and procedure identified by the plan can be scaled up or down as needed to address different levels of supply disruption severity.

Oregon Electricity and Natural Gas Emergency Response Plans

As the designated state lead for ESF-12 overseeing electric and natural gas sector emergency preparedness, planning, response, and recovery, OPUC is responsible for working with energy asset owners and operators in addressing electric and natural gas disruptions regardless of the cause. Prior to electric and natural gas emergencies, OPUC plays a key role in a variety of resource and sector planning activities intended to avert shortages or insufficiency. Upon activation, OPUC actions include:

- Coordinating, tracking, and providing status updates on electricity and natural gas sector restoration efforts. This includes state leadership briefings, operational briefings, and situation reports.
- Assisting energy asset owners and operators in identifying resources needed to stabilize and resolve limiting factors in restoration of energy systems.
- Coordinating with energy asset owners and operators to advise local, state, Tribes, territorial, and federal authorities on priorities for energy system restoration, assistance, and supply during response and recovery operations.

Winter storms can result in area wide outages due to damage to electrical equipment.

A natural gas explosion in NW Portland in 2016 damaged a city block.

- Assisting energy asset owners and operators, and local, state, Tribal, and territorial authorities with requests for emergency response actions, as required, to meet Oregon's energy demands.
- Serving as Oregon's point of contact with the electric and natural gas industry for information sharing and requests for assistance from private and public sector owners and operators.
- Evaluating and ensuring continuous ESF-12 OPUC staffing throughout the duration of an event.

Oregon Cybersecurity Emergency Response Network

Information security affects the state's enterprise information assets and its ability to provide services to citizens of Oregon. Enterprise Information Services (EIS) has responsibility for statewide information and cybersecurity standards, as well as policies on information security, under the authority of Oregon Revised Statute 276A.300.

As part of EIS, Cyber Security Services (CSS) is responsible for creation and maintenance of statewide information and cyber security standards. CSS sets the statewide direction for cybersecurity and follows guidance from National Institute of Standards and Technology and the Center for Internet Security as well as other cybersecurity organizations such as the Cloud Security Alliance where appropriate. State regulation guidance includes:

- Statewide Information Security Plan
- Statewide Information and Cyber Security Standards V1.0
- Statewide Agency Gap Analysis
- Security Plan Template
- System Security Plan Template

Security Incident Response

In the event of an information or cyber event, the CSS Security Operation Center (SOC) responds to incidents that may affect multiple agencies or pose a significant threat to the state. The SOC is responsible for coordinating interagency security incident response resources and communications during an information security incident that affects multiple agencies.

Agencies responding to the SOC collect, classify, and catalog all reported information-security incidents. When an information-security incident occurs that does not require SOC activation, CSS may assist agencies in responding to an information-security incident upon request. The CSS maintains confidentiality in accordance with agency policy, rules, and legal requirements on all information-security incidents reported to it.

The Oregon Department of Administrative Services (DAS), through CSS, has authority and responsibility for the statewide incident response program. The program establishes enterprise-wide procedures, standards, and guidelines for statewide and agency-level information-security incident response. The CSS maintains a forensics program capable of assisting agencies. The CSS maintains the State of Oregon Information Security Incident Response Plan.

An Oregon “Whole of Government Community" Cyber Disruption Response and Recovery (OCDR) - Voluntary Resource Guide has also been developed. This plan brings the governing entities in Oregon together for an inclusive cybersecurity network. Below is a matrix highlighting cybersecurity resources available to Oregon agencies.

Table 7: Cybersecurity Resources for Oregon Agencies [1]

Service	State		Federal		Dual Role	
	Cyber Security Services (CSS)	Office of Emergency Management (OEM)	Cybersecurity Infrastructure Security Agency (CISA)	Multi State-Information Sharing & Analysis Center (MS-ISAC)	Oregon Titan Fusion Center	Oregon National Guard
Proactive						
Advisories/Threat Notification	X	X	X	X	X	
CIS SecureSuite Membership				X		
Consulting				X		
Continuity Planning						X
Cyber Assessments			X			X
Cyber Exercise Planning			X			X
Cyber Training/Education Resources	X		X	X		
Cyber Vendor Contracts	X					
Malicious Domain Blocking				X		
Managed Security Services				X		
Network Monitoring				X		
Penetration Testing			X			X
Phishing Campaign Assessments			X			
Risk & Vulnerability Assessment			X			
Validated Architecture Design			X			
Vulnerability Scanning			X	X		
Web Application Scanning			X			
Reactive						
Alerts	X		X	X	X	
Emergency Declaration		X				
Incident Response Assistance	X		X	X		
Malicious Code Analysis Platform				X		
Malware Analysis			X	X		
Vulnerability Assessment				X		
Vulnerability Management Program				X		

REFERENCES

[1]Enterprise Information Services. “Cyber Security Services.” (2023). https://www.oregon.gov/eis/cyber-security-services/pages/cyber-disruption-plan.aspx

IV. ESF-12 REGIONAL COORDINATION WITH PARTNERS

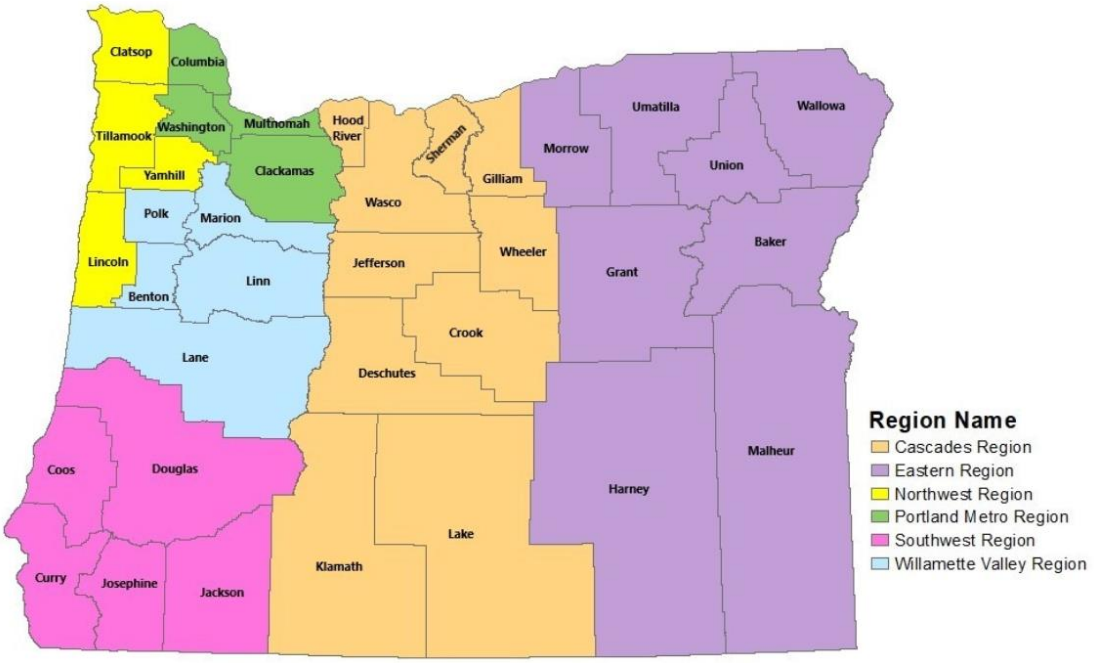
Ensuring Oregon's energy security requires collaboration with many partners as we face a changing energy landscape and threats to the critical energy infrastructure. This section describes ESF-12 programs that promote regional coordination within the state, in the region, and with federal partners.

ESF-12 Coordination within Oregon

As ESF-12 co-leads, the Oregon Department of Energy (ODOE) and the Oregon Public Utility Commission (OPUC) work closely with the Oregon Department of Emergency Management's (OEM) Regional Coordinator Teams to engage Oregon's 36 counties and 241 incorporated cities.[1] OEM has two regionally focused teams serving as dedicated points of contact for state ESF agencies across six Oregon regions to support local and Tribal emergency managers. This includes the Regional Preparedness & Response (P&R) Coordination Team and the Regional Mitigation and Recovery (MARS) Coordination Team.

Both teams serve as liaisons between state ESF agencies and counties, city governments, and the Tribes. The teams also represent OEM at local meetings and support regional programs at the local level.

Figure 5: OEM Map of Oregon's Six Regions



ODOE and OPUC may engage P&R Regional Coordinators to coordinate training, seminars, and workshops for the six regions on ESF-12 planning, preparedness, and response plans and strategies. P&R Regional Coordinators help ensure local operations plans align with state ESF 12 priorities.

ODOE and OPUC may also coordinate with MARS Regional Coordinators when working with local government agencies in planning and preparing for and implementing energy recovery missions to ensure alignment with federal, state, and local priorities.

Coordination with Local Governments

ODOE and OPUC engage local jurisdictions to promote collaboration and information sharing of state and local ESF 12 energy priorities, concerns, planning strategies, resources, and capabilities. ODOE and OPUC provide technical assistance to counties and cities to develop procedures for responding to energy issues in local emergency operations plans, and to coordinate with local governments to conduct workshops, training, and exercises to ensure state and local officials can effectively address energy disruptions. This confirms ongoing program readiness.

When responding to energy disruptions, ODOE and OPUC work with county and city partners to assess energy impacts in local communities, provide situational awareness and recommend protective actions, and address mission requests as appropriate.

In addition, local governments are critical contributors to statewide energy security planning efforts. ODOE also supports local energy resilience planning efforts by providing resources and funding to help advance energy resilience at the local level. OPUC supports local governments in wildfire mitigation planning efforts by providing workshops and information on Public Safety Power Shutoffs.

Coordination with the Tribes

Energy infrastructure of the nine federally recognized Tribal Nations is intertwined with energy systems from Oregon and the broader region. Energy security planning and energy emergency response planning in Oregon must consider and coordinate with Tribal governments.

One of the primary venues for coordination between Oregon state government and Tribal government emergency planners and managers is the Tribal Preparedness Coalition of Oregon. Eleven years after the first Annual Tribal Public Health Preparedness Conference hosted by the Northwest Portland Area Indian Health Board, the Tribal Preparedness Coalition of Oregon (Tribal Coalition) was convened in August 2016. All nine federally recognized Tribes are represented on the Tribal Coalition, which is staffed by the Oregon Health Authority.

Figure 6: Oregon's Nine Federally Recognized Tribes

Source: Oregon Department of Education

The Tribal Coalition promotes activities concerning disaster preparedness, planning, response and recovery, and continuity of operations. The Tribal Coalition coordinates with and among its member Tribes, federal agencies, state agencies, and local jurisdictions to enhance preparedness and resilience of Tribal communities in preparation for disasters and to support response activities during incidents.

The Tribal Coalition conducts monthly coordination meetings virtually and meets in person quarterly. State and federal agencies are invited guests to Tribal Coalition meetings. ODOE and OPUC engage the Tribes monthly and quarterly in person to continue learning the priorities, concerns, and emergency preparedness needs of Oregon's nine federally recognized Tribes.

State government agencies also work with Tribal Governments to provide:

- Presentations, training, and workshops as requested on state ESF 12 plans and strategies for preparing for, responding to, and recovering from energy emergencies affecting the Tribes.
- Technical assistance on Tribal plans and strategies in response to energy emergencies as needed.

When responding to emergencies, state partners work closely with the Tribes to:

- Provide situational awareness on the energy outlook.
- Assess energy impacts to the Tribes.
- Recommend protective actions as appropriate.
- Work with energy providers to address mission and resources requests from the Tribes.

Oregon state government recognizes Tribal nation sovereignty and respects the Tribal laws, authorities, and policies that govern the actions necessary to provide safety for all Tribal members and other residents on Tribal lands, property, and natural and cultural resources.

Federal and Multi-State Coordination

Because energy systems cross jurisdictional boundaries, events such as power outages, fuel shortages, and natural gas disruptions in one state can affect communities in neighboring states. With the increase in cyberattacks and extreme weather events, coordination and collaboration with neighboring states prior to an emergency is critical to ensuring rapid response and recovery from supply chain disruptions threatening the region.

Energy Emergency Assurance Coordinators Program

The Energy Emergency Assurance Coordinators (EEAC) Program is a cooperative effort between the U.S. Department of Energy (USDOE), National Association of State Energy Officials (NASEO), the National Association of Regulatory Utility Commissioners (NARUC), the National Governors Association (NGA), and the National Emergency Management Association (NEMA).

The EEAC Program provides states with a means of sharing and receiving credible, accurate, and timely information with other states and USDOE leading up to and during energy emergencies. Structured communications are essential for understanding the severity, magnitude, and consequences of energy disruptions regardless of the causes. EEACs serve as points of contact for USDOE in the event of an emergency. Membership is made up of representatives from state energy offices, public utility commissions, state ESF-12 responders, emergency management agencies, homeland security agencies, local governments, and governors' offices.

The Oregon Department of Energy (ODOE) and Oregon Public Utility Commission (OPUC) are the state's designated EEACs and lead planning and response roles during energy emergencies. ODOE and OPUC staff are registered on a website called ISERNet, which USDOE hosts. ODOE and OPUC review and update their contacts annually.

Examples of Products USDOE has Shared with Oregon

USDOE leverages the EEAC network to communicate important notices, such as situation reports and outage estimate reports. USDOE distributes limited-release and official use information including situational awareness, energy sector analysis, and alerts to EEACs leading up to and during energy emergencies. For example, during the COVID-19 pandemic, USDOE's Office of Cybersecurity, Energy Security, and Emergency Response (CESER) disseminated weekly COVID-19 situation reports to all states in addition to situation reports for emergency events like the June 2023 physical attacks on critical electric infrastructure in the Pacific Northwest.[2]

Examples of Products Oregon has Shared with USDOE

ODOE has leveraged the EEAC network to communicate important notices, such as situation reports, waivers, state emergency declarations, and state energy reports to USDOE as well as state energy offices across the Western Region and adjoining states. Due to the regional nature of most energy emergencies, ODOE collaborates with neighboring states to ensure better situational awareness and monitoring, and to improve the overall operating picture during emergencies and disasters.

Energy Security Committee

The National Association of State Energy Officials' (NASEO) Energy Security Committee provides a forum for State Energy Officials to discuss, learn, and collaborate on energy emergency preparedness and response. The committee seeks to address all natural and manmade hazards as part of its energy assurance efforts. It supports state efforts in the areas of energy data and analysis, intra-state and inter-state communications and training, and public-private sector coordination.

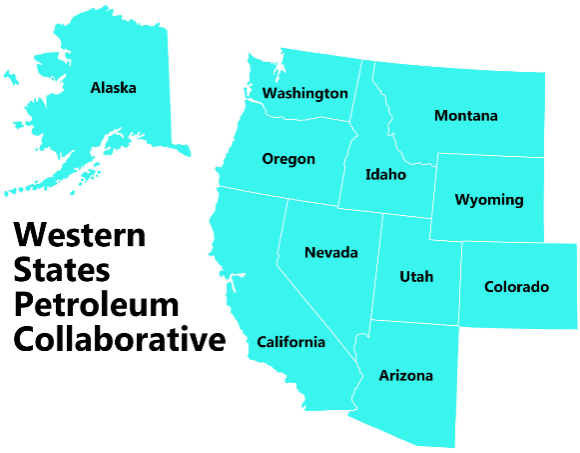
The committee collaborates with relevant federal partners and industry stakeholders to promote comprehensive energy sector security. The committee leverages its network to assist states in carrying out their responsibilities as state energy data repositories, providing technical assistance to other state government agencies, and conducting energy assurance planning and preparedness activities. The committee structure is designed as a conduit to solicit diverse state perspectives on a variety of subjects in order to inform future activities and resource requests, and to guide NASEO advocacy.

ODOE participates in NASEO's monthly Energy Security Committee virtual meetings to discuss, learn, and collaborate in the areas of energy data and analysis, intra-state and inter-state communications and training, and public-private sector coordination. The committee collaborates with relevant federal partners and industry stakeholders to promote the roles, responsibilities, and capabilities of State Energy Offices' comprehensive energy sector security.

ODOE also participates in the committee's monthly State Hazards and Operations Rundown Call. During regional or national emergencies, these meetings allow states to share information pertaining to potential, anticipated, and ongoing hazards; response actions and updates; outstanding needs; and ongoing tactics and strategies concerning the event. During "blue sky days," states discuss ongoing preparedness efforts, best practices, and lessons learned from responding to energy events advancing regional coordination and collaboration.

Western States Petroleum Collaborative

In March 2020, the Western States Petroleum Collaborative (WSPC) was created to facilitate the coordination and development of a regional fuel response framework with 11 state energy offices and emergency management agencies. The western states recognized the need to work together and share resources to address regional petroleum shortage preparedness and response needs. This effort was built off the existing EEAC Program originally established in 1996 to encourage information sharing in energy disruptions. The WSPC expands the coordination beyond information sharing to include coordinated response actions. This effort was sponsored by USDOE-CESER, NASEO, and NEMA.



Staff from ODOE and Oregon Department of Emergency Management (OEM) co-chaired the 18-month effort sponsored by the USDOE, NASEO, and NEMA to establish the framework for the WSPC. As co-chairs, ODOE and OEM provided guidance and worked to ensure project goals and objectives reflected the need for regional coordination to manage fuel disruptions affecting multiple states.

The WSPC Framework was finalized in September 2021 and establishes a multi-state coordinated response structure for the western states in response to liquid fuel emergencies affecting multiple states. The purpose of the WSPC Regional Framework is to codify guidance for coordinated response, prioritize response actions and measures, standardize information flows, and pre-identify tools and templates that are necessary to respond to a liquid fuels shortage.

Multi-State Coordinated Response

The multi-state coordinated response structure developed by the WSPC:

- Identifies a set of petroleum shortage response actions, decision-making protocols, and priorities for regional coordination when triggers and thresholds are met;
- Identifies data sources and essential information required for states to establish a common operating picture during petroleum disruptions to determine whether coordinated response actions are warranted;
- Identifies triggers and thresholds to allow states to determine the level of response and collaboration required to reflect the severity of the disruption; and
- Creates consistency and streamlines the response process for fuel providers operating in multiple states.

ODOE's implementation of coordinated regional response actions is voluntary, and coordinated actions typically occur when two or more states in the region face a petroleum shortage and those states agree that a coordinated regional approach is mutually beneficial. When regional coordination is warranted, ODOE uses existing pre-established decision-making authorities and processes described in the Oregon Fuel Action Plan.

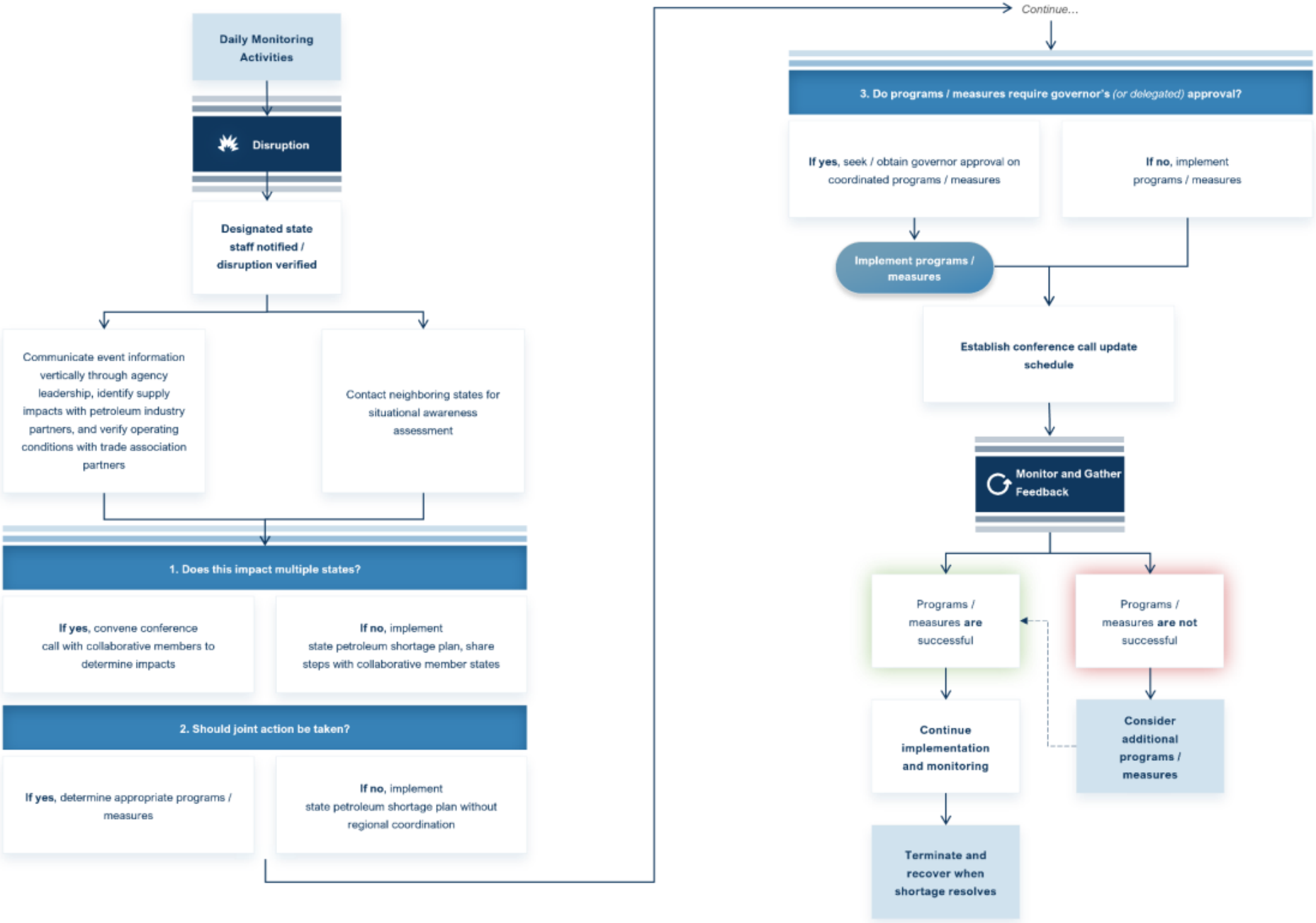
When there is a disruption of liquid fuels supply, ODOE and other states in the region consider the following questions when assessing the situation and determining whether to conduct a coordinated response.

Table 8: Considerations for Coordinated Response

Does this event affect multiple states?	
If the answer is **YES**, affected states should convene the WSPC member states in a coordination call to indentify the scope of impacts and consider aligning response actions. Additional support from NASEO will be available, if requested.	If the answer is **NO**, the affected state should carry out its individual state liquid fuels plan (or energy security plan) and share updates with WSPC member states for information purposes.
Should joint action be taken?	
If the answer is **YES**, affected states should align needs and capabilities to determine which programs/measures to enact and the process required to do so.	If the answer is **NO**, the affected state or states should implement their individual state liquid fuels plan (or energy security plan) without regional coordination, but maintain communication with WSPC member states regarding the situation and actions taken.
Do the identified programs and measures require the Governor's (or delegated) approval for implementation?	
If the answer is **YES**, affected states should follow their respoective procedures for obtaining gubernatorial (or other) approval on the selected programs and measures.	If the answer is **NO**, affected states should carry out implementation of the selected programs and measures to address the disruption.

The multi-state coordinated response structure flow chart (below) describes the process for implementing a multi-state response.

Figure 7: Regional Coordinated Response Structure Flowchart



Case Study: Oregon Implements Multi-State Coordinated Response to 2021 Wildfires

ODOE used the WSPC Multi-State Coordinated Response Structure during the 2021 wildfire season. Oregon experienced jet fuel supply shortages when COVID restrictions lifted and the state had a sudden increase in commercial travel coupled with an early wildfire season in late spring.

With the exception of the Portland International Airport, all jet fuel deliveries are transported by truck from the Portland fuel hub to airports around the state. Fuel carriers already working at capacity were unable to add unscheduled jet fuel deliveries to airports in eastern and southern Oregon to support wildfire response.

With NASEO's assistance, ODOE coordinated with WSPC states to provide situational awareness and to find out if other states in the region were experiencing the same problems. It was evident from our discussions that Oregon's jet fuel problems in response to wildfires did not affect neighboring states, and no joint actions were needed.

ODOE worked with jet fuel providers, state fire officials, and the airports to ensure adequate supply was available at air bases that were supporting wildfire response in Oregon. ODOE and the Oregon Department of Forestry established the new state-federal Fuel Coordination Group and procedures for responding to jet fuel shortages during wildfire season. ODOE provided situation reports, new Fuel Coordination Group procedures, and lessons learned from the 2021 wildfires to WSPC states.

WSPC Role During Steady-State Conditions

To foster collaboration and facilitate collective maintenance of response capabilities, WSPC states conduct quarterly virtual coordination meetings. States discuss common issues, concerns, and goals for preparedness, as well as raise potential solutions to strengthen resilience in the region. WSPC states also share information on relevant training and exercises that other member states may support or participate in. This allows states to integrate regional coordination elements into liquid fuels exercises. USDOE and NASEO participate in the WSPC coordination meetings to provide federal reports on training opportunities, regional exercises, and upcoming webinars and workshops that may interest the WSPC member states.

States rotate hosting the quarterly WSPC meetings on an annual schedule. Oregon, Washington, and California hosted and facilitated meetings in 2021, 2022, and 2023, respectively.

National Association of Regulatory Utility Commissioners

OPUC participates within the overall structure of the National Association of Regulatory Utility Commissioners (NARUC), which organizes collaborative efforts relating to energy security, risk identification, and mitigation. Key to the work of energy security are the following subcommittees:

- Staff Subcommittee on Critical Infrastructure
- Staff Subcommittee on Electric Reliability and Resilience
- Staff Subcommittee on Pipeline Safety

Committee on Critical Infrastructure

Established on a temporary basis after the September 11, 2001 terrorist attacks, the now-permanent Critical Infrastructure Committee provides state regulators with a forum to analyze solutions to utility infrastructure security and delivery concerns. As demonstrated on September 11 and later during Hurricane Katrina, protection of the nation's energy and telecommunications infrastructure is critical to national security, and this committee provides OPUC opportunities to share best practices and collaborate with other states and federal counterparts.

NARUC also houses the Critical Infrastructure Resource Repository, which provides “one-stop” access to topical information across a spectrum of activities undertaken by public utility commissions to address critical infrastructure security. These activities focus on approaches and strategies related to energy infrastructure reliability and resilience, cybersecurity, and emergency response.

Information on this site is proprietary. It is voluntarily shared by public utility commissions to facilitate peer engagement and information exchange. It is intended to help drive innovation and encourage consistency and alignment across states' activities in the critical infrastructure security domain.

Committee on Electricity

OPUC participates in the Electricity Committee to develop and advance policies that promote reliable, adequate, and affordable supply of electricity. Through strong collaboration with the Federal Energy Regulatory Commission (FERC) and other federal agencies, the committee also seeks ways to improve the quality and effectiveness of regulation through education, cooperation, and exchange of information.

Gas Committee

OPUC works closely with FERC, USDOE, and the U.S. Department of Transportation (USDOT) on the Gas Committee. Through panel discussions and educational sessions, the committee fosters awareness and understanding of issues affecting the transportation, distribution, and sale of natural gas safely, efficiently, and economically.

Cybersecurity Manual

NARUC has developed the Cybersecurity Manual, a comprehensive suite of cybersecurity tools, to help public utility commissions gather and evaluate information from utilities about their cybersecurity risk management and preparedness.

Components of the Cybersecurity Manual can be used individually but are designed to work together. NARUC’s intent is to provide a comprehensive set of assessment tools that, when applied, provide a consistent, complete view of utilities’ cybersecurity preparedness.

Western Regional Mutual Assistance Group (WRMAG)

Over decades of emergency response functions, the electric and natural gas industries have established strong industry ties that enable them to rapidly access response support for a variety of emergencies. Over the past decades these have been exercised in response to earthquakes (i.e. Loma Prieta in 1989, Northridge in 1996 and others), storms and hurricanes (November 2007, February 2021) and wildfires (October 2017, January 2018, and September 2020). This regional structure (which is facilitated through the Western Energy Institute) is backfilled with access to additional regions should the response activity be requiring additional support, and is hosted through industry organizations such as EEI (Edison Electric Institute). Support could include logistics, materials (including long-lead items), equipment, or — as in the case of Hurricane Maria in Puerto Rico —engineering, procedures, and other fundamental building blocks for re-creating utility infrastructure and systems.

Mutual Aid Assistance

Mutual aid is an essential resource for receiving assistance through prearranged agreements with and from other states to provide support under specified terms and conditions. Oregon established three ESF-12 Mission-Ready Packages (MRP) for mutual aid during steady state. MRPs include detailed information about the type of resource that can be offered, the amount of the resource, timing considerations, and any associated costs. By establishing these details in advance, states identify needs and key resources they can offer or request from other states within the region. Oregon's ESF-12 agencies established the following MRPs:

- Electric Utility ESF-12 Technical Assistance Support
- Liquid Fuels ESF-12 Technical Assistance Support
- Natural Gas ESF-12 Technical Assistance Support

Oregon's MRPs define explicit terms, including considerations for how the agreement is activated, how the requesting and supporting entity communicate and coordinate with one another, and funds available to support the terms of the agreement. The MRPs were coordinated and established through OEM's Emergency Management Assistance Compact. MRPs not only speed up the mutual aid process, but provide an opportunity for continued coordination with regional partners as part of preparedness.

REFERENCES

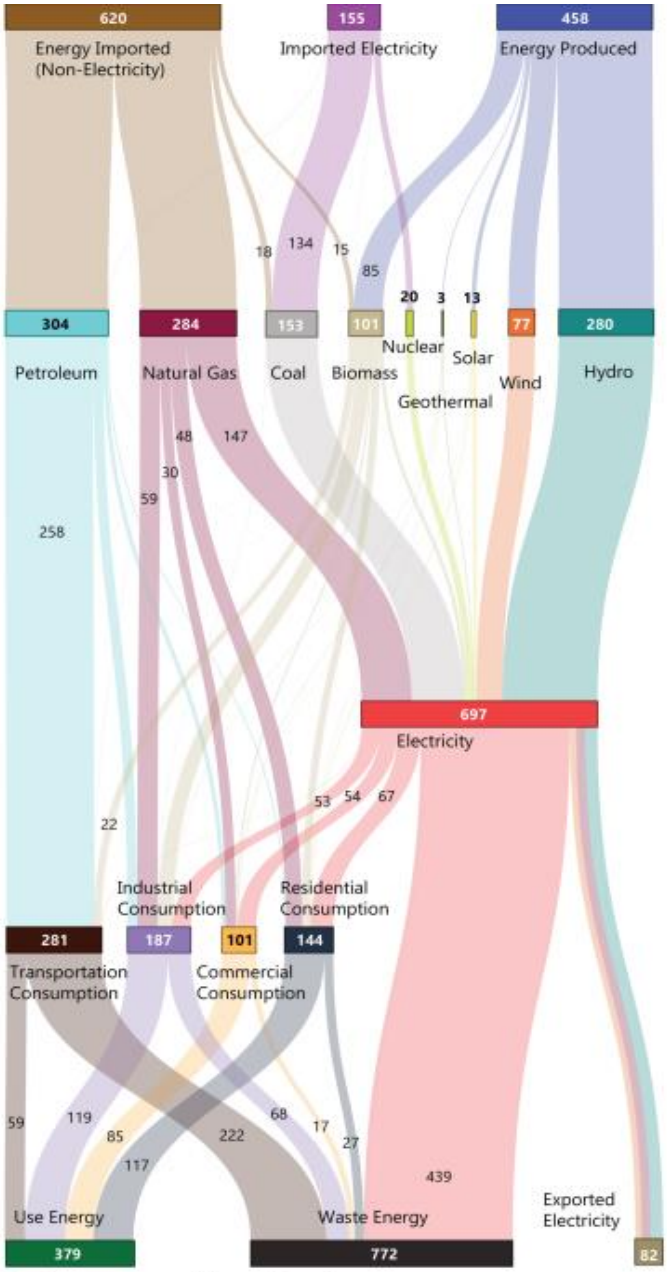
[1]Oregon Department of Emergency Management. "OEM Regional Coordinators Program Overview." (August 2023).

[2]U.S. Department of Energy Office of Cybersecurity, Energy Security, and Emergency Response. "Monthly Energy Events Analysis Brief" for Energy Emergency Assurance Coordinators. (June 2023).

V. OREGON ENERGY LANDSCAPE

Solicitation for a contractor to complete a risk assessment to **quantify and propose actions to mitigate threats to Oregon's energy infrastructure** is underway, with work to be completed in 2024. Updated information will be included in the Oregon Energy Security Plan submission to USDOE September 30, 2024. The selected contactor will use information from the Oregon Energy Landscape against which to conduct the risk assessment. A summary of the contractor Scope of Work, as contained in the Request for Proposals, is included in Appendix E to the Plan.

Figure 8: Oregon's Energy Flow



Numbers represent trillions of Btu of energy.

2022 Biennial Energy Report

This section provides an overview of Oregon's energy profile and provides baseline data, maps, charts, and other information on state energy markets and infrastructure for all energy sources. The information here provides the baseline of Oregon's energy systems, against which identified risks and threats will be assessed.

Oregon's energy story has evolved over time to include new technologies, address changes in the availability of different generation resources, and to meet state energy goals. Energy sources classified as renewable are not a new concept to Oregon. The Pacific Northwest has a long history of using hydropower resources, but as recently as 20 years ago, solar and wind-generated energy was scarce.

Today, Oregon's energy resources are more diverse. In Figure 8, start at the top to see imported energy and energy produced in Oregon. The numbers represent trillions of Btu of energy. The energy lines flow through to show the different types of resources we use – including the energy we produce in Oregon and what we import as direct fuels or electricity – and where they end up in Oregon's energy ecosystem. The energy we produce and import helps meet various needs, whether they are in-state electricity generation, transportation fuels, or the natural gas and electricity that supply homes and businesses. Some energy is exported to other states, and the remainder goes unused due to system inefficiencies.

The chart provides a macro level look at the energy Oregonians produce, import, consume, and export. Energy Produced includes forms of energy that Oregon produces in-state, such as hydroelectric, wind, and biomass energy. Electricity Imports includes electricity that is generated in other states and brought in for use in Oregon. Energy (non-electric) Imports includes the other forms of energy brought into the state for various uses, such as gas to power transportation and fuels to heat Oregon homes.

The flow to Waste Energy includes all the energy that is not harnessed, from the point of extraction to the point of use. This includes energy lost as heat during combustion or transformation into electricity, transmission losses, and many other factors.[1] [2]

Btu A **British Thermal Unit** is a measurement of the heat content of fuels or energy sources. Btu offers a common unit of measurement that can be used to count and compare different energy sources or fuels. Fuels are converted from physical units of measurement, such as weight or volume, into Btu to more easily evaluate data and show changes over time.

Energy Sources Used in Oregon

Solar. Photovoltaic technology converts energy radiating from the sun into electricity. Solar systems are located on homes, businesses, and large utility-scale arrays. From 2012 to 2020, solar generation in Oregon increased from 6,400 megawatt-hours to over 1 million MWh.[3]

Nuclear. Generated electricity from a nuclear reactor where thermal energy is released from the fission of nuclear fuel. Oregon's nuclear power comes from the Columbia Generating Station in Washington State, and the electricity produced is marketed by the Bonneville Power Administration.

Hydropower. Electricity generation harnessed from the flow of water through dams. Oregon has 105 hydropower facilities of varying size, including four federal facilities on the Columbia River that span the Oregon and Washington border, and two facilities that span the Oregon and Idaho border.

Wind. Generation of electricity by the force of wind turning turbines. As of 2020, Oregon has 54 operating facilities in the state with a total capacity of 4,203 MW.[3]

Geothermal. Energy extracted from hot water or steam from natural underground sources can be used for water/space heating or the generation of electricity. Oregon has two geothermal electric generation facilities with a capacity of 24 MW.[3]

Natural gas. Fossil fuel extracted from beneath the earth's surface. Oregon has a single natural gas field located in Mist. Oregon imports most of the natural gas it consumes for electricity and as a direct fuel. There are 13 natural gas electricity generation facilities with a combined capacity of 4,354 MW.[3] Natural gas is used directly for residential, commercial, industrial and transportation uses.

Coal. Combustible rock is burned for industrial processes and to create electricity. Oregon had one coal-fired power plant, the 575-MW Boardman facility, which closed in October 2020 and was demolished in September 2022.[4] The state also imports coal-generated electricity from neighboring states.

Biomass. Includes all renewable biogas and biofuels derived from the energy of plants and animals. Wood and wood waste is Oregon's greatest source of biomass, which is used for space heating, cooking, electricity generation, and transportation. Oregon has 11 biomass and 30 biogas operating facilities converting waste products to electricity.[3] Oregon also produces plant-derived ethanol fuel and biodiesel from used cooking oil to be used as transportation fuels.

Petroleum. Fossil fuel extracted from beneath the earth's crust that includes gasoline, diesel, heating oil, lubricants, and other fuels we use for space heating, industrial equipment, and transportation. Oregon imports the petroleum that it uses.

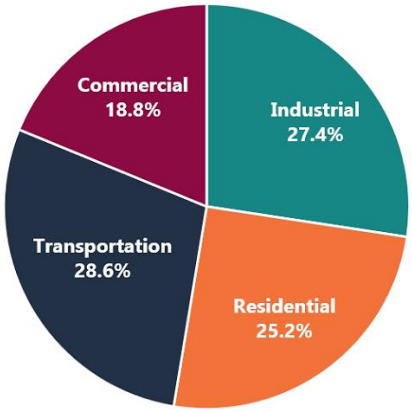
Energy Consumption

By Sector

Energy consumption is tracked by how it is used among four main end-use sectors: Residential, Commercial, Transportation, and Industrial.

In Oregon in 2021, those four sectors combined consumed 983 trillion Btu of energy,[3] including each sector's respective share of electrical system losses,[i] as discussed earlier in *Understanding Oregon's Energy Story*.

Figure 9: Energy Consumption by Sector



25.2% **of Oregon's 2020 energy consumption[2]**

Residential: this category includes single family, multi-family, and manufactured homes for Oregonians. Energy is used for lighting, to heat and cool living space, cooking, and appliances. Electricity is the most used energy resource in homes – with heat pumps, electric furnaces, and electric resistance heaters as examples of primary electric heat options.

18.8% **of Oregon's 2020 energy consumption[2]**

Commercial: this category includes businesses that provide goods and services, government and office buildings, grocery stores, and shopping malls. Energy is used to heat and cool spaces, power equipment, and illuminate facilities. It is Oregon's smallest energy-consuming sector, supported by the adoption of advanced energy codes, energy efficiency programs, and advancements in equipment and processes.

27.4% **of Oregon's 2020 energy consumption[2]**

Industrial: this category includes facilities used to produce, process, and manufacture products – including agriculture, fishing, forestry, manufacturing equipment, mining, and energy production. Energy powers industrial equipment and machinery to manufacture products. This sector has seen contractions in aluminum, forestry, and manufacturing – with improvements in efficiency of industrial facilities and equipment.

[i] Electricity generation and transmission result in energy losses that are estimated and included in EIA consumption data. Electrical system energy losses account for energy lost during generation, transmission, and distribution of electricity.

28.6%
of Oregon's 2020 energy consumption[2]

Transportation: Personal cars, fleets, shipments, airline travel, and more make up Oregon's transportation energy use. Petroleum is the most used resource and the largest contributor of greenhouse gas emissions in Oregon. Alternative fuels like electricity and biofuels are a growing part of this sector.

Oregon's Energy Consumption Compared to Other States

Oregon uses less energy per capita than most states. In 2021, Oregon was ranked 36th in overall energy consumption per capita. The graph below is from EIA estimates and can be used to compare Oregon to other states. EIA data does not show a complete picture of Oregon's energy consumption. For example, Oregon consumes electricity from coal and nuclear power. Oregon collects data from utilities, BPA, state agencies, and other stakeholders to calculate a more comprehensive accounting of energy consumption by Oregon. All other reported consumption numbers are from ODOE's *2022 Biennial Energy Report*.

Figure 10: 2021 Energy Consumption in Oregon[4]

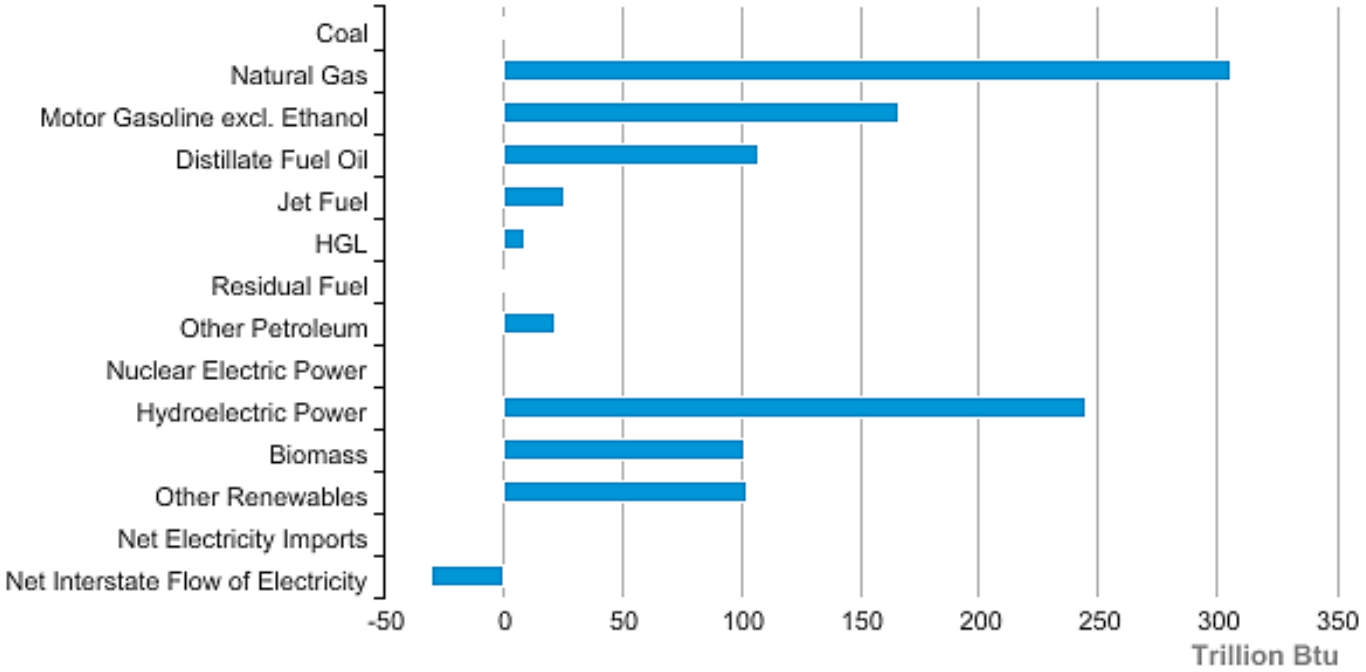
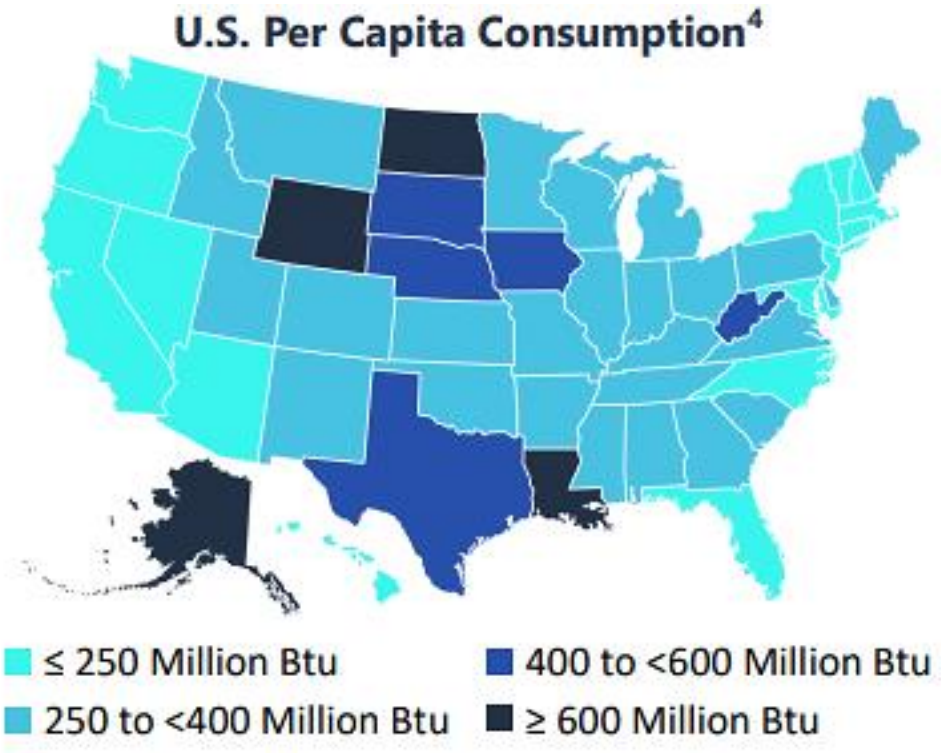


Figure 11: Oregon Consumption Compared to Other States[4]

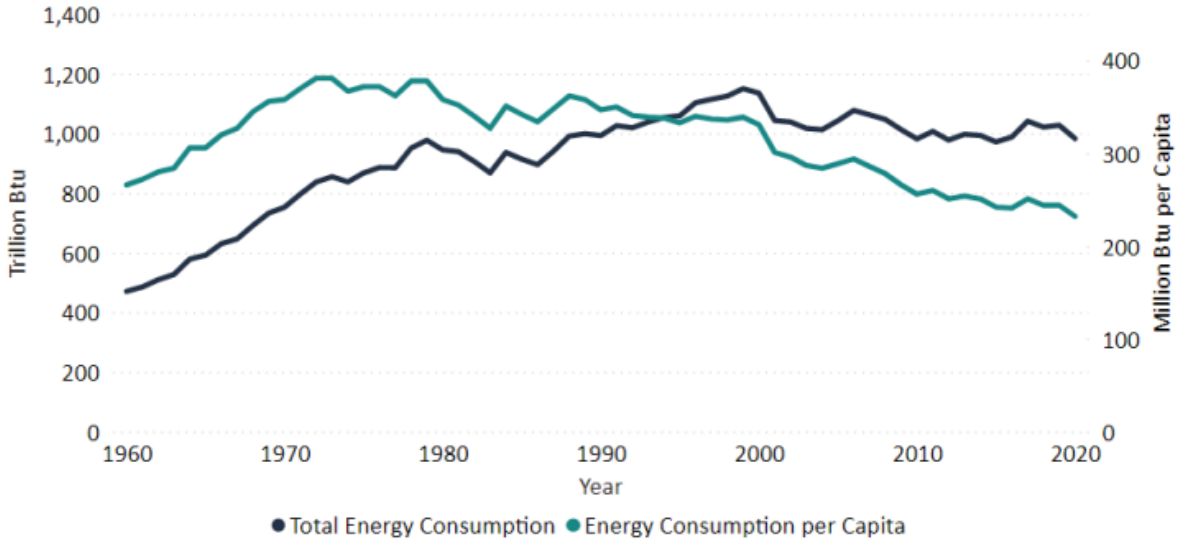


Oregon's Energy Consumption Over Time

Oregon saw an overall trend of increased energy use for almost four decades—an average of 3.6 percent growth per year from 1960 to 1999.[4] During that time, the state shifted from a reliance on fuel oil and wood to an increased use of natural gas and electricity in homes and businesses. Oregon reached its highest consumption of energy in 1999 in both stationary and transportation uses. Since then, total energy use has been decreasing.

The amount of energy used in Oregon declined by 13.4 percent between 2000 and 2020. Energy consumption per capita does not directly correlate with overall energy use. In the last 20 years, Oregon has had steady population increase during a period of slight decline in overall energy consumption. This translates to a steady decrease in energy consumption per capita.[4]

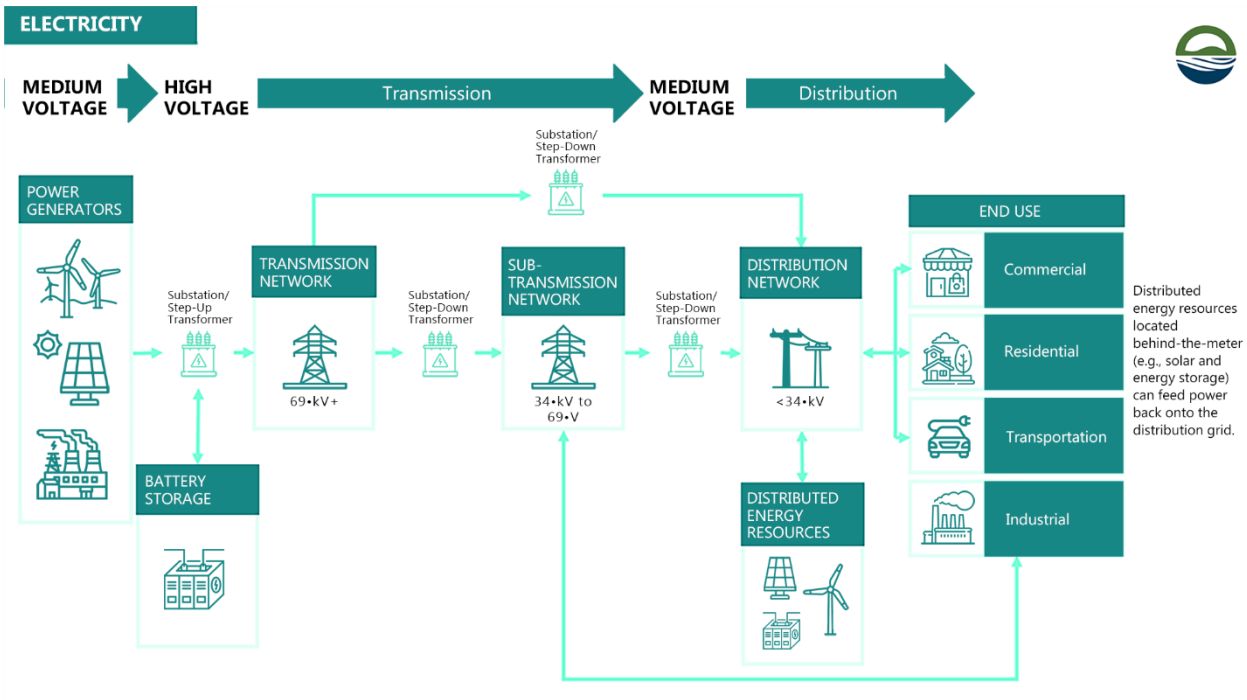
Figure 12: Energy Use Over Time – Oregon's Total Energy Consumption and Per Capita Energy Consumption Over Time[4]



Electricity Sector

Power plants generate electricity that is delivered to customers through transmission and distribution power lines. High-voltage transmission lines, such as those that hang between tall metal towers, carry electricity over long distances to meet customer needs. Higher voltage electricity is more efficient and less expensive for long-distance electricity transmission. Lower voltage electricity is safer for use in homes and businesses. Transformers at substations increase (step up) or reduce (step down) voltages to adjust to the different stages of the journey from the power plant on long-distance transmission lines to distribution lines that carry electricity to homes and businesses.

Figure 13: Electricity Supply Chain

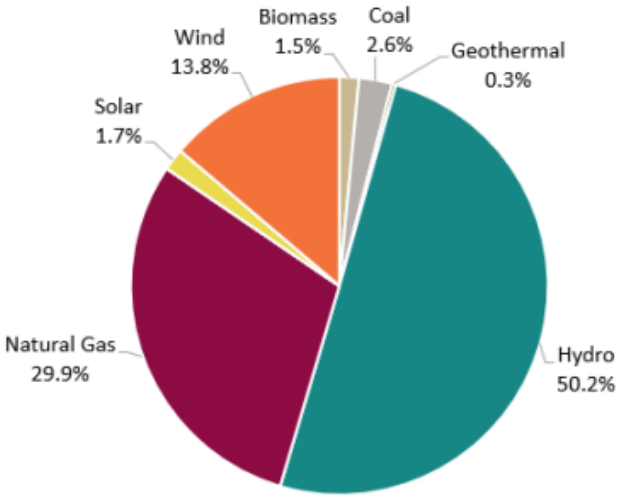


Generation

Oregon generates electricity from a variety of resources — hydropower, natural gas, and wind are the largest. Oregon is the second largest producer of hydroelectric[ii] power in the U.S. after Washington.[5] In 2020, half of Oregon's electricity generation came from Oregon's 105[6] hydroelectric facilities.[7] The state's four largest electricity generating facilities are federally owned and operated dams on the Columbia River. The combined capacity these four dams represent is double that of the remaining six largest power plants in the state.[5] A detailed table of all commercial electricity generating facilities in the state is provided in Appendix D.

Oregon's abundance of renewable electricity is used in the state and exported. In 2020, 34 percent of Oregon's hydropower and 57 percent of its wind generation were exported.[8] Sixty-eight percent of electricity generated in Oregon in 2020 came from renewable resources.[7] Hydroelectric, wind and solar generation varies diurnally (over the course of a day) and seasonally.

Figure 14: 2020 Electricity Generated



63.6 Million

Megawatt hours of electricity generated in Oregon in 2020.[1]

53.8 Million

Megawatt hours of electricity consumed in Oregon in 2020.[5]

68%

Percentage of Oregon's electricity generation that comes from renewable resources.[5]

62%

Percentage of Oregon's electricity generation that is used in-state.[5]

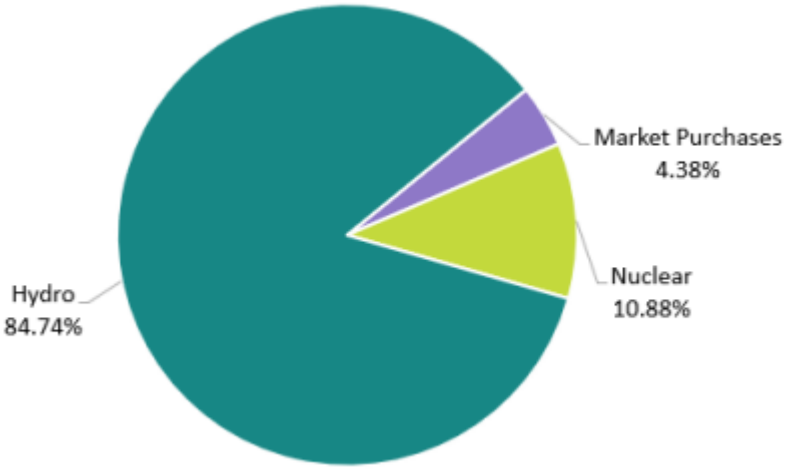
Natural gas represented 30 percent of Oregon's 2020 electric generation. A little less than 3 percent[7] of electricity came from the Boardman coal plant, which shut down in October 2020 and was demolished in 2022.[7] Oregon natural gas facilities import all but a very small fraction of the natural gas they use. Oregon has a single site in the northwestern region (Mist) that produces some natural gas but is used primarily for gas storage. Additionally, several large landfills have landfill gas collection systems and have the ability to generate electricity. Oregon has no coal or petroleum resource extraction facilities.

[ii] "Oregon's four largest electricity generating facilities by capacity—John Day, The Dalles, Bonneville, and McNary—are on the Columbia River and are all at federally owned and operated dams." U.S. Energy Information Administration - EIA - Independent Statistics and Analysis

Bonneville Power Administration and Market Purchases

Consumer-owned utilities in Oregon purchase most of their electricity from the Bonneville Power Administration, a federal agency that markets wholesale electric power from 31 federal hydroelectric facilities in the Northwest, a non-federal nuclear power plant, and several other small non-federal power plants. The dams generating the hydroelectric power are operated by the U.S. Army Corps of

Figure 15: 2020 Bonneville Power Administration Resource Mix



Engineers and the Bureau of Reclamation, while the nuclear facility is operated by Energy Northwest. BPA provides about 28 percent of the electricity used in the Northwest.[9] Other generation facilities in the state sell electricity to Oregon utilities and the regional power market. While many Oregon electric utilities own facilities that generate power, they also purchase power from the regional market to meet customer demand.

Figure 16: BPA Transmission System and Federal Dams

BPA owns and operates 15,239 circuit miles of transmission lines across a six-state region that forms the backbone for delivering power from 31 federal hydroelectric dams in the Northwest. Both the Federal Columbia River Power System and Transmission System require regular and strategic investment to ensure a cost-effective level of reliability.

Key Balancing Authority

A balancing authority ensures, in real time, that power system demand and supply are finely balanced. This balance is needed to maintain the safe and reliable operation of the power system. If demand and supply fall out of balance, local or even wide-area blackouts can result.

The bulk electric grid and wholesale power market in Oregon is managed by the Western Interconnection. The Western Interconnection serves a population of over 80 million people across 1.8 million square miles in all or part of 14 states, the Canadian provinces of British Columbia, and Alberta, and the northern part of Baja California in Mexico.

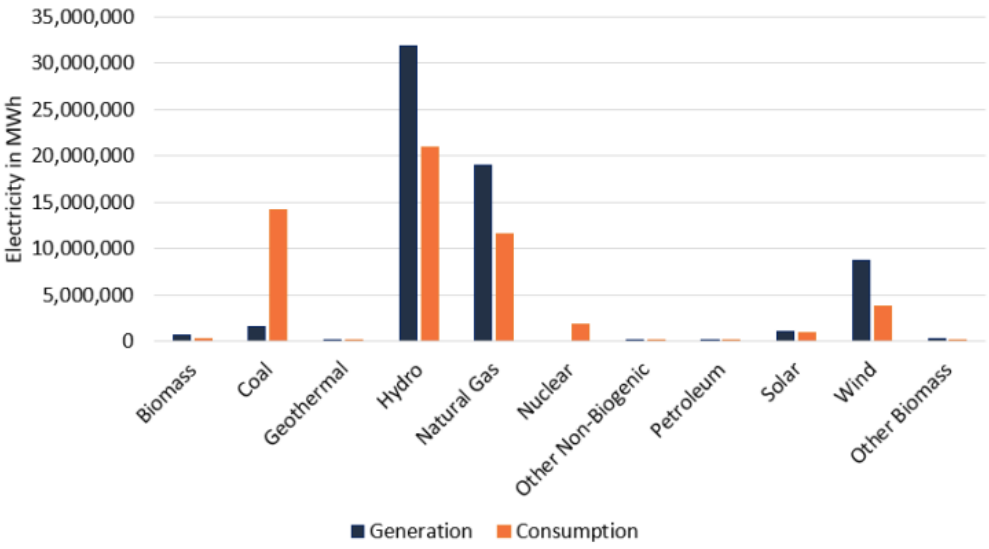
The Western Interconnection is made up of about 136,000 miles of transmission lines. Two features distinguish the flow of electricity in the West from that in the East:

- Long, high-voltage lines were built to connect remote generating resources with distant population centers, primarily along the West Coast.
- Other lines carry power from hydroelectric resources in the Pacific Northwest to California and other states. These resources have the greatest capacity during the spring and summer, when demand in the Northwest is relatively low. This allows distribution of hydroelectric power that would otherwise be considered excess.

Because of these unique supply and demand patterns, utilities in the West rely more heavily on electricity transported over long distances than utilities in the East. Electricity generally flows south and west in a “doughnut” pattern, rather than the typical spiderweb pattern of the East.

Figure 17: Map of Western Interconnection

Figure 18: 2020 Oregon's Electricity Generation and Consumption



Source: 2022 Biennial Energy Report

Oregon 2020 Exports

57% of wind generation

34.4% of hydropower

16.7% of solar generation

Oregon 2020 Imports

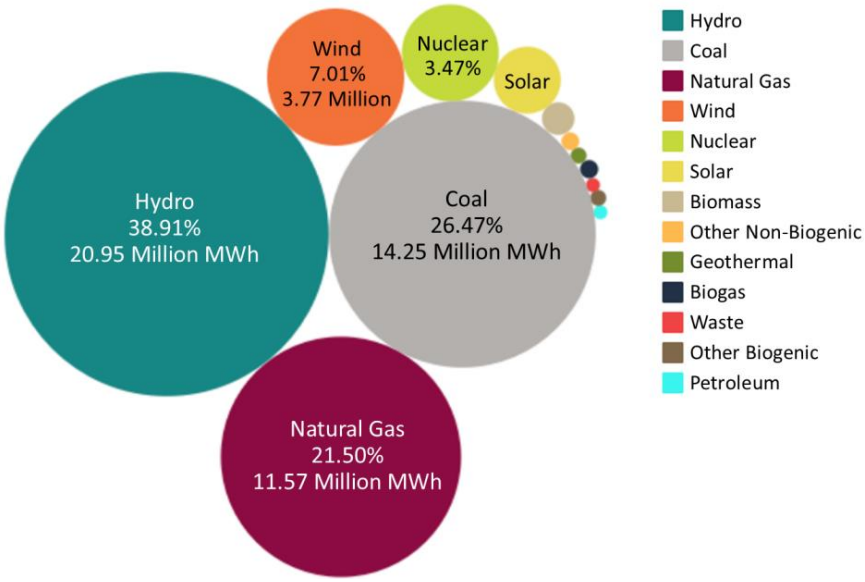
88.6% of coal based electricity

100% of nuclear electricity

Consumption

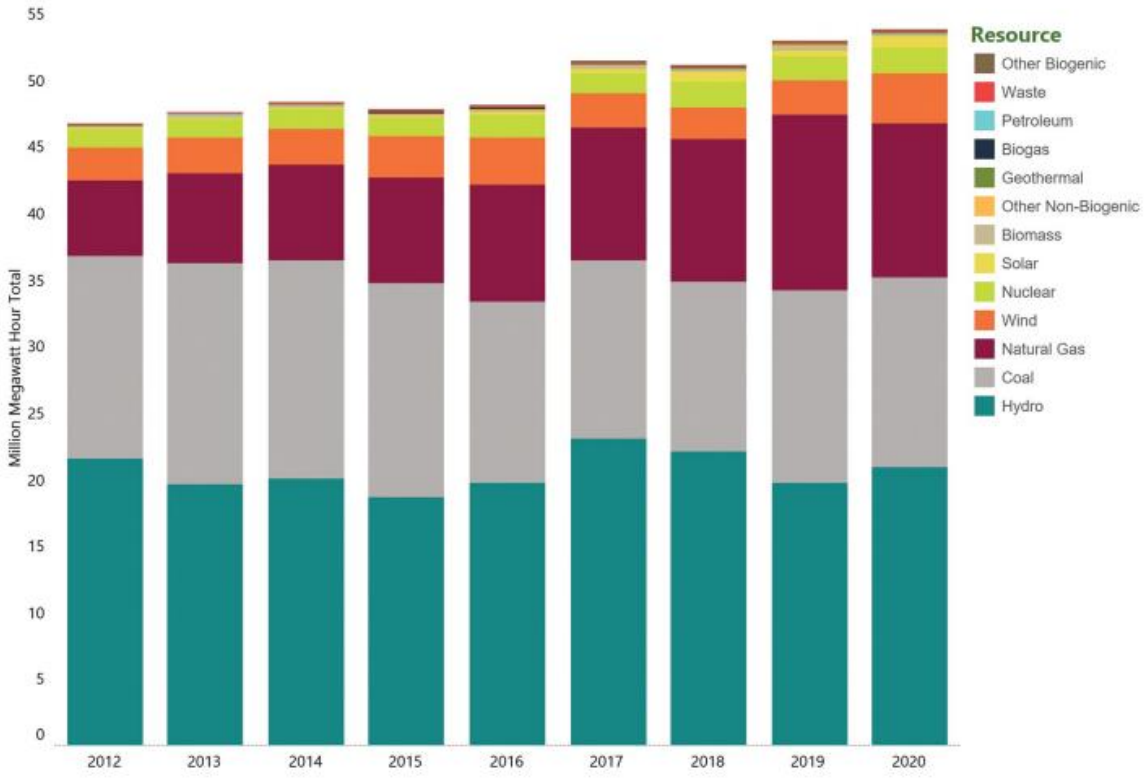
In 2020, Oregon used 53.7 million megawatt hours (MWh) of electricity from both in-state and out-of-state sources. Hydropower, coal, and natural gas make up the bulk of the electricity Oregonians use, commonly called the resource mix, although the share of each resource is constantly changing and evolving. Renewable energy makes up an increasingly larger share of the mix each year. In 2021, the Oregon Legislature passed House Bill 2021, requiring Oregon's largest electric utilities, Portland General Electric and Pacific Power, to reduce greenhouse gas emissions to 80 percent below baseline emissions levels by 2030, 90 percent below by 2035, and 100 percent by 2040. The five largest sources used to generate electricity used by Oregonians are labeled below; the resources from solar and smaller represented in the bubble chart are each under 2 percent.[9]

Figure 19: Oregon Electricity Use - Resource Mix



Oregon's electricity resource mix displays the proportion that each resource (solar, wind, hydropower, etc.) contributes to the total amount of electricity that Oregonians consume each year. The chart below presents Oregon's mix from 2012 to 2020 and shows two notable trends: First, total annual electricity consumption has increased from 47 to 53 million MWh between 2012 to 2020, driven by factors like economic and population growth and increased customer demand. Second, the percentage that each resource contributes to total electricity for Oregon consumption changes year-to-year. For example, between 2012 and 2020, coal's share of electricity consumed in Oregon steadily declined from 32 to 26 percent, while the share of natural gas increased from 12 to 21.5 percent. In the same period, hydropower's share went up and down according to annual precipitation patterns, with a high of 46 percent in 2012 and a low of 37 percent in 2019.

Figure 20: Oregon's Electricity Mix Over Time



Fluctuations in the sources of electricity consumed in Oregon are the result of several factors, including the regional nature of energy markets, resource availability, market dynamics and utility contracts, public policy, and other factors.[9]

Electric Utilities

Electric utilities are privately owned electric companies or consumer-owned utilities that distribute electricity to retail electricity consumers in Oregon. Oregon utilities generate their own electricity, purchase power from wholesale providers like BPA, or enter into contracts to buy electricity from third-party owned power plants and the market.

Three investor-owned electric utilities operate in Oregon, providing service to approximately 74 percent of the customers in the state.

OREGON HAS 41 ELECTRIC UTILITIES

- 3 Investor owned
- 20 Cooperative
- 12 Municipal
- 6 PUDs

The average annual kilowatt hour (kWh) consumption of residential customers for Oregon operations of investor-owned electric utilities is as follows:

Table 9: Investor-Owned Electric Utilities

Year	2017	2018	2019	2020	2021
Average annual residential consumption (kWh)	10,848	10,151	10,205	10,304	10,554

Source: Oregon Public Utility Commission 2021 Oregon Utility **Statistics** Book

Table 10: Electric Suppliers Serving Customers in Oregon in 2019

Type of Electricity Supplier	Number	Number MWh Sales in Oregon (%)	Customers in Oregon (%)
Investor-Owned	3	60.4	74.2
Independent Power Producers	6	4.9	<0.1
Cooperative	19	16.8	10.4
Municipal-Owned	12	8.9	9.6
People's Utility District	6	9.0	5.8

Source: Oregon Public Utility Commission 2021 Oregon Utility **Statistics** Book

A description of the utilities that are included in this table is listed below. The number of customers served and the amount of electricity consumed varies widely by provider.

Table 11: Major Electric Utilities

Utility Name	Ownership Type	Total Customer	% of State's Customers	Total Sales (MWh)	% of State's Sales
Portland General Electric Co	Investor Owned	911,625	46%	18,296,054	35%
PacifiCorp	Investor Owned	610,313	30%	13,510,324	26%
City of Eugene - (OR)	Municipal	96,356	5%	2,301,228	4%
Central Lincoln People's Ut Dt	Political Subdivision	40,584	2%	1,272,593	2%
Central Electric Coop Inc - (OR)	Cooperative	36,400	2%	774,591	1%
City of Springfield - (OR)	Municipal	32,730	2%	755,471	1%
Oregon Trail El Cons Coop, Inc	Cooperative	31,505	2%	677,519	1%
Consumers Power, Inc	Cooperative	22,777	1%	411,691	1%
Emerald People's Utility Dist	Political Subdivision	22,655	1%	487,505	1%
Tillamook Peoples Utility Dist	Political Subdivision	21,833	1%	496,854	1%
Salem Electric - (OR)	Cooperative	20,631	1%	329,730	1%
Midstate Electric Coop, Inc	Cooperative	20,410	1%	436,765	1%
Idaho Power Co	Investor Owned	19,586	1%	685,578	1%
Coos-Curry Electric Coop, Inc	Cooperative	18,317	1%	341,275	1%
City of McMinnville - (OR)	Municipal	18,238	1%	704,397	1%
Columbia River Peoples Ut Dist	Political Subdivision	16,948	1%	494,257	1%
Umatilla Electric Coop Assn	Cooperative	16,029	1%	4,886,784	9%
Lane Electric Coop Inc	Cooperative	13,203	1%	243,438	0%
City of Forest Grove	Municipal	10,563	1%	263,550	1%
Northern Wasco County PUD	Political Subdivision	10,395	1%	1,110,694	2%
Clatskanie Peoples Util Dist	Political Subdivision	4,295	0%	953,929	2%
Tesla Inc.	Behind the Meter	3,707	0%	28,769	0%
Surprise Valley Electrification	Cooperative	1,860	0%	40,078	0%
Constellation NewEnergy, Inc	Retail Power Marketer	136	0%	335,500	1%
Columbia Rural Elec Assn, Inc	Cooperative	130	0%	6,650	0%
Sunrun Inc.	Behind the Meter	89	0%	440	0%
Calpine Energy Solutions, LLC	Retail Power Marketer	36	0%	1,608,725	3%
Longroad Energy	Behind the Meter	24	0%	1,430	0%
Shell Energy North America (US), L	Retail Power Marketer	9	0%	440,122	1%
TerraForm US Energy Services, LLC	Behind the Meter	3	0%	737	0%
Avangrid Renewables		2	0%	394,271	1%
Bonneville Power Administration	Federal	1	0%	5,624	0%
Total		**2,001,390**		**52,296,573**	

Source: Oregon Public Utility Commission

The following figures illustrate that the geographic extent of utility service areas is highly variable across the state. This results in an extensive network of high voltage power lines to distribute electricity from the point of generation to areas with lower population density.

Figure 21: Oregon Utility Territories

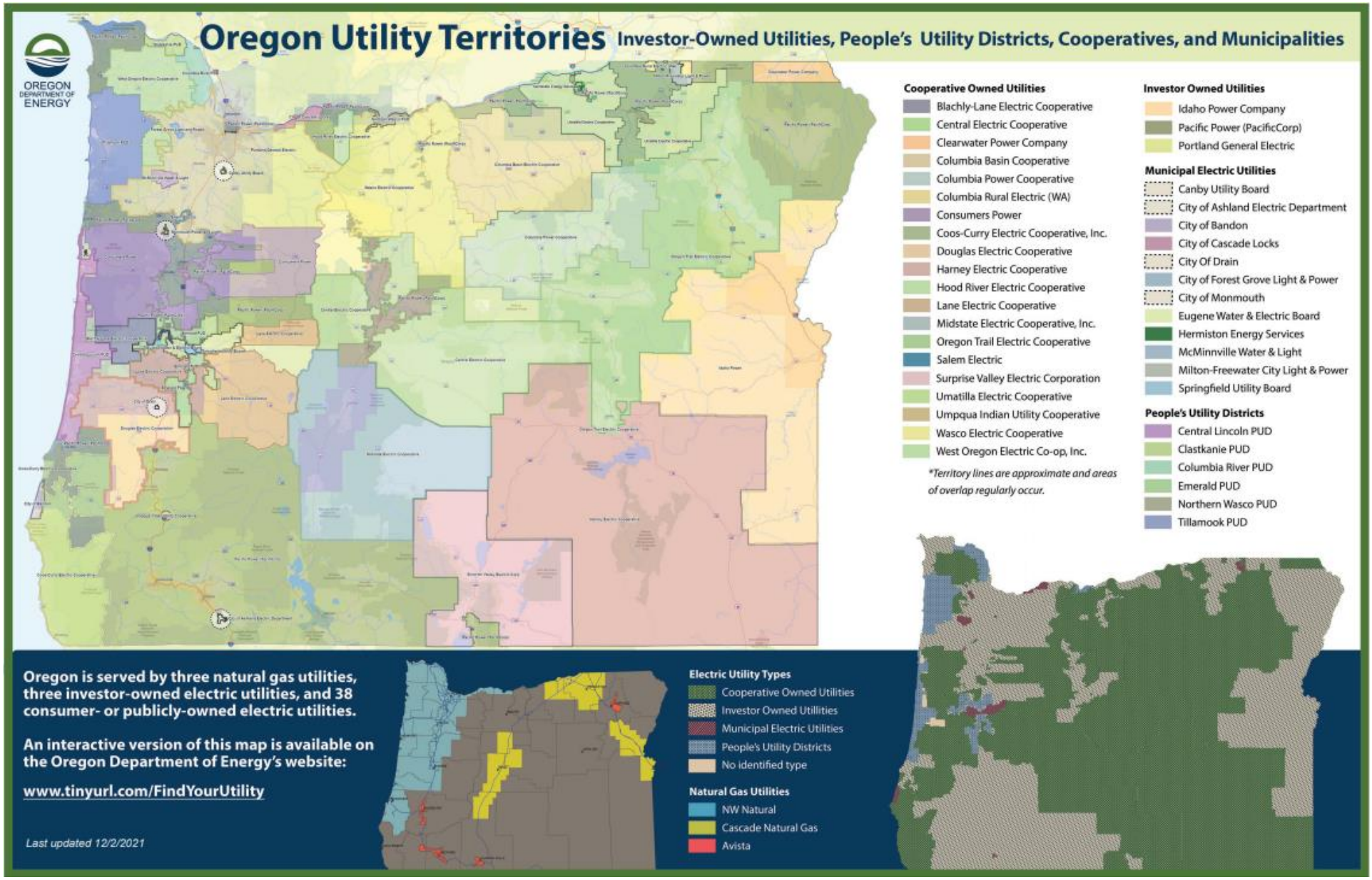
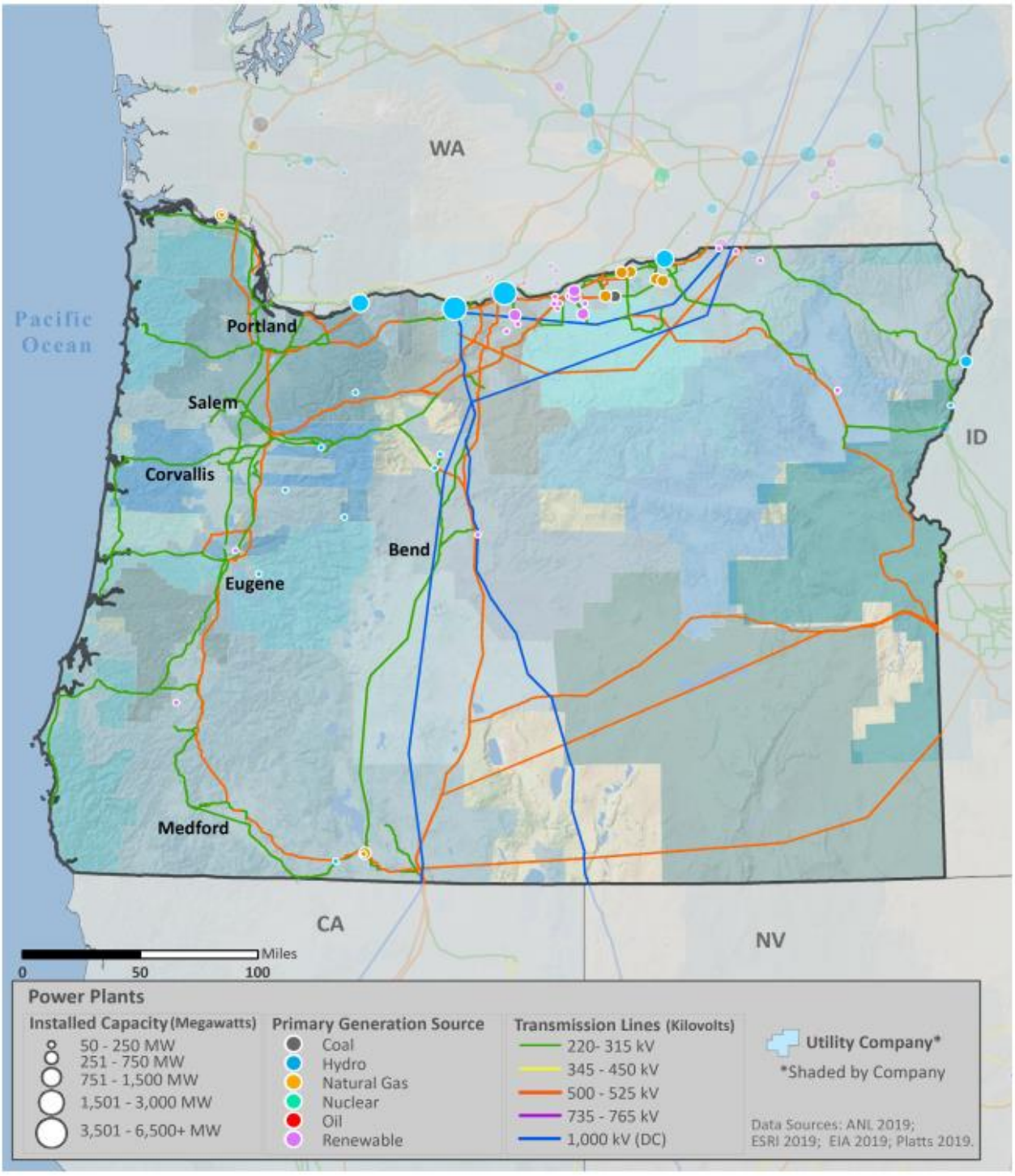


Figure 22: Map of Electric Power Plants and Transmission Lines in Oregon

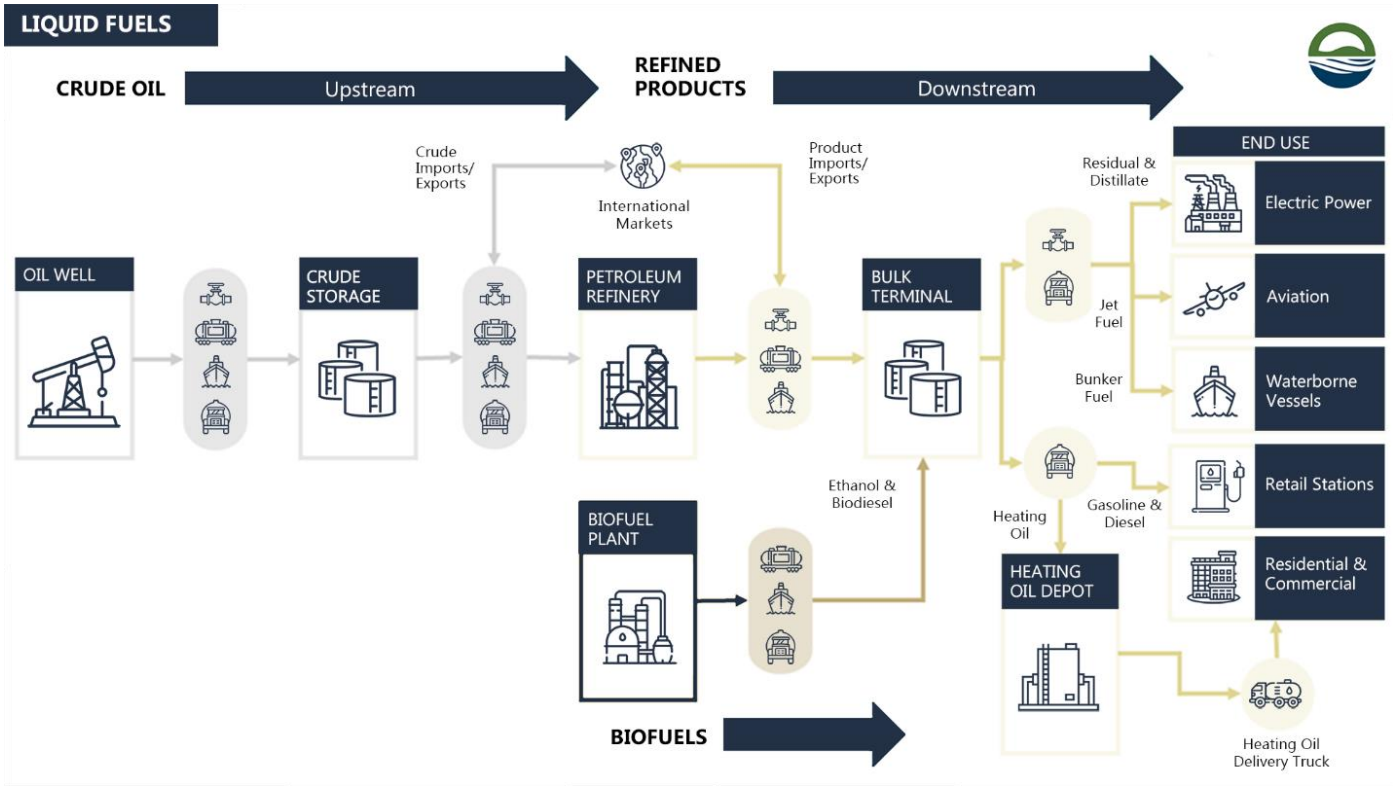


Source: Oregon Risk Profile

Liquid Fuels Sector

Liquid fuels are either sourced from renewable stock or from refined oil. Oil is drilled from wells in the field and transported by pipeline, rail, or barge for processing at refineries. At the refineries, crude oil is processed into gasoline, diesel, jet fuel, propane, and other petroleum products. From refineries, gasoline, diesel, and other refined products are again transported by pipeline, rail, or barge to distribution terminals where ethanol is blended into gasoline. The finished product is loaded into trucks for delivery or transported by pipeline to the end user or retail station. For the purposes of this section, liquid volumes will be discussed in the unit of barrels (bbl), which is 42 gallons or approximately 159 liters.

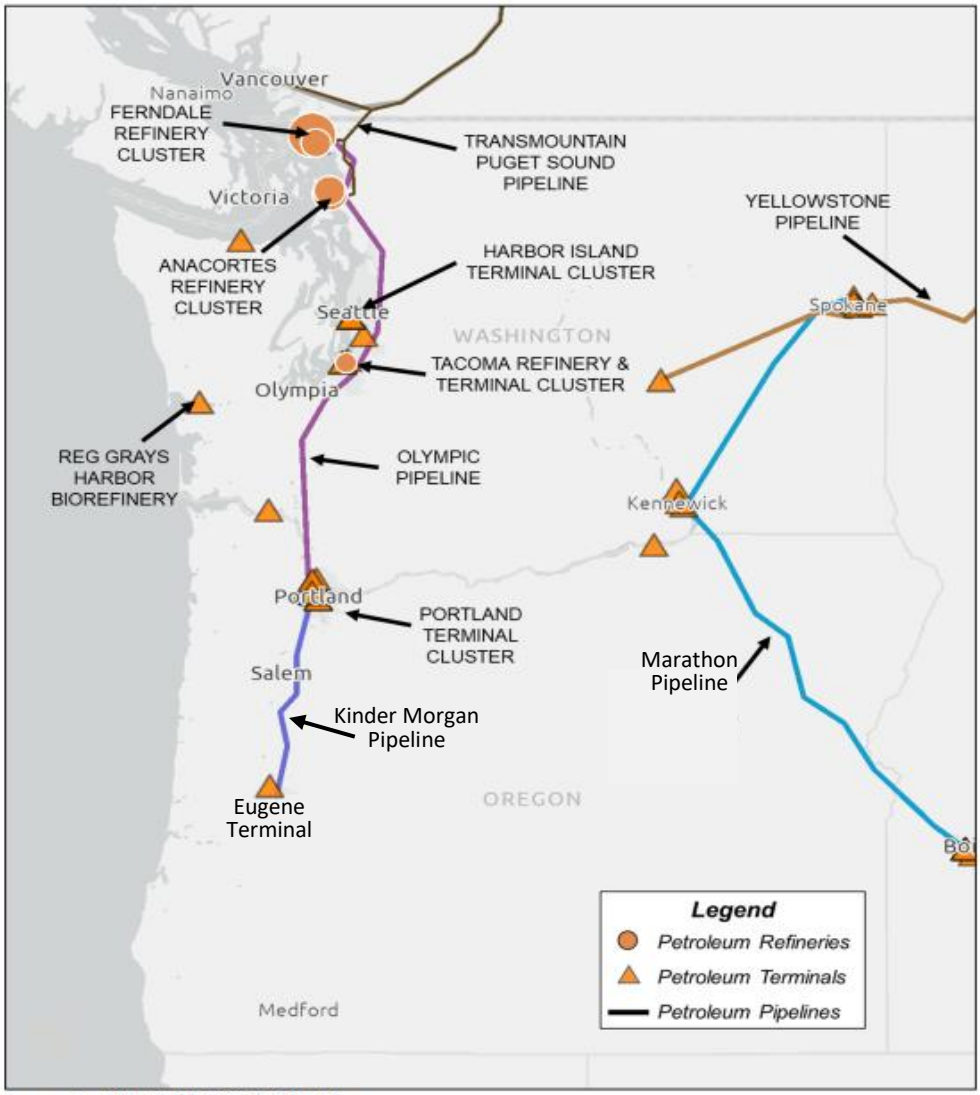
Figure 23: Liquid Fuels Supply Chain



Pacific Northwest Liquid Fuels Infrastructure

Unlike most other Western states, Oregon has neither crude oil resources nor refineries. Oregon imports 100 percent of the refined liquid fuels product used in the state. Oregon, along with Alaska, Arizona, California, Hawaii, Nevada, Washington, and Western Canada form a nearly self-contained system of petroleum production and consumption. The American states are referred to by the federal government as Petroleum Administration for Defense District Five (PADD V). Although the system is stable, a major disruption in any part of the supply and distribution chain could create a severe and prolonged petroleum shortage. The map below illustrates the Pacific Northwest Critical Petroleum Infrastructure.

Figure 24: Map of Pacific Northwest Critical Petroleum Infrastructure[10]



Source: ArcGIS, HIFLD, EIA, DOE Notations

Crude Supply and Refineries

Oregon relies on refined liquid fuels from refineries in Washington state. Washington is a major oil refining center with the fifth-largest crude oil refining capacity in the nation. Washington's refineries receive crude oil supplies by pipeline, marine vessel, and rail. The state's five refineries process domestic and foreign crude oils, primarily from Canada, North Dakota, and Alaska. Overall, the refinery cluster receives 49 percent of its crude supply from foreign imports (mostly from Canada), 30 percent from Alaska, and the balance from the Bakken oil field in North Dakota.[10]

The table below gives a high-level overview of the five Washington State refineries. The refineries are divided into clusters based on location:

- Ferndale Cluster – BP Cherry Point and Phillips 66 refineries
- Anacortes Cluster – HF-Sinclair Puget Sound and Marathon-Tesoro refineries
- Tacoma Refinery – Par Pacific Refinery

A more in-depth discussion of the Ferndale and Anacortes refinery clusters follows the table.

Table 12: Washington Refining Capacity and Markets Served[10]

Inbound Crude	Refineries	Refining Capacity (bbl/day)	Refined Product Distribution	Markets Served
• Canadian Crude via Trans Mountain Puget Sound Pipeline • Alaskan and Foreign Crude by Barge • North Dakota Bakken Crude by rail	**Ferndale Cluster**			
	BP Cherry Point, Ferndale	238,500	Olympic Pipeline Tanker Trucks Barges	Pacific Northwest
	Phillips 66, Ferndale	105,000		
	Anacortes Cluster			
	Sinclair Puget Sound, Anacortes *(formerly Shell)*	145,000	Olympic Pipeline Tanker Trucks Barges	Pacific Northwest
	Tesoro, Anacortes *(formerly Marathon)*	119,000		
	Tacoma Refinery			
	Par Pacific, Tacoma (U.S. Oil)	40,700	Pipeline	McChord Air Force Base
			Tanker Trucks	Local Retail Stations
			Barges	Domestic - Foreign

Ferndale Refinery Cluster – The BP Cherry Point Refinery and the Phillips 66 Ferndale Refinery are located within close proximity from the Ferndale Refinery Cluster in Whatcom County, approximately 100 miles north of Seattle. Most of Ferndale's refined products are distributed by the Olympic Pipeline, tanker truck, and barge to markets in the Pacific Northwest. BP Cherry Point Refinery is the largest supplier of jet fuel to the Seattle, Portland, and Vancouver airports. The source and capacity of crude supplies for this cluster is presented below.

Table 13: Ferndale Refinery Cluster – 2021 Crude Supply by Refinery (bbl/day)[10]

Ferndale Refinery Cluster	BP Cherry Point	Phillips 66	Total
Estimated Crude Runs *	215,000	95,000	310,000
Waterborne Alaska Receipts	85,000		85,000
Waterborne Foreign Imports	27,000	9,000	36,000
Trans Mountain Pipeline	49,000	48,000	97,000***
Rail from North Dakota**	83,000		83,000
Rail from Canada	13,000		13,000

Source: EIA, 2021 Company Level Imports; 2021 U.S. Army Corps of Engineers
* Estimated runs based on 90% operating capacity
** Balance of crude runs minus imports and Alaska receipts
***Total may include up to 5,000 bbl/day of Canadian oil shipped by marine vessel from western Canadian ports

The Ferndale Refinery Cluster has a combined crude oil refining capacity of around 332,000 bbl/day, or approximately 52 percent of the Pacific Northwest refining capacity, and nearly 13 percent of the total refining capacity in the West Coast PADD 5 region.[10]

Anacortes Refinery Cluster[10] – The HF-Sinclair Puget Sound Refinery and Marathon Tesoro Refinery from the Anacortes Refinery Cluster in Skagit County, WA, approximately 70 miles north of Seattle. Anacortes refineries have access to deepwater docks and the Trans Mountain Puget Sound Pipeline. Marathon Tesoro also has a rail crude oil unloading facility. Most of Anacortes' refined products are distributed by Olympic Pipeline, tanker truck, and barge to markets in the Pacific Northwest. The source and capacity of crude supplies for this cluster is presented below.

Table 14: Anacortes Refinery Cluster – 2021 Crude Supply by Refinery (bbl/day)[10]

Anacortes Refinery Cluster	HF Sinclair	Marathon	Total
Estimated Crude Runs*	130,000	107,000	237,000
Waterborne Alaska Receipts	72,000		72,000
Waterborne Foreign Imports	30,000		30,000
Trans Mountain Pipeline	49,000	48,000	97,000
Rail from North Dakota**			38,000

Source: EIA, 2021 Company Level Imports; 2021 U.S. Army Corps of Engineers
* Estimated runs based on 90% operating capacity
** Balance of crude runs minus imports and Alaska receipts

The Anacortes refinery cluster has a combined crude capacity of around 265,000 bbl/day, or approximately 41 percent of the Pacific Northwest refining capacity.[10]

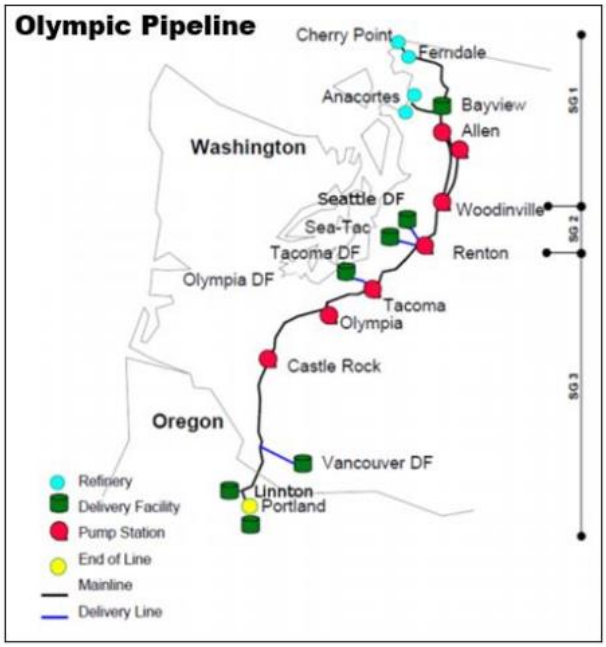
Tacoma Refinery - The fifth refinery, Par Pacific Refinery in Tacoma, Washington (U. S. Oil) has a crude distillation capacity of 40,700 bbl/day and a total storage capacity of 3.0 million barrels. U.S. Oil produces petroleum products such as gasoline and diesel for local markets in Washington.[10]

Pipeline and Marine Distribution

The vast majority of liquid fuels in the Pacific Northwest are transported via major pipelines. Transporting liquid fuels by pipeline allows for high volume continuous deliveries to markets in Washington and Oregon. The Olympic Pipeline is the backbone of the region's liquid fuels supply chain.

The **Olympic Pipeline**, owned by a consortium of companies and investment firms including BP America, is the primary transportation system delivering petroleum fuels to distribution terminals in the Pacific Northwest west of the Cascades. Olympic is a 400-mile interstate pipeline system that transports gasoline, diesel, and jet fuel from the Cherry Point and Anacortes refinery clusters in northwest Washington state to delivery points in western Washington and Oregon, including the Seattle and Portland metropolitan areas.

Figure 25: Olympic Pipeline Map[10]



The total capacity of Olympic Pipeline is approximately 325,000 bbl/day, and in 2022, the system transported approximately 280,000 bbl/day of petroleum products. Approximately 159,000 bbl/day of those products were delivered to terminals in Washington State and 120,000 bbl/d delivered to terminals in Oregon.[10] It is estimated that Olympic transports approximately 66 percent and 81 percent of the petroleum fuels consumed in

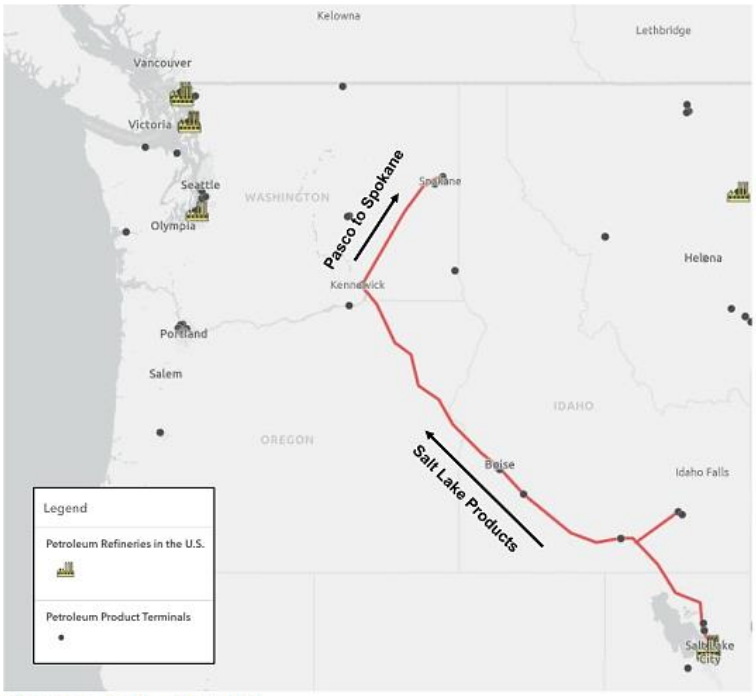
Washington state and Oregon. Olympic Pipeline's supply of transportation fuels is critical to the Pacific Northwest region and even a short-duration outage would likely cause supply shortages.

Kinder Morgan Pipeline, owned and operated by Kinder Morgan Inc, starts where the Olympic Pipeline ends at the Port of Portland. The Kinder Morgan Pipeline connects eight liquid fuels terminals that form the Portland petroleum terminal cluster supplying most Oregon's liquid fuels needs. More information about the Portland petroleum terminal cluster is provided below. From the Kinder Morgan Terminal in Portland, the pipeline supplies refined product both to Eugene, the only other petroleum terminal in the state, and to the Portland International Airport (PDX).

From the Kinder Morgan Terminal in Portland, the pipeline travels 115 miles delivering 2,000 bbl/hour of diesel and gasoline continuously to the Kinder Morgan Terminal in Eugene, Oregon. The Kinder Morgan Pipeline also travels 8.5 miles delivering 17,000 bbl of jet fuel to PDX as needed by the airport.

Marathon Northwest Products Pipeline System (MNPPS), owned and operated by MNPPS, is a 760-mile refined products system that extends from refineries and connected pipelines in Salt Lake City, Utah to distribution terminals in Utah, Idaho, and eastern Washington, including Pasco, Spokane, and Fairchild Air Force Base.

Figure 26: Marathon Pipeline Map[10]



Source: EIA, ArcGIS

MNPPS receives products from five refineries in Salt Lake City. The pipeline can also receive shipments from interconnecting carriers in Salt Lake City. In 2022, the pipeline system received 77,000 bbl/day from Salt Lake City refineries and an additional 6,500 bbl/day from the interconnected pipeline systems in the Salt Lake area, for a total system throughput of 83,500 bbl/day of gasoline, jet fuel, and distillate.[10] MNPPS' Salt Lake Products System extends from Salt Lake City to delivery points in Utah and Idaho. The system passes through Oregon from Idaho as two 6-inch lines terminating at the Tesoro Logistics terminal in Pasco, Washington, which is approximately 30 miles north of the Oregon border. In 2021, the pipeline system received 12,000 bbl/day of petroleum products via barge at the terminal in Pasco, but no such shipments were registered in 2022.[10] From Pasco, fuels are transported south to eastern Oregon via trucks.

In summary, Oregon receives liquid fuels either directly or indirectly distributed through three main pipelines.

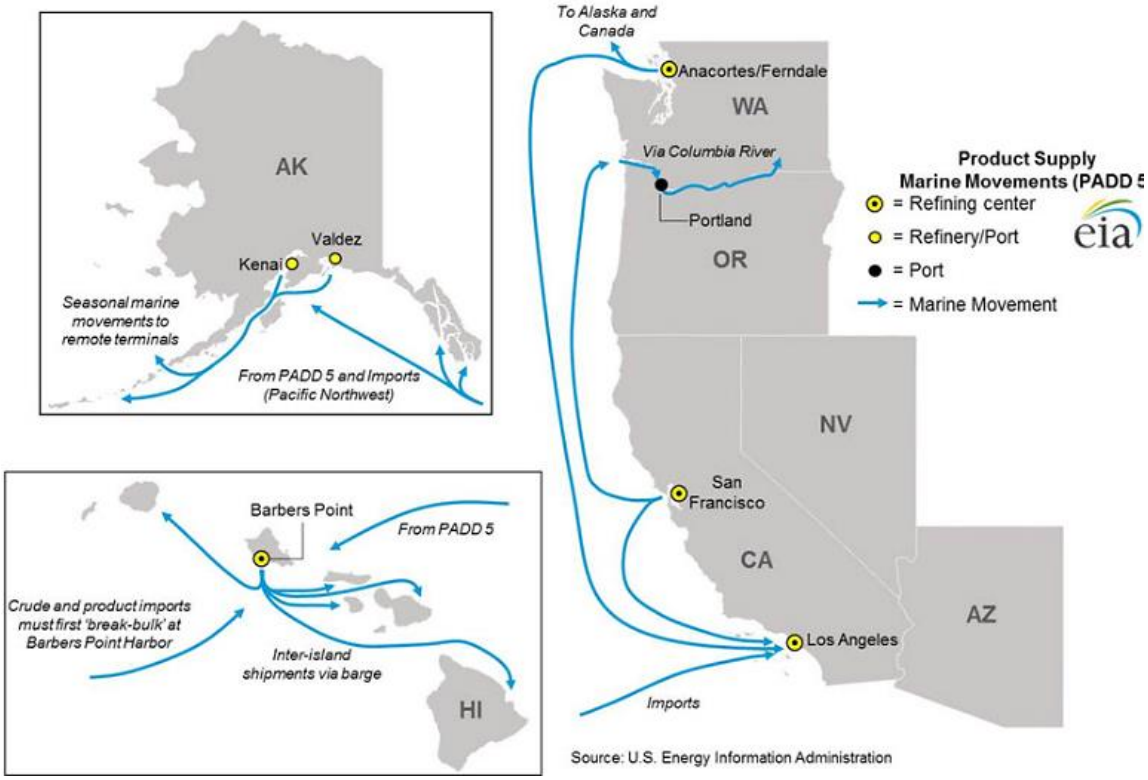
Table 15: 2022 Refined Product Pipelines Servicing Oregon[10]

Operator	Line Name	Origin-Destination	Throughput (bbl/day)
BP	Olympic Pipeline 400 Miles	Ferndale/Anacortes, WA to: • Western, WA • Oregon	280,000 total • 159,000 WA • 120,000 OR
Kinder Morgan	Line Section 14 114 Miles	Portland to Eugene Terminal	• 48,000 *
	Line Section 1880 8.5 Miles	Portland to Portland International Airport (PDX)	Upon PDX request: • 17,000 bbl*
MNPPS	Marathon Pipeline 760 Miles	Salt Lake City, UT to: • Idaho • Eastern WA - *Supply trucked to Eastern OR* • Fairchild Air Force Base	• 83,500

*Throughput provided by Kinder Morgan.

PADD 5 is not one market for transportation fuels, but rather six distinct regional markets. Because there is limited pipeline infrastructure connecting the six regional markets, marine movements within PADD 5 play a key role in moving transportation fuels from regions with excess supply to regions with supply shortfalls. As a result, marine vessels are generally highly utilized, and there is minimal capacity to increase intraregional shipments to manage supply disruptions.

Figure 27: PADD 5 Marine Movements



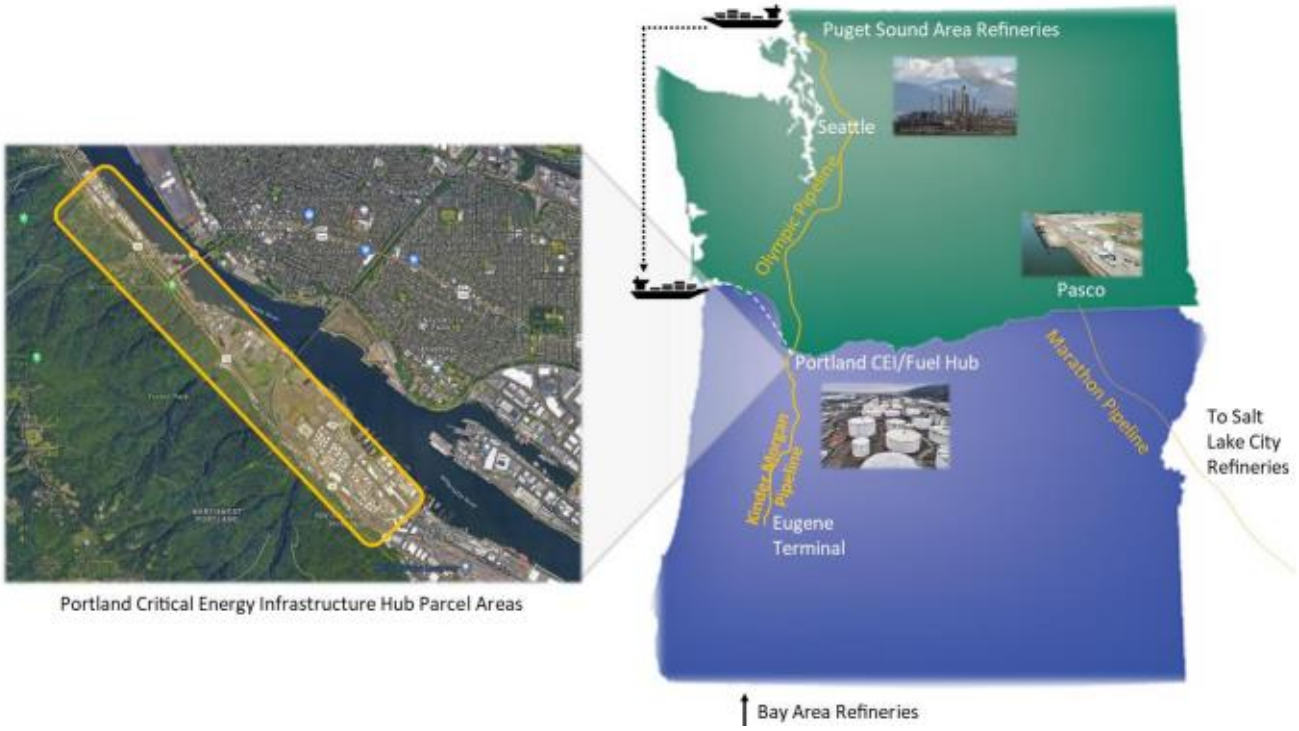
Oregon Liquid Fuel's Supply and Distribution System

More than 90 percent of transportation fuels used in Oregon are produced in refineries in Washington and delivered via the Olympic Pipeline and barge to eight Portland-area terminals. From these terminals, some of the product flows via the Kinder Morgan pipelines south to Eugene or to PDX. The Eugene distribution terminal serves southern, central, and eastern Oregon. Tank barges also carry some refined petroleum up the Columbia River to Pasco, Washington to service eastern Oregon communities. Additionally, an estimated 1,500 tanker trucks deliver fuel from the Portland-area terminals to about 2,400 fueling locations throughout the state.[11]

Less than 10 percent of the refined petroleum products used in Oregon originate from refineries in Salt Lake City and the San Francisco Bay Area.[11] From Salt Lake City, the Marathon Pipeline transports product to a distribution terminal in Pasco, Washington. From the Pasco facility, trucks deliver fuel to eastern Oregon communities.

San Francisco Bay Area refineries supply small quantities of fuel to a Chico, California terminal from which trucks deliver supply to southern Oregon communities.

Figure 28: Map of Oregon and Washington Fuel Supply and Distribution System



Portland Terminals

The Portland Terminal Cluster (PTC), located along the Columbia River in Portland, Oregon, is the primary source of petroleum product supply storage for Oregon. The cluster is comprised of eight bulk terminals with a combined storage capacity of 7.4 million barrels of liquid fuels, including gasoline, distillate, jet fuel, natural gas liquids, and ethanol. Product is primarily supplied into the cluster by the Olympic Pipeline from refineries in Washington state. From the PTC, refined product is distributed primarily by truck throughout the state, pipeline to the Eugene distribution terminal to central, southern, and eastern Oregon markets and jet fuel to PDX, and by barge to Pasco, Washington for distribution to Washington and eastern Oregon markets.

In 2021 the PTC also received just over 6,700 bbl/day of marine shipments, including 5,500 bbl/d of domestic movements, and nearly 1,200 bbl/day of international imports. Ethanol is also delivered to the terminals via tanker railcar.

Table 16: Portland Terminal Cluster Storage Capacity[10]

COMPANY	PRODUCTS	STORAGE CAPACITY (bbl)
Shell Terminal	Gasoline, Diesel, Ethanol, Biodiesel	400,000
Zenith Energy Terminals	Asphalt, Crude	1,466,000
Kinder Morgan: Linnton	Gasoline, Diesel, Jet Fuel, Additives	420,000
Willbridge	Gasoline, Diesel, Jet Fuel, Additives	1,478,000
Chevron Terminal	Gasoline, Diesel, Ethanol, Biodiesel	1,600,000
NuStar Terminal	Gasoline, Diesel, Jet Fuel, Ethanol, Biodiesel, Fuel Oils	1,191,000
Seaport Terminal	Gasoline, Diesel, Lube Oil, Additives	601,500
Phillips 66 Terminal	Gasoline, Diesel, Ethanol, Biodiesel, Lube Oil	760,000
McCall Oil Terminal	Gasoline, Diesel, Biodiesel, Asphalt, Additives	930,000
Port of Portland Total	**Service Territory:** Statewide by pipeline, truck, and barge	**8,846,500**

Table 17: Eugene Terminal Storage Capacity

COMPANY	PRODUCTS	STORAGE CAPACITY (bbl)
Kinder Morgan Terminal	Gasoline, Diesel, Additives	620,093
Eugene Total	**Service Territory:** Central, Southern, and Eastern Oregon by truck	**620,093**

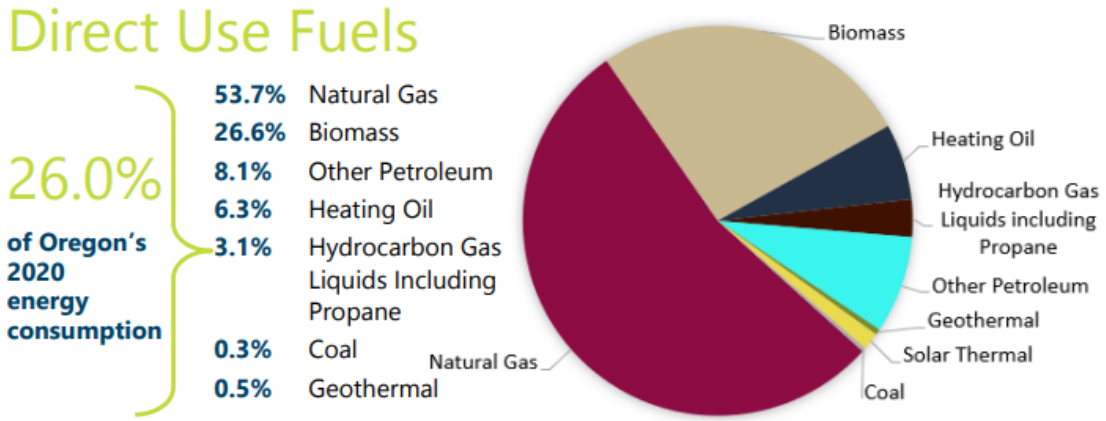
Consumption

Oregon imports all of the petroleum fuels it consumes and its lack of regional petroleum resources generally results in increased costs compared to the national average. The Pacific Northwest has no crude oil resources and is located far from North America's major petroleum production regions in Alaska, Texas, North Dakota, and Alberta, Canada. Over the last 10 years, the mix of crude resources that feeds northwest refineries has changed, resulting in changes to how Oregon's crude oil is transported.

More crude is now delivered by rail, and most crude rail shipments travel through the Columbia River Gorge and Portland before moving north to Washington refineries.

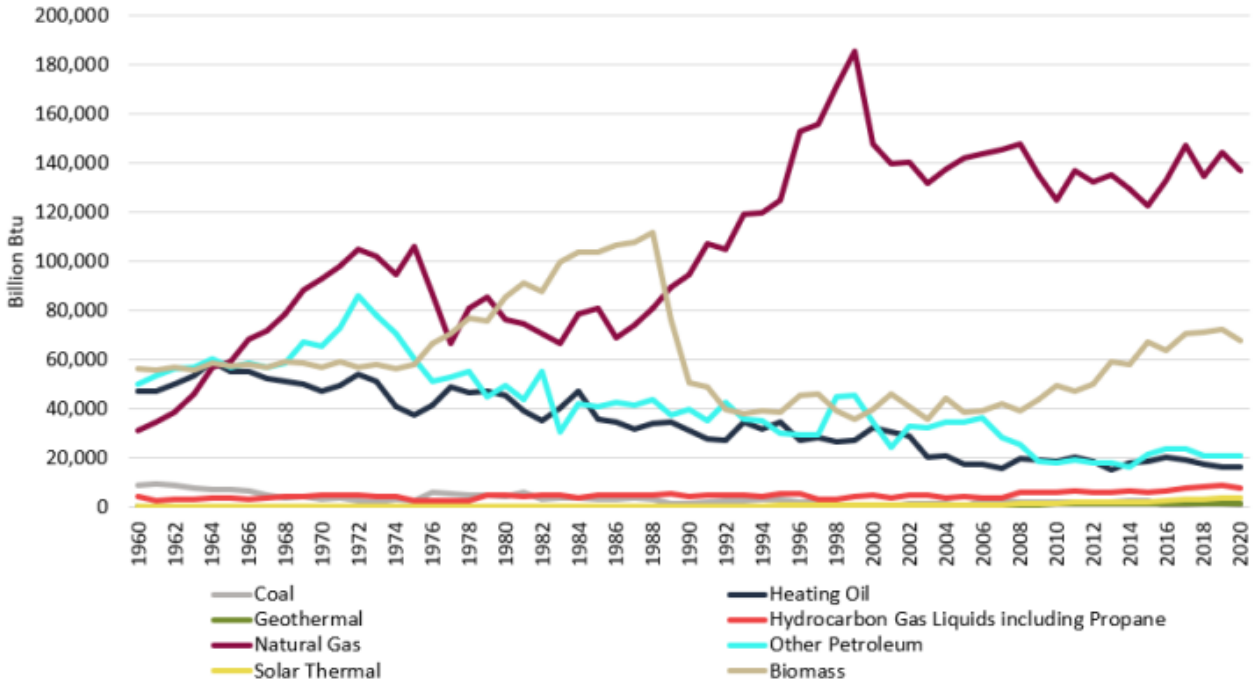
Direct Use Fuels - Direct Use Fuels include heating oil, natural gas, propane, and other fuels used to heat homes and commercial spaces, as well as other fuels used directly in manufacturing and industrial processes. They do not include fuels used to generate electricity or support the transportation sector. In 2020, Oregon used 255.7 trillion Btu of direct use fuels onsite in the residential, commercial, and industrial sectors. Direct use fuels make up about 26 percent of the total energy consumed annually in Oregon.[1] Petroleum products make up 71 percent of the fuels consumed for direct use.

Figure 29: 2020 Direct Use Fuels



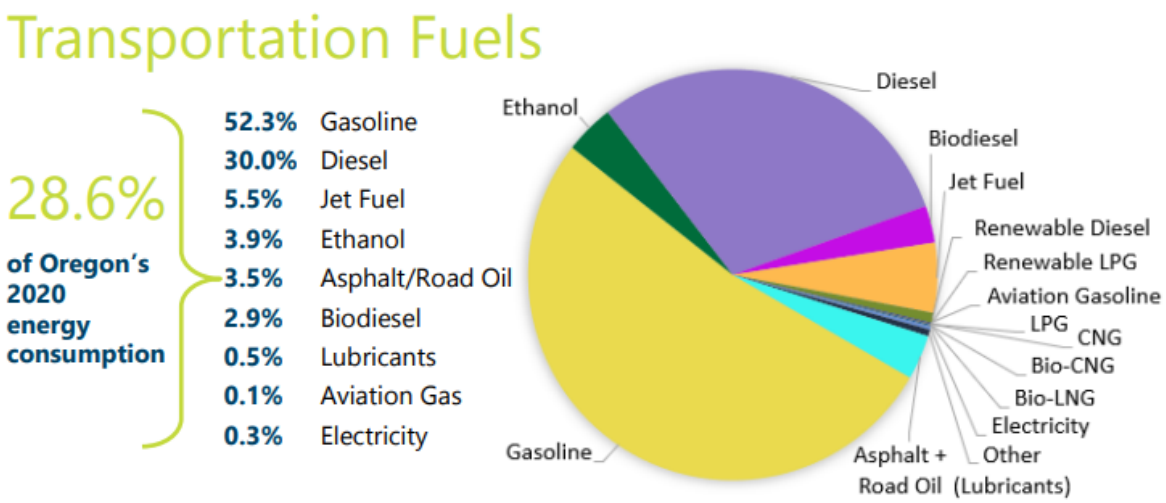
Oregon's energy consumption has evolved over time. For direct use fuels, that has meant decreasing wood and fuel oil use and an increase in natural gas. The chart below uses data from the U.S. Energy Information Administration to compare total consumption of direct use fuel types in Oregon's residential, commercial, and industrial sectors from 1960 to 2020.

Figure 30: Oregon Direct Use Fuels Consumtion Over Time



Transportation Fuels - In 2020, Oregon's transportation sector used 28.6 percent — or 281 trillion Btu — of the energy consumed in Oregon, the most of any sector.[1] The Oregon Department of Energy analyzes data from the Oregon Department of Environmental Quality's Clean Fuels Program and the Department of Transportation's fuel tax program to determine an estimate of the mix of transportation fuels consumed in Oregon illustrated in the chart below. In 2020, petroleum-based products accounted for 92 percent of fuel consumed in the transportation sector.

Figure 31: 2020 Transportation Fuel Consumption

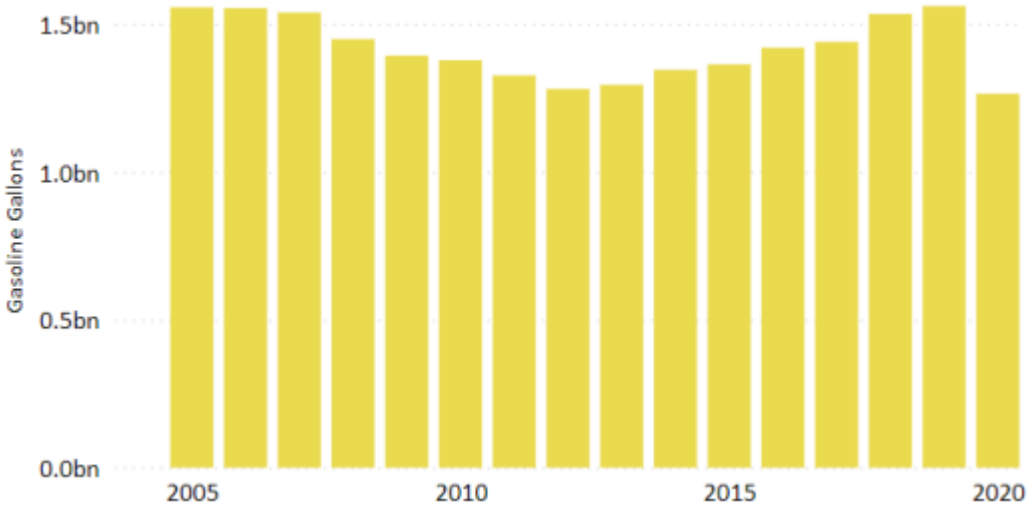


Gasoline

- **1,265,441,000 gallons (29,915,260 bbl)** — Total gasoline consumed in Oregon in 2020
- **0** — total gasoline produced in Oregon in 2020
- **1,850** — public and private fuel stations in Oregon

Gasoline is the most widely used transportation fuel in the United States and Oregon, powering cars, motorcycles, light trucks, airplanes, and boats. Gasoline accounts for 52 percent of Oregon's total transportation fuel consumption. Oregon's renewable fuel standard requires that nearly all commercially available gasoline for light-duty vehicles has a 10 percent ethanol blend, called E10. Petroleum refineries and blending facilities in Washington produce and transport 90 percent of motor gasoline for sale at retail gasoline fueling stations in Oregon.[12] In 2020, nearly 1.3 billion gallons of gasoline powered vehicles on Oregon roads, or about 296 gallons per Oregonian.[13]

Figure 32: Oregon On-Highway Gasoline Consumption by Year

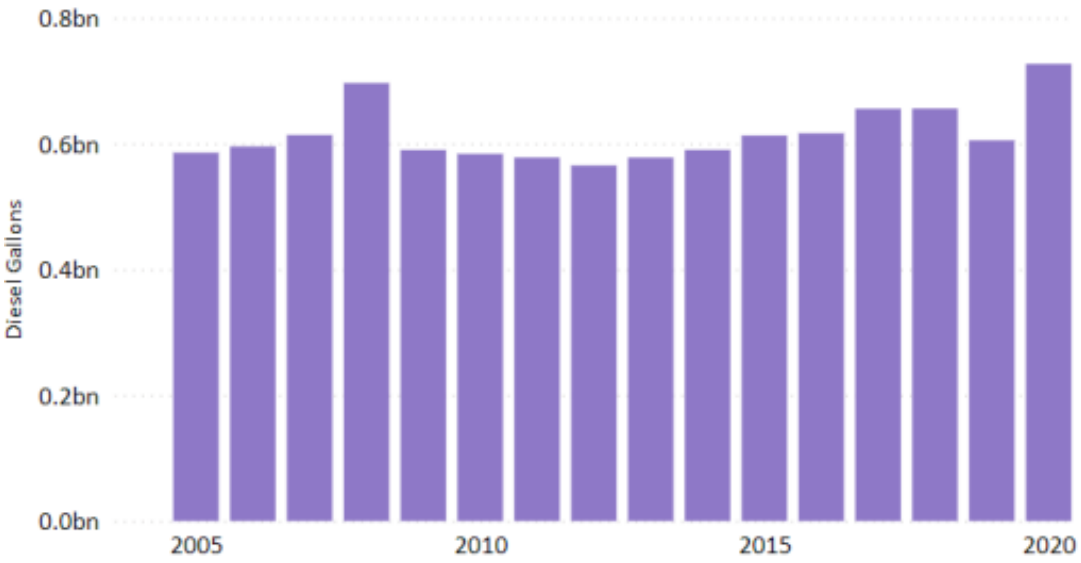


Diesel

- **661,795,000 gallons (1,757,000 bbl)** — Total Diesel consumed in Oregon in 2020
- **0** — Total Diesel produced in Oregon in 2020
- **1,350** — public and private fuel stations in Oregon

Diesel fuel is second only to gasoline in fuel consumption in Oregon.[14] It is commonly used by trucks, buses, automobiles, and locomotives, as well as farm and construction equipment.[15] While both gasoline and diesel start as crude oil, they are separated into their component parts and blended with other fuels at a refinery. Diesel is typically blended with biodiesel at 5, 20, and 99 percent amounts. In Oregon, all diesel fuel that is sold or distributed must contain at least a 5 percent blend of biodiesel or renewable diesel called B5. A 20 percent blend, called B20, is also widely available in Oregon. Additional blends of petroleum diesel, biodiesel, and renewable diesel are used to cut lifecycle greenhouse gas emissions of diesel fuel consumption and are available in some parts of the state.[16] There are no petroleum reserves or crude oil refineries in Oregon, meaning all petroleum-based fuel must be imported into the state. Over 90 percent of diesel at Oregon service stations comes from refineries in Washington state. While it typically costs more, diesel contains more energy per gallon than gasoline, so a diesel engine requires less energy to accomplish the same amount of work.

Figure 33: Oregon On-Highway Diesel Consumption by Year



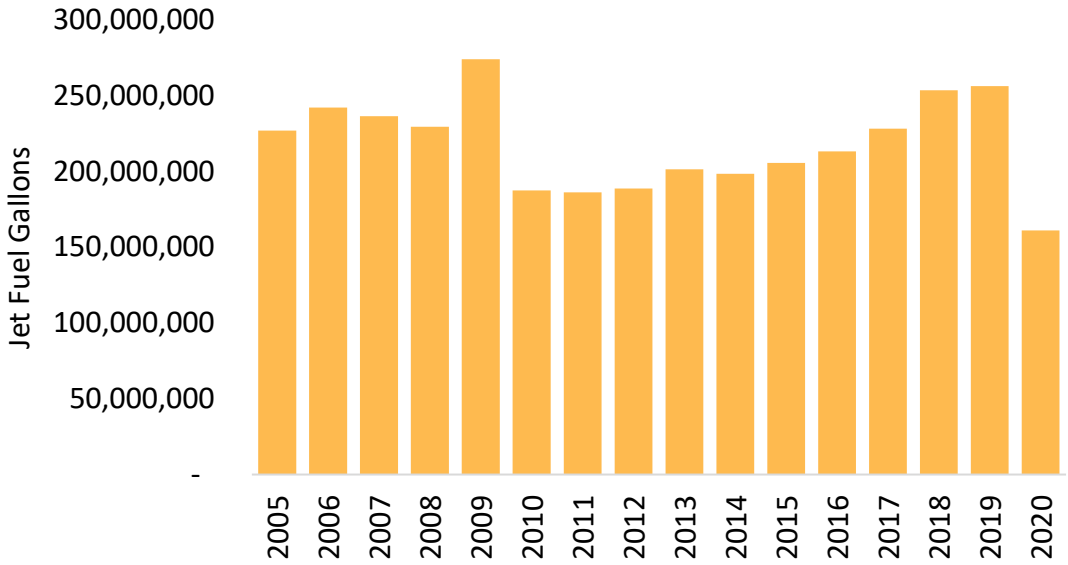
Jet Fuel

- **161,028,000 gallons (3,834,000 bbl)** — Total Jet Fuel consumed in Oregon in 2020
- **0** — Total Jet Fuel produced in Oregon in 2020
- **98** — public airports in Oregon

Jet fuel is an aviation fuel for a variety of aircraft powered by gas-turbine engines and is used in commercial and military applications in Oregon. There are many types of jet fuels. They are derived from crude oil and blended or refined with products such as naphtha, gasoline, or kerosene to meet specific military or commercial specifications. Jet fuel is delivered to and consumed by many of Oregon's

airports. As discussed above, Washington refineries supply the jet fuel used by Oregon airports. The Portland Petroleum Terminal Cluster stores most of the jet and petroleum fuels to be used by the Western portion of the state. Most fuel is distributed by truck from this major petroleum hub to airports across the state, with a pipeline providing jet fuel to PDX directly from the Portland Terminal Cluster.

Figure 34: Oregon Jet Fuel Consumption by Year



Propane

- **750,000 gallons** — total propane consumed in Oregon in 2020
- **0** — Total propane produced in Oregon in 2020

Propane is a gas at atmospheric pressure and a liquid – called liquified petroleum gas or LPG – under higher pressures or cold temperatures. Its versatility and high energy density in liquid form make it useful for many purposes, including as a feedstock for petrochemical plants, as a heating or cooking fuel, and as a transportation fuel. Propane is used in Oregon to power buses, locomotives, forklifts, taxis, farm tractors, and Zamboni machines at ice skating rinks. The Pacific Propane Gas Association estimates that more than 95 percent of the propane consumed in Oregon is sourced from natural gas processing plants in Alberta and British Columbia, Canada.[17] Propane does not degrade as quickly as gasoline and diesel when being stored, making it a good transportation fuel for vehicles that are not in regular use. Nearly all propane used in Oregon is transported to Oregon via rail.

Figure 35: Propane Supply Chain

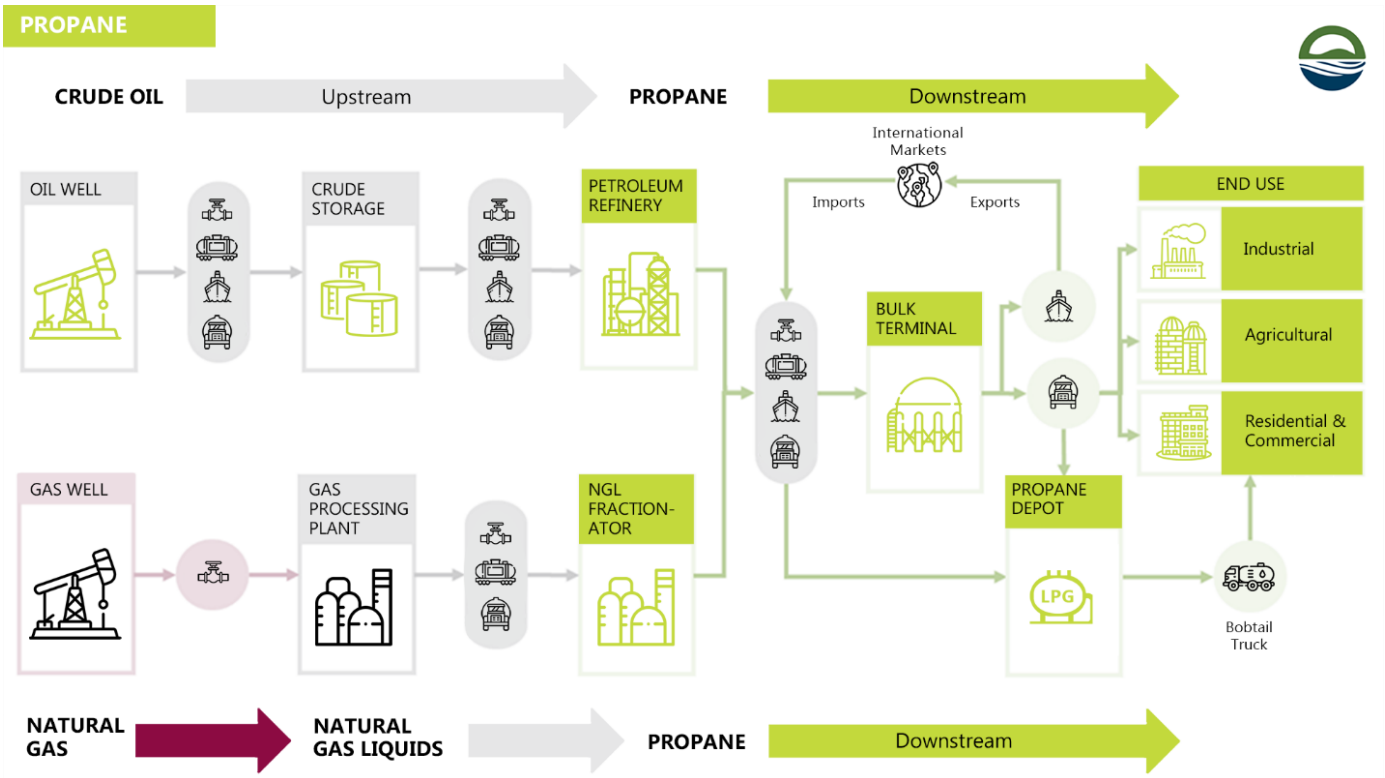
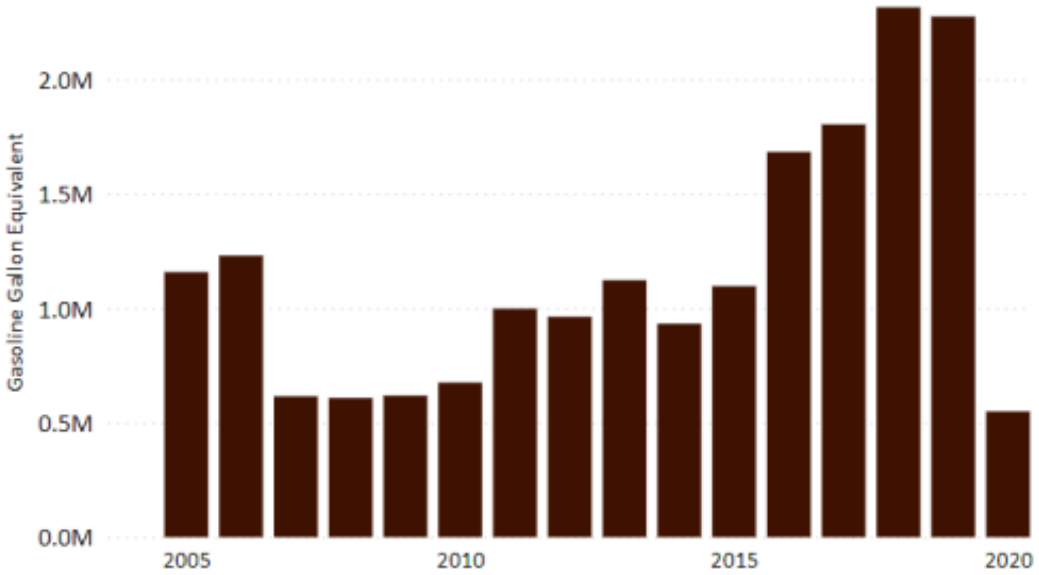


Figure 36: Oregon On-Highway Propane Consumption by Year



Petroleum Alternatives

The use of alternative fuels – including electricity, renewable diesel, propane, and biofuels – is 8 percent of all transportation fuel use in Oregon. These fuels provide Oregonians with a variety of options and an increasingly more diverse landscape of transportation fuels. Alternative fuels can and in some cases are being produced in Oregon, reducing dependence on imported fuels. Alternative fuels generally have the benefit of lower greenhouse gas emissions and lower tailpipe emissions of other air pollutants. Fuels such as ethanol and biodiesel are blended into most petroleum gasoline and diesel respectively, and are widely used in all vehicles and sectors. "Drop-in fuels" are renewable fuels that can use existing fueling infrastructure and can be added to the tank of an existing fossil fuel vehicle without needing to modify it. Renewable diesel is an example of a drop-in fuel, it can be used in existing diesel engines and transportation infrastructure but can be challenging to find enough supply to meet current demand. Some fuels, such as electricity and natural gas, require buying a new vehicle capable of using the fuel and may require new fueling infrastructure. Oregon policymakers are increasingly assessing policy options that support the production and adoption of cleaner transportation fuels to meet state greenhouse gas reduction goals, and Oregonians are seeing more fuel and vehicle options available. Renewable diesel is not produced in the Pacific Northwest at this time, but there are multiple proposed facilities that if built, would provide refining capacity for the region.

Blended Fuels

Ethanol

- **141,760,000 gallons (3,375,000 bbl)** – Total Ethanol consumed in Oregon in 2020
- **33,180,000 gallons (790,000 bbl)** – Total Ethanol produced in Oregon in 2020
- **4** – Public and private E85 fuel stations in Oregon

Ethanol is the most common gasoline substitute, with more than 98 percent of U.S. gasoline containing some amount of ethanol. It is a renewable, alcohol-based fuel, made by fermenting and distilling crops, such as corn, sugar cane, sorghum, and wheat. Ethanol oxygenates the gasoline, causing it to burn hotter and cleaner and reducing air pollution and greenhouse gas emissions.

Biodiesel

- **68,258,000 gallons (1,625,000 bbl)** – Total biodiesel consumed in Oregon in 2020
- **11,130,000 gallons (265,000 bbl)** – Total bioldiesel produced in Oregon in 2020
- **33** – Public and Private fuel stations in Oregon

Biodiesel is a fuel created from fats, oils, and greases and is currently the dominant form of biomass-based diesel. When blended with diesel fuel it can be used by standard diesel trucks, buses, trains, and boats. Oregon's Renewable Fuels Standard requires all diesel fuel sold in the state to include a 5 percent biomass-based diesel blend, known as B5.

Zero Tailpipe Emission Fuels

Electricity

- **209,535,000 kWh** – Total electricity consumed for transportaion in Oregon in 2020
- **63,624,782,000 kWh** – kWh of total electricity generated in Oregon in 2020
- **2,200** – public and private charging stations in Oregon

Electricity used as a transportation fule is growing rapidly in Oregon's passenger vehicle sector and is increasingly used for medium and heavy-duty turcks, port equipment, construction equipment, and other non-road vehicles.

Renewable Fuels

Renewable Diesel

- **17,588,000 gallons (419,000 bbl)** – Total renewable diesel consumed in Oregon in 2020
- **0** – Total renewable diesel produced in Oregon in 2020
- **40** – estimated public and private fuel stations in Oregon

Renewable Diesel is a is a low carbon intensity biofuel made from waste or renewable materials like organic oils and fats using a different production process than biodiesel to power diesel vehicles.

Renewable Natural Gas

- **~370 MMcf** – Total renewable natural gas consumed in Oregon in 2020
- **Unknown** – Total renewable natural gas produced in Oregon in 2020
- **5** – public and private fuel stations in Oregon

Renewable natural gas, or biomethane, is a fuel derived from biogas, a methane byproduct of municipal waste streams such as garbage, wastewater, and waste food or agricultural waste streams like manure. It is collected and refined to power natural gas cars and trucks. RNG enters the pipeline from the treatment system to a utility's pipeline for distribution to end users.

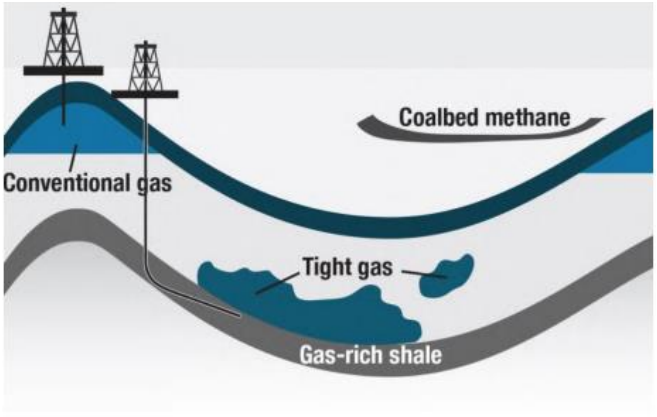
Table 18: 2020 Oregon Transportation Fuels – Quick Facts

Fuel	Total Estimated Consumption in Oregon GGE (2020)	Estimated Production in Oregon GGE (2020)	Average Carbon Intensity in gCO2e/MJ (2021)	Estimated No. Public and Private Fuel Stations in Oregon
Gasoline	1,265,440,694	0	100.14	1,849
Diesel	726,634,560	0	100.74	1,352
Compressed Natural Gas (CNG)	407,359	†	79.98	15
Liquid Natural Gas (LNG)	84,880,477	†	86.88	2
Propane	549,102	0	80.88	44
Ethanol	94,340,735	43,062,160	53.72	4
Biodiesel	70,292,133	12,878,161	41.84	33
Hydrogen	0	0	74.68 - 82.54***	0
Electricity	6,495,585	63,624,782	25.35**	2,193
Renewable Gasoline	0	0	TBD	0
Renewable Diesel	18,617,155	0	36.98	43
Renewable Natural Gas	3,205,366	†	20.55	5
Renewable Propane	530,416	0	34.66	42

Natural Gas Sector

Natural gas is a fossil fuel found in underground beds of porous rock and gathered from drilled wells through a series of collection pipes. When extracted, it is typically a mixture of hydrocarbon gases, primarily methane. It is refined and processed from wellhead collection points to separate valuable components like oil and natural gas liquids from impurities like water, carbon dioxide, and sulfur that could cause pipeline corrosion. The result is pipeline quality gas that can be distributed or stored underground until it is needed during peak periods of high demand, such as winter.

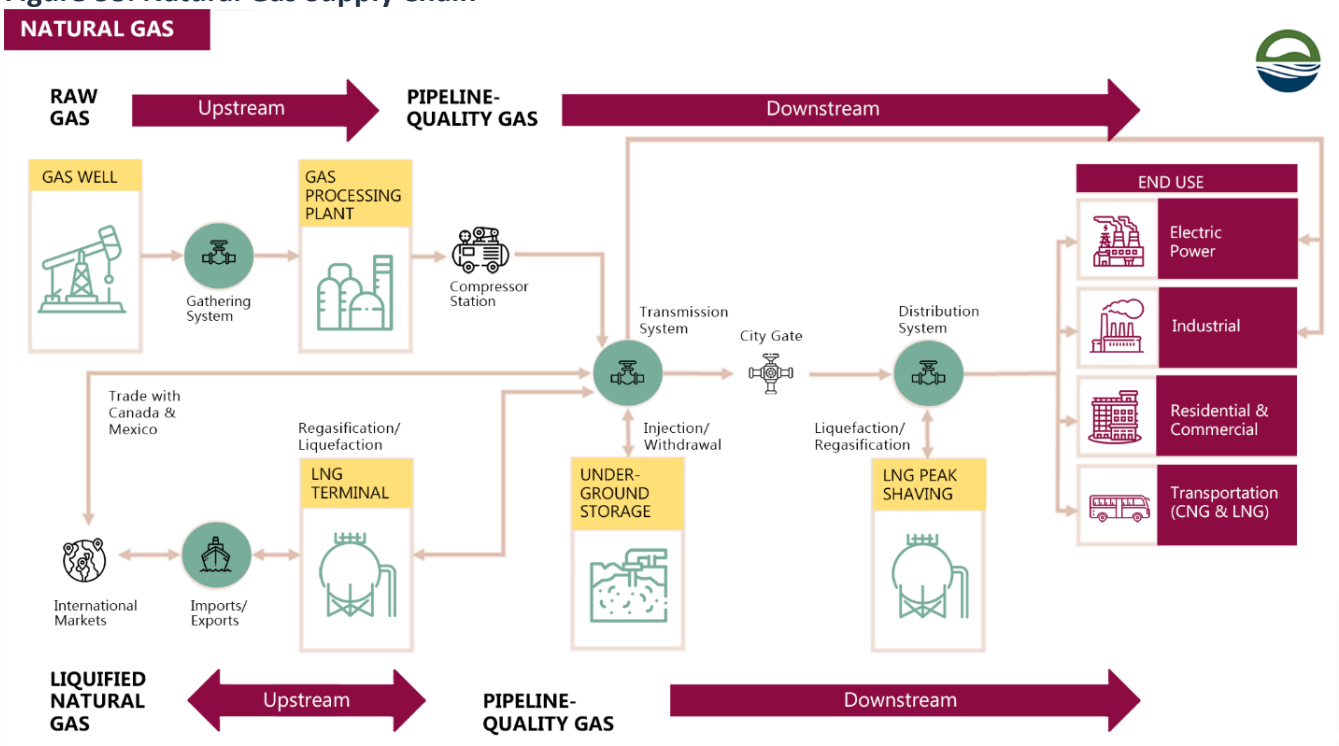
Figure 37: Where Natural Gas is Found



Natural gas is pressurized and introduced into an interstate pipeline network for safe, reliable transport. Distribution pipeline networks deliver natural gas directly to some large commercial and industrial consumers, like utilities in Oregon. The remainder is delivered to local distribution companies which add odorant—to ease detection of even small leaks—before transporting the gas through smaller distribution pipes, or "mains," to businesses and homes throughout Oregon.

Natural gas data is typically discussed in either volumes like cubic feet or in units of energy like British Thermal Units (Btu). One cubic foot (cf) of natural gas is approximately 1,036 Btus. At the volumes appropriate for Oregon, the data is typically in Billion Cubic Feet (Bcf) or million Cubic Feet (MMcf). When discussing flow rates, the units are typically per day (/d). As an example, 1 MMcf/d is 1 million cubic feet of natural gas per day, and that volume would equate to 1.036 billion Btus.

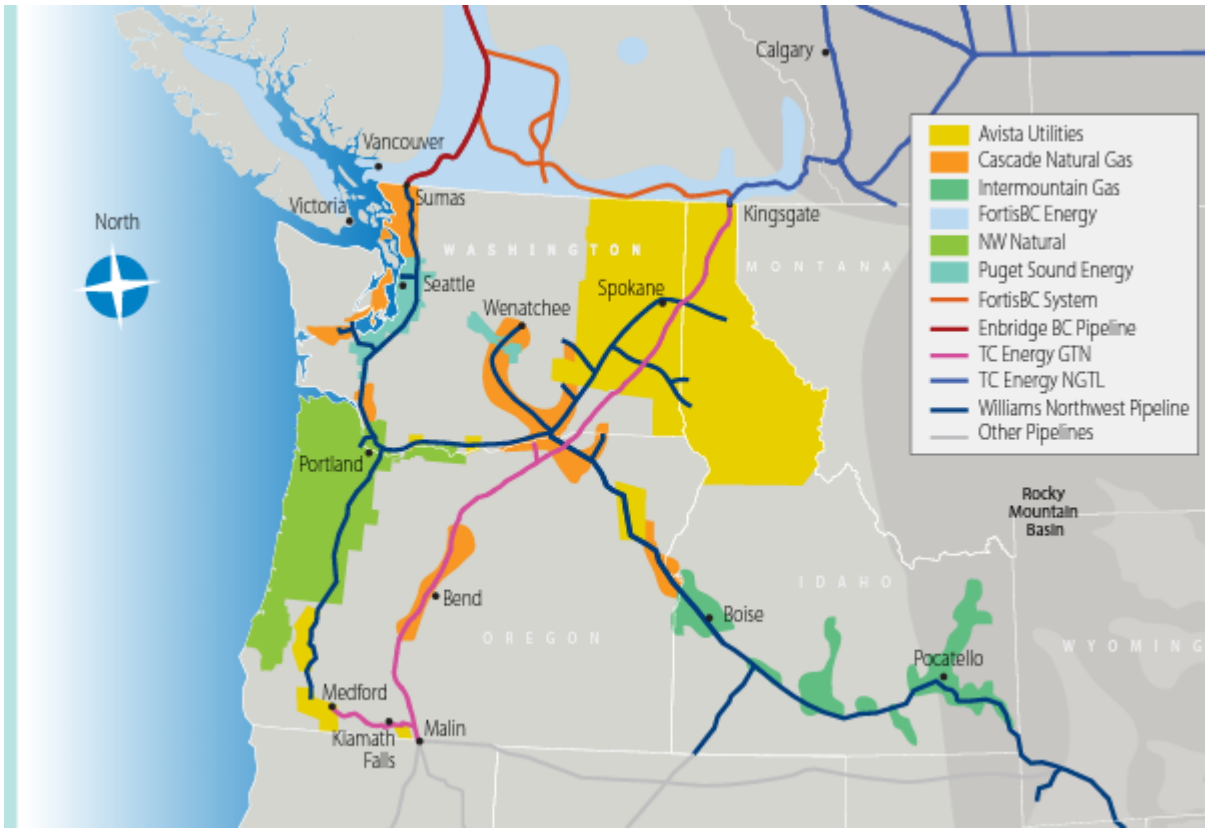
Figure 38: Natural Gas Supply Chain



Natural Gas in Oregon

There are three major investor-owned natural gas operators in Oregon — Northwest Natural Gas, Avista Utilities, and Cascade Natural Gas. These companies have a collective in-state workforce of more than 1,160 employees. To meet customer needs, the system includes a pipeline network of nearly 16,000 miles of distribution main lines and just over 730 miles of high-pressure transmission pipeline and related storage facilities illustrated below. There are 13 operators of intrastate pipelines that typically serve a single commercial entity in the state.

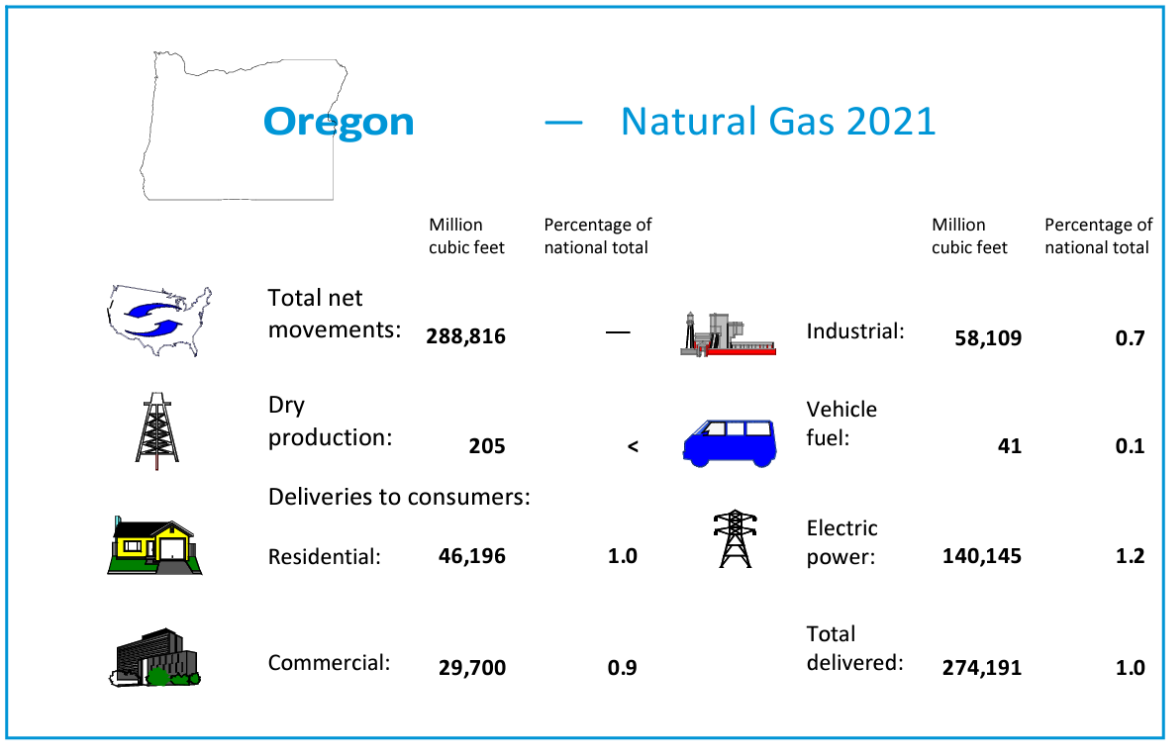
Figure 39: Map of Natural Gas Distribution Company Territories



Source: Northwest Gas Association

In addition to providing some natural gas-generated electricity, natural gas is also delivered to consumers across the state for "direct use" in buildings and industrial processes. Many homes and businesses rely on natural gas for space and water heating, cooking, and to fuel other gas appliances and systems. Industrial facilities often use natural gas to generate heat and/or power for industrial processes.

Figure 40: Oregon Natural Gas Overview



Source: EIA

Natural Gas Infrastructure

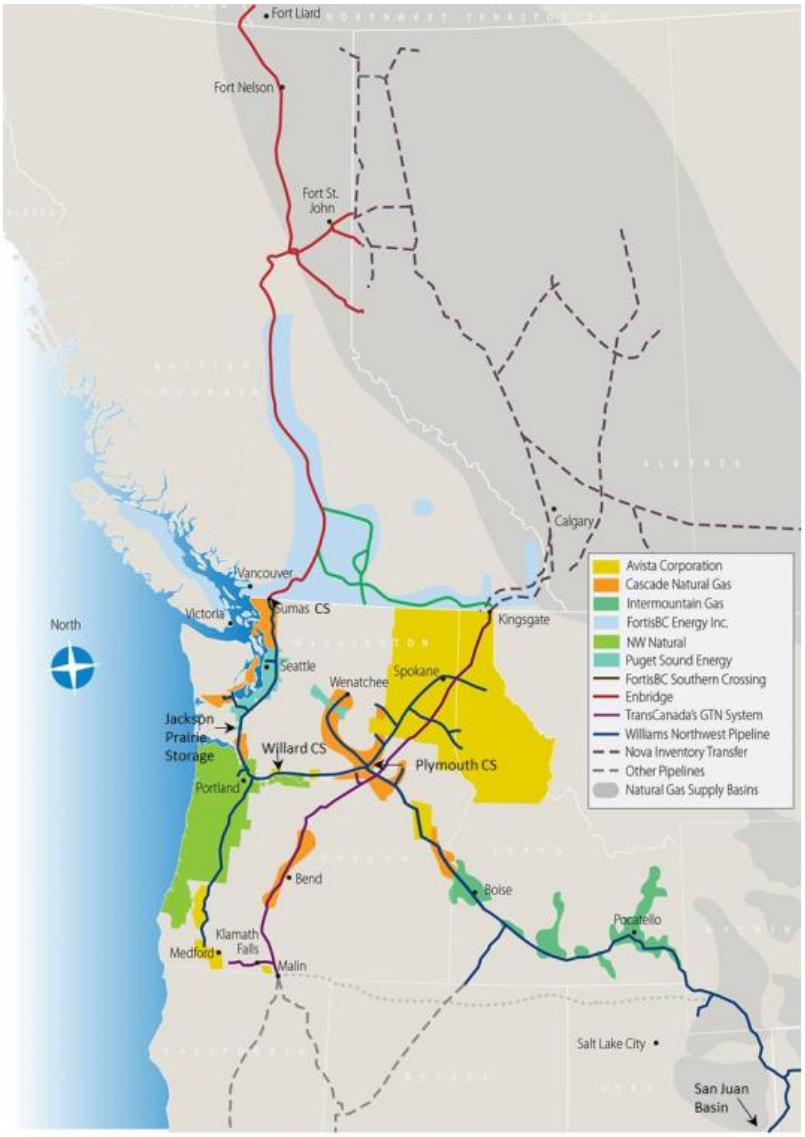
There are no major natural gas basins in Oregon, so the natural gas that is consumed in the state must be brought in from outside of the state's borders. Due to Canada's proximity, natural gas resources, and mature infrastructure, most natural gas consumed in Oregon (up to two thirds) – depending on demand and market conditions – is imported from Canada.[10] Three transmission pipelines provide gas transport to and through our region from major supply basins in the Rockies, Northern Alberta, and Northern British Columbia.

Enbridge BC Pipeline - The 1,776-mile Enbridge BC Pipeline, shown in red on the map, serves as the main natural gas transmission line for natural gas development in British Columbia, Canada. It goes south from Fort Nelson to the U.S.-Canada border at Huntingdon-Sumas, a major natural gas trading hub. The pipeline transports about 60 percent of the natural gas produced in British Columbia and has been the backbone of B.C.'s natural gas industry since 1957. The pipeline also supplies about 50 percent of the natural gas demand in Idaho, Oregon, and Washington.[10]

Williams Northwest Pipeline – Started more than 60 years ago, the 1,500-mile pipeline, shown in dark blue on the map, has grown to a 4,000-mile bi-directional transmission system crossing the states of Washington, Oregon, Idaho, Wyoming, Utah, and Colorado. This system provides access to British Columbia-sourced natural gas (where it connects to the Enbridge BC Pipeline at the U.S.- Canada border), Alberta sourced gas (via the connection shown in purple), U.S. Rocky Mountain gas, and San Juan Basin gas supplies.[10]

Gas Transmission Northwest (GTN) System Pipeline – The 1,377-mile pipeline shown in purple on the map begins at the U.S.-Canadian border in Idaho. From the Kingsgate hub, the pipeline travels south through the southeast corner of Washington and then through central Oregon to the California border. The pipeline delivers gas to the Pacific Northwest and California and has been in operation since 1961.[10] This border crossing provides access to the AECO-C/Nova Inventory Transfer market center located in Alberta, and is a major long-distance transportation system which transports natural gas to points throughout Canada and to the United States. Alberta is the major Canadian exporter of natural gas to the U.S. and historically produces 90 percent of Canada's natural gas.[10]

Figure 41: Natural Gas Infrastructure Map



Source: Northwest Gas Association

Table 19: 2022 Pacific Northwest Natural Gas Pipeline Deliveries

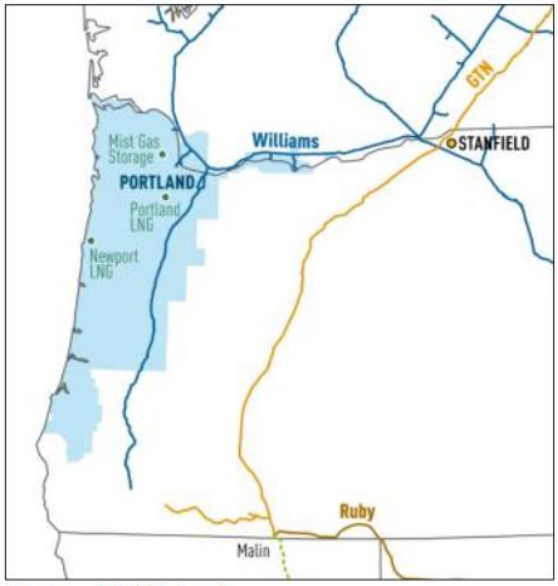
NATURAL GAS TRANSMISSION PIPELINES			
Pipeline Company	**Line Miles**	**Capacity 2022**	**Markets**
Enbridge BC	1,776 miles	1.09 Bcf/d 1.36 Bcf/d Peak Flow *(1.56 Bcf/d Capacity)*	Pacific Northwest
Williams Northwest	4,000-miles bi-directional	1.23 Bcf/d *(~3.8 Bcf/d Capacity)*	WA - Est. 0.92 Bcf/d *(96% of state deliveries)*
			OR – Est. 0.31 Bcf/d *(38% of state deliveries*)
GTN	1,377-miles	2.46 Bcf/d Imports from Other Countries *(2.74 Bcf/d Capacity)*	1.39 Bcf/d to Pacific Northwest *(55% of Pacific Northwest deliveries)*

Source: USDOE Pacific Northwest Critical Energy Infrastructure Study (2023)

Storage in Oregon

Gas utilities use underground natural gas storage to balance supply and demand on their systems when transmission pipelines supplying gas from outside the region are at capacity—typically during the winter heating season and on hot summer days when demand from electric generators is high.

Figure 42: NW Service Territory



Source: NW Natural

Mist Facility

NW Natural's Mist Underground Storage is the only natural gas storage facility in Oregon, and is the second largest such facility in the Pacific Northwest. Located in Columbia County, approximately 50 miles northwest of Portland, the facility consists of eight depleted field reservoirs with a working capacity of 21.1 Bcf and maximum deliverability of 635 MMcf/d.48

According to NW Natural, the withdrawals from the Mist facility were projected to meet approximately 30 percent of design day sales for the company's natural gas distribution segment serving northwest Oregon during the 2022-23 winter heating season. The 4.1 Bcf North Mist facility, which was completed in 2019 and is part of the Mist complex, is contracted for the exclusive use of Portland General Electric (PGE), which uses gas to fuel its gas-fired electric generation facilities. Gas from the North Mist facility can be withdrawn rapidly at a rate of up to 120 MMcf/d to supply PGE's Port Westward Power Station in Clatskanie, Oregon via a 13-mile pipeline.

Figure 43: Mist Underground Storage

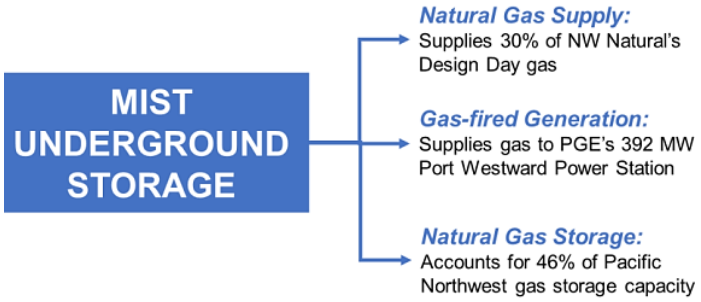
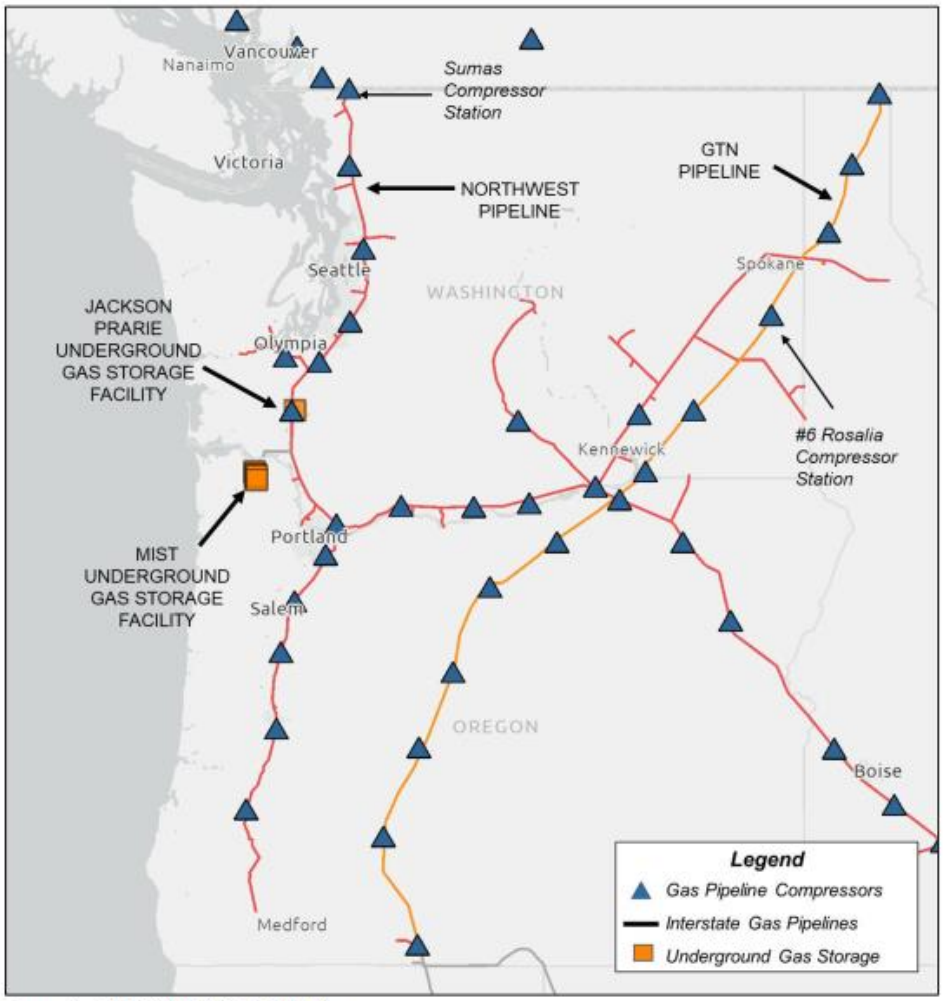


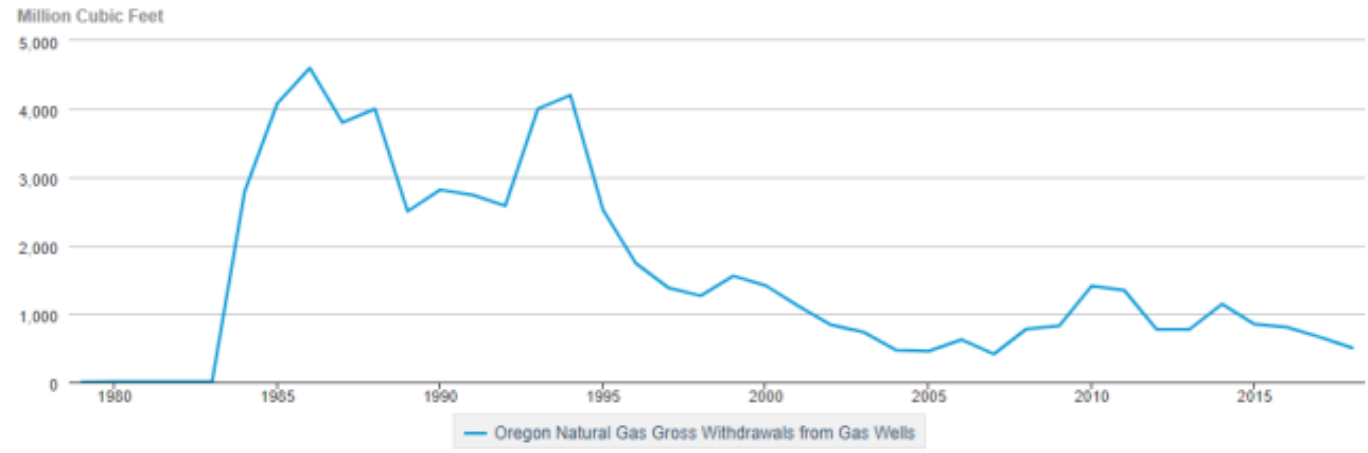
Figure 44: Map of Pacific Northwest Natural Gas Storage and Critical Infrastructure



Source: ArcGIS, HIFLD, EIA, DOE Notations

Facility production has steadily decreased while Oregon's demand has increased over time.[7] Annual natural gas production from the field declined to 205 million cubic feet in 2021 or the equivalent of 0.12 percent of Oregon's total natural gas consumption.[7] The field no longer has any significant natural gas reserves or production, and is used primarily for natural gas storage.

Figure 45: Oregon Natural Gas Production

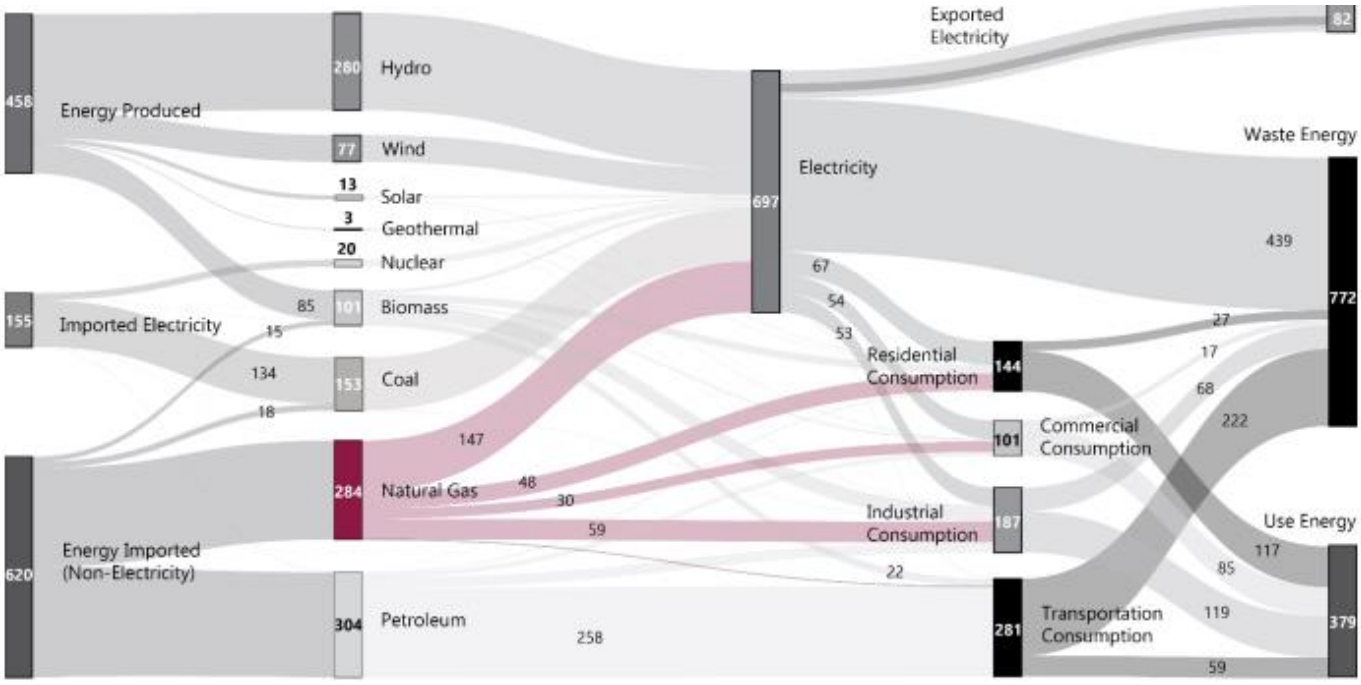


Source: EIA

Consumption

Oregon consumed 284 trillion Btu of natural gas in 2020.[18] Oregon's electric power sector uses half of the natural gas delivered to Oregon, as presented below.

Figure 46: How Natural Gas Moves Through Oregon's Energy Flow



Numbers are in trillions of British thermal units.

The industrial sector accounts for about 20 percent of state consumption. The residential sector, where almost three in five Oregon households use natural gas as their primary energy source for home heating, accounts for about 17 percent of natural gas deliveries, and the commercial sector uses 11 percent.

Consumption Over Time - Consumption of natural gas in Oregon has increased significantly in recent decades. Figure 47 shows Oregon's aggregate consumption of natural gas from the electricity, residential, commercial, industrial, and transportation sectors between 1960 and 2020. Oregon's consumption of 284 trillion Btu of natural gas in 2020 was an increase of 3 percent from the 275 trillion Btu Oregon consumed in 2008.[18]

Figure 47: Total Natural Gas and Propane Consumption 1960 – 2020 (Billion Btu)

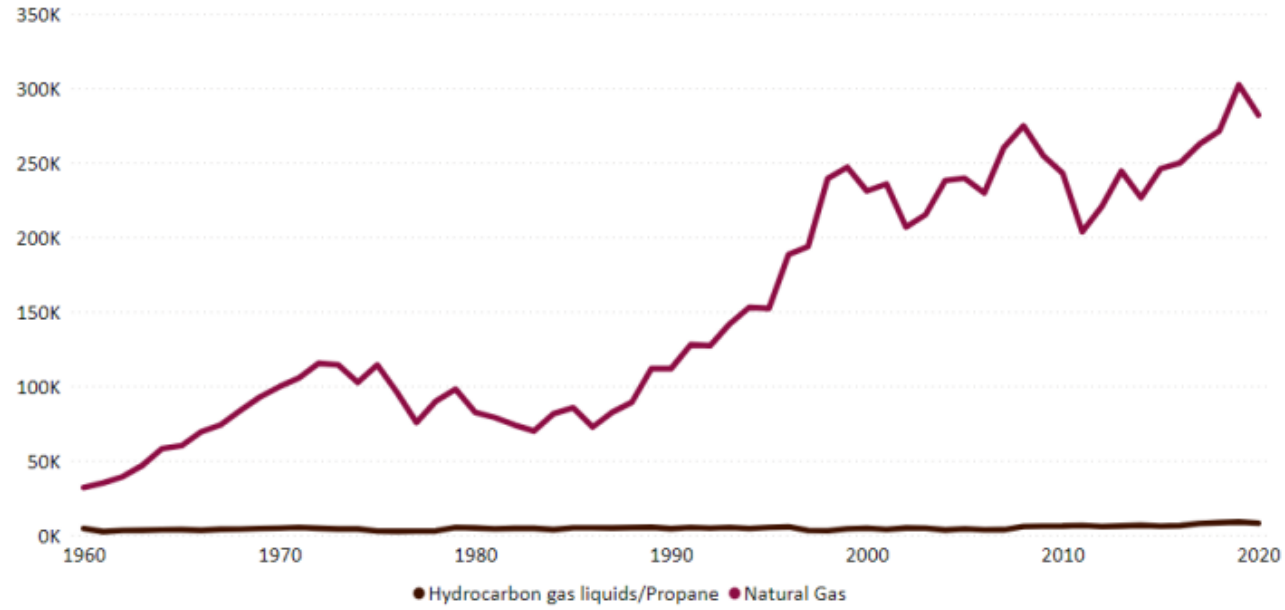
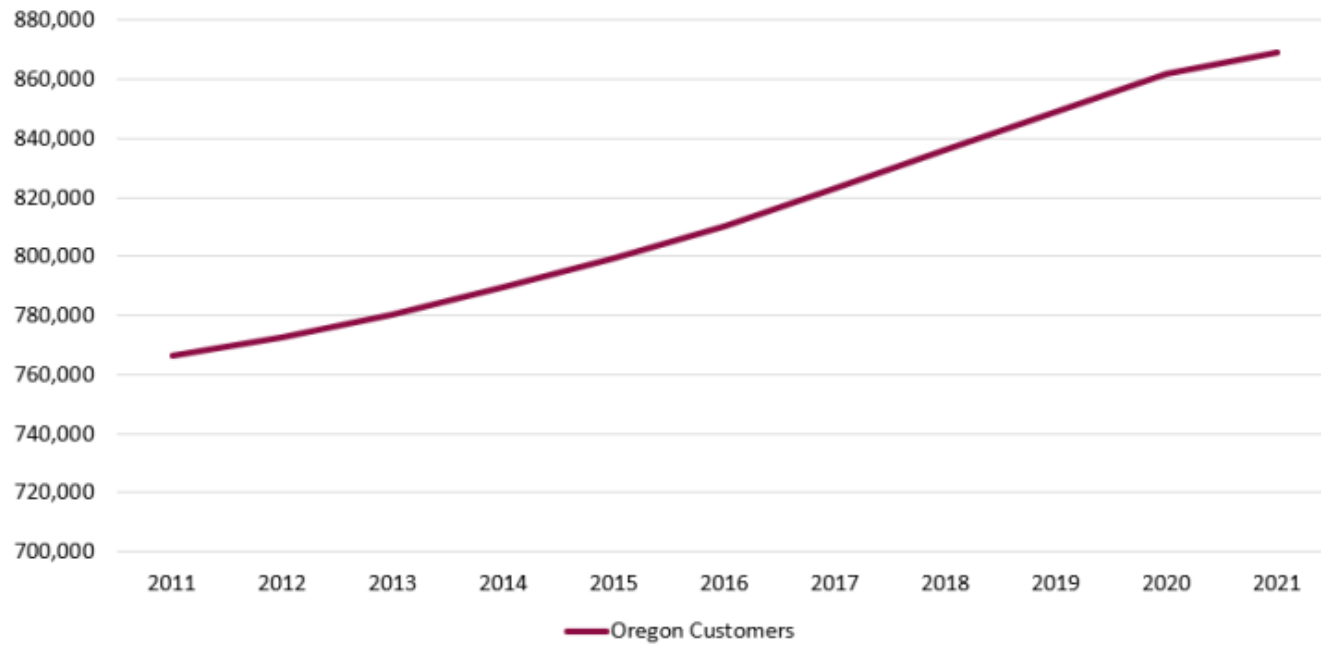


Figure 48 demonstrates that the total number of natural gas retail customers in Oregon has also steadily increased over the last decade. In 2021, there were approximately 870,000 retail gas customers in the state.

Figure 48: Total Natural Gas Retail Customers in Oregon 2011-2021



Consumption for Electricity - There are 13 natural gas electricity generation facilities in Oregon with a combined capacity of 4,354 MW. Demand for electricity produced by natural gas in Oregon has increased over time.[19] Total consumption by Oregon's electric power sector increased from 119 trillion Btu in 2008 to 137 trillion Btu in 2020, an increase of 15 percent.[19] Natural gas plants are also able to play different roles in grid management, including serving as steady dispatchable power generators and acting as highly flexible generators that can ramp up and down quickly to meet constantly changing electricity demand.

Table 20: Oregon Natural Gas Consumption by End Use (Million Cubic Feet)

Oregon	2017	2018	2019	2020	2021	2022
Total Consumption	247,206	255,713	287,017	268,298	282,060	Not Available
Pipeline and Distribution Use	5,298	6,362	5,838	7,026	7,859	Not Available
Volumes Delivered to Consumers	241,877	249,324	281,160	261,256	274,191	271,470
Residential	47,841	42,625	47,927	45,487	46,196	49,232
Commercial	31,763	28,997	32,379	28,351	29,700	32,772
Industrial	57,849	54,267	57,008	56,700	58,109	57,064
Vehicle Fuel	61	70	54	49	41	46
Electric Power	104,362	123,365	143,791	130,669	140,145	132,356

Source: Oregon Natural Gas Consumption by End Use (eia.gov)

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VI. ENERGY SECTOR THREATS

Solicitation for a contractor to complete a risk assessment to **quantify and propose actions to mitigate threats to Oregon's energy infrastructure** is underway, with work to be completed in 2024. Updated threat information will be included in the Oregon Energy Security Plan submission to USDOE September 30, 2024. A summary of the contractor Scope of Work, as contained in the Request for Proposals, is included in Appendix E to the Plan.

Natural disasters and man-made threats have the potential to cause damage to the state's energy infrastructure, which could result in loss of life, harm to the environment, and destruction to property. Many organizations in the state have completed assessments to identify the hazards and associated vulnerabilities facing Oregonians. However, while these reports have helped the state, local governments, and Tribes better understand energy sectors hazards and risks, data gaps remain. As part of the Oregon Energy Security Plan (OR ESP) development, the Oregon Department of Energy (ODOE) will bring together existing threat analysis information and address the data gaps to quantify risks and threats to the energy sectors, including cyber and physical security threats.

The energy sector threat information in this section describes what is currently known about the threats to Oregon's energy systems. This section also provides an overview of the energy infrastructure risk assessment that ODOE will hire a consultant to conduct. This includes the statement of work from the Risk Assessment and Mitigation Request for Proposal (RFP) posted in August 2023.

Natural Hazards

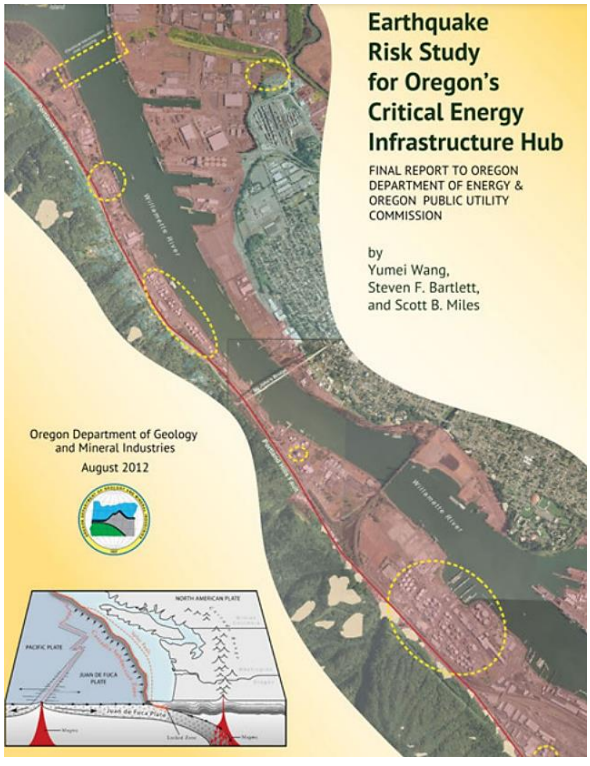
Whenever threats to the energy systems are discussed in the Pacific Northwest, the "big one" comes to mind.

Cascadia Subduction Zone Earthquake and Tsunami

Planning for a Cascadia Subduction Zone (CSZ) earthquake and tsunami stretches from northern California to British Columbia, where the Juan de Fuca tectonic plate converges with the North American plate. This convergence of the two plates has built pressure over time, and the pressure is likely to be released in the form of a mega-earthquake, which would likely cause a tsunami that, depending on the epicenter of the quake, would severely impact the Oregon coast.

State leaders and scientists have done extensive planning and study of the potential effects of a CSZ event on Oregon's critical infrastructure lifelines, including the energy sector. The Oregon Resilience Plan and an Earthquake Risk Study showed that a CSZ event would likely devastate the region's critical energy infrastructure. While major impacts are expected from the CSZ event in western Oregon and particularly on the coast, central

Figure 49: Oregon Earthquake Risk Study



and eastern Oregon will also be affected. For example, most liquid fuel is trucked from Portland or Eugene fuel hubs to communities across the state. After the CSZ event, both fuel terminals may not be operable.

These plans and studies investigated the seismic deficiencies of Oregon's energy storage and transmission infrastructure, with a special emphasis on the vulnerability of the state's critical energy infrastructure hub, a six-mile stretch of the lower Willamette River in North Portland where energy storage — including liquid fuel tanks and pipelines and natural gas storage and transmission — and electric transmission facilities are concentrated.

Extreme Weather Events

There are other more frequent threats that regularly affect Oregon's energy assets and delivery systems. In the past five years, the Governor issued 81 emergency declarations requiring statewide response to extreme weather events in the state.

Table 21: 2019-2023 Oregon Emergency Declarations

Year	Floods	Wildfires	Conflagrations	Severe Weather	Landslides	Droughts	Total
2019	1	-	-	1	-	-	**2**
2020	1	3	16	-	-	7	**27**
2021	-	1	9	6	-	10	**26**
2022	-	1	5	1	1	7	**15**
2023	-	-	2	3	-	6	**11**
Total	**2**	**5**	**32**	**11**	**1**	**30**	**81**

Extreme weather events in Oregon have caused the state to evaluate the state's response activities and identify corrective actions to improve the way the state government responds to events. This includes after-actions reports for the 2021 Excessive Heat Event and historic 2019 Winter Storm.

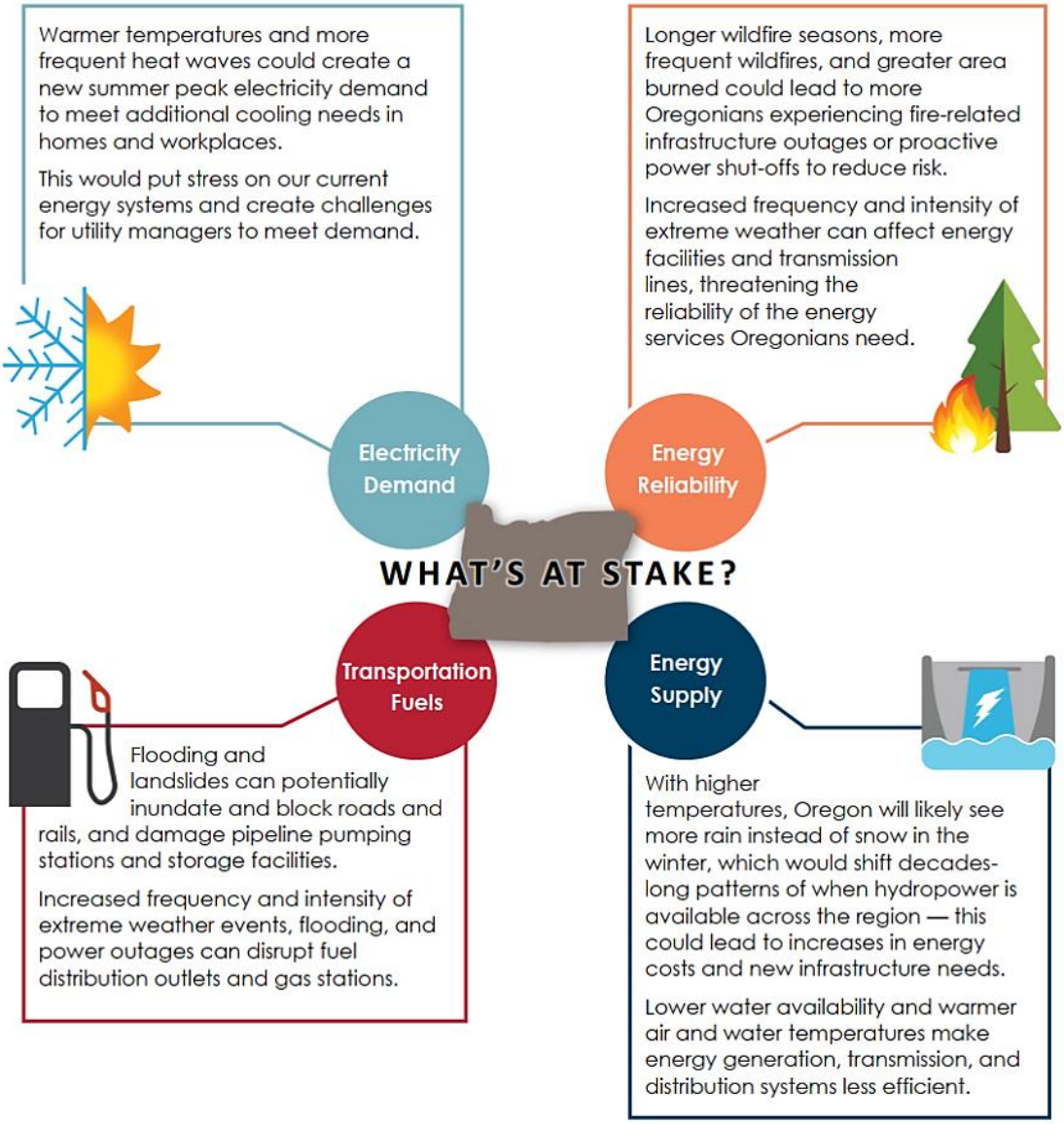
Examples of recent implementation of ESF-12 emergency response systems include ODOE activating the Oregon Fuel Action Plan in response to extreme weather events like major wildfires and ice storms to ensure timely fuel deliveries to airports supporting wildfire response efforts, and to hospitals, utility crews, and first responders supporting storm response. As a result of wildfires, ODOE and the Oregon Department of Forestry established a state and federal Fuel Coordination Group and procedures for meeting jet fuel needs at airports supporting wildfire response efforts in the state.[1]

OPUC worked with electric utilities during winter storms to restore power to affected communities and support communities preparing for public safety power shutoffs during recent wildfire seasons. In March 2020, the Governor issued Executive Order 20-04 directing OPUC to evaluate risk-based wildfire program plans for investor-owned utilities and to conduct workshops to share best practices for mitigating risks with stakeholders.

Climate Vulnerability Assessment

A changing climate is leading to more extreme weather events, which may increase risks to Oregon's energy systems. ODOE has taken initial steps to assess and identify specific hazards that may result from changing climate conditions in the future, potential impacts that may harm energy assets, and the outlook of these hazards in future years. This work is detailed in a "Policy Brief: Climate Vulnerability Assessment" in ODOE's *2020 Biennial Energy Report*.

Figure 50: Extreme Weather Events Affect Energy Systems



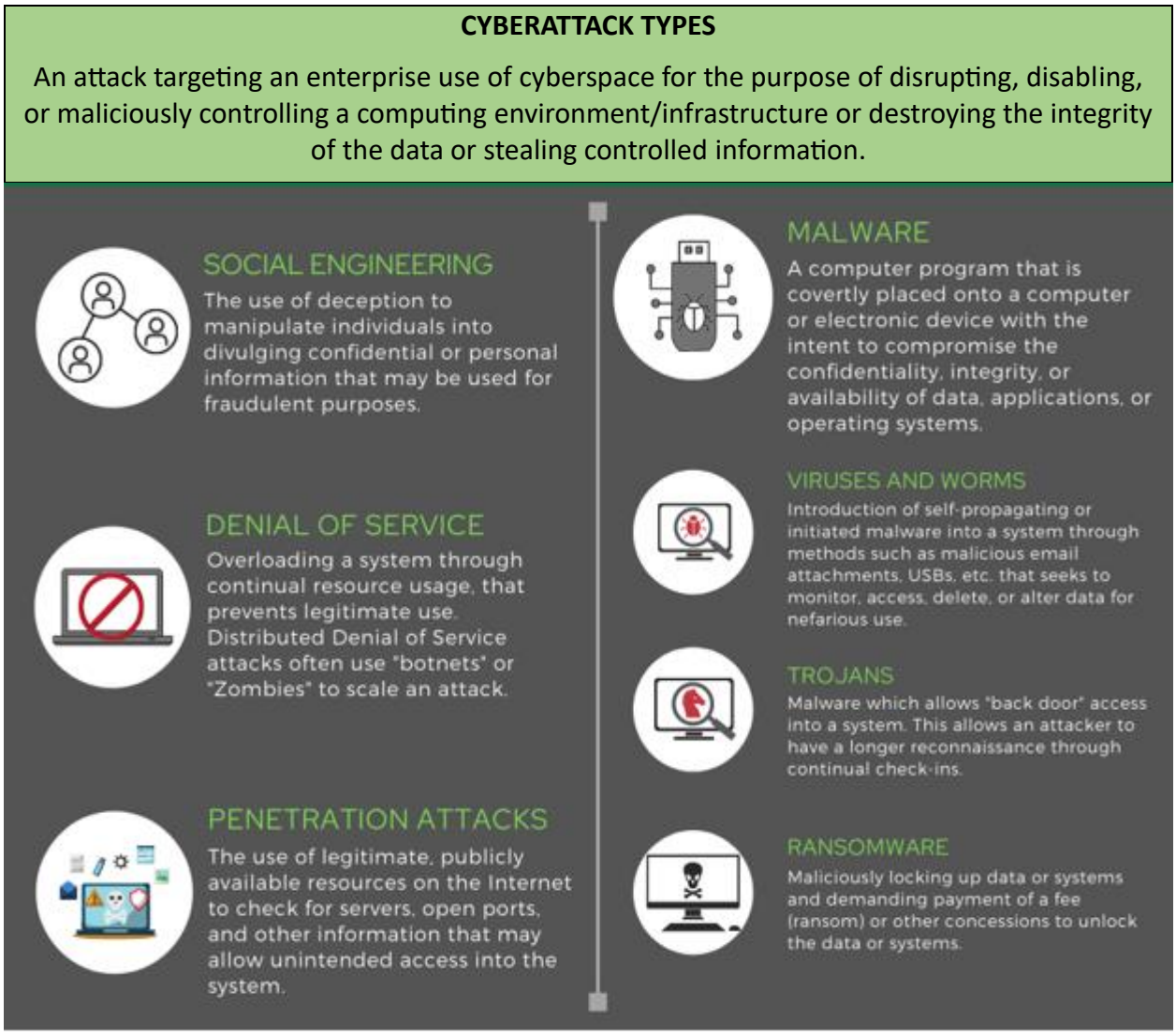
ODOE will expand on this work in 2024 to analyze the degree of risk posed by different climate hazards to various energy systems and assets across the state. This information will be integrated into the OR ESP energy infrastructure risk assessment.

Man-Made Threats

Cybersecurity Attacks

Today's energy sector is technology driven resulting in many benefits, including improvements to efficiency, resiliency, and flexibility. However, because the energy sector is uniquely critical – all other critical infrastructure sectors depend on power and fuel to operate – this makes the energy assets attractive targets for cyberattacks. In support of the development of state Energy Security Plans, USDOE provided an overview of possible cyber threats energy providers face.

Figure 51: Cyberattack Types



Source: USDOE Office of Cybersecurity, Energy Security, and Emergency Response

Energy infrastructure owners and operators use technology to monitor or control physical devices and systems that interact with the physical environment. These systems monitor or control physical devices, processes, and events. Examples include:

- Energy Management Systems and Supervisory Control and Data Acquisition (SCADA)
- Oil refinery, gas processing, and electricity generation distributed control systems.
- Pipeline pump/compressor stations and electrical substations
- General industrial control systems used in energy processes

A cyber incident within energy operational systems can result in a physical consequence in addition to potential losses of data or damage to an organization's reputation.

Table 22: Information Technology vs. Operational Technology Impacts

INFORMATION TECHNOLOGY IMPACTS	OPERATIONAL TECHNOLOGY IMPACTS
• Brand damage - loss of confidence in company • Loss of personally identifiable information • Loss of business data • Customer - supplier payment issues	• Operator loses visibility into operations • Operator forced to switch to manual operations mode • Supply fails to meet demand • Disruption to basic daily activities – loss of power or access to fuel • Health, safety, and economic impacts • Impacts from prolonged disruptions can cascade into larger consequences

Source: USDOE Office of Cybersecurity, Energy Security, and Emergency Response

A cyber-physical event can cause loss of power or access to fuel, initiate prolonged cascading impacts, create potential risks to health and safety, and result in economic impacts to not only the company, but also to the people and businesses that rely on energy. Understanding the current and evolving threat landscape as well as possible consequences of a cyber-physical event can help state officials and energy owners and operators understand risks.

ODOE's energy infrastructure risk assessment will take a more in-depth look at cyber-physical risk to energy systems in the state and be submitted in the 2024 ESP.

Physical Attacks

In recent years, there is a recognition that physical attacks on energy infrastructure are a serious risk to energy security across the nation. Transmission lines may be affected by individuals hitting power poles, cutting trees down, or striking underground wires. Attacks on pipelines or other fuel infrastructure could cause a major disruption of services. Third-party strikes on electric substations can disrupt service.

According to the U.S. Department of Energy, incidents related to physical security of electricity infrastructure increased 70 percent in 2022, compared to the prior three years. In Oregon on Thanksgiving Day 2022, two intruders cut through the fencing around a substation in Clackamas County, shooting and disabling numerous pieces of equipment and causing significant damage. Washington state saw four substations near Tacoma attacked on Christmas Day 2022 in an apparent effort to cut power so the assailants could commit a burglary.

From simple trespassing and acts of vandalism to more serious attacks on energy infrastructure with destructive devices, states need to be aware of and prepared for physical threats. ODOE's energy infrastructure risk assessment will take a more in-depth look at such risks to energy systems in the state and be submitted in the 2024 ESP.

Summary of Energy Sector Threats

The table below provides a high-level summary of common threats and impacts to the energy sector. This list of general threats will be used to inform ODOE's Energy Infrastructure Risk Assessment.

Table 23: Energy Sector Threats and Impacts

HAZARD	ELECTRICTY	LIQUID FUELS	NATURAL GAS
Cyber Incident	Informational technology and operation technology systems can be affected. This includes company data, payment and scheduling systems, sensors, and control systems.		
Drought	• Reduced hydroelectric generation due to low water levels. • Reduced efficiency at thermoelectric generation facilities if there are constraints on steam or cooling.	• Impacts to biofuel feedstocks from low moisture in soil. • Low water levels can prevent barge traffic on inland waterways. • May limit drilling and refinery operations if alternate water supply is not available.	• May limit drilling and refinery operations if alternate water supply is not available.
Dam Failure	Damage to downstream electric, liquid fuels, and natural gas infrastructure due to flooding and debris.		
	• Hydroelectric power generation may be disrupted, which may also reduce black start capabilities.	• Unearthing and rupturing pipelines.	
Earthquake	Damage to downstream electric, liquid fuels, and natural gas infrastructure due to shaking and liquefaction.		
	• Power generation facilities, substations, transmission poles, etc.	• Pipeline rupture, refineries, well sites, pumping stations, etc.	• Pipeline rupture, processing plants, well sites, compressor stations, etc.
Equipment Malfunction	• Line arcing, power surges, corrosion, or moisture on equipment can cause system malfunction or go offline.	• Corrosion, material failure, excess pressure buildup, or controls malfunction can cause supply disruptions.	
Extreme Heat	• Increased demand for cooling causing power plants to operate below reserve margins pending available capacity. • Can cause rolling brownouts and blackouts.	• Can reduce operating efficiency at refineries and terminals. • Can reduce product delivery capabilities.	
Flood	Damage to equipment exposed to water and debris.		
	• Power generation equipment, control center buildings, transmission lines, etc.	• Refinery process units, tanks, underground pipelines, etc.	• Processing plant units, underground pipelines, etc.
Landslide	Damage to nearby electric, liquid fuels, and natural gas infrastructure.		
Man-Made Damage	Deliberate physical attacks on or takeovers of infrastructure. Human error can cause facilities to run outside of design parameters.		

Man-Made Damage (cont.)	• Transmission lines may be affected by individuals hitting power poles, cutting trees down, or striking underground wires. Third-party strikes on substations can disrupt service.	Third-party strikes of pipelines can rupture lines and disrupt service.	
Pandemic	Shifts in demand of energy supplies and reduced worker availability.		
Tropical Cyclone	Damage to electric, liquid fuels, and natural gas infrastructure from high winds, debris, and flooding.		
	• Power generation facilities, substations, transmission poles, etc.	• Pipeline pumps and tank damage — production facilities and refineries may shut down ahead of storm for personnel safety. • Shoaling in ports can prevent ship and barge traffic to terminals.	
Thunderstorm and Lightning	• Blown transformers and downed trees may affect power lines.	• Power outages may affect refinery, terminal, or pumping operations.	• Power outages may affect select electric compressor operations.
Tornado	• High winds can cause damage to power lines and power generation facilities.	• High winds can cause damage to refineries, terminals, and other aboveground facilities.	• High winds can cause damage to processing plants, compressor stations, metering and regulating stations, and other aboveground facilities.
Wildfire	• Damage to power lines and generation facilities. • Utilities may shut off power to prevent wildfires *(high temperatures and winds).*	• Combustible material if exposed, primarily affecting above-ground infrastructure.	
Winter Storm and Extreme Cold	• Freezing in cooling towers prevents electric generation. • Rail freezing affects delivering feedstock to power generation (Coal). • Can cause rolling brownouts and blackouts.	• Freezing for non-weatherized equipment including frozen product in piping system, malfunctioning flow control equipment, flaring, and production shut-ins. • Increased backup generator demand. • Rolling brownouts and blackouts can reduce product delivery capabilities.	• Freezing for non-weatherized equipment, which can cause production shut-ins. • Increased demand for heating can strain capacity. • Rolling brownouts and blackouts can reduce product delivery capabilities.

Source: U.S. Department of Energy Office of Cybersecurity, Energy Security, and Emergency Response

Energy Infrastructure Risk Assessment

The state has completed several assessments to identify hazards, vulnerabilities, and risks facing Oregonians. This includes the Natural Hazards Mitigation Plan and the Threat and Hazard Identification and Risk Analysis. The Oregon Department of Emergency Management also provides a Hazard Vulnerability Analysis that provides a simple numerical calculation that allows local governments and Tribes to complete comparative ranking of hazards in their jurisdictions. These hazard analyses are broad in scope and do not focus on threats to the energy sectors.

In 2021, the U.S. Department of Energy produced the State of Oregon's Energy Risk Profile. This profile examines the relative magnitude of the risks that the state's energy infrastructure routinely encounters in comparison with the probable impacts. The profile identified both natural and physical hazards with the potential to cause disruption of the energy infrastructure.

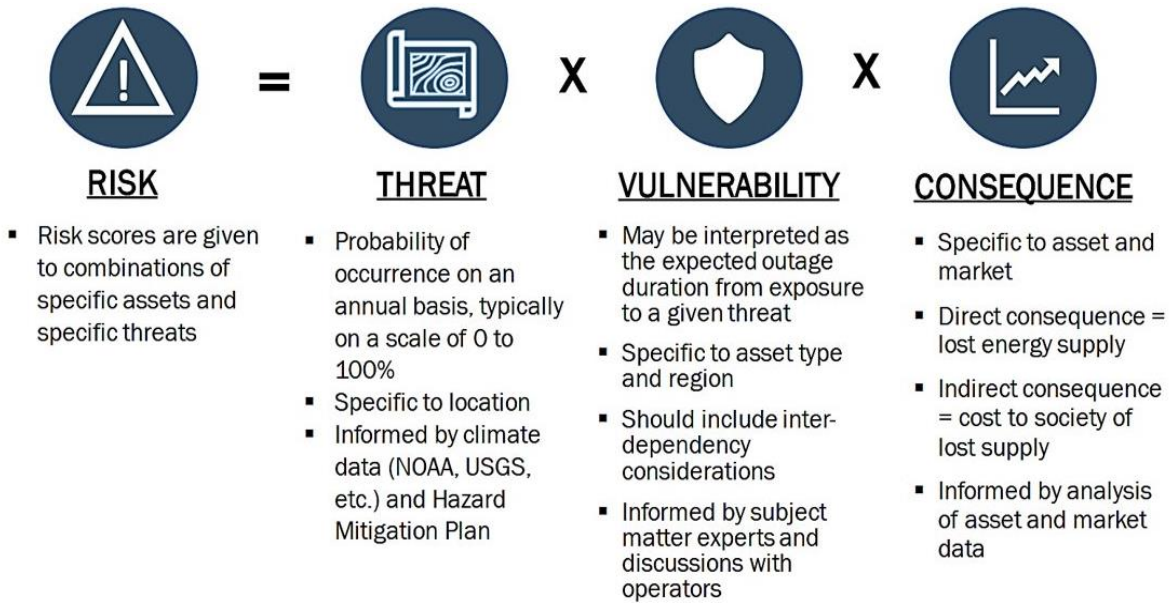
Missing from state and federal risk assessments to date are thorough evaluations of energy sector threats from a pandemic, cyber-physical attacks, and extreme wildfire events of recent years.

The intent of ODOE's Energy Infrastructure Risk Assessment is to bring together all relevant existing threat information and collect new data to fill gaps to complete a quantified risk assessment of all threats to Oregon's energy systems. The goal is to increase awareness of risk to Oregon's energy systems so that the state, local governments, and Tribes — in collaboration with energy providers — can better prepare for supply disruptions and make more informed decisions related to energy systems and infrastructure investments, resilience and hardening strategies, and asset management.

Risk Assessment Methodology

To arrive at the clearest picture of the risk associated with Oregon's energy systems and infrastructure, ODOE will work with a consultant to apply the following methodology to evaluate risks.

Figure 52: Risk Assessment Methodology



Source: U.S. Department of Energy – ICF Consultant

- **Threats and Hazards** – Identifying man-made threats and natural hazards helps to establish the boundaries for how the state may need to prepare for energy events.
- **Vulnerabilities** – Knowing how susceptible an energy asset is to a disruption (natural or man-made) helps in gaining a better understanding of how vulnerable an asset may be. This allows decision-makers to focus resources on better protecting the most vulnerable assets.
- **Consequences** – Assessing impacts that result when energy infrastructure assets are disrupted by a threat or hazard helps to determine the level and type of damage or loss that can occur. Economic losses, loss of life or human health, loss of infrastructure functionality, loss of service, and degradation of public opinion and trust are consequences that should be considered.
- **Criticality** – Certain energy infrastructure assets may be especially important to ensuring energy infrastructure continuity. Being able to identify the assets that are most critical to the infrastructure or that provide significant support to other critical infrastructure systems helps to more effectively determine overall risk and prioritize mitigation strategies.

Cross Sector Interdependencies

The Risk Assessment will also evaluate the interdependencies and connections that exist between critical infrastructure elements and sectors. Identifying and understanding interdependencies (two-way) or dependencies (one-way) between infrastructure assets and sectors is important both for assessing risks and vulnerabilities and for energy security and resilience planning. Connections and interdependencies between infrastructure elements and sectors means that damage, disruption, or destruction to one infrastructure element can cause cascading effects, affecting continued operation of another.

The U.S. Department of Homeland Security (DHS) has identified 16 critical infrastructure sectors. DHS defines critical infrastructure as the assets, systems, facilities, networks, and other elements that society relies upon to maintain national security, economic vitality, and public health and safety. This includes energy, which all of the the other critical infrastructure sectors depend on power and/or fuel to operate. A disruption or loss of the services provided by the energy sector can directly affect the security and resilience within and across numerous sectors.

For example, energy stakeholders provide essential power and fuels to key portions of the communication, transportation, and water sectors — and, in return, the energy sector relies on them for fuel delivery (transportation), electricity generation (water for production and cooling), as well as control and operation of infrastructure (communication). These connections and interdependencies between infrastructure elements and sectors mean that the loss of one or more lifeline function typically has an immediate impact on the operation or mission in multiple sectors. As a result, additional functions may be lost as time passes.

Further, identifying and officially recognizing cross-sector interdependencies prompts collaboration and information exchange, allowing each sector to mitigate potential vulnerabilies that promote continuity of operations and services during emergencies.

The figures below show key dependencies and interdependencies between the energy sector and other critical infrastructure sectors.

Figure 53: Electricity Cross Sector Interdependencies

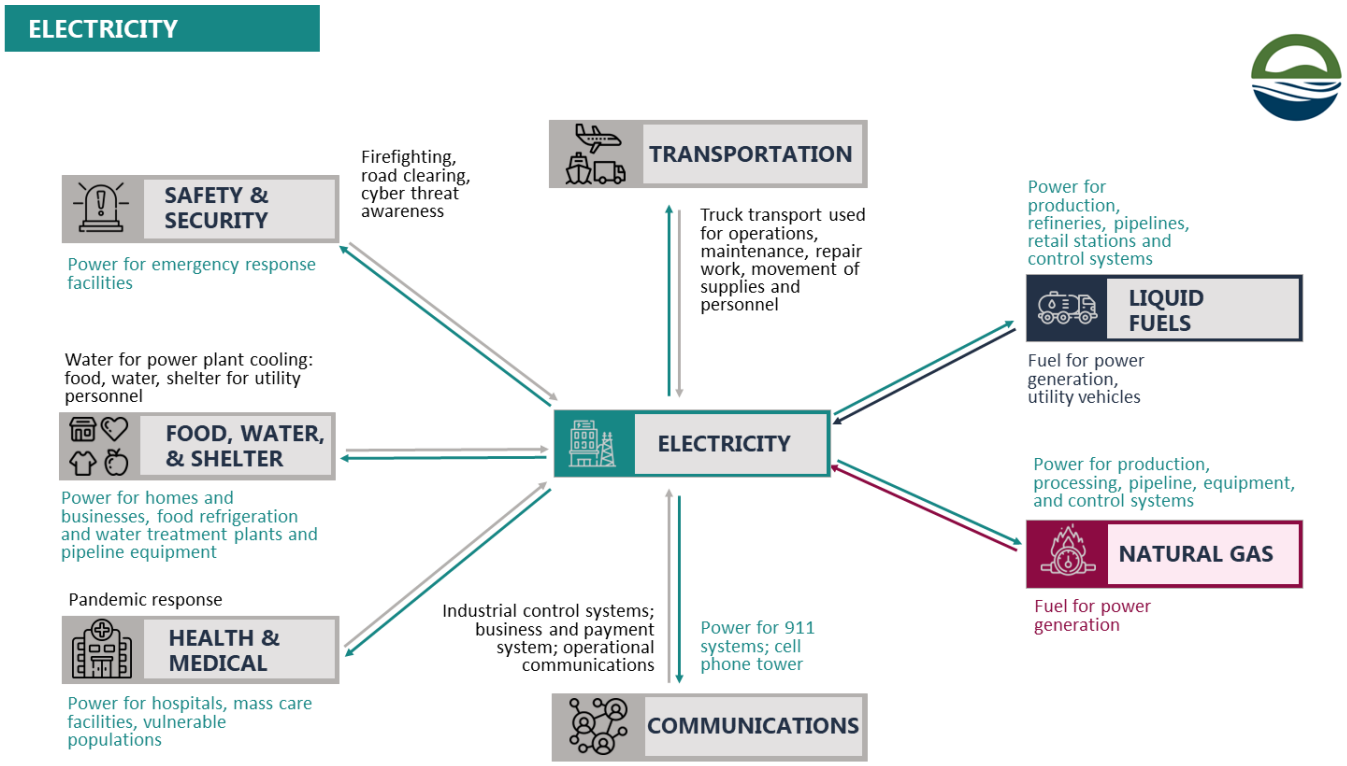


Figure 54: Liquid Fuels Cross Sector Interdependencies

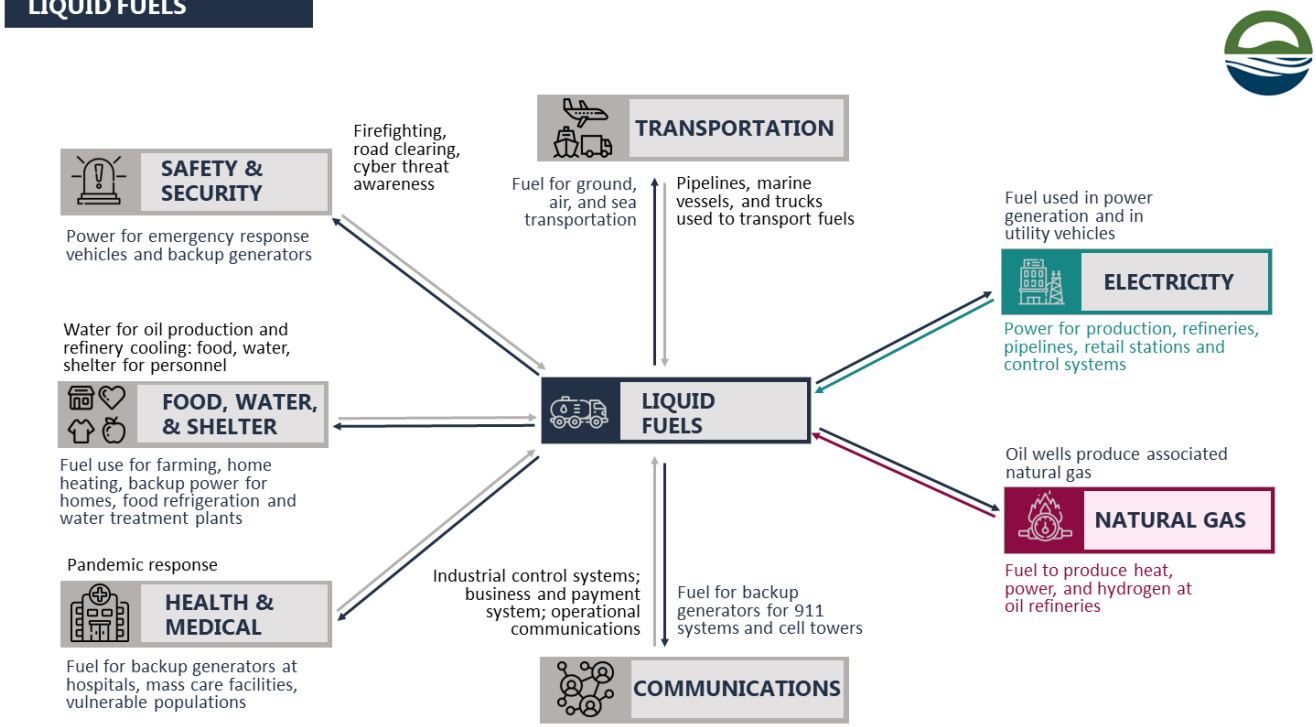
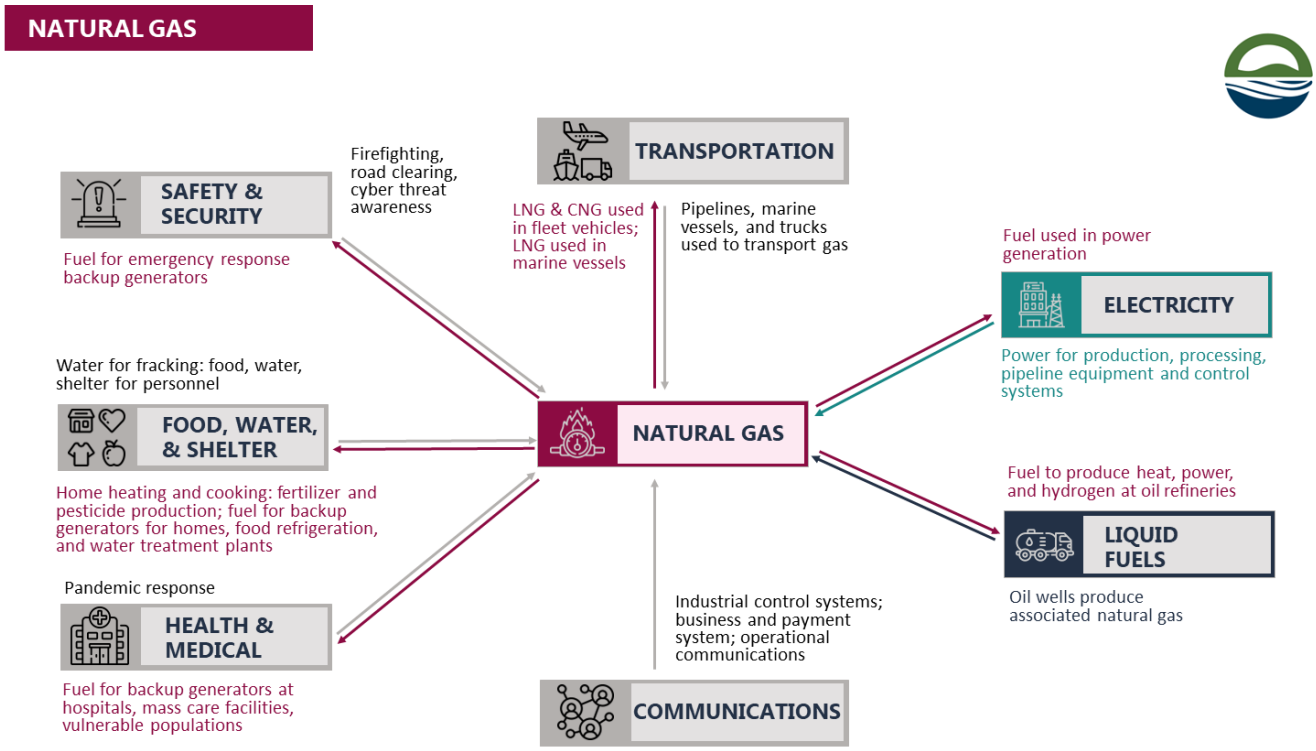


Figure 55: Natural Gas Cross Sector Interdependencies



Risk Assessment and Mitigation Request for Proposal

In August 2023, ODOE posted the OR ESP Risk Assessment and Mitigation Consultant Request for Proposal (Appendix E). The following is an overview of the RFP work scope, which includes tasks and deliverables to be completed by the selected consultant. All deliverables are to be completed by September 2024.

Table 24: Overview of the Risk Assessment and Mitigation RFP

TASKS	DESCRIPTION	DELIVERABLES
Task 1	**Work Plan Development** – Develop and refine a project work plan in coordination with ODOE that incorporates Statement of Work (SOW) tasks and deliverables. Identify and describe project team's roles and responsibilities.	• Provide a Draft Project Work Plan for ODOE review no later than 14 days after contract award.
Task 2	**Consultant Onboarding Meeting** – Coordinate with ODOE to finalize Draft Work Plan to identify issues, information needs (e.g., data gaps, critical stakeholders, timing), and concerns in the SOW.	• Final Work Plan with detailed timeline for achieving project deliverables.
Task 3	**Project Administration** – Establish clear expectations and process for project administration.	• Meeting agendas, minutes, and other records from meetings with ODOE.

		• Financial and performance reports to ODOE. • Revised work plans as needed with ODOE approval.
Task 4	**Stakeholder Engagement** – Participate in ODOE-hosted stakeholder meetings to collect energy sector threats, vulnerabilities, and consequences to the energy systems and mitigation measures to reduce risk. Follow-up discussions with stakeholders may be needed.	• Report on relevant energy data collected from stakeholder input to inform the risk assessment, method of collection, and stakeholder contact information. This includes data collected in follow-up meetings.
Task 5	**Data Collection** – Complete document review of existing reports, studies, assessments, strategies, and resources provided by ODOE on Oregon's energy systems. Collect missing data energy infrastructure threats and information needed to complete a comprehensive risk assessment.	• Inventory of primary data, description, citations, and key assumptions differing across resources from document review. • Summary of data gaps to inform the risk assessment and mitigation work – data collection as directed by ODOE. • Report on newly-collected energy sector data and information source.
Task 6	**Risk Assessment and Analysis** – Quantify energy sector risks using USDOE recommended methodology: "Risk = Threat x Vulnerability x Consequence" 1) Identify threats and determine probability of occurrence by region on an annual basis — Eastern, Central, Northwest, Portland Metro, Willamette Valley, and Southwest (Refer to map below). 2) Evaluate weaknesses within the energy infrastructure, processes, and systems or the degree of susceptibility to various threats. This includes determining energy assets, processes, and systems that can be modified and mitigated to either prevent a disruption from occurring or lessen the consequences of a disruption.	• Region-specific presentations of threats for stakeholder meetings. • Draft report on findings and results of the threats identified, analyzed, and prioritized based on hazard probability, vulnerability, and consequence by geographic region. • Draft "executive summary" or overview of the energy infrastructure risk assessment conducted for ODOE review and inclusion into the ESP. • Develop GIS maps, figures, charts, tables, and other graphics as appropriate.

	3) Assess the interconnected nature within the energy sectors and with other critical lifeline sectors including cascading impacts. 4) Assess energy emergency response plans, including cyber, continuity of operations, and government and community readiness to recover rapidly from an energy disruption. 5) Analyze and score threats based on probability, vulnerabilities, and consequences by geographic region in the state.	
Task 7*	**Mitigation Measures and Analysis** 1) Identify, assess, and rank (score) viable mitigation measures that reduce the exposure or consequence of each vulnerability to hazards identified by geographic region in the state. 2) Based on prioritized mitigation measures, develop recommended statewide mitigation approach to improve the state's energy resilience for ODOE consideration. 3) Develop a "mitigation action plan" based on the recommended mitigation approach. The plan should include: - Next steps (feasibility studies, legislation, new policies, training, outreach, etc.), timeline, estimated budget, and designate the organization responsible for carrying out the mitigation action. - Evaluation methodology to measure the effectiveness of mitigation strategies implemented over time: a. Short-term: 5-10 years b. Mid-term: 10-20 years c. Long-term: 20+ years	• Region-specific presentations of proposed mitigation strategies for stakeholder meetings. • Report on the findings and results of the mitigation strategies identified, analyzed, and prioritized to reduce risk, enhance recovery, and improve energy resilience by geographic region. • Draft "mitigation action plan" to include an evaluation methodology to help ODOE assess and measure the effectiveness of the mitigation strategies implemented over time. • Drafted "executive summary" or overview of the mitigation measures, recommended mitigation approach, and implementation plan to improve energy resilience in Oregon for ODOE review and inclusion into the OR ESP. • Develop GIS maps, figures, charts, tables, and other graphics as appropriate.
Task 8*	**Geographically Distributed Fuel Network Analysis (SB 1567)** 1) Evaluate strategies to increase liquid fuels storage capacity throughout Oregon - diesel, renewable diesel, unleaded gasoline, and jet fuel. The intent is to ensure vulnerable and	• Draft report on the findings, results, and a proposed prioritized list of locations and a strategy to increase geographic diversity of fuel storage by region in Oregon.

	isolated populations have greater access to fuel following a major disaster. 2) Evaluate existing public and private sector fuel sites: - State motor pools, local public works facilities, and state transportation maintenance yards and airports. - Private-sector fleet fueling (cardlocks), electric and natural gas utility field operation centers, public transit yards, and commercial airports. 3) Evaluate the seismic resilience of fuel storage facilities under consideration using existing data sources. 4) Identify and propose steps to mitigate limiting factors or barriers to implementing a geographically distributed fuel network.	• Draft "executive summary" or overview of the disaster fuel resilience strategy to improve statewide fuel reserves to support response and recovery activities during natural disasters by geographic region in Oregon for Agency review and inclusion into the OR ESP. • Develop GIS maps, figures, charts, tables, and other graphics as appropriate.

**Tasks 7 and 8 are discussed in Section VII of this Plan.*

REFERENCES

[1]Oregon Department of Forestry. "Fuel Coordination Group: Strategic Communications Plan." (July 2022).

[2] Attacks on 4 Washington Substations Cut Power to Thousands, Officials Say - The New York Times (nytimes.com)

VII. IMPROVING ENERGY RESILIENCE

Solicitation for a contractor to complete a risk assessment to **quantify and propose actions to mitigate threats to Oregon's energy infrastructure** is underway, with work to be completed in 2024. Updated risk mitigation information will be included in the Oregon Energy Security Plan submission to USDOE on September 30, 2024. A summary of the contractor Scope of Work, as included in the Request for Proposals, is included in Appendix E to the Plan.

Oregon is geographically diverse. The state consists of mountainous regions, large valleys, high-elevation desert plateau, dense evergreen forests, and more than 360 miles of coastline.

Risks to one region of the state differ from another due to the varied climate and topography. Hazards facing Oregon's coastal communities like tsunamis, erosion, and landslides differ from wildfire threats along the Cascade Mountains in the central part of the state. An earthquake along the Portland Hills Fault would endanger the Portland-Metro region, while the Cascadia Subduction Zone earthquake event has the potential to threaten the entire western part of the state, as well as Washington, British Columbia, and northern California. There is also significant variation in population density across the

state. Mitigation in a dense urban center may look very different from strategies focused on low-density rural communities.

This section describes the work to be completed primarily by a consultant to identify, evaluate, and prioritize mitigation measures to reduce risks to the energy systems in Oregon, by region. This section also includes an inventory of potential mitigation measures to consider for the energy infrastructure and highlights state programs and activities underway to improve Oregon's energy resilience. All mitigation measures, activities, and programs in this section will inform the Energy Infrastructure Risk and Mitigation Assessment.

Presidential Policy Directive - 21

"Resilience is the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents."

Prioritize Threats and Mitigation Measures by Region

The planned Energy Infrastructure Risk and Mitigation Assessment, to be completed in 2024 with support from a contractor, will consider both statewide and region-specific risk mitigation strategies for critical energy assets and systems. As part of the assessment, the Oregon Department of Energy (ODOE) will travel around the state to engage stakeholders and the Tribes in person to seek input on energy system threats and collaborate on mitigation strategies specific to the six regions. ODOE will use the regional county organization map created and used by the Oregon Department of Emergency Management.

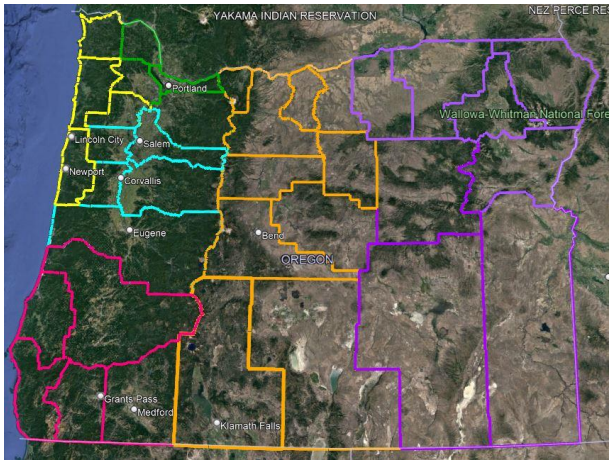


Table 25: Energy Security Plan Outreach in Six Regions

REGION	COUNTIES
Eastern	Baker, Grant, Harney, Malheur, Morrow, Umatilla, Union, and Wallowa
Cascades	Crook, Deschutes, Gilliam, Hood River, Jefferson, Klamath, Lake, Sherman, Wasco, and Wheeler
Portland Metro	Clackamas, Columbia, Multnomah, and Washington
Northwest	Clatsop, Lincoln, Tillamook, and Yamhill
Willamette Valley	Benton, Lane, Linn, Marion, and Polk
Southwest	Coos, Curry, Douglas, Jackson, and Josephine

Engaging a wide range of people and organizations — including policymakers, planners, community groups, organizations representing historically underserved communities, system operators, and Tribes —by region aids in in-depth and comprehensive analyses to identify and quantify energy sector threats

and measures to mitigate risks. It also creates greater buy-in to support implementation of both regional and statewide risk mitigation approaches.

Risk Assessment and Mitigation Plan

To mitigate impacts from evolving threats to the energy sectors, ODOE is hiring a consultant to support technical analysis and evaluation. The selected consultant will identify and evaluate mitigation technologies and operational measures that improve energy systems and reduce risks. The Risk Assessment and Mitigation Consultant Request for Proposal (RFP) introduced in Section 6 includes two tasks surrounding risk mitigation. Refer to Appendix E for a copy of the RFP. As noted, at the time of submittal of this document, the RFP is still open for proposals. The results of the consultant work will be included in the September 30, 2024 Oregon Energy Security Plan submittal.

The Table below continues the scope presented in Section 6 and describes the mitigation tasks and deliverables to be completed by September 2024. This includes requirements from Oregon Senate Bill 1567 that direct ODOE to evaluate strategies to increase liquid fuels storage capacity throughout Oregon to improve fuel resilience in the aftermath of a Cascadia event or other major disaster.

Table 26: Overview of the Risk Assessment and Mitigation RFP (continued)

TASKS	DESCRIPTION	DELIVERABLES
Task 1*	**Work Plan Development** – Develop and refine a project work plan in coordination with ODOE that incorporates SOW tasks and deliverables. Identify and describe project team's roles and responsibilities.	• Provide a Draft Project Work Plan for ODOE review no later than 14 days after contract award.
Task 2*	**Consultant Onboarding Meeting** – Coordinate with ODOE to finalize Draft Work Plan to identify issues, information needs (e.g., data gaps, critical stakeholders, timing), and concerns in the SOW.	• Final Work Plan with detailed timeline for achieving project deliverables.
Task 3*	**Project Administration –** Establish clear expectations and process for project administration.	• Meeting agendas, minutes and other records from meetings with ODOE. • Financial and performance reports to ODOE. • Revised work plans as needed with ODOE approval.
Task 4*	**Stakeholder Engagement** – Participate in ODOE-hosted stakeholder meetings to collect energy sector threats, vulnerabilities, and consequences to the energy systems and mitigation measures to reduce risk. Follow-up discussions with stakeholders may be needed.	• Report on relevant energy data collected from stakeholder input to inform the risk assessment, method of collection, and stakeholder contact information. This includes data collected in follow-up meetings.
Task 5*	**Data Collection** – Complete document review of existing reports, studies, assessments, strategies,	• Inventory of primary data, description, citations, and key

	and resources provided by ODOE on Oregon's energy systems. Collect missing data energy infrastructure threats and information needed to complete a comprehensive risk assessment.	assumptions differing across resources from document review. • Summary of data gaps to inform the risk assessment and mitigation work – data collection as directed by ODOE. • Report on newly-collected energy sector data and information source.
Task 6*	**Risk Assessment and Analysis** – Quantify energy sector risks using USDOE recommended methodology: "Risk = Threat x Vulnerability x Consequence" 1) Identify threats and determine probability of occurrence by region on an annual basis — Eastern, Central, Northwest, Portland Metro, Willamette Valley, and Southwest (Refer to map below). 2) Evaluate weaknesses within the energy infrastructure, processes, and systems or the degree of susceptibility to various threats. This includes determining energy assets, process, and systems that can be modified and mitigated to either prevent a disruption from occurring or lessen the consequences of a disruption. 3) Assess the interconnected nature within the energy sectors and with other critical lifeline sectors including cascading impacts. 4) Assess energy emergency response plans, including cyber, continuity of operations, government and community readiness to recover rapidly from an energy disruption. 5) Analyze and score threats based on probability, vulnerabilities, and consequences by geographic region in the state.	• Region-specific presentations of threats for stakeholder meetings. • Draft report on findings and results of the threats identified, analyzed, and prioritized based on hazard probability, vulnerability, and consequence by geographic region. • Draft "executive summary" or overview of the energy infrastructure risk assessment conducted for ODOE review and inclusion into the ESP. • Develop GIS maps, figures, charts, tables, and other graphics as appropriate.
Task 7	**Mitigation Measures and Analysis** – 1) Identify, assess, and rank (score) viable mitigation measures that reduce the exposure or consequence of each vulnerability to hazards identified by geographic region in the state. 2) Based on prioritized mitigation measures, develop recommended statewide mitigation	• Region-specific presentations of proposed mitigation strategies for stakeholder meetings. • Report on the findings and results of the mitigation strategies identified, analyzed, and prioritized to reduce risk, enhance

	approach to improve the state's energy resilience for ODOE consideration. 3) Develop a "mitigation action plan" based on the recommended mitigation approach. The plan should include: - Next steps (feasibility studies, legislation, new policies, training, outreach, etc.), timeline, estimated budget, and designate the organization responsible for carrying out the mitigation action. - Evaluation methodology to measure the effectiveness of mitigation strategies implemented over time: a. Short-term: 5-10 years b. Mid-term: 10-20 years c. Long-term: 20+ years	recovery, and improve energy resilience by geographic region. • Draft "mitigation action plan" to include an evaluation methodology to help ODOE assess and measure the effectiveness of the mitigation strategies implemented over time. • Drafted "executive summary" or overview of the mitigation measures, recommended mitigation approach, and implementation plan to improve energy resilience in Oregon for ODOE review and inclusion into the OR ESP. • Develop GIS maps, figures, charts, tables, and other graphics as appropriate.
Task 8	**Geographically Distributed Fuel Network Analysis (SB 1567)** 1) Evaluate strategies to increase liquid fuels storage capacity throughout Oregon - diesel, renewable diesel, unleaded gasoline, and jet fuel. The intent is to ensure vulnerable and isolated populations have greater access to fuel following a major disaster. 2) Evaluate existing public and private sector fuel sites: - State motor pools, local public works facilities, and state transportation maintenance yards and airports. - Private-sector fleet fueling (cardlocks), electric and natural gas utility field operation centers, public transit yards, and commercial airports. 3) Evaluate the seismic resilience of fuel storage facilities under consideration using existing data sources. 4) Identify and propose steps to mitigate limiting factors or barriers to implementing a geographically distributed fuel network.	• Draft report on the findings, results, and a proposed prioritized list of locations and a strategy to increase geographic diversity of fuel storage by region in Oregon. • Draft "executive summary" or overview of the disaster fuel resilience strategy to improve statewide fuel reserves to support response and recovery activities during natural disasters by geographic region in Oregon for Agency review and inclusion into the OR ESP; and • Develop GIS maps, figures, charts, tables, and other graphics as appropriate.

**Tasks 1-6 are discussed in section VI of this Report.*

It is important to note that much information is already available to support a risk mitigation analysis. ODOE will consider existing energy infrastructure mitigation information when evaluating viable measures.

Inventory of Energy Infrastructure Mitigation Strategies

The U.S. Department of Energy (USDOE) compiled an inventory of potential risk mitigation measures for the energy infrastructure. ODOE intends to use this inventory as a starting place for conversations with stakeholders and the Tribes that will lead to developing a risk mitigation approach to enhance statewide energy reliability and end-use resilience, to be submitted as part of ODOE's September 30, 2024 Energy Security Plan.

The measures summarized in the table below are categorized into two main groups. The "All Hazards" measures can apply to a range of threats. The "Hazard-Specific" measures are designed to mitigate a specific threat or risk. All Hazard measures are divided into categories that align with three of the "infrastructural qualities" outlined in the Department of Homeland Security's Resilience Framework. For the OR ESP, ODOE will also consider a fourth quality, equity:

- **Robustness** – measures that strengthen a system to withstand external hazards without degradation or loss of functionality.
- **Redundancy** – measures that allow for alternate options, choices, and substitutions when a system is under stress.
- **Rapid Detection/Recovery** – measures that accelerate the time it takes to overcome a disruption and restore energy services.
- **Equity** – measures that remove institutional barriers or undue environmental burden to historically underserved communities.

Table 27: All-Hazards Risk Mitigation Measures

ROBUSTNESS				
Measure	**Description**	**Sector**		
Demand Response, Conservation, and Efficiency Programs	Demand response, conservation, and efficiency programs relieve pressure on electric, liquid fuels, or natural gas delivery systems by reducing or time-shifting customer energy usage. Demand reduction during peak periods reduces the chance of system overload and service failure. In addition to enhancing reliability, demand response can also help reduce generator or supplier market power and lessen price volatility. Also, less driving can reduce pressure on liquid fuels delivery systems.			
System Segmentation	Energy systems (power grids, gas pipeline networks, and liquid fuels pipeline networks) can be sub-divided to more efficiently isolate damaged areas, allowing undamaged segments to continue serving customers. By segmenting networks, service isolations can be more targeted and affect fewer customers.			

Undergrounding Power Lines	Placing transmission lines underground protects them against external threats, including high winds and falling branches, wildfires, extreme heat or cold, icing, dirt/dust/salt accumulation, and animals. Buried lines may be more vulnerable to flooding if located in low-lying areas and may be more difficult and expensive to maintain and repair.			

REDUNDANCY				
Measure	**Description**	**Sector**		
Backup Generators	Fixed or portable backup generators can provide backup power to critical facilities when grid-supplied power is interrupted. Backup generators may be designed to power emergency functions, such as emergency lighting, fire suppression, or stormwater removal, or may be designed to power some or all of a facility's operational functions. Mobile generators can power utility or emergency responder base camps (sites where response personnel and equipment are staged). Backup generators require adequate fuel supply to operate, which may be in limited supply if fuel distribution systems are affected.			
Battery Storage	Battery energy storage can be used to provide backup power during electric grid outages. Batteries can be deployed at utility-scale as front-of-the-meter systems, which provide services like utility load peak shaving, or they can be behind-the-meter with customers. Batteries are often paired with solar photovoltaic systems and included in microgrid designs. This is a viable option for all businesses that store, distribute, or dispense fuels making them more resilient during power outages.			
Microgrids	A microgrid is a group of interconnected loads and distributed energy resources that acts as a single controllable entity with respect to the grid. It can connect and disconnect from the grid to operate in grid-connected or island mode. Microgrids can improve customer reliability and resilience to grid disturbances.			
Ties Between Gas Pipelines	Natural gas system operators can add ties between gas distribution lines or "mains" to diversify the transmission system and allow additional pathways to route natural gas in the event some sections of transmission mains are damaged.			

RAPID DETECTION AND RECOVERY				
Measure	**Description**	**Sector**		
Advanced Distribution	Advanced distribution management systems integrate numerous utility systems and provide automated outage			

Management Systems	restoration and optimization of distribution grid performance. These functions improve the resilience of the distribution system and decrease the length of customer outages.			
Artificial Intelligence Analysis	Artificial intelligence analysis can augment the abilities of subject matter experts to prioritize transmission line operations, identify defects, and update asset management systems.			
Distribution Automation	Distribution automation uses digital sensors and switches with advanced control and communication technologies to automate feeder switching; voltage and equipment health monitoring; and outage, voltage, and reactive power management.			
Drones for Asset Inspection	The use of drones to inspect pipelines, transmission lines, or other assets allows for safer and more frequent inspections, enhanced asset information, reduced operational costs and failure rates, and extended asset lifetimes.			
LiDAR for Vegetation Management	Vegetation is the primary cause of overhead power line outages. “Light Detection and Ranging” (LiDAR), is remote-sensing technology that can measure how close vegetation is to power lines. LiDAR units can be deployed on the ground, or by drones or aircraft, to enable more effective vegetation management reducing the impact of storms on electric infrastructure.			
Remote-Operated Valves	Remote-operated valves more efficiently isolate systems during disruptions or peak event load management (e.g., temporarily disconnecting gas customers).			
Advanced Metering Infrastructure	Advanced metering infrastructure (AMI) is an integrated system of smart meters, communications networks, and data management systems that enables bi-directional communication between utilities and customers. Smart meters can provide near-real-time visibility into customer outages and help utilities allocate resources and restoration activities more efficiently.			
Supply Chain Resilience Planning	Assessing current supply chains and working with relevant stakeholders to strategically plan for the continuity and rapid restoration of those supply chains after major disruptions improves supply chain resilience.			

Table 28: Hazard-Specific Risk Mitigation Measures

COLD WEATHER PROTECTION				
Measure	**Description**	**Sector**		
Pipeline Insulation & Trace Heating	Fiberglass insulation used to enclose piping can protect against freezing. Additionally, an electrical heating element installed along the length of a pipe and covered by thermal			

	insulation can be used to maintain or raise the temperature of the pipe during cold weather.			
Water Line Management	Draining water lines prevents rupturing that would otherwise be caused by the freezing water caught inside. Water lines that cannot be drained can be set to drip. The small amount of flow caused by the steady drip can help prevent the water inside the lines from freezing and rupturing the lines.			
Heating & Pitch Adjustment for Wind Turbines	Wind turbine blades and lubricant housings can be fitted with heating elements that prevent ice accumulation that would otherwise impair operations. Wind turbines can also be configured to operate in winter ice operation mode, which changes the pitch of the blades to allow continued operation as they accumulate ice.			
Thermal Enclosures	Instrumentation can be enclosed and heated to ensure functionality and operational continuity during extreme cold conditions.			

EXTREME HEAT & DROUGHT RESISTANCE				
Measure	**Description**	**Sector**		
Advanced Water-Cooling Technologies	Power plants require significant volumes of water for thermoelectric cooling. Asset owners can employ approaches to reduce their water use to make them more resilient to drought conditions. Alternative approaches include recirculating cooling, dry cooling (highlighted below), and wet-dry hybrid cooling technologies. Cooling equipment capable of using alternative water sources (e.g., brackish water, wastewater) can reduce the impact of droughts.			
Dry Cooling	Nearly all thermal generation, including nuclear and coal-fired power plants, requires large quantities of water for cooling. Extreme heat can lead to water shortages or make the water used for cooling too warm, forcing power plant operators to curtail electricity output. Dry cooling technologies use air-cooled heat exchangers and other technologies to significantly reduce water use.			
Hydropower Reservoir Capacity	Increasing reservoir storage capacity at hydroelectric power plants can offset the effects of precipitation variability.			
Turbine Efficiency	Higher-efficiency hydroelectric turbines require less water per unit of electricity generated and are more resilient to drought.			

FLOOD PROTECTION		
Measure	**Description**	**Sector**

Elevate Equipment	Elevating equipment located in low-lying areas can protect it from flooding that would otherwise damage or destroy it.			
Environmental Management	Preserving certain kinds of natural habitats (e.g., coastal wetlands) provides a natural barrier to lessen the impact of storm surges.			
Flood Walls and Gates	Installing flood walls, gates, and/or barriers can protect essential equipment in flood-prone areas from water intrusion and avoid restoration delays after major storms and floods.			
Relocate Assets	Relocating energy assets away from flood-prone areas can reduce or eliminate their exposure to flooding and inundation threats.			
Stormwater Pumps	Stormwater pumps can remove flood water and help prevent equipment from being submerged.			
Submersible Equipment	Equipment located in flood-prone areas, such as underground power distribution systems in low-lying areas, can be modified or replaced with equipment that is designed to continue functioning when subjected to flooding from water containing typical levels of contaminants such as salt, fertilizer, motor oil, and cleaning solvents.			
Vent Line Protectors	A vent line protector (VLP) protects gas regulator vent lines from encroaching water. The VLP is usually open, but if water enters the vent line via the VLP, a float will seal the vent line shut. The float will drop when the water recedes, re-opening the vent to its normal position.			
Vented Manhole Covers	In flooding scenarios, manhole covers can dislodge, and the exposed manhole creates a hazard for pedestrians and vehicles. Proper vent design can allow for the flow of excess water without dislodging the cover.			

SEISMIC PROTECTION				
Measure	**Description**	**Sector**		
Base Isolation Transformer Platform	Substation transformers can be placed on platforms designed to absorb the shaking from earthquakes that would otherwise damage the equipment.			
Culverts	Placing fuel pipelines within buried concrete trenches, called culverts, significantly reduces the fracturing, buckling, and other damage to buried pipelines during an earthquake.			
Flexible Joints	Flexible joints between steel pipe segments absorb the deformations caused during an earthquake and lessen the damage caused to pipeline infrastructure.			

WILDFIRE PROTECTION		
Measure	**Description**	**Sector**

Covered Conductors	To mitigate wildfire risk, utilities can replace bare wire overhead conductors on high-voltage transmission lines with conductors that have a plastic covering (also called tree wire). Covered conductors greatly reduce the number of faults, and the risk of ignition. Similar products include spacer cables and aerial cables.			
Fire-Resistant Poles	Wood poles can be replaced with ones made from fireproof materials, or wrapped in fireproof sheaths (e.g., wool-ceramic fiber).			
Line-Break Protection Systems	Automated monitoring equipment, called phasor measurement units, installed on transmission lines can detect a voltage change associated with the breakage of a power line. The system can respond in near real-time by de-energizing that segment of the transmission line so that the broken power line does not spark a fire as it falls to the ground.			
Pre-Treat Assets in Path of Fire	Pre-treating infrastructure (e.g., by applying flame retardant coatings or wrapping assets such as utility poles in flame retardant sheaths) decreases wildfire damage and expedites restoration of service.			
Reconducting	Reconductoring is the process of installing new conductor wires on existing towers to increase transmission capacity, thus reducing propensity for high loads and line sag, which can cause ignition. Reconductoring typically involves replacing traditional steel-reinforced lines with composite core lines.			
Breakaway Service Connectors	A breakaway service connector is designed to disconnect when the power line it is attached to is pulled by a falling limb or other debris. This avoids damage caused when a service wire is pulled down in a way that damages the meter receptable. Meter receptables are not owned by the utility, and a private electrician is needed to first make repairs, delaying service restoration.			
Dead-End Towers	Dead-end towers (also called anchor towers or anchor pylons) are self-supporting structures made with heavier material than suspension towers. Dead-end towers are used at the end of a transmission line where the transmission line turns at a large angle, on each side of a major crossing such as a large river or highway or large valley, and at intervals along straight segments to provide additional support. Suspension towers are typically used when the transmission line continues along a straight path. When weaker suspension towers are compromised or toppled, the stronger dead-end structures can stop a domino effect that takes down multiple towers. Reducing the spacing between dead-end structures can limit the impacts of domino effect failures.			

Stronger Utility Poles	This can involve reinforcing wood poles, replacing wood poles with concrete ones, or replacing wood cross-arms with fiberglass ones.			
Vegetation Management	Clearing vegetation away from transmission and distribution lines helps prevent damage to power lines (e.g., falling tree branches) that cause outages.			

While cyber resilience measures were outside of the intended scope of this USDOE inventory, cyber resilience measures will be included in ODOE's Risk Assessment and Mitigation RFP.

State Energy Resilience Policy Package

Enhancing energy resilience is a state priority. On July 27, 2023, Governor Tina Kotek signed House Bill 3409 known as the "Climate Resilience Package" into law, investing $90 million in climate action that could return up to $1 billion in federal funding over the next few years. The Climate Resilience Package is a compilation of more than a dozen bills that focuses on community resiliency and shaping the state's clean energy future.

The programs created and implemented from the Climate Resilience Package will influence energy investments and resilience in Oregon over time. ODOE will factor in these programs when evaluating risk mitigation strategies for the energy sectors as appropriate.

Table 29: Climate Resilience Package[1]

SHAPING OREGON'S CLEAN ENERGY FUTURE	
HB 3166	**Oregon Department of Energy (ODOE) "One Stop Shop"** – Supports ODOE in establishing and administering two energy efficiency and home electrification programs to help efficiently and equitably allocate $114 million in expected federal funding to Oregonians.
HB 2534	**State Energy Strategy** – Directs ODOE to develop a comprehensive state energy strategy that identifies optimized pathways to achieving the state's energy policies, including 100% clean energy by 2040.
HB 3378	**County Energy Resilience Planning** – Enables Oregon counties to apply for $50k each in grants from ODOE to support the development of energy resilience plans.
SB 5506	**Oregon Solar + Storage Rebate Program** – SB 5506 in the 2023 legislative session, extended the sunset of the Oregon Solar + Storage Rebate Program to January 2, 2029 and included an additional investment of $10 million in the program. SB 5506 also allocated $20 million from the general fund to expand Oregon's Community Renewable Energy Grant Program.
SB 852	**Environmental Justice and Tribal Navigator** – Creates a position at ODOE to provide information about state and federal funding opportunities and technical assistance in developing energy projects for rural, Tribal, and other environmental justice communities.
HB 3418	**Residential Solar Rebate Program Extension and Investment –** Extends popular rebate program for residential solar and storage projects through January 2029 and invests another $10 million. ODOE also expects to receive significant federal funding soon from IRA's Solar For All to leverage this state investment.

HB 3056	**Residential Heat Pump Program Extension –** Supports implementation of the state's Residential and Community Heat Pump Deployment Programs established by the 2021 legislature to bring much-needed heat relief to Oregon communities.
CLIMATE RESILIENCE AND SUSTAINABLE COMMUNITIES	
Resilient Efficient Buildings Package	
SB 868	**Healthy Heating and Cooling for All** – Sets a state goal to get 500,000 new heat pumps installed by 2030, with a priority for low-income and environmental justice communities. Leverages new federal incentives and existing state programs to accelerate heat pump adoption and increase weatherization and retrofits of homes, apartments, and businesses. Aligns Oregon's energy efficiency programs with our state climate goals. Creates a workforce training fund at ODOE.
SB 869	**Building Performance Standard** – Establishes a building performance standard for existing large commercial buildings across the state, which will reduce climate pollution and improve their energy efficiency over time.
SB 870	**Build Smart from the Start** – Strengthens building codes for new construction to increase energy efficiency and resilience and encourage low-carbon building materials. Ensures our building codes help achieve our state climate goals.
SB 871	**Smart State Buildings** – Ensures state-owned public buildings walk the talk on Oregon's efficiency and climate goals.
HB 2714	**Electric Truck Rebates** – Creates a new state rebate program for medium- and heavy-duty zero-emission vehicles like delivery and semi-trucks, transit, and school buses, anticipated to leverage federal funding from the Inflation Reduction Act.
HB 2990	**Community Resilience Hubs and Networks** – Builds community resilience by creating hubs and networks across Oregon that activate before, during, and after climate disasters.
SB 530	**Natural Climate Solutions** – Supports statewide forestland owners, farmers, and ranchers to implement climate-smart land management practices, improving Oregon communities' resilience and natural resource economies while sequestering carbon.
HB 3181	**Siting Renewable Energy** – Creates stakeholder process and collaboration between DLCD and ODOE to find opportunities and minimize conflicts when siting renewable energy projects in Oregon.
SB 522	**Oregon Climate Action Modernization** – Supports staffing and expanded representation on the Oregon Global Warming Commission, renaming it the Climate Action Commission.
HB 3016	**Community Green Infrastructure Act AKA TREES Act** – Provides funding to develop community green infrastructure projects. Provides technical and financial assistance to public bodies, Tribal governments, watershed councils, and CBOs to respond to canopy damage due to pests, diseases, or other conditions.
OTHER NOTABLE RESILIENCE PROGRAMS	
IIJA	**Grid Resilience** – In support of President Biden's Investing in America agenda, in June 2023 USDOE awarded $19,907,304 to ODOE via the Grid Resilience State and Tribal Formula Grants program, which is supported by the Infrastructure Investment and Jobs Act (IIJA). ODOE's goal will be to fund projects that will have

	the greatest community benefits while addressing the most pressing grid resilience needs.
SB 1567	**Fuel Tank Seismic Stability** – In 2022, Senate Bill 1567 gave the Oregon Department of Environmental Quality (DEQ) the authority to develop a program that evaluates the vulnerability of fuel tank systems to earthquakes and requires facilities to develop a plan to minimize risk. These rules will apply to facilities managing over two million gallons of fuel in Lane, Multnomah and Columbia counties.
EO 20-04	**Wildfire Mitigation** – Governor Executive Order 20-04 directs the Oregon Public Utility Commission (OPUC) to evaluate electric companies' risk-based wildfire protection plans. This includes planned activities to protect public safety, reduce risks to utility customers, and promote energy system resilience in the face of increased wildfire frequency and severity.

Resilience Resources

Mitigating impacts from hazards to the energy system is a topic that is constantly being reevaluated, and the guidance for best practices is ever-changing. Below are resources focusing on ways to increase the resilience of energy systems. Note: this is not a comprehensive list of resources.

Oregon Department of Energy. 2019. Oregon Guidebook for Local Energy Resilience.

The guidebook is intended to help Consumer Owned Utilities' staff identify incremental actions they can take to: 1) Improve business continuity planning; 2) Develop a framework to prioritize investments in distributed energy resources; and 3) Better understand the role of local utilities within the context of federal, state, and local emergency management planning. The Guidebook includes a Resilience Resource List and Resilience Guidance Deep Dives addressing a number of resilience topics, including distributed energy resources, State of Oregon emergency planning resources, the Federal Emergency Management Agency's role, and others.

Institute of Electrical and Electronics Engineers. 2020. *Resilience Framework, Methods, and Metrics for the Electricity Sector*.

This report provides an overview of resilience definitions (including its relationship with reliability), the existing frameworks for holistically defining resilience planning and implementation processes, and the metrics to evaluate and benchmark resilience. It also evaluates technologies, tools, and methods to improve electrical system resilience.

National Renewable Energy Laboratory. 2019. *Energy Resilience Assessment Methodology*.

This report presents a replicable energy resilience assessment methodology for sites, military bases, and campuses to assess energy risks and develop prioritized solutions to increase site resilience.

National Renewable Energy Laboratory. 2019. *Power Sector Resilience Planning Guidebook: A Self-Guided Reference for Practitioners*.

This guidebook introduces policymakers, power sector investors, planners, system operators, and other energy-sector stakeholders to the key concepts and steps involved in power sector resilience planning.

U.S. Climate Resilience Toolkit. 2019. *Building Resilience in the Energy Sector*

Examines climate change challenges for the energy sector, possible actions to mitigate risk and links to resources.

U.S. Department of Homeland Security. 2019. *National Mitigation Investment Strategy.*

The National Mitigation Investment Strategy ("NMIS"), developed by the Mitigation Framework Leadership Group is a single national strategy for advancing mitigation investment to reduce risks posed by natural hazards and increasing the nation's resilience to natural hazards. This report outlines the investment strategy and how federal and non-federal partners can coordinate community mitigation investments.

U.S. Dept. of Energy. 2016. *Climate Change and the Electricity Sector: Guide for Climate Change Resilience Planning*.

This report provides basic assistance to electric utilities and other stakeholders in assessing vulnerabilities to climate change and extreme weather, and in identifying an appropriate portfolio of resilience solutions.

Electric Power Research Institute (EPRI). 2016. *Electric Power System Resiliency*.

This report describes innovative technologies, strategies, tools, and systems that the electricity sector is developing and applying to address resiliency. The report explores three elements of resiliency: damage prevention, system recovery, and survivability.

U.S. Dept. of Energy. 2014. *United States Fuels Resiliency Volume III: U.S. Fuels Supply Infrastructure Vulnerabilities and Resilience*.

This study evaluates the ability of the nation's oil and natural gas transportation, storage, and distribution infrastructure to respond to and recover from natural disasters and intentional acts, system chokepoints and interdependencies, and other supply interruptions.

U.S. Dept. of Energy. 2010. *Hardening and Resiliency: U.S. Energy Industry Response to Recent Hurricane Seasons*.

This report examines the storm hardening and resilience measures that refiners, petroleum product pipeline operators, and electric utilities in the Gulf Coast area took in response to the 2005 and 2008 hurricane seasons. It focuses on the segments of the energy industry that contribute most to the delivery of gasoline and diesel to the Southeast U.S.

REFERENCES

[1] Climate Solutions. August 28, 2023. *Oregon's Climate Wins in the 2023 Legislative Session*. https://www.climatesolutions.org/article/2023-08/oregons-climate-wins-2023-legislative-session

VIII. ENERGY SECURITY READINESS

Emergency Support Function (ESF)-12 agencies routinely participate in training and activities at the local, state, regional, and national levels to ensure the Oregon is prepared to respond to and rapidly recover from energy supply disruptions. This includes creating and practicing programs and measures that strengthen energy systems, reduce risk, and minimize impacts to communities.

This section describes the programs and activities to increase statewide energy program readiness. These activities change every year depending on available resources, opportunities, and program needs. This section examines the prior year's events and describes best practices, lessons learned, corrective actions, progress, and achievements toward improving the state's resilience posture to ensure energy security.

Training and Exercises

Through training and exercises, the state is able to test capabilities, practice procedures, and improve performance in a no-fault learning environment, so decision-makers and responders are ready to tackle energy supply disruptions. This includes the Oregon Fuel Action Plan and strategies to respond to liquid fuels supply and distribution problems affecting the state. Links to ESF-12 plans for electricity and natural gas are forthcoming in the 2024 Oregon Energy Security Plan. Training and exercises also allow ESF-12 agencies the chance to identify strengths, planning and response gaps, and other areas for improvement in coordination and collaboration with emergency response partners.

ESF-12 agencies participate in virtual and hybrid workshops, tabletop drills, and functional exercises to review, validate, and assess the effectiveness of energy response plans and procedures. This allows the agencies to ensure a coordinated response and rapid recovery of energy systems from various designed scenarios. The most recent events and exercises are presented below:

2023 Olympic Pipeline Worst Case Disaster Exercise

The Oregon Department of Energy (ODOE) participated in its first Olympic Pipeline exercise in August 2023. ODOE collaborated with the company, state agencies, local government, and federal partners in response to a simulated pipeline breach that caused a jet fuel spill into the Columbia River. Even though Olympic Pipeline's primary focus was oil spill response, the company took this opportunity to integrate ODOE into the company's emergency response plan and structure.

During oil spill events or exercises, ODOE will serve as a Liaison/Agency Representative to work with Olympic Pipeline officials to address potential supply and distribution concerns resulting from the oil spill and damaged pipeline. As a part of exercise play, ODOE monitored potential supply concerns resulting from the oil spill and its impacts to meeting local, regional, and statewide jet fuel needs, provided situational awareness, and discussed the need for issuing temporary waivers.

Kinder Morgan Tabletop

ODOE regularly participates in private sector tabletops exercises. In October 2022, Kinder Morgan invited ODOE staff to join the company's National Preparedness for Response Exercise Program Tabletop. The scenario involved a pipeline failure 15 feet underneath the Willamette River with more than 60,000 gallons of jet fuel released into the river. The cause of the failure was unknown, and resulted in the extended shutdown of the Olympic Pipeline for weeks. The Olympic Pipeline

supplies more than 75 percent of the refined product used in Oregon from refineries located in Washington.

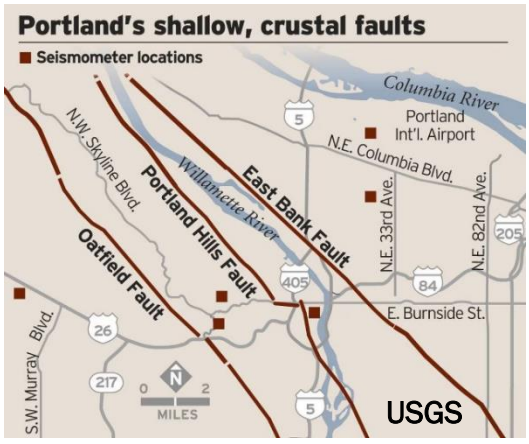
While the Oregon Department of Environmental Quality, U.S. Coast Guard, and U.S. Environmental Protection Agency worked with Kinder Morgan to address oil spill response and environmental cleanup issues, ODOE focused on potential supply concerns affecting the state. ODOE coordinated with Kinder Morgan, Port of Portland, Portland International Airport (PDX), and jet fuel providers, including British Petroleum, Chevron, Marathon, and others to address:

- Alternate sources of jet fuel to meet PDX fuel demands. Airport officials coordinated with incoming flights to fuel up at SeaTac, Boise, Denver, Los Angeles, and other airports in the region prior to arriving at PDX until the pipeline is restored.
- Alternate methods to deliver jet fuel to PDX. With no active loading racks at PDX to receive jet fuel by truck, the only option was for PDX to reroute flights to other airports when possible, and continue ensuring incoming flights were fueling up elsewhere prior to arrival. PDX is installing two loading racks to ensure the airport can receive jet fuel by truck should the pipeline be compromised in a real-world scenario.
- Potential statewide supply chain impacts to all refined products to Oregon if the pipeline were to remain inoperable for weeks. ODOE may need to request federal support should the pipeline remain shut down and threaten public health and safety due to supply disruptions across all fuel types.
- Kinder Morgan request for temporary waivers to expedite permits for pipeline repairs under the Willamette River. Waivers included Hours of Service, Vapor Recovery, Reed Vapor Pressure, and others requiring ODOE to coordinate with local, state, and federal agencies.

During a briefing, ODOE reported on the agency's action to activate the Western States Petroleum Collaborative in this scenario to provide situational awareness, assess potential impacts to neighboring states, and to coordinate potential joint state actions if needed. The inability to move jet fuel from the Kinder Morgan pipeline, barge, or truck could create a backlog of all refined product deliveries, eventually affecting refinery operations in Washington state and supply issues in the region.

2022 Fuel Injection Tabletop

ESF 12 agencies participated in the September 2022 Fuel Injection Tabletop exercise sponsored by Clackamas County, Oregon and the Regional Disaster Preparedness Organization (RDPO). The Tabletop was designed for the Portland metropolitan area counties to test their emergency fuel management plans and make operational decisions in response to a Portland Hills Fault earthquake. This includes Clackamas, Columbia, Multnomah, and Washington counties in Oregon and Clark County in Washington. ESF 12 agencies in Oregon and Washington participated in the Tabletop that involved participants more than 35 local government agencies, fuel providers, and federal partners.



According the [Oregon Department of Geology and Mineral Industries] (DOGAMI), a 6.8 magnitude earthquake along the [Portland Hills fault] could result in severe ground shaking, landslides, and damage to the Critical Energy

Infrastructure (CEI) Hub. The CEI Hub is a six-mile stretch of facilities on the west bank of the Willamette River in Northwest Portland. The majority of Oregon's liquid fuels infrastructure and a portion of electric and natural gas infrastructure is located in the CEI Hub.

ODOE provided technical assistance to the counties and helped to validate county processes to determine fuel inventory, requirements, and priorities in response to a Portland Hills fault earthquake scenario. This included validating processes to request and acquire emergency fuel from the state and collaborating on county-specific and regional fuel allocation priorities and strategies for operating fuel points of distribution. on liquid fuels planning, OPUC provided technical assistance to the counties on issues surrounding power outages from this scenario.

While the Tabletop focused on the Portland metro counties fuel management plans, a Portland Hills Fault earthquake could cause statewide fuel supply and distribution problems. ODOE collaborated with the Washington Department of Commerce (WDOC), the state's ESF-12 lead agency on potential regional impacts from this scenario. WDOC also supported Clark County in validating policies and procedures in the local fuel management plan at the Tabletop.

Exercise Opportunities in the next year

IronOR 24

IronOR 24 is a functional disaster exercise focused on interagency and statewide coordination following a 9.0 magnitude Cascadia Subduction Zone (CSZ) earthquake and tsunami. This state-level exercise will involve state, local and Tribal partners. IronOR 24 exercise play will begin at Day 4 post CSZ and will be conducted over a four-day period in October 2024. ESF 12 agencies will coordinate with energy providers and federal, state, local, and Tribal partners to respond to potential energy supply and distribution concerns resulting from the exercise scenario.

All lessons learned from responding to actual emergencies, exercises, and training will be incorporated as appropriate in forthcoming revisions to the state's energy emergency response plans.

Case Studies

The most effective way to test and validate the state's energy plans and procedures is in response to real world events. ESF-12 agencies in Oregon have had several opportunities in recent years to demonstrate the state's resources and capabilities to effectively address and resolve potential and actual energy supply issues. Below are some highlights of ESF 12 agency actions and lessons learned.

Oregon Highway 101 Landslide

Ongoing rain storms in early January 2023 drenched southwest Oregon, cutting off power, flooding communities, prompting evacuations, and causing a major landslide on Hwy 101 along the coast near the town of Port Orford. The Oregon Department of Transportation (ODOT) closed all lanes of U.S. Highway 101 for nearly a week. Hwy 101 is the only major road connecting communities on the southern Oregon coast with Oregon's major cities and distribution networks to the north.

Specifically, the closure of Hwy 101 presented problems for fuel companies delivering product to communities along the southern Oregon coast. Typically, fuel delivered to the southern Oregon coast communities originates at a distribution terminal in Eugene, traveling west, and then south on Hwy 101, never leaving Oregon. However, with the closure of Hwy 101, the safest and most efficient alternate route to these communities from Eugene would be to pass through California using Hwy 199 to Hwy 197, and then north back onto Hwy 101 at Smith River (see map).

Oregon and California state regulations for trucking differ for both truck weight limits and axle limits. The Oregon Department of Energy (ODOE) and ODOT collaborated with the California Energy Commission (CEC) and California Department of Transportation (Caltrans) on the appropriate protocols if Oregon were to request a temporary waiver to allow fuel trucks originating from Oregon to exceed the California 80,000 lbs weight limit and 6-axle restriction when passing through California to deliver fuel to Oregon communities on the southern Oregon coast during the closure of Hwy 101. This would allow fuel trucks delivering fuel loads to the southern Oregon communities to carry their normal 105,500 lb fuel loads with 8-axle truck and trailer combinations, which is consistent with Oregon regulations and the typical size of a delivery vehicle in Oregon. The alternative would be to have more, smaller fuel vehicles traveling on California highways, which is less efficient, requires more trips, and produces more greenhouse gas emissions. It's also during a time of limited truck and truck driver availability, which presents logistical challenges for fuel delivery companies.

However, ODOT was able to make the necessary repairs to reopen one lane of Hwy 101 within five days of the closure so no temporary waiver was necessary from California. A major lesson learned from this event was that CEC and Caltrans do not have the authority to issue permits for divisible loads without a Presidential declaration, approval from the Federal Highway Administration, and accompanying executive orders from the Governors of Oregon and California.

September 2022 Public Safety Power Shutoff

Gusty winds and extreme fire conditions led multiple electric utilities in several counties to implement proactive Public Safety Power Shutoffs (PSPS) in early 2022 to prevent possible fire ignitions from the electric infrastructure. Electric utilities first evaluated the weather conditions including wind speed, moisture levels in trees and brush, humidity, and temperature. Field observations were also conducted before activating this last-resort safety measure to help protect customers and the community. Electric utilities implemented the PSPS in September 2022 after determining that the combined extreme fire conditions, low humidity, and strong wind gusts topping 50 MPH created a high risk of fire in six Oregon counties – Douglas, Linn, Lincoln, Marion, Polk, and Tillamook. By implementing proactive outage measures that de-energize power lines in high-risk areas, electric utilities in Oregon reduced the risk of wildfire and prevented the potential devastating loss of life and property such as those the state experienced in 2020.

OPUC coordinated with electric utilities, state agency partners, and local governments to activate Community Resource Centers in the affected communities, providing access to charging for personal electronics and Wi-Fi, and distributing ice and water. OPUC also supported restoration efforts, which involved several hundred operational personnel, including contractors and mutual assistance crews working round-the-clock to patrol, inspect, and make necessary repairs along several thousand miles of service lines required to safely restore power.

2021 Wildland Fires

Starting in June 2021, a sudden increase in commercial air travel as the COVID pandemic waned, coupled with an early wildfire season in late spring, resulted in jet fuel supply and distribution problems for smaller airports in southern and northeast Oregon to support wildland firefighting missions. While there was no shortage of jet fuel in Oregon, there were logistical challenges connecting available supplies with fuel haul trucks and drivers to get the much-needed fuel to those local airports where the demand for jet fuel exceeded local supplies. ODOE worked with state, local, and federal partners, as well as with the private sector, to ensure firefighters had the fuel they needed to continue to fight wildfires. This included establishing procedures in coordination with the Oregon Department of Forestry and the Oregon Department of Aviation for requesting and meeting fuel needs in future wildfire seasons.

OPUC coordinated with Pacific Power, Portland General Electric, and Bonneville Power Administration to reroute downed transmissions lines affected by smoke from the Bootleg Fire in southern Oregon. These transmissions lines power the California Oregon Intertie that supplies power to a significant portion of southern California.

2021 Winter Storm

In February 2021, the Governor declared a state of emergency after freezing rain and snow blanketed nine Oregon counties, causing treacherous conditions and widespread power outages. OPUC facilitated a significant number of utility crews from outside of the region to supported power restoration to 600,000 customers. With three times the normal number of line crews, OPUC also coordinated with the Oregon Department of Emergency Management to meet the safety, nutritional, and housing needs of the lineworkers.

OPUC coordinated with ODOE to meet the fueling needs of utility crews to ensure lineworkers were working safely and efficiently. Also, because roundtrip fuel deliveries from Portland to central Oregon and to some coastal communities average ten hours under normal conditions, ODOE coordinated with the Oregon Department of Transportation to secure an Hours-of-Service (HOS)

waiver to allow fuel truck drivers to exceed the 11-hour limitation, if needed, to make deliveries safely without penalties. Oregon HOS laws limit drivers to 11 hours of drive time within a 14-hour window after 10 consecutive hours off duty. ODOE also worked with suppliers and distributors to coordinate fuel deliveries to first responders and critical infrastructure facilities like water and wastewater treatment facilities for powering backup generators.

All lessons learned from responding to real world emergencies will be incorporated as appropriate in forthcoming revisions of the state's energy emergency response plans.

Monitoring Implemented Statewide Risk Mitigation Actions

Solicitation for a contractor to complete a risk assessment to **quantify and propose actions to mitigate threats to Oregon's energy infrastructure** is underway, with work to be completed in 2024. Updated risk mitigation information will be included in the Oregon Energy Security Plan submission to USDOE September 30, 2024. ODOE will monitor and highlight risk mitigation measures being considered, in progress, or implemented in this section beginning in Oregon's ESP submission to USDOE in 2025.

APPENDIX A – ACRONYMS

BBL	Barrels = 42 Gallons
Bcf	Billion Cubic Feet
BPA	Bonneville Power Administration
BRIC	Building Resilient Infrastructure and Communities Program
BSEE	Bureau of Safety and Environmental Enforcement
Btu	British Thermal Unit
CBP	U.S. Customs & Border Protection
CEC	California Energy Commission
CEI	Critical Energy Infrastructure
CESER	Cybersecurity Energy Security, and Emergency Response (USDOE)
CISA	Cybersecurity Infrastructure Security Agency
CSS	Cyber Security Services
CSZ	Cascadia Subduction Zone
DAS	Department of Administrative Services
DLA	Defense Logistics Agency
ECC	Emergency Coordination Center
EEAC	Energy Emergency Assurance Coordinators Program
EIA	Energy Information Administration (USDOE)
EIS	Enterprise Information Services
EOP	Emergency Operations Plan
EPA	U.S. Environmental Protection Agency
ESF	Emergency Support Function
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FMCSA	Federal Motor Carriers Safety Administration
GDC	Governor’s Disaster Cabinet
GIS	Geographic Information System
HMGP	Hazard Mitigation Grant Program
HOS	Hours of Service
IIJA	Infrastructure Investment and Jobs Act
kWh	Kilowatt Hour
LiDAR	Light Detection and Ranging
MARS	Regional Mitigation and Recovery Coordination Team
MMcf	Million Cubic Feet
MNPPS	Marathon Northwest Products Pipeline System
MRP	Mission Ready Packages
MWh	Megawatt Hours
NARUC	National Association of Regulatory Utility Commissioners

NASEO	National Association of State Energy Officials
NEMA	National Emergency Management Association
NGA	National Governors Association
NIMS	National Incident Management System
NIST	National Institute of Standards and Technology
NRCC	National Response Coordination Center
ODEQ	Oregon Department of Environmental Quality
ODOE	Oregon Department of Energy
ODOT	Oregon Department of Transportation
OE	Office of Electricity (USDOE)
OEA	Office of Enterprise Assessments (USDOE)
OEM	Oregon Department of Emergency Management
OICG	Oregon Infrastructure Coordination Group
OMD	Oregon Military Department
OPUC	Oregon Public Utility Commission
OR ESP	Oregon Energy Security Plan
ORNG	Oregon National Guard
ORS	Oregon Revised Statutes
OTFC	Oregon TITAN Fusion Center
PADD	Petroleum Administration for Defense District
PDX	Portland International Airport
PHMSA	U.S. Pipeline and Hazardous Materials Safety Administration
PNW	Pacific Northwest
P & R	Regional Preparedness & Response Coordination Team
PSPS	Public Safety Power Shutoffs
PTC	Portland Terminal Cluster
RFP	Request for Proposal
SB 1567	Senate Bill 1567
SESP	State Energy Security Plan
SLTT	State, Local, Tribal, and Territory Governments
SRF	State Recovery Function
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
US DHS	U.S. Department of Homeland Security
USDOE	U.S. Department of Energy
USDOT	U.S. Department of Transportation
WDOC	Washington Department of Commerce
WRMAG	Western Regional Mutual Assistance Group
WSPC	Western States Petroleum Collaborative

APPENDIX B – LIST OF FIGURES

APPENDIX C – LIST OF TABLES

APPENDIX D: LARGEST GENERATORS BY CAPACITY

Plant Name	Entity Name	County	Net Summer Capacity (MW)	Net Winter Capacity (MW)	Technology	2021 Generation	% of Total Generation
John Day	USACE Northwestern Division	Sherman	118	118	Conventional Hydroelectric	6,048,748	9.9%
The Dalles	USACE Northwestern Division	Wasco	14	14	Conventional Hydroelectric	4,734,282	7.8%
Bonneville	USACE Northwestern Division	Multnomah	13.1	13.1	Conventional Hydroelectric	3,726,676	6.1%
McNary	USACE Northwestern Division	Umatilla	58	58	Conventional Hydroelectric	2,907,291	4.8%
Hells Canyon	Idaho Power Co	Wallowa	131.8	131.2	Conventional Hydroelectric	944,339	1.5%
Biglow Canyon Wind Farm	Portland General Electric Co	Sherman	125.4	125.4	Onshore Wind Turbine	863,705	1.4%
Port Westward Unit 2	Portland General Electric Co	Columbia	18.7	18.7	Natural Gas Internal Combustion Engine	624,545	1.0%
Klondike Windpower III	Avangrid Renewables LLC	Sherman	76.5	76.5	Onshore Wind Turbine	610,767	1.0%
Wheatridge Hybrid	Wheatridge Wind Holdings, LLC	Morrow	30	30	Batteries	516,047	0.8%
Round Butte	Portland General Electric Co	Jefferson	110	110	Conventional Hydroelectric	501,583	0.8%
South Hurlburt Wind LLC	Caithness Shepherds Flat LLC	Gilliam	290	290	Onshore Wind Turbine	499,774	0.8%
Horseshoe Bend Wind LLC	Caithness Shepherds Flat LLC	Gilliam	290	290	Onshore Wind Turbine	494,388	0.8%
North Hurlburt Wind LLC	Caithness Shepherds Flat LLC	Gilliam	265	265	Onshore Wind Turbine	467,149	0.8%
Oxbow (OR)	Idaho Power Co	Baker	52	53	Conventional Hydroelectric	459,893	0.8%
Montague Wind Power Facility LLC	Avangrid Renewables LLC	Gilliam	200	200	Onshore Wind Turbine	427,793	0.7%
Biomass One LP	Biomass One LP	Jackson	8.5	8.5	Wood/Wood Waste Biomass	380,524	0.6%
Leaning Juniper Wind Power II	Avangrid Renewables LLC	Gilliam	199.2	199.2	Onshore Wind Turbine	340,893	0.6%
Hermiston Power Partnership	Hermiston Power Partnership	Umatilla	184	195	Natural Gas Fired Combined Cycle	305,059	0.5%
Elkhorn Valley Wind Farm	Telocaset Wind Power Partners	Union	100.7	100.7	Onshore Wind Turbine	265,008	0.4%
Wheatridge 1	Portland General Electric Co	Morrow	100	100	Onshore Wind Turbine	243,493	0.4%
Vansycle II Wind Energy Center	FPL Energy Stateline II Inc	Umatilla	98.9	98.9	Onshore Wind Turbine	233,567	0.4%
Leaning Juniper	PacifiCorp	Gilliam	100.5	100.5	Onshore Wind Turbine	225,861	0.4%
Carty Generating Station	Portland General Electric Co	Morrow	168.2	189.9	Natural Gas Fired Combined Cycle	221,629	0.4%
Klondike Windpower II	Avangrid Renewables LLC	Sherman	81	81	Onshore Wind Turbine	204,421	0.3%
Pelton	Portland General Electric Co	Jefferson	36	36	Conventional Hydroelectric	197,915	0.3%
Star Point Wind Project LLC	Avangrid Renewables LLC	Sherman	98.7	98.7	Onshore Wind Turbine	181,963	0.3%
Arlington Wind Power Project	Arlington Wind Power Project LLC	Gilliam	102.9	102.9	Onshore Wind Turbine	174,228	0.3%
Pebble Springs Wind LLC	Avangrid Renewables LLC	Gilliam	98.7	98.7	Onshore Wind Turbine	173,187	0.3%
Hay Canyon Wind Power LLC	Avangrid Renewables LLC	Sherman	100.8	100.8	Onshore Wind Turbine	171,647	0.3%
Wheat Field Wind Power Project	Wheat Field Wind Power Project	Gilliam	102.9	102.9	Onshore Wind Turbine	168,773	0.3%
Willow Creek Energy Center	Invenergy Services LLC	Morrow	72	72	Onshore Wind Turbine	136,429	0.2%
Green Peter	USACE Northwestern Division	Linn	40	40	Conventional Hydroelectric	134,098	0.2%
Lookout Point	USACE Northwestern Division	Lane	40	40	Conventional Hydroelectric	132,146	0.2%
Lost Creek	USACE Northwestern Division	Jackson	24.5	24.5	Conventional Hydroelectric	129,983	0.2%
Neal Hot Springs Geothermal Project	US Geothermal Inc.	Malheur	5.9	9.5	Geothermal	129,975	0.2%
Detroit	USACE Northwestern Division	Marion	50	50	Conventional Hydroelectric	129,209	0.2%
Eurus Combine Hills Turbine Ranch 2	Eurus Combine Hills II LLC	Umatilla	66.1	66.1	Onshore Wind Turbine	112,326	0.2%
North Fork	Portland General Electric Co	Clackamas	27	27	Conventional Hydroelectric	112,068	0.2%
Millican Solar Energy LLC	Invenergy Services LLC	Crook	71.4	71.4	Solar Photovoltaic	104,961	0.2%
John C Boyle	PacifiCorp	Klamath	47.6	47.6	Conventional Hydroelectric	103,508	0.2%
Prospect 2	PacifiCorp	Jackson	18	18	Conventional Hydroelectric	102,668	0.2%
Seneca Sustainable Energy LLC	Seneca Sustainable Energy LLC	Lane	19.8	19.8	Wood/Wood Waste Biomass	101,871	0.2%
Carmen Smith	Eugene Water & Electric Board	Linn	3.8	6.5	Conventional Hydroelectric	100,869	0.2%
Waste Management Columbia Ridge	WM Renewable Energy LLC	Gilliam	0.8	0.8	Landfill Gas	99,743	0.2%
Solar Star Oregon II	Avangrid Renewables LLC	Crook	56	56	Solar Photovoltaic	98,381	0.2%
Toketee Falls	PacifiCorp	Douglas	15	15	Conventional Hydroelectric	96,677	0.2%
FPL Energy Vansycle LLC (OR)	FPL Energy Vansycle LLC	Umatilla	122.8	122.8	Onshore Wind Turbine	95,702	0.2%