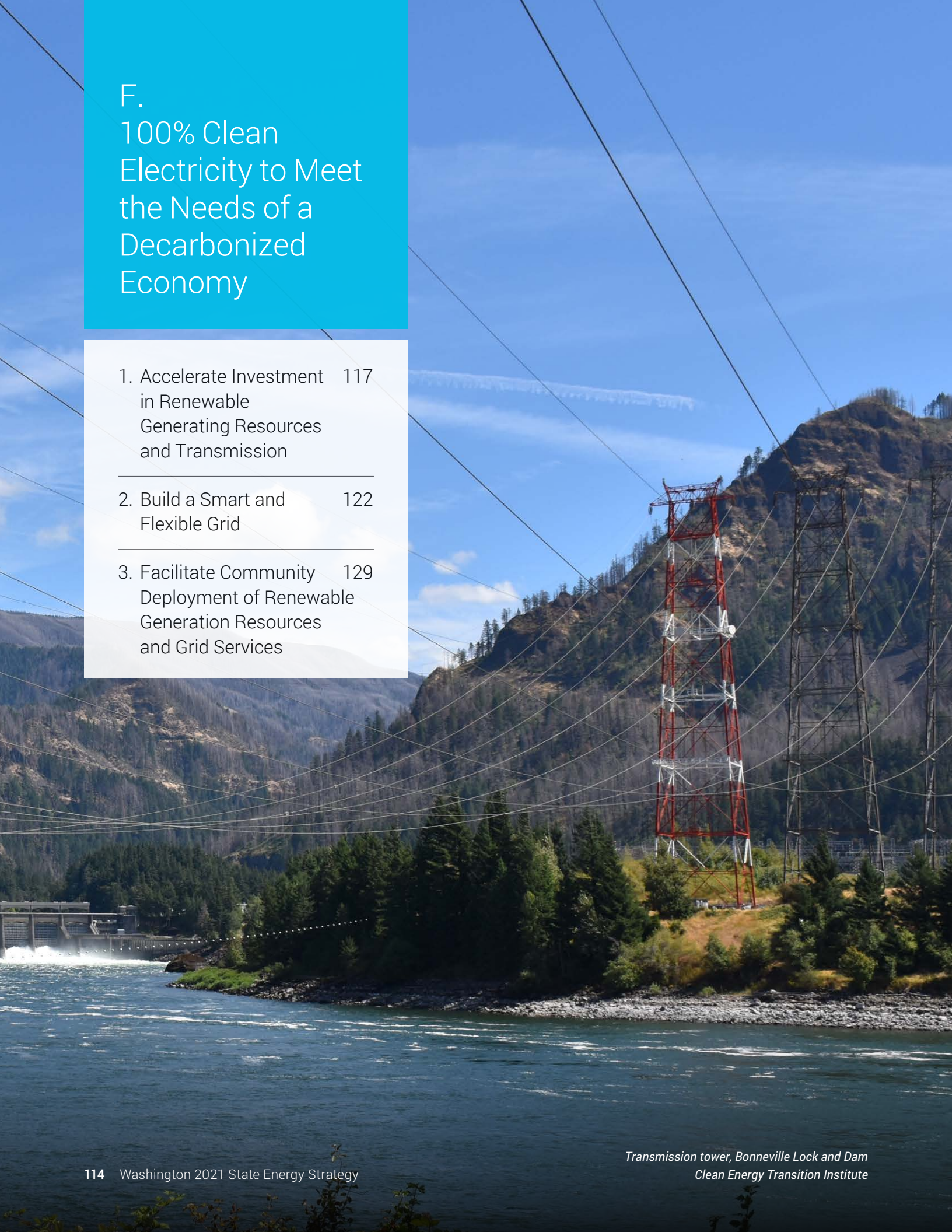
F. 100% Clean Electricity to Meet the Needs of a Decarbonized Economy



Transmission tower, Bonneville Lock and Dam
Clean Energy Transition Institute

F. 100% Clean Electricity to Meet the Needs of a Decarbonized Economy

Electricity will play a transformative role in meeting Washington's greenhouse gas reduction limits. The state will need to grow and manage clean, reliable electricity generation to meet increasing demand from buildings, industry and transportation. With its relatively clean grid,[201] ambitious clean electricity requirements and deep expertise in electricity, Washington is poised to be a leader in the transition to an electrified, decarbonized economy over the coming decade.

This will require a comprehensive change of the electricity sector—from the interactions of individual customers and communities with the grid to the generation and transmission of electricity across the West. An equitable transformation, as envisioned in the Clean Energy Transformation Act (CETA), will reflect community priorities for resilience and affordability, ensure that all customers benefit from smart grid services and preserve reliable service.

The electricity sector strategies complement those recommended for other sectors with end uses converted from fossil fuels to electricity where possible. This is particularly true for the transportation and buildings sectors. The strategies will:

- Meet CETA's requirements for a greenhouse gas neutral electricity supply by 2030 and 100% renewable or non-emitting ("clean") electricity by 2045, while incorporating equity, reliability and resource adequacy principles.

Solar panels on roof of North Utility Building at Marymoor Park, WA.

- Fulfill energy and capacity demands created by increased electricity use in transportation, buildings and industry.
- Increase grid resilience and satisfy community demands for electricity services.[202]
- Advance an equitable clean energy economy and create living-wage jobs.

The deep decarbonization modeling analysis performed for this strategy, combined with a review of existing decarbonization plans and independent analyses, point to a transformational role for the electricity sector in a decarbonized future. Even in those scenarios with continued use of gas or liquid forms of energy, Washington needs clean electricity to produce those fuels.

[201] "Washington State Electric Utility Fuel Mix Disclosure Reports: For Calendar Year 2018" (Washington State Department of Commerce, 2019), https://www.commerce.wa.gov/wp-content/uploads/2020/04/Energy-Fuel-Mix-Disclosure-2018.pdf.

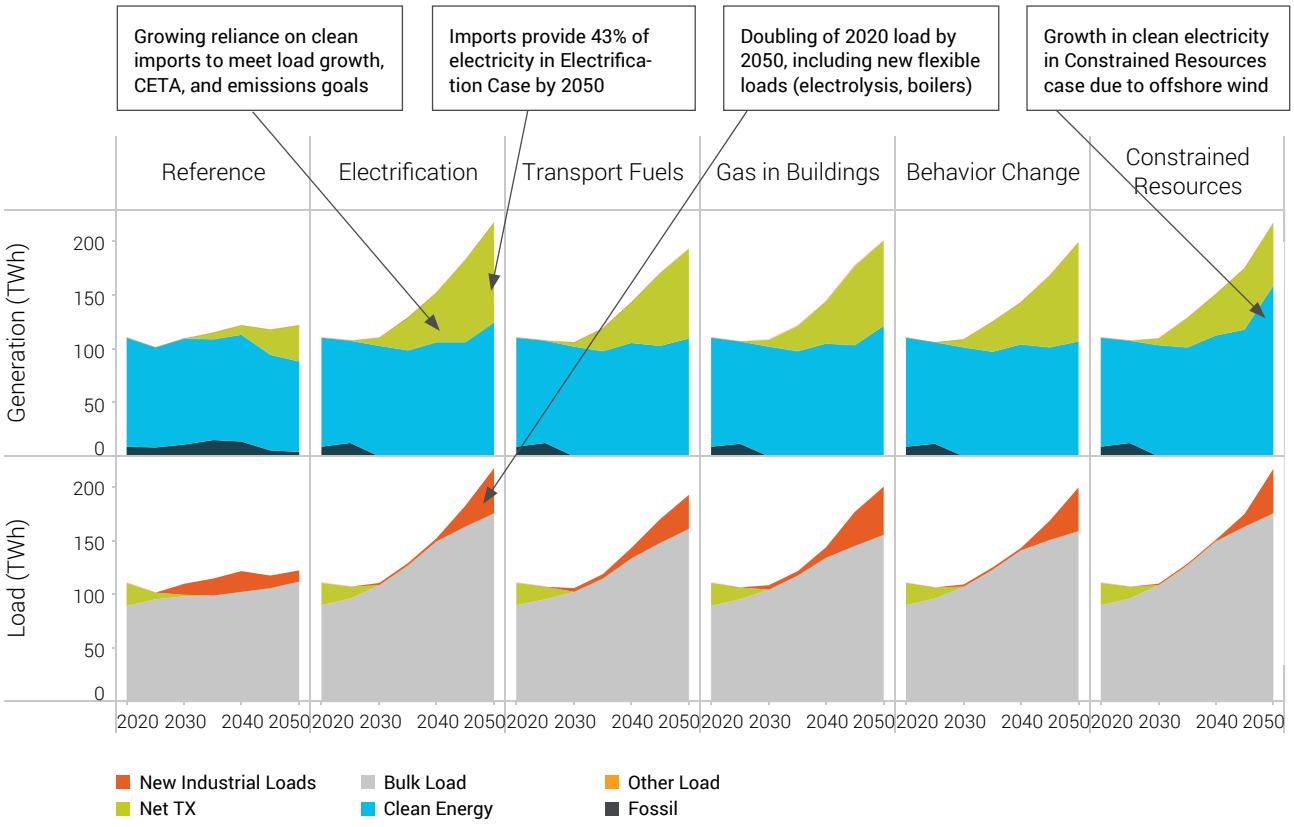
[202] Ralph Kappelhoff et al., "Embracing the Voice of the Customer" (2019 Grid Forward Conference, October 9, 2019). Customer and community demands include enhanced energy security, health and environmental benefits, uninterruptible, high-fidelity power for data operations and the procurement of locally-sourced electricity.

The modeling suggests that electricity demand in Washington could grow by 13-20% over 2020 levels by 2030. Electricity load growth then accelerates, and by 2050 is up to 92% above the 2020 level, as shown in Figure 26. By 2045, 42-50% of the energy used in Washington would be in the form of electricity, up from 21% today. This growth — occurring parallel with CETA requirements for carbon-neutral electricity by 2030 and 100% non-carbon emitting by 2045 — will require diverse, new non-carbon-emitting generation resources.

The transformation to clean electricity will enable and require Washington to use energy more efficiently. In addition to the inherent efficiency advantages of electric vehicles and electric heat pumps over direct combustion alternatives, Washington must continue to prioritize end-use efficiency, with particular emphasis on the buildings sector. This has been a successful strategy in the Pacific Northwest for more than 40 years. As the power system evolves, an increasingly smart grid will allow more complex energy management, such as regional demand response programs and other non-wires solutions, leading to the efficient use of renewable and non-emitting generation.

To transform the state's overall energy system, the electric power system requires substantial alteration. New or expanded transmission capacity is required for access to the best renewable resources and to take full advantage of coordination opportunities across the West.

FIGURE 26. POTENTIAL FUTURE ENERGY MIX IN DEEP DECARBONIZATION MODELING



Source: Appendix A – Deep Decarbonization Pathways Modeling Report, December 11, 2020 (p. 38).

A modernized grid will allow more flexibility in operations and more use of distributed resources such as solar, storage and demand response. The institutions and organizations that operate, plan and regulate the electric system also require change.

1. Accelerate Investment in Renewable Generating Resources and Transmission

Significant quantities of new clean generation will be required to meet the future energy requirements of Washington's businesses and households. The resource requirements include new power generation facilities, expanded transmission capacity, demand response resources, end use energy efficiency and modernization of the electric distribution grid. Washington's utilities can choose among multiple types of clean generation resources.

The deep decarbonization modeling suggests that wind and solar will be the most cost-effective resources, but all resource decisions are subject to more specific analysis, including the 2021 Northwest Power Plan[203] and individual utility integrated resource plans. Under CETA, nuclear generation can compete as well. There also are choices to be made about the location of new generating resources, either within the state or at more distant locations with better energy characteristics but greater transmission requirements. The actual outcome will almost certainly be a combination of resource types sited both in-state and outside Washington.

The electric power system investments required by the transformation can provide an important economic and financial opportunity for workers and businesses. However, after almost 30 years of stable electricity demand,[204] electric resource acquisition of this scale and at this pace will be an unfamiliar challenge for utilities, project developers, planning organizations, the financial community, regulators and siting agencies. The Legislature anticipated this challenge in CETA with additional planning requirements[205] and authority for the Utilities and Transportation Commission (UTC) to use alternative regulatory approaches.[206]

Wind turbines, Goldendale, WA. Clean Energy Transition Institute

Recommended approaches to meet this challenge focus on a more robust transmission system across the Western Interconnection, an increased focus on resource adequacy, reform of wholesale electric markets, improved data and research about resource options and accelerated modernization of the communications and control abilities in the distribution system.

[203] "The 2021 Northwest Power Plan," accessed November 1, 2020, https://www.nwcouncil.org/2021-northwest-power-plan.

[204] The state's electricity consumption in 1992 exceeded its consumption in 2018, the most recent year for which data is available. "Table CT3. Total End-Use Energy Consumption Estimates, 1960-2018, Washington," Washington - SEDS - U.S. Energy Information Administration (EIA), n.d., https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_use/tx/use_tx_WA.html&sid=WA.

[205] Chapter 19.280.030 RCW.

[206] Chapter 80.28.401 RCW; Chapter 80.04.250 RCW.

Panoramic view of solar panels.

1.1. Assess the Potential for and Facilitate Deployment of New Clean Energy Resources

To take best advantage of opportunities to develop clean resources within Washington, utilities will need detailed information about potential locations. Accurate site information could speed resource development, avoid duplication of efforts and reduce conflicts among competing uses, including wildlife and military uses.

In 2020, the Legislature funded a pilot study, modeled on work in California,[207] to identify solar sites in the Columbia Basin that minimize conflict among potential uses. However, this funding was among the budget items vetoed due to budget shortfalls related to the COVID-19 pandemic.[208] This pilot study concept should be expanded to a statewide assessment.

An assessment should engage a range of stakeholders and communities, ensure burdens and benefits are shared and incorporate public and environmental health as part of the review. Technical, environmental, legal and economic criteria should reflect the requirements of communities, utilities and project developers. This stakeholder engagement should inform a statewide effort to identify clean energy corridors or development zones. A successful assessment could support changes to permitting requirements.

ACTION

- Funding should be made available to Commerce and electric utilities to conduct a statewide clean energy potential assessment to identify clean energy development zones.

[207] "Mapping Lands to Avoid Conflict for Solar PV in the San Joaquin Valley," May 2016, https://www.law.berkeley.edu/research/clee/research/climate/solar-pv-in-the-sjv/.
[208] "Engrossed Substitute Senate Bill 6168," § 604(33) (2020), http://leap.leg.wa.gov/leap/budget/lbns/2020Omni6168-S.SL.pdf.

1.2. Strengthen the Transmission System across the West and within the State

A power system that relies primarily on renewable resources will require a more robust and flexible transmission network, compared to a power system that relies on fossil fuels. Enhanced transmission capacity improves access to superior wind resources in the Mountain West and superior solar resources in the Southwest. A robust transmission system increases reliability and reduces the amount of resources each utility must hold in reserve to ensure adequate supplies.

While unsuccessful past efforts could discourage a strategy that relies on out-of-state resources and coordinated operations, the crucial role of transmission, as well as effective market coordination, is demonstrated in recent analysis for the Western Interstate Energy Board.[209] The analysis concluded that increased regional grid integration and market coordination would lower future electricity costs and significantly reduce the potential for curtailment of renewable generation.

Under baseline business-as-usual assumptions, renewable curtailments could approach 20% of total renewable energy production by 2035. (Curtailment occurs when renewable generation exceeds demand for electricity.) With regional coordination, curtailments would be less than 10% and production costs would be $2.2 billion lower than in the baseline case. In contrast, limited regional coordination — that is, no day-ahead market — results in the highest increase in costs ($11.3 billion in 2035) and leads to renewable curtailment of 50%.

The needed expansion of transmission capacity will require coordination among utilities, planning agencies and governments. Some stakeholders advocate for creation of a regional transmission organization to administer the transmission grid on a regional basis.[210] The owners of existing transmission resources, such as BPA and various retail electric utilities, are in the best position to advance this work and build on recent progress in establishing NorthernGrid, a collaborative transmission planning entity.[211]

An important element of this work in Washington is the transmission corridors workgroup created by the Legislature as part of CETA.[212] The primary focus of this workgroup is to ensure adequate transmission capacity and appropriate environmental review of transmission projects within the state. In addition to new capacity, additional capacity could be made available within the existing system through the reform of transmission pricing and contract structures.

ACTIONS

- The Governor's office, the UTC and Commerce should pursue opportunities for enhanced transmission planning and integration across the Western grid and advocate for joint development where feasible.
- Utilities and planning agencies should evaluate the need for joint development of new and upgraded transmission capacity and consider the viability of a regional transmission organization.

1.3. Encourage and Monitor Development of a Resource Adequacy Program

One of the core requirements of CETA is reliable service. Each utility must ensure it maintains enough resources to maintain reliable service under a wide range of operating conditions.[213] The priority of resource adequacy (RA) is demonstrated by CETA's provision allowing a utility to temporarily suspend the clean energy transition if necessary to preserve reliability.[214] Commerce is directed to lead an evaluation of the impact of CETA's requirements on system reliability and other values starting in 2023.[215]

[209] Energy Strategies, "Western Flexibility Assessment" (Western Interstate Energy Board, 2019). https://westernenergyboard.org/wp-content/uploads/2019/12/12-10-19-ES-WIEB-Western-Flexibility-Assessment-Final-Report.pdf

[210] "Electric Power Markets," Federal Energy Regulatory Commission, accessed November 30, 2020, https://www.ferc.gov/industries-data/market-assessments/electric-power-markets.

[211] "NorthernGrid," accessed November 30, 2020, https://www.northerngrid.net/.

[212] Chapter 19.405.150 RCW.

[213] Chapter 19.280.030 RCW.

[214] Chapter 19.405.090 RCW.

[215] Chapter 19.405.080 RCW.

Hydroelectric power plant and transmission at the Grand Coulee Dam, WA.

In 2019, the Northwest Power Pool (NWPP), composed of major generating utilities serving the Northwestern U.S., British Columbia and Alberta, started a project to address RA. NWPP has proposed a program in which individual utilities would adopt consistent standards for the amount and type of resources needed to serve customers reliably. An RA standard and program not only reduce the risk of a shortage of electricity supply, but also lower the amount of resources needed to achieve any particular level of reliability.

While the NWPP initiative is a promising start, ongoing monitoring and evaluation by the UTC and Commerce will be required. The effective implementation of an RA program in compliance with CETA will require complex analysis of resource requirements and the contributions to reliability from diverse resources, such as hydro, wind, solar, storage and demand response.[216] The analytical methods must be consistent and transparent. They must account for the diverse capabilities of these resources to ensure that renewables, storage and hybrid resources compete on an equal footing with thermal resources.

ACTIONS

- Washington utilities, resource owners and developers and other stakeholders should continue to engage in development of a consistent and non-discriminatory RA program through the NWPP.
- Commerce and the UTC should review the progress and outcomes of the NWPP RA initiative and evaluate the need for additional state action to ensure CETA's RA requirements are fulfilled.

1.4. Reform and Expand Wholesale Electricity Markets

Wholesale markets are important for maintaining a reliable and affordable electricity supply. Invisible but beneficial to individual customers, these markets help utilities balance the supply and demand for electricity. When utilities find a cheaper power source outside their own portfolio, a market transaction avoids the excess costs of building or separately procuring additional resources. Without electricity markets, electricity would be more expensive and less reliable.

Historically, Washington's electric utilities have relied heavily on a bilateral market in which individual utilities, power plant operators and brokers contract for power at the mid-Columbia delivery point on the transmission system.[217] A bilateral market focuses on short-term trades without a central entity to consider other financially feasible trades.

Since 2014, the region's utilities have increasingly relied on the Western Energy Imbalance Market (EIM) to identify and capture cost-minimizing power trades in a centralized system. The EIM was created by the California Independent System Operator and PacifiCorp. By 2022, most utilities serving Washington customers will participate directly or indirectly in the EIM.[218] These markets have saved utility customers in the West more than a billion dollars when compared with the cost for each utility running its own power plants to serve its own customers every hour.[219]

[216] "Redesigning Capacity Markets: Innovation Landscape Brief" (International Renewable Energy Agency, 2019), https://www.irena.org/publications/2019/Jun/Market-Design-Innovation-Landscape-briefs.

[217] "Wholesale Electricity and Natural Gas Market Data," accessed November 1, 2020, https://www.eia.gov/electricity/wholesale/.

[218] "Western EIM Factsheet" (California ISO, 2020), https://www.westerneim.com/Documents/WesternEIMFactSheet.pdf.

[219] "ISO Announces the Western EIM Surpassed $1 Billion in Benefits" (California ISO, Western Energy Imbalance Market, 2020), https://www.westerneim.com/Documents/ISO-Announces-Western-EIM-Surpassed-1Billion-Benefits.pdf.

There is value in extending the scope of organized markets to cover more than the short-term market. However, the existing wholesale electricity markets require reform to ensure that market rules do not force utilities to choose between meeting their clean electricity obligations and realizing the efficiency benefits of organized markets. This potential conflict arises because existing markets typically do not differentiate between electricity from renewable sources and electricity from natural gas or coal-fired plants. While market traders have the option to specify that electricity will be renewable, the vast majority of current market transactions are for "unspecified electricity." This market rule is the result of industry practice rather than any legal requirement.

Because of the potential conflict between market practices and clean electricity requirements, in November 2019 Commerce and the UTC convened a carbon and electricity markets workgroup under CETA. The workgroup will provide input into rules to address the use of market purchases to serve retail customers. Commerce and the UTC are required to adopt rules by June 2022.

Electricity market reform is necessarily a multi-state effort. Success will likely require a different organization or governance structure than the EIM, which is controlled by the State of California with participation by a Body of State Regulators.[220] For example, public power utilities in the Northwest have published a set of principles for appropriate governance of an expanded market.[221]

These principles include establishing a board with a selection process that is durable and independent from market participants or regional governments; giving that board decision-making authority over market rules; engaging an independent market expert; including a third-party dispute resolution process and ensuring that participation is voluntary. In the longer term, the industry should explore the use of market mechanisms to buy and sell capacity resources, which will become increasingly important as coal and natural gas generating facilities are retired.

[220] "Western EIM - EIM Body of State Regulators," accessed November 1, 2020, https://www.westerneim.com/Pages/Governance/EIMBodyofStateRegulators.aspx.

[221] "Northwest Public Power EDAM Governance Interests" (Public Generating Pool, Public Power Council, PNGC Power, Northwest Requirements Utilities, 2019), https://static1.squarespace.com/static/5e9fc98ab8d9586057ba8496/t/5ee532273ef4864f3e274b8e/1592078888146/1-23-2020-EDAM-Governance-Interests-with-logos.pdf.

Solar installation at the Capitol in Olympia, WA. Department of Commerce

ACTIONS

- Wholesale market participants should develop market rules to allow trade in electricity from sources verified to comply with CETA's clean energy requirements. The UTC and Commerce, with input from the Carbon and Electricity Markets Workgroup, should adopt rules to ensure this outcome.
- Electric utilities should pursue the long-term development of a fully integrated Western regional electricity market, beginning with expansion of organized markets to trade day-ahead and longer term resources. Long-term market development should explore opportunities to trade capacity resources, including demand response resources.
- Commerce's 2024 CETA evaluation under RCW 19.405.080 should include an assessment of industry progress in developing efficient and resource-specified electricity markets.

2. Building a Smart and Flexible Grid

A smart, flexible and optimized grid is foundational to meeting CETA goals and electrifying the economy while assuring system reliability and resilience at both the distribution and transmission levels. A modern system allows for two-way energy flows, control and management of the entire grid using data and digital technologies. The grid must be both resilient and flexible.

Resiliency includes the mitigation of and recovery from outages due to a range of possible scenarios including earthquakes, wildfires and human-caused cyber and physical attacks. Simply put, how much can the grid bend, but not break. Flexibility gives the system the capacity to manage and balance variable load from both centralized and especially distributed energy resources (DERs), like wind and solar. There is a wide range of DER technologies and applications available today.[222, 223]

Developing a modern grid will require new planning processes, infrastructure, software solutions and other tools to enable a mix of DER technologies.[224] Grid operators will need new controls to securely and reliability operate that future grid—managing variable demand and supply, ensuring adequate resource capacity and providing resilience.[225] Utilities will need situational awareness of capacity constraints and resilience for critical infrastructure to avoid issues experienced by some states with high penetrations of renewables, such as Hawaii and California.

Supported by new markets for firm capacity and other essential grid services,[226] the deployment of flexible capacity through demand response programs and other "non-wires" strategies, such as microgrids, will reduce grid congestion and improve efficiency, especially at the transmission level. At the distribution level, these adjustments will enable interactive customer engagement and allow for deployment of community-scale resources.

> To electrify the economy while assuring system reliability and resilience requires a smart, flexible and optimized grid.

[222] Tanuj Deora, Lisa Frantzis, and James Mandel, "Distributed Energy Resources 101: Required Reading for a Modern Grid," Advanced Energy Perspectives, 2017, https://blog.aee.net/distributed-energy-resources-101-required-reading-for-a-modern-grid.

[223] "The Many Types of Distributed Energy Resources, Common and Obscure," August 14, 2019, https://insidelines.pjm.com/the-many-types-of-distributed-energy-resources-common-and-obscure/.

[224] Kelsey A Horowitz et al., "An Overview of Distributed Energy Resource (DER) Interconnection: Current Practices and Emerging Solutions" (National Renewable Energy Laboratory, April 11, 2019), https://doi.org/10.2172/1508510.

[225] Appendix H – WA State Energy Strategy PNNL Presentation to CETI October 2020

[226] These include frequency response, regulating, contingency and ramping reserves, voltage management and power quality. "Connected Communities, Funding Opportunity Announcement (FOA) Number: DE-FOA-0002206, Appendix J" (Department of Energy, Office of Energy Efficiency and Renewable Energy, 2020), https://eere-exchange.energy.gov/Default.aspx#FoaId9d24afcd-e292-4ea2-a4d3-d36e2b9dd9c7.

Portland General Electric's Salem Smart Power Center includes a large-scale energy storage system. Portland General Electric

Fire threatening power lines running along US 97 in Washington State. WA State Department of Transportation

A modern electric grid delivers reliable, affordable and clean electricity to consumers where and when they want it. Grid resilience protects customers and businesses from outages. Flexibility ensures that renewable and distributed resources are smoothly integrated into the grid.

A better understanding of the value of DERs — especially the value of services ancillary to the grid — will help utilities and regulators understand the full impact and opportunity of these assets. A roadmap for DERs has been laid out through previous work on energy storage: The UTC conducted foundational work[227] to understand regulatory barriers. Five different pilot projects, funded in part by grants from the state's Clean Energy Fund (CEF)[228] and supported by analysis by the Pacific Northwest National Laboratory (PNNL), showed how storage can provide a range of services to the grid, such as energy shifting, flexibility and improved distribution system efficiency.[229]

2.1. Expand the State's Energy Infrastructure Security & Emergency Management Capabilities

As transportation and buildings are electrified and "smart" appliances become more ubiquitous, a flexible grid is essential. Flexibility will help to meet variable energy and demand needs (e.g., the timing of vehicle charging) and to deploy distributed stored energy (e.g., storage in vehicle batteries and water heaters). Strengthening and updating the electric grid with new technology can help prevent outages and permit real-time data sharing to increase system-wide efficiency.

At the same time, grid modernization will require a focus on cybersecurity and policies and practices to safeguard privacy. Privacy and security considerations are related but not synonymous. Generally, privacy is about controlling who has access to personal information, and security is about protecting that information from unauthorized access.[230]

Advanced metering infrastructure (AMI) is one of the key components of a smart grid, but its progress has been delayed by — among other factors — concerns about security and privacy.[231] Security protections, incentives for customer participation and opt-out provisions may address these concerns and remove obstacles to full deployment.[232]

Further, with regard to cybersecurity and resiliency, while Commerce is working with the National Association of State Energy Offices (NASEO) to develop and review best practices for the security of solar installations, the overall capacity of Washington's energy emergency management office is stretched thin. Washington should have a full Washington Office of Energy Infrastructure Security and

[227] "Report and Policy Statement on Treatment Of Energy Storage Technologies in Integrated Resource Planning and Resource Acquisition" (Washington Utilities and Transportation Commission, 2017), https://www.utc.wa.gov/_layouts/15/CasesPublicWebsite/GetDocument.ashx?docID=237&year=2016&docketNumber=161024.

[228] "Federal Research Spurs Washington State to Store Energy," Pacific Northwest National Laboratory, 2014, https://www.pnnl.gov/NEWS/release.aspx?id=1060.

[229] Vilayanur V. Viswanathan et al., "Washington Clean Energy Fund: Energy Storage System Performance Test Plans and Data Requirements" (Pacific Northwest National Laboratory, April 17, 2017), https://doi.org/10.2172/1474881.

[230] "Creating Smart Communities: A Guide for State Policymakers" (National Conference of State Legislatures, 2020), https://www.ncsl.org/Portals/1/Documents/energy/Smart_Communities_v03_11_20_35545.pdf. p. 19.

[231] Coley Girouard, "The State of Advanced Metering Infrastructure and Time-Varying Rates, in Three Maps and One Graph. The Leaders – and Laggards – May Surprise You.," Advanced Energy Perspectives (blog), accessed October 29, 2020, https://blog.aee.net/the-state-of-advanced-metering-infrastructure-and-time-varying-rates-in-three-maps-and-one-graph.-the-leaders-and-laggards-may-surprise-you. Some stakeholders also express concern about AMI as a tool to perform remote shutoffs and enable workforce reductions.

[232] Dockets U-180525, adoption order 7/29/2020 and Dockets U-180117, policy guidance issued on 4/10/2018.

Emergency Management modeled on the U.S. Department of Energy Office of Cybersecurity, Energy, Security and Emergency Response (DOE CESAR).[233]

A fully-funded office would coordinate with local emergency management officials to include assessment data in local hazard mitigation plans, support applications for FEMA resilience (BRIC) funding and coordinate energy resilience data and efforts with other infrastructure planning groups, such as the Washington Infrastructure System Improvement Team (Sync),[234] Public Works Board[235] and the Infrastructure Assistance Coordinating Council.[236]

The Energy Emergency Management Director at Commerce should have the authority and resources to: coordinate with utilities and local, state and federal emergency management offices about data uses and opportunities; review current industry standards for demand response equipment; coordinate with key state agencies and other stakeholders to identify what standards are already in place and what needs to be added; provide educational opportunities for energy providers in cybersecurity best practices; and continue to coordinate with NASEO on cybersecurity best practices.

ACTIONS

- Provide support for increased deployment of advanced metering infrastructure (AMI), with safeguards for privacy and security.
- Expand the energy emergency management program at the Department of Commerce.
- Develop statewide energy security standards.

[233] "Office of Cybersecurity, Energy Security, and Emergency Response," Energy.gov, accessed November 1, 2020, https://www.energy.gov/ceser/office-cybersecurity-energy-security-and-emergency-response.

[234] "Sync - System Improvement Team," Washington State Department of Commerce, accessed November 1, 2020, http://www.commerce.wa.gov/building-infrastructure/sync-systems-improvement-team/.

[235] "Public Works Board - Home Page," Washington State Department of Commerce, accessed November 1, 2020, http://www.commerce.wa.gov/building-infrastructure/pwb-home-page/.

[236] "Infrastructure Assistance Coordinating Council (IACC)," accessed November 1, 2020, https://www.infrafunding.wa.gov/.

Columbia River gorge high desert.

2.2 Define and Value Storage Resources

As the electricity system transforms to 100% clean resources, there is a likely role for energy storage to balance the supply and demand for electricity. Storage options include pumped hydro systems, battery storage systems and other technologies.

The need for storage resources should be assessed with care because the deep decarbonization modeling suggests that there may be other, more cost-effective approaches, such as developing hydrogen production as a flexible load. The value proposition for storage in the Pacific Northwest may be different from other regions where hydro resources are not available for short term load balancing.[237]

Long-duration storage, which would enable the region to hold hydroelectric generation from wet years to dry years, is a potentially valuable resource. Storage resources are also likely to be an important tool in increasing the resilience of the electricity grid. For example, community-based resilience hubs equipped with on-site renewable generation and battery storage could provide vital services during natural disasters and extended outages.

A technology-neutral policy toward capacity and demand response resources will allow storage resources to emerge where appropriate. Washington should also ensure that CETA's energy accounting practices accommodate the charging and discharging of storage resources.

ACTIONS

- Utilities should establish planning and evaluation methods that appropriately identify, define and calculate the value of storage for integration and of variable renewable energy resources to be considered as a source of capacity, ancillary services and additional services, such as voltage regulation.
- The UTC and Commerce should ensure that CETA's energy accounting methods accommodate the charging and discharging of storage resources within the electricity grid.

2.3. Prepare for Widespread Deployment of Distributed Energy Resources (DERs)

Washington's clean energy transition will require integration of DERs. Clear policy guidance, a common framework and better data can help inform utility and local planning for DER integration, guard against incompatible technology decisions and increase the confidence of investors and regulators. A voluntary, non-adversarial technology roadmap development could accelerate the identification and prioritization of the requirements for investments, communications, cybersecurity and technical standards.

There also is a need for a better understanding of the value of DERs and the capacity of distribution systems to host them. Utilities should perform and publish analyses of hosting capacity—that is, the amount of DERs that can be added to the distribution system at a given time and location without compromising power quality or reliability. This type of analysis will also assist utilities in meeting their CETA obligation to identify and acquire demand response resources.

Utilities can also identify system constraints, where DERs might be beneficial to the system. Project developers can use data from hosting capacity analyses to make interconnection processes faster and more transparent, identify the optimal locations to deploy DERs and avoid unnecessary distribution grid upgrades.[238] An analysis of critical loads can help local jurisdictions and emergency managers right size and prioritize DERs to promote resilience on the most important parts of the grid. The Oregon Public Utilities Commission's distribution system planning provides a helpful model for the UTC and individual utilities.[239]

[237] A summary of The Growing Role of Energy Storage in Clean Energy Policy can be found here: https://www.ncsl.org/research/energy/the-growing-role-of-energy-storage-in-clean-energy-policy.aspx

[238] Gwen Brown, "California Adopts First Interconnection Rules to Utilize Hosting Capacity Results," Interstate Renewable Energy Council (blog), 2020, https://irecusa.org/2020/09/california-adopts-first-interconnection-rules-to-utilize-hosting-capacity-results/.

[239] "Distribution System Planning," Oregon Public Utility Commission, accessed November 30, 2020, https://www.oregon.gov/puc/utilities/Pages/Distribution-System-Planning.aspx.

DER planning involves analyzing the potential contribution of demand-side resources to energy needs and resource adequacy while factoring in the distribution grid upgrades needed to realize that potential. In 2019, the Legislature adopted policy and practices that utilities must address if they pursue distributed energy resource planning.[240] However, DER planning remains voluntary for Washington utilities. The Legislature should continue to assess whether to maintain this approach or provide more specific requirements for DER planning.

ACTIONS

- Request support from the U.S. Department of Energy and PNNL to convene a DER workgroup to identify and resolve grid architecture barriers to DER deployment.
- Utilities should incorporate comprehensive assessments of the value of DERs in the specific context of individual distribution grids by performing and publishing hosting capacity and critical load studies.
- The Legislature should assess whether voluntary distribution system planning is the appropriate policy approach given the requirements of CETA.

2.4. Pursue Universal, Statewide Deployment of Broadband

The importance of universal broadband access is discussed throughout this strategy. Within the electricity sector, the value of broadband access comes from the role of communication in a flexible, smart electric grid. The electric grid needs universal communication to manage a diverse portfolio of clean energy resources. This approach will require rapid communication of information across the electricity network to individual devices located at customers' premises. Smart, connected end-use equipment, such as EV chargers and electric water heaters, interact with grid operators to maintain reliable service.

For example, Washington adopted a requirement that electric water heaters sold in the state have a built-in communications port capable of supporting remote demand response signals.[241] The port can be used with any number of communications devices and networks, which might be a proprietary electric utility network or a broadband Internet connection, but its value as resource to balance the power grid exists only with a reliable data connection.[242]

Biofuel worker. Argonne National Laboratory-Wes Agresta

The electric industry is well-positioned to support widespread deployment of broadband access, combining its own communication requirements with those of education, public safety, business and other parts of society. Several electric utilities already provide telecommunications services in their service areas. For example, 15 public utility districts operate telecommunications systems that are available to retail providers of Internet service.[243] Utilities can also contribute to a societal solution as users of a public network where feasible, rather than investing in proprietary solutions.

ACTION

- Adopt a state policy to mandate universal broadband access.

[240] Chapter 19.280.100 RCW.

[241] "Appliance Standards," Washington State Department of Commerce, accessed November 1, 2020, http://www.commerce.wa.gov/growing-the-economy/energy/appliances/.

[242] The communications port is described in this BPA report: "Performance Test Results: CTA-2045 Water Heater: Testing Conducted at the National Renewable Energy Laboratory" (Palo Alto, CA: EPRI, 2017).

[243] "PUDs Providing Telecommunications Services," Washington Public Utility Districts Association, accessed November 1, 2020, https://www.wpuda.org/telecommunications.

2.5. Advance Grid Modernization with Clean Energy Fund Investments in Resilient & Flexible Projects

Grid resilience is an excellent investment. According to the National Institute for Building Science, every $1 invested in resilience funding through federal agencies saves $6 in averted disaster costs.[244, 245] These figures represent the savings to physical infrastructure in the face of natural disasters. As recently recommended by the Energy & Climate Policy Advisory Committee (ECPAC), the Clean Energy Fund (CEF) can invest in new technology and infrastructure required for a successful and equitable transition to clean electricity by adding resilience as a project priority. ECPAC and Commerce also recognize the need to engage communities on how these funds should be deployed to ensure projects are beneficial to local energy resilience.

There is also a long history of supporting infrastructure planning assistance in Washington through the Infrastructure Assistance Coordinating Council,[246] which helps local jurisdictions connect with grants and funding. However, local planning efforts do not often include grid modernization planning. By creating a mechanism for more holistic, institutional support for local clean energy infrastructure planning, flexible and resilient solutions like DERs can be introduced much further upstream in the planning process.

Planning efforts would be enhanced by increased connection between utilities and research institutions and the U.S. Department of Energy, and increased engagement from the clean tech sector. State funding should leverage private, federal or other funding and could include programs that increase resilience through microgrid and transactive projects, deploy demand response or load flexibility, especially with large industrial customers, and deploy clean energy solutions for critical load centers.

ACTIONS

- Provide state support for flexible and resilient planning and project development by creating a new cluster within Commerce's Office of Economic Development and Competitiveness to focus on utility grid optimization and DER deployment.
- Target CEF funding to projects that enable flexible load management and increase grid resilience.

[244] "National Institute of Building Sciences Issues New Report on the Value of Mitigation," National Institute of Building Sciences, 2018, https://www.nibs.org/news/381874/National-Institute-of-Building-Sciences-Issues-New-Report-on-the-Value-of-Mitigation.html.

[245] "Every $1 Invested in Disaster Mitigation Saves $6," The Pew Charitable Trusts, accessed November 1, 2020, http://pew.org/2D2JuLb.

[246] "Infrastructure Assistance Coordinating Council (IACC)."

Solar installation at the Decatur Island Community Solar Project.
Orcas Power & Light Cooperative

3. Facilitate Community Deployment of Renewable Generation Resources and Grid Services

Just as utilities must incorporate equity into their planning, state government must address access and equity in its own programs and funding. The Legislature has begun to signal this change through updated budget instructions for the CEF[247] and by funding efforts like the state Environmental Justice Task Force,[248] which has identified ways that state agencies can incorporate environmental justice priorities into their work.

Historically, state incentives have not been readily accessible to community-scale projects. Under the Renewable Energy System Incentive Program (RESIP),[249] over half of the solar installed was for residential scale solar, while community solar accounted for just 1% of projects.[250] Net metering laws often restrict meter aggregation and do not have specific requirements for virtual net metering, limiting access for multifamily projects. Low-income households can have difficulty taking advantage of incentives,[251] and a significant gap in adoption of distributed solar technologies exists for communities of color.[252]

To address the inequities created by previous efforts as deployment of DERs is accelerated, community engagement and understanding of opportunities for local capacity-building must be prioritized. Public processes like the King County Climate Equity Task Force and community-based participatory research provide models of equitable and accessible approaches to this work.

Priority communities can be identified using statewide energy equity indicators and environmental health and cumulative impact analysis tools such as the Environmental Health Disparity Map.[253] These tools can also be used in partnership with direct service providers like community action partnerships,[254] who have a rich history of working with state agencies and are well situated for qualifying and engaging with highly impacted populations. This mapping and other recommendations are supported by the work of the Environmental Justice Task Force.

3.1. Increase the Opportunity for Community DERs and Energy Program Management

Sharing the benefits of DERs allow communities to be in control of their energy supply, provide local clean job opportunities and bring resilience to the grid. However, local projects must compete with the economies of scale that utility-scale projects provide. In addition to helping local jurisdictions obtain the data to help understand the value of resilience on their grid (Section 2), the state can ensure a more equitable clean energy future by supporting local planning resources, including efforts by Tribal governments.

Policies must recognize the individual needs of Tribes across the state and help leverage local energy resources, such as bioenergy, or support projects that promote energy independence, such as microgrids. Both public and private entities can create carve-outs in existing programs to account for the unique tax status of Tribes and the structure of land ownership that may prevent Tribes from taking advantage of some financial tools. Programs should help leverage funding from the DOE Tribal Energy Office.

Consideration could be given to forming energy districts as community institutions modeled after Conservation Districts.[255] In addition, a resilience hub program[256] would

[247] "Substitute Senate Bill 6090" (2018), http://leap.leg.wa.gov/leap/budget/lbns/1719Cap6090-S.SL.pdf.

[248] "Environmental Justice Task Force."

[249] Chapter 82.16.165 RCW.

[250] "The Renewable Energy System Incentive Program: Legislative Report: October 2019" (Energy Program, Washington State University, 2019), http://www.energy.wsu.edu/documents/Renewable%20Energy%20System%20Incentive%20Program%20Report-Oct2019.pdf.

[251] Bentham Paulos, "Bringing the Benefits of Solar Energy to Low-Income Consumers: A Guide for States & Municipalities" (Clean Energy States Alliance, 2017), https://www.cesa.org/wp-content/uploads/Bringing-the-Benefits-of-Solar-to-Low-Income-Consumers.pdf.

[252] Deborah A. Sunter, Sergio Castellanos, and Daniel M. Kammen, "Disparities in Rooftop Photovoltaics Deployment in the United States by Race and Ethnicity," Nature Sustainability 2, no. 1 (January 2019): 71–76, https://doi.org/10.1038/s41893-018-0204-z.

[253] "Washington Environmental Health Disparities Map" (Washington Department of Health, n.d.), https://www.doh.wa.gov/DataandStatisticalReports/WashingtonTrackingNetworkWTN/InformationbyLocation/WashingtonEnvironmentalHealthDisparitiesMap.

[254] "Washington State Community Action Partnership > Home," accessed November 1, 2020, http://www.wapartnership.org/.

[255] Conservation districts were established as part of the New Deal and authorized in Washington in 1939 through RCW 89.50. See also, "A Geography of Change" (Winneshiek Energy District, 2019), https://energydistrict.org/wp-content/uploads/2019/01/A-Geography-of-Change-full.pdf.

[256] Kristin Baja, "Resilience Hubs" (Urban Sustainability Directors Network, 2018), https://www.usdn.org/uploads/cms/documents/usdn_resiliencehubs_2018.pdf.

Solar installer.

support deployment of solar generation, storage and microgrids at community centers to provide the surrounding community free access to essential services, such as heating, cooling, device charging and internet access in the event of a grid outage.

Providing grants and technical assistance to community centers for the development of resilience hubs in both rural and urban areas of need could encourage local engagement and community independence. Projects may also provide important insights into community-focused resilience metrics, which can used to inform a "value of resilience" to be incorporated into regional planning.

In some rural communities, increased support of opportunities for agrivoltaics — the beneficial co-location of solar panels and agricultural activity — could demonstrate that solar projects do not have to compete for land with agricultural production. The state should consider a statewide standard for pollinator-friendly solar (see Maryland and Minnesota) and consider funding research and pilot projects.

To help community projects get off the ground, the state can allocate resources to fund community-centered feasibility studies and other outreach and education for flexible and resilient energy projects. Funds can also be used to develop training resources including sample project plans, design standards and sample past projects and templates. Streamlined applications and eligibility can be implemented to eliminate redundancies and the complexity of grant application processes.

ACTIONS

- Develop resources for expanded outreach, technical assistance and education for community efforts.
- Create specific programs for Tribal energy projects that promote Tribal sovereignty and self-determination.
- Support the development of community resilience hubs and energy districts.
- Support clean energy projects that benefit agricultural communities.

3.2 Develop Tools for Equitable Energy Distribution and Deployment

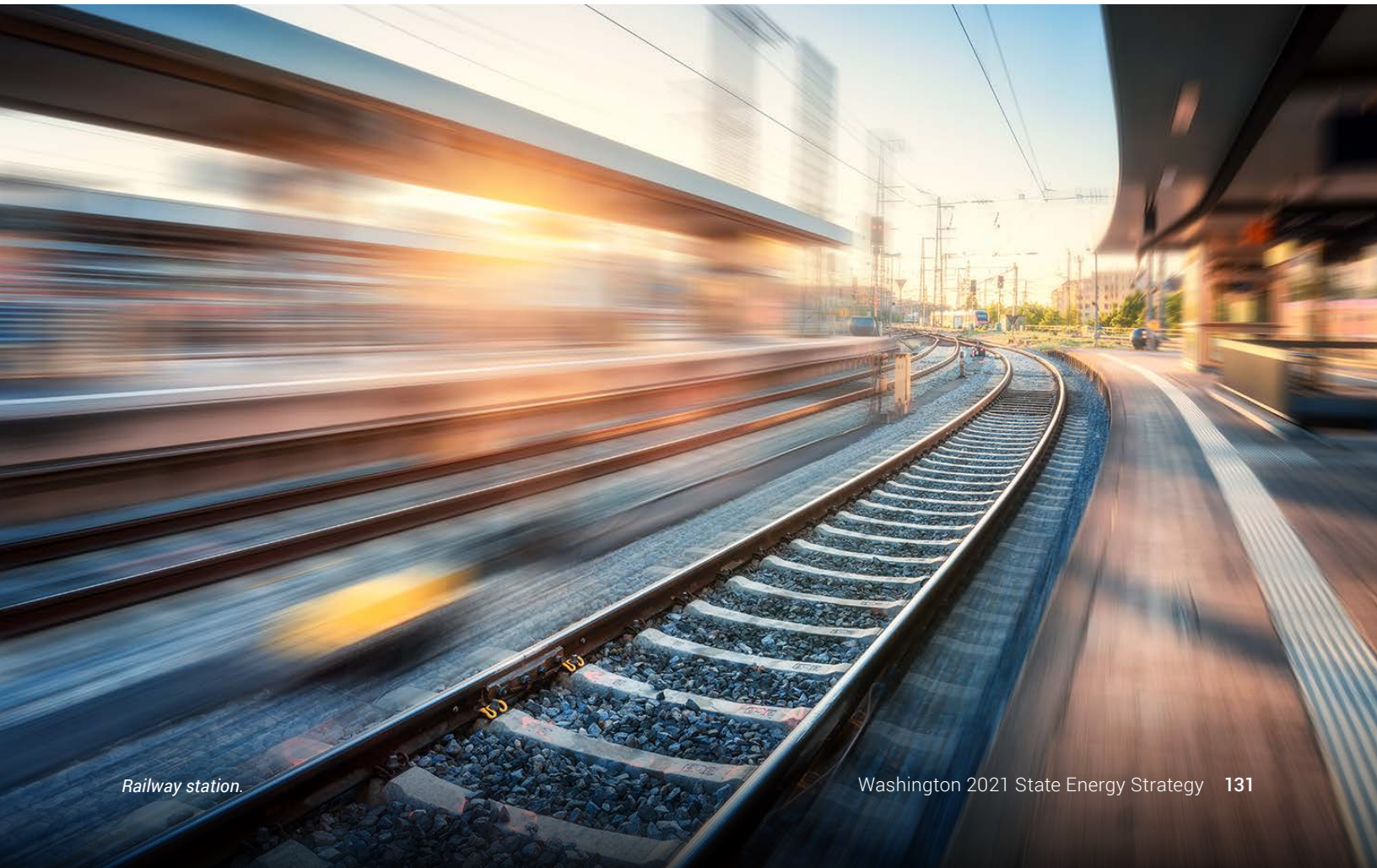
Energy equity indicators, data collection and a publicly accessible energy equity dashboard would assist in ensuring a just transition. The indicators should include both outcome and process measures. Outcome measures, such as increasing renewable energy in communities, must be supported by community engagement process metrics to hold state agencies accountable for increasing meaningful engagement with communities.

To understand current inequities associated with disbursement of energy funds and incentives, Commerce should review past and existing programs that support clean energy (e.g., Clean Energy Fund, Energy Efficiency and Solar grants) and other state incentives, such as the RESIP and net metering. Commerce should compare the locations of projects supported by public programs with the Environmental Health Disparities Map to identify highly impacted populations. The outcome can be used to identify gaps in service and specific use cases (i.e., multifamily housing) for further investment.

The Legislature and Commerce should use equity design elements for CEF and related energy programs. Those elements could include a lower or no match requirement based on applicant type, a requirement that grant applicants identify how their project will lead to more equitable outcomes, incentives to include underrepresented communities or organizations on project teams and ensuring community-driven outreach and participation in program design and implementation.

ACTIONS

- Perform an equity assessment of existing programs related to renewable energy.
- Explore the adoption of energy equity indicators and a publicly accessible energy equity dashboard, including both outcome and process measures.
- Use an equity and environmental justice lens for CEF program structure, design elements and participation.



Railway station.