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Earlier this year Washington released its 2021 State Energy Strategy, which is our state's first comprehensive roadmap for meeting science-based greenhouse gas emission limits. These limits were enacted by the state Legislature and Gov. Jay Inslee in 2020 and include 45% by 2030 and net-zero emissions by 2050. To develop this strategy our agency looked comprehensively at energy uses across the economy, using a deep decarbonization pathways approach. In addition to meeting our climate goals and maintaining affordable and reliable energy services, we sought opportunities for addressing inequities among residents and communities in our state.

Electricity is a relatively small contributor of greenhouse gas emissions in Washington, and the path for electricity is already established with our 100% clean electricity standard enacted in 2019. However, electricity emerged in the state energy strategy as a key element in transforming the overall economy to clean energy. Electrification of end uses currently served by fossil fuels – such as gasoline and diesel for transportation and fossil natural gas in buildings – is required to meet our climate goals. This is not meant to diminish other pathways, such as the substitution of renewable natural gas for fossil natural gas, but clean electricity is the main pathway in the Washington state energy strategy.

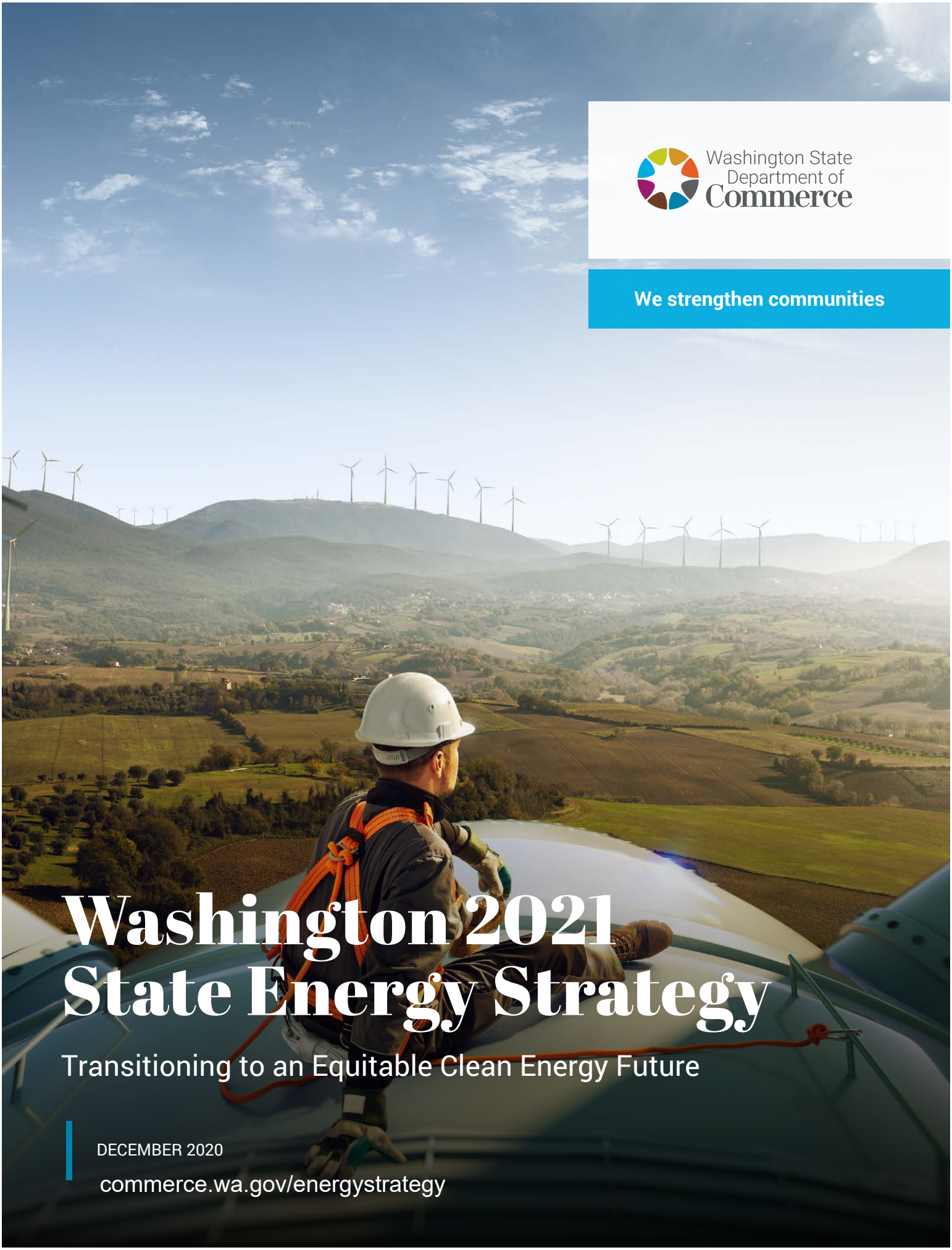
The electricity supply requirements for this transformation are substantial. Washington State needs to roughly double its electricity supplies by 2050. And virtually all of the new resources need to be clean electricity using renewable energy. Our hope is to draw those resources from multiple locations and energy sources across the West, capturing the advantages that different areas of our country have in producing electricity from renewable energy. This approach will not only minimize costs but also improve the reliability of our electricity portfolio.

A key component of this strategy – and one that is best addressed in coordination with the federal government and other states – is to strengthen the long-distance transmission system. The overall amount of required generating capacity will be lower if we have robust transmission, and generating resources can be sited in the locations where they have the best performance and lowest environmental impact. Another important multi-state issue is to maintain and protect transparent, efficient electricity markets that enable exchange of clean electricity.

The economy-wide transformation envisioned in our energy strategy will require substantial investments in the energy system. We need consumer equipment such as electric vehicles and high-efficiency heat pumps, as well as infrastructure investments in charging stations and grid modernization. These represent new business opportunities and new jobs in our state.

Because the strategy depends so heavily on investments and infrastructure, the risk is high that the clean energy transition will exacerbate our existing disparities in wealth and prosperity. Those with access to capital, such as home equity or corporate bonds, could make the upfront investments to shift

to less expensive clean energy. This could leave those without resources to pay for expensive fossil fuels and their infrastructure. Regulators and policy makers must work to avoid this outcome and more broadly to ensure that our transition to a clean energy economy is equitable for all households and communities.



Washington State Department of Commerce

We strengthen communities

Washington 2021 State Energy Strategy

Transitioning to an Equitable Clean Energy Future

DECEMBER 2020

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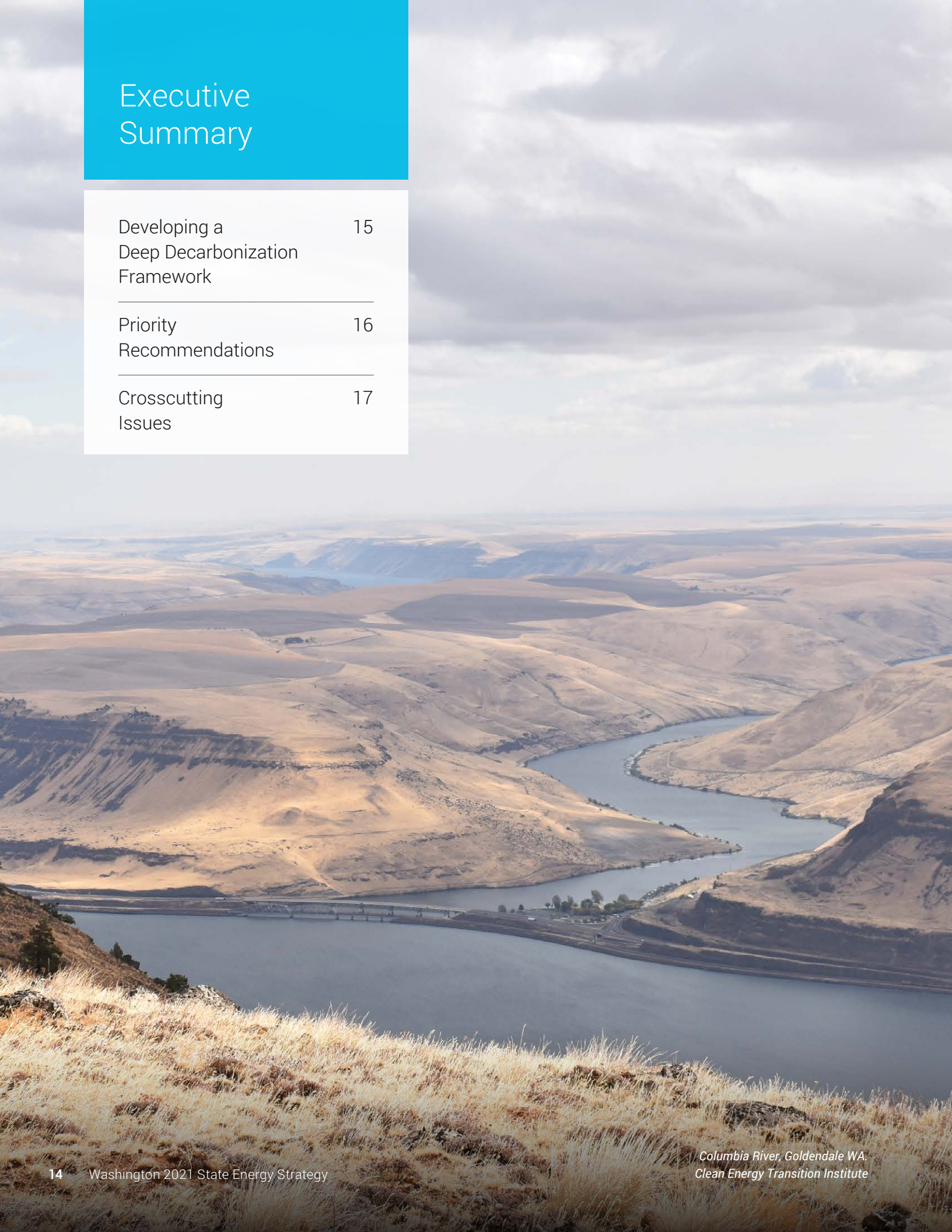


Columbia River, Goldendale WA.
Clean Energy Transition Institute

Executive Summary

Avoiding the worst impacts of climate change requires a comprehensive commitment to decreasing greenhouse gas emissions. Washington launched initial efforts with legislation to require clean electricity and efficient buildings. Much more is required in the near term to realize the transition to a clean economy. The path forward requires investment and action and promises a stronger and more just economy.

The 2021 State Energy Strategy is designed to provide a roadmap for meeting the state's greenhouse gas emission limits. Enacted in 2020, the law commits Washington to limits of 45% below 1990 levels by 2030, 70% below 1990 levels by 2040 and 95% below 1990 levels with net zero emissions by 2050.[7]

The path to a clean energy economy outlined in this strategy requires rethinking virtually every aspect of energy use in Washington. The state needs more efficient buildings, smarter appliances, vehicles using new sources of energy, investments in industrial processes, a stronger electricity grid and significant innovation.

Washington is known for innovation and environmental stewardship — as illustrated by its commitment to a 100% clean electricity grid. This strategy represents the next step — to find the policies and actions that will achieve the state's climate protection goals, put it on the road to reducing emissions to net zero by 2050 and improve quality of life and economic vitality. Particularly in light of COVID-19's devastating economic impacts, a just and equitable state energy strategy is a necessary condition for success. The strategy must benefit people, businesses, and rural, urban, highly impacted and indigenous communities throughout the state.

Developing a Deep Decarbonization Framework

The analytical framework for the 2021 State Energy Strategy is a comprehensive assessment of the options for achieving the state's emissions limits. This "deep decarbonization pathway" analysis searches for the lowest cost path to reduce emissions based on what we know today about technologies, costs and markets. By exploring multiple pathways, the analysis illuminates tradeoffs for decision makers.

Washington's legislatively mandated emissions limits decrease steeply over the next nine years and eventually require the replacement of virtually all fossil fuels. The range of feasible pathways is smaller than studies have found when analyzing less ambitious limits. To meet the current limits, Washington needs to move aggressively on multiple fronts, especially to meet the 2030 limit.

TRANSPORTATION, at 45% of the state's 2018 emissions, Washington must embrace a multi-pronged strategy in this sector of electrifying as many passenger, truck and freight vehicles as possible; investing immediately in the infrastructure required to support massive vehicle electrification; and developing incentives and land-use plans to reduce miles traveled and increase other modes of transport, such as transit, cycling and walking.

BUILDINGS, with 23% of the state's emissions, require a 10-year market transformation approach that combines transitioning from fossil gas to electrification, with deep levels of efficiency for new and existing buildings, and smart building demand management.

ELECTRICITY, at 16% of the state's emissions, must be 100% clean by 2030 and by 2050 must roughly double its output, while continuing to provide reliable power.

[7] Chapter 19.285 RCW.

INDUSTRY must be a focus of policy makers to reduce emissions where possible; develop clean fuels and carbon capture; work with energy-intensive, trade-exposed (EITE) businesses to mitigate the impacts of the clean energy transition; and develop a clean energy industrial policy to guide the state's low-carbon future.

Figure 1 below shows the state's total historical gross greenhouse gas emissions from 1990 to 2018 and projected gross emissions from 2020 to 2050 by source.

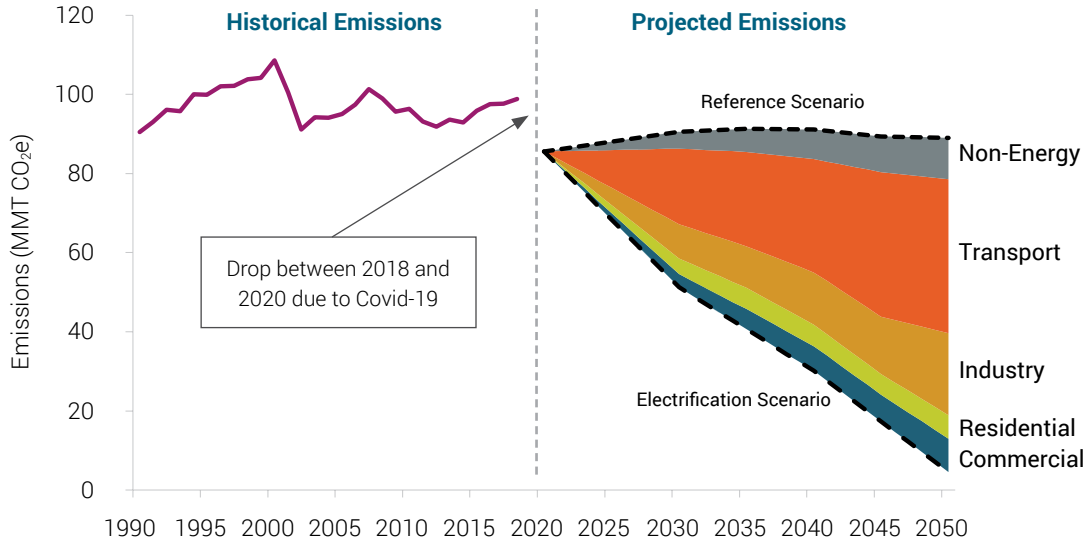
The deep decarbonization approach of looking at multiple sectors of the economy simultaneously yields insights that could easily be missed in a sector-by-sector approach. For example, an important cross-sector finding is that clean fuels, such as renewable hydrogen and clean synthetic or biogenic fuels, will be key to decarbonization. Washington can produce these products using clean, renewable or non-emitting electricity, carbon captured from industrial processes and fuels derived from biomass and other biogenic feedstocks (see Figure 23). Doing so can improve the flexibility of the electric system to manage high levels of intermittent renewable power generation. These fuels will replace fossil fuels in uses that cannot be quickly or completely converted to direct use of electricity.

The economic analysis demonstrates that the state can make this transition to clean energy and still maintain its economic vitality. The total amount spent on energy is within the historical range — 5-7% of gross state product — but the money is spent on equipment and infrastructure instead of imported fossil fuels. The clean energy investments in houses, factories, the power grid and the transportation system create demand for additional skilled workers and managers. The largest employment increase is in the construction sector and involves occupations that typically require less than a four-year undergraduate degree. The long-term financial payoff for these investments includes increased employment and income and economic activity, with businesses and households spending significantly less on the direct costs of energy.

Priority Recommendations

The Washington 2021 State Energy Strategy identifies policies and actions to achieve the state's greenhouse gas limits and transition to 100% clean energy. This represents a significant and intentional transition for the state's economy. Highly impacted communities and vulnerable populations must gain the most from this transition as they are most at risk from worsening climate impacts. At the

FIGURE 1. HISTORICAL AND PROJECTED GROSS GREENHOUSE GAS EMISSIONS IN WASHINGTON STATE



Source: Washington State Department of Ecology for historical emissions (2018 value is preliminary).
Appendix A – Deep Decarbonization Pathways Modeling Technical Report, December 11, 2020 (p. 26).

same time, decarbonization also presents many opportunities for addressing inequities among the residents and communities in our state including:

- **Enhancing resilience in rural Washington** by strengthening the electric grid to deliver clean energy and using universal broadband access to support a smart grid and remote work;
- **Growing and diversifying Washington's economy**, and increasing the prevalence of good, family-sustaining jobs by expanding access to education and training for workers;
- **Improving health outcomes** with more deliberative siting processes, upgrades to aging housing stock and cleaner transit options; and
- **Improving the comfort of homes**, **growing neighborhood businesses and ensuring basic necessities are accessible and affordable** to more Washingtonians, including those without an automobile or living in our most remote communities.

The strategy is organized by broad sectors of the state's economy, where similar technological and policy issues are present. It includes dozens of individual recommendations for action by policy makers, government agencies, utilities, the private sector and individual households. Please see the Key Actions List on page 19.

Crosscutting Issues

While the strategy is primarily organized along the ways that energy is used in the economy — by end-use sectors — several cross-cutting issues arise in more than one sector. In many cases, these issues will not be addressed effectively within any one sector or would best be resolved at a higher level. These include:

1. Increased Resources for Planning, Data Analysis and Outreach

A common theme across the strategy is the lack of adequate capabilities in government to evaluate, communicate and plan for the clean energy transition. In the industrial sector, policy makers lack basic information about manufacturing processes, opportunities for efficiency and conversion to clean energy and the effects of potential carbon reduction.

Planning and accountability in the transportation sector is shared across multiple jurisdictions with inadequate coordination and unclear policy direction. Progress in the building sector will require more staff resources to develop a net-zero energy code and benchmark the energy performance of existing buildings. The transition also requires more effort by the state to provide technical assistance and outreach to industry, local government, highly impacted communities and consumers.

2. Role of Investment in an Equitable and Inclusive Transition.

Throughout the strategy there is a common pattern over time where aggressive climate action requires substantial initial investment in equipment and infrastructure. This upfront cost yields a payoff in later years in reduced purchases of fossil fuels while providing an immediate opportunity for skilled workers and businesses. It also requires access to capital on reasonable terms.

For example, the electricity sector must invest in transmission capacity and grid enhancements to capture the benefits of fossil-free clean electricity. Transportation needs charging and fueling stations. Housing needs retrofits. High-efficiency consumer equipment and vehicles are often more expensive to purchase but much less expensive to operate.

Because the strategy relies so heavily on investments and infrastructure, the risk is high that the clean energy transition will exacerbate the inequitable distribution of wealth and prosperity. Those with access to capital, such as home equity or savings, could make the upfront investments to shift to less expensive clean energy. This could leave those without resources paying for expensive fossil fuels and the infrastructure used to produce and deliver them. Public sector mechanisms to finance the transition are necessary to avoid this result.

3. Universal Broadband Access as a Foundation for Energy Transition

The need for universal broadband access is outside the customary ambit of energy policy, but this need emerges across sectors. There are multiple examples where universal, reliable Internet access is required to capture energy efficiency improvements and increase access to fossil-free energy resources. Perhaps the most obvious is to reduce travel by enabling work from remote locations. This is another area with great risk of injustice. Without universal broadband access, many of the clean energy benefits identified in the strategy will be realized only by wealthier households and those outside rural areas.

4. Transition of the Fossil Natural Gas Industry

Natural gas is an important part of the state's economy, with billions of dollars invested in distribution infrastructure, millions of customers using its product and thousands of people employed in the industry. Fossil natural gas has lower direct emissions than either coal or petroleum. As a result, in some contexts past policies have identified natural gas as a clean source of energy.

However, the state's long-term greenhouse gas emissions limits cannot be achieved while continuing current uses of this fuel. Some uses will be replaced by clean electricity. Another option is to substitute renewable natural gas or a synthetic gas made using clean electricity. A well-planned transition, with clear legislative and regulatory direction, is required to protect the interests of all concerned.

5. Valuable Role of Comprehensive Pricing Mechanisms

This strategy includes, in addition to recommendations targeted at specific energy uses or economic sectors, the need for broad-based mechanisms to ensure that energy prices are not distorted by ignoring the costs of pollution. In the transportation and industrial sectors, the recommended approach is a low carbon fuel standard, which creates a price premium for fossil fuels and rewards electricity, biofuels and other clean fuels for their emissions benefits.

The market recommendations for the electricity sector can help power generators and utilities identify clean power and realize appropriate value for it. More accurate pricing of energy, as a standalone policy, is unlikely to achieve emissions reduction limits. Specific policies will be more successful when energy prices properly align with environmental and other costs.

6. Benefits of Research, Development and Early Deployment

The 2021 State Energy Strategy avoids reliance on yet-to-be-invented technologies, but it embraces many solutions that are not yet widely deployed, such as electric and hydrogen vehicles, advanced building techniques, green hydrogen production and intelligent grid devices. The emphasis on advanced technology is unavoidable given the ambition of the state's emissions reduction limits. It presents an opportunity to make even more and faster progress through research and innovation, and to boost the state's economy.

These efforts might yield efficiency gains or cost reductions for energy storage, nuclear power generation, geothermal energy, offshore wind, power grid control or many other technologies. This calls for collaboration with research universities, national laboratories, federal agencies and private sector innovators.

7. Development of Green Hydrogen and Clean Fuels

The deep decarbonization modeling and the state energy strategy identify an important role for clean fuels in every sector of the energy economy. Green hydrogen is of particular significance, because it could serve both as a flexible use of electricity when generation exceeds demand and as a feedstock for production of synthetic fuels. This could create new jobs and businesses in the state and help the transportation sector to transition to electricity.

Production of biofuels and renewable natural gas will support the agriculture and forest sectors and provide valuable substitutes for fossil natural gas and petroleum (see Figure 23). As these examples illustrate, the development of clean fuels involves complex production and distribution processes crossing multiple sectors of the economy. There is worldwide interest in these low-carbon fuels and therefore ample opportunity to work with other states and countries in their development.

Key Actions

Communities

Climate change will inflict its greatest harm on highly impacted communities, Tribes, rural areas and low-income households, just as the economic and health impacts of COVID-19 are now disproportionately affecting those same populations. Absent deliberate and committed efforts, the envisioned clean energy transformation could easily leave these communities worse off.

- Adopt state policies to achieve universal broadband access.
- Examine clean energy policies for equity impacts in development and during implementation.
- Provide needed funding for communities to participate in the clean energy transformation.
- Support workers to ensure they have the skills for clean energy jobs and adopt policies to protect workers in transition.

Transportation

No sector is as important as transportation to achieving decarbonization, nor as complex in its operation and governance.

- Establish specific targets for vehicle sales, transportation demand and emissions with accountability measures for meeting those targets.
- Adopt a low carbon fuel standard – a comprehensive mechanism to replace fossil fuels with electricity, hydrogen and clean synthetic or biogenic fuels.

Buildings

There is great potential to reduce and eventually eliminate the use of fossil fuels to heat and power Washington's residences, offices, warehouses, shops and other buildings.

- Replace the direct consumption of fossil fuels, primarily natural gas, with high-efficiency electric heat pumps for space and water heating.
- Strengthen and deepen energy efficiency programs and standards to focus on avoiding and reducing emissions.
- Adopt specific targets and accountability for greenhouse gas emissions in the built environment.

Industry

Policy makers and the private sector would benefit from more information, technology and coordination.

- Conduct a thorough assessment of opportunities to transition to low-emission industrial production and collect information about the use of fossil fuels in industrial processes and the opportunities to increase efficiency and switch to electricity.
- Coordinate with other jurisdictions to adopt consistent policies that recognize and reward lower emission in-state production.
- Enhance research and development programs and state agencies' data and analytical resources.
- Promote development of green hydrogen production, clean fuels refining and carbon capture.

Electricity

Washington is on its way to eliminating greenhouse gas emissions from electricity with the implementation of the Clean Energy Transformation Act (CETA). Structural changes are needed to ensure the capacity to provide electricity to replace fossil fuels in transportation, buildings and industry.

- Invest in new transmission capacity and renewable generation, coordinating with other states.
- Develop distributed energy resources with smart grid capabilities and in consumer equipment to ensure reliability and flexibility.
- Strengthen market mechanisms to ensure resource adequacy and efficient electricity markets.