

Taking the Long View: Examining Pathways to Deep Decarbonization for Washington State

Rationale

The international scientific community, through the Intergovernmental Panel on Climate Change, agrees that net global greenhouse gas emissions must approach zero by the second half of the 21st century to avoid the worst consequences of climate change and to limit global warming to 2°C or lower. Washington is a signatory to the Under2 MOU (memorandum of understanding), along with other U.S. states and cities, and international subnational jurisdictions, which commits the parties to reduce GHG emissions to levels necessary to limit global warming below 2°C. The Washington State Department of Ecology recommends that the state reduce emissions by 80 percent below 1990 levels by 2050 to meet this goal.

Approach

Meeting this level of emission reductions requires steep reductions in energy-related CO₂ emissions, a process frequently referred to as “deep decarbonization.” To guide our understanding of the choices and implications of an 80 percent reduction, the state commissioned a study to develop three possible pathways for our state’s future energy system:

- § **Electrification** – Powering as much of our economy with electricity as we can
- § **Renewable pipeline** – Replacing our dependence on natural gas for heating and industrial processes with low carbon fuels such as biogas, synthetic natural gas and hydrogen
- § **Innovation** – Incorporating new technological breakthroughs in electric vehicles, hydrogen fuel cells and autonomous vehicles

These scenarios were built using the following principles: (a) maintain an economy and lifestyle similar to that of today; (b) use commercially demonstrated or near commercial technologies; (c) replace energy infrastructure at the end of its design life; (d) maintain power system reliability; and (e) recognize limits on the supply of biogas, renewable energy and pumped hydro storage potential.

Key conclusions

This work shows that Washington can achieve deep emission reductions using a variety of technologies and approaches. It also reveals some common themes across pathways:

- § Ambitious energy demand reductions are needed and require investment in energy-efficient and low-carbon technologies.
- § Electricity’s importance will continue to increase in our economy and needs to be produced from sources that generate little to zero GHGs.
- § Our passenger cars will need to be predominately electric.
- § The decisions and investments we make today about our buildings, vehicles and energy infrastructure will shape our carbon future for decades to come.

So what technologies do we need and what does this mean for Washington’s economy? We can achieve an 80 percent reduction largely using current technology; “breakthrough” technologies are not required. However, technological improvements will make our task easier and cheaper as well as create new economic opportunities for Washington companies. The incremental/net cost of achieving GHG reductions through 2050 is likely to be quite reasonable: The analysis finds that the cost of low-carbon and energy-efficient energy infrastructure is small relative to both the projected size of Washington’s economy and the savings from avoided fossil fuel purchases.

Reaching the goal: Costs per year

