

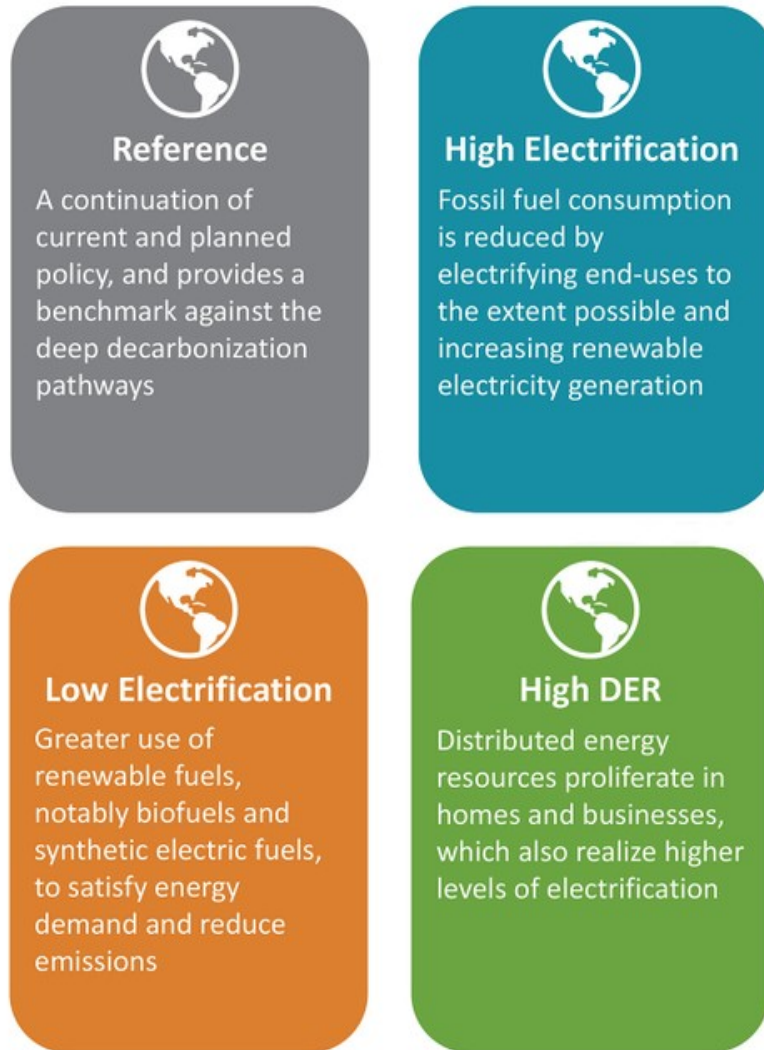
OREGON BUSINESS NEWS

PGE study: low-carbon grid is doable, affordable

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Scenarios



(PGE/Evolved Energy Research)

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The Oregonian/OregonLive

The energy and transportation sectors are not only capable of executing steep cuts in greenhouse gas emissions, doing so could save households and businesses

money in the long run, according to a study that Portland General Electric circulated this week.

Not surprisingly, that future looks bright for PGE and other electric utilities. Most carbon-reduction pathways rely on aggressive electrification, whether for transportation, home and commercial heating, or cleaning up the gas supply. It would also involve vast new investments in renewable electricity generation to provide reliable service while customers are being weaned off fossil fuels.

PGE is opposed to the carbon pricing legislation currently under consideration in the Legislature, but says that is a question of program design, not an objection to a cap on greenhouse gas emissions and some form of carbon pricing.

The utility hired San Francisco-based Evolved Energy Research to look at the challenges and opportunities of reducing greenhouse gas emissions within its service territory to meet the state's current goal: 75 percent below 1990 emission levels by 2050.

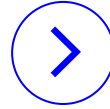
They were plentiful, and as one of the study's authors, Gabe Kwok noted. "The changes we evaluated were transformational, not incremental. 100 percent of vehicle sales are electric by the mid-2030s," for example. Those changes would require both consumer and producer buy-in, major investments in new infrastructure and timely planning.



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For its part, PGE said the study isn't any kind of formal plan, but is meant to provide a basis for discussion.

"If we're making decisions about this today, we want to make sure they make sense," said Brett Sims, PGE's director of planning. "How will our grid operations need to evolve to handle this? The world presented is dramatically different from today's state. It would require a grid that looks quite a bit different. Is it possible? From a technical standpoint, this suggests it is."

The analysis didn't assume any major technology breakthroughs, changes in customers' lifestyles or overnight turnover in their vehicles or appliances. Sims said the goal was to make conservative assumptions, though the utility didn't release anything but high-level findings.

The consulting firm designed and evaluated three scenarios that could meet the emissions reductions goal. The first, "high electrification," essentially involved electrifying everything, from vehicles to building heating,

and powering it all with low-carbon renewables. The second, "low electrification," is actually a bit of a misnomer, as it still involved electrification of transportation, but decarbonized the pipeline system by using electricity to produce cleaner gas and biofuels. The final scenario, "distributed generation," included a big slice of rooftop solar.



All three pathways shared common pillars: reducing energy consumption per person by about 40 percent, reducing the carbon intensity of electricity by 90 percent or more, and increasing the share of electricity in total energy use from 25 percent today to half or more.

How would that happen? In transportation, a high electrification pathway might involve transitioning vehicles on the road to battery electric vehicles and plug-in hybrids, which are 70 percent more efficient than internal combustion engines, and charging those vehicles on a low-carbon electricity grid.

The scenarios also involved a staggering amount of new renewable resources – adding 600 megawatts per year between 2030 and 2050, according to the study. For a sense of scale, that's more than two of the company's Tucannon River wind farms a year, a 267-megawatt project near Dayton, Washington, that cost \$500 million.

Effectively, the intermittent nature of renewables would require utilities to overbuild their generation – more than tripling PGE's current capacity – in order to reliably meet demand. It also would require a diverse mix of back-up resources, including gas, hydro and energy storage. And it means that for a good chunk of the day, the utility would be generating more power than it needed, and would likely have to pull the plug on some of its renewable projects, called curtailment.



Still, in terms of household energy costs, the study concluded that a high electrification path could reduce costs by \$25 a month by 2050 as consumers made the transition away from less efficient fossil fuels.

"The utilities should love this" future, said Robert McCullough, a Portland energy consultant, noting that utilities don't earn a rate of return on their fuel costs, only the capital they invest in hardware. "This is a lot of new hardware."

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