

HB 1770: to mandate zero-emission construction on new homes

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Key Findings

1. Legislators are seeking to impose strict new net-zero housing requirements to meet the state's CO₂-reduction targets.
2. The proposed rules duplicate existing climate regulations, adding cost but little environmental benefits.
3. The legislation requires new homes to be solar-ready even though the state is already on track to zero-emission electricity and rooftop solar is the most expensive form of renewable energy.
4. Although solar-ready construction would add costs to all new homes, the benefits would go primarily to families earning twice the median income.
5. Replacing natural gas heating with electricity will increase demand, pushing up costs and increasing the risk of electricity shortages, especially during peak demand hours.
6. The bill's rules would take 100 years to reduce an equivalent amount of emissions as available alternatives.
7. The bill would increase housing costs at a time of rising inflation. Electric heating is also more expensive, increasing monthly costs above the initial construction cost.

Introduction

Washington state's new economy-wide CO₂ emissions cap has not even been implemented yet, and legislators are already proposing new regulations that would dictate how residents must reduce future household emissions. HB 1770 would require new homes and other buildings to be built to net-zero emission standards, including a specific rule that homes be pre-wired for rooftop solar panels. The purported goal is to cut the 23.4 percent of Washington's greenhouse gas emissions that come from heating buildings.

The proposal would increase housing costs at a time when affordability is a problem for many Washington residents. Mandating these new construction standards would impose very high costs while yielding small, theoretical environmental benefits in the future. Shifting from natural gas heating to electricity not only costs more, it increases pressure on the electric grid at a time when energy supply is becoming more intermittent and costly.

Legislators should consider the high cost of these proposed housing mandates, and look for alternatives that are more flexible, affordable, effective, and immediate to reduce state emissions.

Proposed restrictions would duplicate existing CO₂ reduction requirements

The intent section of the bill lays out the rationale for the new restrictions. The bill claims, "In order to meet the statewide greenhouse gas emissions limits in RCW 70A.45.020, the state *must* require construction of increasingly low-emission energy efficient homes and buildings and achieve construction of zero fossil-fuel greenhouse gas emission homes and buildings by 2030" (emphasis

mine).¹ This is not accurate.

In 2023, Washington state will implement a steadily-declining cap on CO2 emissions to achieve the state's goal of decarbonization by 2050. That law includes a range of options to reduce emissions and increases the cost of CO2-emitting sources of energy. Because Washington's electricity is mostly CO2-free, mandating electric home heating is one method of meeting that goal, but it is not the only way, nor is it the most cost-effective.

Regulations that narrowly focus on how individual sectors or industries cut emissions not only go against the logic of the climate law the legislators adopted just last year, they reduce the flexibility that allows Washington residents to choose climate efforts that are less costly and more effective.

The bill's mandate to require the installation of solar-ready electrical equipment shows how the bill adds cost without helping meet the state's CO2 targets. HB 1770 would specifically require that new construction, "must include wiring for electrical raceways and designated space for solar equipment for photovoltaic panel installation..." This rule would be particularly wasteful and counterproductive.

Rooftop solar is an extremely poor way to generate electricity in Washington. The U.S. Department of Energy and industry expert Lazard note that rooftop solar is the most expensive form of renewable electricity.² Additionally, Washington state is particularly ill-suited for solar electricity. The National Renewable Energy Laboratory ranks Western Washington as the worst place in the U.S., outside of Alaska, for solar energy.³

Washington state's electricity is on track to be 100 percent renewable by 2030. Adding solar would simply displace low-cost, CO2-free electricity with expensive solar electricity.

Finally, even with large government subsidies, wealthy families are the most likely to install solar panels and use the pre-installed wiring. Research from the Lawrence Berkeley National Laboratory found that "The median solar adopter income was about \$113k/year in 2019, compared to a U.S. median of about \$64k/year."⁴ Forcing middle and working-class families to buy electrical equipment they may never use simply increases housing prices without reducing CO2 emissions.

There are already questions about whether the cap on CO2 emissions adopted in 2021 will be effective, and about the costs of that system. Adding costly and inflexible regulations to that system is likely to make it more difficult to meet the state's strict CO2 targets.

The bill puts all our home-heat eggs in one basket

Moving from natural gas heat to electricity would increase pressure on Washington's electrical grid. It would increase electricity demand at the same time when the growing number of electric vehicles will increase the need for electrical generation.

As demand for electricity increases, Washington's electricity is also moving toward renewable sources of electricity, making supply less predictable. For example, between January 22nd and 30th this year, there was virtually no wind-generated electricity on the Bonneville Power Administration's system.⁵ As the Northwest increasingly relies on sources of electricity that fall short or even disappear for a week at a time, the risk of blackouts and

1 "HB 1770, Strengthening energy codes," Washington State Legislature, introduced January 5, 2022, at <https://app.leg.wa.gov/bills/summary?BillNumber=1770&Year=2021&Initiative=false>.

2 "Solar Energy Technologies Office Overview," U.S. Department of Energy, October 2020, at <https://www.energy.gov/sites/default/files/2020/10/f79/Solar%20Energy%20Technologies%20Office%20Overview.pdf> and "Lazard's leveled cost of energy analysis - Version 15.0," Lazard, October 2021, at <https://www.lazard.com/media/451881/lazards-levelized-cost-of-energy-version-15-0-vf.pdf>.

3 "Solar Resource Maps and Data," National Renewable Energy Laboratory, at <https://www.nrel.gov/gis/solar-resource-maps.html>, Accessed February 3, 2022.

4 "Residential Solar-Adopter Income and Demographic Trends: 2021 Update," Galen Barbose, Sydney Forrester, Eric O'Shaughnessy, and Naim Darghouth, Lawrence Berkeley National Laboratory, April 2021, at https://eta-publications.lbl.gov/sites/default/files/solar-adopter_income_trends_final.pdf.

5 "Data for BPA Balancing Authority Total Load, Wind Gen, Wind Forecast, Solar Gen, Solar Forecast, Hydro, at Thermal, and Net Interchange: 2022," Bonneville Power Administration, https://transmission.bpa.gov/Business/Operations/Wind/WindGenTotalLoadYTD_2022.xls.

similar energy shortages increases.

Renewable sources of electricity like wind and solar don't fit the daily pattern of electricity demand. Electricity demand peaks in the morning as people wake up, declines in the middle of the day, then peaks again in the evening, before falling to very low levels during the night. As solar power becomes available in the morning and middle of the day, demand is generally declining from the morning peak. In Washington state, the wind generally blows during the middle of the night, precisely when demand is lowest. There are ways to shift demand to meet supply, such as charging electric vehicles overnight, but those changes cannot eliminate family needs in the morning and evening. This need must be met by a reliable source of electric generation that can be turned on and off, such as hydro and natural gas. Meeting that demand will become increasingly difficult as several coal-powered generators go offline over the next 15 years.⁶ Electric heating will add demand in the early evening as temperatures drop, precisely when renewables are least available. The greater the mismatch between peak supply and demand, the more electricity costs will go up during the day, bringing average electricity costs up with them.

Currently, Washington's reliable hydroelectric generation can meet that fluctuating demand during the day. That may not be the case in the future as the need for electricity increases and the supply of dependable power declines.

Increased costs for homeowners, but few environmental benefits

Supporters of the legislation acknowledge the bill will add to the cost of a new home. They argue that in the long run, it will save money and will generate environmental benefits worth the cost. That outcome is unlikely. Indeed, even when we account for the benefits of reducing CO2 emissions, the costs

6 "2021 Power Plan Resource Adequacy Assessment," by John Fazio, John Ollis, Dan Hua, Northwest Power and Conservation Council, July 16, 2021, at <https://nwcouncil.app.box.com/s/k12r8hry1ofogeqxjw8spgnv2n55lvm>.

of the proposal are very high.

Homes emit about four metric tons (MT) of CO2 annually. Any strategy to reduce or eliminate those emissions must consider the cost to achieve that goal. If it costs one dollar, then the benefits would far outweigh the costs. If, on the other hand, the cost is very high, it would make more sense to spend the money elsewhere to reduce emissions or on other priorities, such as improving public health or solving other environmental problems.

There are a variety of ways to calculate the value of reducing greenhouse gas emissions from public policy like the proposed mandates. The market price for projects that reduce emissions is about \$10 per MT. That benefit is readily available to anyone from groups like the Bonneville Environmental Foundation.⁷ Government-created carbon markets also have a price for CO2 reductions. In California's cap-and-trade system, the current cost is \$28.26 per ton.⁸ Finally, the Biden Administration estimates the social cost of carbon – the theoretical damage caused by each MT of CO2 – starts at about \$51 in 2020 dollars and will increase to \$85 in 2050.⁹ Using these cost estimates, we can calculate the time it would take for the new rules to yield environmental benefits equal to the cost.

According to estimates, the upfront cost of building with electric heat rather than natural gas is \$8,131.¹⁰ With additional net-

7 "Carbon Offsets – BEF | Sustainability Products and Services (b-e-f.org)," Bonneville Environmental Foundation, at <https://www.b-e-f.org/programs/bef-carbon-offsets/>.

8 "California Cap-and-trade program: Summary of California-Quebec Joint Auction Settlement Prices and Results," California Air Resources Board, November 2021, at https://ww2.arb.ca.gov/sites/default/files/2020-08/results_summary.pdf.

9 "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990," Interagency Working Group on Social Cost of Greenhouse Gases, United States Government, February 2021, at https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.

10 "Cost and Other Implications of Electrification Policies on Residential Construction," Home Innovation Research Labs, February 2021, at <https://www.nahb.org/-/media/NAHB/nahb-community/docs/committees/construction-codes-and-standards-committee/home-innovation-electrification-report-2021.pdf>.

zero elements, that would add about \$14,495 to the cost of a house.¹¹ Using a social cost of carbon of \$62 starting in 2030 and escalating annually, it would take 26 years to reach the low-end estimate of \$8,131 in climate benefits. Using the higher estimate of \$14,495, it would take 42 years. That is a relatively long time to create environmental benefits equal to the up-front costs. The useful lifespan of some equipment is likely to be longer than even the shorter timeline. The cost of meeting the net-zero codes is likely to cost more than the environmental benefits they might provide.

Spending thousands of dollars today in anticipation of supposed future CO2 reduction has a high opportunity cost. Rather than spending \$8,000 to gradually reduce emissions over several decades, we could also use that money (or a portion of it) to cut emissions immediately. At the market rate of \$10/MT, we could reduce 800 MT of CO2 for \$8,000.

Assuming a house emits about 4/MT of CO2 annually, it would take 200 years for a net-zero house to avoid that much greenhouse gas emission. At the current California market price of \$28.26, we could reduce CO2 emissions by about 283 MT. That emissions reduction would take more than 70 years for a net-zero home to achieve.

Using either a simple cost-benefit analysis or considering the lost opportunity to reduce an equivalent amount of emissions immediately, the bill's requirement to build to net-zero standards is unlikely to be environmentally positive and will waste the opportunity to reduce a greater amount of emissions immediately.

Construction costs are not the only added expense that will be paid by net-zero homeowners. Currently, it is more expensive to heat using electricity than with natural gas. In 2020, it cost about \$34.79 for one dekatherm of electricity from Seattle City Light.¹² By way of comparison, in Washington state, the

residential cost of natural gas was \$10.97 per dekatherm in 2020.¹³ On average, electricity costs more than three times as much as heating with natural gas in Seattle.

Advocates of mandating electric heating know this is true. In 2021, Seattle City Light CEO Debra Smith testified in favor of similar legislation that would increase the use of electricity for heating. I let legislators know that City Light's own data showed that electric heating was more expensive. The day after I pointed this out, Seattle City Light officials removed that cost data from their website.¹⁴ They know electric heating costs far more but they didn't want legislators to see the evidence.

While some advocates of the bill will attempt to claim it comes without additional costs, most will argue that while there are costs, they think the environmental benefits are worth it. Analysis, however, shows this is not true. Based on the bill's own cost estimates, mandating net-zero construction would be an extremely expensive way to reduce emissions and is far less effective than alternatives available in the market or in California's cap-and-trade system. The legislation has high costs on the public today in the vain hope of gaining meaningful future emission reductions.

Conclusion

Mandating that new construction meet a net-zero standard is an expensive and ineffective way to reduce CO2 emissions and is duplicative of existing regulations. Rather than add mandates that increase the cost of housing without generating meaningful environmental benefits, legislators should allow the market to work using the flexibility, albeit limited, of the economy-wide system that will take effect next year.

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11 These costs assume a home is not financed. Adding interest costs from home loans would increase those amounts.

12 "Annual Electric Power Industry Report, Form EIA-861 detailed data files," U.S. Energy Information Administration, October 7, 2021, at <https://www.eia.gov/electricity/data/eia861/>.

13 "Natural Gas Prices," U.S. Energy Information Administration, at https://www.eia.gov/dnav/ng/ng_pri_sum_a_EPG0_PRS_DMcf_a.htm.

14 "Seattle City Light officials remove inconvenient cost data after legislative testimony," Todd Myers, Washington Policy Center, March 11, 2021, at <https://www.washingtonpolicy.org/publications/detail/seattle-city-light-officials-remove-inconvenient-cost-data-after-legislative-testimony>.