Appendix 5. Qualitative Policy Scorecards

U1 Align Energy Efficiency Programs with State's Climate Goals

Target	• Ensure energy efficiency programs align with other policies such as HB 2021 and CPP • Ensure demand response programs delivery and enable GHG emissions reductions

Note: This policy was not assessed quantitatively; a qualitative assessment of the policy has been undertaken using the same framework. This assessment is based on our understanding of the policy intention and our best assessment of its impacts.

Indicators

1. GHG emissions	↓ Decreases emissions	Aligning energy efficiency programs with GHG emissions reductions will reduce emissions
2. Economic impact- lifecycle abatement cost	↑ Costs money per ton of emissions reduced	Efficiency measures leading to deep emissions reductions are capital intensive but lead to cost savings over the long run
3. Energy efficiency	↓ Decreases energy consumption	Energy efficiency measures will by definition reduce energy consumption
4. Resiliency	↑ Increase resilience	Efficiency measures which reduce GHG emissions will increase resilience by improving the passive survivability of homes
5. Public health and air quality	↓ Decreases health costs	Efficiency measures which reduce energy consumption improve health outcomes and decrease health costs
6. Household expenditures	↓ Decreases household energy costs	Energy efficiency measures will decrease household energy costs

7. Economic impact-employment	↑ Employment	Energy efficiency expenditures will stimulate employment
8. Social cost of carbon	↓ Decreases the social cost of carbon	Energy efficiency measures designed to reduce GHG emissions will reduce the social cost of carbon

Discussion

1. GHG Emissions

The provision of renewable energy is critical to decarbonising the energy system. Energy efficiency measures can reduce the capacity of renewable energy required both by reducing overall annual consumption, reducing peak demand and reducing demand when carbon intensive electricity is highest.

Energy efficiency measures can be compounding. For example, weatherization of a home can reduce the annual heating requirements by 50%. This reduces the size of heating equipment required, and if a heat pump is installed, which uses one unit of energy to generate three units of heat, the overall reduction in energy consumption is nearly 85%.

Energy efficiency measures which target deep GHG emissions are different from energy efficiency measures which target energy savings writ large. Measures can target savings to periods of more GHG intensive electricity generation. Other measures can avoid locking in investments in equipment or measures that result in incremental energy savings but do not result in substantial emissions reductions over the long run.

2. Economic Impact, Costs and Savings

GHG emissions reductions require a more systematic approach to energy efficiency that targets investments with a longer-term payback such as weatherization of the envelope over measures with a shorter term payback such as commercial lighting upgrades.[1] Incremental costs and savings can be reduced by retrofitting multiple buildings simultaneously; an approach known as the industrialisation of retrofits.

3. Energy Efficiency

Energy efficiency programs which will achieve GHG emissions reductions can be classified into four categories:

- More efficient equipment (i.e. heat pumps)
- Passive demand reduction (e.g., peak-saving efficiency)
- Demand flexibility programs (e.g., managed electric vehicle charging)
- Non-energy resources (e.g., refrigerant savings for GHG abatement, tree planting)

4. Resiliency

Some energy efficiency measures can increase the resilience of the home or building by increasing its passive survivability, its ability to maintain heating or cooling without external energy inputs. When the power is out as a result of a storm, the building or home will remain hot or cold for a period of time as a result of its enhanced thermal envelope, enabling people to shelter in place for longer periods. A study of buildings in New York City found that homes with efficiency upgrades

[1] For example see the analysis of the net present value of deep retrofits calculated for the Oregon Global Warming Commission presentation on October 7, 2022. Retrieved from: https://www.keeporegoncool.org/meeting-calendar/2022/10/7/oregon-global-warming-commission-meeting-virtual

could maintain indoor temperatures of over 60 degrees during a week-long power outage, whereas the temperature in average efficiency homes with no retrofit fell below 35°F in three days.[2]

5. Public Health and Air Quality

Households facing energy poverty or energy insecurity face challenges such as "pay the rent or feed the kids", "heat or eat", or "cool or eat". In particular, energy insecurity disempowers low-income residents such as single parents, the elderly, persons with disabilities, and others with low or fixed incomes, resulting in stresses such as utility-related debt, shutoffs, inefficient heating systems, antiquated appliances, and extreme home temperatures with significant health impacts.[3] Children may experience nutritional deficiencies, higher risks of burns from non-conventional heating sources, higher risks for cognitive and developmental behavior deficiencies, and increased incidences of carbon monoxide poisoning.[4] Subsequent impacts include parents being unable to work in order to look after children, missed school days, and lost productivity.

There are also health benefits to the extent that efficiency measures reduce combustion in the building envelope.

Maintaining or improving indoor air quality as a result of energy efficiency improvements requires careful design of ventilation and consideration of the materials used in the weatherization upgrades.

6. Household Expenditures

Energy efficiency measures decrease household expenditures on energy, and reduce the exposure of households and businesses to fluctuations in energy costs.

7. Economic Impact, Employment

Energy efficiency measures stimulate job creation.

8. Social Cost of Carbon

Energy efficiency measures that reduce greenhouse gas emissions will reduce the social cost of carbon.

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[2] C2ES. (2018). Resilience Strategies for Power Outages.

[3] Hernández, D., & Bird, S. (2010). Energy burden and the need for integrated low-income housing and energy policy. Poverty & Public Policy, 2(4), 5–25. https://doi.org/10.2202/1944-2858.1095

[4] Ibid.

U2 Modify Energy Trust of Oregon's Mission

Target	• Change Energy Trust of Oregon's (ETO) mission to lead with greenhouse gas (GHG) emissions reductions and equity instead of leading with fuel-neutral energy efficiency • Direct the PUC to consider GHG reduction in Energy Trust/utility conservation programs. • Remove barriers to customer choice through ETO funds and other programs that provide efficiency incentives to replace bulk fuels with a more efficient electric system (rather than a forced switch). • ETO programs should be made available statewide.

Note: This policy was not assessed quantitatively; a qualitative assessment of the policy has been undertaken using the same framework. This assessment is based on our understanding of the policy intention and our best assessment of its impacts.

Indicators

1. GHG emissions	↓ Decreases emissions	Aligning ETO's mission with GHG emissions reductions will reduce emissions
2. Economic impact- lifecycle abatement cost	↓ Negligible cost per ton of emissions reduced	ETO can bundle measures which cost money with measures that save money to ensure savings per ton of emissions reductions
3. Energy efficiency	↓ Decreases energy consumption	ETO programs will reduce energy consumption and increase efficiency under this policy
4. Resiliency	↑ Increase resilience	ETO programs which save energy and address equity will increase resilience
5. Public health and air quality	↓ Decreases health costs	ETO programs that reduce GHG emissions will improve health outcomes and decrease health costs

6. Household expenditures	↓ Decreases household energy costs	Conservation programs will decrease household energy costs
7. Economic impact-employment	↑ Employment	Energy efficiency expenditures stimulate employment
8. Social cost of carbon	↓ Decreases the social cost of carbon	Energy efficiency measures designed to reduce GHG emissions will reduce the social cost of carbon

Discussion

1. GHG Emissions

This policy ensures that ETO's programs result in GHG emissions reductions.

2. Economic Impact, Costs and Savings

GHG emissions reductions require a more systematic approach to energy efficiency that targets investments with a longer-term payback such as weatherization of the envelope over measures with a shorter term payback such as commercial lighting upgrades.[1]

GHG emissions reductions related to electrification generate financial savings.[2]

3. Energy Efficiency

ETO programs which will achieve GHG emissions reductions can be classified into four categories:

- More efficient equipment (i.e. heat pumps)
- Passive demand reduction (e.g., peak-saving efficiency)
- Demand flexibility programs (e.g., managed electric vehicle charging)
- Non-energy resources (e.g., refrigerant savings for GHG abatement, tree planting)

4. Resiliency

ETO programs that focus on conservation and GHG emissions can increase the thermal performance of buildings, which can increase resilience against power outages and extreme heat and cold.

ETO programs that support electrification can also increase resilience against extreme heat by providing cooling capacity for those homes that don't already have an air conditioner.

5. Public Health and Air Quality

A focus on electrification will reduce air pollution.

Maintaining or improving indoor air quality as a result of energy efficiency improvements requires careful design of ventilation and consideration of the materials used in the weatherization upgrades.

6. Household Expenditures

ETO programs which focus on efficiency and GHG emissions will decrease household expenditures on energy, and reduce the exposure of households and businesses to fluctuations in energy costs.

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[1] For example see the analysis of the net present value of deep retrofits calculated for the Oregon Global Warming Commission presentation on October 7, 2022. Retrieved from: https://www.keeporegoncool.org/meeting-calendar/2022/10/7/oregon-global-warming-commission-meeting-virtual

[2] Ibid

If ETO programs focus on electrification, the impact on household energy costs is sensitive to the differential between natural gas and electricity prices.

7. Economic Impact, Employment

A focus on GHG emissions reductions in ETO programs will stimulate new jobs as more significant investments in weatherization are likely required.

8. Social Cost of Carbon

ETO programs that reduce greenhouse gas emissions will reduce the social cost of carbon.

U3 Promote, Incentivize, and/or Subsidize Air Purification Systems

Target	• Promote, incentivize, and/or subsidize air purification systems. • Use only an approved product list of effective air cleaners. • Prioritize efficiency upgrades and clean air systems in Oregon schools. • Further prioritize schools that serve diverse or disadvantaged communities.

Note: This policy was not assessed quantitatively; a qualitative assessment of the policy has been undertaken using the same framework. This assessment is based on our understanding of the policy intention and our best assessment of its impacts.

Indicators

1. GHG emissions	– No change	The impact on GHG emissions will be negligible
2. Economic impact-lifecycle abatement cost	↓ Saves money per air purification system	Installing portable air purification systems will generate a net positive benefit
3. Energy efficiency	↑ Increases energy consumption	The policy will increase energy consumption, but the impact will be small
4. Resiliency	↑ Increase resilience	Cleaning air in homes and schools will increase resilience against wildfires
5. Public health and air quality	↓ Decreases health costs	Health care costs will decline as a result of this policy
6. Household expenditures	↑ Increases household energy costs	Household energy costs will increase marginally

7. Economic impact-employment	– Employment	Employment impacts will be minor, depending on the scale of deployment
8. Social cost of carbon	– No change to the social cost of carbon	The impact on the social cost of carbon will be negligible

Discussion

1. GHG Emissions

The GHG impact is negligible, going from approximately 0.054 metric tons to 0.014 metric tons.

2. Economic Impact, Costs and Savings

The costs of wildland fire-related health costs in the U.S. are estimated to be tens to hundreds of billions of dollars per year.[1] Using a method to calculate health damages from wildfires,[2] the authors estimated that 2012 wildfire smoke in Oregon totaled $2.1 billion (2018 dollars), including the costs of lost lives, medical care in emergency rooms and hospitals, prescribed medications, and lost wages.[3] The cost of an air purifier capable of removing air pollutants from a 200 ft^2 room is approximately $200.[4] If 700,000 homes installed this type of air purifier, the total cost would be approximately $140 million. A study in Southern California also found that the avoided health care benefits exceeded the costs of providing portable air cleaners and the benefit increases if the homes of elderly are targeted.[5]

3. Energy Efficiency

The introduction of air purification systems can increase electricity consumption. For example, an air purifier running continuously can consume 450 kWh per year in electricity for a home; using an Energy Star certified model can reduce this total to 120 kWh/year,[6] which is similar to an efficient refrigerator.

4. Resiliency

Air purifiers increase the resiliency of households against wildfire smoke. Portable air cleaners can reduce PM2.5 concentrations in homes by 63% to 88%.[7]

5. Public Health and Air Quality

Smoke-affected communities are at increased risk of all-cause mortality and respiratory-related emergency room and doctor visits, hospital admissions, and use of rescue medication. Evidence suggests that smoke exposure is also associated with increased cardiovascular mortality, hospital admissions for ischemic heart disease, and out-of-hospital cardiac arrests. Emerging evidence also links wildfire smoke to reduced birth weight, increased systemic inflammation, and bone marrow effects.[8]

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[1] Davison, G., Barkjohn, K. K., Hagler, G. S., Holder, A. L., Coefield, S., Noonan, C., & Hassett-Sipple, B. (2021). Creating clean air spaces during wildland fire smoke episodes: Web Summit summary. *Frontiers in Public Health*, *9*, 508971.
[2] Limaye, V. S., Max, W., Constible, J., & Knowlton, K. (2019). Estimating the health-related costs of 10 climate-sensitive US events during 2012. *GeoHealth*, *3*(9), 245-265.
[3] Limaye, V. and Constible, J. (2019). Up in Smoke: Oregon Wildfires Cost Billions in Health Harms.
[4] NY Times (2022). The Best Air Purifier. Retrieved from: https://www.nytimes.com/wirecutter/reviews/best-air-purifier/
[5] Fisk, W. J., & Chan, W. R. (2017). Health benefits and costs of filtration interventions that reduce indoor exposure to PM 2.5 during wildfires. *Indoor Air*, *27*(1), 191-204.
[6] EPA. Air purifiers. Retrieved from: https://www.energystar.gov/products/air_purifiers_cleaners
[7] Barn, P. K., Elliott, C. T., Allen, R. W., Kosatsky, T., Rideout, K., & Henderson, S. B. (2016). Portable air cleaners should be at the forefront of the public health response to landscape fire smoke. *Environmental Health*, *15*(1), 1-8.
[8] Ibid

People who are particularly vulnerable include:

- seniors
- pregnant people
- infants and young children
- people who work outdoors
- people involved in strenuous outdoor exercise
- people with an existing illness or chronic health conditions, such as:
    - cancer
    - diabetes
    - mental illness
    - lung or heart conditions

Children are vulnerable as they often spend more time outdoors, breathe more air relative to their body weight, are growing and developing and a higher proportion of particles can penetrate deeply into the lungs.[9] The large population of children spending time in schools suggests that providing portable filtration is a potentially cost-effective intervention that could provide significant benefit.[10]

6. Household Expenditures

The economic impact of an air purifier is minimal, increasing electricity costs by approximately $15 per year per installation.[11]

7. Economic Impact, Employment

The impact on employment is negligible.

8. Social Cost of Carbon

The impact on the social cost of carbon is negligible.

[9] Holm, S. M., Miller, M. D., & Balmes, J. R. (2021). Health effects of wildfire smoke in children and public health tools: a narrative review. *Journal of exposure science & environmental epidemiology*, *31*(1), 1-20.
[10] Ibid
[11] Ibid