



## Enact energy-efficient building codes

Target	Existing: 100% of existing buildings are retrofitted by 2035, thermal energy requirements reduced by 50%, plug load reduced by 50%	New: 80% reduction in new building energy consumption from the 2006 Oregon codes
Building types	Existing residential and commercial buildings	New residential and commercial buildings
Building sizes	Buildings ≥ 50,000 ft <sup>2</sup>	Buildings ≥ 50,000 ft <sup>2</sup>

### Impact on GHG Emissions Relative to All Building Policies Analysed



### Indicators

1. GHG emissions	↓ Decreases emissions	<b>-1,200,000 metric ton CO<sub>2</sub>e</b> average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact-lifecycle abatement cost	↑ Costs money per ton of emissions reduced	<b>\$72</b> net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	<b>-41,000,000 MMBTU</b> average annual avoided energy consumption (2022-2050)
4. Resiliency	↑ Increases resiliency	<b>1,752,000 homes</b> with retrofits that increase resiliency against heat, cold and severe weather events

5. Public health and air quality	 Decreases health costs	<b>-\$305 million</b> average annual avoided public health costs (2022-2050)
6. Household expenditures	 Decreases household energy costs	<b>-31.40%</b> change household energy expenditures between 2022 and 2050
7. Economic impact-employment	 Employment	<b>1,316</b> average annual person years of employment created (2022-2050)
8. Social cost of carbon	 Decreases the social cost of carbon	<b>-\$86.5 million</b> average annual avoided damage from climate change globally (2022-2050)

# Background

## 1. GHG Emissions

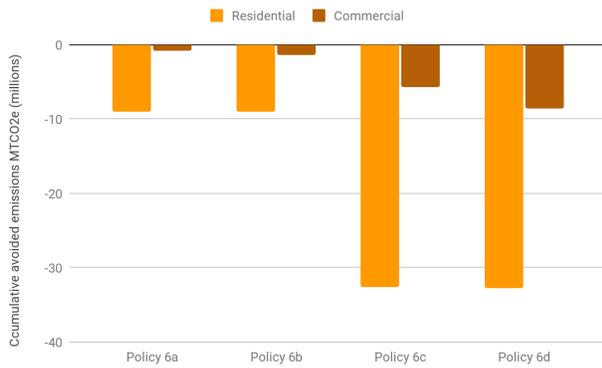


Figure 1: Building Codes Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

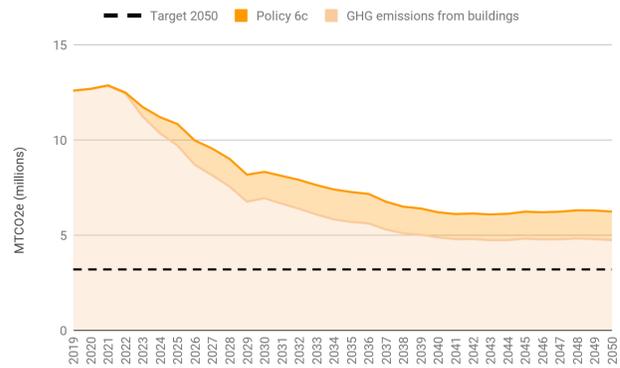


Figure 2: Building Codes Policy scenario 6c, annual GHG emissions reductions resulting from scenario 6c relative to total projected GHG emissions from buildings in Oregon

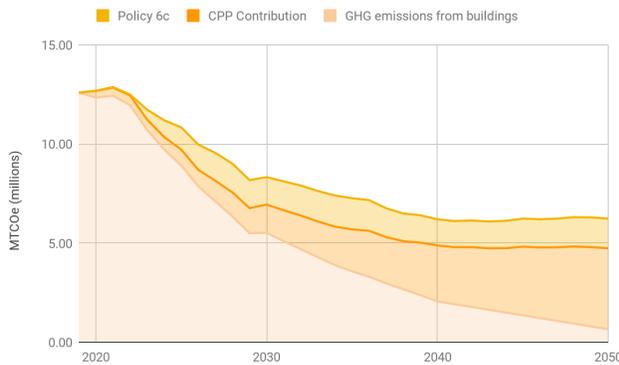


Figure 3: Building Codes Policy scenario 6c, annual GHG emissions reductions resulting from scenario 6c relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

## 2. Economic Impact, Costs and Savings

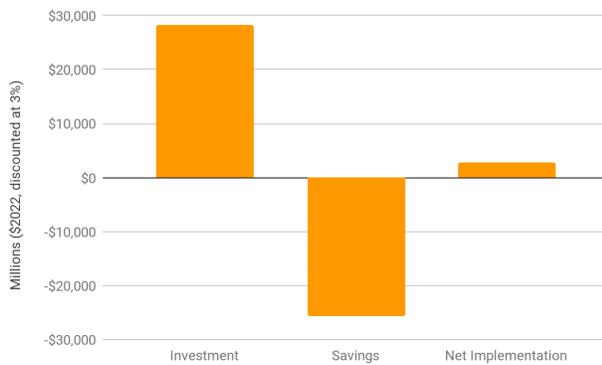


Figure 4: Building Codes Policy scenario 6c, NPV over the study period

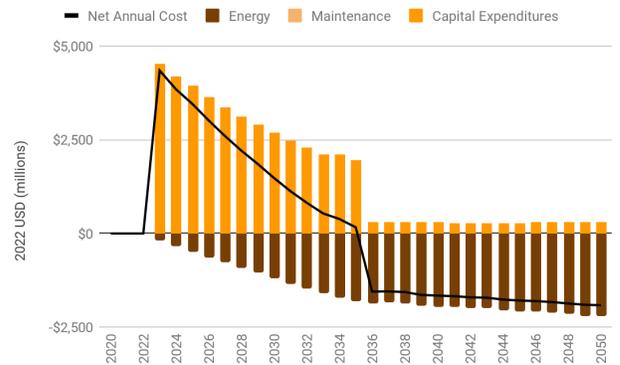


Figure 5: Building Codes Policy scenario 6c, net annual costs or savings

### 3. Energy Efficiency

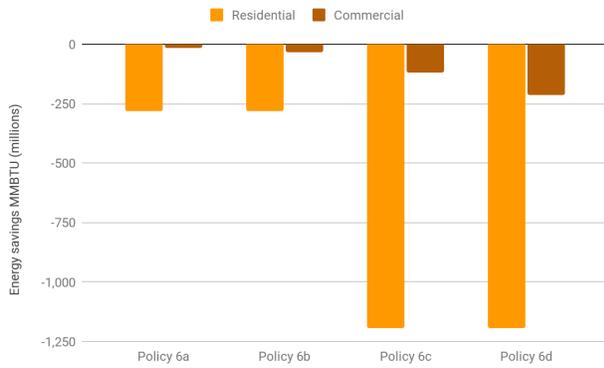


Figure 6: Building Codes Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

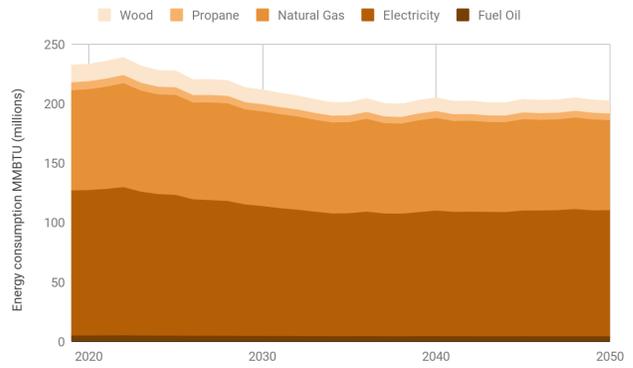


Figure 7: Building Codes Policy scenario 6c, energy consumption by energy source

### 4. Resiliency

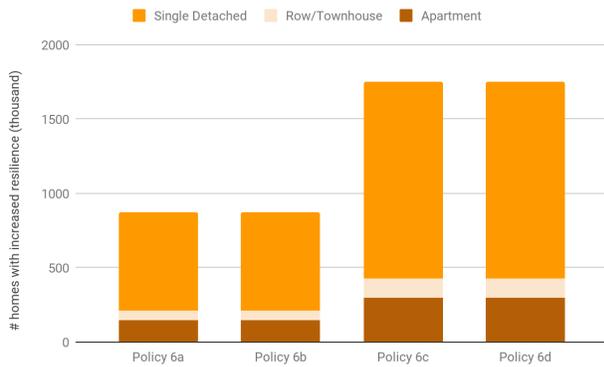


Figure 8: Building Codes Policy scenarios, # of homes with increased resilience by 2050

### 5. Public Health and Air Quality

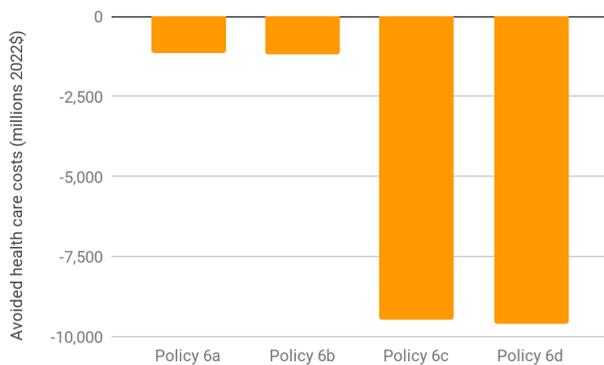


Figure 9: Building Codes Policy scenarios, avoided cumulative health costs

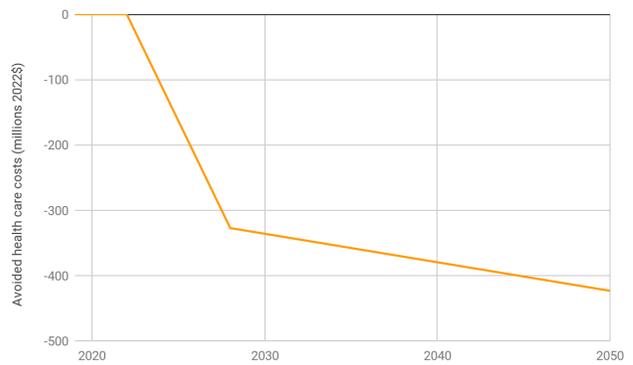


Figure 10: Building Codes Policy scenario 6c, avoided annual health costs

## 6. Household Expenditures

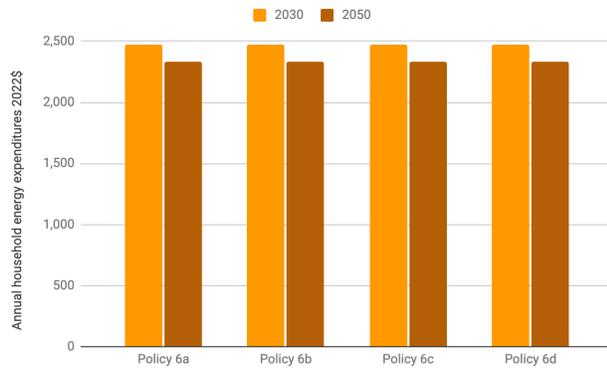


Figure 11: Building Codes Policy scenarios, annual household energy expenditures

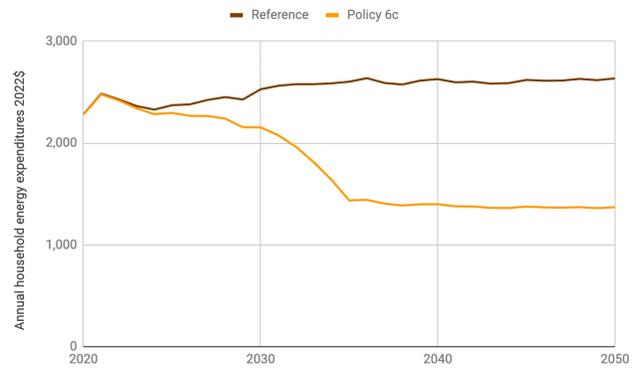


Figure 12: Building Codes Policy scenario 6c, annual household energy expenditures relative to the reference scenario

## 7. Economic Impact, Employment

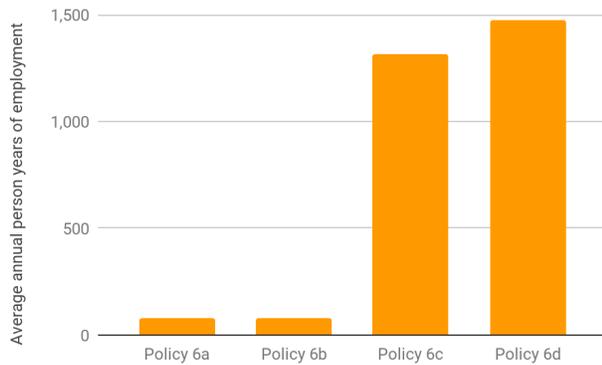


Figure 13: Building Codes Policy scenarios, cumulative person years of employment

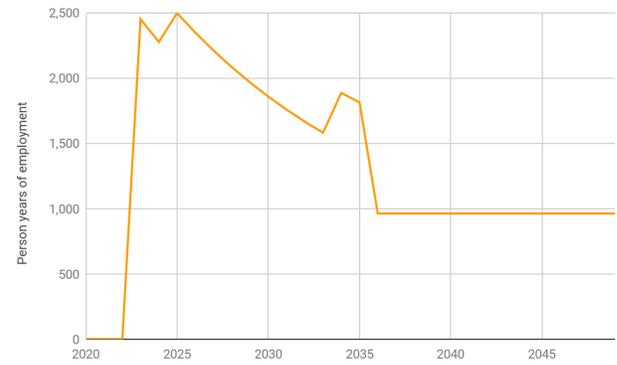


Figure 14: Building Codes Policy scenario 6c, annual person years of employment

## 8. Social Cost of Carbon

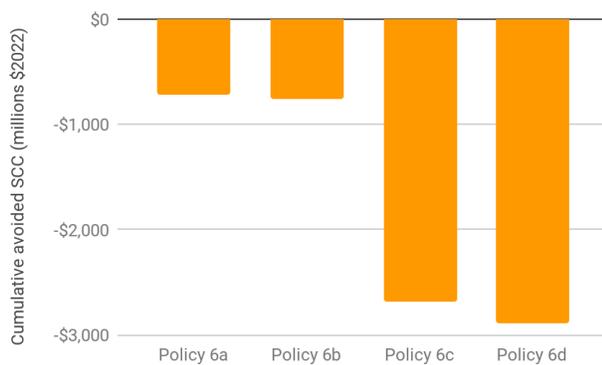


Figure 15: Building Codes Policy scenarios, cumulative avoided social cost of carbon

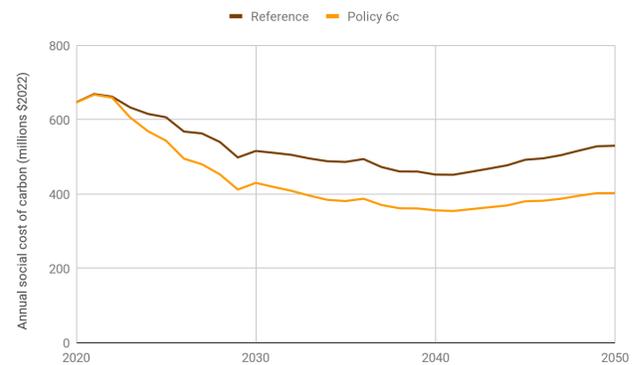


Figure 16: Building Codes Policy scenario 6c, annual avoided social cost of carbon relative to the reference scenario

# Key

Term/Acronym	Definition	Additional information
CPP	Climate Protection Program	The Climate Protection Program sets a declining limit, or cap, on greenhouse gas emissions from fossil fuels used throughout Oregon, including diesel, gasoline, natural gas and propane, used in transportation, residential, commercial and industrial settings. The rate of reduction is applied to covered fuels in the residential and commercial sectors.
Cumulative		The sum of the annual costs or savings over the period. For example, if there were \$40 of savings in 2022, \$60 of savings in 2023 and \$120 of costs in 2024, the cumulative value would be $-\$40 + -\$60 + \$120 = \$20$ .
GHG	Greenhouse gases	The three primary GHGs are carbon dioxide (CO <sub>2</sub> ), methane (CH <sub>4</sub> ), nitrous oxides (NO <sub>x</sub> ).
Household energy expenditures		Cost of energy used in a house, calculated by summing total expenditures on energy in houses in Oregon divided by number of houses.
MMBtu	Million british thermal units	A measure of energy. 1 kWh of electricity is equivalent to 3,400 Btu 1 gallon of gasoline is equivalent to 120,000 Btu
MtCO <sub>2</sub> e	Metric tons of carbon dioxide equivalent	A measure that combines CO <sub>2</sub> , CH <sub>4</sub> , NO <sub>x</sub> into one measure. For example, 1 unit of CH <sub>4</sub> is equivalent to 28 units of CO <sub>2</sub> over 100 years. In other words, 1 unit of CH <sub>4</sub> causes 28 times more warming than 1 unit of CO <sub>2</sub> over 100 years, where the 28 is described as the Global Warming Potential (GWP). If a policy results in 2 Mt of CO <sub>2</sub> and 2 Mt of CH <sub>4</sub> , the total would be $2 + (2 \times 28) = 58$ MtCO <sub>2</sub> e.
NPV	Net present value	A method used to determine the current value of all future cash flows generated by a project, including the initial capital investment. Based on the idea that a future dollar is worth less than a current dollar, future costs and savings are discounted back to current dollars. The net present value is sensitive to the discounting rate.
Person years of employment		One person working full time for a year. For example, a job which lasts 10 years is equivalent to 10 person years of employment.
Reference		The reference scenario includes: <ul style="list-style-type: none"> <li>● Population growth</li> <li>● Employment growth</li> <li>● Heating and cooling degree days projections</li> <li>● Community Renewable Energy Program</li> <li>● Energy efficiency standards for appliances</li> <li>● HB2021</li> <li>● Heat Pump Rebate Program</li> <li>● Implement Healthy Homes Repair Fund</li> <li>● Manufactured home replacement</li> <li>● Solar + Storage Rebate Program</li> </ul>

Resilience		Residential building retrofits are assumed to increase the resilience of the home. By increasing the thermal performance of the home, the retrofit increases its passive survivability, the ability of a building to maintain critical life-support conditions for its occupants if services such as power, heating fuel are lost for an extended period.
SCC	Social cost of carbon	The SCC is a comprehensive estimate of climate change damages and includes changes in net agricultural productivity, human health, property damages from increased flood risk, and changes in energy system costs, such as reduced costs for heating and increased costs for air conditioning.