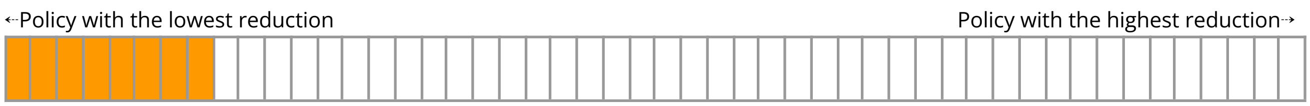
Appendix 3. Policy Scorecards

1a Building Performance Standard

Target	Direct emissions need to reach 5% below 2035 levels in the BAP by 2035
Building types	Existing residential, commercial and multi-family buildings
Commercial building sizes	All building sizes

Impact on GHG Emissions Relative to All Building Policies Analysed



Indicators

1. GHG emissions	↓ Decreases emissions	**-360,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact- lifecycle abatement cost	↓ Saves money per ton of emissions reduced	**-$213** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-10,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	- no change	**0 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health costs	**-$36 million** average annual avoided public health costs (2022-2050)

6. Household expenditures	↑ Increases household energy costs	0.08% change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	432 average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	-$28.0 million average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

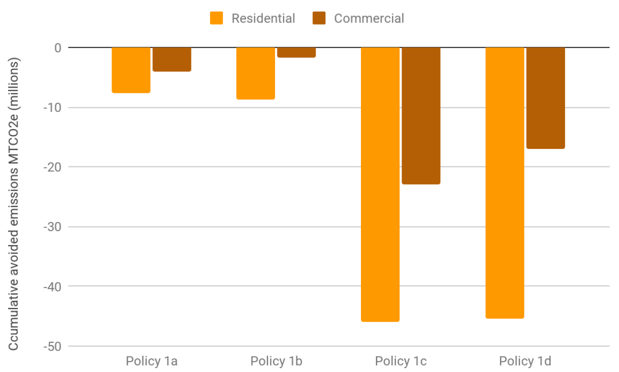


Figure 1: Building Performance Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

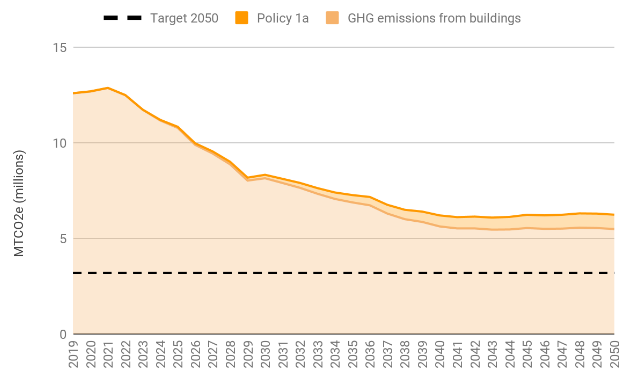


Figure 2: Building Performance Policy scenario 1a, annual GHG emissions reductions resulting from scenario 1a relative to total projected GHG emissions from buildings in Oregon

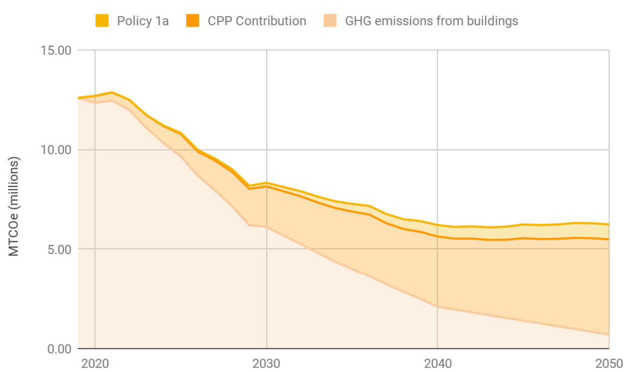


Figure 3: Building Performance Policy scenario 1a, annual GHG emissions reductions resulting from scenario 1a relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

Figure 4: Building Performance scenario 1a, NPV over the

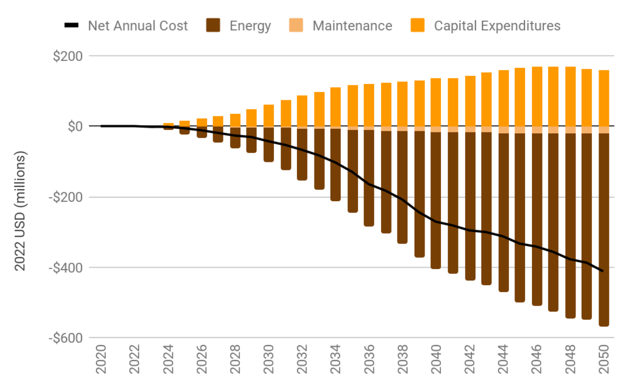


Figure 5: Building Performance scenario 1a, net annual

study period

costs or savings

3. Energy Efficiency

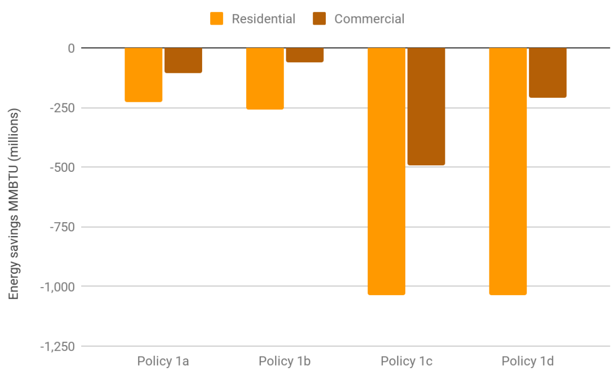


Figure 6: Building Performance Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

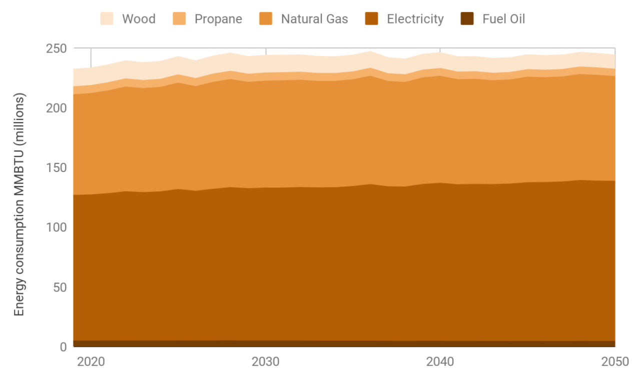


Figure 7: Building Performance Policy scenario 2a, energy consumption by energy source

4. Resiliency

N/a

5. Public Health and Air Quality

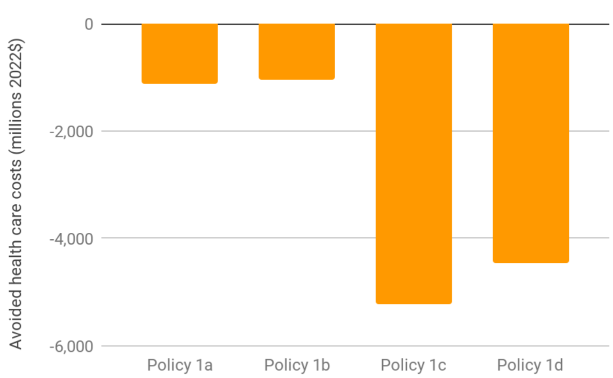


Figure 8: Building Performance Scenarios, avoided cumulative health costs

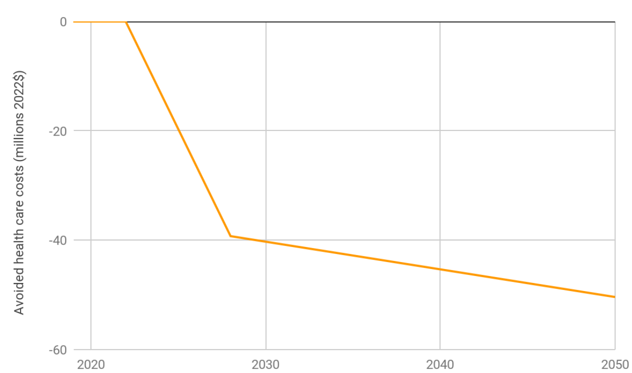


Figure 9: Building Performance Scenario 1a, avoided annual health costs

6. Household Expenditures

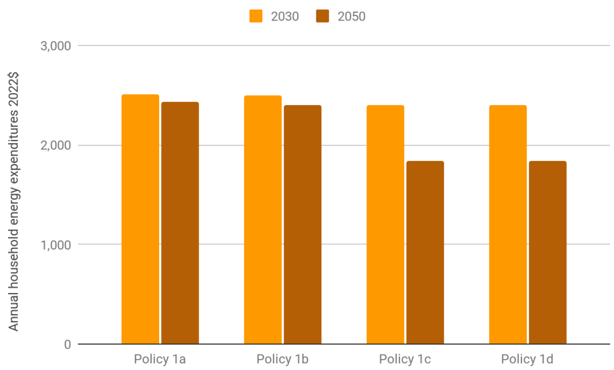


Figure 10: Building Performance Scenarios, annual household energy expenditures

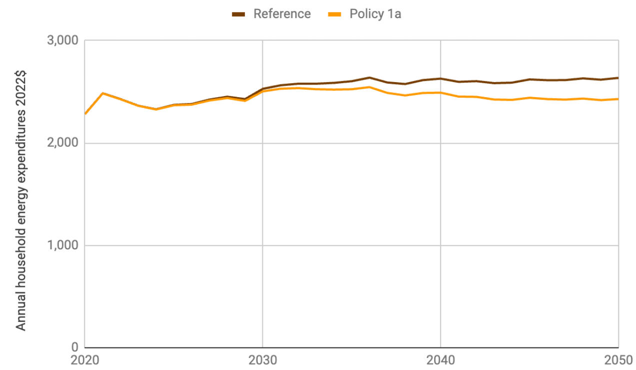


Figure 11: Building Performance scenario 1a, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

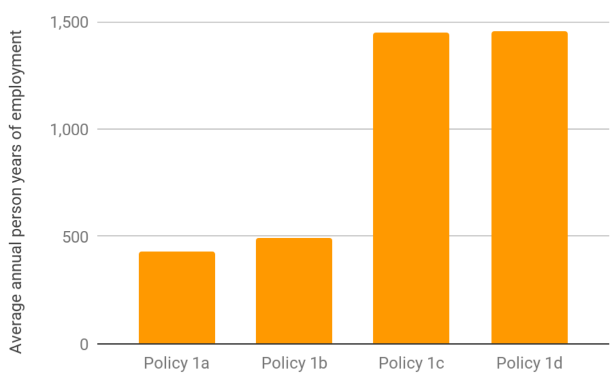


Figure 12: Building Performance scenarios, cumulative person years of employment

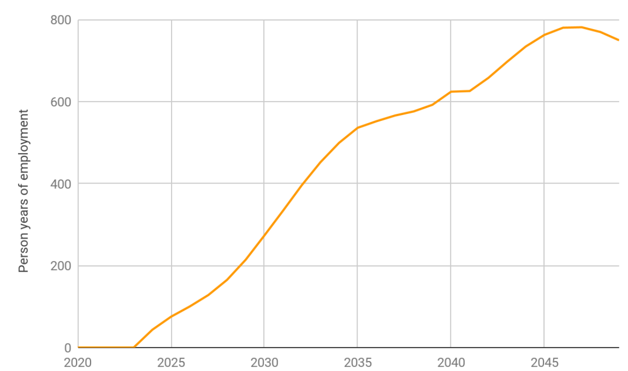


Figure 13: Building Performance scenario 1a, annual person years of employment

8. Social Cost of Carbon

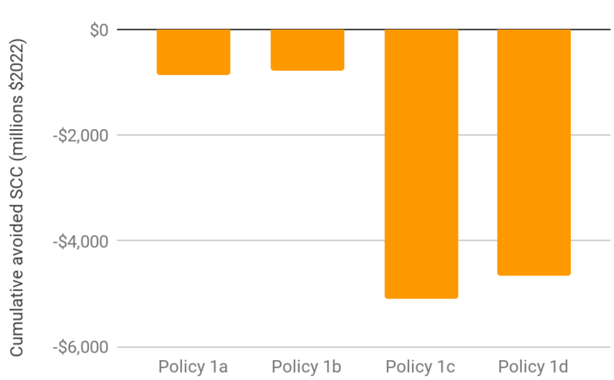


Figure 14: Building Performance Policy scenarios, cumulative avoided social cost of carbon

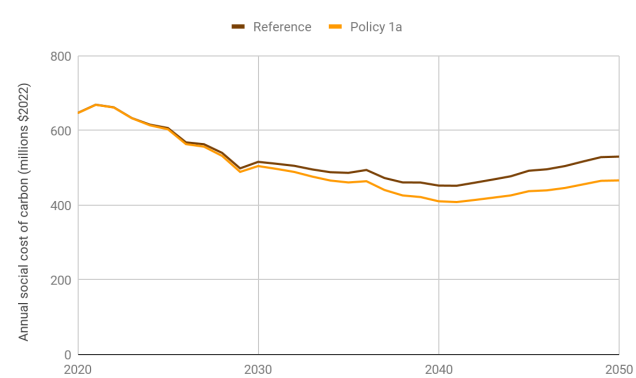


Figure 15: Building Performance Policy scenario 1a, annual avoided social cost of carbon relative to the reference scenario

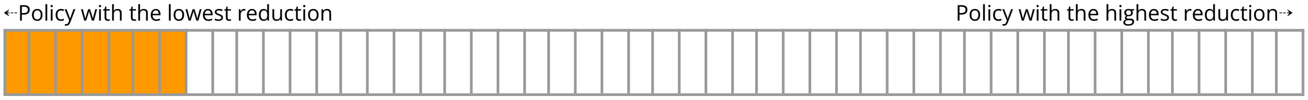
1b

Building Performance Standard

Target	Direct emissions need to reach 5% below 2035 levels in the BAP by 2035
Building types	Existing residential, commercial and multi-family buildings
Commercial building sizes	All building sizes

Impact on GHG Emissions Relative to All Building Policies Analysed

←Policy with the lowest reduction Policy with the highest reduction→



Indicators

1. GHG emissions	↓ Decreases emissions	**-330,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact-lifecycle abatement cost	↓ Saves money per ton of emissions reduced	**-$270** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-10,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	- no change	**0 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health costs	**-$34 million** average annual avoided public health costs (2022-2050)

6. Household expenditures	↓ Decreases household energy costs	**-1.11%** change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	**491** average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	**-$25.2 million** average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

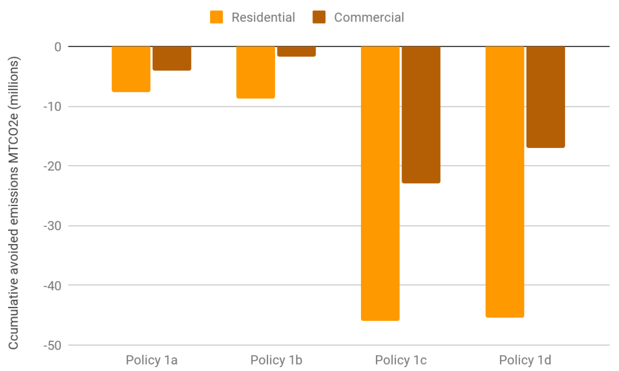


Figure 1: Building Performance Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

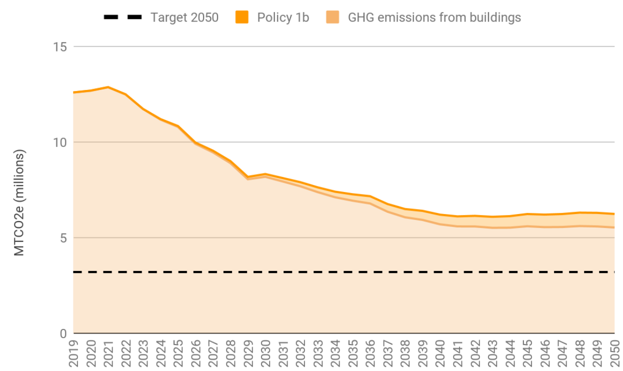


Figure 2: Building Performance Policy scenario 1b, annual GHG emissions reductions resulting from scenario 1b relative to total projected GHG emissions from buildings in Oregon

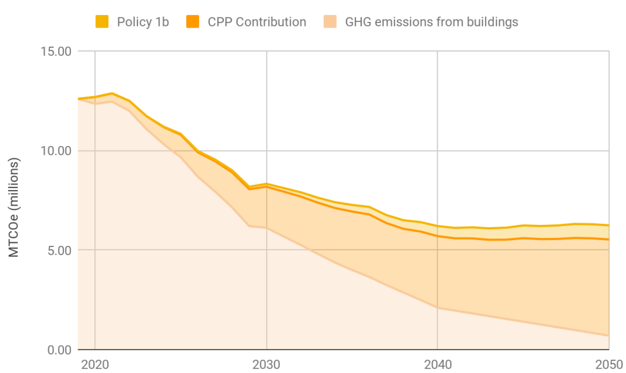


Figure 3: Building Performance Policy scenario 1b, annual GHG emissions reductions resulting from scenario 1b relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

Figure 4: Building Performance scenario 1b, NPV over the study period

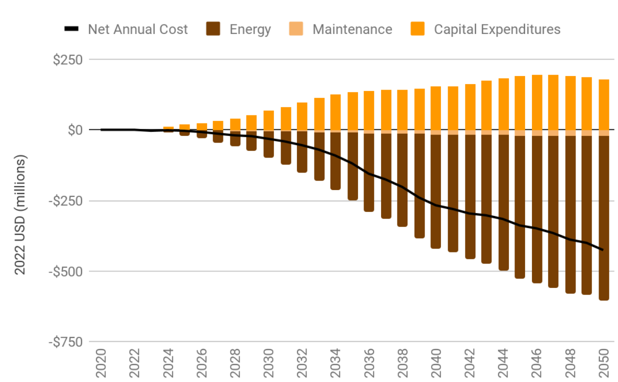


Figure 5: Building Performance scenario 1b, net annual costs or savings

3. Energy Efficiency

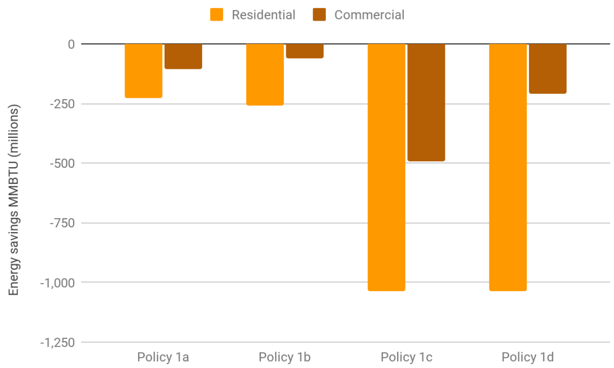


Figure 6: Building Performance Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

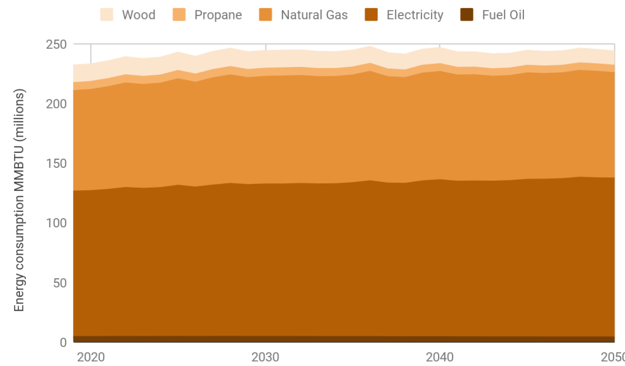


Figure 7: Building Performance Policy scenario 1b, energy consumption by energy source

4. Resiliency

N/a

5. Public Health and Air Quality

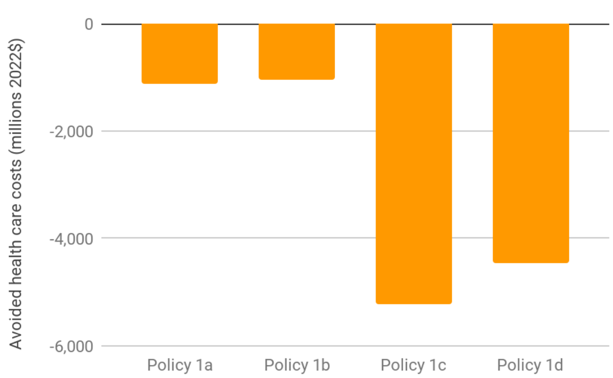


Figure 8: Building Performance Scenarios, avoided cumulative health costs

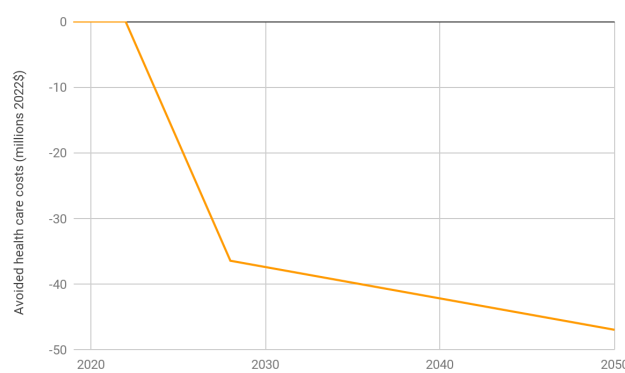


Figure 9: Building Performance Scenario 1b, avoided annual health costs

6. Household Expenditures

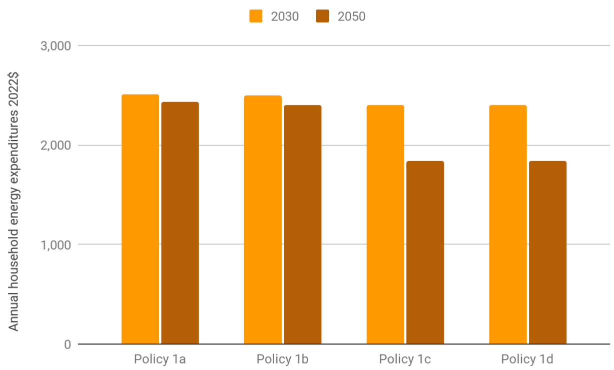


Figure 10: Building Performance Scenarios, annual household energy expenditures

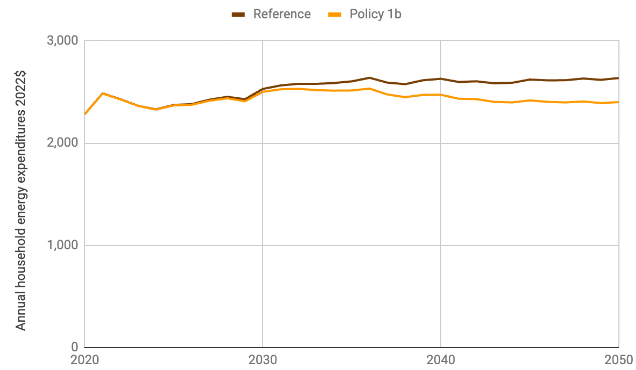


Figure 11: Building Performance scenario 1b, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

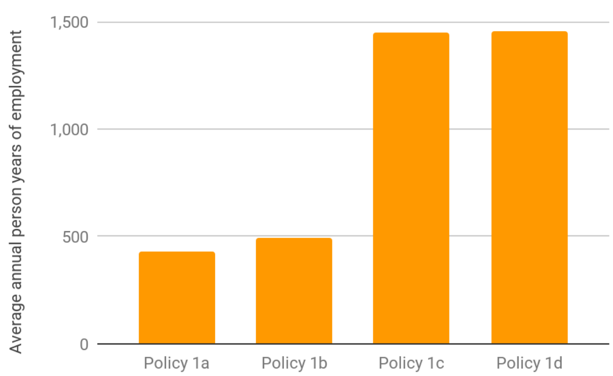


Figure 12: Building Performance scenarios, cumulative person years of employment

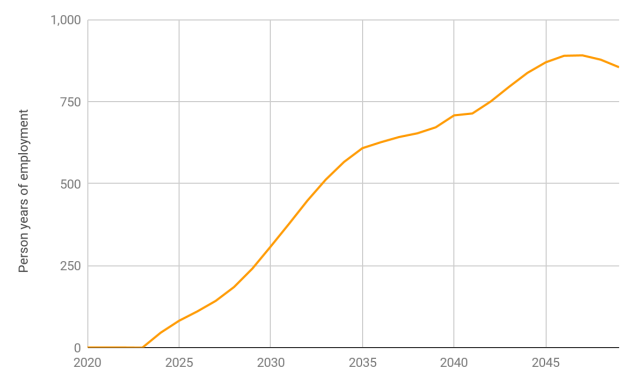


Figure 13: Building Performance scenario 1b, annual person years of employment

8. Social Cost of Carbon

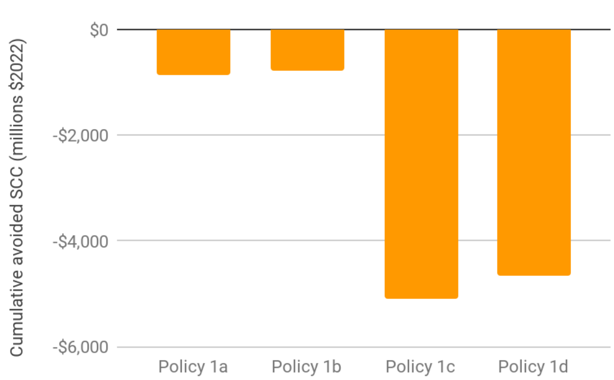


Figure 14: Building Performance Policy scenarios, cumulative avoided social cost of carbon

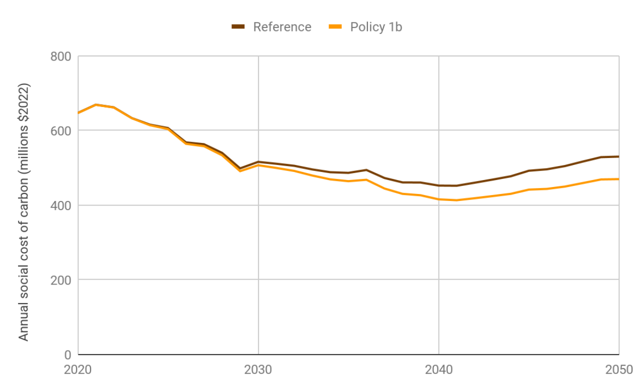


Figure 15: Building Performance Policy scenario 1b, annual avoided social cost of carbon relative to the reference scenario

1c Building Performance Standard

Target	Direct emissions need to reach 40% below 2035 levels in the BAP by 2035
Building types	Existing residential, commercial and multi-family buildings
Commercial building sizes	All building sizes

Impact on GHG Emissions Relative to All Building Policies Analysed

Indicators

1. GHG emissions	↓ Decreases emissions	-2,160,000 metric ton CO2e average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact- lifecycle abatement cost	↓ Saves money per ton of emissions reduced	-$172 net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	-48,000,000 MMBTU average annual avoided energy consumption (2022-2050)
4. Resiliency	- no change	0 homes with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health costs	-$169 million average annual avoided public health costs (2022-2050)

6. Household expenditures	↓ Decreases household energy costs	**-24.43%** change household energy expenditures between 2022 and 2050
7. Economic impact- employment	↑ Employment	**1,453** average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	**-$164.4 million** average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

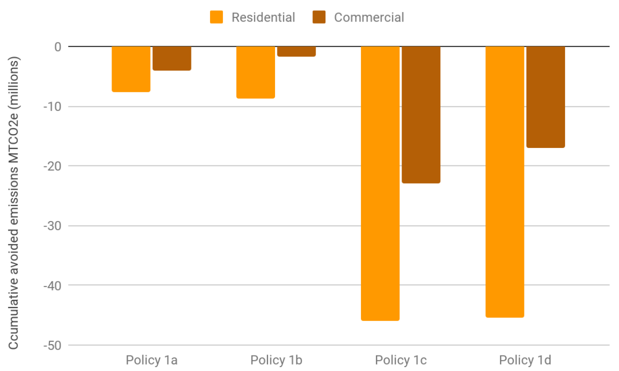


Figure 1: Building Performance Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

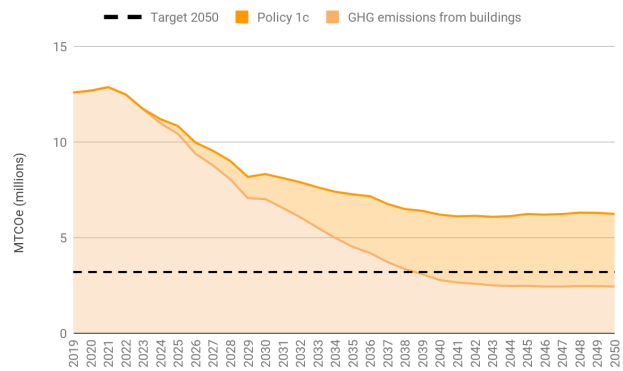


Figure 2: Building Performance Policy scenario 1c, annual GHG emissions reductions resulting from scenario 1c relative to total projected GHG emissions from buildings in Oregon

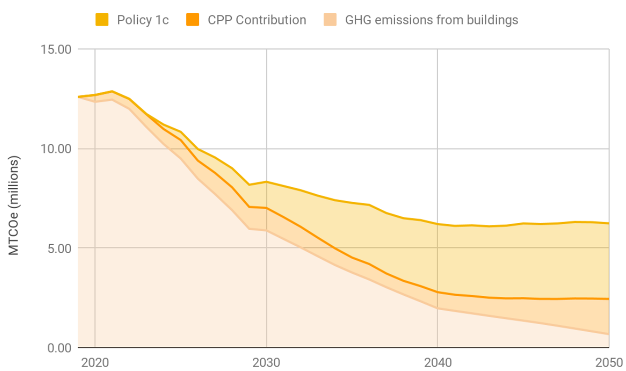


Figure 3: Building Performance Policy scenario 1c, annual GHG emissions reductions resulting from scenario 1c relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

Figure 4: Building Performance Policy scenario 1c, NPV over the study period

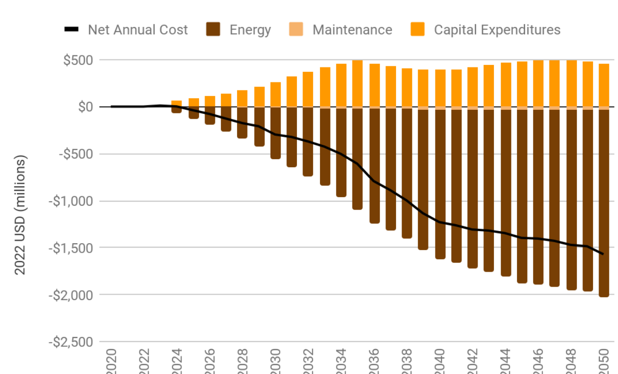


Figure 5: Building Performance Policy scenario 1c, net annual costs or savings

3. Energy Efficiency

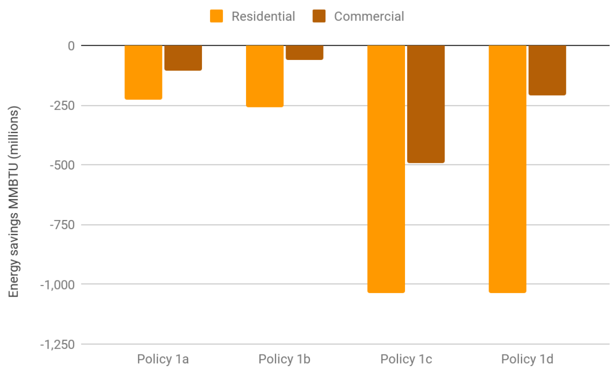


Figure 6: Building Performance Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

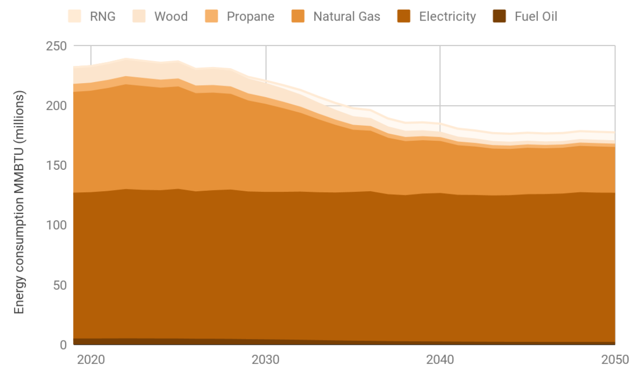


Figure 7: Building Performance Policy scenario 1c, energy consumption by energy source

4. Resiliency

N/a

5. Public Health and Air Quality

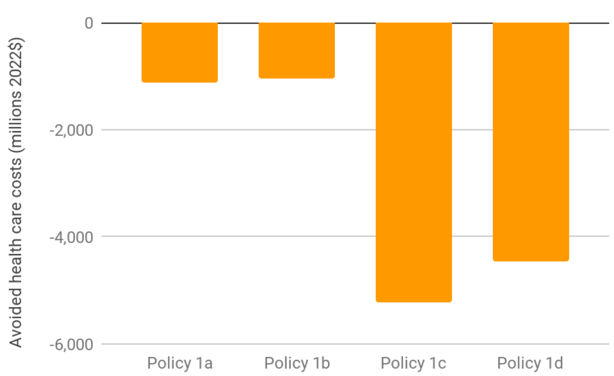


Figure 8: Building Performance Policy scenarios, avoided cumulative health costs

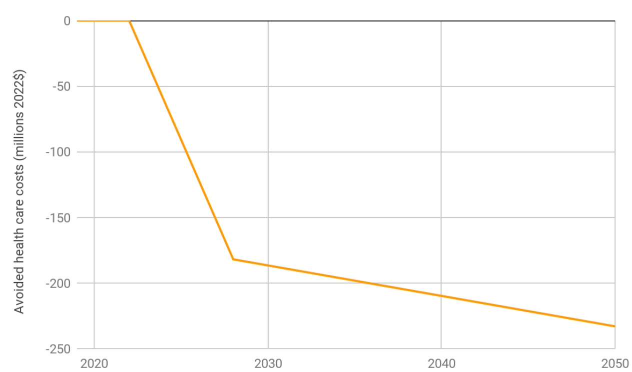


Figure 9: Building Performance Policy scenario 1c, avoided annual health costs

6. Household Expenditures

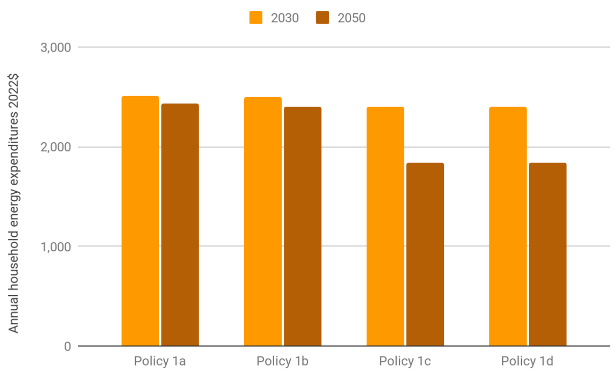


Figure 10: Building Performance Policy scenarios, annual household energy expenditures

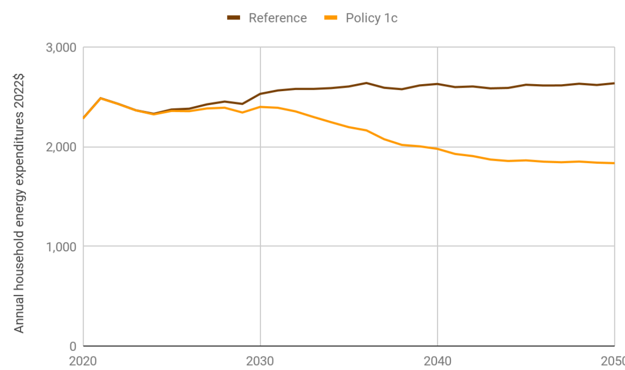


Figure 11: Building Performance Policy scenario 1c, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

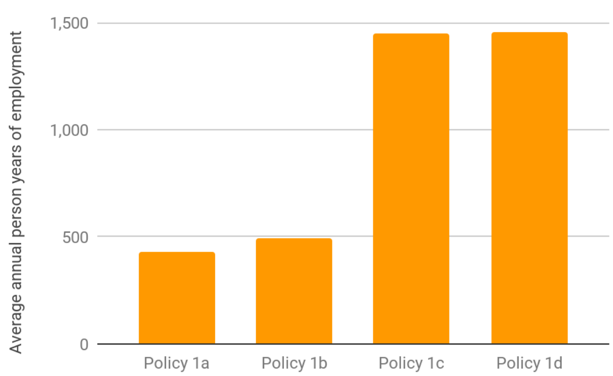


Figure 12: Building Performance Policy scenarios, cumulative person years of employment

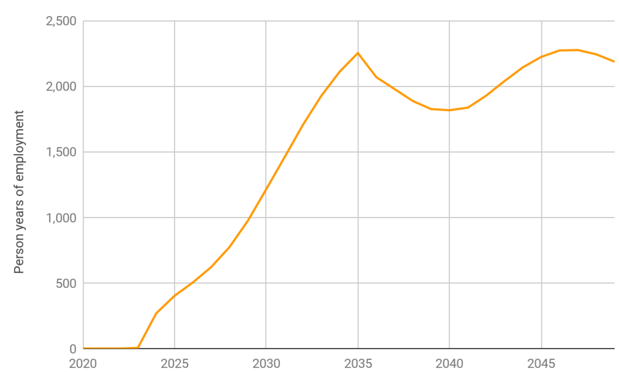


Figure 13: Building Performance Policy scenario 1c, annual person years of employment

8. Social Cost of Carbon

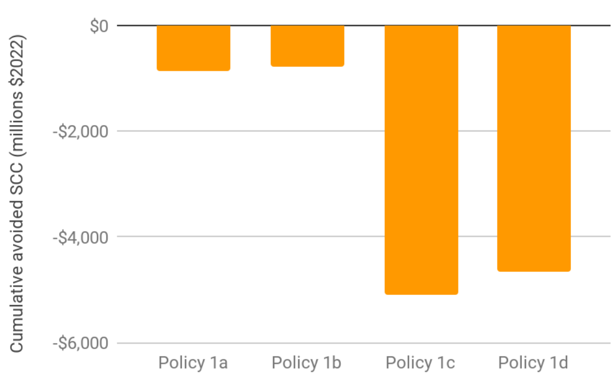


Figure 14: Building Performance Policy scenarios, cumulative avoided social cost of carbon

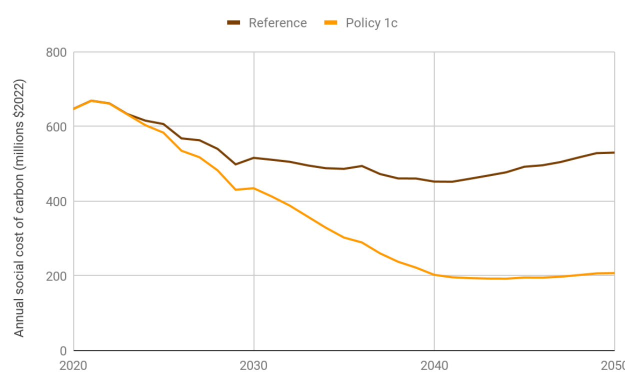


Figure 15: Building Performance Policy scenario 1c, annual avoided social cost of carbon relative to the reference scenario

1d Building Performance Standard

Target	Direct emissions need to reach 40% below 2035 levels in the BAP by 2035
Building types	Existing residential, commercial and multi-family buildings
Commercial building sizes	All building sizes

Impact on GHG Emissions Relative to All Building Policies Analysed

Indicators

1. GHG emissions	↓ Decreases emissions	**-1,950,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact-lifecycle abatement cost	↓ Saves money per ton of emissions reduced	**-$190** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-39,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	- no change	**0 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health costs	**-$144 million** average annual avoided public health costs (2022-2050)

6. Household expenditures	↓ Decreases household energy costs	-24.43% change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	1,453 average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	-$150.6 million average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

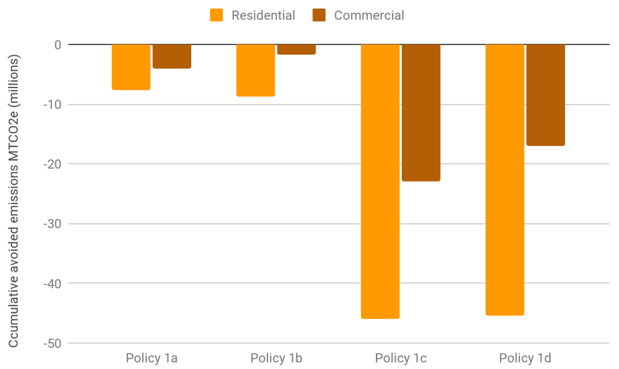


Figure 1: Building Performance Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

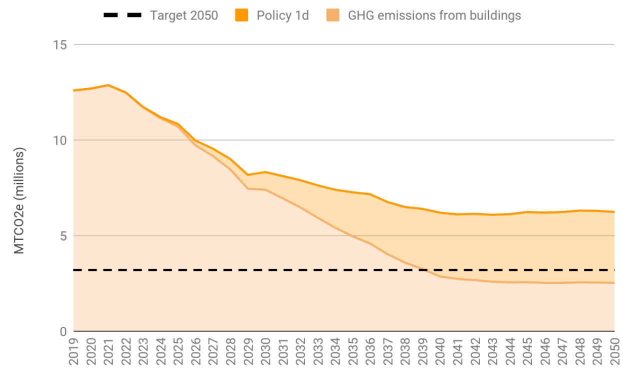


Figure 2: Building Performance Policy scenario 1d, annual GHG emissions reductions resulting from scenario 1d relative to total projected GHG emissions from buildings in Oregon

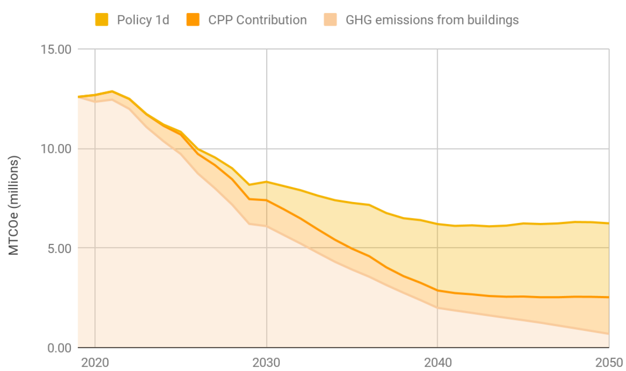


Figure 3: Building Performance Policy scenario 1d, annual GHG emissions reductions resulting from scenario 1d relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

Figure 4: Building Performance scenario 1d, NPV over the study period

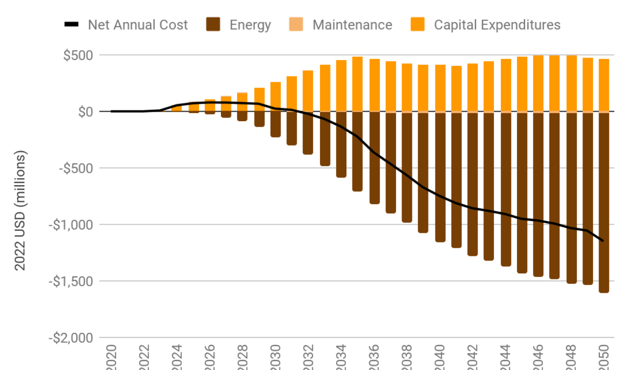


Figure 5: Building Performance scenario 1d, net annual costs or savings

3. Energy Efficiency

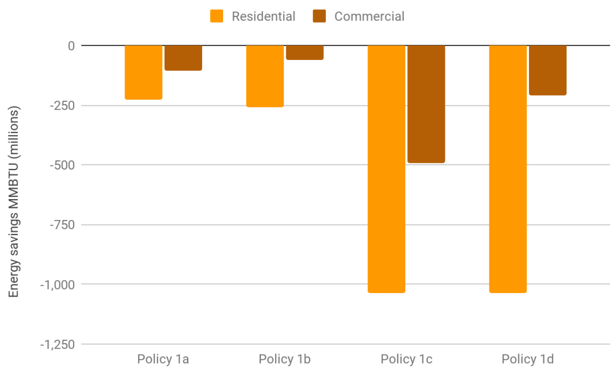


Figure 6: Building Performance Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

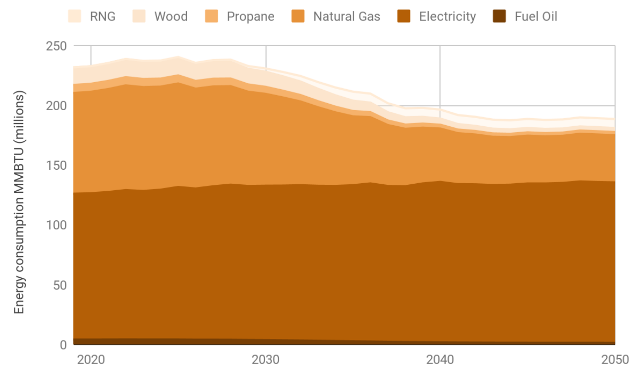


Figure 7: Building Performance Policy scenario 1d, energy consumption by energy source

4. Resiliency

N/a

5. Public Health and Air Quality

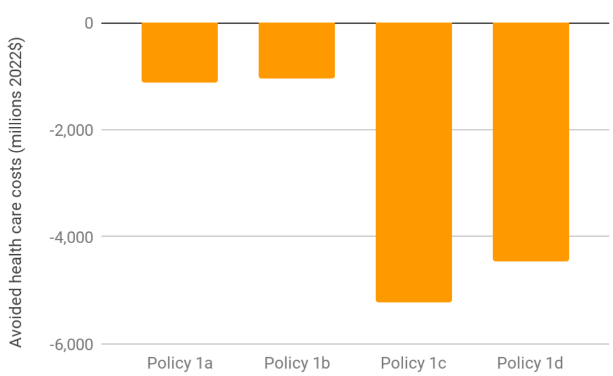


Figure 8: Building Performance Scenarios, avoided cumulative health costs

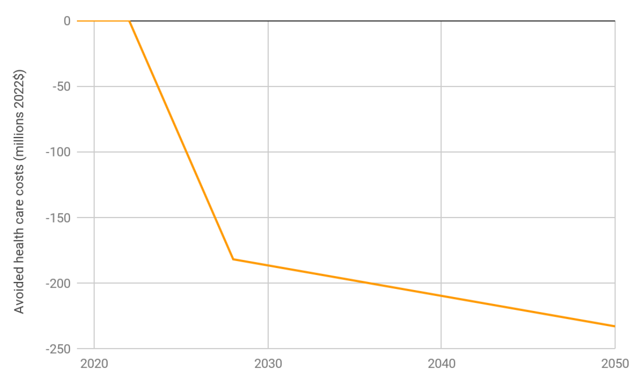


Figure 9: Building Performance Scenario 1d, avoided annual health costs

6. Household Expenditures

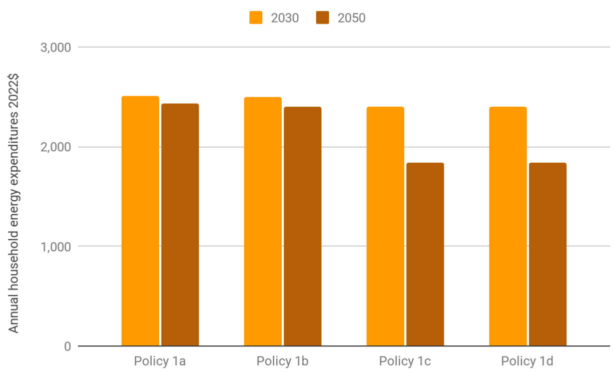


Figure 10: Building Performance Scenarios, annual household energy expenditures

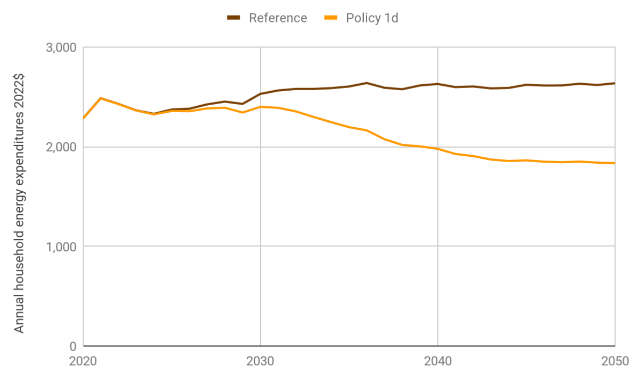


Figure 11: Building Performance scenario 1d, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

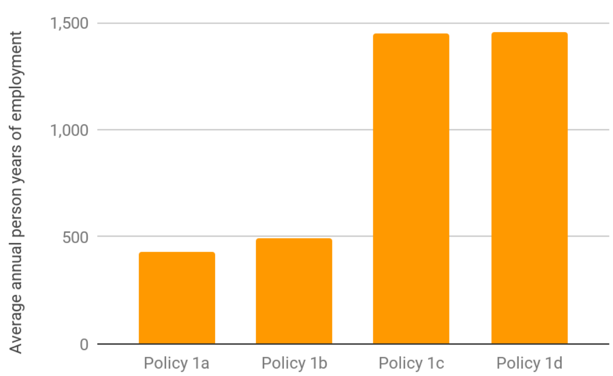


Figure 12: Building Performance scenarios, cumulative person years of employment

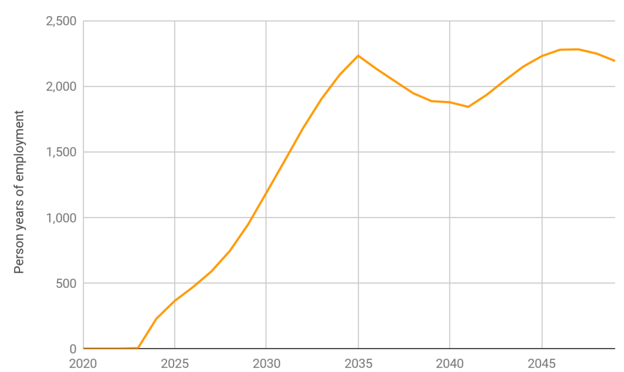


Figure 13: Building Performance scenario 1d, annual person years of employment

8. Social Cost of Carbon

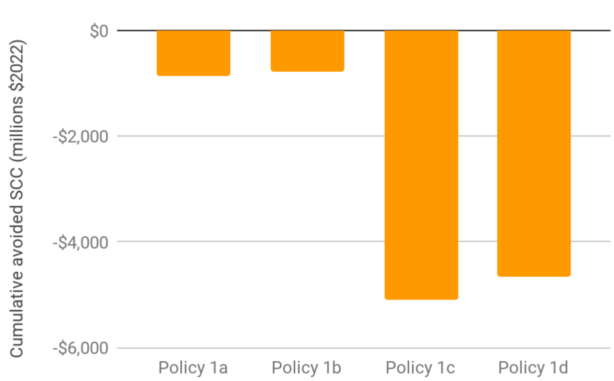


Figure 14: Building Performance Policy scenarios, cumulative avoided social cost of carbon

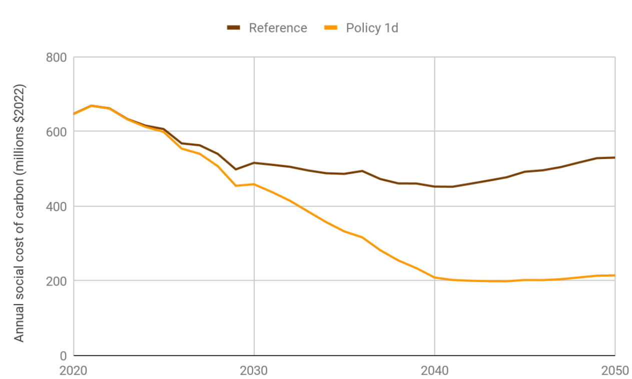
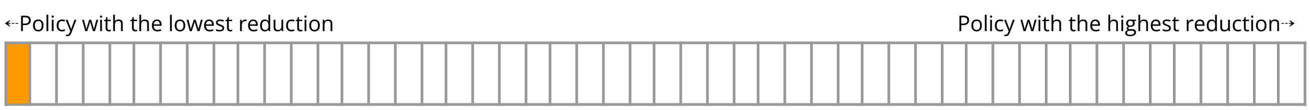


Figure 15: Building Performance Policy scenario 1d, annual avoided social cost of carbon relative to the reference scenario

2a Promote, incentivize and or subsidize energy efficiency and heating/cooling

Target	50% of buildings are retrofitted by 2050, thermal energy requirements reduced by 15%
Building types	All building types
Commercial building sizes	Buildings ≥ 50,000 ft2

Impact on GHG Emissions Relative to All Building Policies Analysed



Indicators

1. GHG emissions	↓ Decreases emissions	**-70,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact-lifecycle abatement cost	↓ Saves money per ton of emissions reduced	**-$591** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-2,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	↑ Increases resiliency	**877,000 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health	**-$9 million** average annual avoided public health costs (2022-2050)

	costs	
6. Household expenditures	↑ Increases household energy costs	4.46% change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	440 average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	-$5.1 million average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

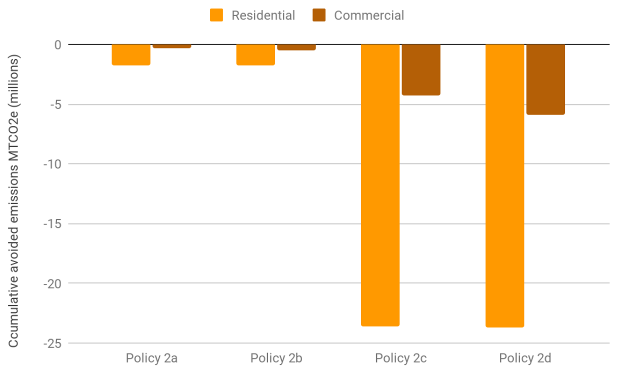


Figure 1: Energy Efficiency Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

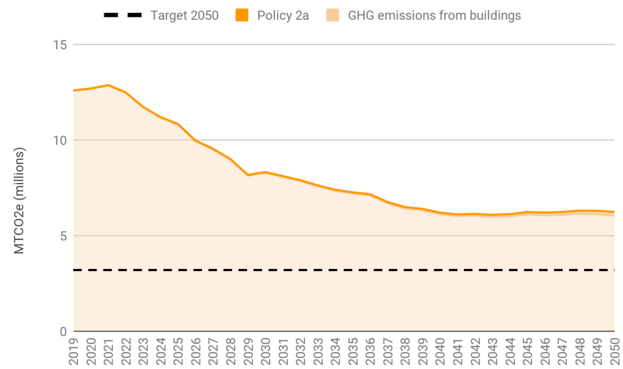


Figure 2: Energy Efficiency Policy scenario 2a, annual GHG emissions reductions resulting from scenario 2a relative to total projected GHG emissions from buildings in Oregon

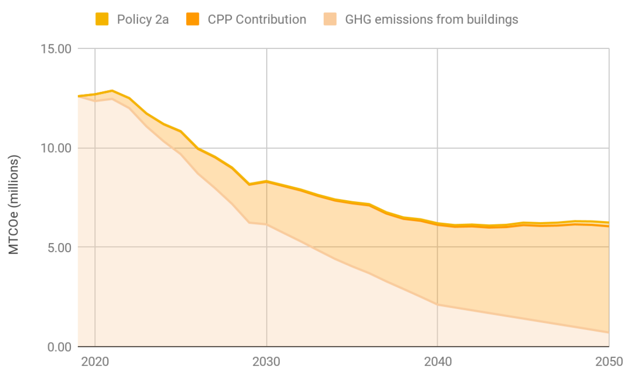


Figure 3: Energy Efficiency Policy scenario 2a, annual GHG emissions reductions resulting from scenario 2a relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

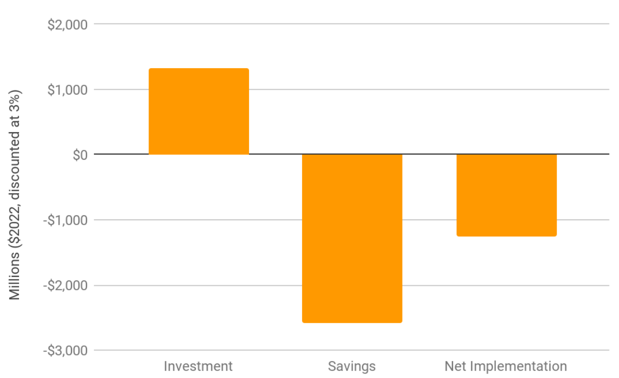


Figure 4: Building Performance scenario 2a, NPV over the study period

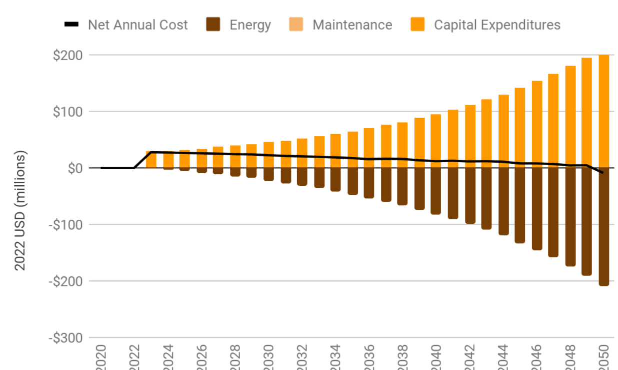


Figure 5: Building Performance scenario 2a, net annual costs or savings

3. Energy Efficiency

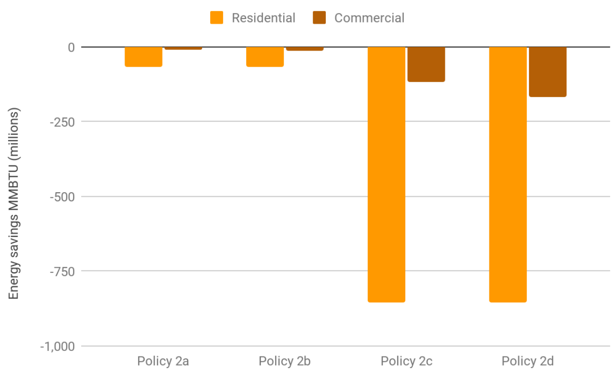


Figure 6: Energy Efficiency Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

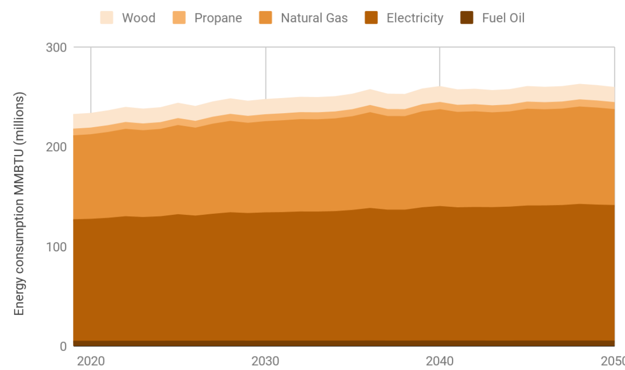


Figure 7: Energy Efficiency Policy scenario 2a, energy consumption by energy source

4. Resiliency

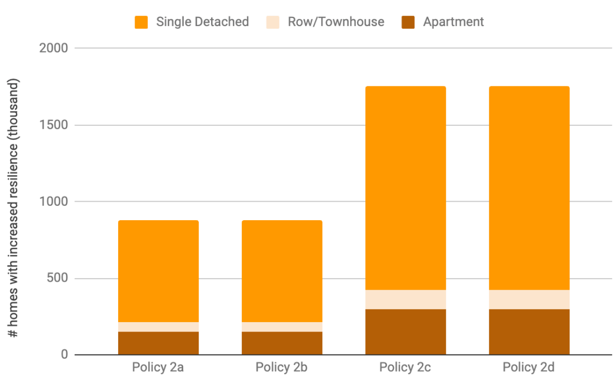


Figure 8: Energy Efficiency Policy scenarios, # of homes with increased resilience by 2050

5. Public Health and Air Quality

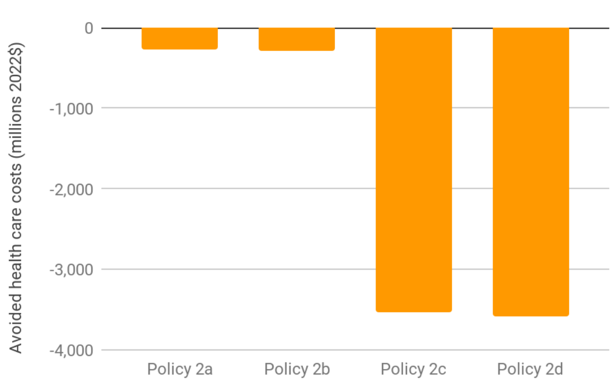


Figure 9: Building Performance Scenarios, avoided cumulative health costs

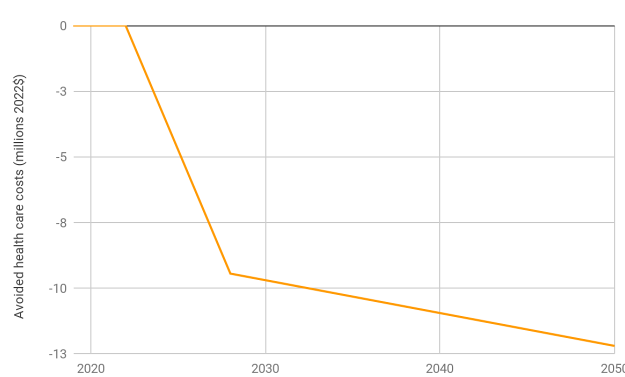


Figure 10: Building Performance Scenario 2a, avoided annual health costs

6. Household Expenditures

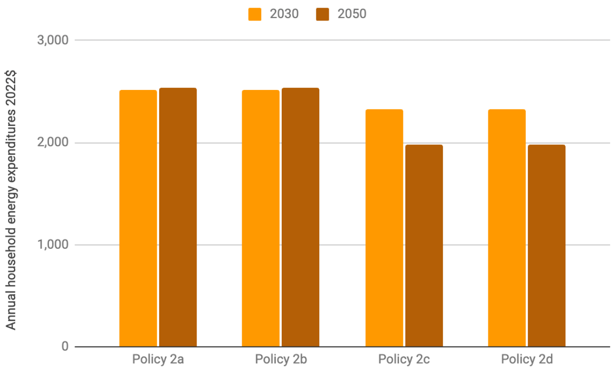


Figure 11: Building Performance Scenarios, annual household energy expenditures

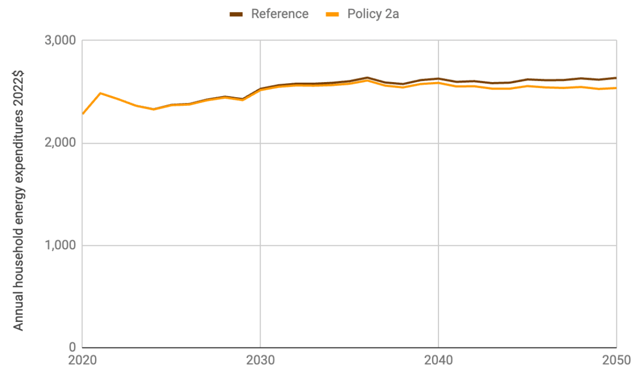


Figure 12: Building Performance scenario 2a, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

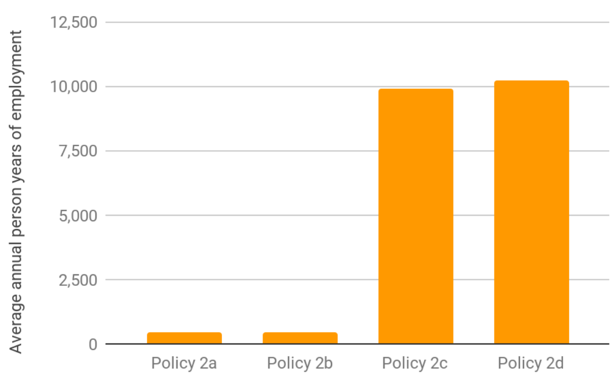


Figure 13: Building Performance scenarios, cumulative person years of employment

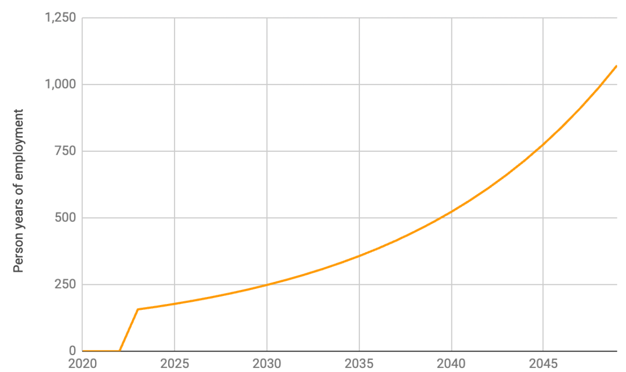


Figure 14: Building Performance scenario 2a, annual person years of employment

8. Social Cost of Carbon

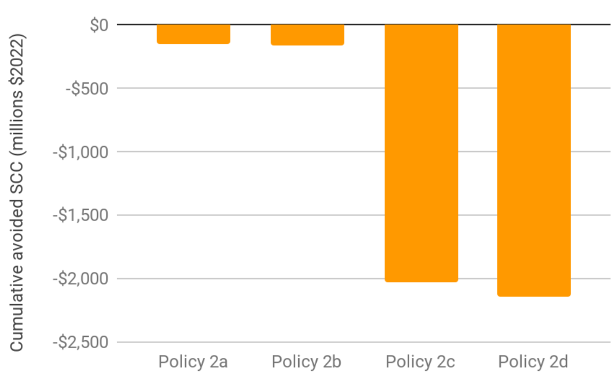


Figure 15: Energy Efficiency Policy scenarios, cumulative avoided social cost of carbon

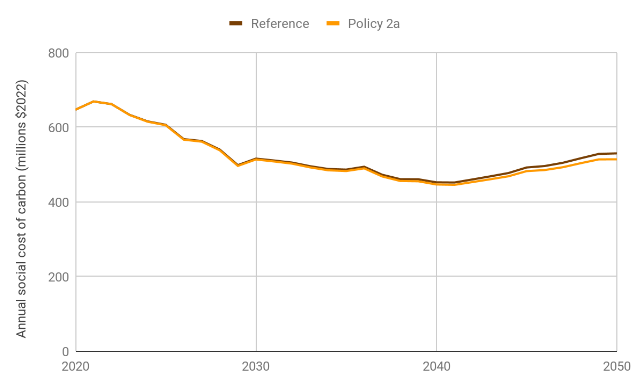
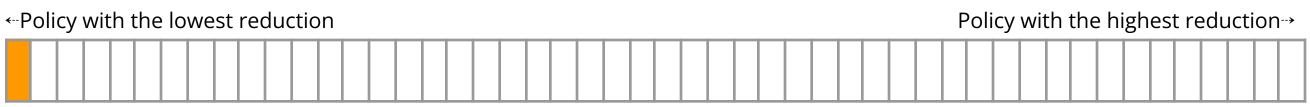


Figure 16: Energy Efficiency Policy scenario 2a, annual avoided social cost of carbon relative to the reference scenario

2b Promote, incentivize and or subsidize energy efficiency and heating/cooling

Target	50% of buildings are retrofitted by 2050, thermal energy requirements reduced by 15%
Building types	All building types
Commercial building sizes	Buildings ≥ 30,000 ft2

Impact on GHG Emissions Relative to All Building Policies Analysed



Indicators

1. GHG emissions	↓ Decreases emissions	**-70,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact- lifecycle abatement cost	↓ Saves money per ton of emissions reduced	**-$576** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-2,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	↑ Increases resiliency	**877,000 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health	**-$9 million** average annual avoided public health costs (2022-2050)

	costs	
6. Household expenditures	↑ Increases household energy costs	4.46% change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	423 average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	-$5.5 million average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

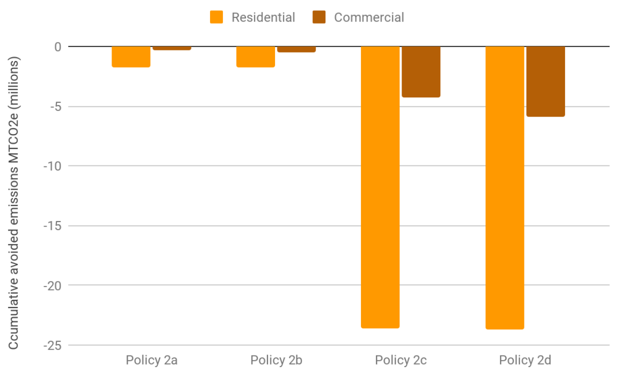


Figure 1: Energy Efficiency Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

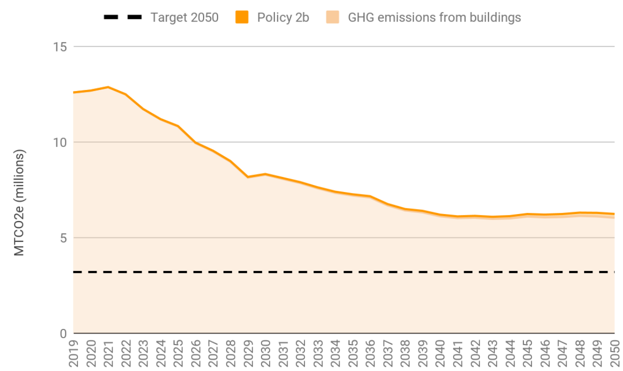


Figure 2: Energy Efficiency Policy scenario 2b, annual GHG emissions reductions resulting from scenario 2b relative to total projected GHG emissions from buildings in Oregon

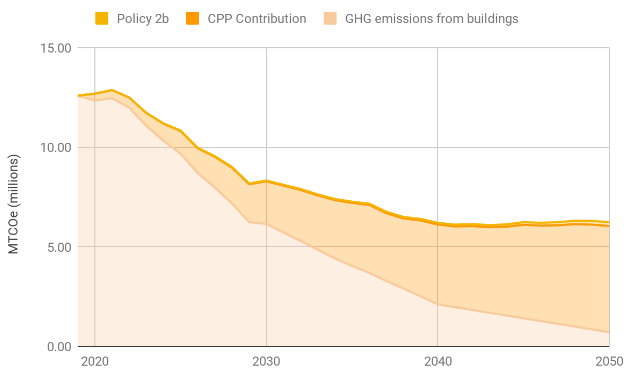


Figure 3: Energy Efficiency Policy scenario 2b, annual GHG emissions reductions resulting from scenario 2b relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

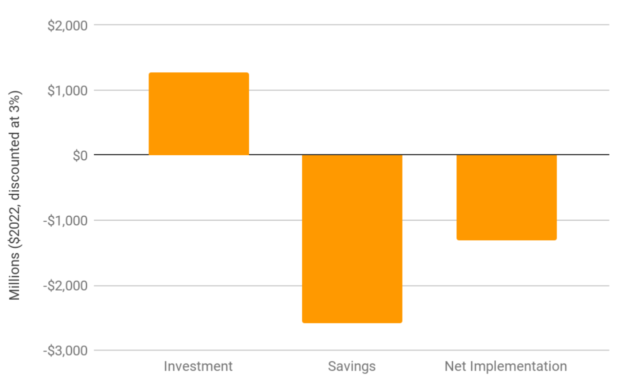


Figure 4: Energy Efficiency Policy scenario 2b, NPV over the study period

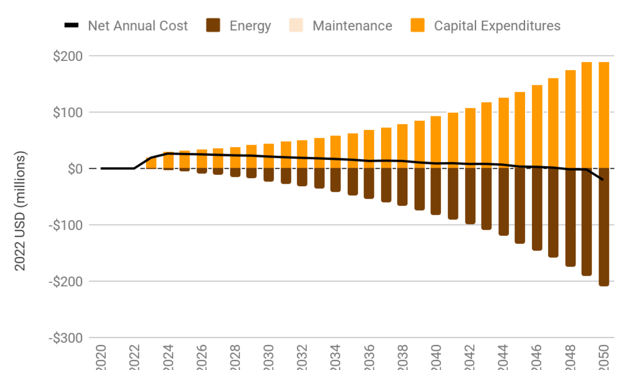


Figure 5: Energy Efficiency Policy scenario 2b, net annual costs or savings

3. Energy Efficiency

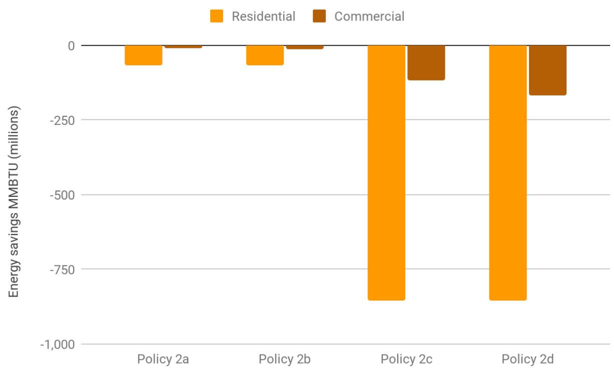


Figure 6: Energy Efficiency Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

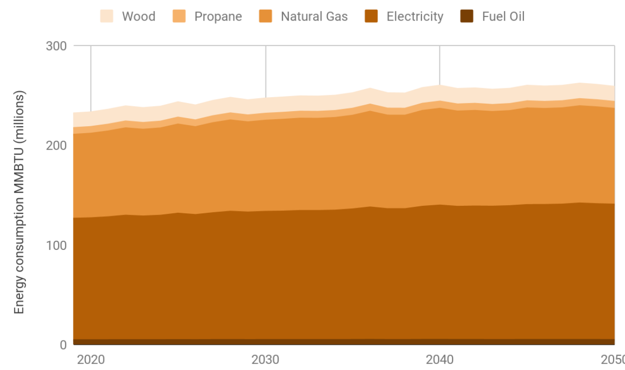


Figure 7: Energy Efficiency Policy scenario 2b, energy consumption by energy source

4. Resiliency

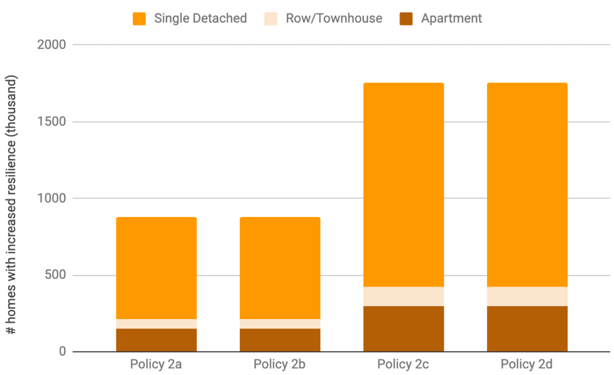


Figure 8: Energy Efficiency Policy scenarios, # of homes with increased resilience by 2050

5. Public Health and Air Quality

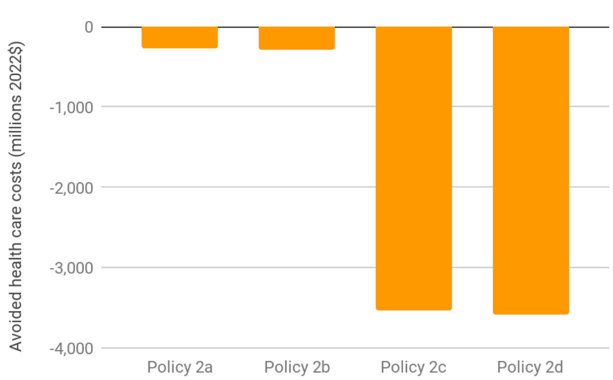


Figure 9: Energy Efficiency Policy scenarios, avoided cumulative health costs

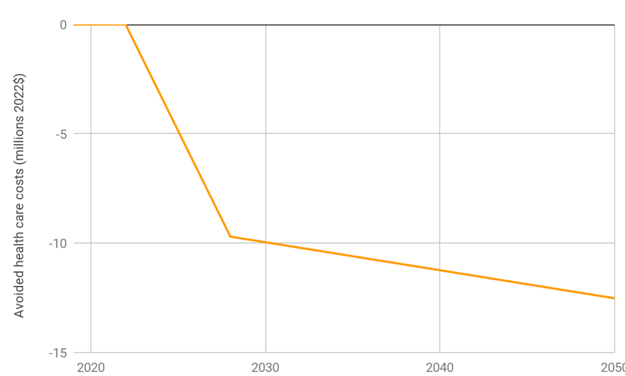


Figure 10: Energy Efficiency Policy scenario 2b, avoided annual health costs

6. Household Expenditures

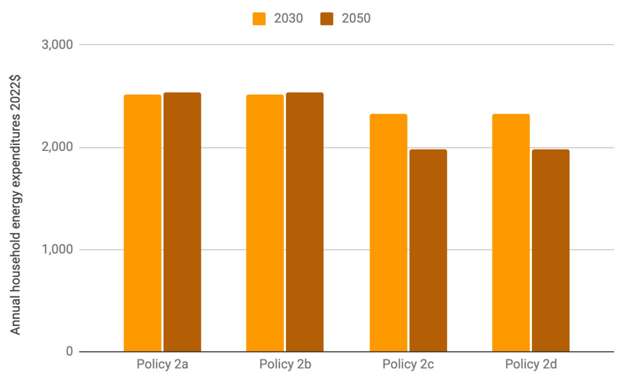


Figure 11: Energy Efficiency Policy scenarios, annual household energy expenditures

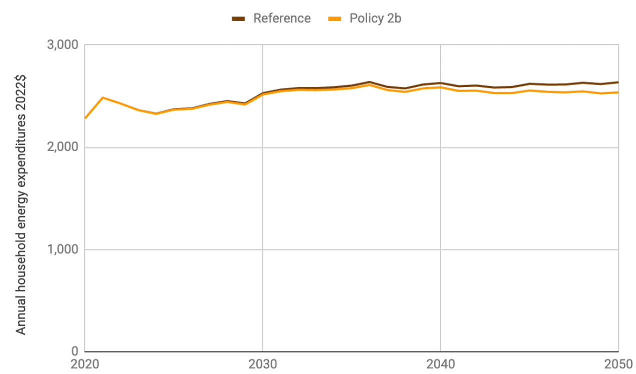


Figure 12: Energy Efficiency Policy scenario 2b, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

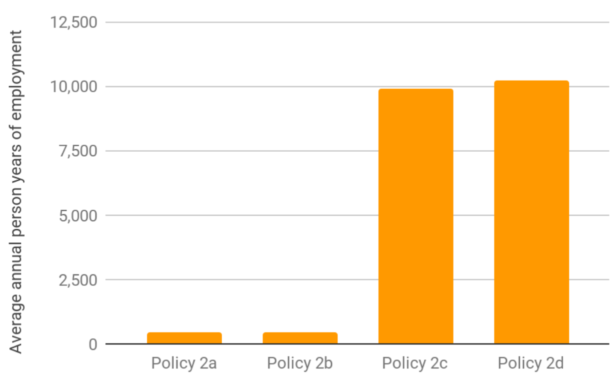


Figure 13: Energy Efficiency Policy scenarios, cumulative person years of employment

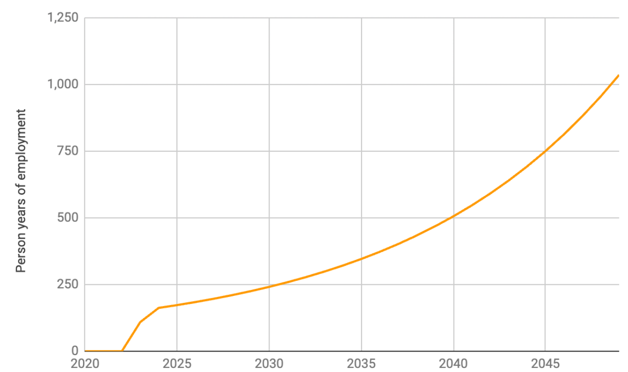


Figure 14: Energy Efficiency Policy scenario 2b, annual person years of employment

8. Social Cost of Carbon

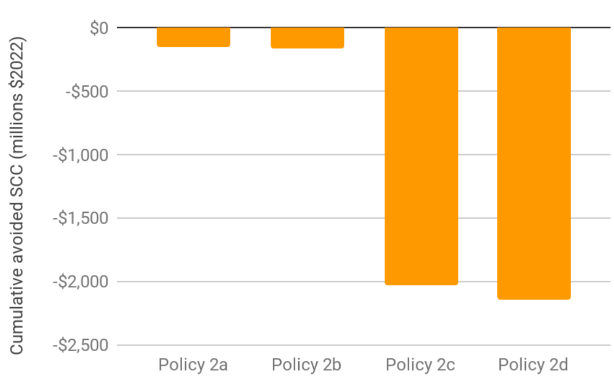


Figure 15: Energy Efficiency Policy scenarios, cumulative avoided social cost of carbon

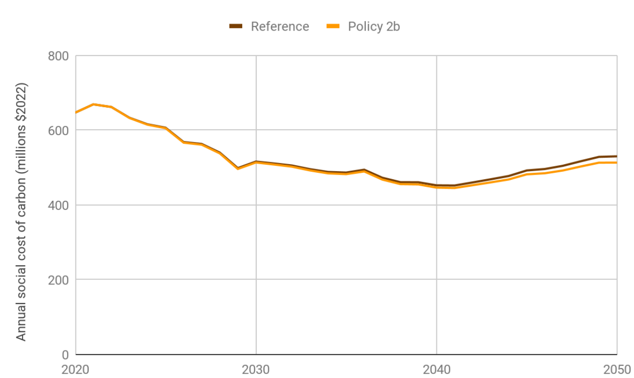


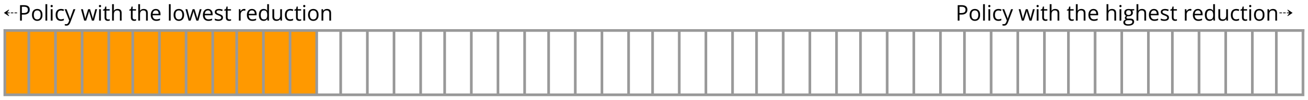
Figure 16: Energy Efficiency Policy scenario 2b, annual avoided social cost of carbon relative to the reference scenario

2c Promote, incentivize and or subsidize energy efficiency and heating/cooling

Target	100% of buildings are retrofitted by 2035, thermal energy requirements reduced by 50%
Building types	All building types
Commercial building sizes	Buildings ≥ 50,000 ft2

Impact on GHG Emissions Relative to All Building Policies Analysed

←Policy with the lowest reduction — Policy with the highest reduction→



Indicators

1. GHG emissions	↓ Decreases emissions	**-870,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact-lifecycle abatement cost	↑ Costs money per ton of emissions reduced	**$560** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-30,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	↑ Increases resiliency	**1,752,000 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health costs	**-$114 million** average annual avoided public health costs (2022-2050)

6. Household expenditures	↓ Decreases household energy costs	**-18.62%** change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	**9,884** average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	**-$65.6 million** average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

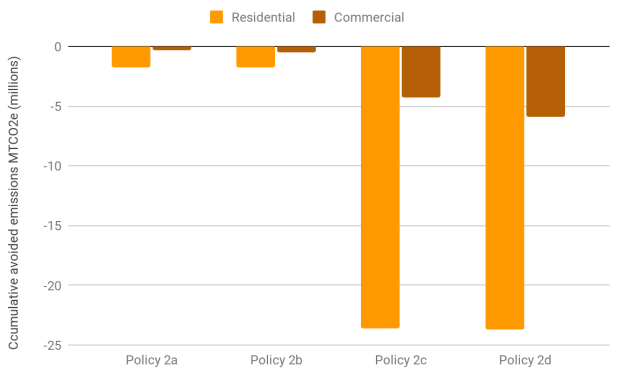


Figure 1: Energy Efficiency Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

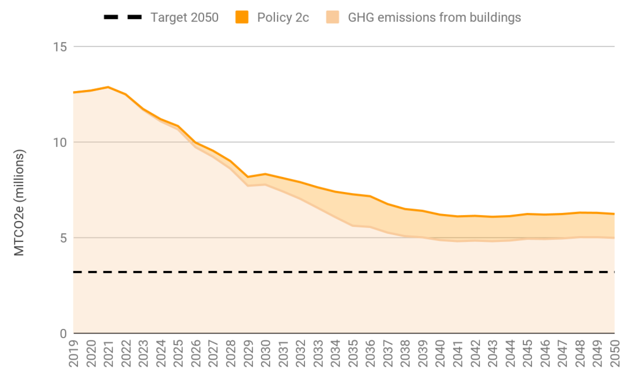


Figure 2: Energy Efficiency Policy scenario 2c, annual GHG emissions reductions resulting from scenario 2c relative to total projected GHG emissions from buildings in Oregon

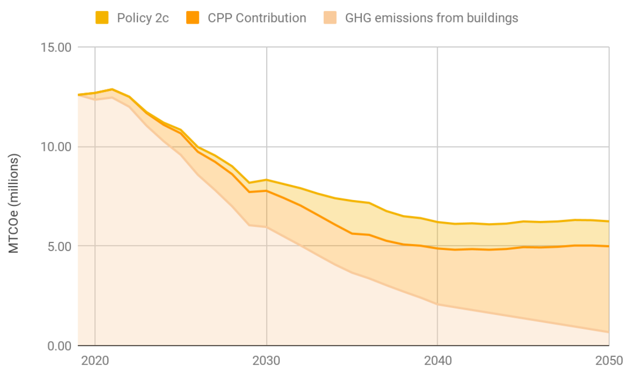


Figure 3: Energy Efficiency Policy scenario 2c, annual GHG emissions reductions resulting from scenario 2c relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

Figure 4: Energy Efficiency Policy scenario 2c, NPV over the study period

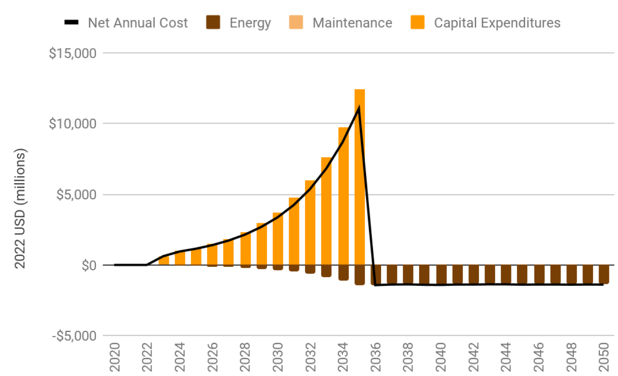


Figure 5: Energy Efficiency Policy scenario 2c, net annual costs or savings

3. Energy Efficiency

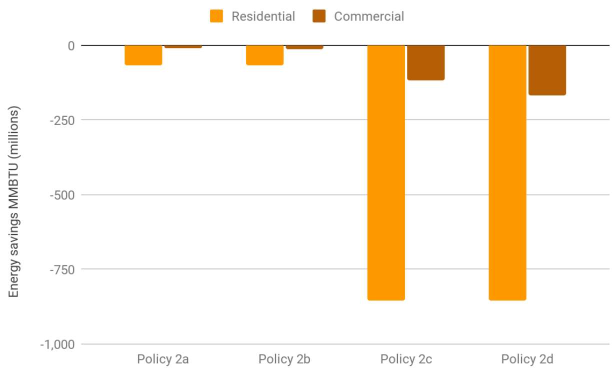


Figure 6: Energy Efficiency Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

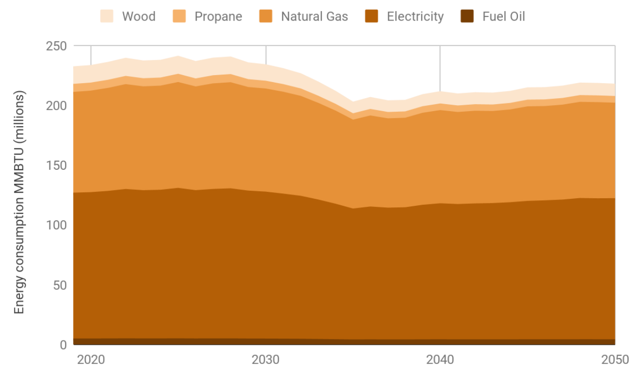


Figure 7: Energy Efficiency Policy scenario 2c, energy consumption by energy source

4. Resiliency

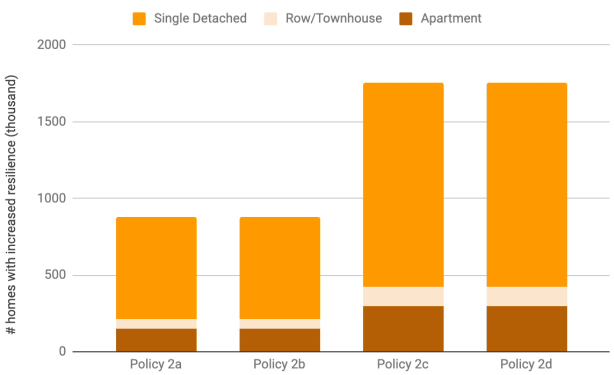


Figure 8: Energy Efficiency Policy scenarios, # of homes with increased resilience by 2050

5. Public Health and Air Quality

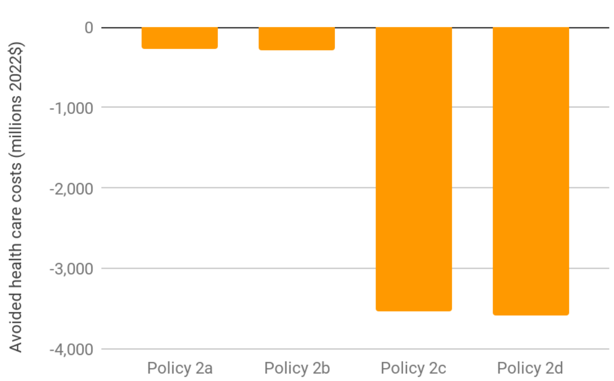


Figure 9: Energy Efficiency Policy scenarios, avoided cumulative health costs

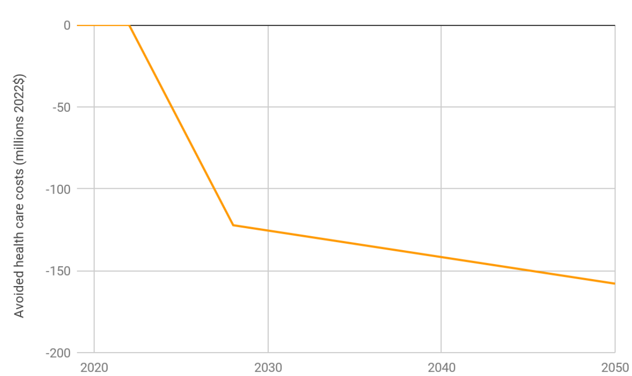


Figure 10: Energy Efficiency Policy scenario 2c, avoided annual health costs

6. Household Expenditures

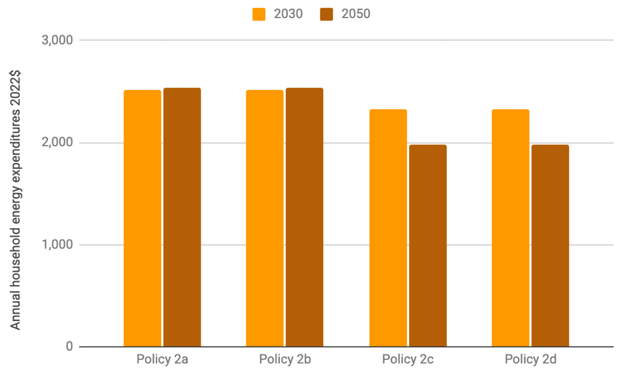


Figure 11: Energy Efficiency Policy scenarios, annual household energy expenditures

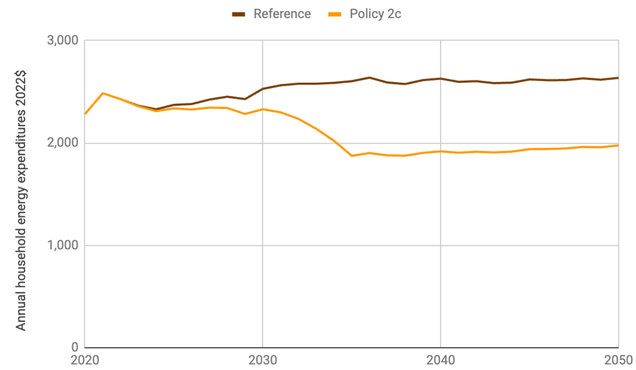


Figure 12: Energy Efficiency Policy scenario 2c, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

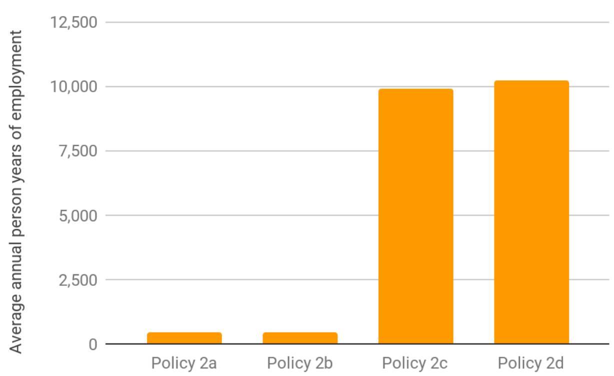


Figure 13: Energy Efficiency Policy scenarios, cumulative person years of employment

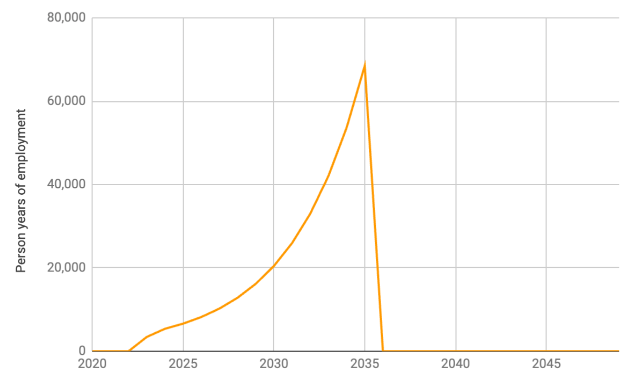


Figure 14: Energy Efficiency Policy scenario 2c, annual person years of employment

8. Social Cost of Carbon

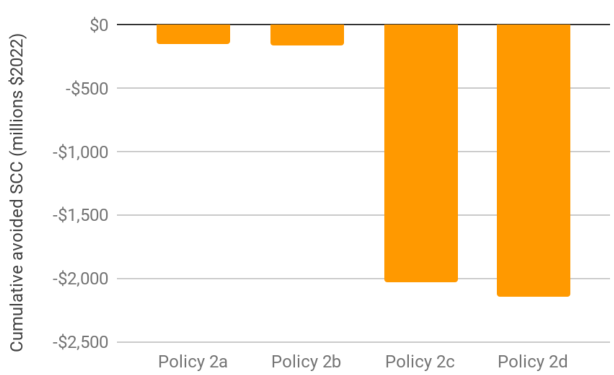


Figure 15: Energy Efficiency Policy scenarios, cumulative avoided social cost of carbon

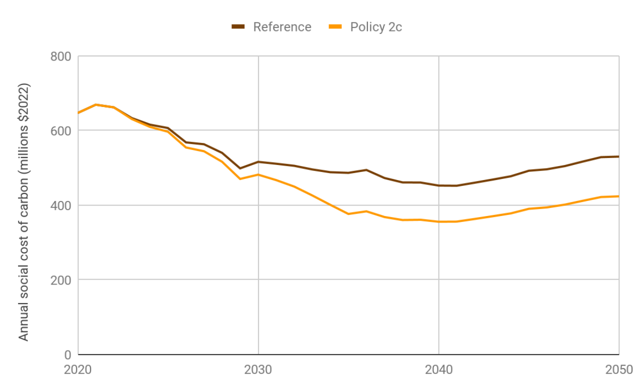
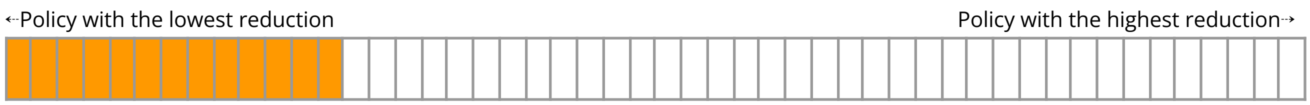


Figure 16: Energy Efficiency Policy scenario 2c, annual avoided social cost of carbon relative to the reference scenario

2d Promote, incentivize and or subsidize energy efficiency and heating/cooling

Target	100% of buildings are retrofitted by 2035, thermal energy requirements reduced by 50%
Building types	All building types
Commercial building sizes	Buildings ≥ 30,000 ft2

Impact on GHG Emissions Relative to All Building Policies Analysed



Indicators

1. GHG emissions	↓ Decreases emissions	**-920,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact-lifecycle abatement cost	↑ Costs money per ton of emissions reduced	**$578** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-32,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	↑ Increases resiliency	**1,752,000 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health costs	**-$116 million** average annual avoided public health costs (2022-2050)

6. Household expenditures	↓ Decreases household energy costs	**-18.62%** change household energy expenditures between 2022 and 2050
7. Economic impact- employment	↑ Employment	**10,248** average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	**-$69.4 million** average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

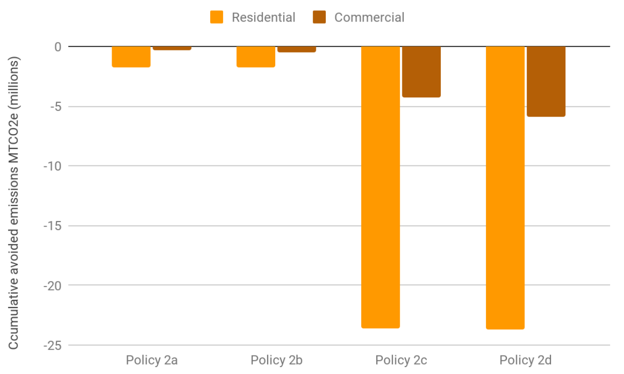


Figure 1: Energy Efficiency Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

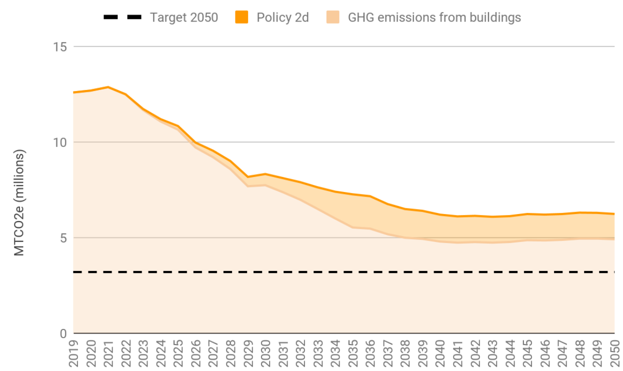


Figure 2: Energy Efficiency Policy scenario 2d, annual GHG emissions reductions resulting from scenario 2d relative to total projected GHG emissions from buildings in Oregon

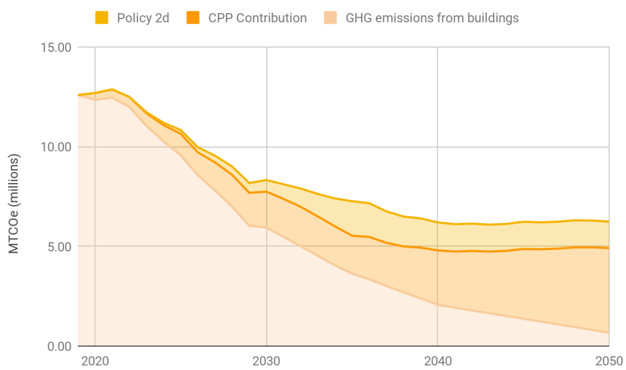


Figure 3: Energy Efficiency Policy scenario 2d, annual GHG emissions reductions resulting from scenario 2d relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

Figure 4: Energy Efficiency Policy scenario 2d, NPV over the study period

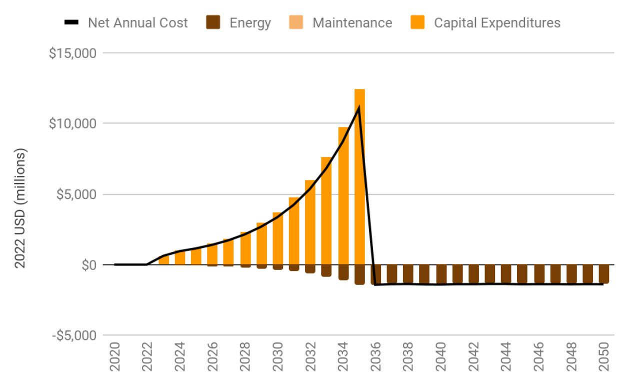


Figure 5: Energy Efficiency Policy scenario 2d, net annual costs or savings

3. Energy Efficiency

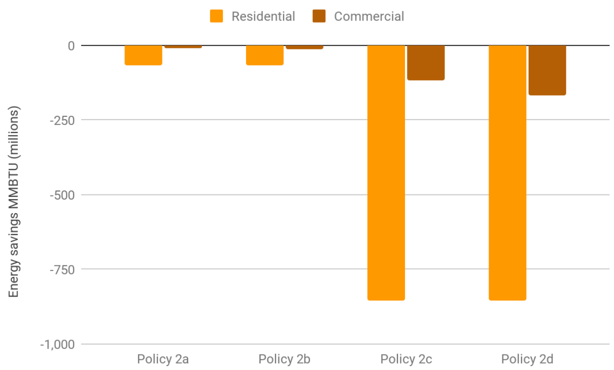


Figure 6: Energy Efficiency Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

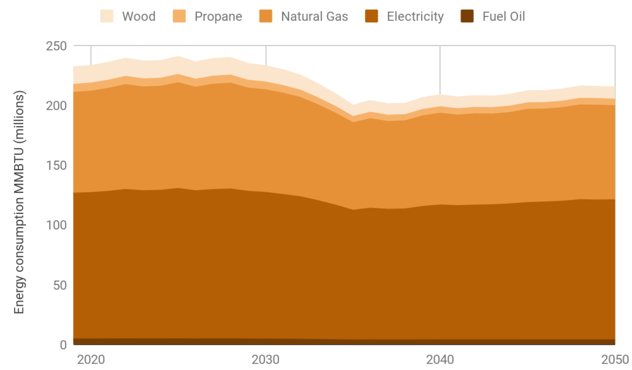


Figure 7: Energy Efficiency Policy scenario 2d, energy consumption by energy source

4. Resiliency

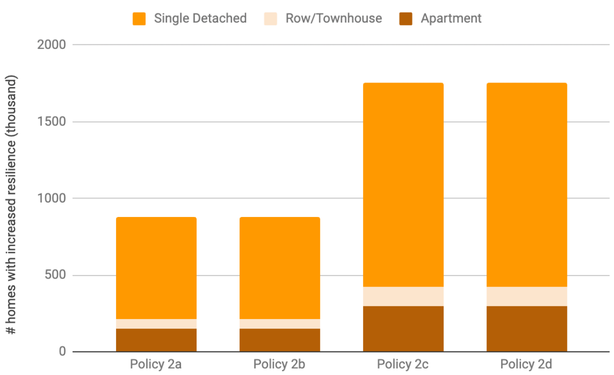


Figure 8: Energy Efficiency Policy scenarios, # of homes with increased resilience by 2050

5. Public Health and Air Quality

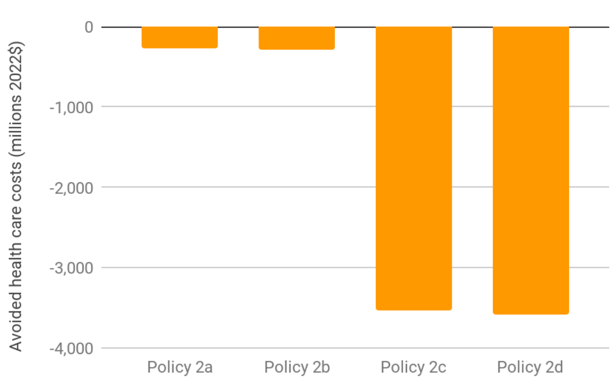


Figure 9: Energy Efficiency Policy scenarios, avoided cumulative health costs

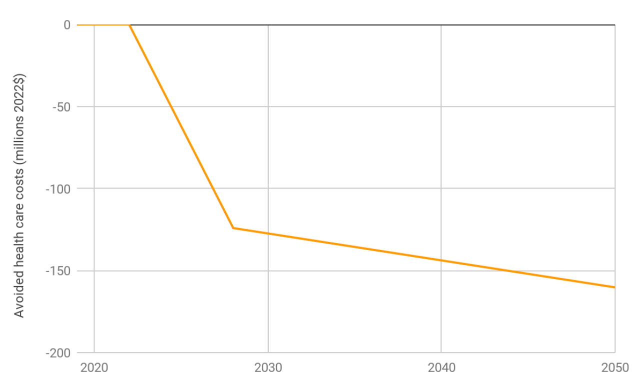


Figure 10: Energy Efficiency Policy scenario 2d, avoided annual health costs

6. Household Expenditures

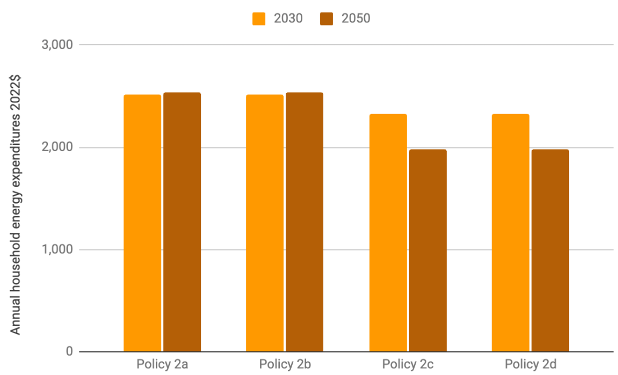


Figure 11: Energy Efficiency Policy scenarios, annual household energy expenditures

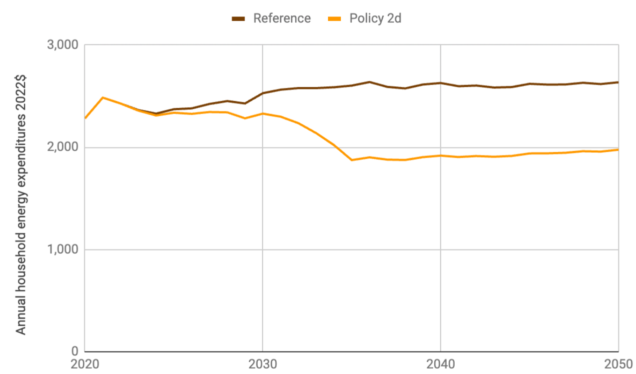


Figure 12: Energy Efficiency Policy scenario 2d, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

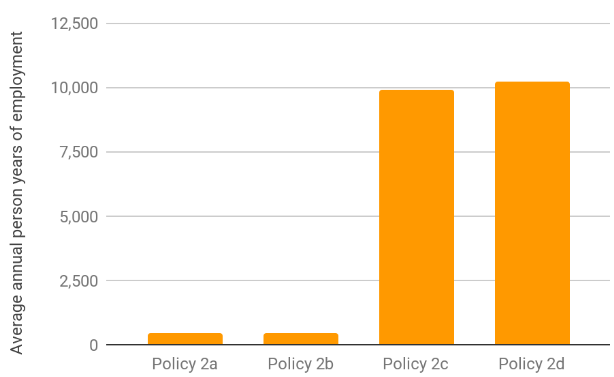


Figure 13: Energy Efficiency Policy scenarios, cumulative person years of employment

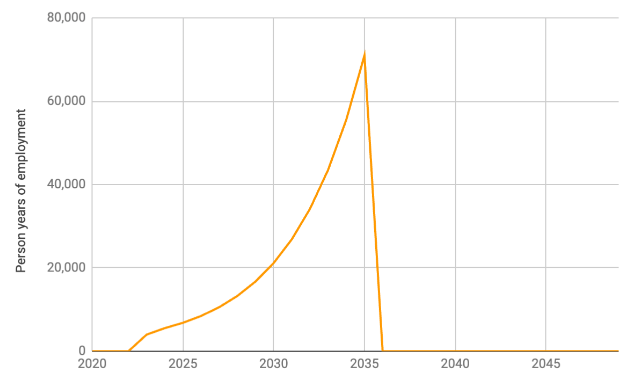


Figure 14: Energy Efficiency Policy scenario 2d, annual person years of employment

8. Social Cost of Carbon

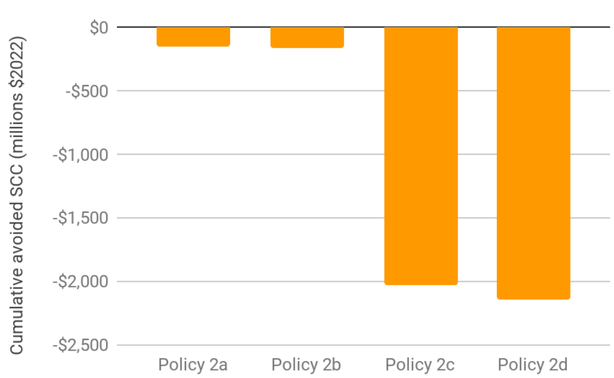


Figure 15: Energy Efficiency Policy scenarios, cumulative avoided social cost of carbon

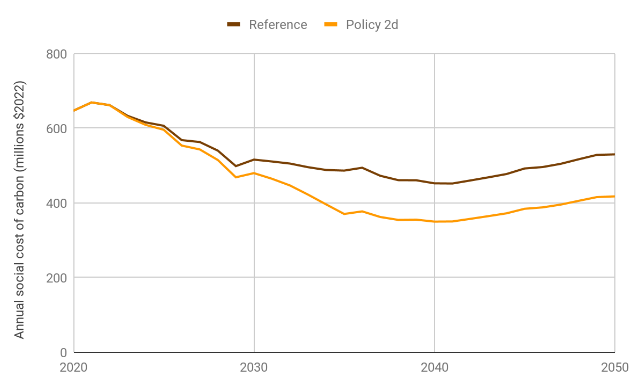
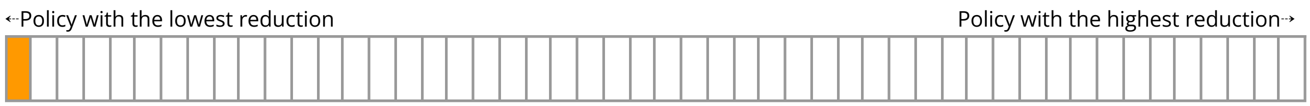


Figure 16: Energy Efficiency Policy scenario 2b, annual avoided social cost of carbon relative to the reference scenario

3a Decarbonize institutional/public buildings

Target	New buildings after 2035 are carbon neutral
Retrofits	50% of buildings are retrofitted by 2045; thermal energy requirements reduced by 15%; plug load reduced by 15%

Impact on GHG Emissions Relative to All Building Policies Analysed



Indicators

1. GHG emissions	↓ Decreases emissions	**-60,000 metric ton CO_2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact- lifecycle abatement cost	↓ Saves money per ton of emissions reduced	**-$241** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-2,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	- no change	**0 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health costs	**-$2 million** average annual avoided public health costs (2022-2050)

6. Household expenditures	- no change	n/a change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	852 average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	-$4.3 million average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

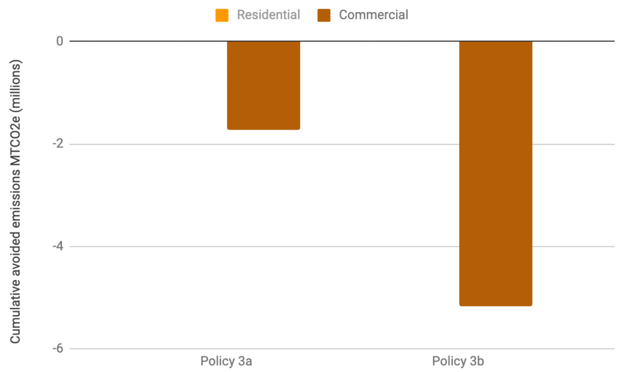


Figure 1: Public Buildings Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

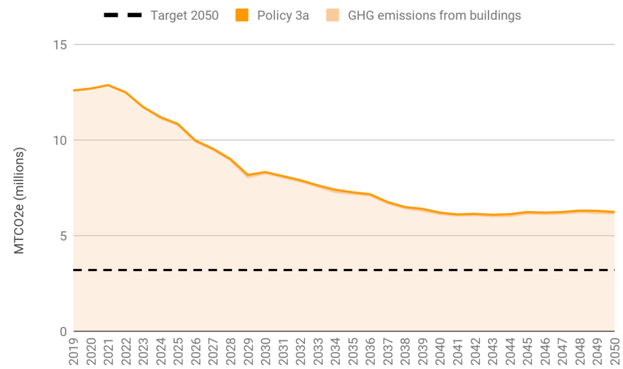


Figure 2: Public Buildings Policy scenario 3a, annual GHG emissions reductions resulting from scenario 3a relative to total projected GHG emissions from buildings in Oregon

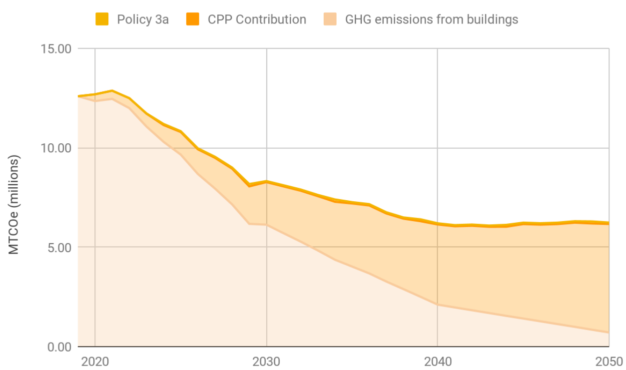


Figure 3: Public Buildings Policy scenario 3a, annual GHG emissions reductions resulting from scenario 3a relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

Figure 4: Public Buildings Policy scenario 3a, NPV over the study period

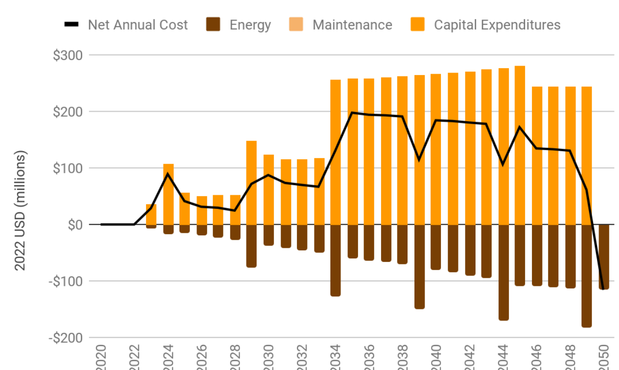


Figure 5: Public Buildings Policy scenario 3a, net annual costs or savings

3. Energy Efficiency

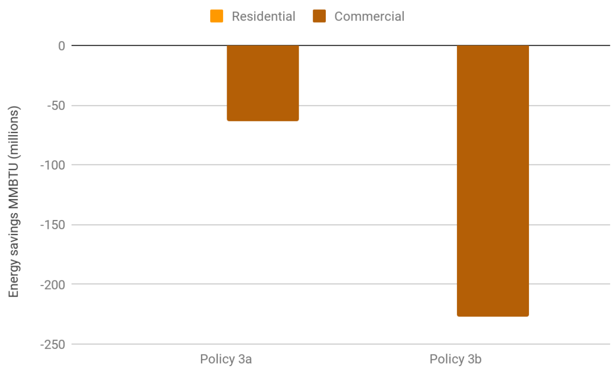


Figure 6: Public Buildings Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

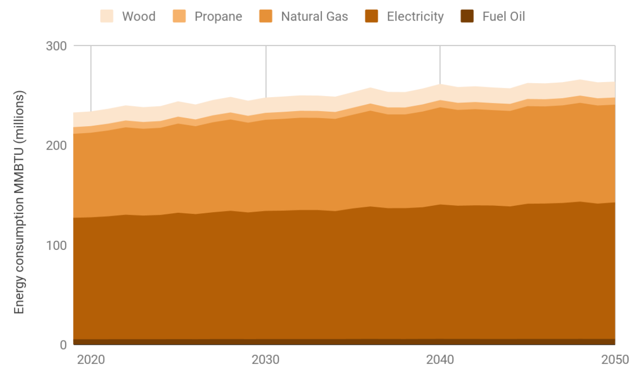


Figure 7: Public Buildings Policy scenario 3a, energy consumption by energy source

4. Resiliency

N/a

5. Public Health and Air Quality

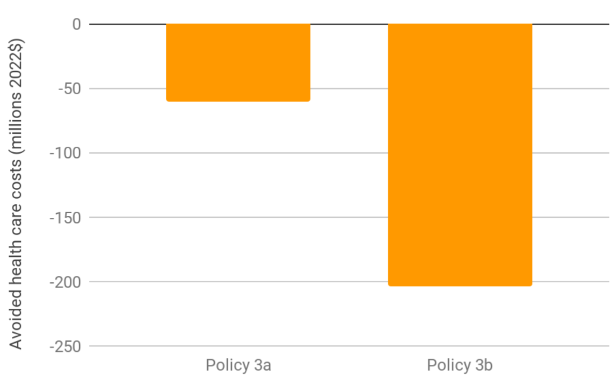


Figure 8: Public Buildings Policy scenarios, avoided cumulative health costs

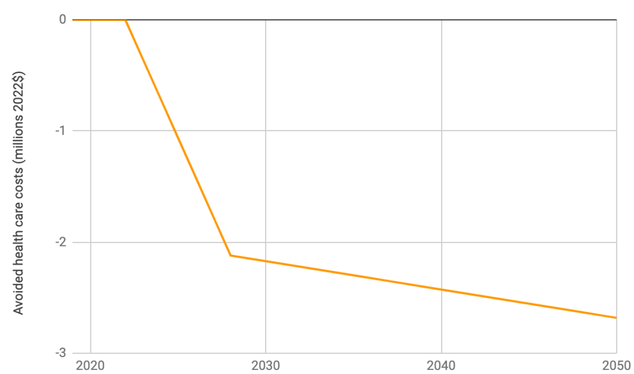


Figure 9: Public Buildings Policy 3a, avoided annual health costs

6. Household Expenditures

N/a

7. Economic Impact, Employment

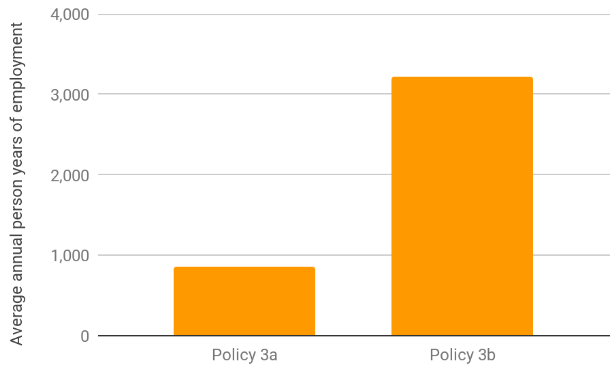


Figure 10: Public Buildings Policy scenarios, cumulative person years of employment

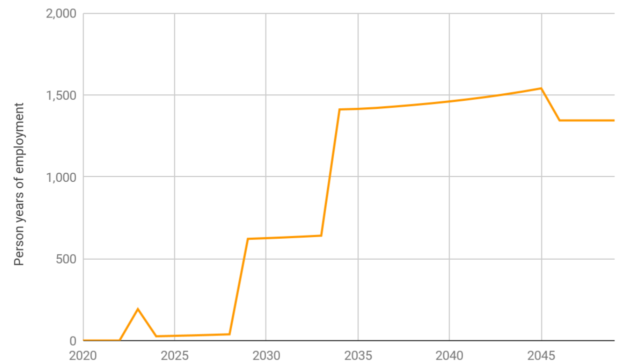


Figure 11: Public Buildings Policy scenario 3a, annual person years of employment

8. Social Cost of Carbon

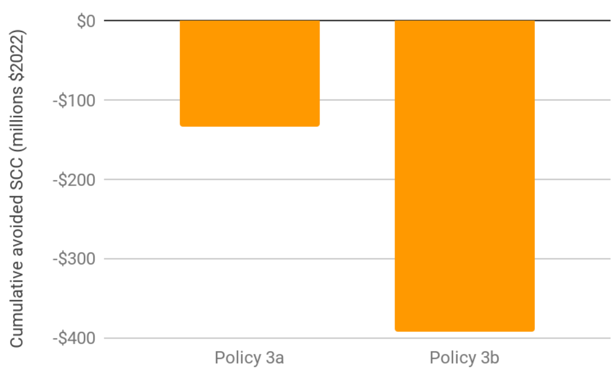


Figure 12: Public Buildings Policy scenarios, cumulative avoided social cost of carbon

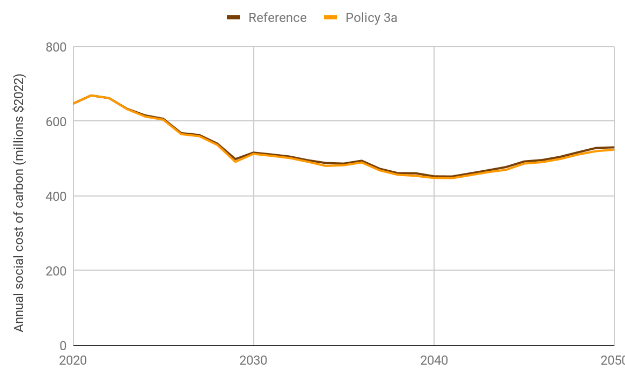
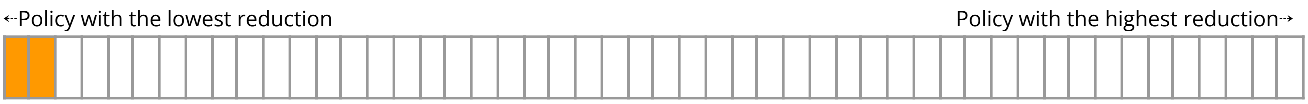


Figure 13: Public Buildings Policy scenario 3a, annual avoided social cost of carbon relative to the reference scenario

3b Decarbonize institutional/public buildings

Target	New buildings after 2023 are carbon neutral
Retrofits	100% of buildings are retrofitted by 2035: thermal energy requirements reduced by 50%; Plug load reduced by 50%

Impact on GHG Emissions Relative to All Building Policies Analysed



Indicators

1. GHG emissions	↓ Decreases emissions	**-180,000 metric ton CO_2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact- lifecycle abatement cost	↑ Costs money per ton of emissions reduced	**$558** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-7,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	- no change	**0 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health costs	**-$7 million** average annual avoided public health costs (2022-2050)

6. Household expenditures	- no change	n/a change household energy expenditures between 2022 and 2050
7. Economic impact- employment	↑ Employment	3,215 average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	-$12.7 million average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

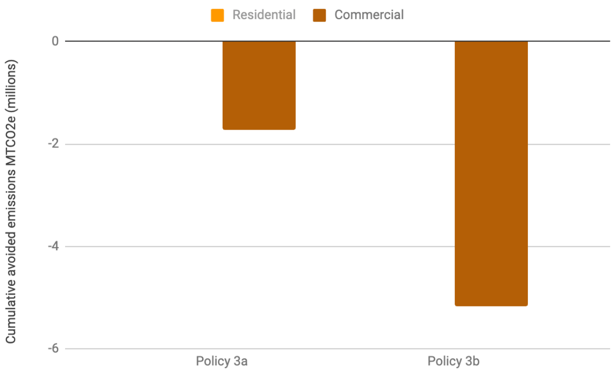


Figure 1: Public Buildings Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

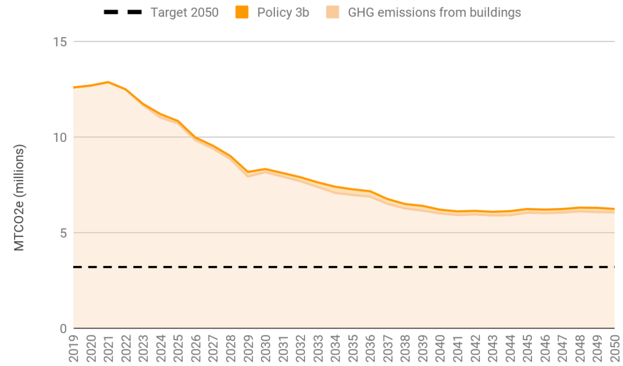


Figure 2: Public Buildings Policy scenario 3b, annual GHG emissions reductions resulting from scenario 3b relative to total projected GHG emissions from buildings in Oregon

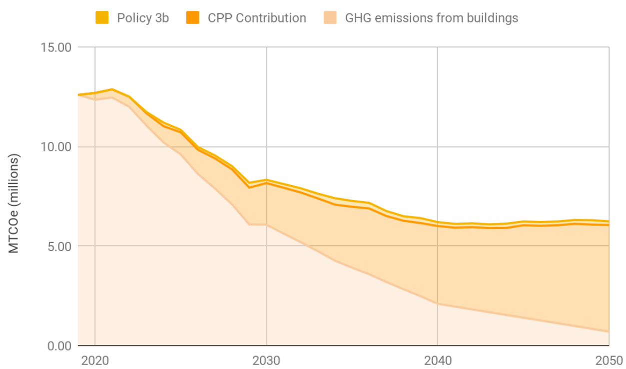


Figure 3: Public Buildings Policy scenario 3b, annual GHG emissions reductions resulting from scenario 3b relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

Figure 4: Public Buildings Policy scenario 3b, NPV over the study period

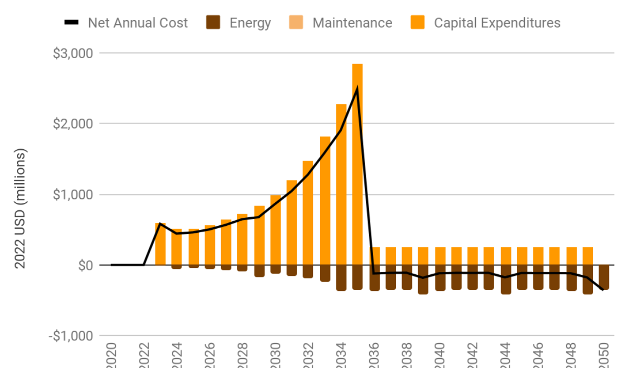


Figure 5: Public Buildings Policy scenario 3b, net annual costs or savings

3. Energy Efficiency

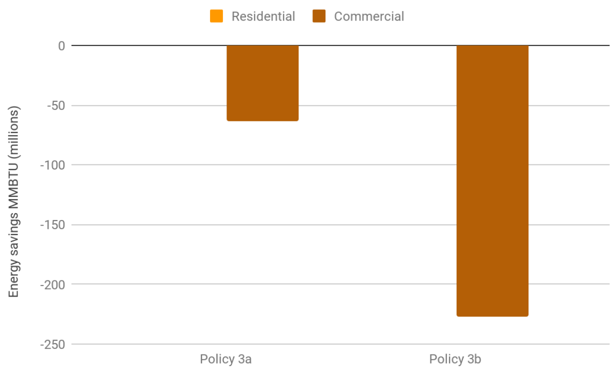


Figure 6: Public Buildings Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

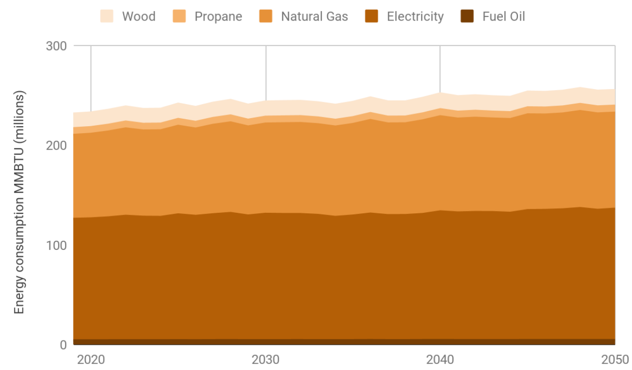


Figure 7: Public Buildings Policy scenario 3b, energy consumption by energy source

4. Resiliency

N/a

5. Public Health and Air Quality

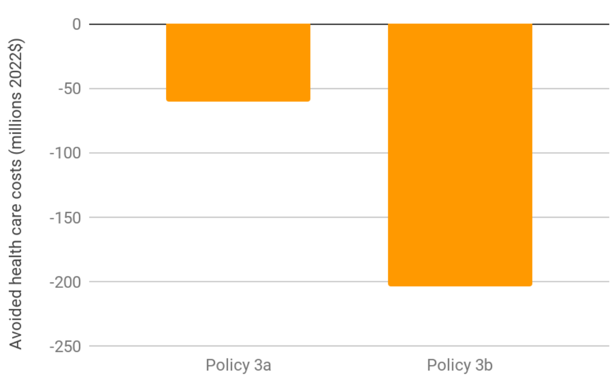


Figure 8: Public Buildings Policy scenarios, avoided cumulative health costs

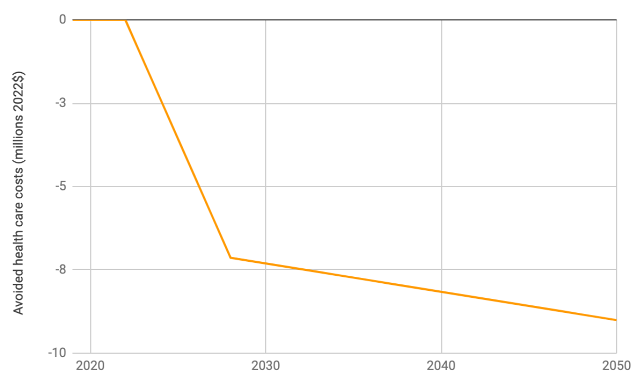


Figure 9: Public Buildings Policy 3b, avoided annual health costs

6. Household Expenditures

N/a

7. Economic Impact, Employment

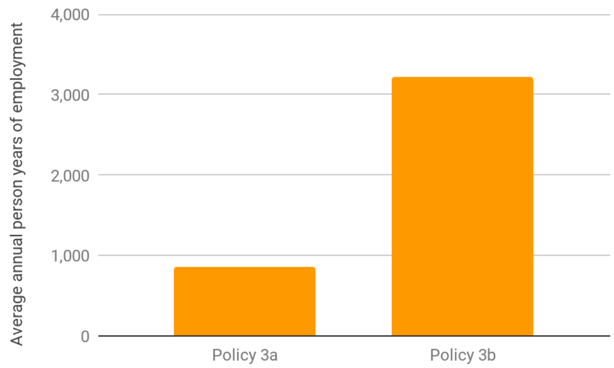


Figure 10: Public Buildings Policy scenarios, cumulative person years of employment

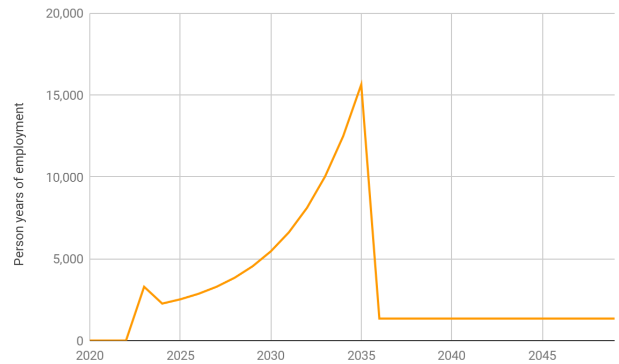


Figure 11: Public Buildings Policy scenario 3b, annual person years of employment

8. Social Cost of Carbon

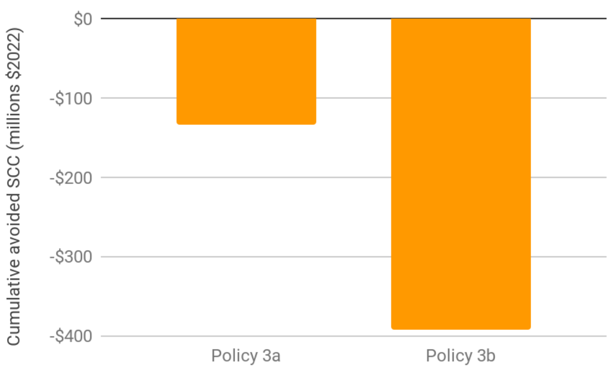


Figure 12: Public Buildings Policy scenarios, cumulative avoided social cost of carbon

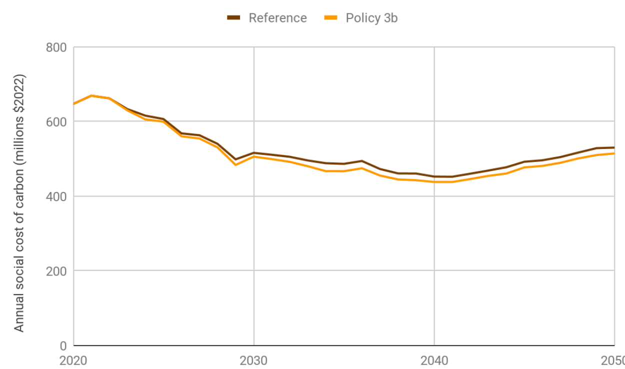


Figure 13: Public Buildings Policy scenario 3b, annual avoided social cost of carbon relative to the reference scenario

4a Promote, incentivize, and/or subsidize heat pumps

Target	80% of covered buildings have a heat pump installed by 2040
Building types	New and existing residential and commercial buildings

Impact on GHG Emissions Relative to All Building Policies Analysed

Indicators

1. GHG emissions	↓ Decreases emissions	**-2,010,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact- lifecycle abatement cost	↓ Saves money per ton of emissions reduced	**-$130** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-48,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	- no change	**0 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health costs	**-$123 million** average annual avoided public health costs (2022-2050)

6. Household expenditures	↓ Decreases household energy costs	**-27.66%** change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	**2,624** average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	**-$154.4 million** average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

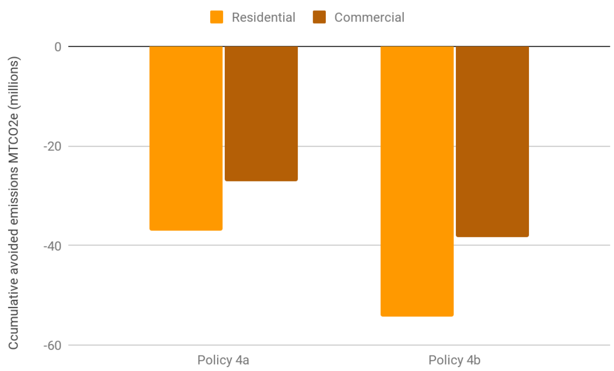


Figure 1: Heat Pumps Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

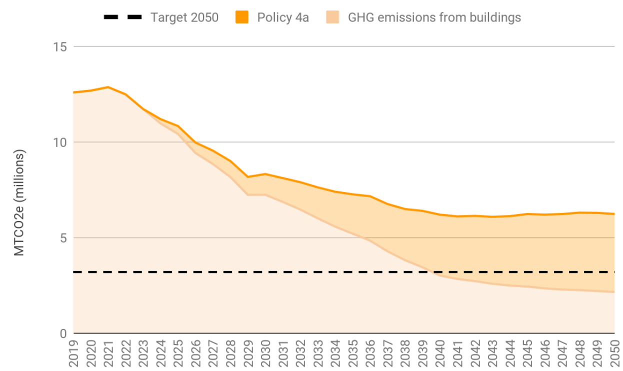


Figure 2: Heat Pumps Policy scenario 4a, annual GHG emissions reductions resulting from scenario 4a relative to total projected GHG emissions from buildings in Oregon

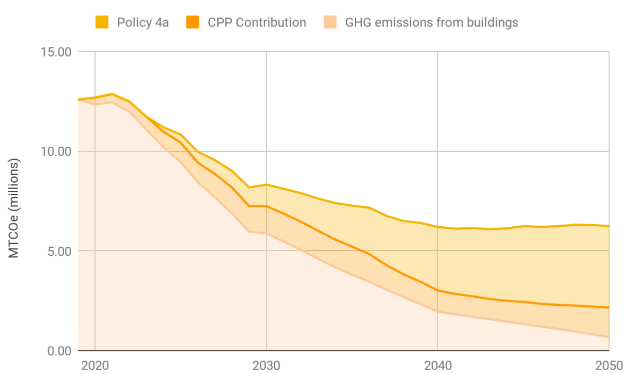


Figure 3: Heat Pumps Policy scenario 4a, annual GHG emissions reductions resulting from scenario 4a relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

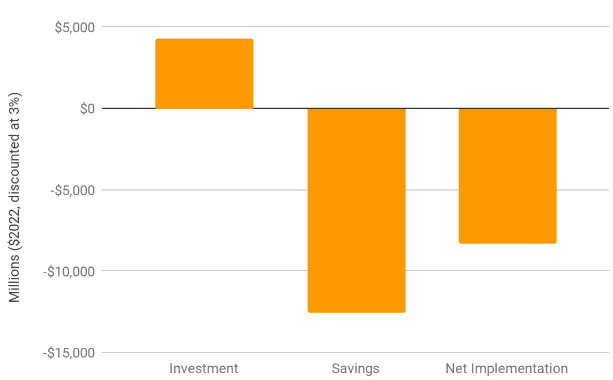


Figure 4: Heat Pumps Policy scenario 4a, NPV over the study period

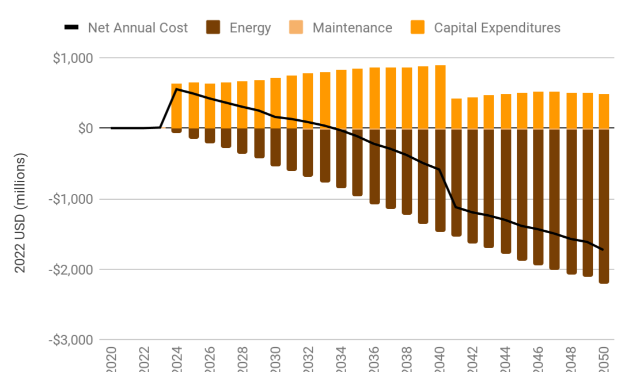


Figure 5: Heat Pumps Policy scenario 4a, net annual costs or savings

3. Energy Efficiency

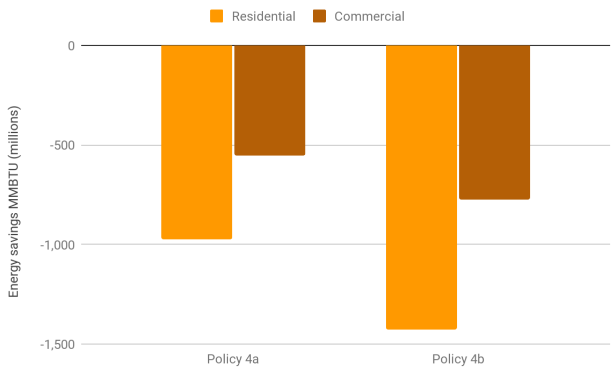


Figure 6: Heat Pumps Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

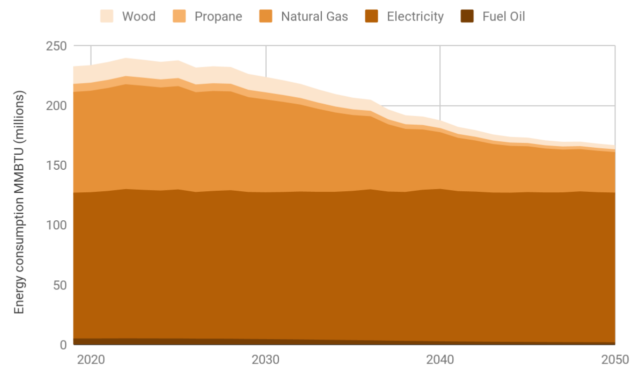


Figure 7: Heat Pumps Policy scenario 4a, energy consumption by energy source

4. Resiliency

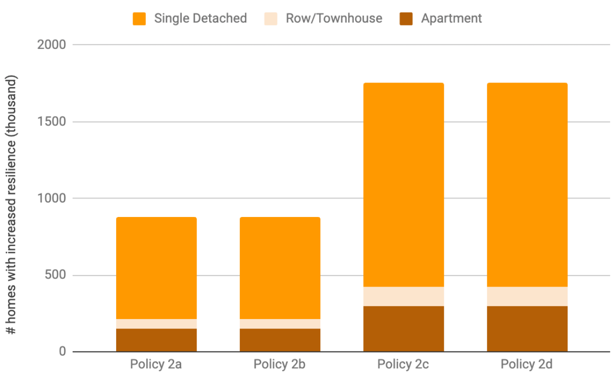


Figure 8: Heat Pumps Policy scenarios, # of homes with increased resilience by 2050

5. Public Health and Air Quality

Figure 9: Heat Pumps Policy scenarios, avoided cumulative health costs

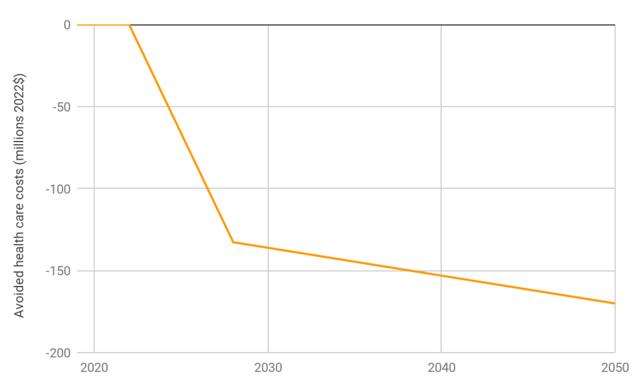


Figure 10: Heat Pumps Policy scenario 4a, avoided annual health costs

6. Household Expenditures

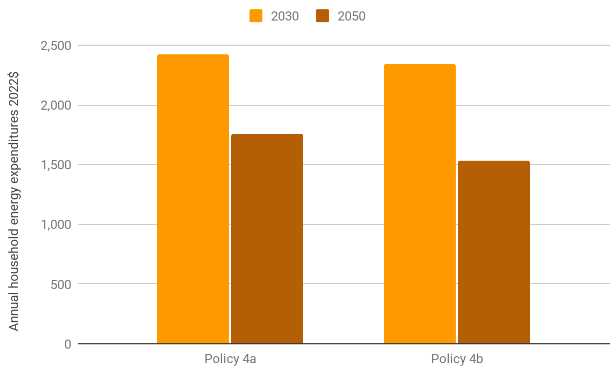


Figure 11: Heat Pumps Policy scenarios, annual household energy expenditures

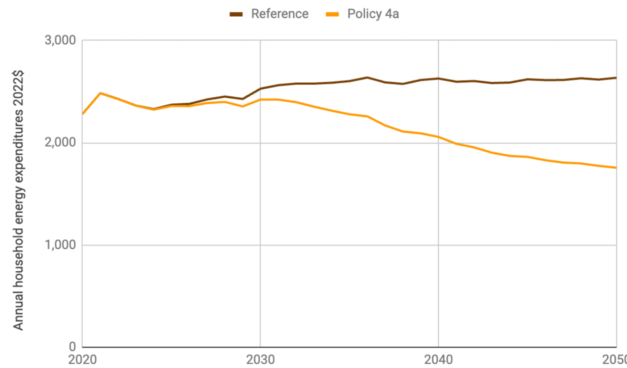


Figure 12: Heat Pumps Policy scenario 4a, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

Figure 13: Heat Pumps Policy scenarios, cumulative person years of employment

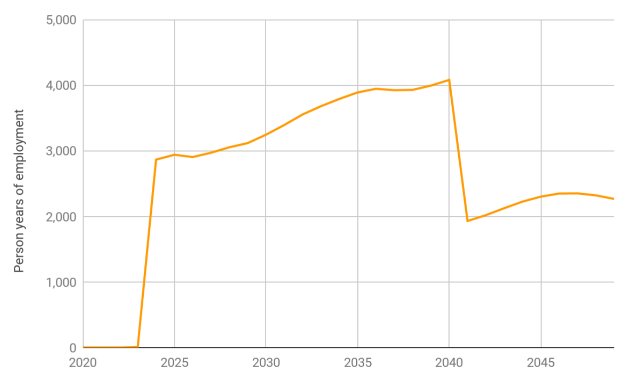


Figure 14: Heat Pumps Policy scenario 4a, annual person years of employment

8. Social Cost of Carbon

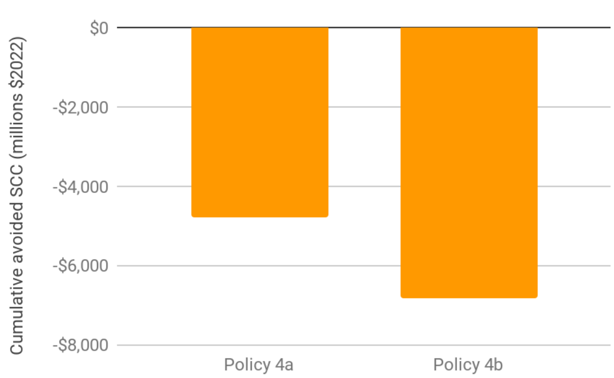


Figure 15: Heat Pumps Policy scenarios, cumulative avoided social cost of carbon

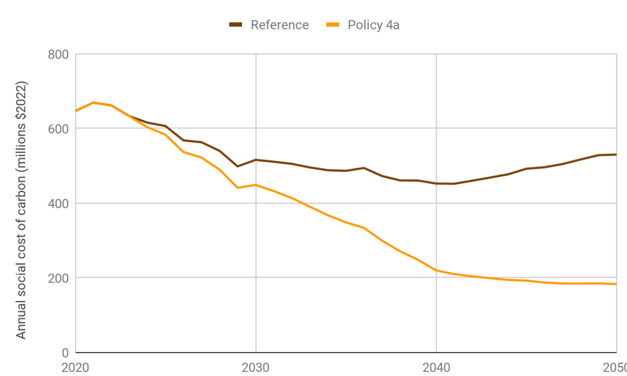


Figure 16: Heat Pumps Policy scenario 4a, annual avoided social cost of carbon relative to the reference scenario

4b Promote, incentivize, and/or subsidize heat pumps

Target	100% of buildings that are covered have a heat pump installed by 2035
Building types	New and existing residential and commercial buildings

Impact on GHG Emissions Relative to All Building Policies Analysed

Indicators

1. GHG emissions	↓ Decreases emissions	-2,890,000 metric ton CO2e average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact- lifecycle abatement cost	↓ Saves money per ton of emissions reduced	-$125 net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	-69,000,000 MMBTU average annual avoided energy consumption (2022-2050)
4. Resiliency	- no change	0 homes with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health costs	-$217 million average annual avoided public health costs (2022-2050)

6. Household expenditures	↓ Decreases household energy costs	**-36.90%** change household energy expenditures between 2022 and 2050
7. Economic impact- employment	↑ Employment	**3,368** average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	**-$220.8 million** average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

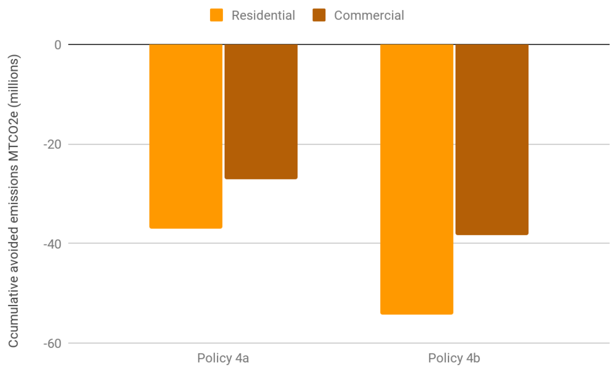


Figure 1: Heat Pumps Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

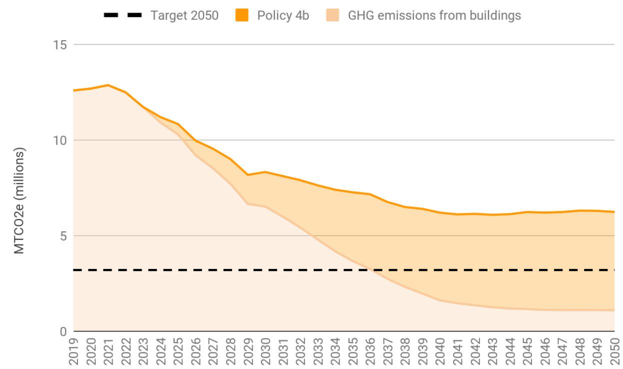


Figure 2: Heat Pumps Policy scenario 4b, annual GHG emissions reductions resulting from scenario 4b relative to total projected GHG emissions from buildings in Oregon

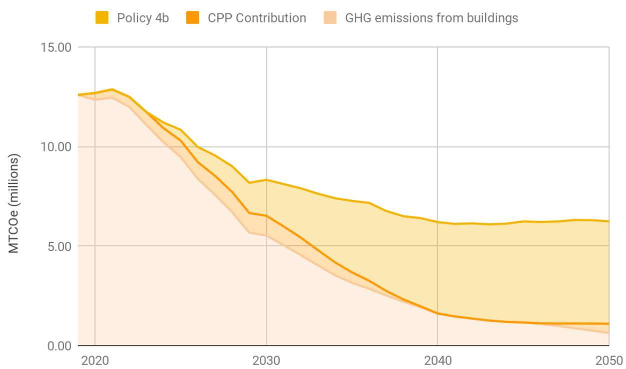


Figure 3: Heat Pumps Policy scenario 4b, annual GHG emissions reductions resulting from scenario 4b relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

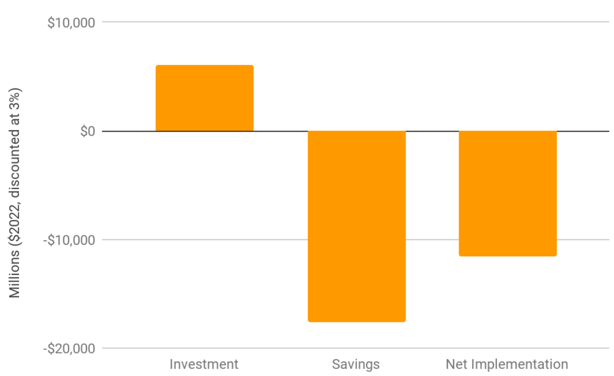


Figure 4: Heat Pumps Policy scenario 4b, NPV over the study period

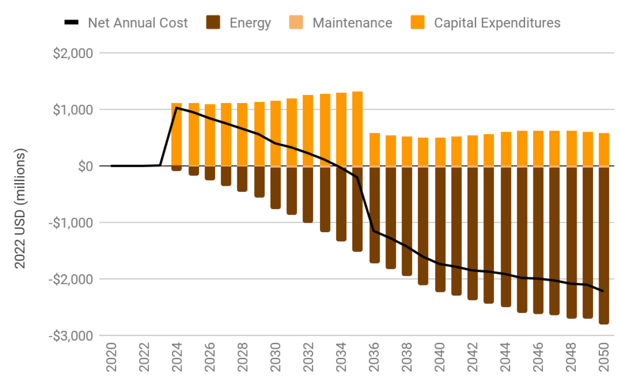


Figure 5: Heat Pumps Policy scenario 4b, net annual costs or savings

3. Energy Efficiency

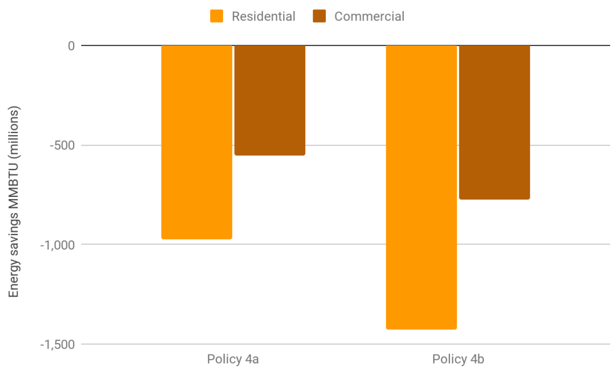


Figure 6: Heat Pumps Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

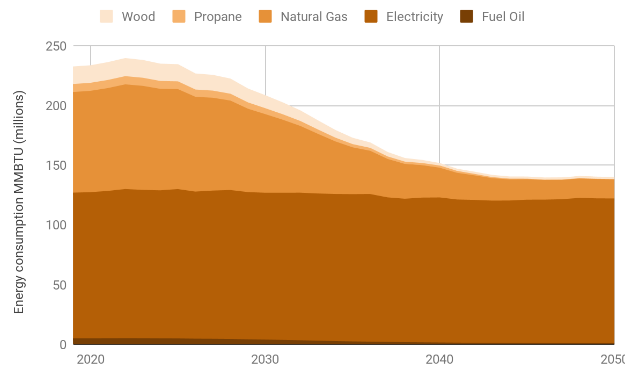


Figure 7: Heat Pumps Policy scenario 4b, energy consumption by energy source

4. Resiliency

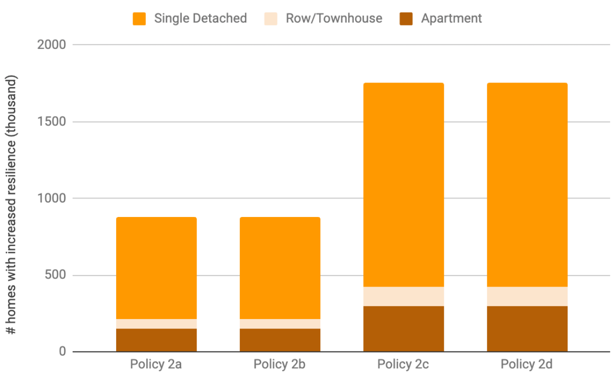


Figure 8: Heat Pumps Policy scenarios, # of homes with increased resilience by 2050

5. Public Health and Air Quality

Figure 9: Heat Pumps Policy scenarios, avoided cumulative health costs

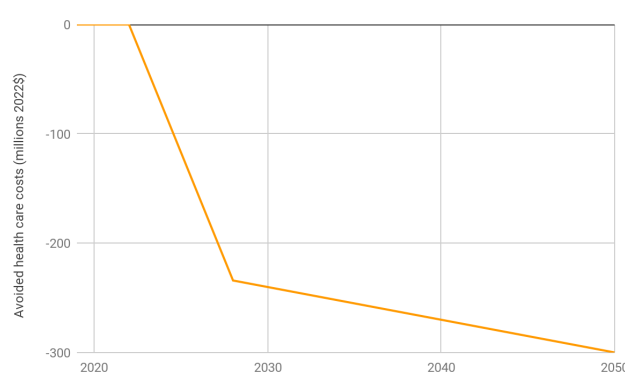


Figure 10: Heat Pumps Policy scenario 4b, avoided annual health costs

6. Household Expenditures

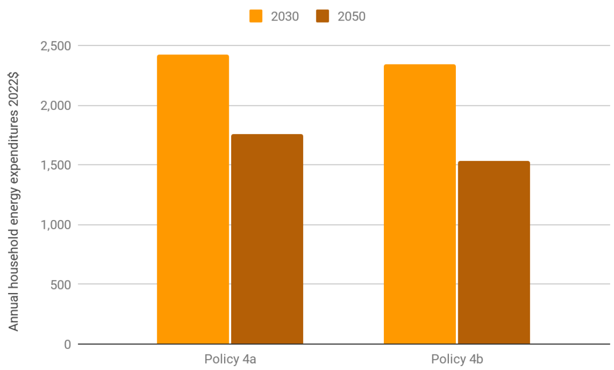


Figure 11: Heat Pumps Policy scenarios, annual household energy expenditures

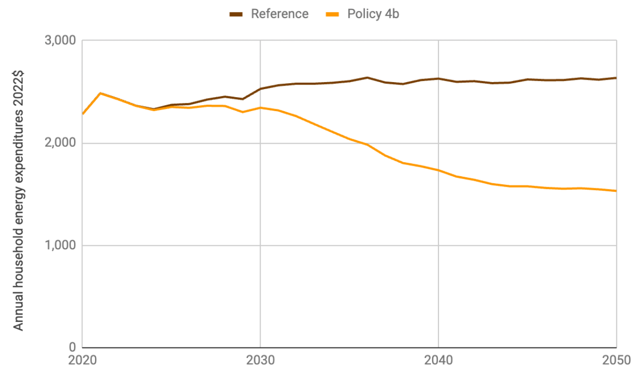


Figure 12: Heat Pumps Policy scenario 4b, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

Figure 13: Heat Pumps Policy scenarios, cumulative person years of employment

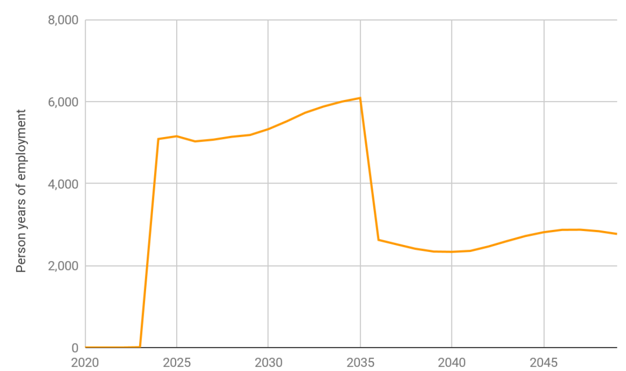


Figure 14: Heat Pumps Policy scenario 4b, annual person years of employment

8. Social Cost of Carbon

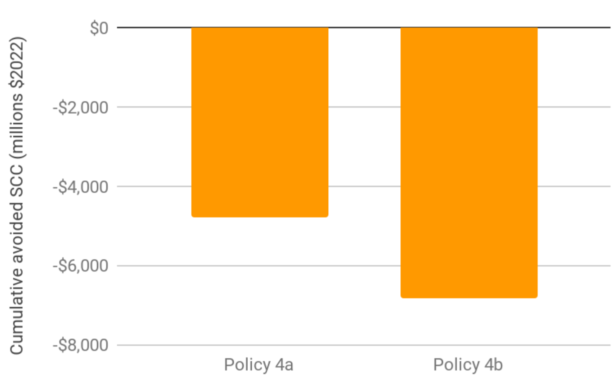


Figure 15: Heat Pumps Policy scenarios, cumulative avoided social cost of carbon

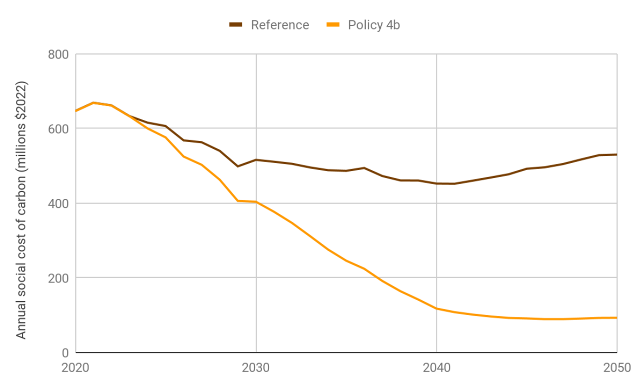
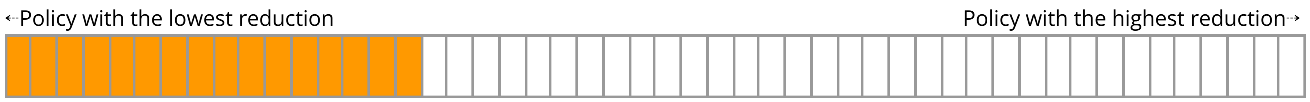


Figure 16: Heat Pumps Policy scenario 4b, annual avoided social cost of carbon relative to the reference scenario

5a Assess and disclose material-related emissions

Target	Reduce embodied carbon from construction by 20% by 2030, compared to 2015
Building types	Residential and commercial buildings

Impact on GHG Emissions Relative to All Building Policies Analysed



Indicators

1. GHG emissions	↓ Decreases emissions	**-1,170,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact- lifecycle abatement cost	↑ Costs money per ton of emissions reduced	**$119** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**0 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	- no change	**0 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	- no change	**$0 million** average annual avoided public health costs (2022-2050)

6. Household expenditures	- no change	n/a change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	1,628 average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	-$86.9 million average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

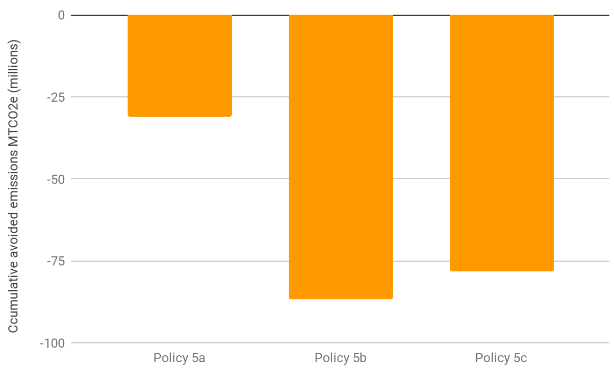


Figure 1: Material-Related Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

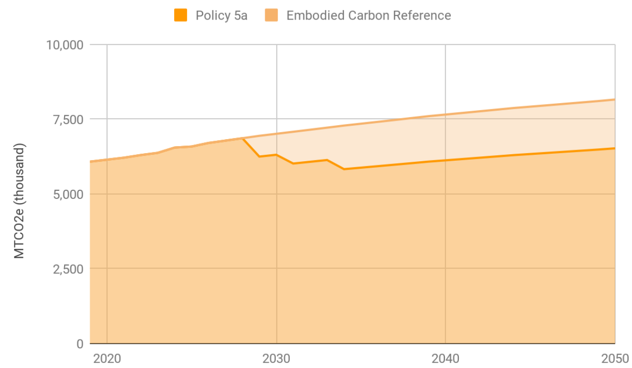


Figure 2: Material-Related Policy scenario 5a, annual GHG emissions reductions resulting from scenario 5a relative to total projected GHG emissions from buildings in Oregon

2. Economic Impact, Costs and Savings

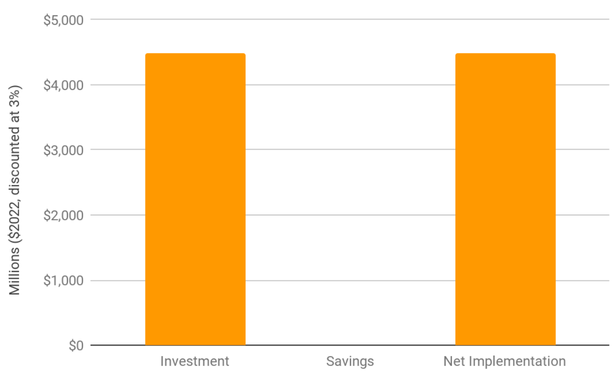


Figure 3: Material-Related Policy scenario 5a, NPV over the study period

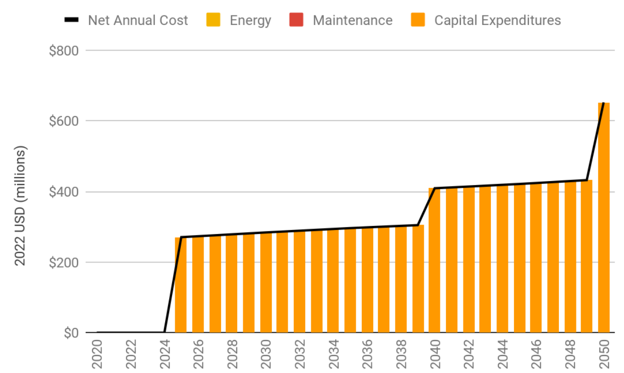


Figure 4: Material-Related Policy scenario 5a, net annual costs or savings

3. Energy Efficiency

N/a

4. Resiliency

N/a

5. Public Health and Air Quality

N/a

6. Household Expenditures

N/a

7. Economic Impact, Employment

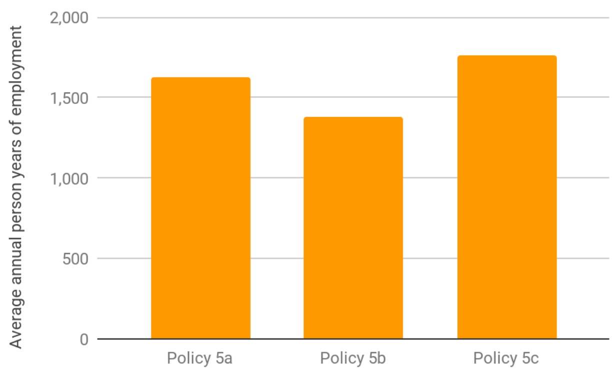


Figure 5: Material-Related Policy scenarios, cumulative person years of employment

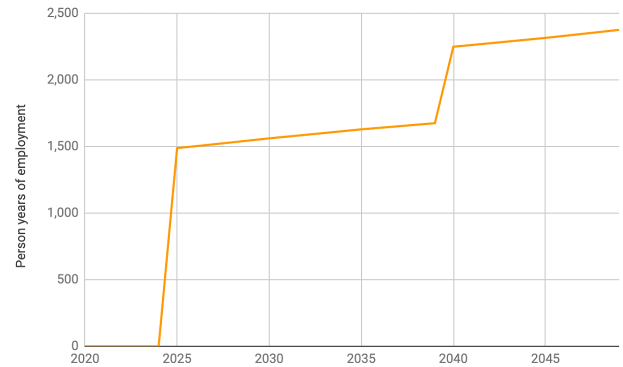


Figure 6: Material-Related Policy scenario 5a, annual person years of employment

8. Social Cost of Carbon

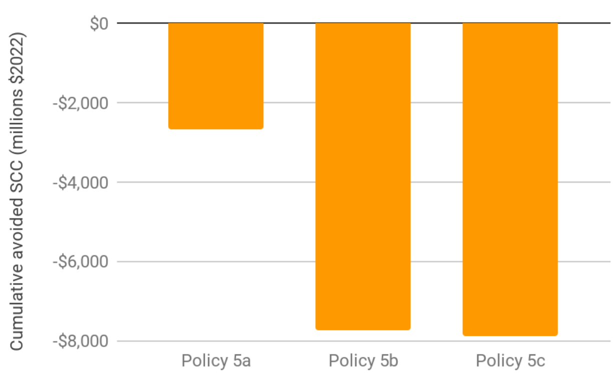


Figure 7: Material-Related Policy scenarios, cumulative avoided social cost of carbon

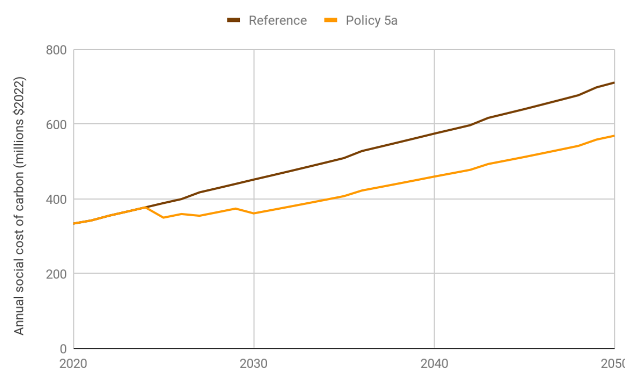


Figure 8: Material-Related Policy scenario 5a, annual avoided social cost of carbon relative to the reference scenario

5b Assess and disclose material-related emissions

Target	Reduce embodied carbon from construction by 60% by 2030, compared to 2015
Building types	Residential and commercial buildings

Impact on GHG Emissions Relative to All Building Policies Analysed

←Policy with the lowest reduction Policy with the highest reduction→

Indicators

1. GHG emissions	↓ Decreases emissions	**-3,340,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact- lifecycle abatement cost	↑ Costs money per ton of emissions reduced	**$37** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**0 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	- no change	**0 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	- no change	**$0 million** average annual avoided public health costs (2022-2050)

6. Household expenditures	- no change	n/a change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	1,384 average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	-$249.5 million average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

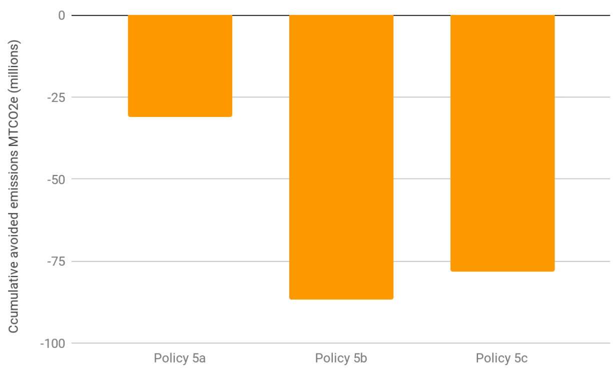


Figure 1: Material-Related Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

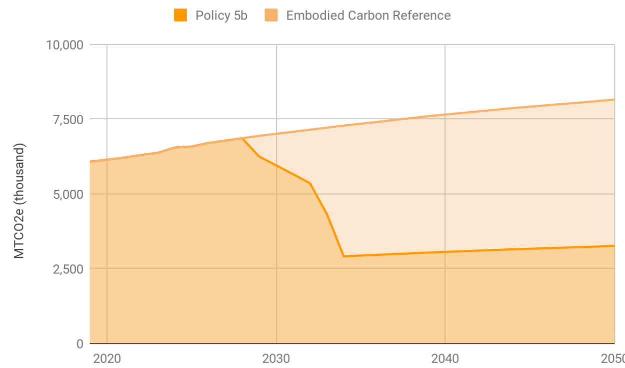


Figure 2: Material-Related Policy scenario 5b, annual GHG emissions reductions resulting from scenario 5b relative to total projected GHG emissions from buildings in Oregon

2. Economic Impact, Costs and Savings

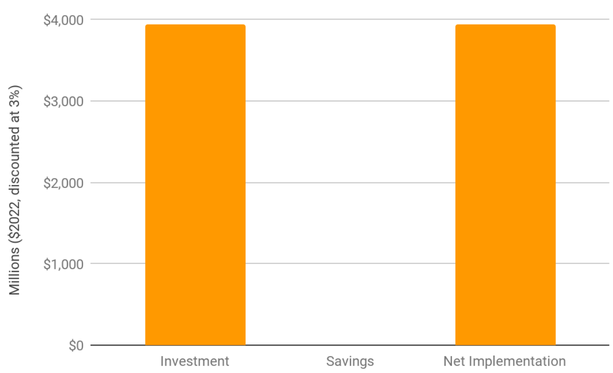


Figure 3: Material-Related Policy scenario 5b, NPV over the study period

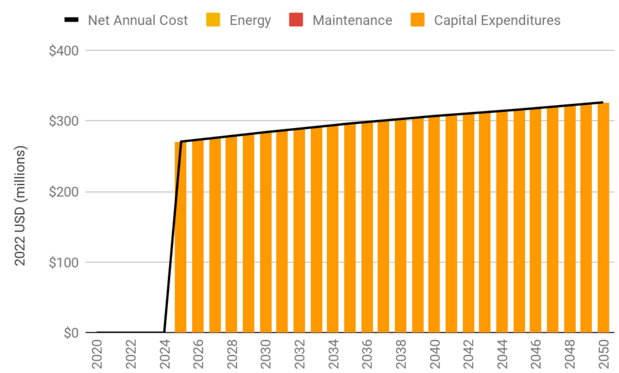


Figure 4: Material-Related Policy scenario 5b, net annual costs or savings

3. Energy Efficiency

N/a

4. Resiliency

N/a

5. Public Health and Air Quality

N/a

6. Household Expenditures

N/a

7. Economic Impact, Employment

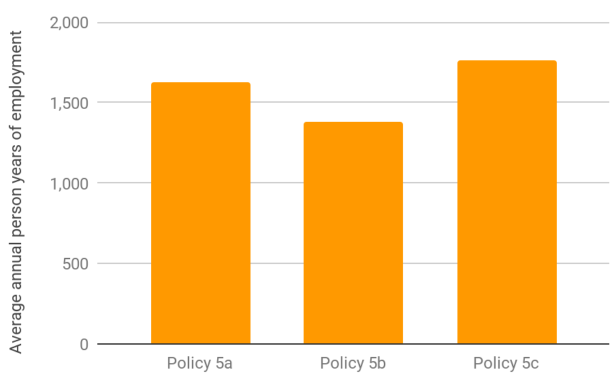


Figure 5: Material-Related Policy scenarios, cumulative person years of employment

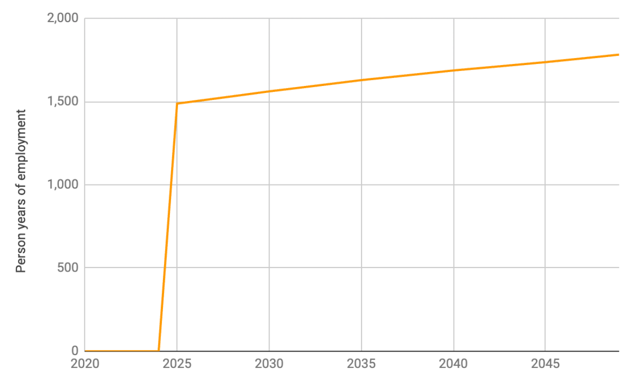


Figure 6: Material-Related Policy scenario 5b, annual person years of employment

8. Social Cost of Carbon

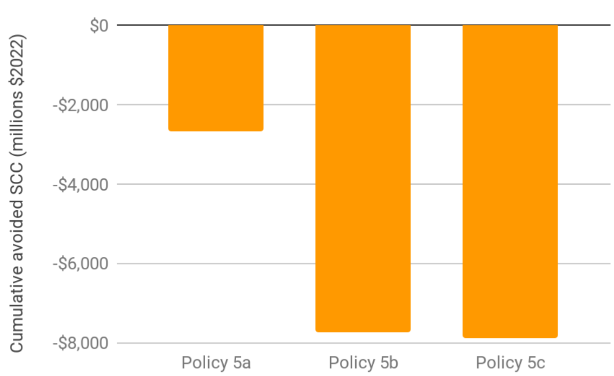


Figure 7: Material-Related Policy scenarios, cumulative avoided social cost of carbon

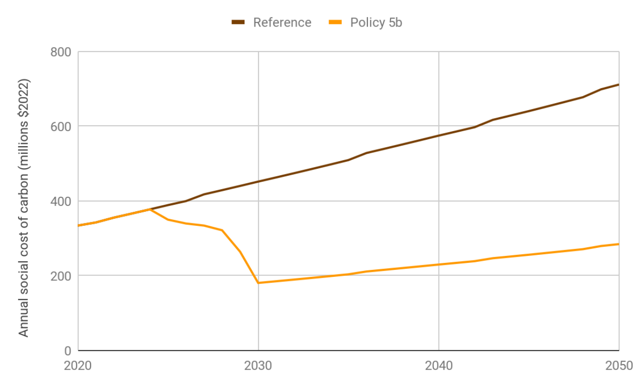


Figure 8: Material-Related Policy scenario 5b, annual avoided social cost of carbon relative to the reference scenario

5c Assess and disclose material-related emissions

Target	Reduce embodied carbon from construction by 100% by 2050, compared to 2015
Building types	Residential and commercial buildings

Impact on GHG Emissions Relative to All Building Policies Analysed

Indicators

Indicator	Effect	Value	Description
1. GHG emissions	↓ Decreases emissions	-3,320,000 metric ton CO2e	average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact- lifecycle abatement cost	↑ Costs money per ton of emissions reduced	$47	net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	0 MMBTU	average annual avoided energy consumption (2022-2050)
4. Resiliency	- no change	0 homes	with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	- no change	$0 million	average annual avoided public health costs (2022-2050)
6. Household income	-	n/a	

	no change	change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	1,764 average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	-$254.8 million average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

Figure 1: Material-Related Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

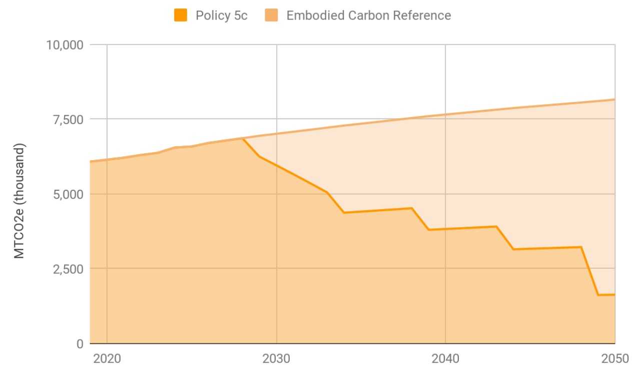


Figure 2: Material-Related Policy scenario 5c, annual GHG emissions reductions resulting from scenario 5c relative to total projected GHG emissions from buildings in Oregon

2. Economic Impact, Costs and Savings

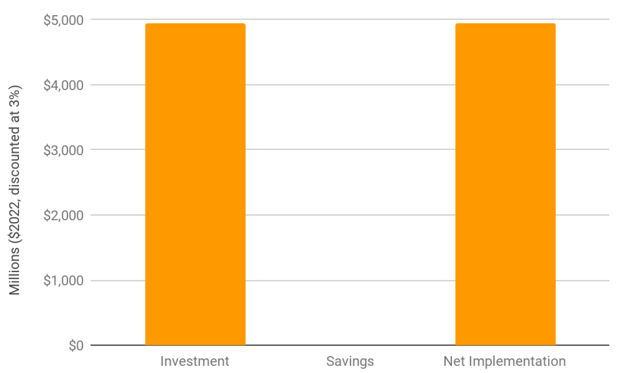


Figure 3: Material-Related Policy scenario 5c, NPV over the study period

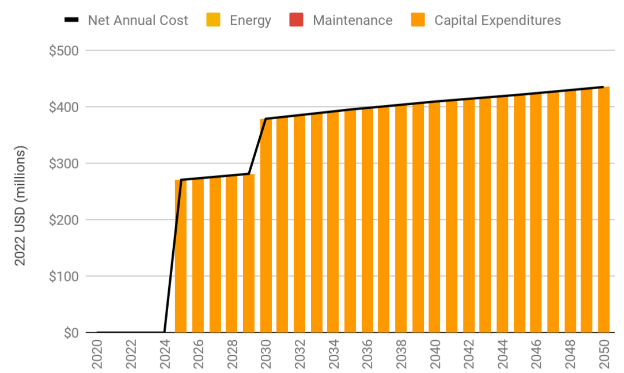


Figure 4: Material-Related Policy scenario 5c, net annual costs or savings

3. Energy Efficiency

N/a

4. Resiliency

N/a

5. Public Health and Air Quality

N/a

6. Household Income

N/a

7. Economic Impact, Employment

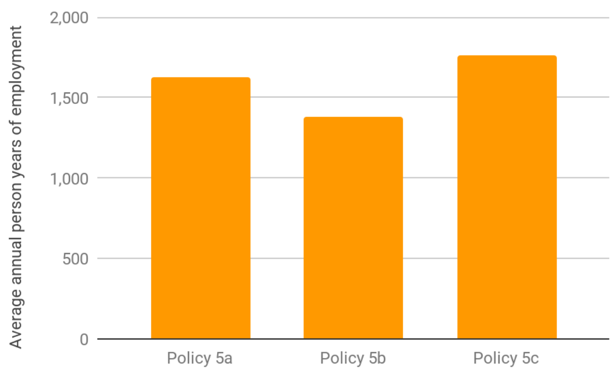


Figure 5: Material-Related Policy scenarios, cumulative person years of employment

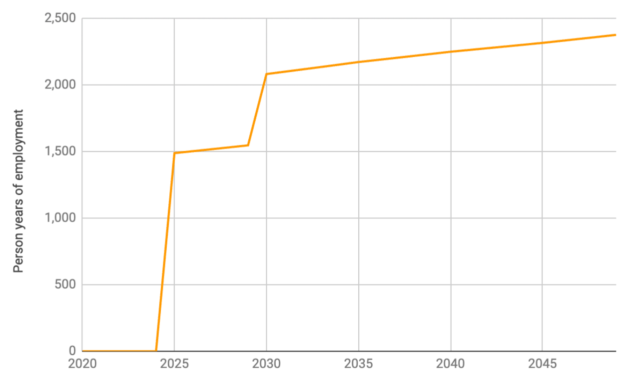


Figure 6: Material-Related Policy scenario 5c, annual person years of employment

8. Social Cost of Carbon

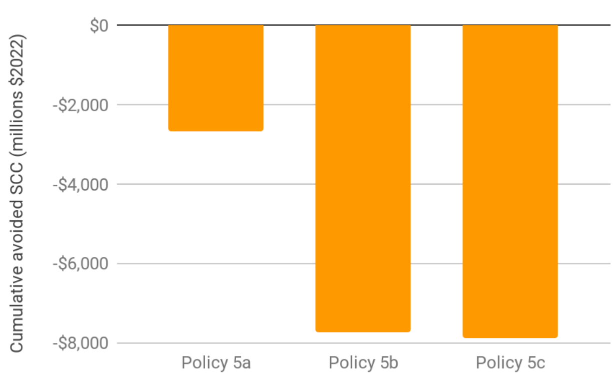


Figure 7: Material-Related Policy scenarios, cumulative avoided social cost of carbon

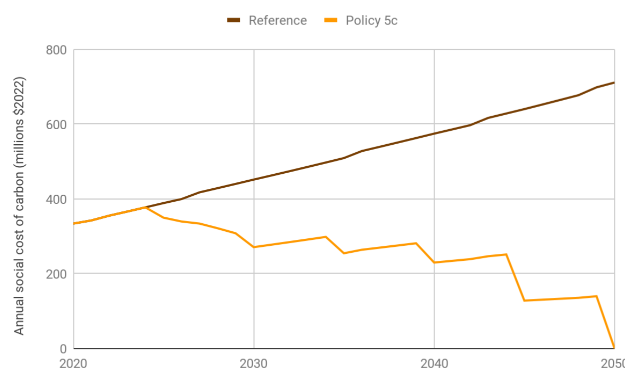
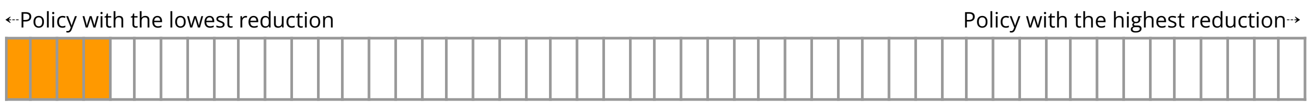


Figure 8: Material-Related Policy scenario 5c, annual avoided social cost of carbon relative to the reference scenario

6a Enact energy-efficient building codes

Target	50% of existing buildings are retrofitted by 2050, thermal energy requirements reduced by 15%, plug load reduced by 15%	A 40% reduction in new building energy consumption from the 2006 Oregon codes
Building types	Existing residential and commercial buildings	New residential and commercial buildings
Commercial building sizes	Buildings ≥ 50,000 ft2	Buildings ≥ 50,000 ft2

Impact on GHG Emissions Relative to All Building Policies Analysed



Indicators

1. GHG emissions	↓ Decreases emissions	**-310,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact- lifecycle abatement cost	↓ Saves money per ton of emissions reduced	**-$261** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-9,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	↑ Increases resiliency	**877,000 homes** with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health	**-$37 million**

	costs	average annual avoided public health costs (2022-2050)
6. Household expenditures	↓ Decreases household energy costs	-2.63% change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	77 average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	-$23.0 million average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

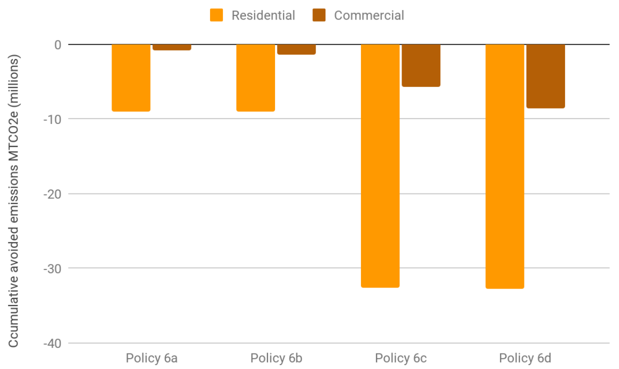


Figure 1: Building Codes Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

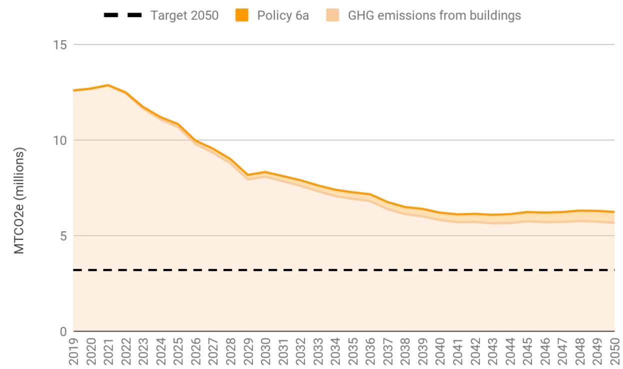


Figure 2: Building Codes Policy scenario 6a, annual GHG emissions reductions resulting from scenario 6a relative to total projected GHG emissions from buildings in Oregon

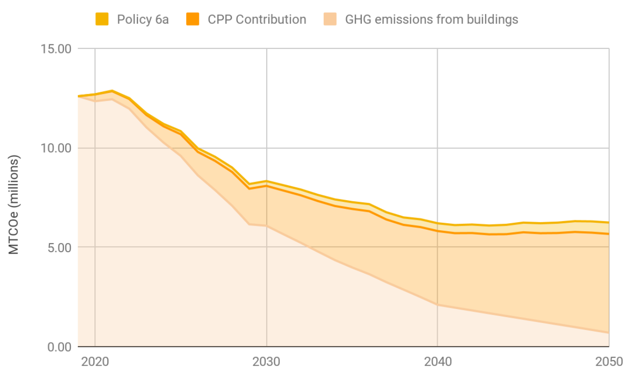


Figure 3: Building Codes Policy scenario 6a, annual GHG emissions reductions resulting from scenario 6a relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

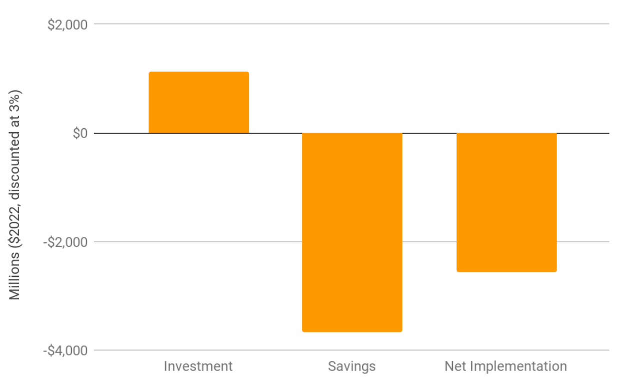


Figure 4: Building Codes Policy scenario 6a, NPV over the study period

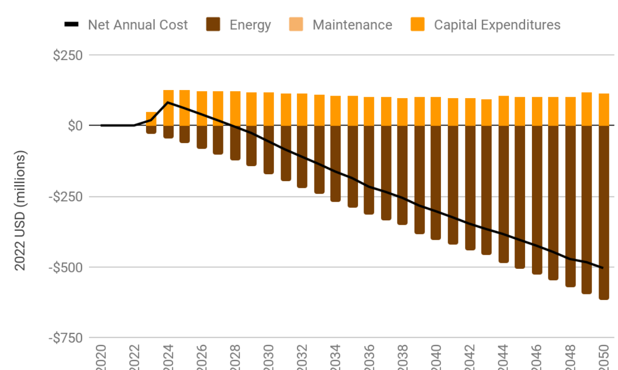


Figure 5: Building Codes Policy scenario 6a, net annual costs or savings

3. Energy Efficiency

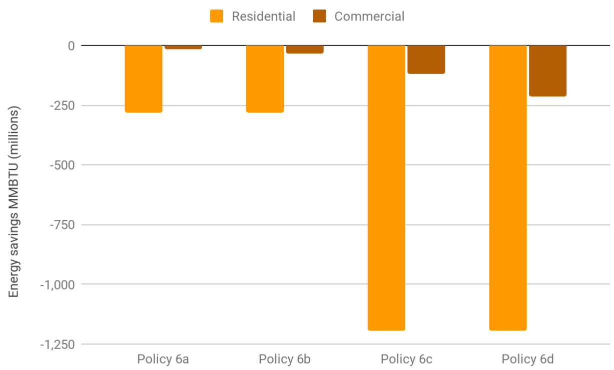


Figure 6: Building Codes Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

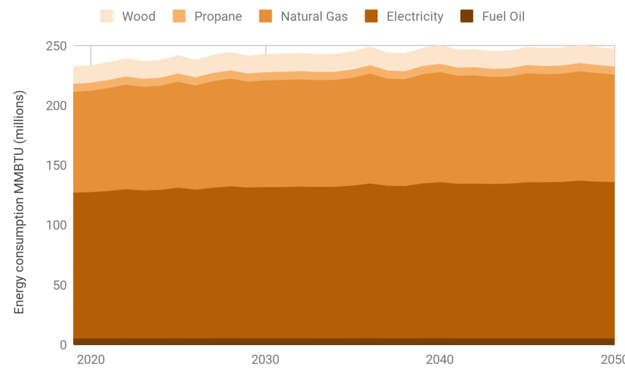


Figure 7: Building Codes Policy scenario 6a, energy consumption by energy source

4. Resiliency

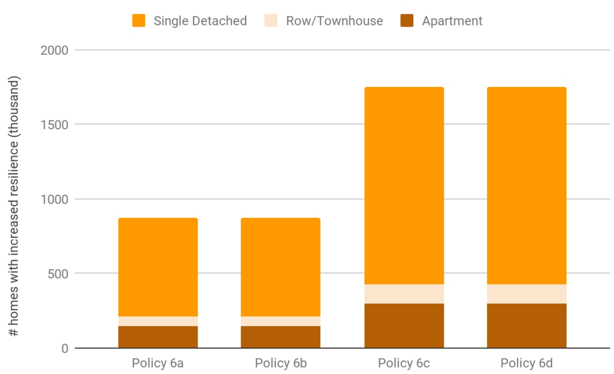


Figure 8: Building Codes Policy scenarios, # of homes with increased resilience by 2050

5. Public Health and Air Quality

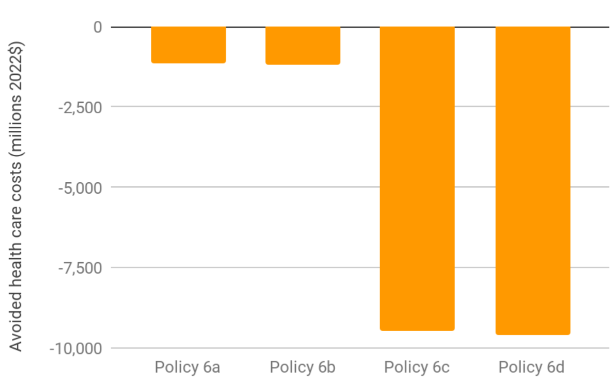


Figure 9: Building Codes Policy scenarios, avoided cumulative health costs

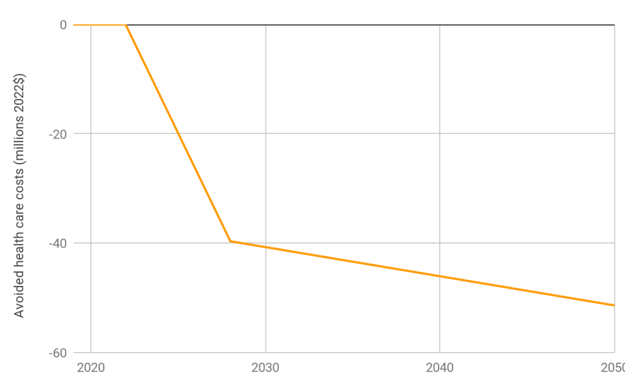


Figure 10: Building Codes Policy scenario 6a, avoided annual health costs

6. Household Expenditures

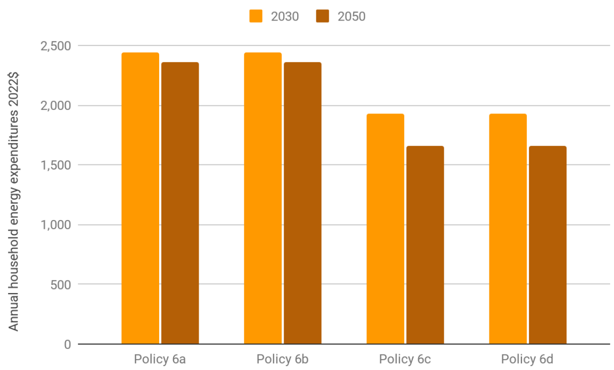


Figure 11: Building Codes Policy scenarios, annual household energy expenditures

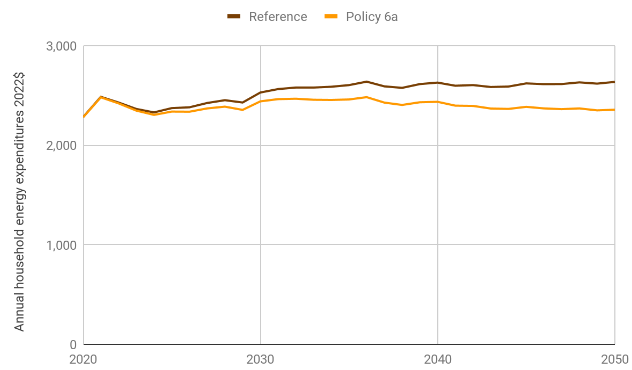


Figure 12: Building Codes Policy scenario 6a, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

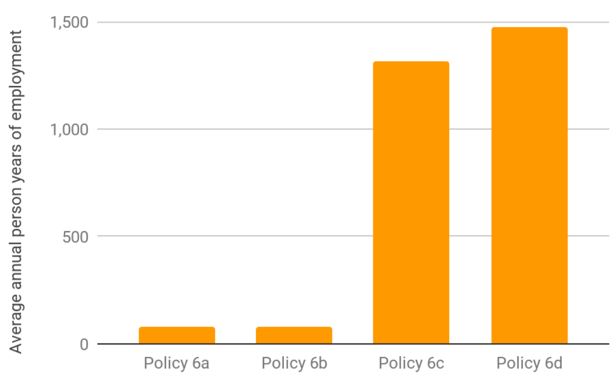


Figure 13: Building Codes Policy scenarios, cumulative person years of employment

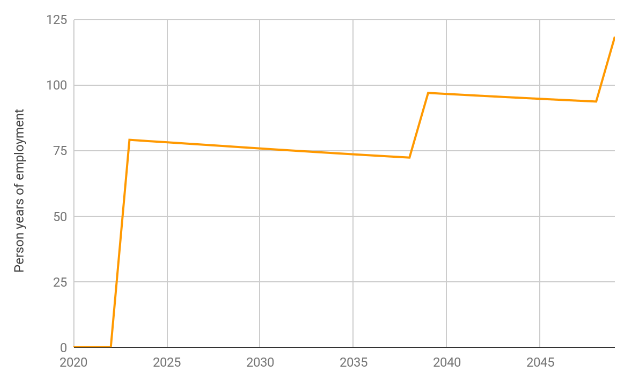


Figure 14: Building Codes Policy scenario 6a, annual person years of employment

8. Social Cost of Carbon

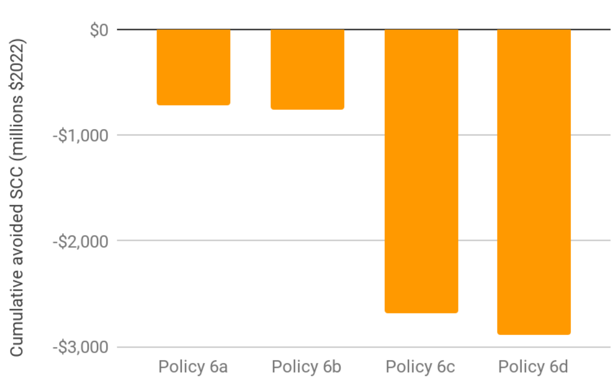


Figure 15: Building Codes Policy scenarios, cumulative avoided social cost of carbon

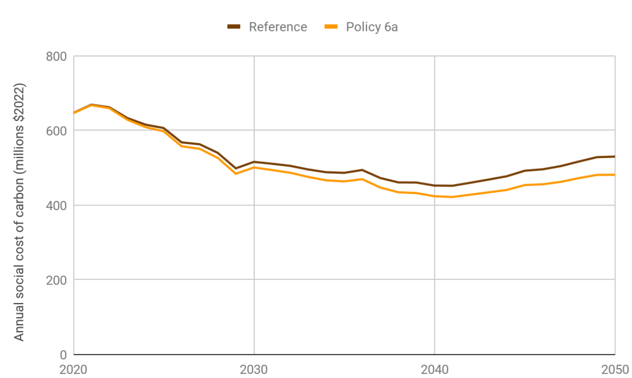
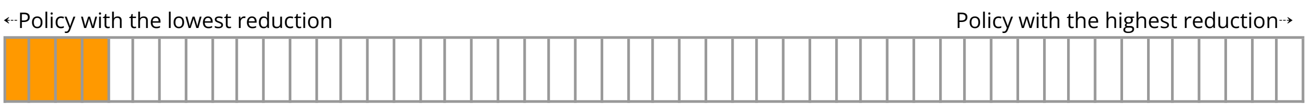


Figure 16: Building Codes Policy scenario 2b, annual avoided social cost of carbon relative to the reference scenario

6b Enact energy-efficient building codes

Target	50% of existing buildings are retrofitted by 2050, thermal energy requirements reduced by 15%, plug load reduced by 15%	A 40% reduction in new building energy consumption from the 2006 Oregon codes
Building types	Existing residential and commercial buildings	New residential and commercial buildings
Commercial building sizes	Buildings ≥ 30,000 ft2	All buildings

Impact on GHG Emissions Relative to All Building Policies Analysed



Indicators

1. GHG emissions	↓ Decreases emissions	**-320,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact-lifecycle abatement cost	↓ Saves money per ton of emissions reduced	**-$258** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-10,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	↑ Increases resiliency	**877,000 homes** with retrofits that increase resiliency against heat, cold and severe weather events

5. Public health and air quality	↓ Decreases health costs	**-$38 million** average annual avoided public health costs (2022-2050)
6. Household expenditures	↓ Decreases household energy costs	**-2.63%** change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	**78** average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	**-$24.3 million** average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

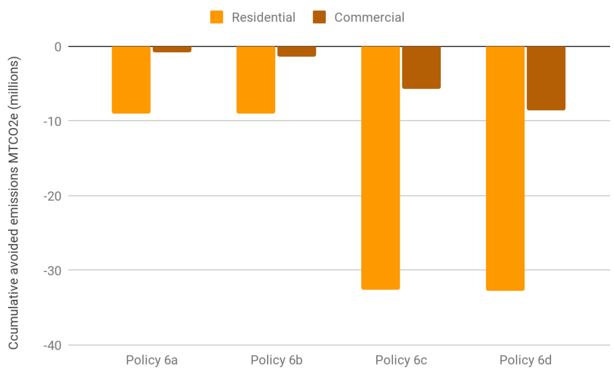


Figure 1: Building Codes Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

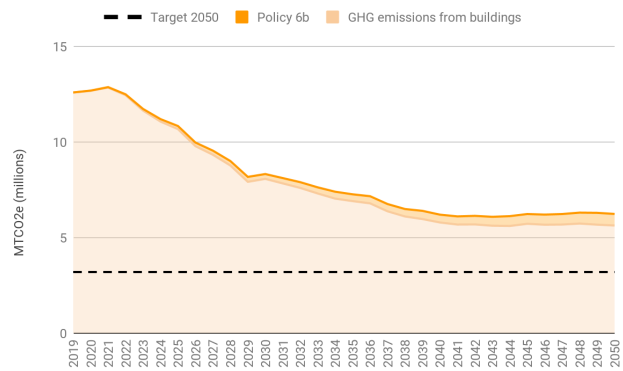


Figure 2: Building Codes Policy scenario 6b, annual GHG emissions reductions resulting from scenario 6b relative to total projected GHG emissions from buildings in Oregon

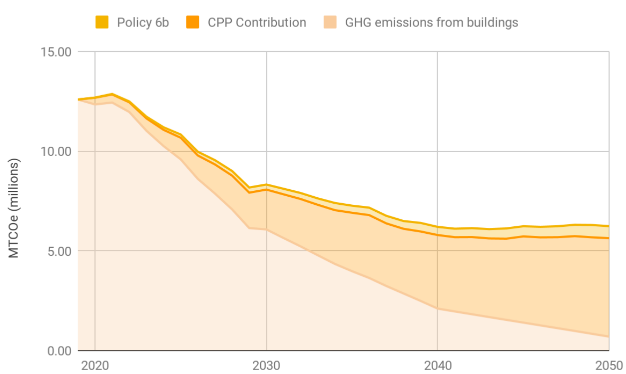


Figure 3: Building Codes Policy scenario 6b, annual GHG emissions reductions resulting from scenario 6b relative to total projected GHG emissions from buildings in Oregon

2. Economic Impact, Costs and Savings

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

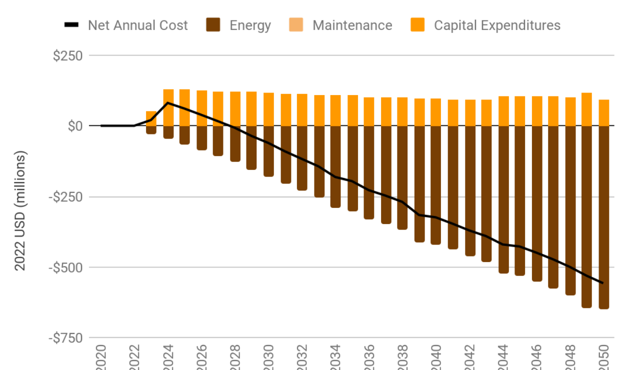


Figure 5: Building Codes Policy scenario 6b, net annual costs or savings

3. Energy Efficiency

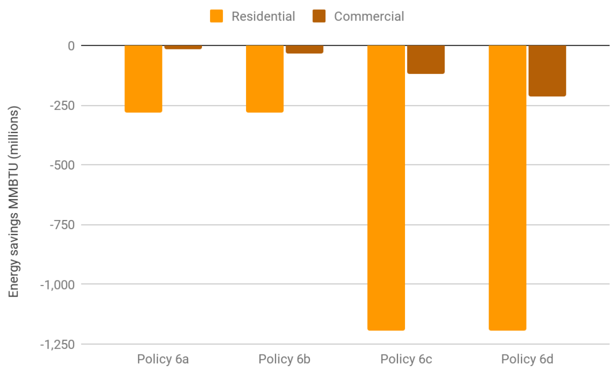


Figure 6: Building Codes Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

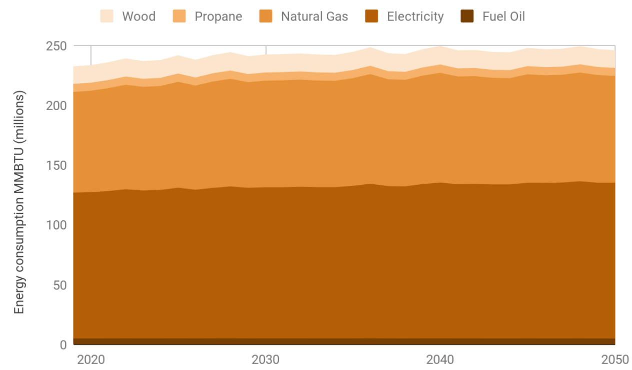


Figure 7: Building Codes Policy scenario 6b, energy consumption by energy source

4. Resiliency

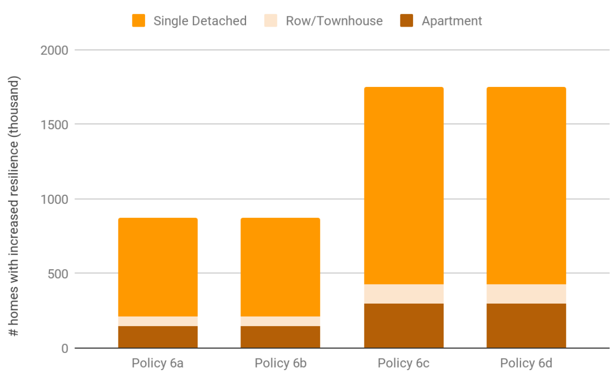


Figure 8: Building Codes Policy scenarios, # of homes with increased resilience by 2050

5. Public Health and Air Quality

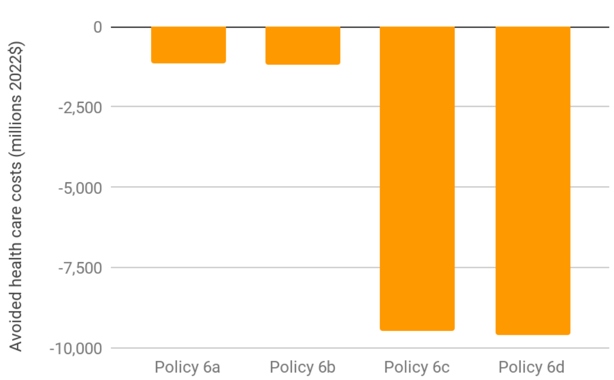


Figure 9: Building Codes Policy scenarios, avoided cumulative health costs

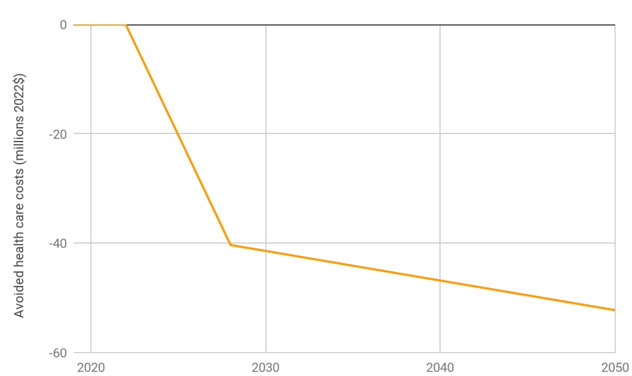


Figure 10: Building Codes Policy scenario 6b, avoided annual health costs

6. Household Expenditures

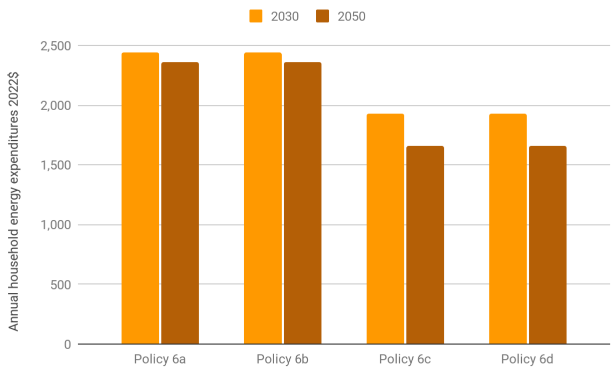


Figure 11: Building Codes Policy scenarios, annual household energy expenditures

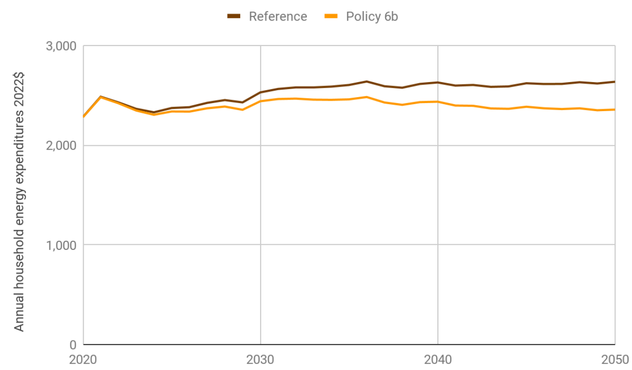


Figure 12: Building Codes Policy scenario 6b, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

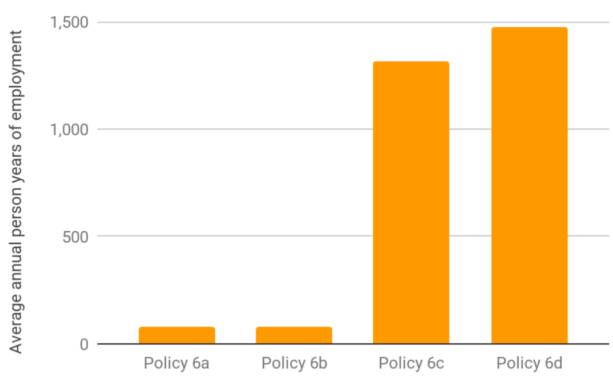


Figure 13: Building Codes Policy scenarios, cumulative person years of employment

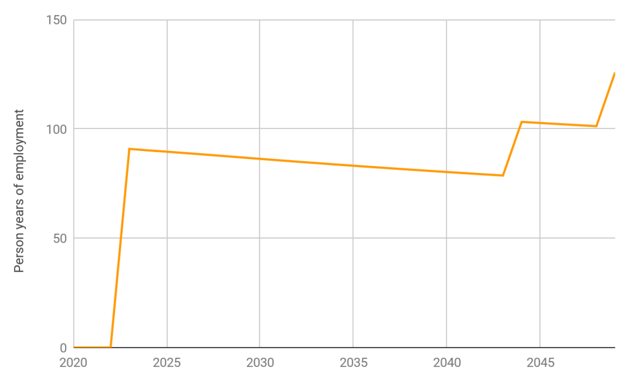


Figure 14: Building Codes Policy scenario 6b, annual person years of employment

8. Social Cost of Carbon

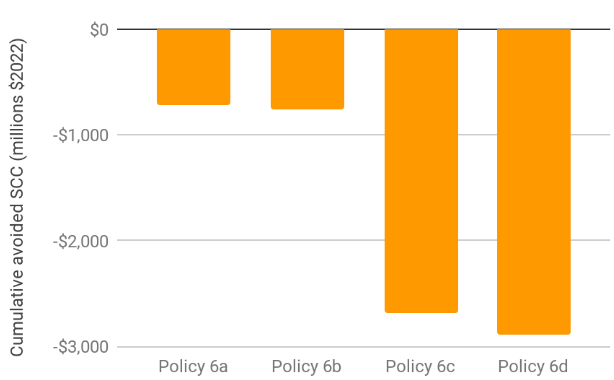


Figure 15: Building Codes Policy scenarios, cumulative avoided social cost of carbon

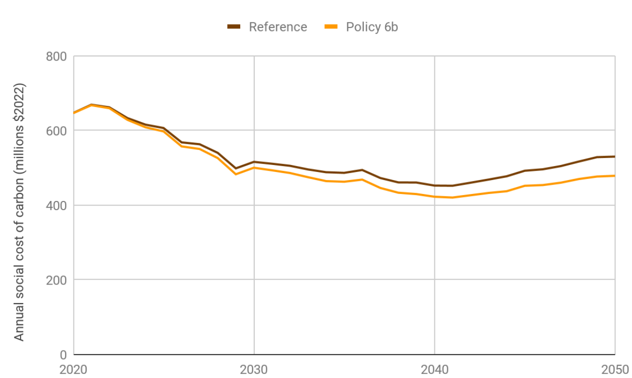
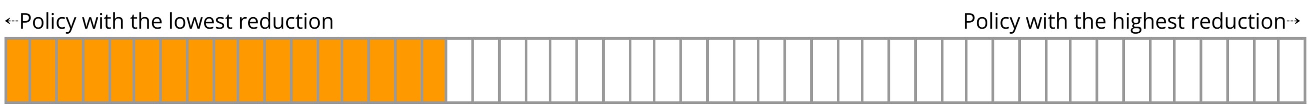


Figure 16: Building Codes Policy scenario 6b, annual avoided social cost of carbon relative to the reference scenario

6c 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
uilding sizes	Buildings ≥ 50,000 ft2	Buildings ≥ 50,000 ft2

Impact on GHG Emissions Relative to All Building Policies Analysed



Indicators

1. GHG emissions	↓ Decreases emissions	**-1,200,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact-lifecycle abatement cost	↑ Costs money per ton of emissions reduced	**$72** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-41,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	↑ Increases resiliency	**1,145,000 homes** with retrofits that increase resiliency against heat, cold and severe weather events

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

Background

1. GHG Emissions

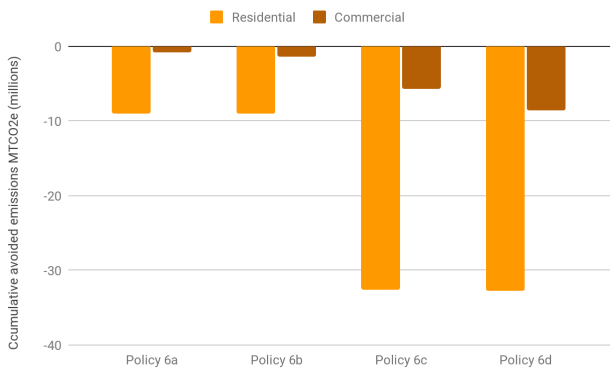


Figure 1: Building Codes Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

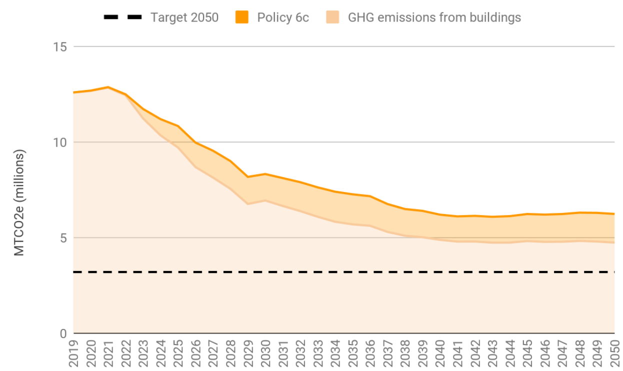


Figure 2: Building Codes Policy scenario 6c, annual GHG emissions reductions resulting from scenario 6c relative to total projected GHG emissions from buildings in Oregon

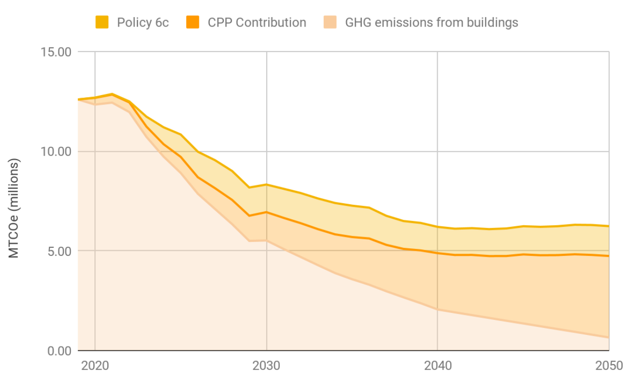


Figure 3: Building Codes Policy scenario 6c, annual GHG emissions reductions resulting from scenario 6c relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

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

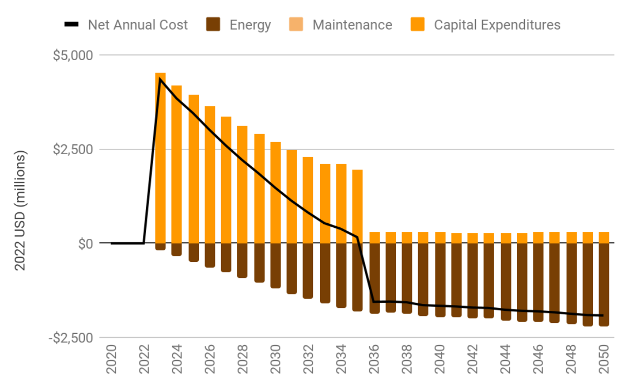


Figure 5: Building Codes Policy scenario 6c, net annual costs or savings

3. Energy Efficiency

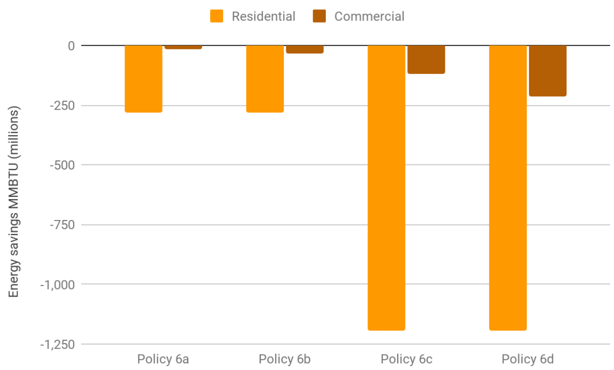


Figure 6: Building Codes Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

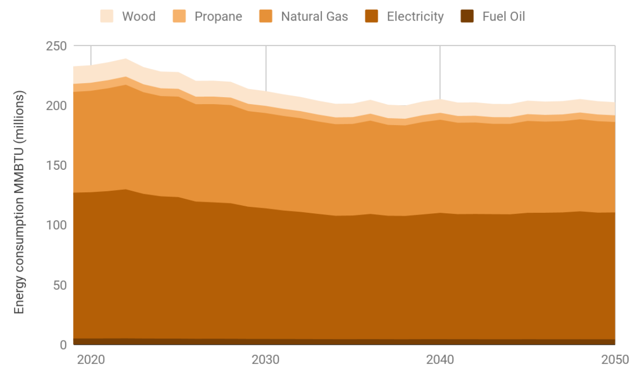


Figure 7: Building Codes Policy scenario 6c, energy consumption by energy source

4. Resiliency

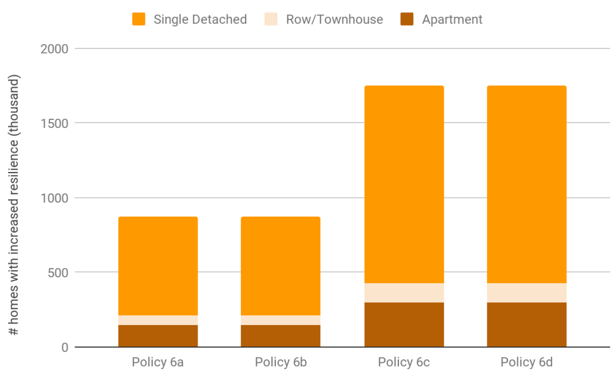


Figure 8: Building Codes Policy scenarios, # of homes with increased resilience by 2050

5. Public Health and Air Quality

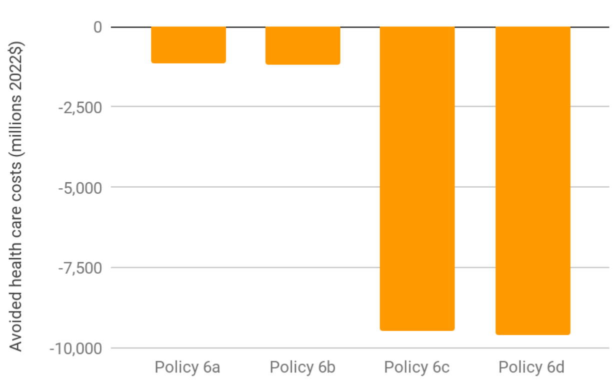


Figure 9: Building Codes Policy scenarios, avoided cumulative health costs

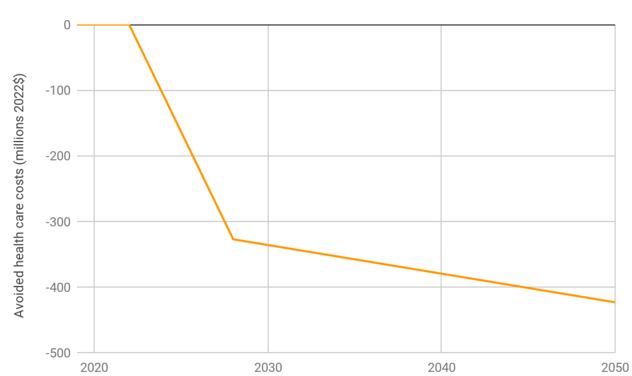


Figure 10: Building Codes Policy scenario 6c, avoided annual health costs

6. Household Expenditures

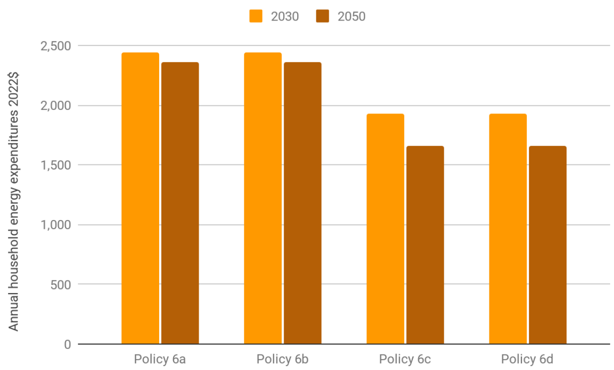


Figure 11: Building Codes Policy scenarios, annual household energy expenditures

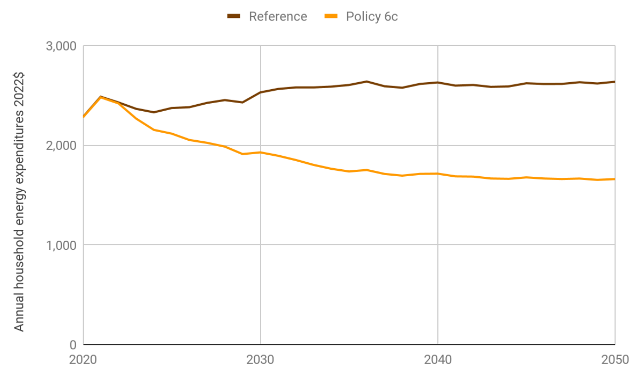


Figure 12: Building Codes Policy scenario 6c, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

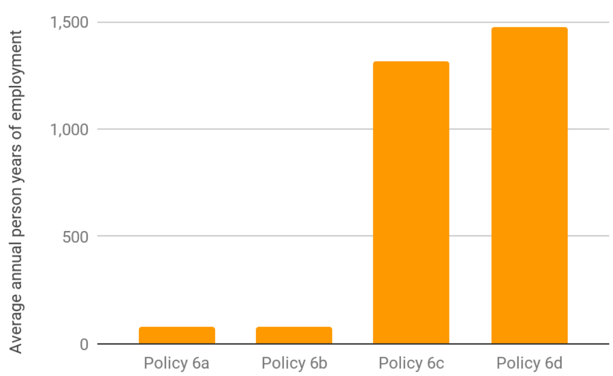


Figure 13: Building Codes Policy scenarios, cumulative person years of employment

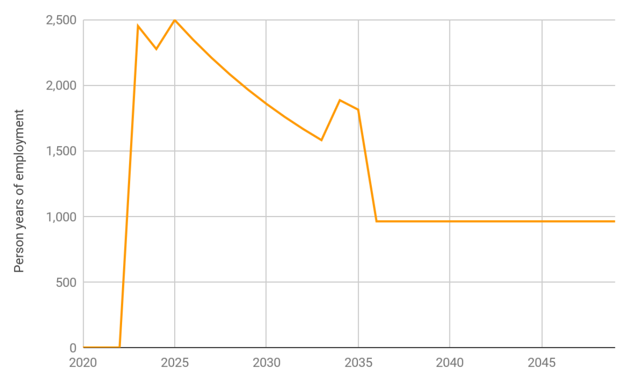


Figure 14: Building Codes Policy scenario 6c, annual person years of employment

8. Social Cost of Carbon

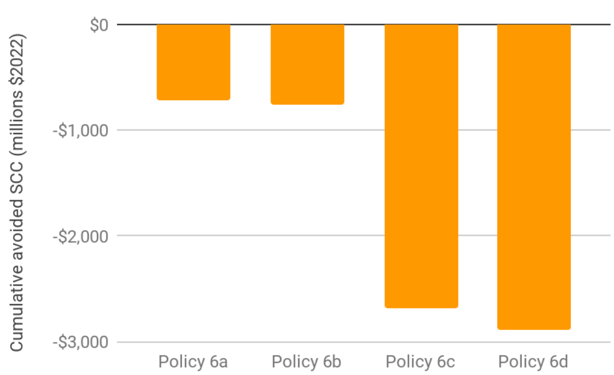


Figure 15: Building Codes Policy scenarios, cumulative avoided social cost of carbon

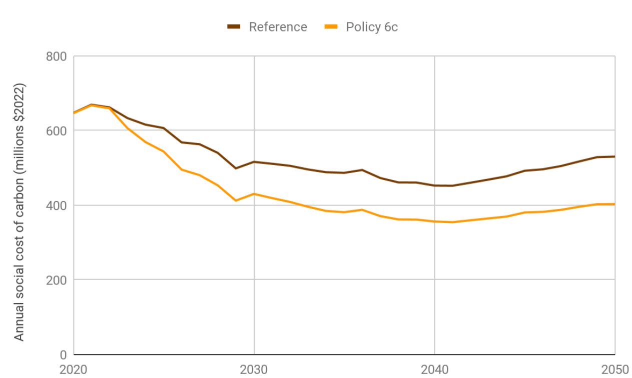


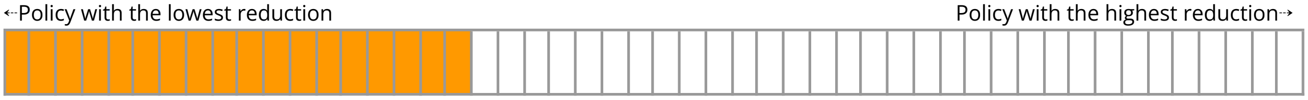
Figure 16: Building Codes Policy scenario 6c, annual avoided social cost of carbon relative to the reference scenario

6d Enact energy-efficient building codes

Target	Existing: 8% of existing buildings are retrofitted each year until 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
Commercial building sizes	Buildings ≥ 30,000 ft2	All buildings

Impact on GHG Emissions Relative to All Building Policies Analysed

←Policy with the lowest reduction … Policy with the highest reduction→



Indicators

1. GHG emissions	↓ Decreases emissions	**-1,290,000 metric ton CO2e** average annual GHG emissions avoided emissions (2022-2050)
2. Economic impact-lifecycle abatement cost	↑ Costs money per ton of emissions reduced	**$70** net present value of a metric ton of avoided GHG emissions with a 3% discount rate
3. Energy efficiency	↓ Decreases energy consumption	**-44,000,000 MMBTU** average annual avoided energy consumption (2022-2050)
4. Resiliency	↑ Increases	**1,145,000 homes**

	resiliency	with retrofits that increase resiliency against heat, cold and severe weather events
5. Public health and air quality	↓ Decreases health costs	-$310 million average annual avoided public health costs (2022-2050)
6. Household expenditures	↓ Decreases household energy costs	-31.40% change household energy expenditures between 2022 and 2050
7. Economic impact-employment	↑ Employment	1,476 average annual person years of employment created (2022-2050)
8. Social cost of carbon	↓ Decreases the social cost of carbon	-$93.3 million average annual avoided damage from climate change globally (2022-2050)

Background

1. GHG Emissions

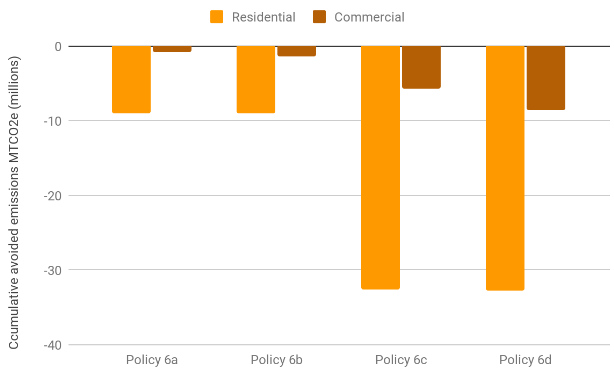


Figure 1: Building Codes Policy scenarios, cumulative GHG emissions reduction by sector, 2022-2050

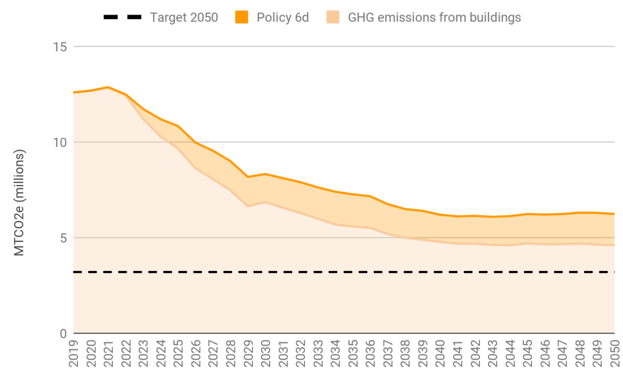


Figure 2: Building Codes Policy scenario 6d, annual GHG emissions reductions resulting from scenario 6d relative to total projected GHG emissions from buildings in Oregon

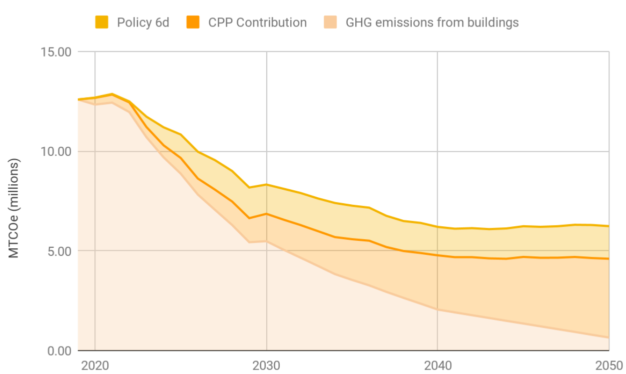


Figure 3: Building Codes Policy scenario 6d, annual GHG emissions reductions resulting from scenario 6d relative to total projected GHG emissions from buildings in Oregon, with reductions from CPP

2. Economic Impact, Costs and Savings

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

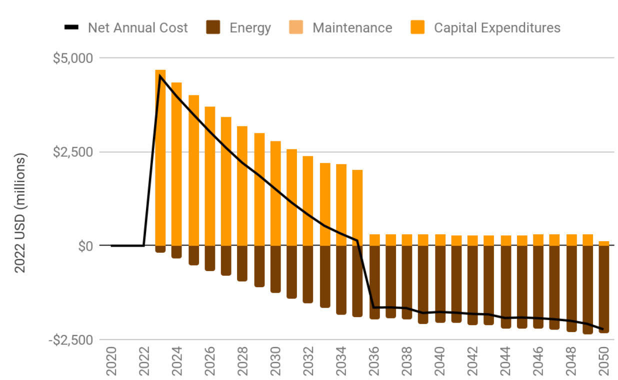


Figure 5: Building Codes Policy scenario 6d, net annual costs or savings

3. Energy Efficiency

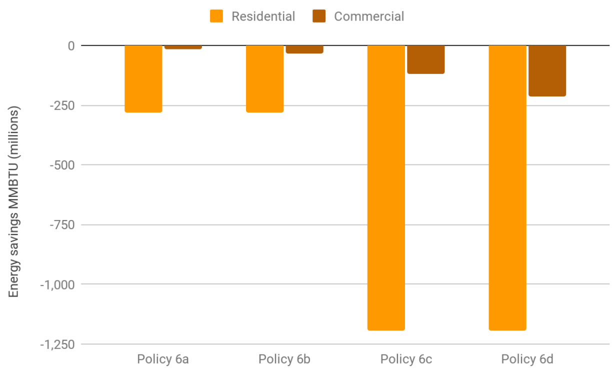


Figure 6: Building Codes Policy scenarios, cumulative energy savings by sector, relative to the reference scenario

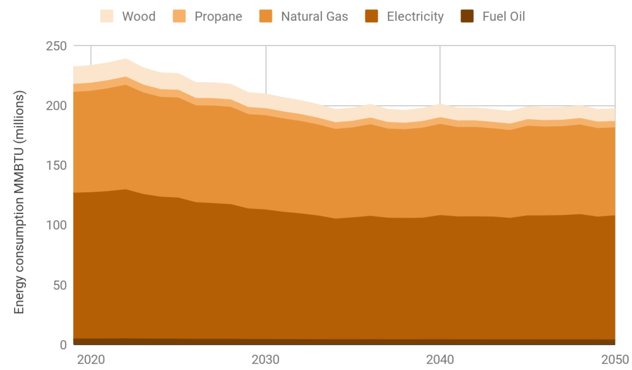


Figure 7: Building Codes Policy scenario 6d, energy consumption by energy source

4. Resiliency

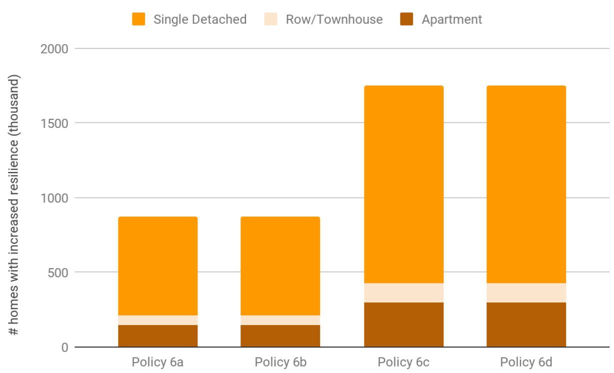


Figure 8: Building Codes Policy scenarios, # of homes with increased resilience by 2050

5. Public Health and Air Quality

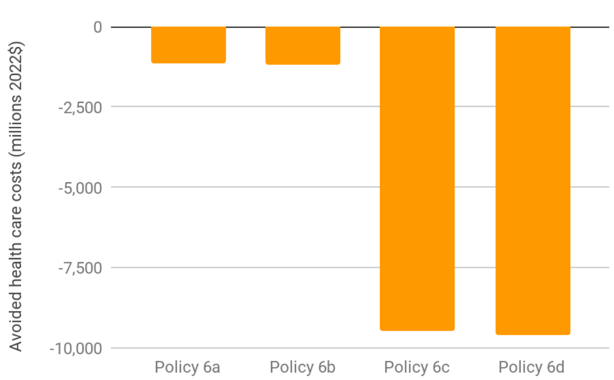


Figure 9: Building Codes Policy scenarios, avoided cumulative health costs

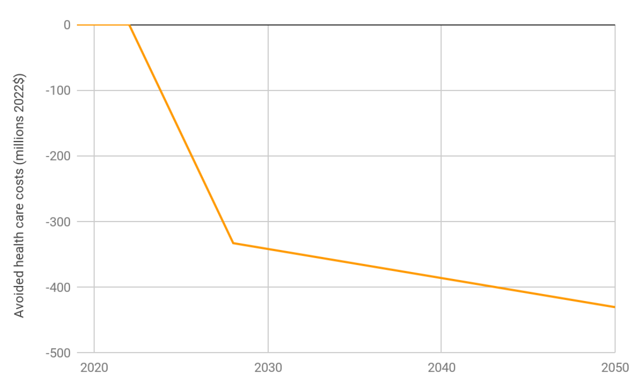


Figure 10: Building Codes Policy scenario 6d, avoided annual health costs

6. Household Expenditures

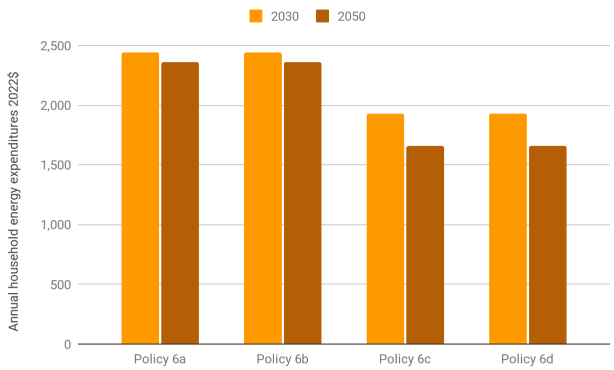


Figure 11: Building Codes Policy scenarios, annual household energy expenditures

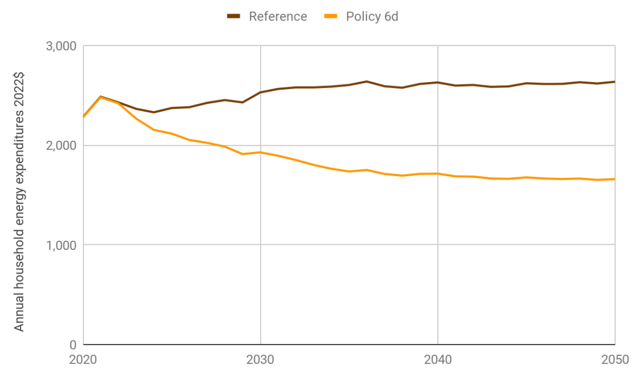


Figure 12: Building Codes Policy scenario 6d, annual household energy expenditures relative to the reference scenario

7. Economic Impact, Employment

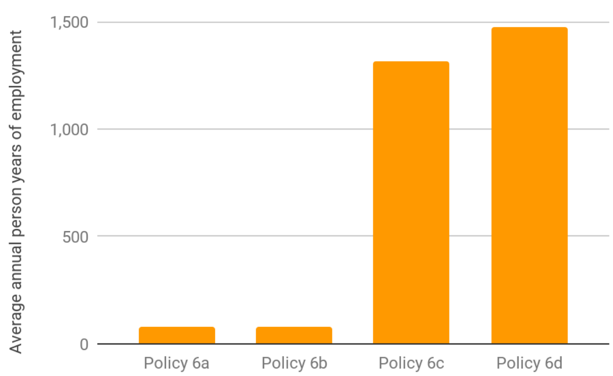


Figure 13: Building Codes Policy scenarios, cumulative person years of employment

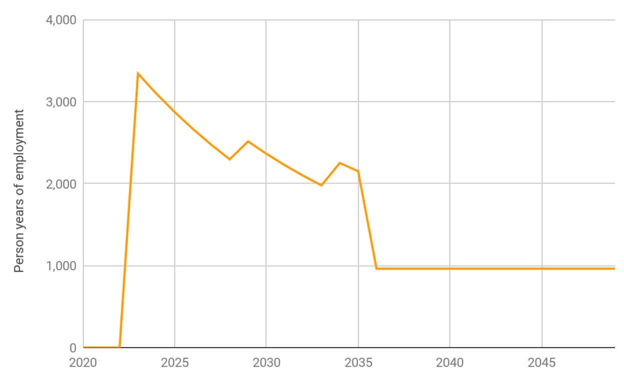


Figure 14: Building Codes Policy scenario 6d, annual person years of employment

8. Social Cost of Carbon

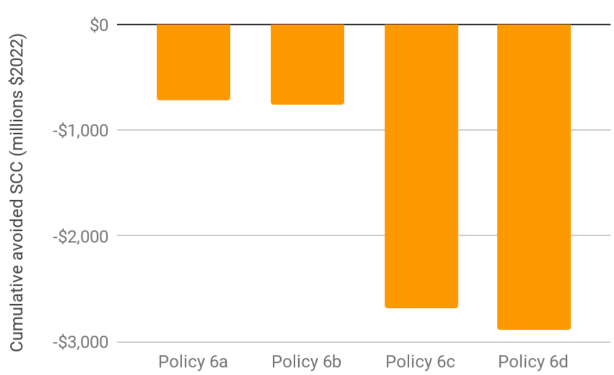


Figure 15: Building Codes Policy scenarios, cumulative avoided social cost of carbon

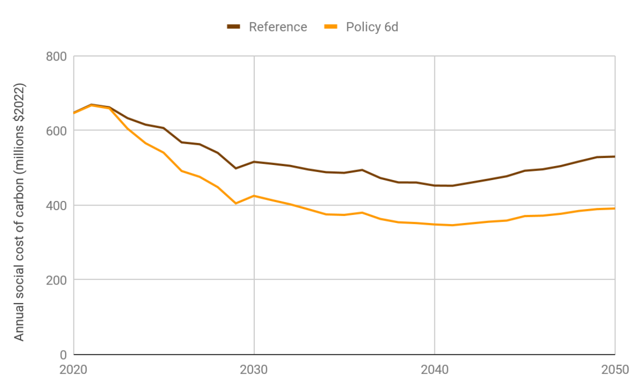


Figure 16: Building Codes Policy scenario 6d, annual avoided social cost of carbon relative to the reference scenario

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_2), methane (CH_4), nitrous oxides (NOX).
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
MtCO2e	Metric tons of carbon dioxide equivalent	A measure that combines CO_2, CH_4, NO_X into one measure. For example, 1 unit of CH4 is equivalent to 28 units of CO_2 over 100 years. In other words, 1 unit of CH4 causes 28 times more warming than 1 unit of CO_2 over 100 years, where the 28 is described as the Global Warming Potential (GWP). If a policy results in 2 Mt of CO_2 and 2 Mt of CH_4, the total would be 2 +(2*28)= 58 MtCO2e.
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: • Population growth • Employment growth • Heating and cooling degree days projections • Community Renewable Energy Program • Energy efficiency standards for appliances • HB2021 • Heat Pump Rebate Program • Implement Healthy Homes Repair Fund • Manufactured home replacement • Solar + Storage Rebate Program

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.