

State Fact Sheet ■ January 2018

What Would Cap-and-Invest Mean for Oregon?

Oregon lawmakers are considering adopting an economy-wide, cap-and-invest program to meet the state's long-term greenhouse gas (GHG) reduction goals. On January 8, 2018, the Oregon House and Senate released cap-and-invest bills¹ that are expected to be taken up for a vote during the state's short legislative session. These bills are broadly based on Senate Bill 1070², introduced in 2017, which set a framework for reducing emissions in the state, while mitigating potential cost impacts and driving investment in clean energy projects.

Oregon is one of a dozen or so states and Canadian provinces taking steps to limit GHG emissions to address the threat of climate change. States in the Northeast have been working to strengthen the existing Regional Greenhouse Gas Initiative (RGGI) trading program through 2030. Virginia has proposed a trading program that would link with the RGGI market. New Jersey is expected to rejoin RGGI after Governor Chris Christie pulled the state out of the program in 2011. And, Ontario joined California and Quebec in the Western Climate Initiative (WCI) carbon market in 2018 after launching its own program in 2017.

This fact sheet explores what a cap-and-invest program could mean for Oregon based on analysis of SB 1070 and the draft House and Senate bills released by Senator Michael Dembrow and Representative Ken Helm ("2018 draft bills").

Overview of a Cap-and-Invest Program for Oregon

In the 2018 legislative session, which runs from February 5 to March 9, 2018, the Oregon state legislature is expected to take up proposals for a market-based emission trading program (or "cap-and-invest" program). A cap-and-invest approach would establish a declining cap on GHG emissions within the state, likely including emissions from electricity production, natural gas use, transportation fuel use, and large industrial sources of emissions. SB 1070 had proposed a long-term goal of reducing emissions at least 80 percent below 1990 levels by 2050,³ and the 2018 draft bills includes the same targets.⁴ Owners of covered facilities, such as power plants and natural gas companies, would be required to surrender an emissions "allowance" or offset credit for every ton of pollution they emit.¹ By establishing a market for allowances, this creates an incentive for companies to implement the most cost-effective compliance solutions. This market-based approach has been widely used in regulating air pollution emissions at both the state and federal level. In addition, the 2018 draft bills would both auction a portion of the allowances each year with the proceeds used to benefit consumers and encourage investments in low-carbon technologies.

In adopting a cap-and-invest approach, Oregon could potentially participate in a broader regional trading market—the Western Climate Initiative (WCI)—with California, Quebec, and Ontario. In fact, the 2018 draft

¹ Offsets represent real and verifiable emissions reductions achieved from sectors not covered under the cap. Emitters can obtain offsets and credit them toward their emissions allowance.

bills make clear that the state will have the opportunity to link with WCI in order to capture the benefits and flexibilities inherent in a regional trading program.

Appendix A provides a detailed summary of the key implementation details for the 2018 draft bills, including the reduction targets, sector coverage, allowance distribution method, and guidance on the distribution of auction proceeds. In Oregon, as elsewhere, the cap-and-invest approach is intended to complement programmatic GHG reduction policies, many of which are already in place at both state and local levels.

The following sections discuss more broadly what a cap-and-invest program would mean for Oregon.

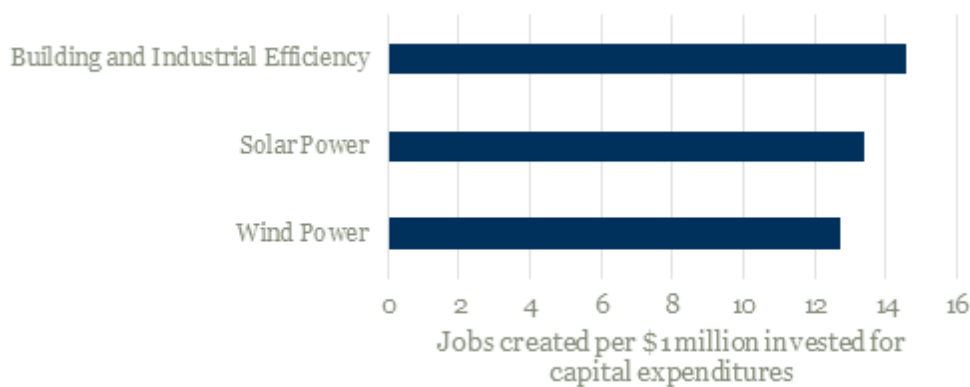
Potential Economic Impacts of Cap-and-Invest

One of the primary advantages of a cap-and-invest approach is the incentive it creates to deploy the most cost-effective reduction measures, thereby minimizing the overall costs of compliance. In the past few years, the Oregon Department of Environmental Quality (DEQ) has considered how a cap-and-invest program might be designed and the potential economic implications for the state. Analysis of SB 1070 suggests that the proposed cap-and-invest programs would have a modest effect on the state's projected economic growth. The analysis forecast of range of outcomes, from a modest decline in projected Gross State Product (-0.08 percent) to an increase in Gross State Product (+0.19 percent) in 2035, depending on a variety of assumptions including how the allowances would be allocated.⁵ Notably, the DEQ study found that if allowances are auctioned and the proceeds are returned to consumers, the program could have net employment benefits of between 915 and 6,578 jobs in 2035. Echoing this conclusion, two studies conducted by Portland State University (PSU) found that carbon pricing ranging from \$10-\$150 per ton could have a net positive impact on employment and labor income with the proceeds invested for consumer benefit.⁶ An additional analysis for the Oregon Global Warming Commission found that full implementation of existing climate policies coupled with carbon pricing starting at \$10 per ton and increasing to \$60 per ton by 2035 would be sufficient to put Oregon on a pathway to achieve its proposed 2035 emissions goal.⁷ The DEQ analysis and PSU studies did not quantify the potential benefits of mitigating the impacts of climate change or the economic cost of failing to act on climate, nor did they examine the potential public health co-benefits of improved air quality.ⁱⁱ

The U.S. Department of Energy estimates that the wind and solar industry employs over 8,000 people in the state and another 42,000 in energy efficiency-related jobs. In the last ten years, Oregon has installed 2,729 MW of wind generation (70 percent of total new generation in the same period).⁸ Oregon also has 280 MW of utility- and small-scale solar providing enough power to supply 35,000 homes. Investments in clean energy and energy efficiency have been found to create a significant number of jobs (Figure 1),⁹ with jobs in wind and solar being among the fastest growing in the nation. Since 2010, solar employment is reported to have risen by 300 percent.¹⁰ A well designed cap-and-invest program could further this job growth.

ⁱⁱ An industry-funded analysis of the proposed SB 1070, released in March 2017, concluded that an Oregon cap-and-invest program would lead to significant economic impacts. However, the study: (1) did not account for improvements, cost reductions, changes in electricity supply, or increased adoption of clean energy technology between now and 2035 in response to a carbon market; (2) did not include important cost-containment flexibilities such as offsets and linking to a regional carbon trading market; (3) assumes that little, if any, revenue raised from the auction of allowances would be returned to consumers or impacted businesses to cushion costs. Each of these factors in effect overstates costs and discounts important benefits for the state and its consumers. Further discussion, including concerns raised regarding key assumptions for this analysis can be found at: <https://www.e2.org/general/cap-invest-system-can-win-oregons-economy-climate/>.

Figure 1: Estimated national job benefits of investing in clean energy projects (Jobs created per \$1 million in public and private funds invested for capital projects) ^{iii,11}



The Potential Risks of Climate Change to Oregon

The Third Oregon Climate Assessment Report concluded that the state is already experiencing the impacts of climate change, and climate change is projected to yield wide-ranging damages on Oregon’s economy and the health of its citizens.¹² While the specific risks will vary across the state, sea level rise is predicted to increase the risk of coastal erosion and flooding along the coast, and warming waters and ocean acidification are projected to impact Oregon’s vibrant commercial fishing industry, which currently employs 15,000 and contributes \$489 million to Oregon’s economy.¹³ In the Willamette Valley, Cascade Range, and Eastern Oregon, declining snowpack may increase wildfire and water scarcity risks. These risks can affect Oregon’s forest resources—an industry that yields \$7.1 billion in revenue from wood products in the state each year, while also adversely affecting outdoor recreational activities and ecological health.¹⁴ The Climate Assessment notes that agriculture is one of the state’s largest industries as it generated nearly \$4.9 billion in gross agricultural products in 2012 and is linked to nearly 14 percent of Oregon jobs.¹⁵ However, climate change is likely to affect crop yields. For example, Oregon’s fruit, tree nut, and berry production, which is responsible for over \$500 million in sales annually, would be susceptible to heat and drought stress, changes in day and nighttime low temperatures, and water availability.¹⁶ Actions to reduce emissions and prepare the state for climate impacts are projected to substantially reduce the costs posed by this challenge and increase the odds of averting more dangerous temperature ranges.¹⁷

ⁱⁱⁱ The estimates presented in this figure represent the job benefits that could result from public and private investment in clean energy projects. These estimates are on a national basis and not necessarily specific to the employment characteristics of Oregon. However, these estimates are indicative of the job benefits that could result from policies that reduce emissions and directs funds to clean energy and energy efficiency projects.

Key Outstanding Policy Decisions

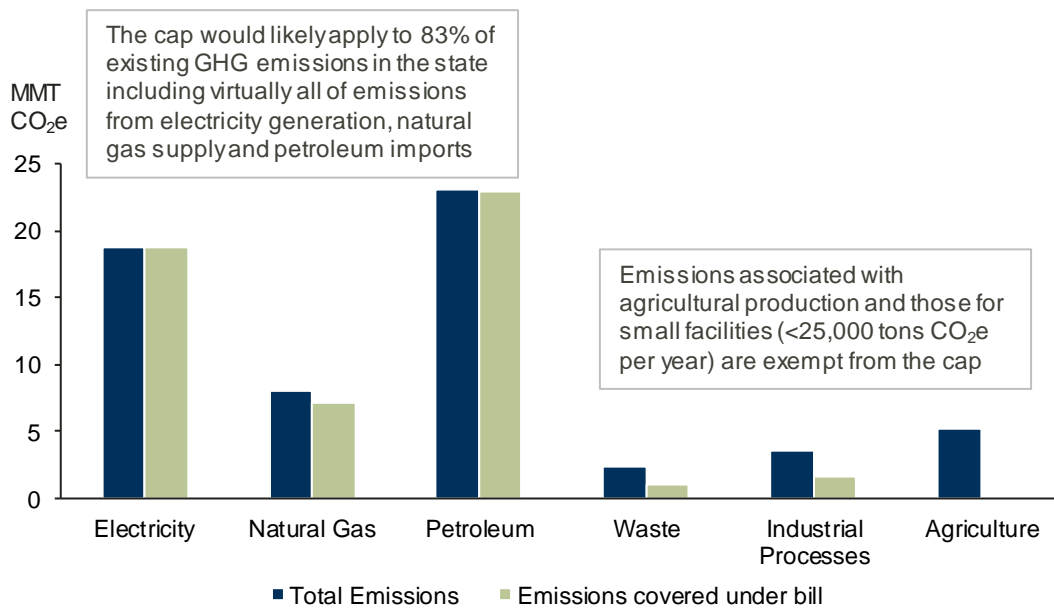
While most of the core elements of the design and implementation the cap-and-invest program are proposed in the 2018 draft bills, there are some key issues that remain to be decided.¹⁸ Additionally, the bills leave discretion to the Environmental Quality Commission (EQC) to develop implementation guidance. Some of the major outstanding policy decisions include:

- **Distribution of Allowances:** The 2018 draft bills offer a set of principles for the distribution of emissions allowances. A key question is whether all of the allowances will be auctioned, with the proceeds used to further reduce greenhouse gases and benefit low income customers, or whether and what amount would be distributed at no cost to compliance entities, including utilities and emissions-intensive and trade-exposed industries (EITEs). The House and Senate drafts differ in some important allowance details that will have to be reconciled in the session.
- **Linkage:** The 2018 draft bills instruct EQC to develop the carbon market in a manner that allows for linkage with other markets, such as the Western Climate Initiative. However, the final decision to link will be made by the state through an evaluation process. In order to link with another state or region, EQC would need to notify the Governor of its intent to link, and the Governor would need to make the necessary findings and provide such findings to the Legislature. If linkage is pursued, one important issue will be to ensure the point of regulation is finalized in a way that facilitates such linking.
- **Treatment of Offsets:** The 2018 draft bills provide EQC with discretion to develop protocols for qualifying offset projects; however, the bill to be introduced in the House allows for up to 4 percent of a facility's compliance obligations to be met with offset credits while the Senate bill allows for up to 8 percent.
- **Definition of Emission-Intensive, Trade-Exposed Industries (EITEs):** The House version directs EQC to work with a third party to identify EITEs while the Senate version uses the North American Industry Classification System to define EITEs. Both, however, would provide allowances at no cost to EITE entities to cover up to 90 percent of the average emissions from these industries in the first year of the program, declining thereafter in proportion with the overall statewide cap.

What Would Oregon’s Cap-and-Invest Mean for Utilities and Ratepayers?

Based on the proposals to date, nearly all major sources of GHG emissions would be covered under the program, including electric generating facilities, petroleum and natural gas suppliers, as well as various industrial sources (Figure 2). These compliance entities would generally pass on the allowance costs to consumers, so the proposals include provisions to benefit consumers and mitigate the costs of the program. The legislative proposals include important flexibilities to limit program costs, including offsets, opportunities to link with other cap-and-trade markets, reinvestment of auction proceeds, and cost-containment measures.

Figure 2: Oregon Emissions and Expected Coverage under Cap-and-Invest by Sector (2015 emissions)



Source: Energy and Environmental Economics, "Memorandum on Macroeconomic Modeling," prepared for Oregon Department of Environmental Quality, February 2017, found at: <http://www.oregon.gov/deq/FilterDocs/app3memo.pdf>.

An Oregon cap-and-invest program has the potential to generate a significant amount of revenue from the auction of carbon pollution allowances that would be invested in programs to benefit consumers while cutting emissions and addressing the impacts of climate change. Existing cap-and-invest programs have used auction proceeds to:

- Increase GHG reductions by directing funds to specific emission reduction opportunities, such as scaling up renewable energy, promoting energy efficiency, and funding clean energy innovation and research;
- Benefit impacted communities by promoting economic diversification, supporting job creation, conducting job training, financing local clean energy and energy efficiency projects, and providing energy-bill assistance; and,
- Mitigate costs for other consumers by funding residential and business energy efficiency and energy bill assistance.

California and RGGI both direct money raised by their auctions to benefit consumers, especially those in low-income or communities disproportionately impacted by climate change and emissions (“impacted communities”).

Based on the 2018 draft bills, Oregon’s cap-and-invest program would include provisions specifically designed to aid low-income consumers and economically distressed communities. The bills propose to require that proceeds from the sale of allowances allocated to electric and natural gas utilities must be invested in activities that “stabilize and reduce energy bills while also lowering greenhouse gas emissions.” This includes providing bill assistance to low-income residential customers, energy-intensive industries, or small businesses, or investing in weatherization and energy efficiency projects. Furthermore, a share of funds raised through the auction of allowances would go toward greenhouse gas reduction measures, clean energy investments, clean tech R&D, job creation programs, and climate resiliency programs in impacted communities or economically distressed areas around the state.

Existing cap-and-invest programs have benefited local economies and consumers. Since the start of the first compliance period of RGGI in 2009, RGGI states have generated and disbursed over \$2 billion in proceeds from its allowance auction back into the economy.^{iv} It has provided substantial benefits to households and industries by saving \$460 million on energy bills between 2012 and 2014 due to energy efficiency improvements, and contributed to the creation of a cumulative 30,000 job-years.¹⁹ California’s program has administered \$1 billion for projects located in or benefiting economically distressed communities.²⁰ A study by researchers at UCLA found that California’s program benefits low-income communities by reducing electricity bills by \$50 per year, natural gas bills by as much as \$18 per year, and gasoline expenditures by as much as \$98 per year for low-income households.²¹ A sampling of specific projects benefiting consumers in California and RGGI states are provided below.

^{iv} More details about RGGI’s decision to auction emissions allowances is available at: <http://www.mjbradley.com/rggi-market>



Investing in Greenhouse Gas Reduction Measures

New York has used its RGGI funds to support a variety of clean energy projects that will drive further greenhouse gas reductions. These include investments in electric vehicle (EV) infrastructure, building greener and more sustainable cities, promoting industrial innovation, scaling up renewable energy, and investing in research for low-carbon transportation. For example, the ChargeNY program aims to install 3,000 EV charging stations in the state and put 30,000-40,000 EVs on the road by 2018.

Source: NYSERDA. Charge NY website. Accessed Dec. 1, 2017.



Investing in Disadvantaged Communities

Over \$1 billion in funds from California’s cap-and-trade program have benefited individuals in disadvantaged communities. This includes the Navdip Badhesha Farm Project. Using \$150,000 in funds allocated from California’s cap-and-trade auction revenue to the State Water Efficiency and Enhancement Program, Navdip Badhesha installed efficient drip irrigation, an energy-efficient water pump, and a 30 kW solar array on his 40-acre farm in a disadvantaged community in Fresno County. California estimates these investments will save 25 million gallons of water and reduce 57 tons of carbon dioxide per acre annually.

Source: California Air Resources Board. 2017 Annual Report to the Legislature on California Climate Investments Using Cap-and-Trade Auction Proceeds. March 2017.



Lowering Energy Bills for Consumers

In 2014, Connecticut invested 70 percent of its RGGI auction proceeds on energy efficiency programs, including the Connecticut Energy Efficiency Fund and the Connecticut Municipal Energy Cooperative. These programs, among other things, fund home energy audits, provide discounts for efficient lighting, and incentivize efficient design for new buildings. In 2014, Connecticut provided these services to over 989,000 households and 6,000 businesses.

Source: RGGI, Inc. State Investment Plans: Connecticut. Accessed Dec. 1, 2017.

What Would Oregon’s Cap-And-Invest Mean for Forest and Agriculture Industries?

Oregon’s forestry and agricultural industry are vital parts of the state’s economy, and these industries stand to be significantly impacted in a changing climate. Already, farmers across the United States are facing the impacts of climate change—from increased pests, greater water scarcity, and heat stress affecting yields and their bottom line.

Wildfire, invasive species, and other climate stressors threaten the value of forest stock for foresters and land-managers. In 2016, aerial surveys conducted by the U.S. Forest Service found that 700,000 acres of forested land in Oregon had tree damage and mortality from insects, diseases, and other animals—up for a third consecutive year.²² That does not include damage caused by wildfires, which in 2014, burned nearly a million acres in Oregon.²³

Oregon’s cap-and-invest program has the potential to bring added value to farmers and foresters while allowing them to play a role in cutting emissions. The program, as proposed in the 2018 draft bills, would provide covered entities flexibility by allowing between 4 and 8 percent of their compliance obligation to be met with offsets. Offsets represent real and verifiable emissions reductions achieved from sectors not covered under the cap. In the forestry and agriculture sectors, land-managers would have a financial incentive to reduce livestock methane emissions by installing biodigesters or to manage forests to promote greater carbon dioxide sequestration. Oregon’s program would be similar to that of California. California allows offsets crediting for projects that reduce agricultural related emissions, bolster forest carbon sinks, destroy potent ozone depleting substances, and capture methane from mines. To date, California has granted offsets totaling more than 85 million metric tons from five approved protocols.²⁴ A study by Stanford University researchers found that offsets purchased through California’s program has earned forest owners \$250 million since 2013.²⁵



Benefiting Forests and Land Managers through Offsets

In 2012, the Yurok Tribe of California registered a 56,000 acre offset project. The Yurok Tribe will undertake an improved management plan for the forest that will enhance carbon sequestration. The Tribe will generate revenue through the sale of the carbon offsets to the California market as well as limited logging on the property.

Source: The Reserve website. ARB Compliance Projects. Accessed Dec. 1, 2017.



Promoting Climate-Smart Agricultural Practices

California’s offsets program also credited the Kettle Butte Dairy, a 7,000-acre dairy farm with approximately 6,000 milking cows. The farm installed a bio-digester that traps and destroys methane from manure. The digester includes two 848 kW generators that supply electricity to on-farm operations.

Source: American Carbon Registry website. Accessed Dec. 1, 2017.

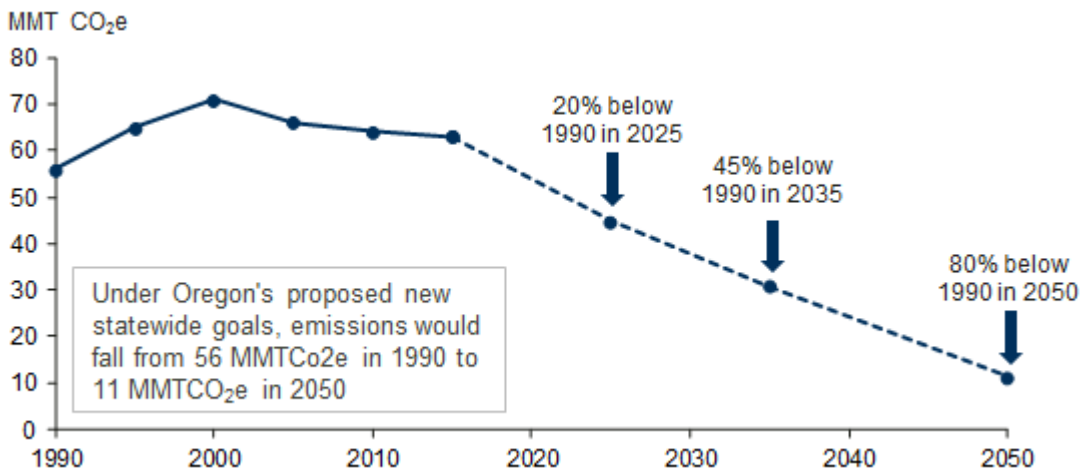
Appendix A

The following discussion provides a detailed summary of the key implementation details for the 2018 draft bills, including reduction targets; sector coverage; allowance distribution method; and guidelines on the distribution of allowance auction proceeds.

1. Reduction Targets in Oregon Cap-and-Invest Proposals

Oregon’s cap-and-invest proposals would repeal existing, non-binding state reduction targets set by the legislature in 2007^v and replace them with more ambitious targets. These original targets aimed to peak emissions in 2010, cut emissions by 10 percent below 1990 levels by 2020, and reach 75 percent below 1990 levels by 2050.²⁶ The proposed new targets aim to reduce state emissions 20 percent below 1990 levels by 2025, 45 percent by 2035, and at least 80 percent by 2050 (Figure a).

Figure a: Historic and Future Greenhouse Gas Emissions Consistent with Statewide Targets



Source: Historic Data from Oregon DEQ Greenhouse Gas Inventory (preliminary 2014 and 2015 data).

2. Major Sources of Emissions Covered Under the Cap-and-Invest Program

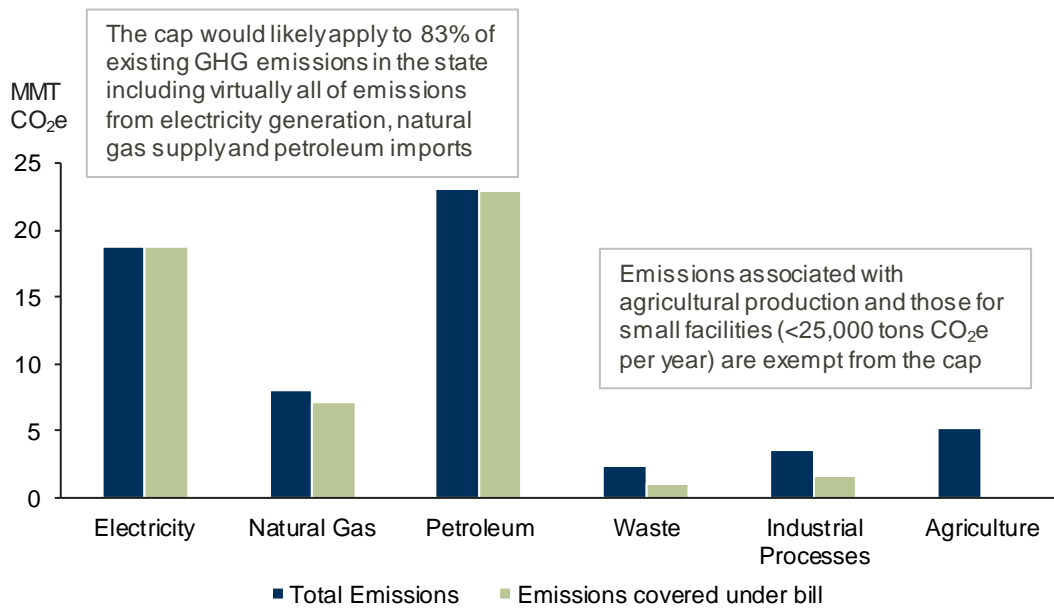
Oregon’s cap-and-invest program would cover approximately 83 percent of GHG emissions in the state and apply to sources that emit at least 25,000 metric tons of carbon dioxide equivalents (CO₂e) per year. Figure b illustrates the expected covered entities. The program would likely cover nearly all emissions from electricity generation, petroleum and natural gas supply, and 90 percent of emissions from large-scale industrial processes (cement, ammonia, pulp and paper, and glass production).²⁷ The cap would also cover emissions from large waste facilities, such as landfills, and large industrial facilities that emit high global warming potential gases. Emissions stemming from the agricultural and forestry sectors, and from small facilities in the industrial, natural gas, and waste sectors would be exempt from the cap.^{vi} In addition, the program provides flexibility by allowing for a portion an entity’s compliance obligation to be met with offsets. While the commission will ultimately develop guidance for the treatment of offsets, the 2018 draft bills propose to encourage in-state offset opportunities and should consider

^v Oregon met its 2010 goal—its emissions peaked in 1999—but is not on track to meet the current 2020 and 2050 goals, and has seen increases in transportation emissions since 2014.

^{vi} Small scale industrial, natural gas and waste facilities are defined here as facilities that emit less than 25,000 metric tons of carbon dioxide equivalents per year. Waste facilities include waste water and waste incineration.

offset markets in other states. It is likely that, similar to California, Oregon would allow for offsets from agriculture and forestry related activities.

Figure b: Oregon Emissions and Expected Coverage under by Sector in 2015.



Source: Energy and Environmental Economics, "Memorandum on Macroeconomic Modeling," prepared for Oregon Department of Environmental Quality, February 2017, found at: <http://www.oregon.gov/deq/FilterDocs/app3memo.pdf>.

3. Allowance Distribution Method

Oregon’s cap-and-invest bills direct the EQC to establish rules for distributing allowances as well as auction a portion of allowances. The EQC would have the authority to allocate allowances to electric companies and natural gas utilities, which would in turn be sold through a consignment auction. A consignment auction provides a transparent system for the pricing and sale of allowances when the value is to be returned to ratepayers; this is the same approach used for electric and gas utilities and suppliers in California, as well as the approach proposed by the Virginia Department of Environmental Quality in its draft cap-and-trade regulations. The program would also direct the EQC to allocate allowances to emissions-intensive, trade exposed industries to address the potential for emissions leakage. The proposed legislation also requires the EQC to set aside a portion of the allowances in an “allowance price containment reserve”. This would be a set number of allowances, available for purchase by covered entities only, to limit compliance costs by injecting additional allowance supply into the market if the allowance price in the consignment auction hit the price set by the EQC (i.e., the minimum reserve price).

4. Auction Proceeds

The 2018 draft bills direct that proceeds from the allowance auctions be invested in programs that benefit consumers and impacted communities. The funds would be disbursed to the Transportation Decarbonization Investment Fund (for proceeds raised by the state through the auction of allowances that pertain to fuels used in motor vehicles), Oregon Climate Investments Fund (85 percent of remaining) and the Just Transition Fund (15 percent of remaining) to fund projects that are consistent with the goals of the cap-and-invest program.

For the Climate Investment Fund, at least 60 percent of these funds would go toward projects that are located in, or would benefit, impacted communities^{vii} (of which 33 percent must benefit rural areas that are impacted communities); 20 percent would be allocated for projects in natural and working lands; 20 percent would be directed to projects related to energy efficiency, electric grid decarbonization, transportation electrification, carbon sequestration, and adaptation or resilience.

Funds in the Just Transition Fund would be directed toward programs that provide financial support for workers dislocated or adversely affected by climate change or climate change policies.

Proceeds from the sale of “consignment allowances” (i.e., allocated to electric and natural gas utilities) must be invested in activities that reduce greenhouse gases or stabilize or reduce energy bills for customers. This may include providing bill assistance to low-income residential customers; all other customers including residential and small commercial customers as well as energy-intensive industrial customers; or investing in weatherization and energy efficiency projects.

^{vii} Impacted Communities would be defined by the EQC, in consultation with the Portland State University Population Research Center, the Oregon Health Authority, the program advisory committee, and other relevant agencies, considering low income households, high unemployment, low levels of homeownership, high rent burden, sensitive populations or low levels of educational attainment, and areas affected by environmental pollution.

References

- ¹ Oregon Senate, “Clean Energy Jobs Bill Draft, LC 44” released on January 8, 2018, online at: https://www.oregonlegislature.gov/helm/workgroup_materials/LC0044_DRAFT_2018_Regular_Session.pdf.
Oregon House, “Clean Energy Jobs Draft, LC 176,” released on January 8, 2018, online at: https://www.oregonlegislature.gov/helm/workgroup_materials/LC0176_DRAFT_2018_Regular_Session.pdf.
- ² 79th Oregon Legislative Assembly, “Senate Bill 1070,” 2017 Regular Session, <https://olis.leg.state.or.us/liz/2017R1/Downloads/MeasureDocument/SB1070/Introduced>.
- ³ 79th Oregon Legislative Assembly, “Senate Bill 1070,” 2017 Regular Session, <https://olis.leg.state.or.us/liz/2017R1/Downloads/MeasureDocument/SB1070/Introduced>.
- ⁴ Oregon State Legislature Clean Energy Jobs Work Group, “Clean Energy Jobs Program Overview,” (December 20, 2017), [https://www.oregonlegislature.gov/helm/workgroup_materials/4%20PROGRAM%20OVERVIEW%20\(final\)%2012%2020%2017.pdf](https://www.oregonlegislature.gov/helm/workgroup_materials/4%20PROGRAM%20OVERVIEW%20(final)%2012%2020%2017.pdf).
- ⁵ Energy and Environmental Economics, “Memorandum on Macroeconomic Modeling,” prepared for Oregon Department of Environmental Quality (February 2017), <http://www.oregon.gov/deq/FilterDocs/app3memo.pdf>.
- ⁶ Liu, Jenny H, et al., “Economic and Emissions Impacts of a Clean Air Tax or Fee in Oregon (SB306),” Portland State University Northwest Economic Research Center (2014), <https://oregonlegislature.gov/Iro/Documents/RR%20-14%20SB%20306%20Clean%20Air.pdf>.
Northwest Economic Research Center, “Carbon Tax and Shift: How to make it work for Oregon’s economy,” Portland State University (March 1, 2013), <https://www.pdx.edu/nerc/sites/www.pdx.edu/nerc/files/carbontax2013.pdf>.
- ⁷ Oregon Global Warming Commission, “Biennial Report to the Legislature 2015,” Keep Oregon Cool (2015), http://www.keeporegoncool.org/sites/default/files/ogwc-standard-documents/OGWC_Rpt_Leg_2015_final.pdf.
- ⁸ U.S. Energy Information Administration, “Monthly Energy Review November 2017,” accessed November 2017, <https://www.eia.gov/totalenergy/data/monthly/>.
- ⁹ Pollin, Robert, Heidi Garrett-Peltier, James Heintz and Bracken Hendricks, “Green Growth: A U.S. Program for Controlling Climate Change and Expanding Job Opportunities,” Univeristy of Massachusetts Amherst Polictical Economy Research Institute, and the Center for American Progress (September 2014), online at: http://www.peri.umass.edu/fileadmin/pdf/Green_Growth_2014/GreenGrowthReport-PERI-Sept2014.pdf;
Pollin, Robert et al., “The Economic Benefits of Investing in Clean Energy,” University of Massachusetts Amherst Political Economy Research Institute and The Center for American Progress (2009), https://cdn.americanprogress.org/wp-content/uploads/issues/2009/06/pdf/per_i_report.pdf.
- ¹⁰ Department of Energy, “U.S. Energy and Employment Report: January 2017,” (2017), https://energy.gov/sites/prod/files/2017/01/f34/2017%20US%20Energy%20and%20Jobs%20Report_0.pdf.
- ¹¹ Pollin, Robert, Heidi Garrett-Peltier, James Heintz and Bracken Hendricks, “Green Growth: A U.S. Program for Controlling Climate Change and Expanding Job Opportunities,” Univeristy of Massachusetts Amherst Polictical Economy Research Institute, and the Center for American Progress (September 2014), online at: http://www.peri.umass.edu/fileadmin/pdf/Green_Growth_2014/GreenGrowthReport-PERI-Sept2014.pdf;
Pollin et al., “The Economic Benefits of Investing in Clean Energy.”
- ¹² Oregon Climate Change Research Institute, The Third Oregon Climate Assessment Report, January 2017, http://www.occri.net/media/1042/ocar3_final_125_web.pdf.
- ¹³ The Research Group, LLC with assistance from the Coastal Oregon Marine Experiment Station, *Oregon Commercial Fishing Industry in 2015, Briefing Report*, Prepared for Oregon Department of Fish and Wildlife (March 2016).
- ¹⁴ Simmons, Eric A.; Scudder, Micah G.; Morgan, Todd A.; Berg, Erik C.; Christensen, Glenn A. 2016. Oregon’s forest products industry and timber harvest 2013 with trends through 2014. Gen. Tech. Rep. PNW-GTR-942. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- ¹⁵ Oregon Climate Change Research Institute, Third Oregon Climate Assessment Report.
- ¹⁶ Oregon Climate Change Research Institute, Third Oregon Climate Assessment Report.
- ¹⁷ See also, <https://olis.leg.state.or.us/liz/2017R1/Downloads/CommitteeMeetingDocument/104912>.
- ¹⁸ Oregon State Legislature Clean Energy Jobs Work Group, “Summary of Policy Decisions on Specific Legislative Components.”
- ¹⁹ MJ Bradley and Associates, “A Pioneering Approach to Carbon Markets: How the Northeast States Redefined Cap and Trade for the Benefit of Consumers,” (February 2017), <http://www.mjbradley.com/sites/default/files/rggimarkets02-15-2017.pdf>.

Analysis Group, “The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States: Review of RGGI’s Second Three-Year Compliance Period (2012-2014),” (July 2015),

http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_july_2015.pdf

Analysis Group, “The Economic Impacts of the Regional Greenhouse Gas Initiative on Ten Northeast and Mid-Atlantic States: Review of the Use of RGGI Auction Proceeds from the First Three-Year Compliance Period,” (November 2011),

http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/economic_impact_rggi_report.pdf.

²⁰ California Air Resources Board (CARB), “California Climate Investments 2017 Annual Report,” (March 2017),

https://www.arb.ca.gov/cc/capandtrade/auctionproceeds/cci_annual_report_2017.pdf; Center for Climate and Energy Solutions, “Policy Hub: California Cap and Trade,” (accessed November 2017), <https://www.c2es.org/content/california-cap-and-trade/>.

²¹ Gattaciecceca, Julien et al, “Protecting the Most Vulnerable: A Financial Analysis of Cap-and-Trade’s Impact on Households in Disadvantaged Communities Across California,” UCLA Luskin School of Public Affairs (April 2016),

<http://innovation.luskin.ucla.edu/sites/default/files/FINAL%20CAP%20AND%20TRADE%20REPORT.pdf>.

²² USDA, “Forest Health Highlights in Oregon – 2016,”

http://www.oregon.gov/ODF/Board/Documents/BOF/20171101/BOFATTCH_20171101_08_01.pdf

²³ National Interagency Fire Center, “National Report of Wildland Fires and Acres Burned by State 2014,”

https://www.predictiveservices.nifc.gov/intelligence/2014_Statsumm/fires_acres14.pdf.

²⁴ CARB, “ARB Offset Credit Issuance,” last updated November 22, 2017,

<https://www.arb.ca.gov/cc/capandtrade/offsets/issuance/issuance.htm>; CARB, “ARB Offset Credits Issued,” last updated November 22, 2017, https://www.arb.ca.gov/cc/capandtrade/offsets/issuance/arb_offset_credit_issuance_table.pdf.

²⁵ Anderson, Christa, et al, “Forest offsets partner climate-change mitigation with conservation,” *Frontiers in Ecology and the Environment* 15 (7), (September 2017) <http://onlinelibrary.wiley.com/doi/10.1002/fee.1515/full>.

²⁶ Oregon State Law 2015 ORS 468A.205, <https://www.oregonlaws.org/ors/468A.205>.

²⁷ Energy and Environmental Economics (E3), “Appendix 3: Memorandum on Macroeconomic Modeling” for Oregon DEQ’s “Considerations for Designing a Cap-and-Trade Program in Oregon,” <http://www.oregon.gov/deq/FilterDocs/app3memo.pdf>.