ISSUE BRIEF

Pricing Carbon in Oregon:

Potential Implications for Oregon Agriculture

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CARBON PRICING: POTENTIAL IMPLICATIONS FOR OREGON AGRICULTURE

HIGHLIGHTS

This issue brief analyzes some of the economic effects pricing carbon may have in rural economies, with a specific emphasis on potential impacts to the agricultural sector.

- The economic impact of the recently proposed cap-and-invest policy in Oregon would likely be less than ±1% of gross state product.[1]
- Direct energy consumption in Oregon agriculture is a small (<10%) but growing portion of total farm production expenses in recent years.
- The agricultural sector uses considerable volumes of diesel and other fossil fuels in production; operating on narrow profit margins, farmers could be impacted by dramatic increases in fuel costs.
- Not all commodities or agricultural areas of Oregon would be impacted the same by pricing carbon due to variance in energy intensities in crop and animal production.
- The strategies of the recent cap-and-invest bill[2] for limiting potentially adverse economic impacts in rural areas focus mainly on inclusion of rural constituents within the policy governance framework, allocations of program revenue to rural disadvantaged communities an working lands, and measures to help keep electric utility rate increases in rural communities minimal.

POTENTIAL IMPACTS OF CARBON PRICING IN RURAL OREGON

The economic impact of the recently proposed cap-and-invest policy are projected to be small relative to the state economy, less than ±1% of the gross state product.[3] This policy would have a relatively small impact on employment and state economic output, although the benefits and costs will likely vary across regions, income levels, and industries.[4] The proposal aims to shift spending from fossil energy to renewable energy, which could result in increased spending on renewable energy in rural disadvantaged communities and in the agricultural sector, potentially lowering energy prices.[5]

Pricing carbon pollution will likely be regressive without mechanisms to control these effects due to the higher proportion of income spent on energy by lower income households.[6] Many of Oregon's rural communities are in consumer-owned utility service areas with a high percentage of hydropower, limiting

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[1] *Consideration for Designing a Cap-and-Trade Program in Oregon* (Rep.). (2017, February 4) (page 30) Retrieved http://www.oregon.gov/deq/FilterDocs/ghgmarketstudy.pdf

[2] Clean Energy Jobs Bill Draft, LC 44, January 8, 2018. Senate Version (p.30) https://www.oregonlegislature.gov/helm/workgroup_materials/LC0044_DRAFT_2018_Regular_Session.pdf

[3] *Consideration for Designing a Cap-and-Trade Program in Oregon* (Rep.). (2017, February 4). Retrieved http://www.oregon.gov/deq/FilterDocs/ghgmarketstudy.pdf

[4] *Ibid*

[5] *Consideration for Designing a Cap-and-Trade Program in Oregon* (Rep.). (2017, February 4). Retrieved http://www.oregon.gov/deq/FilterDocs/ghgmarketstudy.pdf

[6] Stavins, Robert N. (2008). *Addressing Climate Change with a Comprehensive US Cap-and-Trade System*. Article. Oxford Review of Economic Policy 24 (2): 298–321. doi:10.1093/oxrep/grn017.

potential rate increases linked to pricing carbon.[7] Other measures of the cap-and-invest proposal to limit negative impacts to rural areas include an operating and revenue sharing structure that distributes benefits to low-income residential customers and small commercial customers, as well as a requirement that investor-owned utility revenues generated from program participation be spent on behalf of customers to reduce energy bills.

Most rural communities have a lower median household income and a higher percentage of the population in poverty compared to the state's metro counties.[8] Rural households also tend to have higher energy needs than urban households. Nationally, rural households are roughly 30% larger and rural families drive about 7,000 miles more than urbanites.[9] Such households may not be able to afford the upfront costs of energy efficient equipment or avoid energy intensive tasks. Rural economies are less diverse than metro areas and many rural natural resource-based industries operate on narrow margins, particularly agricultural operations that can also be relatively carbon-intensive.[10]

ENERGY USE IN AGRICULTURE

Agriculture has many direct and indirect energy needs. The highest direct energy uses are diesel, electricity, gasoline, and natural gas. The largest indirect energy uses for producers are typically chemical inputs (e.g. pesticides and fertilizer). For Oregon agriculture, it is highly likely that only direct energy consumption would be affected by state-level carbon pricing policy, and not indirect energy consumption or possible emissions resulting from agricultural practices.

TABLE 1. Direct and Indirect Energy as a Percentage of Farm Production Costs in Oregon Agriculture.

	% of Total Farm Production Expenses (2012)	Cost
Direct energy		
Fuel (Gasoline, diesel, and oils)	5%	$233 million
Utilities	4%	$154 million
Indirect energy		
Fertilizer	7%	$325 million
Chemicals	5%	$224 million

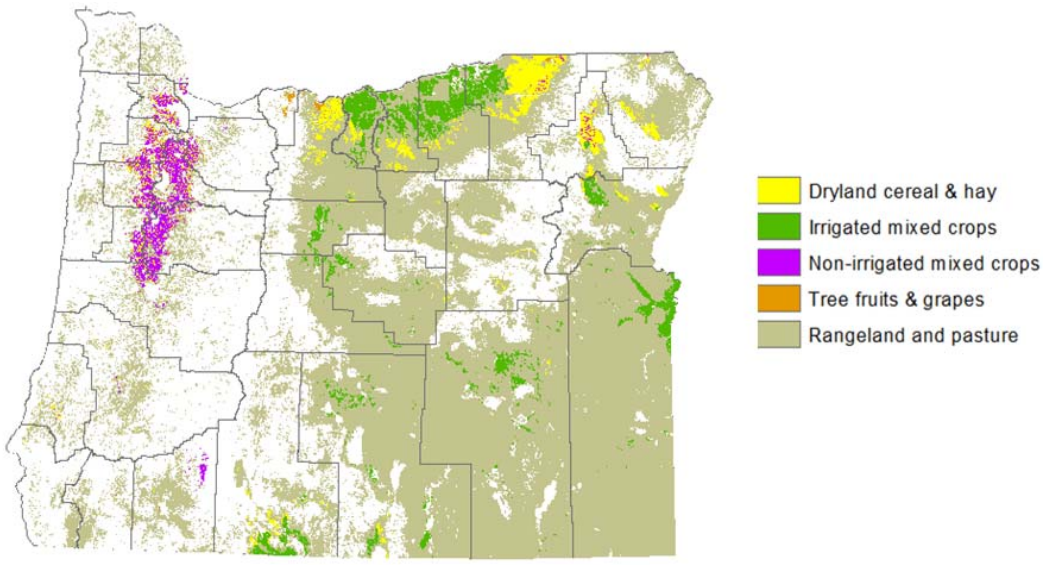
Source:https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_State_Level/Oregon/st41_1_004_005.pdf

Direct energy use accounted for 9% ($387 million) of total farm production expenses in Oregon agriculture in 2012, whereas 12% ($549 million) of total farm production expenses during this same year were associated with indirect energy (Table 1). While agricultural chemicals contain embedded energy, very few of these chemicals are produced in-state in volumes that would fall under the recently proposed carbon pollution cap, meaning that the price of these chemicals would not be affected by the proposed policy.

[7] Oregon Clean Energy Jobs Legislation Rural Opportunities and Benefits, Sustainable Northwest
[8] US Census Bureau, Small Area Income and Poverty Estimates Program, Retrieved from https://www.census.gov/programs-surveys/saipe.html
[9] *Consideration for Designing a Cap-and-Trade Program in Oregon* (Rep.). (2017, February 4). Retrieved http://www.oregon.gov/deq/FilterDocs/ghgmarketstudy.pdf
[10] *Ibid*

Average farmers in the U.S. net a 3 – 4% profit, and Oregon farm operations are marginal too. In 2012, it cost Oregon farmers an estimated $4.4 billion to produce $4.8 billion in products sold by the state's farms which at the time numbered 35,439.[11] There are concerns that increases in direct energy costs can increase production costs, especially given that direct energy consumption has comprised a small (<10%) but growing portion of total farm production expenses in recent years. One particular fuel of importance to many agricultural operations is off-road diesel, which is typically available for use on farms at a lower cost than regular "No. 2 highway diesel." This fuel has been treated the same as other fuels in carbon pricing proposals.

FIGURE 1. Variation in Oregon Agriculture.



Source: Data from USDA National Agricultural Statistics Service Cropland Data Layer; https://nassgeodata.gmu.edu/CropScape/ (accessed {April 2018}; USDA-NASS, Washington, DC.

Oregon produces more than 220 agricultural commodities due to the diversity of its more than 16 million acres of agricultural lands (Figure 1). This diversity translates to significant variation in direct energy consumption, and the economic impacts that pricing carbon pricing would have on agriculture. Livestock operations generally require less direct energy costs (3-7% of operating costs) than crop production.[12] Among cropping, wheat producers may be among the most impacted, yet direct energy consumption (i.e. diesel use) varies with tillage practices, as is the case with other annual crops.[13]

Oregon's ~1.6 million acres of irrigated agricultural lands use significant amounts of energy.[14] A 2008 survey on energy use in irrigation found that Oregon farms spent nearly $52 million pumping water, with the vast majority of this expense ($49 million) being for electricity.[15] Depending on the source, rates for

[11] https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_State_Level/Oregon/st41_1_004_005.pdf
[12] Sands, R., & Wescott, P. (2011, August). *Impact of Higher Energy Prices on Agriculture and Rural Economies* (Rep. No. 123). Retrieved https://www.ers.usda.gov/webdocs/publications/44894/6814_err123_1_.pdf?v=41432
[13] Shoemaker, R., McGranahan, D., & McBride, W. (n.d.). Agriculture and Rural Communities Are Resilient to High Energy Costs. Retrieved from https://www.ers.usda.gov/amber-waves/2006/april/agriculture-and-rural-communities-are-resilient-to-high-energy-costs/
[14] Page, S. (2011, April). *Agriculture and Energy in Oregon* (Rep.). Retrieved https://digital.osl.state.or.us/islandora/object/osl:1331/datastream/OBJ/view
[15] USDA National Agriculture Statistics Service. 2009. 2007 Census of Agriculture state data for Oregon. http://www.agcensus.usda.gov/Publications/2007

this electricity may or may not be significantly impacted by carbon pricing. Converting from flood irrigation to sprinkler irrigation improves water use efficiency, which is an important step in a changing climate, but this shift requires increasing direct energy costs due to increased use of electricity.

RENEWABLE ENERGY IN AGRICULTURE

Oregon farmers are producers of renewable electricity, with about 4% of farms having a significant renewable energy installation as a component of their operation (see Table 2). Still, up-front costs can make adopting renewable energy and energy efficiency challenging for farmers. This is the case even for projects with a short payback periods or significant co-benefits such as reduced labor costs or water consumption, which are more likely to be attractive to farmers. As a shift from flood and furrow irrigation to drip and sprinkler irrigation typically requires increasing electricity consumption there is an opportunity to pair water use efficiency with energy efficiency and renewable energy investments.

TABLE 2. Oregon farms are increasingly adopting renewable energy.

	Number of Farms
Total farms producing renewable electricity	1,401
Solar	1,141
Wind turbines	151
Methane digesters	8
Geoexchange systems	95
Small hydro	41
Wind rights leased to others	160

Source:https://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_1_State_Level/Oregon/st41_1_004_005.pdf

STRATEGIES TO ENGAGE RURAL AGRICULTURE IN CARBON PRICING POLICY

There are several options to include rural and agricultural communities in carbon pricing. The Clean Energy Jobs Bill of 2018 contained the following attributes in part to help mitigate potential regressive impacts on economically challenged rural communities:

- A **Joint Legislative Committee on Climate** would include rural representation, as well as serve as a sounding board for program review and public input.[16]
- A **Program Advisory Committee** would have three members representing rural Oregon, each one with corresponding specific expertise in forestry, agriculture and fisheries.[17]
- The definition of **Impacted Communities** addressed the "communities most at risk of being disproportionately impacted by climate change," and this includes rural

[16] Oregon Clean Energy Jobs Legislation Rural Opportunities and Benefits, Sustainable Northwest
[17] Clean Energy Jobs Bill Draft, LC 44, January 8, 2018. Senate Version (p.9)

communities. Impacted communities will be identified implementing a methodology that takes into account geographic, socioeconomic, public health and environmental hazard criteria. These factors consider areas with low incomes, high unemployment, and low levels of homeownership, high rent burden, and low levels of educational attainment; it will allocate a greater weight on predictors of vulnerability to the impacts of climate change.[18] These are challenges faced by many rural communities in Oregon.

- **Oregon Climate Investments Fund:**
    - Fund would receive 85% of funds that are transferred to the Auction Proceeds Distribution Fund under the 2018 senate bill.[19]
        - 60% of the Climate Investments Fund would be destined to projects, programs or activities that benefiting impacted communities, of which 33% must be designated to rural areas.[20,21]
        - 20% will be destined to projects that increase carbon sequestration and resiliency in natural and working lands, specifically in forestry, agriculture, rangelands, and coastal communities. Investment types may include payments for carbon sequestration on forest and agricultural lands, water storage and transportation, easements that maintain working lands and wildlife habitat, and wildfire risk reduction to maintain forest health and minimize risk of carbon loss.[22] As has been the case for investments in working lands made through California's Greenhouse Gas Reduction Fund,[23] standard methodologies for quantifying the benefits of conservation practices/programs could be similarly integrated into programs in Oregon.

- **Agricultural offset projects** can be used as a means to engage non-capped sectors, i.e. forestry and agriculture, in actions that reduce greenhouse gas emissions, help conserve working lands, and contribute to land stewardship.

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[18] Clean Energy Jobs Bill Draft, LC 44, January 8, 2018. Senate Version (p.28)
[19] Clean Energy Jobs Bill Draft, LC 44, January 8, 2018. Senate Version (p.31)
[20] Clean Energy Jobs Bill Draft, LC 44, January 8, 2018. Senate Version (p.32)
https://www.oregonlegislature.gov/helm/workgroup_materials/LC0044_DRAFT_2018_Regular_Session.pdf
[21] Rural areas are defined as those "areas located entirely outside of the acknowledged Portland Metropolitan Area Regional Urban Growth Boundary and the acknowledged urban growth boundaries of cities with populations of 30,000 or more".
Clean Energy Jobs Bill Draft, LC 44, January 8, 2018. Senate Version (p.33)
https://www.oregonlegislature.gov/helm/workgroup_materials/LC0044_DRAFT_2018_Regular_Session.pdf
[22] Oregon Clean Energy Jobs Legislation Rural Opportunities and Benefits, Sustainable Northwest
23 http://www.caclimateinvestments.ca.gov/natural-resources-waste-diversion/