AGENDA

Regulated Entities Work Group

November 2, 2017
10:00 AM – noon
Hearing Room 50 State Capitol (ground level)

AGENDA

- Welcome and Introductions
- Q&A with representatives of linked jurisdictions
- Work Group Discussion of Policy Questions
- Public Comment
- Next Steps
- Adjourn

This meeting will be livestreamed. You may access the livestream at: *https://www.oregonlegislature.gov/citizen_engagement/Pages/Legislative-Video.aspx.* You may also participate in this meeting by teleconference by calling 1--877-848-7030, meeting # 7714152.

Meeting materials are posted at: *https://www.oregonlegislature.gov/dembrow/Pages/regulated-entities.aspx*.

October 26, 2017

Policy Questions to Prepare and Discuss at November Work Group Meetings

(11/2/17)

Senate Bill 1070
Policy Questions

At the upcoming work group meetings, each work group will discuss the policy questions below. Each section has been assigned to a work group, however some questions are likely to be discussed in multiple work groups. Thank you for reviewing the document and coming prepared with your feedback.

OFFSETS – AGRICULTURE, FORESTS, FISHERIES, RURAL COMMUNITIES, AND TRIBES

Percentage of compliance obligation that can be met with offsets?	**SB 1070**: 8% cap, allows lower percentage in certain areas. **Proposal**:
Restrictions on offset project location?	**SB 1070**: Be located in the United States or a country with which EQC has entered an agreement for administering a carbon pollution market **Proposal:**
Should aggregation be allowed?	**SB 1070**: Not addressed **Proposal:**
Principles that govern protocol development?	**SB 1070**: Not addressed **Proposal:**
Role of ODA and ODF in protocol development?	**SB 1070**: Not addressed **Proposal:**

POINT OF REGULATION – UTILITIES AND TRANSPORTATION

Utilities POR?	**SB 1070**: Not specified **Proposal**: first jurisdictional deliverer (FJD)
Natural Gas POR?	**SB 1070**: Not specified **Proposal:** Load serving entity (LSE)
Industrial Sources POR?	**SB 1070**: Not specified **Proposal:**

ALLOWANCE DISTRIBUTION AND CONSIGNMENT – UTILITIES AND TRANSPORTATION

Are allowances distributed to utilities free of charge for consignment?	SB 1070: Yes Proposal: Establish set of principles in legislation to guide distribution
Should allowances distributed free of charge to utilities be consigned to auction?	SB 1070: Yes Proposal:
Should allowances be distributed free of charge to covered COUs? If so, how should revenue investments be overseen?	SB 1070: Allowed but not required. Proposal:

EMISSIONS-INTENSIVE, TRADE-EXPOSED INDUSTRIES (EITEs) – REGULATED ENTITIES

Criteria to identify EITE's?	SB 1070: No criteria. Directs EQC to hire or contract with 3rd party to provide data and analysis to identify leakage risk Proposal:
How are allowances allocated to EITEs?	SB 1070: Requires free distribution to address leakage and as determined necessary by EQC. Proposal: Establish principles governing distribution formula?
Should there be principles/ criteria for whether allowances are full or partial; on a declining schedule over time; and subject to review?	SB 1070: No criteria Proposal:

COST CONTAINMENT MEASURES – REGLATED ENTITIES AND UTILITIES AND TRANSPORTATION

Linkage	SB 1070: Directs program to be developed in a manner necessary to pursue linkage. Proposal:
Price containment reserve	SB 1070: Requires DEQ to place a percentage of allowances in reserve as directed by EQC to assist covered entities in event of unanticipated high costs of compliance instruments. Proposal:
Banking	SB 1070: Requires EQC to adopt rules to specify allowance holding limits Proposal:
Price floor	SB 1070: Requires EQC to adopt rules to set an auction price floor and schedule for floor price to increase Proposal:

REVENUE INVESTMENTS – ENVIRONMENTAL JUSTICE/JUST TRANSITION

Definition of "impacted communities" and "economically distressed areas"	SB 1070: SB 1070 language Proposal: (12) Communities experiencing disparate impacts of climate change or "Most Impacted communities" is defined by an analysis of racial and socioeconomic demographics, overlaid with environmental and public health data by census tract. In identifying 'Most Impacted Communities" the methodology must consider indicators including, but not limited to, the following: (a) Above the state average percentage nonwhite population; (b) Above the state average percentage of the population has an income below 200% of the federal poverty limit; (c) Above the state average percentage of the population over 25 years of age without a high school degree/diploma; (d) Above the state average percentage of the labor force over 16 years of age are not employed;

	(e) Above the state average percentage of the population are over 65 years of age or under 10 years of age (g) Above the state average cancer risk, with cancer risk being defined as an estimate of an individual's cancer risk as the result of a lifetime of exposure to a range of point and mobile source air toxins within a geographic entity (h) Above the state average respiratory hazard risk, with respiratory health risk being defined as an estimate of adverse health effects identified by length of time and concentration of exposure to a range of point and mobile source air toxins within a geographic entity (i) A Native American population on a reservation or tribal trust lands of a federally recognized tribe in Oregon, particularly those reliant on subsistence lifestyles.
Criteria for revenue investments? Including use of consigned allowance revenue?	SB 1070: Umbrella requirement: reduce greenhouse gas emissions consistent with statewide greenhouse gas emissions levels and to promote adaptation and resilience in the face of climate change. See attached diagram for additional criteria. Proposal:
Method of revenue distribution?	SB 1070: Grants. See attached diagram. Proposal: Proceeds can be distributed through both grant based programs and automatic allocation.
Investment governance and oversight roles and responsibilities	SB 1070: See attached diagram. Proposal:
Should revenues be utilized in part to incentivize sequestration and adaptation?	SB 1070: Revenues can be used for purposes of the Act, which is to reduce greenhouse gas emissions and to promote adaptation and resilience by the state's communities and economy in the face of climate change. Proposal:
Should regulated entities be allowed to be the recipients of program grants or other funding to help them comply?	SB 1070: Not addressed Proposal:

CAP-AND-INVEST PROGRAM GOVERNANCE – ALL

Which agency administers this program?	SB 1070: Primarily DEQ, with role for ODOT and Business OR in grant distribution Proposal:
Are there appropriate accountability measures?	SB 1070: The Greenhouse Gas Cap and Investment Program Oversight Committee is required to study the implementation of the program, make recommendations and conduct other necessary studies to provide implementation oversight. Proposal:

Senate Bill 1070 (2017)

Governance of Auction Revenues

STATE TREASURY

All SB 1070 funds must be used to reduce greenhouse gas emissions and to promote climate change adaptation and resilience by Oregon s communities and economy.

State Highway Fund *§14,§11*
Climate Investments Account

Oregon Climate Investments Fund *§15,§11*
(85% of general auction proceeds)

Just Transition Fund *§19,§11*
(15% of general auction proceeds)

Consignment Proceeds *§11,§13*
Allowances distributed free-of-charge must be consigned to the state for auction

ODOT

Distribution Requirements

- At least 20% to projects geographically located in impacted communities
- At least 20% to projects that otherwise benefit impacted communities
- Meaningful share to projects that involve businesses owned by women and minorities
- Funding preference to projects that result in greatest GHG reductions

Rulemaking: ODOT *(§38)*

DEQ

CLIMATE INVESTMENTS GRANT PROGRAM *§16*

Distribution Requirements

- At least 50% to projects geographically located in impacted communities
- At least 40% to projects geographically located in economically distressed areas; emphasis placed on job creation, job education, and training opportunities
- Funding preferences specified *(§16(5)(a-g))*

Rulemaking: EQC in consultation with EJ Task Force, Indian tribes, PUC, ODOE, ODOT, OHA, other interested agencies, and Advisory Committee

Climate Investments Grant Committee

Reviews grant applications and makes funding determinations; governor-appointed, subject to senate confirmation

Business Oregon

JUST TRANSITION GRANT PROGRAM *§20*

Distribution Requirements

- Support economic diversification, job creation, job training, and other employment and mental health services for Oregon workers and communities that are adversely affected by climate change or climate change policies

Rulemaking: Business Oregon in consultation with Advisory Committee

Just Transition Grant Committee

Reviews grant applications and makes funding determinations; governor-appointed, subject to senate confirmation

Climate Investments in Impacted Communities Advisory Committee

Consult and make recommendations on investments that benefit impacted communities *§17*

Advisory Committee *§7*

Provide advice from diversity of interests

Electric Companies & Natural Gas Utilities

Distribution Requirements

- Must serve to stabilize and reduce energy bills
- Prioritize low-income residential customers

Rulemaking: PUC in consultation with Advisory Committee

Consumer-Owned Utilities

Distribution Requirements

- None specified

Rulemaking: DEQ

Types of Auction Revenues

- State Highway Fund Revenue *(Or. Const. Article IX, § 3a)*
- Other Funds Revenue
- Consignment Revenue

Legislative Policy and Research Office, September 2017

Memorandum regarding WCI Allocation of Allowances to EITE

(11/2/17)

WCI allocation of allowances to EITE

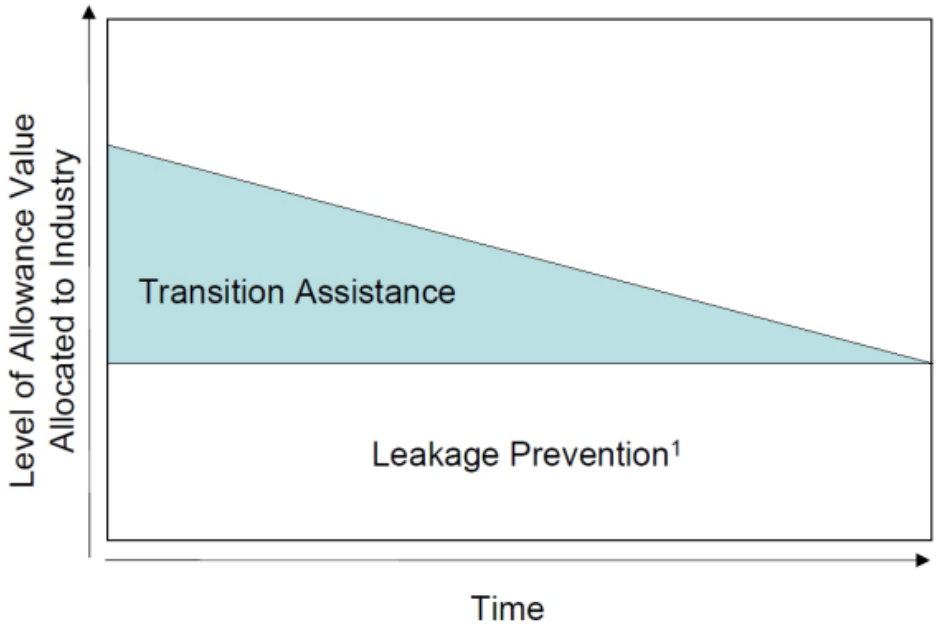
The Western Climate Initiative (WCI) jurisdictions have adopted a form of allowance allocation to emissions-intensive and trade-exposed (EITE) industrial emitters that's called an output based benchmarking approach. Under this approach, allowances are given freely to industrial emitters that might leave the state or shut down because the carbon price would make them uncompetitive with their competitors outside the jurisdiction. These industries get allowances based on how much of their product they produce and the average emissions intensity of this output in their sectors.

Following is a description of how this allocation has operated in California and a brief comparison to the similar approaches used in Ontario and Quebec.

How this works

The emissions-intensive part of the EITE designation is basically pass/fail, and all emitters in the industrial sector that are large enough to be covered by the cap-and-trade program's 25,000 metric tons per year emissions threshold have been given allowances to start with in California. This has excluded power plants. The second part – trade exposed – is the more difficult part of the classification. Allocations to less trade-exposed and emissions-intensive industries were planned as transition assistance that would be curtailed over time, but as described later those curtailments have now been deferred in California until at least 2025.

Figure II-1: Representation of Allowance Value Distribution for Transition Assistance and Leakage Prevention



[1] Mitigation of carbon costs that cannot be passed on due to leakage risk

To start off with, California, Quebec, and Ontario first distinguish all of their industrial emitters using the North American Industrial Classification System (NAICS). This groups all of the covered emitters together in terms of what they produce[1].

California then classified the degree of leakage[2] risk from each sector. California grouped its industries into high, medium, and low leakage risk categories with the original intent that industries at a high leakage risk would receive more allowances than those at the medium and low risk. Quebec and Ontario did not go through the same effort in terms of quantifying the degree of leakage risk for their emitters, opting instead to either grant a benchmark based allocation that would go down only with the cap decline factor in the case of Quebec, or to defer such an analysis as California has done for later in the case of Ontario.

In most cases the number of allowances industrial emitters are given varies based on how much they produce – that's the output-based part – and it's benchmarked to 90% of the average emissions-intensity in that sector.

For example, let's say there are five creameries that produce butter, and the most efficient facility emits about 0.02 tons of carbon per 2,000 pounds of butter, the middle three emit just over 0.04 tons, and the least efficient emits just under 0.14 tons. On average they emit .043 tons per 2,000 pounds of butter produced, producing a benchmark of 0.039 of an allowance per 2,000 pounds of butter produced[3]. Thus, each facility gets 0.039 of an allowance for each 2,000 pounds of butter it produces, setting aside the cap decline factor described later.

Setting the benchmarks this way creates a predictable and level playing field by letting existing and new facilities know how many allowances they will get per unit of production. The number of allowances they receive is based on the amount of production they have, so there's no incentive to cut or shut down production and sell the allowances you might be guaranteed under a different type of allocation method such as one based on your facility's historical emissions. This provides a clear signal to improve efficiency and rewards the businesses that have made the investments to be the most efficient in their sector.

The data for these benchmarks came from third-party verified reporting collected by California's mandatory greenhouse gas reporting program, and is based on 2008-2010 data. Over time, additional data has been submitted by industry and adjustments to many of the sectoral benchmarks have been made. In addition, several industries have been issued additional benchmarks to better characterize their processes. For example, creameries have 11 benchmarks for the different products they produce – butter, fluid milk, condensed milk, powdered milk, cheese, and others.

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[1] For an example of the classifications and covered facilities, see the following ARB document that shows how their emitters were grouped together for industrial allocations in 2013: https://www.arb.ca.gov/cc/capandtrade/allowanceallocation/sector_based_industrial_allocation.pdf

[2] Leakage refers to when economic activity leaves a jurisdiction with a carbon price because of the carbon price and moves its economic output and emissions to another jurisdiction without a carbon price. When that happens emissions in the priced jurisdiction would fall, but global emissions would remain flat, thwarting the intent of the carbon pricing program.

[3] These were real examples: https://www.arb.ca.gov/regact/2013/capandtrade13/2appabenchmarks.pdf

Example

The following example illustrates how many allowances a creamery might receive in California. Using the 0.039 allowances per 2,000 pounds of butter benchmark, let's say the facility produces 500 million pounds of butter in a year. Based on the butter benchmark alone, this would mean the facility would receive 9,750 free allowances.

However, the allocation also declines by the assistance factor for the sector in question, and the cap decline factor. The assistance factor is based on if the facility's sector is classified as being at a high, medium, or low risk of leakage/trade exposure. Let's say the creameries are at a medium risk, and in the current compliance period that means their assistance factor is 100%. The cap decline factor is the annual percentage decline in the statewide allowance budget. If the statewide cap has declined by 2% each year, then the cap decline factor would be set at 0.98 for the *second* year (i.e. the first year of the cap decline) of the program. Similarly, if the cap declines by 5% each year, the cap decline factor for the *third* year of the program would by 0.90 (i.e. the second year of the cap decline).

Allowance Allocation = (Benchmark * Output) * Assistance Factor * **Cap decline factor**

Using the above example of a creamery producing 500 million pounds of butter in a year, we get the following allowance allocation under scenarios with a 2% cap decline factor in the second year versus a 5% cap decline factor in the third year.

When the cap has declined 2% on the second year:
9,555 = [0.039 * (500,000,000 / 2000)] * 1.0 * **0.98**

Similarly, when the cap has declined 10% on the third year:
8,775 = [0.039 * (500,000,000 / 2000)] * 1.0 * **0.90**

On average each sector starts of receiving about 90% of the allowances they need for compliance for free under the benchmark. However, the cap decline factor ensures the number of allowances will continue to decline for all industries over time, even if all other factors remain constant. This reflects the growing scarcity of allowances over time as the program's cap on carbon emissions falls towards the jurisdiction's targets.

How is the Emissions-Intensive and Trade-Exposed classification determined and how is risk of leakage assessed?

California's original methodology[4] for determining the leakage risk for various industries was to determine two metrics: Emissions Intensity and Trade Exposure. Emission intensity was measured by how much they emitted versus how versus the value they added to their products. Trade Exposure was calculated by the trade share of covered entities to their other competitors.

[4] https://www.arb.ca.gov/regact/2013/capandtrade13/capandtrade13isorappb.pdf

Emissions intensity = Metric Tons CO2e / $Million value added[5]

The emissions data was supplied by the Air Resources Board's greenhouse gas reporting program, while the value added was taken from the US Census Bureau's Annual Survey of Manufactures and Economic Census or from data from the National Bureau of Economic Research.

The emissions intensity values were used to group the industrial emitters into four categories:

High:	> 5,000	mtCO2e/$M value added
Medium:	4,999-1,000	
Low:	999-100	
Very Low:	< 100	

The following shows the range of values calculated for various sectors from one of the 2010 rulemaking documents[6] for California's Cap-and-Trade Program.

Table K-4: Proposed Emissions Intensity Classification

Emission Intensity Classification	ARB Sector Classification	NAICS	Emissions Intensity (CO_2e/ $M Value added)
High	Lime manufacturing	327410	29,398
	Cement manufacturing	327310	13,744
Medium	Iron and steel mill	331111	4,148
	Flat glass manufacturing	327211	3,444
	Oil and gas extraction	211111	3,352
	Soda ash mining and mfg	212391	3,248
	Paperboard manufacturing	322130	3,111
	Petroleum products manufacturing	324	2,720
	All Other Basic Inorganic Chemical Manufacturing	325188	2,636
	Reconstituted Wood Product Manufacturing	321219	1,762
	Paper manufacturing	322121	1,663
	Glass container manufacturing	327213	1,708
	Gypsum Product Manufacturing	327420	1,487
	Mineral wool manufacturing	327993	1,102
Low	Steel and aluminum processing	331X	645
	Polystyrene Foam Product Manufacturing	326140	814
	Food manufacturing	311	608
	Sawmills	321113	600
	Breweries	312120	324
	Turbine and Turbine Generator Set Units Manufacturing	333611	307
	Pesticide and other agricultural chemical mfg	325320	232
Very low	Cut and Sew Apparel Mfg	3152	93
	Pharmaceutical and Medicine Manufacturing	325412	64
	Aircraft Manufacturing	336411	37

[5] Value added is calculated as product value minus the value of the raw materials for the product. So for example, if a can of tomato paste is worth $5, and the raw tomatoes cost $2, then the value added by a tomato processor is $3.

[6] Page K-15 https://www.arb.ca.gov/regact/2010/capandtrade10/capv4appk.pdf

Trade Share was calculated as a percentage according to the following formula:
Trade share = (imports + exports) / (shipments + imports)

The import and export data was taken from the International Trade Commission's database and the total value of shipments data was taken from the US Census Bureau's Annual Survey of Manufactures and Economic Census or from data from the National Bureau of Economic Research. California calculated trade shares using averaged data covering 2003-2008. The trade exposure of the industries was categorized like so:

High: > 19%
Medium: 19-10%
Low: < 10%

For an example, here are the calculated trade shares for a number of industries calculated by ARB using the approach described above:

Table K-6: Proposed Trade Exposure Classification

Trade Exposure Classification	ARB Sector Classification	NAICS	Import %	Trade Share*
High	Cut and sew apparel mfg	3152	97%	80%
	Turbine and turbine generator set units manufacturing	333611	36%	78%
	Oil and gas extraction	211111 211112	100%	65%
	Soda ash mining and mfg	212391	0%	63%
	Aircraft manufacturing	336411	27%	61%
	All other basic inorganic chemical manufacturing	325188	54%	57%
	Flat glass manufacturing	327211	43%	46%
	Steel and aluminum processing	331111	69%	37%
	Metal processing	331X	69%	37%
	Reconstituted wood product manufacturing	321219	90%	35%
	Pharmaceutical and medicine manufacturing	325412	50%	31%
	Sawmills	321113	78%	28%
	Paper manufacturing	322121	53%	25%
	Paperboard manufacturing	322130	NA	25%
	Pesticide and other agricultural chemical mfg	325320	28%	20%
	Glass container manufacturing	327213	80%	19.4%
Medium	Polystyrene foam product manufacturing	326140	56%	18%
	Mineral wool manufacturing	327993	45%	18%
	Breweries	312120	85%	17%
	Petroleum products manufacturing**	324110	76%	13%
	Cement manufacturing	327310	94%	16%
	Food manufacturing	311	50%	12%
Low	Gypsum product manufacturing	327420	45%	5%
	Lime manufacturing	327410	67%	3%

These two metrics were then synthesized to come up with the leakage risk category:

Table 1 Leakage Risk Categorization

Leakage Risk	Emissions Intensity	Trade Exposure
High	High	High Medium Low
	Medium	High
Medium	Medium	Medium Low
	Low	High Medium
Low	Low	Low
	Very Low	High Medium Low

Originally California intended to step down allocations for medium and low leakage risk EITE industries like so:

Leakage Risk Category	2013-2014 Compliance Period	2015-2017 Compliance Period	2018-2020 Compliance Period
High	100%	100%	100%
Medium	100%	75%	50%
Low	100%	50%	30%

However, this ramping down of free allocation over time for medium and low leakage risk industries has not occurred. Responding to stakeholder concerns in their 2013 rulemaking that the risk of leakage was higher than the agency had calculated and pulling back allocations to industrial emitters that were classified as medium or low risk in 2015 would harm those businesses, the agency extended the 100% assistance factor through the 2015-2017 compliance period, and upped the assistance factors for the 2018-2020 compliance period as shown in the following table.

Leakage Risk Category	2013-2014 Compliance Period	2015-2017 Compliance Period	2018-2020 Compliance Period
High	100%	100%	100%
Medium	100%	100%	75%
Low	100%	100%	50%

In addition, the California legislature weighed in on this topic in 2017[7], requiring that ARB:

> "Set industry assistance factors for allowance allocation commencing in 2021 at the levels applicable in the compliance period of 2015 to 2017, inclusive. The state board shall apply a declining cap adjustment factor to the industry allocation equivalent to the overall statewide emissions declining cap using the methodology from the compliance period of 2015 to 2017, inclusive."

This language locks in the 100% assistance factors for all three leakage risk categories from 2021 onward[8]. ARB is currently considering if it should continue with the scheduled step down in the assistance factors for the 2018-2020 compliance period, only to have it step back up in 2021.

Ontario and Quebec

Ontario also includes an assistance factor in its allocation methodology, beginning with 100% industries' benchmark emission intensities. These industry benchmarks are calculated similarly to the approach described above for California – 90% of the average emission intensity within an industry. Ontario has indicated this allocation mechanism will be used for all industrial sector emitters through 2020. Post-2020, Ontario has indicated it will consider lowering the assistance factors for its industrial emitters based on a leakage risk analysis and public consultation, but has not yet begun that process.

Quebec does not include an assistance factor in its allocation methodology, which has the same effect as setting the assistance factor at 100%, electing to let the allocations decline simply with the cap decline factor. Quebec differs somewhat from the California approach, using a historical carbon intensity baseline for facilities, but with adjustments for changes in production from that historical baseline. Quebec also applies a weighting factor for industrial process emissions (e.g. pulp and paper production) and combustion emissions; the form emissions are weighted at 100% while the latter are weighted at 80%.

Links to additional jurisdiction-specific details

California: www.arb.ca.gov/cc/capandtrade/allowanceallocation/allowanceallocation.htm#industry

Quebec: Division II: http://legisquebec.gouv.qc.ca/en/ShowDoc/cr/Q-2,%20r.%2046.1#se:41_1

Ontario: www.downloads.ene.gov.on.ca/envision/env_reg/er/documents/2016/012-6837_Final%20Methodology.pdf

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[7] https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB398

[8] Prior to the passage of AB 398, ARB had contracted with outside researchers to refine their methodology for determining leakage risk. These proposals were an attempt to create a more sophisticated set of metrics for leakage risk, and better account for competition from competitors located within the US versus those overseas. However, they were significantly more complex and held back for further work by ARB in the 2016-2017 rulemaking even before the legislative change. An updated proposal based on those studies was proposed in October 2016: https://www.arb.ca.gov/cc/capandtrade/meetings/20161021/ct-af-proposal-102116.pdf

Memorandum regarding Combating Emission Leakage from Oregon's Industrial Sector (Linn & Burtraw, Resources for the Future)

11/9/17

To: Regulated Entities Work Group
From: Josh Linn and Dallas Burtraw / Resources for the Future / Washington DC
November 9, 2017

Combating Emissions Leakage from Oregon's Industrial Sector[1]

Emissions leakage would occur if capping Oregon's greenhouse gas (GHG) emissions causes emissions outside the state to increase. As Oregon considers cap-and-trade, the state is looking for a policy design that will achieve environmental and economic goals, including minimizing leakage. This memo explains that the distribution of emissions allowances is a powerful tool for meeting these goals. We make four main points:

1. Oregon can use allowance allocations to balance the benefits of auction revenue with the benefits of minimizing leakage;
2. The state can reduce or eliminate leakage using output-based updated allocation, recognizing that doing so has an opportunity cost because it diverts allowance revenue from other potential uses;
3. We recommend simple allocation rules based on available data;
4. For allocation to be effective at reducing leakage, covered facilities must anticipate that the allocations will be updated based on their production levels. Allocation *rules* can be updated based on new information as the cap-and-trade program unfolds.

Oregon can use allowance allocations to balance the benefits of auction revenue with the benefits of minimizing leakage

Cap-and-trade policy has three components. First is a determination of the total quantity of emissions allowed under the emissions cap, which the state can enforce by limiting the number of emissions allowances issued. Second is the distribution of emissions allowances, which includes the decision about whether and how many allowances to auction, and whether and how many allowances to distribute for free. Third is the provision for allowance trading, or more generally purchase or sale. Trading is essential for cap-and-trade to help identify the lowest cost path to reducing emissions.

In Oregon, a compelling reason to auction allowances is that the auction yields revenues that the state can reinvest to accelerate its transformation to a low-carbon economy. For example, the revenue could be used to build electric vehicle charging stations or subsidize investments in wind or solar power.

However, as the cap internalizes the currently external costs of climate change, some firms may need incentives to reduce the risk that they relocate. Oregon can reduce these

[1] Linn is a Senior Fellow and Burtraw is the Darius Gaskins Senior Fellow at Resources for the Future. Ideas in this memorandum draw partly on research by Linn on behalf of the California Air Resources Board (2016) and on the report of the Economic and Allocation Advisory Committee recommendation to the California Air Resources Board (2010), on which Burtraw served. The opinions expressed here are strictly those of the authors. Resources for the Future is nonadvocacy and takes no positions on these issues.

costs and leakage risk by reducing the share of allowances it auctions, and using free allocation as an incentive to maintain production at affected facilities. But doing so would reduce the available auction revenue, creating the need to balance the objectives of raising auction revenue and reducing leakage.

The state can reduce or eliminate leakage using output-based updated allocation

Under output-based allocation, a firm receives free allowances equal to an industry-specific factor (described below) multiplied by its production in the current or recent time period. Free allocation affects the variable costs of operating a facility because the freely allocated allowances have a market value, analogous to fuel or other inputs at a facility. When the firm uses the allowances for production it foregoes the opportunity of selling them in the market. To offset the increase in variable costs associated with using allowances for compliance, the regulators can determine the amount of free allocation on the basis of the level of production in a current or recent period, and update that allocation over time. This explicitly links free allocation to the level of production, and so it constitutes a production incentive that reduces variable costs. As a result, output-based updated allocation can help Oregon firms maintain their production levels and reduce the amount of production that shifts from Oregon to other areas—reducing the extent of the leakage. If designed carefully, such allocation can preserve incentives to reduce emissions as well.

Importantly, free allocation must be delivered as a production incentive and for a specific firm the allocation must be based on a maintained level of production. This is the approach taken by California, for example. In contrast, free allocation in fixed quantity that is not updated over time, and instead is perhaps based on a historic data such as production output, heat input or emissions in a fixed (previous) year, does not provide a production incentive. This form of free allocation constitutes a transfer of a valuable asset, which may provide compensation to the firm, but it does not provide an incentive to increase its production activities, or even to remain in business in the state. For this reason, we emphasize the need to update each firm's allowance allocation based on its production.

Output-based updated allocation does not undermine the overall integrity of a statewide emissions cap. If such an allocation causes a firm to increase production compared to its production level without output-based updating, this would decrease the allowances that can be auctioned or granted to other firms or industries. The statewide emissions cap remains unchanged, although we reiterate the tradeoff between the value of auction revenue and reducing leakage risk discussed above.

We recommend simple allocation rules based on available data

Implementing output-based updated allocation requires regulators to make two decisions: which industries should be included, and the rule that determines the allocation to specific firms. Leakage risks may be highest for "emissions intensive" firms with production processes involving intensive use of carbon-based energy (including carbon

embodied in electricity) or high levels of process emissions. Leakage risk may also be highest for "trade exposed" firms with significant market competition from out-of-state producers. The trade exposure suggests that if these firms try to pass the costs on to consumers, they would lose business to out-of-state competitors, and leakage would result.

However, emissions intensity and trade exposure do not always imply potential leakage: other factors may apply. Local producers can enjoy a cost advantage over importers due to transportation or other costs. In these circumstances a GHG emissions cap may raise local costs, but not enough to make imports cheaper than local production. In this case, local producers experience lower profits but still maintain their local production. *In short, the set of industries eligible for output-based updated allocation should be based on an assessment of the leakage risk that is made using all available data.* The literature describes approaches to quantify the leakage risk for individual industries.

For allocating the allowances to eligible industries, *an individual firm's allocation should depend on its output and an industry-specific allocation factor*. The factor should be proportional to the leakage risk for the industry—i.e., to the full production cost increase caused by the program, which may include direct emissions (from fuel combustion or processes) and emissions embodied in electricity. The output-based updated allocation would occur via a rebate that is provided in proportion to actual production. The rebate would offset at least some, and no more than all, of the production cost increase.

It is relatively easy to implement output-based updated allocation in the electricity sector because the product, electricity, is homogenous and easily measured in megawatt-hours. In contrast, some industries produce heterogeneous products. For these industries, a benchmark allocation could be determined based on specific engineering or technological criteria. Benchmarking can be used within an output-based updated allocation approach to address differences among industries, technologies, or fuels. Under the benchmarking approach, the regulator establishes a baseline emissions rate for an industry (e.g., cement) or process (e.g., fossil-fired electricity generation), and awards allowances to all facilities in that industry according to the baseline GHG content of their output. The benchmark could reflect early actions to reduce emissions intensity.

Output-based updated allocation effectively reduces the cost of producing output, which could reduce output prices relative to a full auction. Lower output prices may seem attractive, but they mitigate incentives for consumers to reduce consumption of the products. However, setting an industry-specific baseline based on best practices rather than a firm-specific factor based on the firm's actual costs would successfully preserve some of the incentive for the firm to invest in energy efficiency or find other means of reducing its emissions intensity.

We offer two caveats for choosing the allocation factors. First, one might be tempted to use entry and exit of facilities to update their allocations, and if a facility closes, it loses its allocation. Although this practice may have intuitive appeal, it creates inefficiencies because firms alter their behavior in order to influence future allocations, potentially

keeping highly emitting facilities in operation because their allowances are free. Instead, the allocation should be tied to the level of production from a facility.

Second, while it may be attractive to assign industries to categories and choose a common factor for each category, this could create economic inefficiency and a sense of unfairness for individual industries. For example, suppose two leakage risk categories are defined (high and low) and industries in the high category have a higher factor. There could be two industries that happen to fall just above and below the cutoff for the two categories, causing substantially different allowance allocations for firms that have essentially the same leakage risk. Instead, we suggest a factor that is directly proportional to the industry specific leakage risk.

For allocation to be effective at reducing leakage, covered facilities must anticipate that the allocations will be updated based on their production levels. Allocation *rules* can be updated based on new information as the cap-and-trade program unfolds

To qualify for a rebate, a firm would have to pass two tests that should be implemented by a state agency on a regular (e.g., biannual) basis to confirm the firm's leakage risk. The precise list of eligible industries should be derived from data at the 6-digit level of the North American Industry Classification System (NAICS). Moreover, if an industry's leakage risk turns out to be different from that expected—either higher or lower—the allowance factor could be adjusted accordingly.