WCI allocation of allowances to EITE

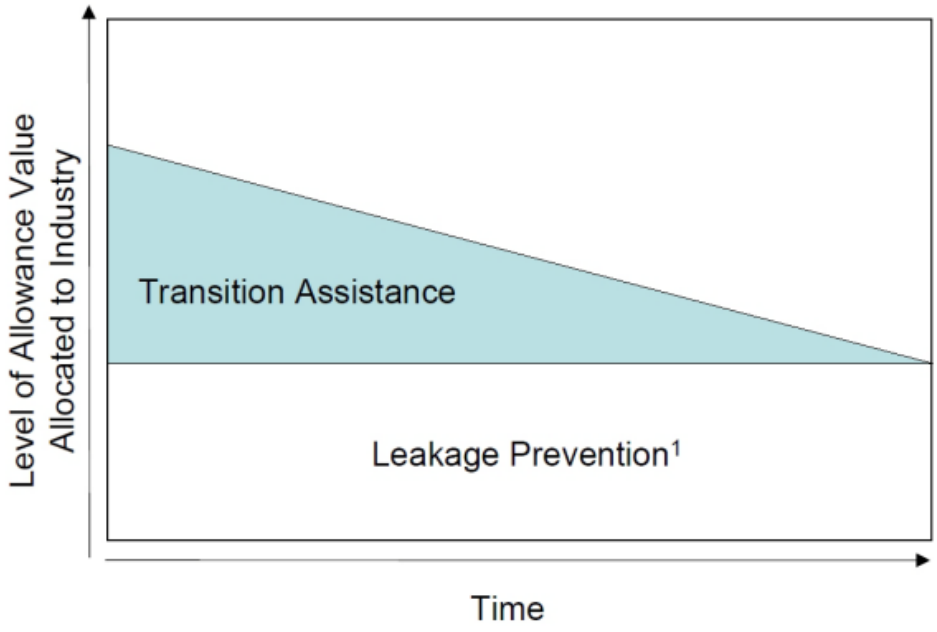
The Western Climate Initiative (WCI) jurisdictions have adopted a form of allowance allocation to emissions-intensive and trade-exposed (EITE) industrial emitters that's called an output based benchmarking approach. Under this approach, allowances are given freely to industrial emitters that might leave 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