Appendix A to 2nd 15-day Cap-and-Trade Regulatory Text: Refinery Allocation Methodology

Background and Initial Proposal

The allowance allocation methodology for the refining sector is a critical part of the cap-and-trade program design. In the first 15-day regulatory package a "simple output barrel" product-based benchmark was proposed as the basis for allocating to refining facilities.[1] This metric was created by evaluating the emissions intensity of the primary products sold by California refineries, including aviation gasoline, motor gasoline, kerosene-type jet fuel, distillate fuel oil, renewable liquid fuels, and asphalt.[2]

Some stakeholders commented that the simple barrel proposal created an inequitable initial distribution of allowances and did not account for the relative complexity of existing refineries in California. As shown in Figure 1, the estimated position of facilities after 2013 allocation shows a wide distribution between the best and worst performers under this metric.

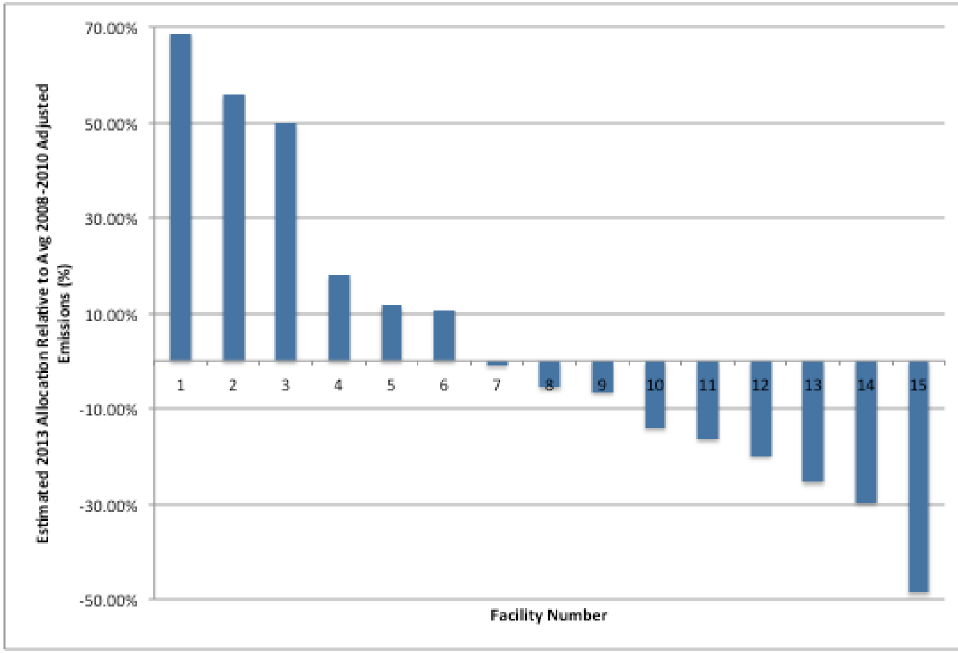
This wide gap could create a significant change in the in-state competitive playing field for California refiners during the first compliance period. Some stakeholders felt this distribution could lead to inappropriate overcompensation for the best facilities and emissions leakage from the worst. Staff acknowledges that this wide initial gap is not in keeping with the concept of minimizing "transition risk" as outlined in the cap-and-trade Initial Statement of Reasons.[3] After considering stakeholder comment, staff has modified the refinery allocation proposal to reduce the spread between the best and worst facilities in the first compliance period.

[1] The initial refinery allocation proposal is described in *Appendix B: Development of Product Benchmarks for Allowance Allocation* released with the first 15-day regulatory package: http://www.arb.ca.gov/regact/2010/capandtrade10/candtappb.pdf (accessed September 5, 2011).

[2] In comments on the first 15-day regulatory package, stakeholders proposed adding or deleting from the list of primary refinery products. Staff is not proposing any additions or deletions at this time. Beginning with the 2011 data year, ARB will collect detailed, third-party verified, refinery product data as part of the effort to monitor for emissions leakage in this sector. This dataset would allow for future changes to product types in the metric as needed.

[3] "Transition risk" is the risk that some California manufacturers will face a loss of profitability as a result of the allocation approach in the cap-and-trade system and that this loss of profitability would inhibit these entities from investing in cost-effective emissions reductions. "Transition assistance" through well-designed free allocation reduces this risk. For a description of these concepts see Appendix J of the *Initial Statement of Reasons for the Proposed Regulation to Implement the California Cap-and-Trade Program*: http://www.arb.ca.gov/regact/2010/capandtrade10/capv4appj.pdf

Figure 1. Estimated 2013 Allowance Surplus (+) or Shortfall (-) After Free Allocation (Initial Proposal)



Current Proposal: First Compliance Period

Sector Allocation

Although the simple barrel metric has limitations if used to allocate allowances to all individual refiners, staff believes it is a robust metric for evaluating the greenhouse gas (GHG) performance of the refining sector overall.[4] The new allocation proposal relies on the simple barrel metric in this fashion to calculate a total amount to allocate to the refining sector in the first compliance period.

By using the simple barrel metric to evaluate GHG intensity for the sector as a whole, the sector allocation is transparent and based on information that can generally be made publicly available. The total amount of allowances to the sector can increase or decrease automatically in response to future production levels of refinery products consistent with the product-based allocation approach for producers in other sectors. Likewise, the initial performance goal (benchmark stringency) for the sector is directly comparable to what is required for other industrial sectors.[5] The sector allocation remains product based, creating an

[4] Staff notes that many refining companies choose to report emissions per unit product as a performance metric in company-wide public reports on greenhouse gas emissions. For examples see:
http://www.exxonmobil.com/Corporate/safety_climate_action.aspx (accessed September 5, 2011)
http://www.shell.com/home/content/environment_society/environment/climate_change/greenhouse_gas_emissions/ (accessed September 5, 2011).

[5] The value for this simple benchmark has been updated, from 0.0465 allowances/barrel of primary refinery products as proposed initially, to 0.0462 allowances/barrel. This change was

incentive to continue efficient production of primary refinery products in California and minimize emissions leakage.

Dividing the Sector Allocation to Individual Refiners
The sector allocation will be divided between individual facilities using a two-pronged method designed to help reduce first period transition risk. The gap between the best and worst performers under the simple barrel metric is partially a result of attempting to compare performance between complex and simple refineries. Complex refineries conduct a variety of emissions-intensive processes that are disadvantaged under the simple barrel metric. To address this issue, the current proposal treats the complex facilities separately from the simplest refiners. After separating the simple facilities, the complex facilities are compared using a complexity-adjusted energy efficiency metric.[6]

Complex Facilities with the Solomon Energy Intensity® Index
Individual first period allocations to complex refiners will be based on a methodology initially proposed by the Western States Petroleum Association (WSPA). This approach allocates allowances based on the following factors: (1) historical emissions for each refinery, (2) the Solomon Energy Intensity® Index (EII) for each refinery, (3) an adjustment factor to reduce competitiveness impacts of allowance allocation between in-state refineries, and (4) future emissions for each refinery.[7]

The Solomon EII is a complexity-adjusted measurement of refinery energy efficiency developed by Solomon Associates. Solomon Associates has been developing energy efficiency benchmarking relied upon by the industry for the past 30 years. They maintain an extensive database of more than 500 refineries' energy consumption and process data, covering over 85 percent of global refining capacity, which is used to develop the EII values.[8] The Solomon EII is the industry standard for comparing energy efficiency across refineries globally. California refineries that have a Solomon EII value represent over 90% of refining capacity in the State.

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made to reflect the inclusion of 2010 data in the development of the benchmark. For calculations of this metric see Table 1 at the end of this document.

[6] For a more detailed description of the issue of refinery complexity see pg. J-40 through J-43 of Appendix J to the Initial Statement of Reasons.

[7] The WSPA membership reached consensus on the use of this allowance allocation approach after extensive internal deliberation. This proposed calculation method was captured in a WSPA spreadsheet that staff made publicly available with the first 15-day rulemaking package: http://arb.ca.gov/cc/capandtrade/meetings/072011/wspa.xls (accessed September 5, 2011)

[8] For more details on Solomon's refinery benchmarking see: http://solomononline.com/documents/Whitepapers/EII_AM_WWW.pdf (accessed September 8, 2011)

Although the EII value is a complexity-adjusted measurement of energy efficiency and not greenhouse gas efficiency, staff feels it provides an appropriate performance metric for complex facilities in the first compliance period. This metric is well understood by all complex facilities and has been recognized under the US EPA's Energy-Star Program.[9]

Under the proposed approach, the facility with the best (most efficient) EII will receive the greatest portion of their historical emissions baseline. Less efficient facilities will receive smaller portions of their individual historical emissions baseline. A true-up using actual emissions will occur at the end of the compliance period to ensure there is no excessive under or over allocation.

Facilities without EII Values

In the first compliance period, refineries that do not have an EII value will receive allowances based on the simple barrel benchmark. To address stakeholder concerns about excessive rewards through free allocation for these simplest facilities, a limit on the amount of allowances a facility can receive was imposed using historical emission levels for the facility in question. This will prevent any excessive allocation under this metric.

Expected First Compliance Period Results

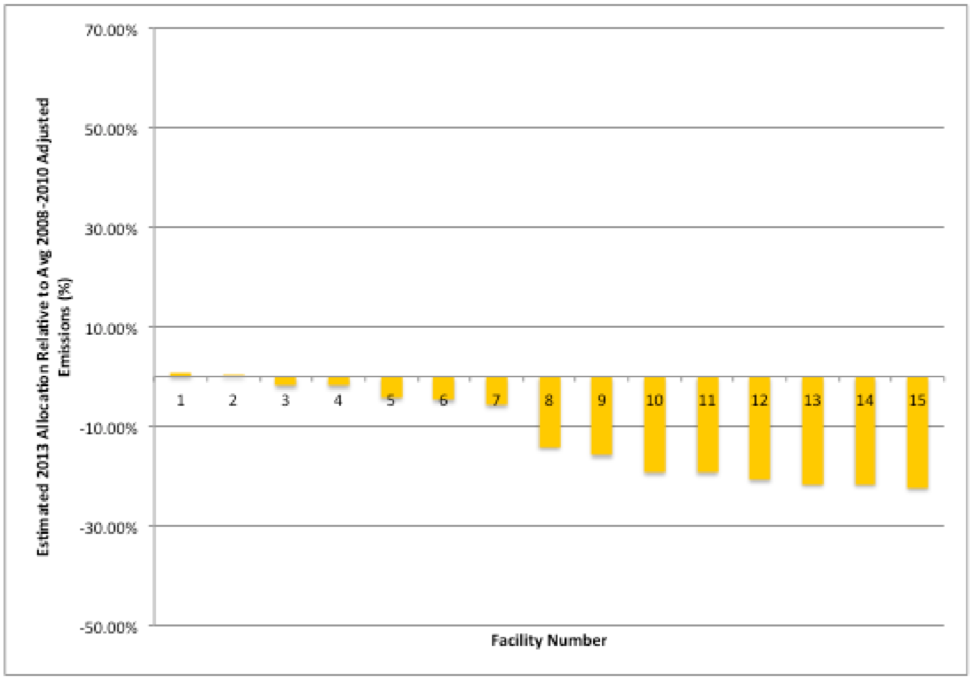
Using this new allocation methodology, staff anticipates a much smaller difference between the initial positions of the best and worst performers as shown in Figure 2 relative to a simple barrel only approach (Figure 1).[10] This smaller range should address concerns expressed by refinery stakeholders about transition risk and short-term competition issues between in-state refining facilities. The expected impact (Figure 2) also addresses concerns noted in stakeholder comments that more than 50% of refiners would have excess allowances relative to emissions under the simple barrel only approach.[11]

[9] For information on US EPA's Energy Star program's guidelines on refinery energy use see: http://www.energystar.gov/ia/business/industry/ES_Petroleum_Energy_Guide.pdf (accessed September 5, 2011)

[10] Note that the ranking of facilities in Figure 2 is not necessarily the same as in Figure 1 due to the change in performance metric for the more complex facilities.

[11] cf. http://www.arb.ca.gov/lists/capandtrade10/1547-ucs_comments_on_15-day_modified_cap-and-trade_regulation_aug_11.pdf

Figure 2. Estimated 2013 Allowance Surplus (+) or Shortfall (-) After Free Allocation (Current Proposal)



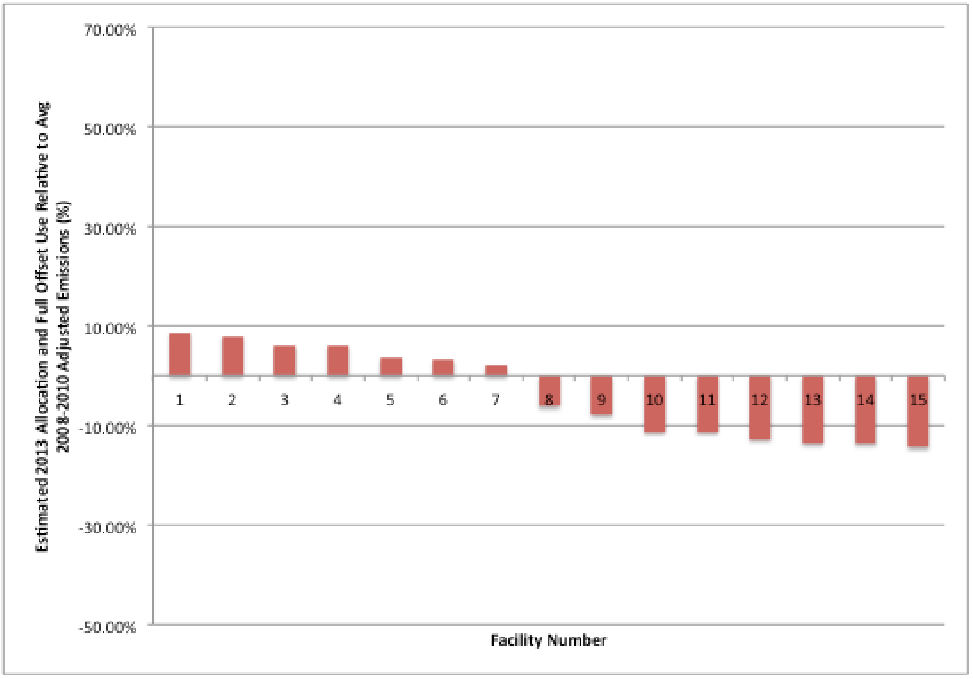
To evaluate the true competitive position of these facilities, offset credit use must also be considered. Because offsets are expected to trade for less than allowances, the combination of freely allocated allowances and permission to use offset credits creates an arbitrage opportunity.[12] Each offset credit purchased and used for compliance liberates one freely allocated allowance that could then be sold for a profit or banked for future compliance.

Staff anticipates that free allocation combined with offset use will create an opportunity for the most efficient industrial facilities to benefit from the cap-and-trade program in the first compliance period. The estimated competitive position of the California refineries in 2013, after accounting for offset use, is shown in Figure 3. Assuming maximum use of offsets, facilities 1 through 7 will benefit from the cap-and-trade program in 2013. Investment in direct GHG reductions at the refining facilities would also free up allowances for sale and allow the facility to benefit from the cap-and-trade program. These rewards for best performers are an intended part of the program design and do not constitute “windfall profit”.

[12] Staff estimates the current spread between California offset and allowance prices to be in the 9.5-10.5 $/metric ton range (estimate based on price information on contracts for December 2013 delivery provided by Evolution Markets, *Western US Environmental Markets Report 09-01-11*).

The spread between EU Emissions Trading Scheme allowance (December 2011 EUA) and offset (Secondary CER) prices was €3.86/metric ton (about 5.56 $/metric ton) as of August 16, 2011. See Volume 5, Issue 7 of *Trading Carbon* available from: http://www.pointcarbon.com/news/tradingcarbon/ (accessed September 5, 2011)

Figure 3. Estimated 2013 Allowance Surplus (+) or Shortfall (-) After Free Allocation and Offset Use (Current Proposal)



Current Proposal: CO_2 Weighted Tonne Approach for the Second and Third Compliance Periods

In the second compliance period, transition risk will have diminished. At this time staff proposes all refineries receive allowances using a uniform complexity-adjusted approach. This method will employ the Carbon Dioxide Weighted Tonne (CWT) metric initially developed for the European Union's Emission Trading Scheme (EU ETS). Extensive work has been conducted using a robust dataset of European refineries to create the CWT approach.[13]

Under this approach, refiners will report throughput or product values for a variety of processes to ARB. ARB will convert these throughput values into CWT

[13] For more information about the development of the CWT approach for allowance allocation in the European Union's Emission Trading Scheme see: (1) the general EU ETS benchmarking page:
http://ec.europa.eu/clima/documentation/ets/benchmarking_en.htm (accessed September 5, 2011).
(2) The initial report on the CWT methodology:
http://ec.europa.eu/clima/studies/ets/docs/bm_study_-_refineries_en.pdf (accessed September 5, 2011).
(3) Sector specific guidance, including info for the refining sector:
http://ec.europa.eu/clima/documentation/ets/docs/benchmarking/gd9_sector_specific_guidance_en.pdf (accessed September 5, 2011).

equivalents using the factors contained in Table 1 of the Mandatory Reporting Regulation. Each facility will receive allowances based on the product output-based equation found in section 95891(b) of the cap-and-trade regulation and the CWT benchmark value of 0.0295 allowances per CWT.

This metric is preferable to the proposed approach in the first compliance period because it is based on greenhouse gas intensity, adjusts to recognize refinery complexity, and can provide equity between all possible ownership structures for hydrogen production, electricity and heat production, and coke calcining facilities.[14] The method also is not dependent on a proprietary index and, therefore, is somewhat more transparent. However, the information necessary to calculate the metric is still generally confidential business information.

Some stakeholders noted a concern that the use of the EII metric only considers energy efficiency and not greenhouse gas efficiency. A move to the CWT allocation methodology in the second compliance period addresses this concern. Staff plans to conduct additional technical work on the CWT approach in 2012 and will recommend any appropriate changes to the Board resulting from this analysis in a future regulatory package.

[14] To provide this equity the benchmarks for hydrogen and coke calcining are based directly off of the CWT factors for these processes.

Table 1. Values Used in the Calculation of the "Simple Barrel" Benchmark

ARB Data	**2008**	**2009**	**2010**	**08-09 Average**	**08-10 Average**
Emissions from Facilities with Product Data (Metric Ton CO_2e)	33,849,176	32,107,493	31,971,381	32,978,335	32,642,683
Indirect Emissions Adjustment for Energy Flows (Metric Ton CO_2e)	-940,369	-786,038	-758,764	-863,203	-828,390
Adjusted Emissions from Facilities with Product Data (Metric Ton CO_2e)	*32,908,808*	*31,321,455*	*31,212,617*	*32,115,132*	*31,814,293*
Motor Gasoline, Jet Fuel, Distillate Production (Thousands of Barrels)	627,050	600,531	608,241	613,791	611,941
Asphalt and Aviation Gasoline Production (Thousands of Barrels)	9,491	6,316	7,372	7,904	7,727
Total Production of Primary Refinery Products (Thousands of Barrels)	*636,541*	*606,847*	*615,613*	*621,694*	*619,667*
Average Emissions Intensity (Metric Ton CO_2e/Thousand Barrels of Primary Products)	*51.7*	*51.6*	*50.7*	*51.7*	*51.3*
Benchmark (Metric Ton CO_2e/Thousand Barrels of Primary Products)				***46.5***	***46.2***
Annual Sum of California Energy Commission Weekly Fuels Watch Data[1] (For comparison to ARB data)					
Motor Gasoline, Jet Fuel, Distillate Production (Thousands of Barrels)	619,489	587,555	600,109	603,522	602,384
% Difference Between CEC and ARB Data [(ARB - CEC)/ARB]	1.2%	2.2%	1.3%	1.7%	1.6%

[1] CEC Data Available from: http://energyalmanac.ca.gov/petroleum/fuels_watch/