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Argus White Paper:
Carbon pricing for oil products in California and Quebec

Greenhouse gas-reduction programs in California and Quebec will expand significantly next year to include gasoline and diesel — their largest single source of carbon emissions. This compels fuel marketers and traders to adapt their fuel contracts to include the cost of buying carbon allowances under these cap-and-trade programs. And they are turning to Argus index prices to account for this cost of carbon per gallon or liter of fuel, which at recent prices will add nearly 10¢/USG to the price of gasoline

Argus launched accurate, independent and transparent index prices for liquid specifications this month. The prices are backed by a published methodology, which is developed in consultation with the industry, strong editorial procedures and a robust corporate compliance program.

Expansion of carbon coverage

The Argus additions target all market participants that are likely to be affected by California and Quebec's expanded cap-and-trade programs. The programs were launched in 2013, but inclusion of transportation fuels and small users of natural gas for the second compliance period, 2015-2017, will roughly double the size of the two linked carbon markets.

Argus' new carbon-in-fuels series will be a useful tool for the industry as carbon costs are likely to be passed on to traders, marketers and ultimately the consumer through wholesale prices at the rack. These carbon prices may also be a guide for others in provinces and states that intend to join a cap-and-trade program that would link them to California and Quebec later.

The additions to Argus environmental markets coverage are:

- California Carbon Allowance (CCA) prices per US gallon (USG) for gasoline and diesel in California
- CCA carbon prices per liter for gasoline and diesel in Quebec
- Low-Carbon Fuel Standard (LCFS) carbon costs per USG for gasoline and diesel in California

California Carbon Allowances (CCAs) must be used to meet most emitters' compliance obligations in the state and are mainly released to the market through state-run quarterly auctions and some free allocations.

The most liquid traded CCA contracts are those for prompt-month and December delivery. Both delivery periods are already assessed by Argus, which added the prompt CCA assessment. Many covered entities in the fuels sector are starting to trade allowances in advance of the start of the second compliance period. Allowances within the same compliance period tend to trade at similar levels, as they are fungible for all years in the compliance period apart from a 30pc annual surrender obligation.

CCA carbon prices per USG for gasoline and diesel in Califonia

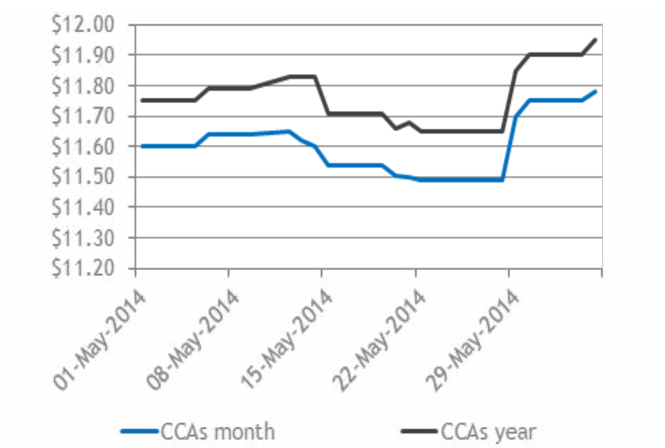
These four carbon prices cover regular, midgrade, and premium CARBOB-derived gasoline and ultra-low sulfur diesel. They are being published daily and are built using the Argus prompt month-delivery assessment of California Carbon Allowances (CCAs).

Fuel traders are expected to trade in the prompt-month CCA assessment, which is most closely aligned with the timeframe in which fuels are priced. Fuel marketers' products and other environmental markets they trade in, such as the federal renewable identification number (RIN) market, tend to price on the day of delivery.

The prompt CCA assessment is for delivery within 30 days, but rolls three business days before the last business day of the month. Argus will also publish the monthly average price on the last business day of the month.

California's cap-and-trade program requires sellers at wholesale points (the rack) to buy and retire carbon credits to cover the combustion emissions of the gasoline and diesel they sell. The compliance requirement for fuels is borne by the entity that has title to the fuel immediately upstream of the rack. Rack markets are highly competitive with small margins. The cost of carbon/USG is likely to be passed on to the consumer as it is several times a rack seller's typical margin for fuels.

CCAs FOR PROMPT MONTH AND END-DECEMBER DELIVERY



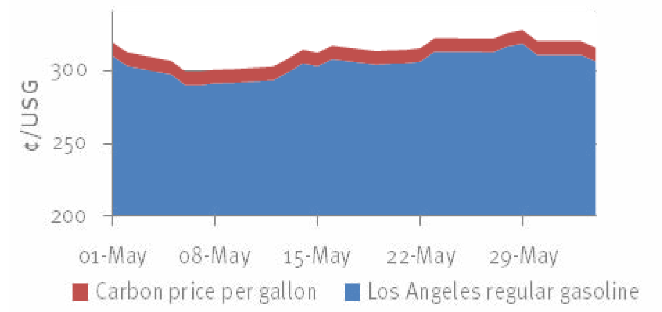
Biofuels are exempt under the cap-and-trade program, so the compliance obligation covers only the petroleum portion of blended fuels. Argus is publishing the cost of those allowances as per gallon prices in cents/USG of the blendstock. The carbon intensity for the blendstocks is spelled out by summer and winter blends and grades. Therefore-Argus will publish the winter and summer numbers as dictated by the normal fuels schedule.

California emissions factors

		Total CO2e/USG	E10 CO2e/USG
CARBOB Summer	Regular	0.00893	0.00804
	Midgrade	0.00891	0.00802
	Premium	0.00889	0.008
CARBOB **Winter**	Regular	0.00891	0.00802
	Midgrade	0.00891	0.00802
	Premium	0.00891	0.00802
Distillate	No. 2 Ultra Low Sulfur	0.01024	

At current CCA prices of \$11.75/t, the carbon costs would add 9.5¢/USG or \$3.94/bl to the cost of gasoline that has 10pc ethanol content in California. That same carbon price leads to a cost of 12.03¢/USG for diesel, or \$5.05/bl.

CCA PRICES VS LCFS CREDIT PRICES



CCA carbon prices per liter for gasoline and diesel in Quebec

The provincial cap-and-trade program is linked with California's and its carbon allowances can be traded with those issued in California. This gives Quebec allowances the same price and enables carbon fuel costs to be based on the same prompt CCA assessment.

Quebec emissions factors

	Emissions factor t CO2e / Kiloliter	t / liter
Automotive Gasoline	2.361	0.002361
Diesel	2.79	0.002790

From next year, fuel sellers in Quebec must buy carbon allowances to cover combustion emissions from fuels they sell. Like California, Quebec requires sellers at wholesale points to buy and retire carbon credits to cover the combustion emissions of the gasoline and diesel they sell to entities below the rack.

LCFS carbon prices per USG for gasoline and diesel derived in California

The weekly price series shows the cost of covering the LCFS compliance obligation for a gallon of diesel and gasoline using the program's credits. The prices are calculated off the Argus weekly LCFS assessments, which were launched in June 2012 and are priced in \$/tons. The carbon price breakdowns may be used in fuel invoicing in the state and are a useful aid to fuel marketers and buyers.

Fuel blenders' Low-Carbon Fuel Standard (LCFS) requirements in California come on top of the carbon allowance costs they may face for compliance with the cap-and-trade program. The LCFS obligations also typically end up at the rack level as that is where fuels tend to be blended and finished.

The LCFS program is designed to reduce the carbon intensity of California's transport fuels by 10pc from 2010 levels by 2020 and is part of a suite of measures to reduce the state's greenhouse gas emissions to 1990 levels by 2020.

LCFS credits are generated by selling low-carbon intensity fuels for use in California, such as biofuels, natural gas or electricity. Fuel producers are rewarded with LCFS credits by the California Air Resources Board for the amount their fuel's carbon intensity is below that year's target. The LCFS has already caused large use of biofuels in gasoline and diesel blends.

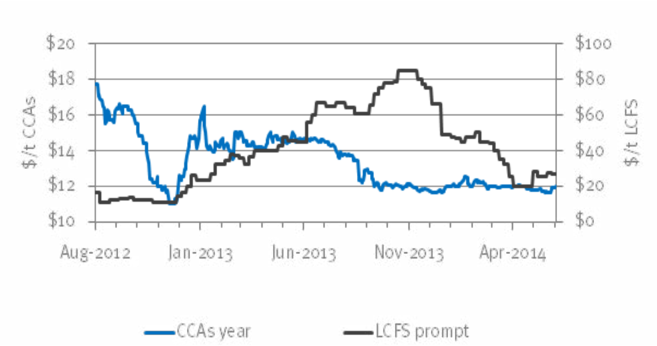
Background

The new services are part of a suite of environmental market prices published by Argus, including SO2/NOx emissions trading assessments; carbon markets in California, the eastern US and Alberta; and renewable energy certificates across the country.

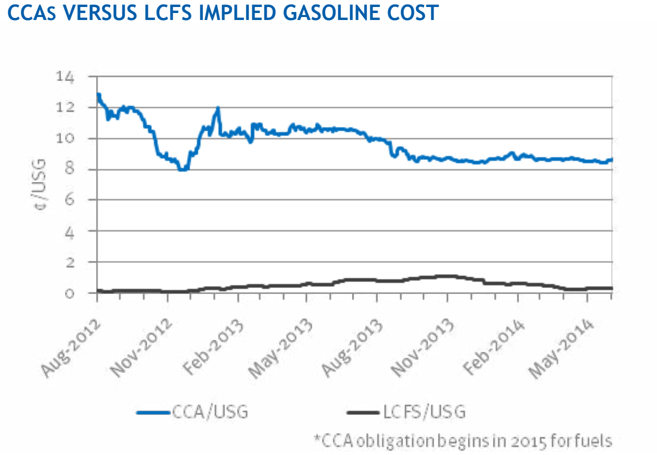
Argus also launched price assessments of two types of California Carbon Offsets, which reflect reductions in emissions elsewhere and can be used for up to 8% of annual compliance under California's cap and trade. Because offset invalidation by regulators is a concern, Argus assessments are for "golden offsets" which are guaranteed by sellers, and "three-year offsets" which can be revoked within three years of being issued if fraud or major errors come to light. The offsets can be used to meet up to 8pc of a compliance entity's obligation.

*See methodology for all Argus environmental assessments: **https://www.argusmedia.com/methodology**

CAP AND TRADE AND THE LCFS



CCAS VERSUS LCFS IMPLIED GASOLINE COST



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