

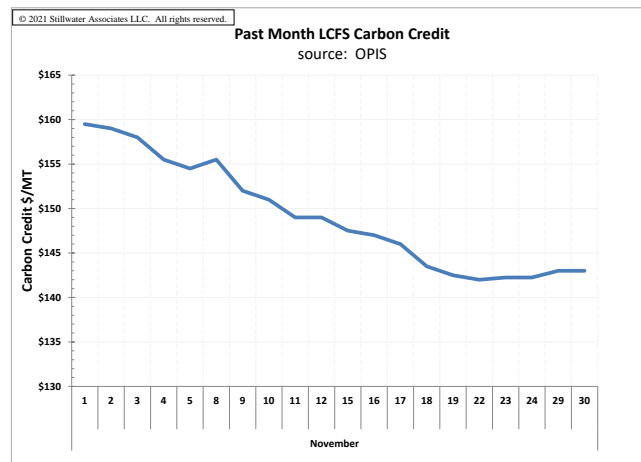
California Low Carbon Fuel Standard (LCFS) Monthly Newsletter November 2021

In this monthly edition...

- **Market:** Credit price decreased to \$143/MT; number of trades and volume of credits traded both decreased.
- **News:** Arbor Renewable Gas selects Beaumont, Texas as home of its first renewable gasoline plant, intending to supply drop-in gasoline made from woody biomass into the California LCFS market.
- **Analysis:** RNG – Is it the “real deal” for LCFS compliance?

LCFS Credit Price Trend

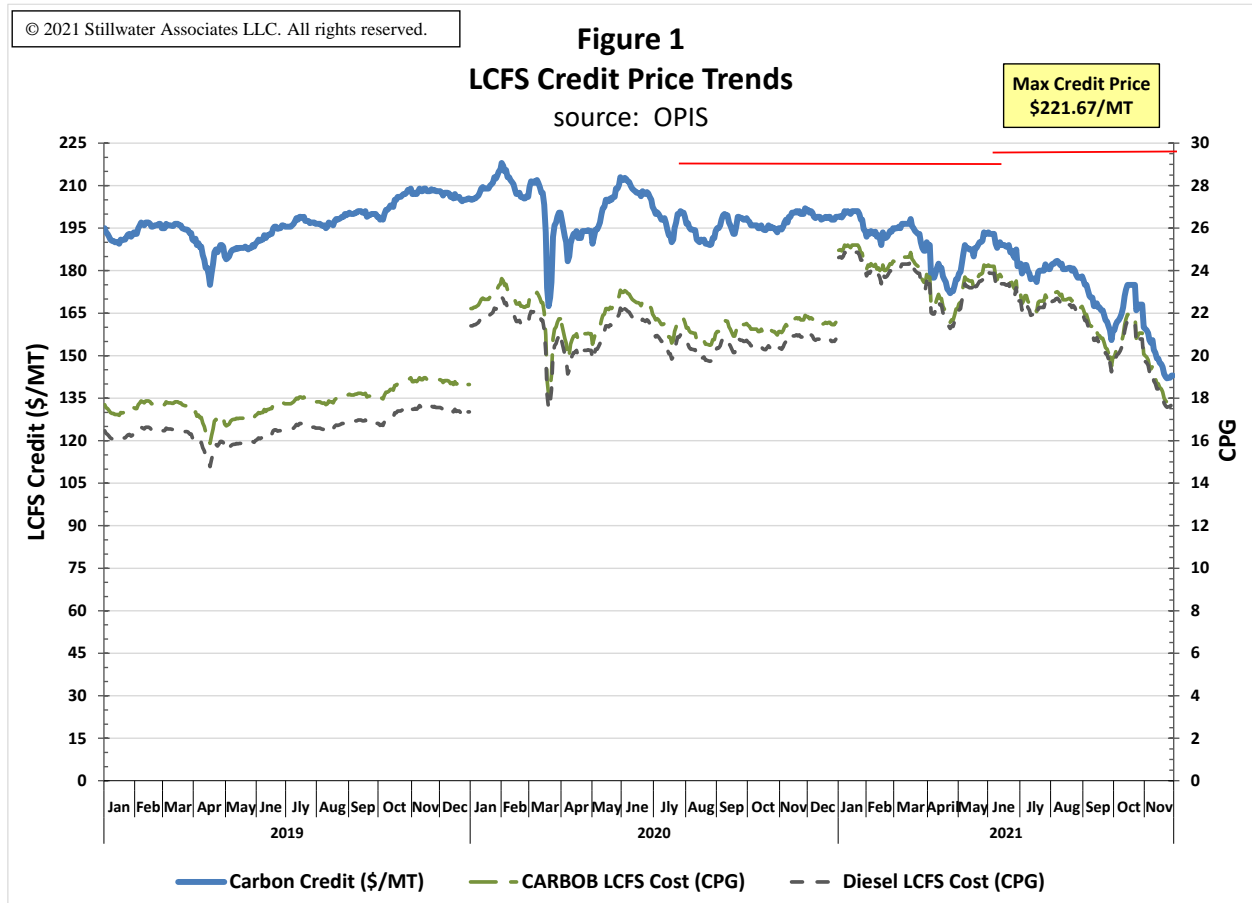
For November, LCFS credit prices ranged from \$159.50 to \$142 per metric ton (MT) of carbon dioxide equivalent (CO₂e). The month closed out at \$143/MT – \$17/MT (~11%) lower than October’s closing price. For the month of November, prices averaged \$142/MT compared to an average of \$195/MT for the same month last year. Based on the 2021 benchmark, a credit price of \$143/MT correlates to 17.2 cents per gallon (CPG) for CARBOB and 16.9 CPG for ULSD.



In addition to the direct cost of LCFS credit prices, in 2020 and 2021 the LCFS program’s incremental crude CI provision has been triggered, adding additional deficits to all CARBOB and ULSD in California. At a credit price of \$143/MT, the November 2021 added cost of the incremental crude provision for CARBOB is 0.70 CPG. For ULSD, the November 2021 incremental crude cost is 0.79 CPG. Given the cost of this additional deficit, the total added cost of the LCFS program for November 2021 is 17.9 CPG for CARBOB and 17.7 CPG for ULSD.

Long-Term LCFS Credit Price Trends

During 2021, LCFS credit prices have averaged \$180/MT, reaching a high of \$201/MT on January 22nd and a low of \$142/MT on November 22nd. For 2020, the year-average price was \$200/MT. With the 2019 amendments to the LCFS program, a maximum credit price (or price cap) was established at \$217.97 effective July 1, 2020, matching the 2020 CCM maximum price. On June 1, 2021, the price cap increased to \$221.67/MT and will remain at that level until June 1, 2022. Credit price trends for the past two years are displayed in Figure 1 below. For 2020 and 2021, the LCFS cost for CARBOB and ULSD displayed includes the cost of the incremental crude provision.



LCFS Credit Trading

Table 1 displays the number, volume, and average price of credits as reported in the California Air Resources Board (CARB) [Monthly LCFS Credit Transfer Activity Report for November](#).

**Table 1
LCFS Credit Trading Reported by CARB**

Time Period	Total Transfers (number)	Total Volume (credits-MTs)	Avg. Price (\$ per Credit) Per ARB Report	Price Range (\$ per Credit)	Ave Transaction Size - MT	Transactions per Week
CY 2012	24	164,000	\$17		6,833	0.5
CY 2013	202	887,000	\$55		4,391	3.9
CY 2014	304	1,667,000	\$31		5,484	5.8
CY 2015	578	2,852,000	\$62		4,934	11.1
CY 2016	929	5,343,000	\$101		5,751	17.8
CY 2017	1226	8,875,000	\$89		7,239	23.5
CY 2018	1725	13,334,000	\$160		7,730	33.1
CY 2019	1656	14,146,000	\$192		8,542	31.8
CY 2020	2461	21,728,000	\$199		8,829	47.1
Q1 2021	729	6,685,000	\$198		9,170	56.7
Q2 2021	616	6,119,000	\$191		9,933	47.4
Q3 2021	488	4,352,000	\$185		8,918	37.1
Oct-21	434	3,782,000	\$182	\$148 - \$215	8,714	98.0
Nov-21	128	1,125,000	\$174	\$141 - \$200	8,789	29.9
TOTALS	11,500	91,059,000	\$118		7,918	22.2

Number of RPs	Selling	Buying	Both
	184	26	144

Source: CARB Monthly LCFS Credit Trading Activity Report for November 2021 and prior reports

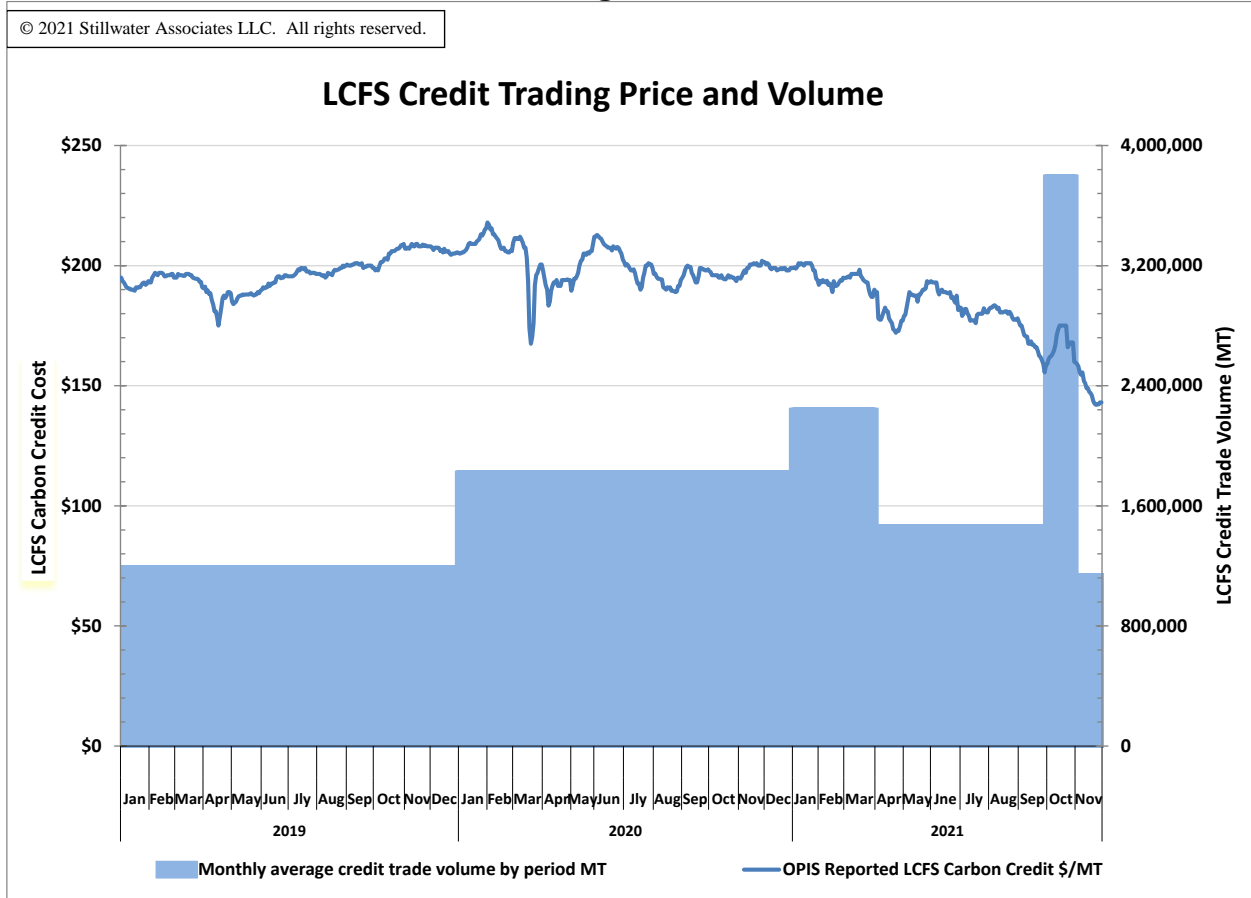
The number of reported transactions decreased by ~75%, from 434 in October to 128 in November. The volume of credits also decreased by ~70%, from 3,782,000 MT in October to 1,125,000 MT reported in November. CARB's reports may include some related party transactions.

The November volume-weighted average price reported by CARB was \$149/MT, which is ~17% lower than the \$174/MT average calculated by daily spot price reports. At a price of \$174/MT, the credits traded in the month of November amount to more than \$195 million changing hands.

LCFS Credit Trading Price and Volume

Figure 2 below graphically illustrates the monthly average transaction values and the volume of credits traded, as reported by CARB, and shows the LCFS credit price reported daily by OPIS.

Figure 2



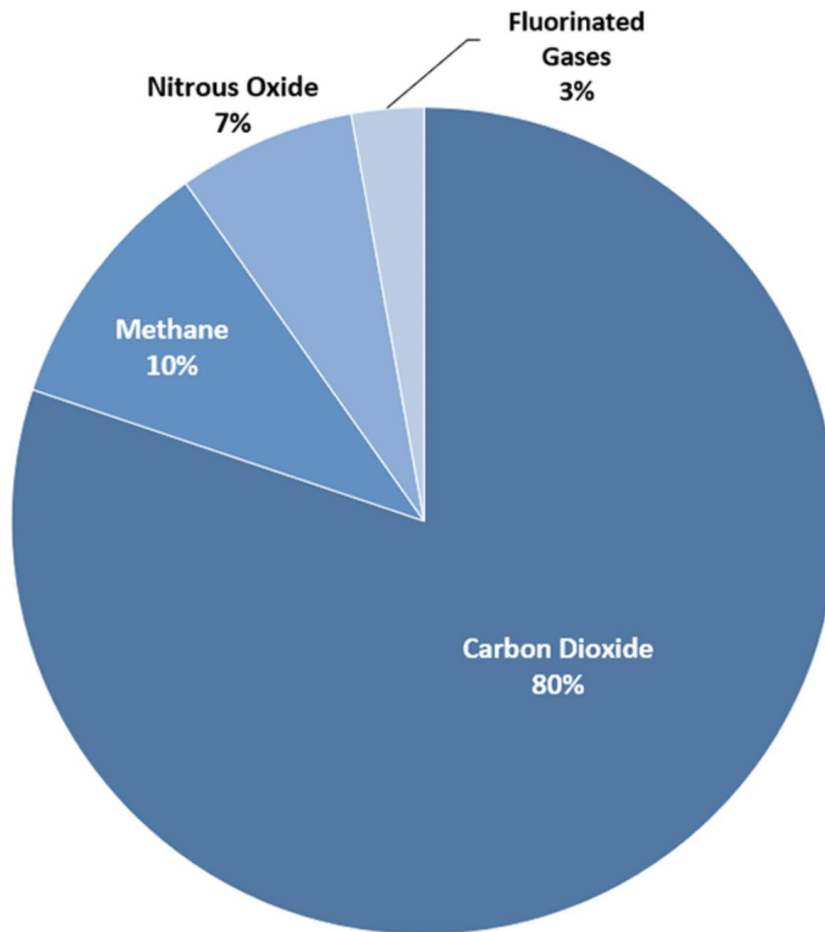
Highlight: Renewable Natural Gas – Is it the Real Deal for LCFS Compliance?

Recently, several alternative fuels have been touted as replacements for fossil fuels to enable movement towards meeting the oft-stated goal of net-zero greenhouse gas emissions by 2050 or even as early as 2035. These fuels include electricity, hydrogen, and renewable natural gas (RNG, also referred to as biogas or biomethane.) In this commentary, we look at RNG’s role in reducing GHG emissions and consider how this role is likely to change in the future.

How is RNG beneficial to reducing GHG emissions?

According to the U.S. Environmental Protection Agency (EPA), methane is the second largest type of GHG emission in the U.S. and makes up 10% of the total in CO₂ volume equivalents, as shown in Figure 3 below.

Figure 3. Overview of U.S. Greenhouse Gas Emissions in 2019¹



U.S. Environmental Protection Agency (2021). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019

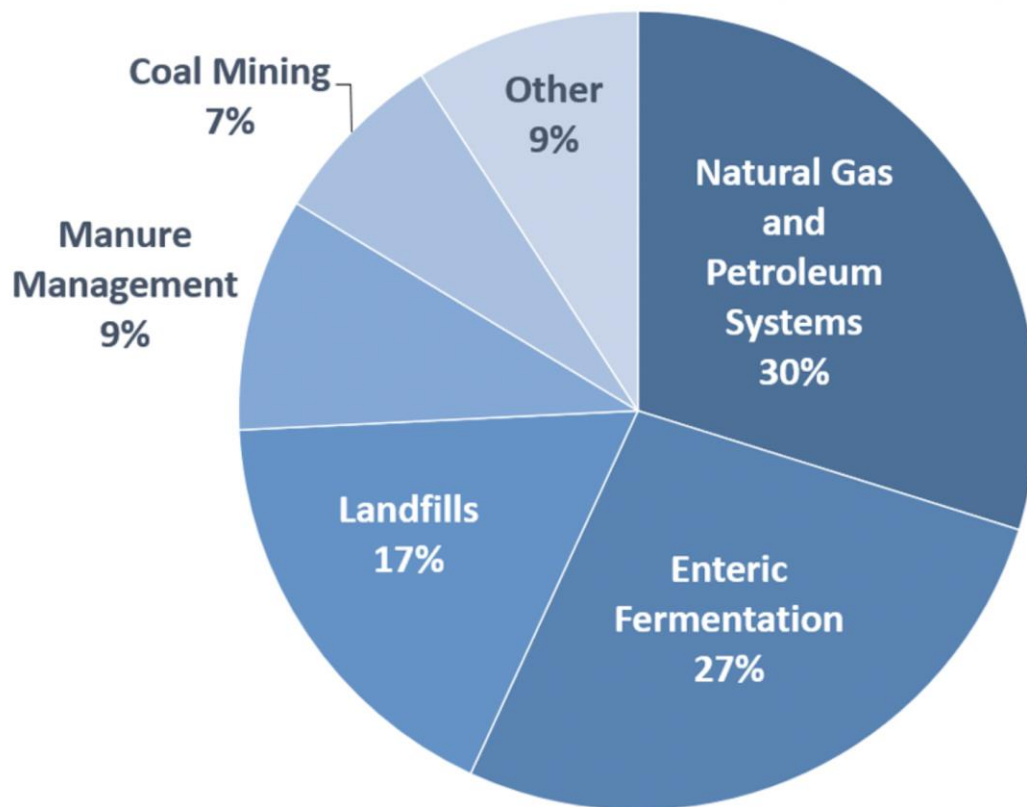
Total U.S. Emissions in 2019 = 6,558 million metric tons of CO₂ equivalent (excludes land sector). Percentages may not add up to 100% due to independent rounding.

¹ <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

Methane emissions have an impact 25 times greater than the same weight of carbon dioxide emissions (this is about a factor of nine based on volume), so reducing the release of methane can have a big impact on overall emissions. For its part, natural gas is a mixture of about 95% methane with small amounts of ethane, nitrogen, and propane and trace amounts of oxygen, CO₂, and argon. Capturing methane that is otherwise being released into the atmosphere without purpose and using it to replace natural gas produced from fossil sources reduces GHG emissions nine times more than simply reducing fossil natural gas consumption by the same volume.

Figure 4 below shows the relative amount of methane emitted from different sources in the U.S.

Figure 4. U.S. Methane Emissions by source (2019)²



U.S. Environmental Protection Agency (2021). Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019

Note: All emission estimates from the Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019 (excludes land sector).

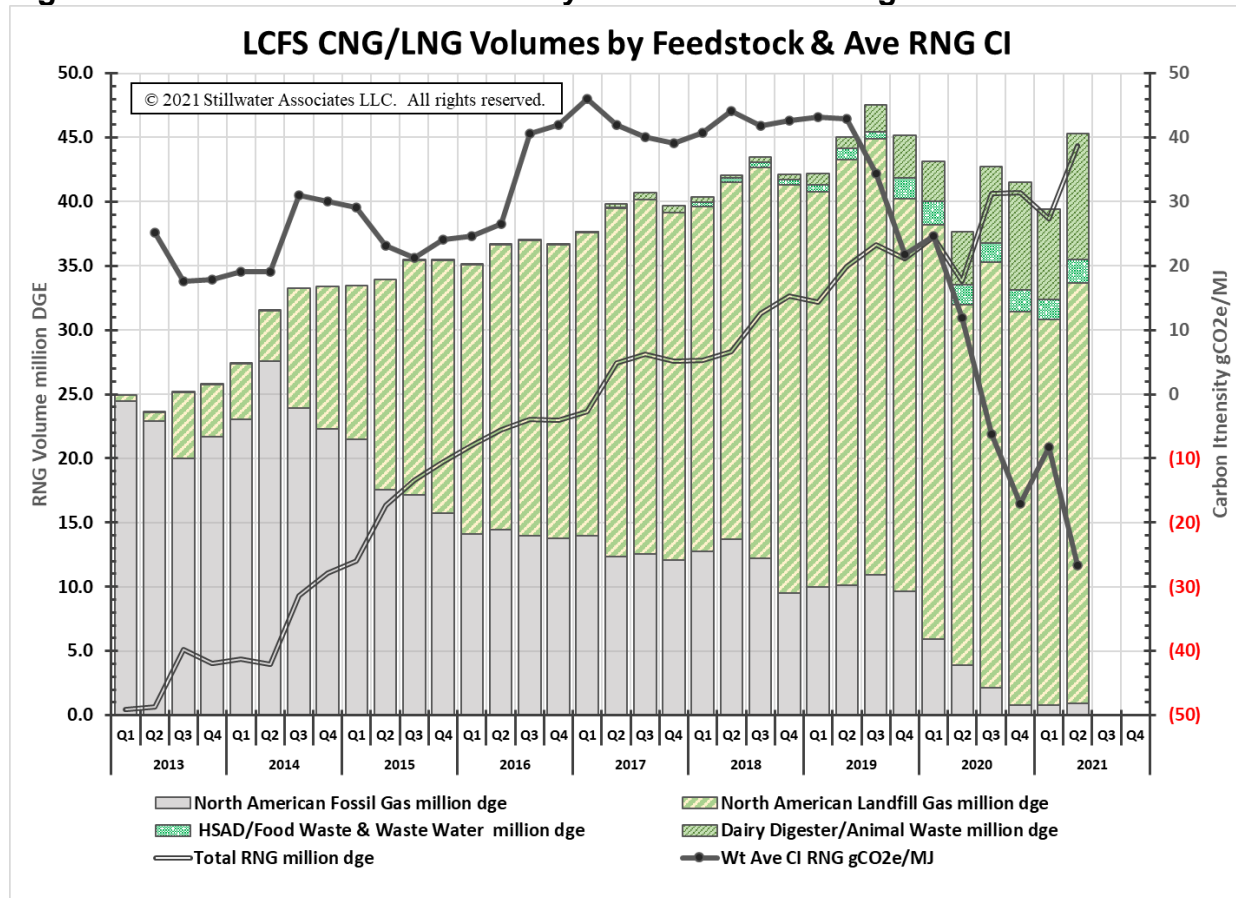
As can be seen, fossil fuel development and use accounts for 30% of the production. This is less than the emissions from manure, landfills, and enteric fermentation (the digestive process in cattle, sheep and goats) which make up about 53% of methane emissions. While work is being done to reduce emissions from enteric fermentation, capturing the

² <https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

emissions from manure and landfills for fuel use has the potential to reduce the methane emissions contribution for U.S. GHG emissions by 26%.

Over the past decade, use of compressed and liquefied natural gas (CNG and LNG) in California for use in natural gas vehicles (NGV) has increased significantly, as seen in Figure 5 below, which shows CNG/LNG volumes in California from 2013 through the second quarter of 2021. From the beginning of LCFS in the first quarter of 2011 through the second quarter of 2013, almost all of the fuel for these vehicles was fossil natural gas. At that time, natural gas for NGVs had an average carbon intensity (CI) of about 78 g/MJ (about 75.5 g/MJ for CNG and 83.5 g/MJ for LNG) and was generating LCFS credits because the CI reduction standard was set at 97.05 g/MJ in 2013. By the end of 2013, significant volumes of renewable natural gas (RNG) produced from landfills began penetrating the market. Methane is naturally produced by anaerobic bacteria in municipal solid waste landfills, which have about 17% of U.S emissions as shown in Figure 4 above. With a CI of about 50 g/MJ, RNG from landfills generates more than twice as many credits as fossil natural gas per unit, so it is a natural replacement for fossil natural gas under the LCFS and grew to over 80% of the CNG/LNG pool by 2018.

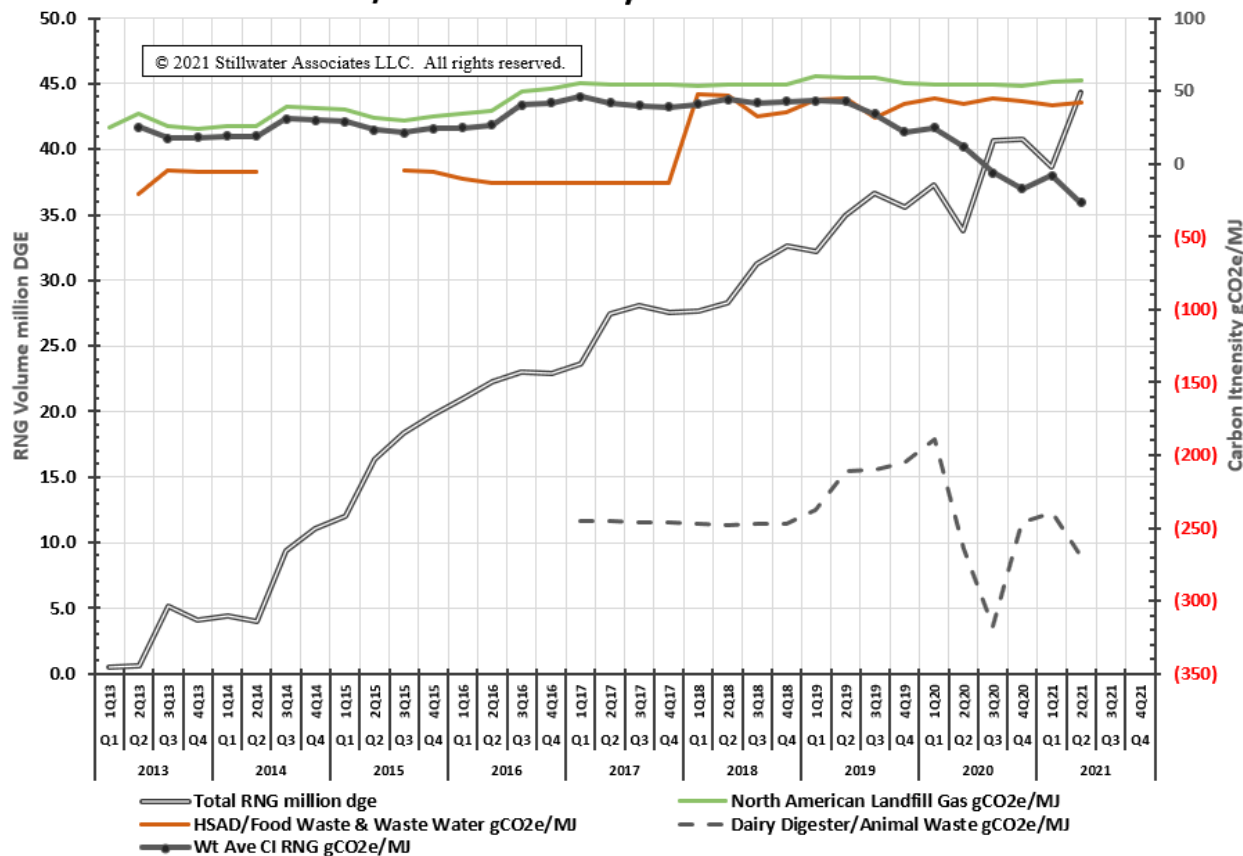
Figure 5. LCFS CNG/LNG Volumes by Feedstock & Average RNG CI



In late 2018, RNG from wastewater solids digesters, food waste, and swine and dairy digesters began to be used in California which initiated a rapid reduction in the average CI of RNG from 46 g/MJ in 2Q2019 to minus 27 g/MJ by 2Q2021. Figure 5 also shows total RNG use increasing from near zero in 1Q2013 to nearly all the gas used in vehicles by 2Q2021.

Figure 6 below shows average CI of the three categories of RNG used in California alongside the total volume of RNG used. RNG from landfill gas, food waste and wastewater, and dairy digester/animal waste have consistently had average CIs of 50 g/MJ, 40 g/MJ, and -250 g/MJ (or less), respectively over this timeframe as total RNG use has risen.

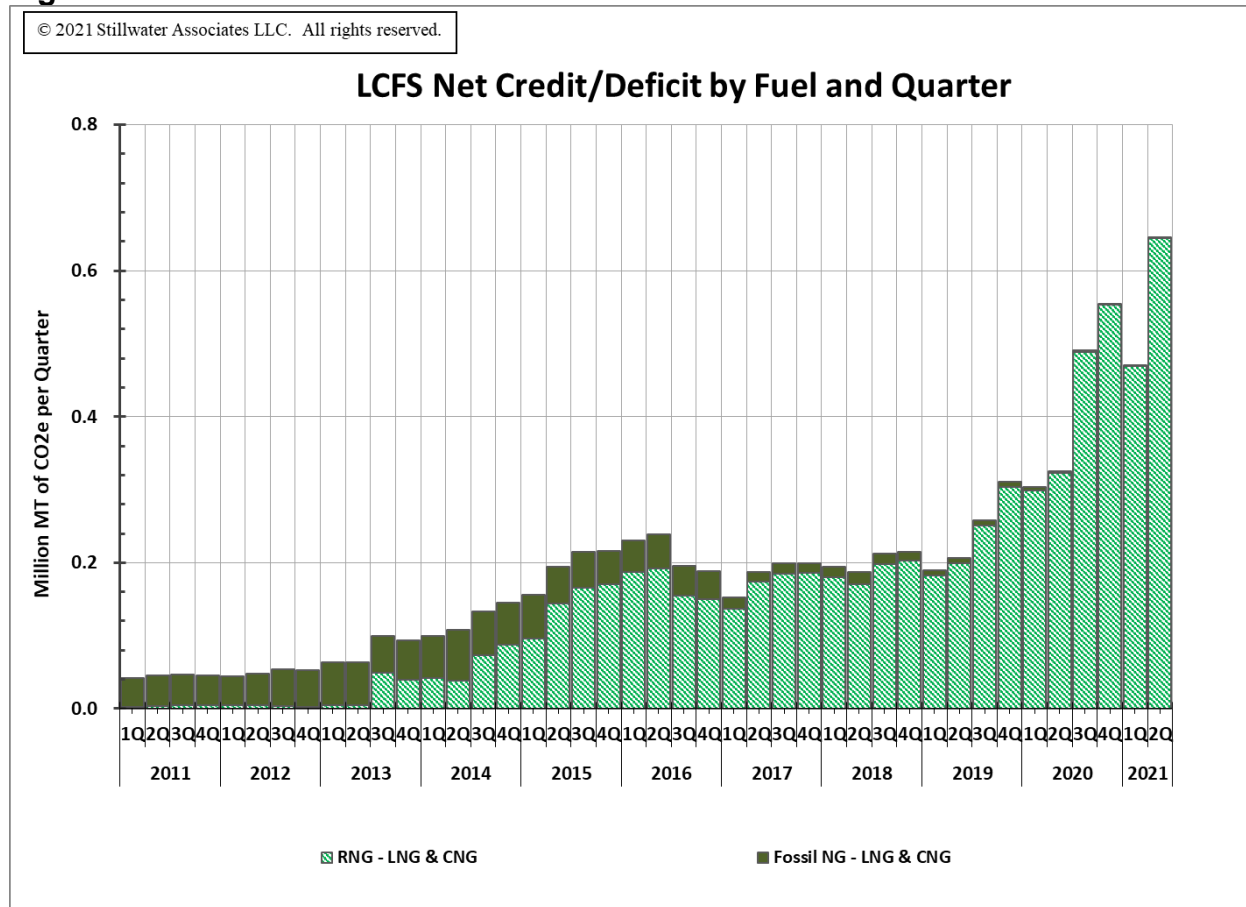
Figure 6. LCFS CNG/LNG Volumes by Feedstock & Average RNG CI
LCFS CNG/LNG Volumes by Feedstock & Ave RNG CI



This growth in volume of RNG used, combined with the sizeable reductions in average RNG CI have resulted in the substantial growth in credits generated from the CNG/LNG sector as shown in Figure 7 below. As can be seen, from 1Q2011 to 2Q2013 credits were completely from fossil fuels and their generation was flat but began to increase with the introduction of RNG in the last half of 2013. After increasing to about 200,000 MT of credits per year as RNG replaced fossil natural gas, credits remained at that level for several years until the increases in dairy digester/animal waste gas began to cause

credits to increase dramatically. Credit generation in 2Q2021 was 645,000 MT, which is more 15 times what it was in the beginning of the program and more than triple what it was just eight quarters ago as the average CI of the CNG/LNG for all sources decreased from 40 to minus 35 g/MJ.

Figure 7. LCFS Credits Generated in the CNG/LNG Pool



CARB currently lists 261 approved Tier 1 and Tier 2 pathways for CNG and LNG from RNG with an average CI for all RNG pathways of about -7.4. These range from -532.74 g/MJ for CNG from Manure at Calumet Dairy Farms in Wisconsin to 83.36 g/MJ for landfill gas from WM Renewable Energy in East St. Louis, Illinois. This contrasts with fossil natural gas CIs, which can be as high as 93.59 g/MJ. Table 2 below displays data for these pathways listed in CARB’s database and shows how incredibly low the CI is for manure relative to the other sources.

Table 1. Summary of Existing RNG Pathways for LCFS Compliance

Feedstock	Number of Pathways	Minimum CI (g/MJ)	Maximum CI (g/MJ)	Average CI (g/MJ)
Manure	54	-151.4	-532.7	-317.6
Landfill Gas	189	7.4	83.4	50.6
Wastes and Wastewater Sludge	18	-79.9	57.8	29.5
Total	261	-532.7	83.4	-7.4

How RNG Qualifies for LCFS Credits

There are at least five ways RNG can qualify for LCFS Credits:

1. Fuel for CNG/LNG vehicles
2. Feedstock for production of hydrogen used in fuel cell vehicles (FCVs)
3. Feedstock for production of hydrogen for refineries to produce CARB gasoline and diesel
4. Fuel to generate electricity used in electric vehicles (EVs)
5. Direct use to replace natural gas at fuel-production facilities – such as ethanol and RD plants and refineries – to reduce the CI of the fuels produced.

Section 95488.8(i)(2) of the LCFS regulation specifies a procedure that enables RNG to qualify for credits from the first three of these methods in addition to direct supply. This procedure is referred to as “Book and Claim” and is also described conceptually in a recent guidance document.³ Book and claim accounting allows RNG that enters a pipeline to be counted towards LCFS if that pipeline is connected to the North American natural gas pipeline network. This is significant because unlike other aspects of refining, such as the generation of process heat needed for operation, RNG can generate credits even if the RNG methane molecules do not physically enter the state. For reporting transactions, the LCFS recognizes the use of book and claim accounting for pipeline-injected RNG that is either claimed as a transportation fuel (e.g., bio-CNG), or claimed as a feedstock to produce hydrogen for transportation purposes (including hydrogen that is used in the production of a transportation fuel). The fact that RNG is allowed for the gas used for refinery hydrogen production, which means that in addition to being used to fuel CNG and LNG vehicles, the growing volume of RNG can begin to displace natural gas used to produce the hydrogen needed to produce CARBOB and CARB diesel, which significantly increases credit generation potential in future years.

The Bottom Line – Is RNG the Real Deal?

Even though CNG/LNG demand has not increased significantly in California over the past couple of years, the Covid pandemic has clearly had an impact on all transport fuel demand. Stillwater expects this demand to increase significantly over the next ten years with miniscule use of fossil natural gas going forward. Even usage of landfill gas will continue to decline in California as larger quantities of lower-CI gas from digesters penetrate the market, significantly lowering the average CI of the fuel and increasing LCFS credit generation. Landfill gas can, however, create value for the refiners who use hydrogen to produce California’s gasoline and diesel. In addition, RNG can be used to

³ https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/guidance/lcfsguidance_19-05.pdf

produce low CI hydrogen for the fuel cell vehicle market. RNG producers understand these opportunities. In just one recent week, CARB announced applications for nine new pathways for hydrogen produced from manure or landfill gas. The bottom line: RNG production and use will continue to grow with increasingly lower CIs that result in significant increases in credit generation. Stillwater considers this to be the real deal.

Take it a step further: How does the above discussion play into the long-term outlook for the LCFS program? Will this support credit prices or case them to plummet further than seen this year? [Contact us](#) to learn more about our Quantitative LCFS Credit Price Outlook which offers Stillwater's expert view into the likely trajectory of the credit bank and credit prices through 2031. We consider the supply and demand of all fuels (including RNG) and project credits covered under the LCFS and CI trends for each fuel pool as we construct an in-depth quantitative view of the market. [Contact us](#) for more information.

Stillwater sees things others miss. We have been tracking developments in California's LCFS and Oregon's CFP and the corresponding credit and fuels markets since the programs' inceptions. Our Associates leverage decades of experience in the transportation fuels industry to provide the insights offered in this newsletter. We are also available to provide more in-depth and personalized analysis and outlooks for our consulting clients. If you find yourself wanting a deeper dive on the subjects we've covered in this newsletter, [contact us](#) to learn how we can help.

In the News – November 2021

- On November 2nd, [Reuters reported](#) that executives at CVR Energy plan to move forward with plans to produce RD at CVR's Wynnewood, Oklahoma refinery beginning Spring of 2022 after halting the proposal earlier this year due to high soybean oil prices. According to Reuters, additional “plans to produce renewable fuels at its Coffeyville refinery in Kansas will depend on the expansion of low carbon fuel standard programs throughout America.”
- On November 2nd, the [Weekly Credit Transfer Report for October 25-31](#) was posted on CARB's website.
- On November 3rd, [Ethanol Producer Magazine reported](#) that the USDA announced a “new Climate-Smart Agriculture and Forestry (CSAF) Partnership Program designed to scale the deployment of climate-smart farming practices and demonstrate the link those practices have on reducing GHG emissions.” One goal is to implement the program “in a manner that allows for the scaling of farmer access to LCFS markets through the establishment of validated, non-proprietary verification protocols.”
- On November 3rd, [RTO Insider reported](#) on a petition submitted to CARB by a coalition of environmental, animal rights and community organizations that challenges the eligibility of dairy-manure biomethane for LCFS credits. “The petition alleges that the standard's credit system doesn't account for emissions throughout the full life cycle of the biomethane,” thus overstating its benefits.
- On November 8th, [Bakersfield.com reported](#) the announcement of Bloom Dairy's one megawatt (MW) fuel cell deployment at Bar 20 Dairy Farms in Kerman, California to produce renewable electricity. “To turn cow waste into renewable electricity, Bar 20 Dairy Farms combined a methane digester, gas clean-up skid, and Bloom Energy fuel cells for an end-to-end, waste-to-electricity solution.”
- On November 9th, [CARB posted](#) that “pursuant to section 95489(c) of the LCFS Regulation, an innovative crude method application using solar photovoltaic generation from Crimson Resources Management, Corp. and SolarSense CA II, LLC is being released for public comments.”
- On November 9th, the [Weekly Credit Transfer Report for November 1-7](#) was posted on CARB's website.
- On November 10th, [Reuters reported](#) that Southwest Airlines and IAG (which owns British Airways) have agreed to purchase nearly 300 million gallons of sustainable aviation fuel (SAF) made from woody biomass. The SAF will generate LCFS credits and RINs. According to Reuters, Southwest and IAG “will buy at a fixed price that includes projected cost of the credits.”
- On November 10th, [CARB released](#) an innovative crude method application using solar photovoltaic generation from Crimson Resources Management, Corp. and SolarSense CA II, LLC for public comments.
- On November 16th, the [Weekly Credit Transfer Report for November 8-14](#) was posted on CARB's website.
- On November 17th, [Arbor Renewable Gas announced](#) that it selected a 53-acre site in Beaumont, Texas, as the home of its first renewable gasoline plant. According to the company's press release: “The plant will produce approximately 1,000 barrels per day of high quality, environmentally responsible ‘drop-in’ renewable gasoline” from

woody biomass and will be shipped to California consumers, qualifying for LCFS credits.

- On November 18th, CARB announced a public “2022 Scoping Plan Update – Natural and Working Lands Scenarios Technical Workshop” which will be hosted Thursday, December 2, 2021 from 1:00 pm – 4:00 pm (Pacific Time). [You can register here](#).
- On November 23rd, CARB announced a public workshop covering “Potential Future Changes to the LCFS Program” which was held Tuesday, December 7th from 9:00 am – 12:30 pm (Pacific Time). Staff presented initial concepts and took verbal comments during the workshop. After the workshop, stakeholders were invited to provide written comments through 5:00 pm Pacific time on January 7, 2021. The agenda was made available at the [LCFS Meetings and Workshops page](#) prior to the workshop, and a link to submit written comments was posted to the same page on the day of the workshop.
- On November 23rd, CARB announced a public workshop covering “2022 Scoping Plan Update – Building Decarbonization” which was held Monday, December 13th from 9:00 am – 3:00 pm (Pacific Time).
- On November 23rd, the [Weekly Credit Transfer Report for November 15-21](#) was posted on CARB’s website.
- On November 24th, the International Energy Agency published a piece entitled “[Carbon capture in 2021: Off and running or another false start?](#)” which highlights advancements in carbon capture, utilization, and storage which is incentivized by the LCFS.
- On November 26th, [The Gazette reported](#) that “Eastern Iowa landowners with property on or near the route of a proposed carbon sequestration pipeline are receiving letters from Navigator CO2 Ventures, telling them of public meetings about the project and that, after the meetings, they could be approached about pipeline easements on their land.” For their part, Iowa ethanol plant officials hope that by sequestering the greenhouse gases produced at their facilities, they can lower their carbon intensity score and be able to sell the biofuel in states, like California and Oregon, with LCFS programs. [According to Iowa Public Radio](#), however, not all Iowa residents are thrilled about the proposed route for the CO2 pipeline.
- On November 30th, the [Weekly Credit Transfer Report for November 22-28](#) was posted on CARB’s website.
- On November 30th, CARB released a provisional Tier 2 Pathway from Element Markets Renewable Energy, LLC for Compressed Natural Gas (CNG) from swine manure at Somerset Farm in Powersville, MO (upgraded biomethane pipelined to California for transportation use) for a 10-day public comment period. The summary of the pathway and related supporting documents are available [on CARB’s website, here](#).
- On November 30th, [Aemetis, Inc. announced](#) that “memorandums of understanding have been signed with 8 airline members of the oneworld Alliance for 350 million gallons of blended fuel containing sustainable aviation fuel (“SAF”) to be delivered to San Francisco International Airport. Once finalized, the agreements will cover the delivery of sustainable aviation fuel over a seven-year term beginning in 2024.”

LCFS News Beyond California

- On November 2nd, the Province of British Columbia published the [October 2021 monthly credit market report](#) on the [B.C. LCFS Credit Market page](#).
- On November 5th, the Oregon DEQ announced [proposed amendments to OAR 340](#) related to the Oregon Clean Vehicle Rebate. “Some of the program changes include a review of the rebate amounts offered by the program, including the option of increasing the Charge Ahead Rebate amount to up to \$5000. Other program changes authorized by the statute include allowing low-income service providers to apply for the Charge Ahead Rebate.”
- On November 8th, [NGT News reported](#) on the clean transportation provisions within President Biden’s infrastructure spending bill, recently passed by the U.S. House of Representatives. Among other things, the bill aims to increase EV charging infrastructure and replace thousands of public transit vehicles with zero-emission vehicles.
- On November 10th, the Oregon Department of Environmental Quality announced that it has appointed an advisory committee to review issues related to the current rulemaking to propose changes to the CFP regulation. Advisory committee meetings are tentatively scheduled as follows:
 - Meeting 1 - Dec. 9, 2021
 - Meeting 2 - Jan. 26, 2022
 - Meeting 3 - March 31, 2022
 - Meeting 4 - May 26, 2022

These meetings are open to the public. The committee will designate time on the agenda to hear community comments. Later in this rulemaking proceeding DEQ will invite public comments on and will hold a public hearing about the proposed rules. At that time any member of the public may submit comments and participate in the public hearing.

- On November 10th, [Albuquerque’s The Paper published](#) an article highlighting comments and commitments made by New Mexico Governor Michelle Lujan Grisham at the U.N. Climate Change Conference in Glasgow, Scotland last week. Among the actions to which Governor Lujan Grisham committed New Mexico was “Implementing a low-carbon fuel standard to reduce the carbon intensity of fuels.”
- On November 10th, [Argus reported](#) that Environment and Climate Change Canada announced that Canada will not finalize its national LCFS program before next spring. They had previously targeted December of this year for program finalization.
- On November 10th, [The Seattle Times](#) reported that the Washington Supreme Court ruled that Gov. Jay Inslee exceeded his constitutional authority when he vetoed lines inside a 2019 transportation bill. According to the Times, this decision by the court “appears to pave the way for another lawsuit by the Legislature against Inslee’s more recent controversial veto. In that instance, Inslee signed into law legislation implementing clean-fuels standards this spring. But he vetoed a part requiring a new statewide transportation-funding package for the climate legislation to come into effect.”
- On November 11th, [SCS Global Services announced](#) that it has been “approved as an independent verifier by the Oregon Department of Environmental Quality for Oregon’s Clean Fuels Program.”

- On November 11th, [the Washington State Wire covered comments](#) from outgoing chair of the Senate Transportation Committee concerning transportation issues, decarbonization, and the recently passed clean fuel standard.
- On November 15th, [Tidewater Renewables announced](#) a multi-year agreement “with an investment-grade company to sell British Columbia Low Carbon Fuel Standard (“BC LCFS”) credits that it will receive through the construction of the Renewable Diesel & Renewable Hydrogen Complex at Prince George, BC (the “Complex”), at values higher than previously budgeted.”
- On November 16th, The Low Carbon Fuels Division of Environment and Climate Change Canada announced that “An information session is planned for Thursday, November 25th from 1 to 4pm EST to provide an overview of draft qualification methods (QMs) under the [proposed Clean Fuel Regulations](#) for “enhanced oil recovery (EOR) with CO₂ capture and permanent storage including technical advice to finalize the QM for CO₂ capture and permanent storage; co-processing in refineries; and the generic QM, for projects of a type for which there is no applicable QM.” The draft QMs will be shared shortly after the session. Stakeholders will then have until December 16th to provide comments. The final QMs will be published alongside the CGII publication, now planned for spring 2022. The WebEx meeting on November 25th [can be accessed here](#).
- On November 26th, the Low Carbon Fuels Division of Environment and Climate Change Canada released [the presentation from its November 25th information session](#) along with the [draft quantification methods](#). Comments on the draft quantification methods were requested by December 16th, 2021.
- On November 29th, [Seattle Weekly reported](#) that Washington state’s King County and the Port of Seattle have agreed to “jointly study the potential for converting municipal solid waste into renewable fuels, including sustainable aviation fuel for Seattle-Tacoma International Airport. Each government agency allocated up to \$250,000 to pursue the technological and economic analysis by early 2023.” According to Seattle Weekly, this work will “help support economic development of the clean energy sector in this region and could help meet the production volume thresholds required in the Washington Clean Fuel Standard.”
- On November 30th, [Reuters reported](#) that “Private equity firm Cresta Fund Management closed on the acquisition of a controlling stake in idled Canadian 135,000-barrel-per-day (bpd) Come-by-Chance refinery, renaming it Braya Renewable Fuels.” The refinery will be converted to a facility capable of initially producing 14,000 barrels of sustainable aviation fuel (SAF) and renewable diesel (RD) daily by about mid-2022 with a second phase aiming to double the capacity of the refinery and incorporate the ability to produce green hydrogen. According to Reuters, “Canada’s Clean Fuel Standard (CFS) will require carbon-intensity reduction targets set for fuels such as gasoline, diesel and kerosene, starting in 2022 and is projected to increase renewable fuel demand.”

- On November 30th, [Advanced Biofuels Canada published a press release](#) stating: “Significant investments are planned in Canada over the next decade for new advanced biofuel and synthetic fuel capacity.”—The results of Advanced Biofuels Canada’s annual capital projects survey of low-carbon fuel producers, technology developers, and industry suppliers indicates that “economic impact from domestic production was calculated to be \$14.1 billion in 2030, almost tripling the sector’s current \$5.3 billion economic impact in 2020.”

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