Waste stream to revenue stream

Calculating the costs and climate impact of California's investments in dairy digester infrastructure

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Abstract

According to the 2023 California Climate Investments Annual Report, the Dairy Digester Research and Development Program (DDRDP) administered by the California Department of Food and Agriculture is the second most cost-effective program funded by cap-and-trade proceeds with expenditure of $9 for every ton of CO_2 abated. While this figure accurately reflects the expenditures of the DDRDP program, it misrepresents the true cost of these investments by ignoring other sources of funding that have flowed to dairy digester projects in California. This report investigates the different state and federal funding sources available to support development of anaerobic digesters on California dairy farms, to better quantify the return on investment (ROI) of public dollars flowing into the industry. This analysis shows that with the inclusion of funding from other state agencies, the return on dairy digester investment from all state-funded programs is closer to $28 per ton of CO_2e. Taking into account other market incentives crucial to digester project feasibility, a conservative estimate of the true public cost of these systems is almost $160 per ton.

Introduction

In its 2017 Short-Lived Climate Pollution (SLCP) Reduction Strategy, the California Air Resources Board (ARB) states that SLCP's are responsible for about 40% of current net climate forcing, due to their role as a significant driver of near-term climate change [1]. One of these pollutants, methane, is a greenhouse gas with a warming potential 25 times that of CO_2 over a hundred-year period[2]. For at least the past 20 years, California's livestock population has accounted for half or more of the State's annual methane emissions [2] [3]. According to the U.S. Environmental Protection Agency (EPA), California emitted more methane from manure management than any other state, and the second most from enteric fermentation (emission of methane produced and released from within the digestive tracts of cattle) [4]. One major reason for the State's elevated methane levels is that California leads the nation in dairy production, and studies show that milk-producing cattle generate more waste on average than 'dry' cows [5] [6]. The state has set a goal of reducing methane emissions statewide by 40% below 2013 levels by the year 2030, and has been rapidly implementing policies to achieve this target [7]. One technology that has shown promise is the installation of anaerobic digesters on dairy farms that can capture methane and use it as an energy source. The projects show promising results and are touted by the state as an extremely cost-effective method of abatement.

[2] This value was determined by the United Nations Intergovernmental Panel on Climate Change's AR4 report, released in 2007. More recent Assessment Reports have updated this calculation, increasing the assessed warming potential for methane, however for consistency, we use the AR4 value as it used by CARB in various GHG accounting applications.

About 25% of California's total methane emissions are a direct result of manure management practices. A common storage technique on California dairy farms is a system that uses water to flush waste from confinement areas to large effluent ponds exposed to the open air [8]. As the organic material within these ponds breaks down, methane is produced and released into the atmosphere. If instead a farm installs an anaerobic digester over its manure lagoon, this methane-containing biogas can be collected and used as an energy source, avoiding the uncontrolled emission of methane and potentially also displacing fossil fuels with a renewable alternative. The first record of a digester in use in California dates back to 1998, when Cal Poly San Luis Obispo installed a digester system on its research farm [9]. In the early 2000's the California Energy Commission (CEC) funded the construction of several digesters, but with challenging permitting issues and prohibitively high costs, widespread digester development was still years away.

It would take strong market signals, significant public investment, and the expansion of environmental crediting programs to include digesters in order to facilitate the industry's growth. Since 2014, the main source of public funding for digester projects has been the Dairy Digester Research and Development Program (DDRDP), run by the California Department of Food and Agriculture (CDFA). Of the approximately 159 digesters currently planned or operating in the state, 131 of them have received funding from the program. The DDRDP was originally supported by California Climate Investments (CCI) funds, which invest revenues from California's Cap-and-Trade program into projects providing climate, public health, and social benefit throughout the state. In its 2023 report on overall cost and impact of its programs [10], CCI estimated that the DDRDP program costs about $9 for every ton of CO_2e abated over a 10-year period. This estimate makes the program the State's second-most efficient climate investment. However, this assessment is incomplete in that it ignores the other sources of funding and revenue available to digester projects.

This report seeks to systematically define and review the various sources of funding that have supported the development of anaerobic digester facilities within California since 2014 when the DDRDP was created. Various funding sources are categorized and summarized below as either direct payment support or market incentives. Following this discussion, we offer revised return on investment (ROI) calculations accounting for these other factors. A brief review of the scientific literature on both digester leakage and methane measurement techniques is then provided, followed by recommendations for the industry.

State and Federal Funding for Dairy Digesters

This section lays out many of the grant programs, incentive structures, and market mechanisms that have been available for the dairy industry of California to leverage in building and operating digesters.

DDRDP: The Dairy Digester Research and Development Program has been funding dairy digesters since its inception in 2014 with money received from the California Climate

Investment fund and in more recent years with General Fund dollars. CCI is funded by proceeds from the state's sale of carbon emission allowances through its Cap-and-Trade auction. According to the program's 2022 annual report, a total of $195 million had been granted to 117 dairy digester projects throughout the state[3]. The program is estimated to reduce over 21 million tons of CO_2e over a 10-year period [10]. An overwhelming majority of California digester projects on record have received funding from this program. Figure 1 displays the amount of funding allocated to the DDRDP program. More information on the DDRDP program can be found on the program website [11].

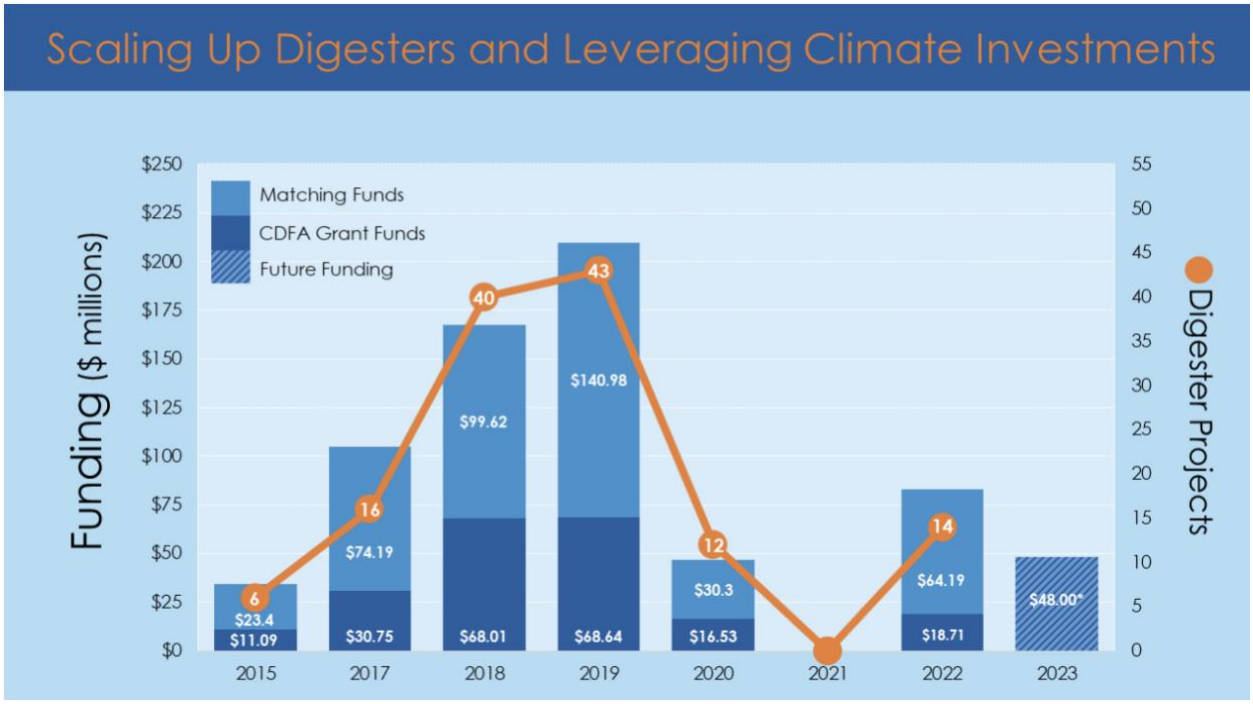

Figure 1: Chart displaying annual DDRDP funding since the program's inception (source: CDFA)

CPUC: The California Public Utilities Commission has also provided funding to support the construction of infrastructure necessary to facilitate the widespread deployment of dairy digester projects. The selection of at least five pilot projects to demonstrate feasibility was legislatively mandated as part of SB 1383, the State's short-lived climate pollutant bill. In 2018, the Commission approved over $300 million in funding for six different pilot projects that would provide interconnection to the natural gas common carrier pipeline. The intention was to further facilitate the growth of the biomethane industry by creating interconnection hubs that multiple dairies could use to inject their produced gas to the state's natural gas supply. In 2019, the Commission adopted ruling 19-12-009 which created an Incentive Reservation System intended

[3] The 2023 DDRDP report has been released but was not cited here because the CCI report that is the subject of this analysis relies on data from the 2022 DDRDP report. The figure included on this page references the 2023 report.

to allocate funding to projects able to successfully interconnect to the natural gas infrastructure by the end of 2026. Thus far, this has provided over $64 million to digester projects around the State. Many projects that participate in these hubs also received funding from the DDRDP program. Details on six selected projects can be found here [12], and information on the Incentive Reservation System is here [13].

CEC: The California Energy Commission has provided multiple funding opportunities to support the construction of digesters on dairy farms, though most of their funding directed towards digesters was provided outside of the temporal scope of this analysis, which is focused on more recent funding. One of the CEC's primary goals as an agency is to facilitate the development of new technologies and innovations, so as mainstream funding and support for digester projects became available, the CEC has shifted its focus to other efforts. Still, around $11 million worth of funding from the CEC has been provided to digester projects through the Electric Program Investment Charge (EPIC) Program since 2014. Information on the history of CEC funding for digesters can be found here [14], and general information on EPIC can be found on the program website [15].

Aliso Canyon Settlement: In 2015, a gas leak at the Aliso Canyon Underground Storage Facility resulted in the release of 109,000 metric tons of methane into the atmosphere [17]. As a result of litigation following the incident, the utility was required to set up a mitigation fund worth $26.5 million to facilitate the development of anaerobic digesters on 12 farms that could capture and abate a comparable amount of methane over the course of ten years. While these funds were provided for digester construction, SoCalGas is not allowed to recover the cost of this fund from its ratepayers, and the abated methane is attributed to the natural gas sector rather than agriculture as with other digester projects [18]. Since this money was provided as a loan rather than a grant, it is excluded from the analysis outlined in this report. More information on the Aliso Canyon Settlement can be found here [19], and in the mitigation agreement itself [20].

USDA REAP: The Renewable Energy for America Program is a federally funded loan and grant program run by the US Department of Agriculture Rural Development Office. Its goal is to assist rural small businesses and agricultural producers in completing energy efficiency improvements or the acquisition of energy systems including anaerobic digesters. Originally started in 2008, the program has been reauthorized several times, most recently with the 2022 Inflation Reduction Act, which significantly expanded the program with plans to award over $2 billion in funding through 2031. The added funding allowed for a doubling of maximum grant awards and federal loan shares rising to 50% of project costs in many cases. On its website, REAP expresses an intent to obligate over a billion dollars to projects within the next two fiscal years. While we know that digester projects in California have received funding from this program in the past, the exact amount of funding provided in total is not available to the public. For this reason, REAP funding, while potentially significant, is omitted from the calculation section of this report. More information on REAP can be found by visiting the program website [16].

Market Incentives

Low Carbon Fuel Standard: A major source of funding/revenue for digester projects comes as a result of participation in the state's Low Carbon Fuel Standard (LCFS) program run by the California Air Resources Board (CARB). The LCFS program is a market mechanism specifically focused on reducing the carbon intensity of transportation fuels in the state. Fuels sold in California are assigned a carbon intensity score in gCO_2e/MJ, and generate credits or deficits depending on whether a given fuel is more or less carbon intensive than the target. The lower the calculated carbon footprint of a fuel, the more credits it can generate and then sell into the market. Since digester projects are intended to abate methane emission, and since the calculation method assumes that the methane would otherwise be emitted, dairy facilities can claim this abatement as a negative emission which drives down the CI of the produced biomethane. Because of the high Global Warming Potential of methane, dairy projects often earn negative fuel carbon intensity scores that far exceed what is possible by other fuel pathways, making them a lucrative source of LCFS credits. Under a current LCFS rulemaking, CARB staff have indicated they may end avoided methane crediting under the program, which would significantly change the CI scores for dairy digester biogas. Since digesters first generated credits in 2017, an estimated $1.1 billion have gone to farms all over the country participating in the market. Currently, there are approximately 57 California farms participating in the LCFS market. Figure 2 shows the rise in LCFS credits generated from animal waste. More information about the LCFS program is available at the program website [21].

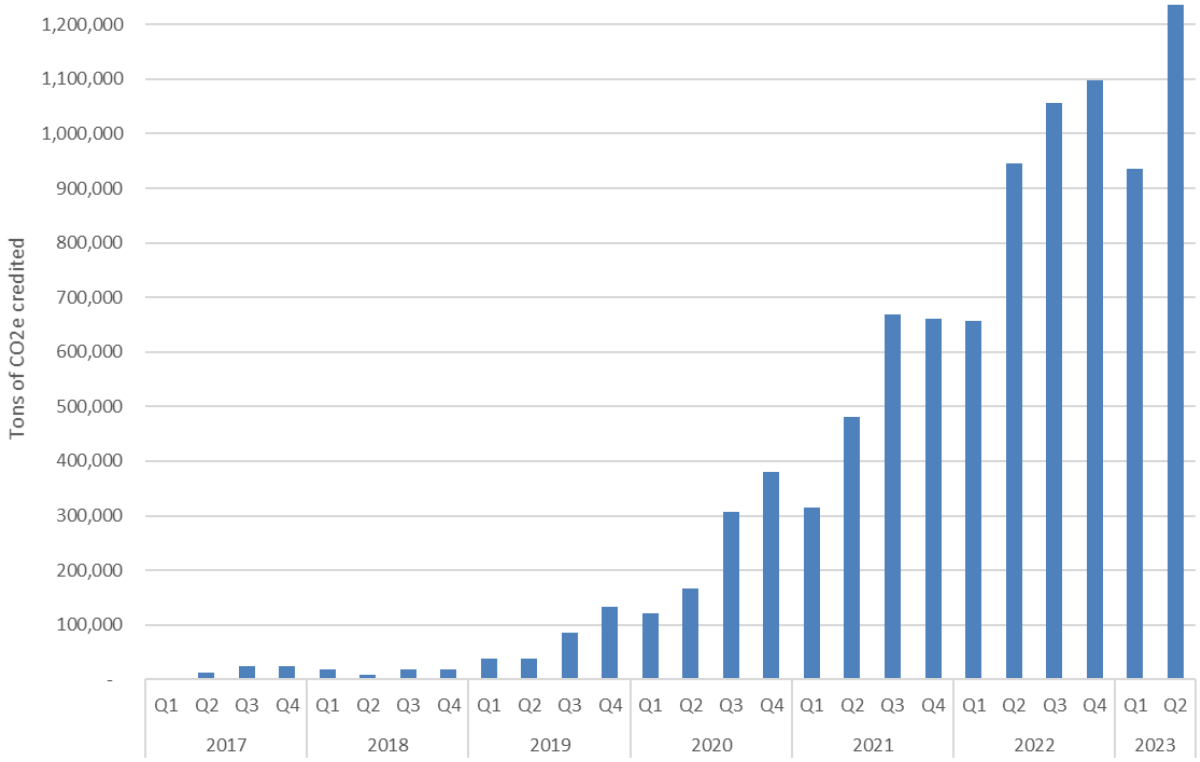

Figure 2: Quarterly credit generation of animal waste digester projects under the LCFS (source: CARB Data Dashboard)

Renewable Fuel Standard: Originally authorized in 2005 and expanded in 2007, the Renewable Fuel Standard (RFS) is a federal market-based program to promote the production and utilization of renewable fuels nationwide. Managed by the US Environmental Protection Agency, the program sets an obligatory amount of renewable fuels of different categories that must be produced and requires fuel refiners and importers to procure increasing amounts of renewable fuel every year. For every gasoline or diesel gallon equivalent a renewable fuel producer generates, they also generate a renewable identification number (RIN) that is sold with the fuel to a conventional fuel blender. Once that renewable fuel is supplied into the national fuel pool, the RIN is separated and can be bought or sold by other fuel suppliers to meet compliance targets. For 2023, over 30 billion gallons of renewable fuel must be provided in total [22]. Over the past two years, the price of a RIN for the type of fuel that digesters produce has averaged between $2 and $3 [23]. It is important to note that biomethane producers can simultaneously claim RINs and LCFS credits for generated fuel. As with the REAP program, available program data is sufficiently granular to accurately estimate the amount of revenue provided from this program to California dairies, so it is omitted from analysis below, though it may offer significant revenue. More about the RFS is available at the program website [24].

Compliance Offset Market: The state's broader cap-and-trade program also allows for digester projects to generate offset credits that can be sold into the market. The program applies to a much larger range of participating entities compared to the LCFS, but both programs are examples of market-based regulation. The requirements between the two programs for digester projects are similar, though importantly more relaxed for LCFS crediting than the traditional cap-and-trade system. For example, LCFS credited projects are not subject to the same additionality requirements that apply to cap-and trade-projects [25]. As a result of the relaxed requirements, and the fact that LCFS credits are far more valuable than cap-and-trade credits, only around 15 California digester projects have participated in the cap-and-trade program. More information on California's cap-and-trade program is available at the program webpage [26].

BioMAT: The Bioenergy Market Adjusting Tariff (BioMAT) program is a CPUC-managed market incentive that obligates the three Investor Owned Utilities (IOUs) to procure electricity from bioenergy facilities less than 5MW in size. A total of 90 MW of electricity is required to be procured from agricultural digesters, split up among the three IOU's. The program exists to facilitate the development of small-scale bioenergy projects within the state, and several projects that have received funding from the DDRDP are participating in this program. IOUs are allowed to match this procurement to their Renewables Portfolio Standard obligations. More information on BioMAT can be found at the CPUC's biomass feed-in tariff page [27].

Financial support for California's dairy digesters

The amount of money invested in the construction and operation of dairy digesters is easier to ascertain for some funding sources than for others. The DDRDP is the most reliable information source on digester investments in California, with legislatively mandated tracking and reporting of expenditures. As of November 2022, the DDRDP had distributed $195 million in funding, while estimating greenhouse gas emissions abatement of approximately 21 million metric tons of CO_2e over the coming 10-year period. The California Public Utilities Commission (CPUC) also has a clearly established funding amount to digester projects, with $318.9 million provided over a 20-year period as part of the Dairy Biomethane Pilot Project selection process and a further $64 million as part of the Incentive Reservation System. The CEC has provided approximately $11 million for three different projects through the EPIC program. The REAP program administered by the USDA does provide funding to digesters, but program data that would reveal direct funding to anaerobic digester projects within the State is not available to the public, so it was excluded from our estimates, as was the RFS program for similar reasons. Table 1 below shows the amounts of verifiable public funding available from different sources that we were able to identify as having flowed to the development of dairy digester infrastructure in California.

Table 1: Public sources of funding for digester projects in California.

Funding Source	**Amount**
Dairy Digester Research & Development Program	$ 195,300,000
California Public Utilities Commission	$ 383,371,518
California Energy Commission	$ 11,000,000
Aliso Canyon Settlement Loans*	$ 26,500,000

*Aliso Canyon loans are included in this table for transparency, but are omitted from further analysis.

Calculating Digester Return on Investment

As discussed above, this report seeks to investigate the California Climate Investment program's estimate of the return on investment (ROI) from dairy digester projects in the state. Appendix A of the 2023 CCI annual report estimates an ROI of $9/ton. This is based on the DDRDP investment of $195.3 million and their projection of 21,024,000 tons of CO_2e in avoided greenhouse gas emissions over ten years:

$$\frac{\$195{,}300{,}000}{21{,}024{,}000\ MT\ CO_2e} = \$9.29/MT\ CO_2e$$

However, as discussed above, the $195 million figure does not represent the total amount of financial support that has been directed to digesters. To calculate an ROI more representative of public investment overall, funding from the CPUC and CEC must also be included. This is especially important as there is a significant overlap in the projects receiving funding. All three of the CEC-funded projects also received money from the DDRDP, and there are many DDRDP-funded digesters that are delivering biogas via the infrastructure paid for from the $318 million contributed by the CPUC. A new ROI taking into account these additional expenditures of state funds can be calculated as follows:

$$\frac{\$195{,}300{,}000\ (DDRDP)\ +\ \$383{,}371{,}518\ (CPUC)\ +\ \$11{,}000{,}000\ (CEC)}{21{,}024{,}000\ MT\ CO_2e} = \$28.05/MT\ CO_2e$$

Not all of the financial support that has flowed to dairy digesters has come from these conventional grant programs, however. Market/regulatory incentives such as the LCFS, RFS, and Cap-and-Trade program all provide crucial financial resources and overall feasibility to the digester market. In a 2022 report on the analysis of California's progress toward achieving the targets of SB 1383, ARB argued that when it comes to dairy digesters, "without large-scale public incentives, the rate of adoption would likely decrease greatly" [18]. In that same report, CARB asserts that a hypothetical 3,000 milking cow dairy could generate as much as $3.5 million in revenue from credit sales at 2019 prices. While the financial incentive is certainly crucial to project implementation, these revenues do not come directly from state coffers. Instead, the costs of the LCFS program are borne by the purchasers of transportation fuels in California. Given that this is a form of subsidy to digester projects that is coming from California taxpayers–even if not directly via their tax dollars–we sought to investigate its impact when considering the public cost of digesters.

Accurate estimation of LCFS credit sales attributable to California's dairy digesters is complicated by the semi-confidential nature of the business transactions taking place. Public data is only available on the monthly average credit price, the total number of credits being generated by animal waste digester projects every quarter, and some heavily redacted information about each LCFS certified dairy pathway. We have estimated credit generation over a ten-year period in order to create a possible range of ROI's that could be feasible should current market conditions persist. This analysis is based on the simplifying assumption there is not a structural difference in fuel production between LCFS-approved dairies in California and those outside the state – meaning that a digester in California generates as many LCFS credits on average as those elsewhere.

Of the 141 LCFS-approved dairy pathways, there are 57 that produce their gas from dairies located in California, equivalent to 40% of the total count, which we therefore assume to produce 40% of total qualifying fuel and LCFS credits. It should also be noted that all 57 of these current dairies received funding from the DDRDP program, so adding this revenue to the total

investment in digesters does not mean increasing the estimated GHG savings, as they are already counted in the DDRDP total.

We know that in the past year, from Q3 of 2022 to Q2 of 2023 there were 4,324,948 total LCFS credits (denominated in tons of CO_2e) generated by digester projects, of which 40%, or 1,729,979 are assumed to accrue to digesters in California based on the above assumption of comparable digester size inside vs. outside the state. Assuming this generation rate remains stable for the ten-year study period and that LCFS credit price over that period remains in line with the 5-year average credit price of \$160[4], LCFS credits would amount to just over \$2.75 billion in revenue to California dairy digesters over this 10-year period. Adding this total to the \$525 million in previously identified state funding results in the following ROI:

$$\frac{\$589{,}671{,}518\ (public\ investment)\ +\ \$2{,}767{,}966{,}720\ (LCFS\ program)}{21{,}024{,}000\ MT\ CO_2e} = \$159.71/MTC0_2e$$

While necessarily imprecise, we believe the above estimates to be conservative. There are around 15 digester projects currently under construction, which were not generating LCFS credits during the period used to estimate revenue but are included in the estimated savings. In addition to new projects coming online, there were funding sources that we were unable to quantify. These include the RFS, offsets created for California's Cap-and-Trade scheme, USDA's REAP program, as well as revenue from the BioMAT program. All of these programs have provided financial support to California dairy digesters but are unable to be reliably estimated and are therefore omitted from our accounting of public investment.

This analysis also assumes that the reported 21.024 million tons of CO_2e that are projected by CCI as being abated over 10 years is an accurate estimate. Estimated project savings that are used by CDFA and by extension the CCI are self-reported using a modified version of the same calculator used to determine LCFS carbon intensity scores at dairies. The modifications allow for the accounting of displaced fossil fuels and assume that farm conditions remain constant for 10 consecutive years of project operation [28].

Additionally, there does not appear to be documentation describing post-installation verification procedures to ensure the accuracy of reported savings after the fact. Table 2 below provides a summary of the range of ROI calculations described in this analysis.

[3]The current LCFS credit price is \$73 per ton and has been on a decline since 2021. However, in its September 8th standardized regulatory impact assessment of proposed changes to the LCFS program, CARB emphasized the importance of a strong credit price and anticipate the new rulemaking will increase the credit price in the coming years as more deficits are generated by the more stringent regulations.

Table 2: Summary of the different calculated ROI's

Calculation	Public Spending	GHG Savings	ROI
Claimed DDRDP Funding	$ 195,300,000	21,024,000	**$ 9.29**
DDRDP + CPUC + CEC Funding	$ 589,671,518	21,024,000	**$ 28.05**
DDRDP + CPUC + CEC + 10 years of 40% of LCFS credit generation	$ 3,357,638,238	21,024,000	**$ 159.71**

State of the Science on Anaerobic Digesters & Emissions

There have been several recent studies aiming to evaluate the effectiveness of anaerobic digesters at capturing methane, with varying results reported. Scheutz & Fredenslund measured total emissions rates at 23 different biogas plants in Europe [29]. The team found that fugitive emissions rates for the plants measured were between 0.4% and 14.9%, with an average of 4.6% of a system's total methane production. Half of the plants in the study were digesting wastewater, while the other half were taking in manure supplemented by other waste streams. For the agricultural digesters only, the average emission rate was 2.4%. Bladé et al. analyzed two digester systems in Canada of different sizes and found that fugitive methane at the larger of the two facilities was 5.5% compared to 3.8% for the smaller facility, though after repairs to the system during the study, the emission rate of the smaller facility dropped to 0.6% [30]. Flesch et al. measured production from a single Canadian biodigester over four seasonal campaigns and found during normal operations the fugitive emissions rate was 3.1% of total production [31]. Comparatively, Vergote et al. measured a system for three consecutive months in autumn and found fugitive emissions varied between 3.9 and 8.2% of total emissions for a given day [32].

While none of these studies represent a manure-only digester system in California, these findings are varied in digester type and feedstock, as well as measurement methodology. We can gather that methane emission levels tend to vary both seasonally and daily, and also depending on the specific on-farm technology and practices. CARB uses a flat rate of 2% of produced methane to calculate an LCFS-participating digester's fugitive methane emissions, a default value that is notably lower than most of the empirical measurements reported above, and without any structural incentive to avoid leakage [33].

There is promising work in the field of remote sensing using satellite- or aircraft-mounted sensors to estimate methane emissions, and several recent studies have focused on California's San Joaquin valley, which is home to the highest concentration of dairies in the State. Duren et al. conducted airborne measurement campaigns on two occasions between 2016 and 2018 and characterized more than 272,000 sources of methane within the state of California [34]. They found that 10% of sources identified were responsible for approximately 60% of point-source

emissions. Of this subset, 26% of these so-called "super emitters" were dairies. No information was offered as to whether the dairies identified were operating digesters. Vechi et al. used remote sensing to estimate emission rates at 14 dairies, and found measured emissions rates that were 60% higher than what was reported in CARB's inventory, though at a low confidence level [35]. Comparatively, Amini et al. used short-term ground-based measurements coupled with airborne sensing, and found that CARB emissions factors were relatively consistent with their estimates [36]. Marklein et al. also conducted a study that, in part, developed a comprehensive database of dairies in California using satellite-based remote sensing to assess the effectiveness of digesters among other goals [37]. The team found that if all current facilities plus those under construction at the time of publication were operational, the state could see statewide CH_4 emissions reduced by 5% and at an average of 26% per facility. These results are promising, though it should be noted that many airborne studies only cover limited time periods, which leaves critical unknowns, given that manure lagoon methane production varies significantly with weather conditions. In a recent publication that sought to establish a comprehensive assessment of the current state of manure management practices in California, the need for "long-term monitoring, in different seasons … after application of different manure management technologies" was highlighted as a crucial next step [38].

Closing Thoughts

When additional funding from outside the DDRDP program is included in the ROI calculation, dairy digester projects are no longer quite as cost-effective as reported by the state. In the California Climate Investments annual report, Appendix A lists every project the state is funding with Cap-and-Trade dollars [39]. There are 77 listed projects from 16 different agencies, though only 51 of these projects provide an ROI calculation. Of these 51, DDRDP's estimated ROI of $9 per ton of CO_2e abated is the second most cost-effective program listed. Including additional public funding from the CPUC and CEC, lowers the ROI to $28.05/ton of CO_2e abated. This would move digesters to the 6th most cost-effective investment listed.

Importantly, without market incentives however, digesters may not be profitable. Including estimated revenue from environmental credit generation yields a more comprehensive view of the financial flows available to digester projects. With estimated LCFS revenues included, the ROI falls to $159 for every ton of CO_2e abated. At this price, digesters fall to about the middle of the pack, as the 22nd most cost-effective program listed in the state's Climate Change Investments report.

Digesters are an emerging and rapidly-expanding technology, with the potential to abate a major point source of methane pollution in California and elsewhere. This is a key reason that so much public funding and incentive support is going into the development of this industry. However, as with any technology pathway, it is important not to overstate the benefits and underplay potential pitfalls as we pursue climate solutions. Expanded research is needed on practically all facets of digester technology and its deployment under the LCFS system.

Below are several recommendations for future work to ensure that these investments deliver climate performance without unintended consequences.

1. **Post-project installation verification of reported greenhouse gas savings:** Currently, to receive DDRDP funding a project need only calculate its estimated emissions savings prior to receiving funds, with no reported follow-up. The program could be amended to allow for third-party verification of methane leakage rate and baseline emissions to determine the actual emission abatement achieved. Finding and addressing methane leakage not only ensures climate outcomes, but also improves the operational economics of digester systems.
2. **Centralized digester tracking system:** Beyond efforts by the EPA's Ag-STAR program, there is no comprehensive list of dairy digester projects currently operating or under construction. Without proper tracking there is no way to determine trends or other important facets of the industry. Simply adding a requirement to register systems with a national database as a requirement of a permit needed to build a digester, or as a requirement of receiving funds would allow for greater transparency into the state of the anaerobic digestion industry and provide a basis for continued research into the field.
3. **Improved data from federal funding and revenue sources:** Currently, data on federal expenditure in the digester industry is unavailable, limiting the scope of digester investment tracking. The REAP program does not publish funding details, and what is available publicly is limited to the name of the funded entity and how much they received. There is no way to determine from readily available data the number and scale of anaerobic digestion systems funded by the REAP program. Similarly, the RFS program does not report sufficiently-granular data to extrapolate credit sales going to digesters, let alone the location of specific facilities.
4. **Stronger economic and industry analysis** to ascertain whether the investments in digesters–especially from the LCFS program–are delivering windfall profits to the dairy industry in ways that could incentivize increased methane generation, distort the market for dairy products, or lead to industry consolidation.

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