



Report of Funded Projects (2015 – 2024)



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Executive Summary

The California Department of Food and Agriculture's (CDFA) Dairy Digester Research and Development Program (DDRDP) awards competitive grants to implement dairy digesters that result in long-term methane emission reductions from manure management on California dairies and minimize or mitigate adverse environmental impacts.

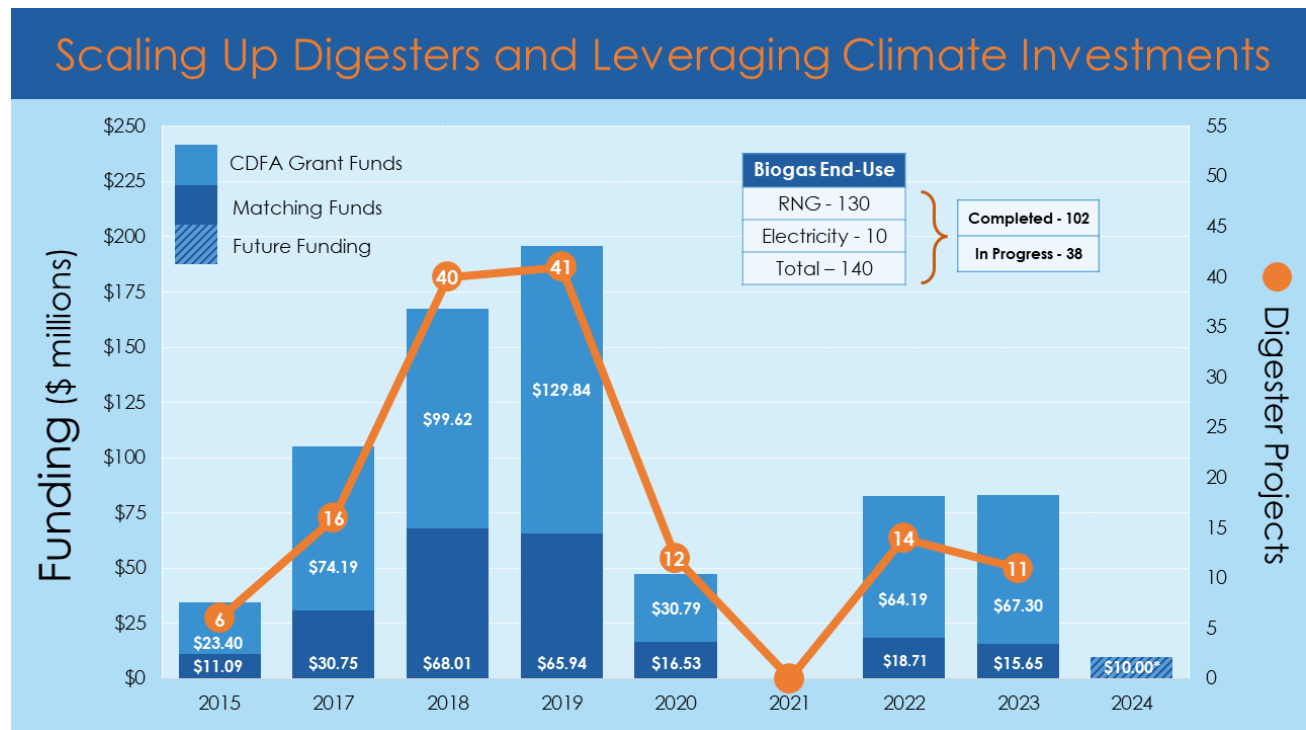


Figure 1. Number of funded digester projects by year¹, with total investments from CDFA grants and matching funds² for each grant cycle, number of projects by biogas end-use³, and number of projects completed and in progress.

The Budget Act of 2017-18 (Item 8570-101-3228) requires CDFA to provide ongoing updates on the Department's DDRDP projects in January of each year beginning in 2018 and continuing through 2027. This legislative mandate is designed to evaluate the efficiency and cost-effectiveness of strategies to reduce emissions of short-lived

¹ The Budget Act of 2022 allocated \$48 million to CDFA for its dairy and livestock methane reduction programs for 2023, which were split evenly for distribution through the DDRDP and the Alternative Manure Management Program (AMMP) with priority given to AMMP. CDFA used half of these appropriations for the 2023 grant solicitation; the remaining funds from the appropriations will be made available through DDRDP and AMMP in 2024, where approximately \$10 million will be made available to DDRDP. This graph does not include an additional \$20 million allocated exclusively to AMMP in the Budget Act of 2022.

² Subject to change.

³ RNG = Renewable Natural Gas

climate pollutants, including methane (a greenhouse gas) from dairy operations. This report includes information on all DDRDP projects funded by CDFA.

CDFA has received \$389 million⁴ since 2014 for the DDRDP and Alternative Manure Management Program (AMMP). The Budget Act of 2022 ([Senate Bill 154, Chapter 43](#)) appropriated \$48 million from California State Budget General Funds to CDFA for dairy methane reduction incentives programs, which were split evenly for distribution through the DDRDP and AMMP. CDFA used half of these appropriations for the 2023 grant solicitation; the remaining funds from the appropriations will be made available through DDRDP and AMMP in a subsequent solicitation expected in the Spring of 2024, where \$10 million will be made available for DDRDP. Furthermore, the 2022 Budget Act (Budget Bill Jr.), [Assembly Bill \(AB\) 179](#) allocated an additional \$20 million exclusively to the AMMP, which was split between 2023 and 2024.

- DDRDP provides financial assistance for the installation of dairy digesters in California, which will result in reduced greenhouse gas emissions from manure management practices.
- AMMP provides financial assistance for the implementation of non-digester manure management practices in California, resulting in reduced greenhouse gas emissions.

CDFA has awarded a total of approximately \$227 million for 140 dairy digester projects, with approximately \$489 million provided in matching funds by grant awardees ([Figure 1](#)). This funding has been awarded to projects that will result in methane emission reductions from manure management practices, as these emissions represent a significant portion of California's agricultural sector greenhouse gas inventory. In 2021, agriculture contributed to approximately 30.85 million metric tons of carbon dioxide equivalents (MMTCO_{2e}), or 8.1 percent of California's total annual greenhouse gas (GHG) emissions ([Appendix A](#)).

Methane emissions resulting from manure management, a subset of these total statewide agricultural methane emissions, account for approximately 2.4 percent of the total statewide GHG emissions, or approximately 29.9 percent of the

⁴ This value covers the cost of providing administrative support to CDFA and technical assistance providers for the AMMP program."

agricultural GHG emissions⁵. The dairy digester projects referenced in this report have a cumulative estimated GHG reduction of 24.6 MMTCO₂e over ten years, or approximately 2.46 MMTCO₂e annually. The funded projects equate to addressing approximately 22.9 percent of the methane emissions from manure management in California and 7.9 percent of the total GHG emissions from the agriculture sector in California ([Figure 3](#)).

I. Program Background and Award Selection Process

Methane is a potent greenhouse gas (GHG) that has a global warming potential 25 times that of carbon dioxide (using 100-year global warming potential). It is also a Short-lived Climate Pollutant (SLCP). Short-lived Climate Pollutants are climate gases that remain in the atmosphere for a much shorter period of time than longer-lived GHGs such as carbon dioxide. The SLCPs are powerful climate forcers that have relatively short atmospheric lifetimes. Because SLCP impacts are especially strong over the short term, acting now to reduce their emissions can have an immediate beneficial impact on climate change and public health. In California, the dairy and livestock sector accounts for over half of statewide methane emissions, with half of these emissions coming from enteric fermentation and the rest coming from manure management. Because no viable enteric methane mitigation option is currently available in the marketplace, the state has focused on methane mitigation strategies related to dairy manure management so far. However, new advances in technology and methane reduction measures from enteric and dairy manure management are beginning to come online, and the State is showing interest in incentivizing research and demonstration projects.

- CDFA was appropriated \$12 million in the Budget Act of 2014 to fund dairy digesters; \$11.09 million was awarded to fund six (6) projects in 2015 through the DDRDP competitive grant process. These projects are estimated to reduce 153,870 MTCO₂e of GHG per year.
- CDFA received an additional \$50 million from the Greenhouse Gas Reduction Fund (GGRF), authorized by the Budget Act of 2016, to fund dairy digesters as well as non-digester practices for methane reduction on California's dairy and livestock operations. Non-digester manure management projects are implemented under a separate program, the

⁵ CARB. California Greenhouse Gas Inventory Program. <https://ww2.arb.ca.gov/our-work/programs/ghg-inventory-program>

Alternative Manure Management Program (AMMP), which provides financial assistance to California dairy and livestock operations.

- \$30.75 million of the FY 2016-17 allocation was awarded to 16 dairy digester projects, which are estimated to reduce 365,676 MTCO_{2e} of GHG per year, and \$9.9 million was awarded to 18 alternative manure management projects in 2017, which are estimated to reduce 65,655 MTCO_{2e} of GHG per year.
- The Budget Act of 2017 and the Budget Act of 2018 allocated \$99 million each year to CDFA to support dairy and livestock methane reduction projects.
 - In 2018, \$68.01 million of the FY 2017-18 allocation was awarded to 40 dairy digester projects, which are estimated to reduce 711,231 MTCO_{2e} of GHG per year, and \$18.25 million was awarded to 35 non-digester projects, which are estimated to reduce 59,212 MTCO_{2e} of GHG per year.
 - In 2019, \$65.94 million of the FY 2018-19 allocation was awarded to 41 dairy digester projects through DDRDP, which are estimated to reduce 681,682 MTCO_{2e} of GHG per year. Another \$30.97 million was awarded to 49 non-digester projects through AMMP and AMMP Demonstration Projects, which are estimated to reduce 71,574 MTCO_{2e} of GHG per year. The latter included AMMP New Technologies and Practices (AMMP Demo - NTP) and AMMP Advancing Practices Farmer-To-Farmer (AMMP Demo – APFF).
- The Budget Act of 2019 allocated \$34 million to CDFA to continue funding DDRDP and AMMP. This allocation was reduced to \$29,058,299 due to smaller than projected Cap and Trade auction proceeds for 2019-20.
 - In 2020, \$16.53 million of the FY 2019-20 was awarded to 12 dairy digester projects, which are estimated to reduce 167,847 MTCO_{2e} of GHG per year, and \$8.93 million was awarded to 13 non-digester projects, which are estimated to reduce 23,513 MTCO_{2e} of GHG per year.
- The Budget Act of 2021 allocated another \$32 million to CDFA to continue supporting dairy and livestock methane reduction programs, with priority given to AMMP.
 - In 2022, \$18.71 million was awarded to 14 dairy digester projects, which are estimated to reduce 193,184 MTCO_{2e} of GHG per year. Additionally, \$18.26 million was awarded to 26 non-digester projects, which are estimated to reduce 32,884 MTCO_{2e} of GHG per year.

- Additionally, from the Budget Act of 2021, \$4.75 million was awarded to fund research grants that will measure and verify emission reductions associated with livestock methane reduction projects through the California Livestock Methane Measurement, Mitigation and Thriving Environments Research Program (CLIM3ATE-RP). Research will include an assessment of the cost-effectiveness of various livestock methane reduction strategies on a per ton basis, including a comparison of projects funded under AMMP and DDRDP, as well as alternative methane reduction strategies such as dietary modification, and research on manure-based product development. To the extent feasible, these research projects will include measurement of emissions of greenhouse gases and criteria pollutants before and after livestock methane reduction projects are implemented ([SB 170, Chapter 240](#)).
- From the Budget Act of 2022, \$10 million was allocated to CDFA and, of this funding, \$9.22 million was awarded to universities through the Livestock Enteric Methane Emission Reduction Research Program (LEMER-RP) for demonstration projects to supplement feed with additives or ingredients, such as seaweed, that have scientifically demonstrated efficacy in reducing methane emissions and research dietary modifications that are intended to reduce methane emissions from livestock ([AB 179, Chapter 249](#)).
- The Budget Act of 2022 ([Senate Bill 154, Chapter 43](#)) allocated \$48 million to CDFA to continue supporting dairy and livestock methane reduction programs, with priority given to AMMP. CDFA used half of these appropriations for the 2023 grant solicitation; the remaining funds from the appropriations will be made available through DDRDP and AMMP in a subsequent solicitation expected in the Spring of 2024, where \$10 million will be made available for DDRDP. An additional \$20 million was allocated exclusively to AMMP in the Budget Act of 2022 ([AB 179, Chapter 249](#)). Half of these funds have been awarded for the 2023 AMMP, and the remaining will be made available through AMMP in the Spring of 2024.
 - In 2023, \$15.65 million was awarded to 11 dairy digester projects, which are estimated to reduce 182,762 MTCO₂e of GHG per year. Additionally, \$21.41 million was awarded to 31 non-digester projects, which are estimated to reduce 41,462 MTCO₂e of GHG per year.

A summary of funds allocated to the DDRDP is provided in [Table 1](#).

Table 1. Summary of CDFA DDRDP funding to date.

Year	Dollar Allocation (millions)	Dairy Methane Reduction Grant Funds Awarded (millions)*			Administrative Cost not to Exceed 5% (millions)
		Dairy Digesters	Dairy Digester Research or Demonstration Projects	Non-digester Practices (Alternative Manure Management Program)	
2014-15	\$12	\$11.09	\$0.2	Not applicable	\$0.68
2016-17	\$50	\$30.75	Not applicable	\$9.87	\$5
2017-18	\$99	\$68.01	Not applicable	\$18.25	\$4.9
2018-19	\$99	\$65.94	Not applicable [‡]	\$30.97	\$4.9
2019-20	\$29.06	\$16.53	Not applicable	\$8.93	\$1.45**
2021-22	\$32	\$18.71	Not applicable	\$18.26	\$1.6**
2022-23	\$24	\$15.65	Not applicable	\$21.41 [€]	\$1.2**
2023-24	\$24	-	Not applicable	- [€]	\$1.2**

*Values have changed from previous reports due to the cancellation of some projects.

**In 2019-20, \$335,235 of the allocations were utilized to fund Technical Assistance Providers (TAP) under the Climate Smart Agriculture Technical Assistance Grants. In 2021-22, \$323,417 was utilized to fund TAP, and in 2022-24, an estimated \$2,090,000 of the allocation is expected to be utilized to fund TAP. AB 2377 (Irwin, 2018) requires CDFA to utilize no less than 5% of the appropriation to provide technical assistance to AMMP applicants and recipients. CDFA funded all applications received by technical assistance providers.

[€]Funding allocations for programs other than those reserved for DDRDP are not included in this table.

[‡]Grant canceled at the request of the recipient.

CDFA has awarded a total of \$227 million for 140 dairy digester projects from 2015 through 2023 ([Figure 2](#)). Dairy digesters remain one of the most efficient GHG programs in terms of the cost of each ton of GHG reduced⁶ at approximately \$9.23 of DDRDP funds per metric ton of carbon dioxide equivalent reduced ([Table 6](#)).

- All 6 funded projects in 2015 are completed and operational.
- All 16 funded projects in 2017 are completed and operational.
- All 40 funded projects in 2018 are completed and operational.
- Of the 41 funded projects in 2019, 33 are complete and operational, and 8 are under construction.
- Of all the 12 funded projects in 2020, 7 are complete and operational, and 5 are under construction.

⁶ CARB. 2021 Annual Report on Cap and Trade Auction Proceeds.

https://ww3.arb.ca.gov/cc/capandtrade/auctionproceeds/2021_cci_annual_report.pdf

- All the 14 funded projects in 2022 are under construction.
- All the 11 funded projects in 2023 are under construction.

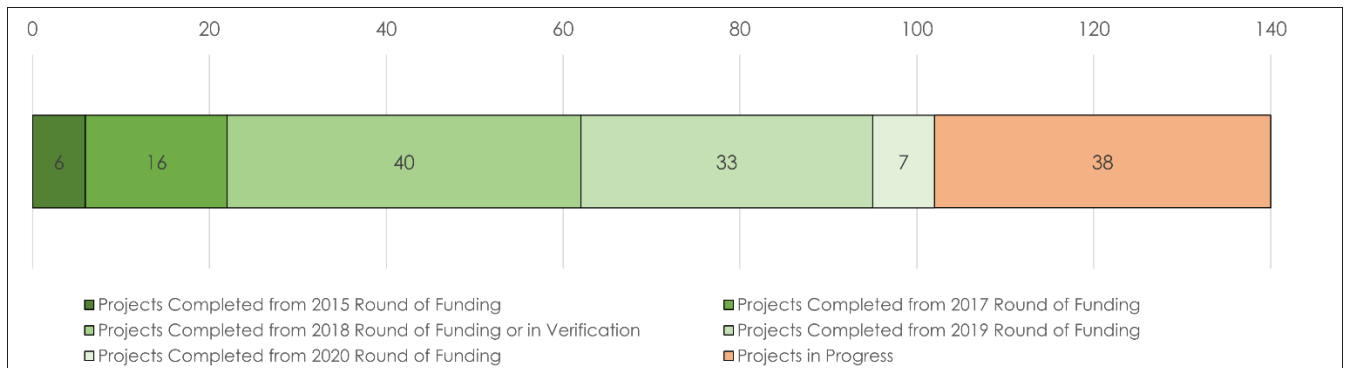


Figure 2. Number of DDRDP funded projects that are complete and in progress since 2015.

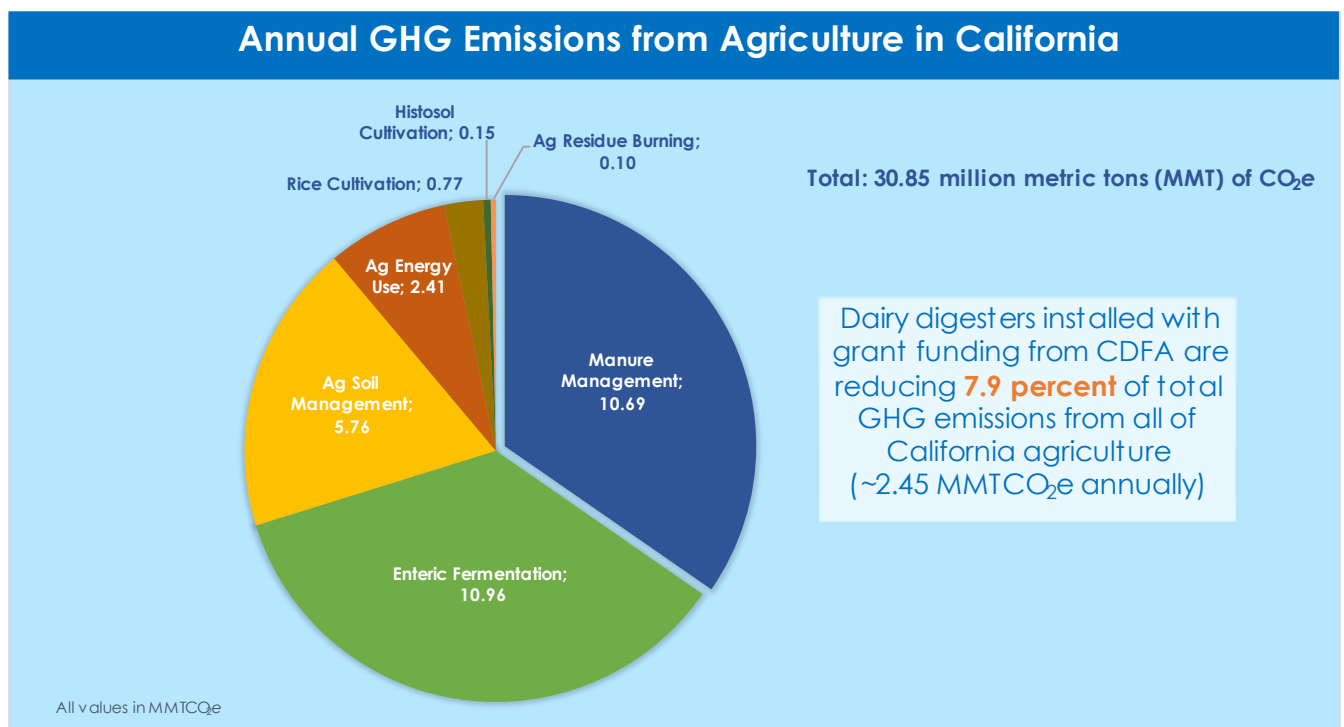


Figure 3. Agriculture sector GHG emissions inventory in California in 2021 divided by sectors, and the impact of DDRDP projects in terms of GHG emission reductions. Source: [California Greenhouse Gas Inventory Program](#).

All funded projects since 2017 must comply with SB 859 ([2016 Budget Bill, Chapter 368](#)), which requires CDFA to review the applicant's analysis identifying potential adverse impacts of a proposed project prior to awarding grant funds from the

GGRF. The requirements specified in the bill prohibit a project from receiving funding from CDFA, unless the applicant has conducted outreach in areas that will potentially be adversely impacted by the project, has determined potential adverse impacts of the project, and has committed to measures to mitigate impacts. The bill requires CDFA to prioritize projects based on the criteria pollutant emission benefits achieved by the project. This is an important component of the program and CDFA has worked diligently to comply with SB 859 requirements even when allocations were appropriated through funding sources other than GGRF (i.e., General Funds).

CDFA has funded \$107.76 million for 172 AMMP projects from 2016 to 2023. Approximately \$23 million in matching funds have been proposed by awardees. These projects achieve a cumulative estimated GHG reduction of 1.46 MMTCO₂e over five years, or 294,302 MTCO₂e annually, and equate to a reduction of 3.15 percent of the total methane emissions coming from manure management in California in 2021. AMMP complements the DDRDP by supporting a diverse range of non-digester manure management practices that provide options to dairy and livestock operations. There is a wide variety of dairy and livestock operations across the state, and factors such as size, management style, location and proximity to infrastructure, and economic feasibility significantly impact the type of improvements pursued. Where an anaerobic digester might not be practical, operations can still reduce manure methane emissions through practices that support the management of manure solids in a dry form and keep them out of a liquid anaerobic environment. These practices include pasture-based management (such as the conversion of a non-pasture operation to pasture or increased time spent by animals on pasture), alternative manure storage options (such as compost bedded pack barn or slatted floor pit storage manure collection), separation of manure solids in conjunction with drying or composting of solids, and conversion of a flush-based system to a scrape system in conjunction with drying or composting of solids.

A. DDRDP Eligibility and Application Process

Under DDRDP, CDFA funds make up to 50 percent of the total project cost. The maximum grant award from the 2015-2019 rounds was up to \$3 million per project; it was reduced to up to \$2 million per project for the 2020 round, and it was once again reduced to up to \$1.6 million per project for the 2022 and 2023 rounds. Funded projects are required to be completed within 30 months of the execution of the

grant agreement. To be eligible for funding, the dairy digester project must be located on a commercial California dairy operation. A group of dairy operations may submit one grant application to develop a centralized dairy digester and gas clean-up facilities, known as a “cluster” or “hub and spoke” project. The location of the centralized digester and/or gas clean-up facility can be determined by participating dairy operations. Defunct non-DDRDP digesters that were constructed in the past and have become entirely non-functional or never became functional since their construction for a minimum of 12 months due to technical or other issues are also considered eligible to apply for funding through DDRDP. However, CDFA does not fund upgrades to existing functional dairy digesters to boost emission reductions and energy production. Additionally, projects that propose to switch existing management practices on the dairy operation to those that increase baseline GHG emissions such as the increase in herd size are not eligible for DDRDP funding. Projects selected for funding may not change their herd size beyond the limits established by the dairy operation’s existing state issued permits (e.g., State or Regional Water Resources Control Board permits) at the time of application throughout the project term (i.e., 30 months).

DDRDP applicants are required to use the latest quantification methodology and its associated benefits calculator tool developed by the California Air Resources Board (CARB) to calculate estimated GHG emission reductions achievable from projects and co-benefits linked to the proposed project. The quantification methodology and benefits calculator tool are available on CARB’s [CCI Quantification, Benefits, and Reporting Materials](#) website. Any project benefits provided according to [AB 1550 \(Gomez, 2016\) Priority Populations](#) are determined and reported to CARB using the [methodologies](#) developed by CARB and consistent with the [Funding Guidelines for Administering Agencies](#).

Funded projects must demonstrate the protection of water and air quality. The design and construction of digester vessels (e.g., ponds, tanks, or other vessels) under this program must be demonstrated to be protective of surface and groundwater quality. To meet the DDRDP water quality requirements, one of the following is required: double-lined ponds consistent with the Tier 1 specification of the Dairy General Order (R52013-0122) of the [Central Valley Regional Water Quality Board](#), above-ground or below-ground digester vessels that are considered protective of water quality provided they are designed to be watertight (i.e., vinyl water seals at joints, proper rebar density to minimize cracking), or built-in accordance with a strict construction quality assurance (CQA) program (i.e., any cracks sealed). The digester system design, construction, and operation must

minimize the emission of air pollutants. For power production projects, the total NO_x (mono-nitrogen oxides) emissions must be no greater than 0.50 lb/MW-hr. These represent the most stringent water and air quality protection standards across the state and must be met by a project regardless of its location in California. Funded projects must use commercially available technologies to produce or capture methane for energy production or transportation fuel. Since 2019, DDRDP may reimburse recipients for costs related to the implementation of nutrient management technologies in order to help dairy farmers manage the excess of nitrogen and nutrients in their facilities.

B. DDRDP Review Process

CDFA conducts three levels of review during the grant submission and review process. The first is an administrative review to determine if all grant application requirements are met. The second is a comprehensive financial review to evaluate the merits of the grant applications based on the scoring criteria, conducted by the CDFA Audits Office. The third is a technical review by subject matter experts and the Technical Advisory Committee (TAC). The TAC is a sub-committee of the [California-Federal Dairy Digester Working Group](#). The TAC consists of state and federal agency individuals with expertise in manure management, methane reduction measures, environmental impacts and permitting in California. The scoring criteria for the review process are listed in [Table 2](#). The TAC review process is assisted by the following:

- (i) The evaluation of the GHG emission reductions calculations and technical soundness of the project by academic experts associated with California (University of California and California State University systems) and other U.S. universities, and
- (ii) The assessment of financial information submitted with the grant application by CDFA's Audit Office.

Table 2. CDFA DDRDP Scoring Criteria for Project Selection.

Criteria	Points
Digester Project Plan and Long-term Viability	20
Budget Worksheet and Financials	10
Estimated Greenhouse Gas Emissions Reduction	35
Project Readiness	10
Environmental Performance	15
Community Impact	10
Total	100

Since 2020, the scoring criteria were modified to award five extra points in addition to the criteria listed in [Table 2](#) to new submitting organizations in order to incentivize the distribution of funds to organizations that were not awarded in previous rounds.

II. CDFA Public Outreach for DDRDP

The development of the DDRDP framework and grant solicitation ([Request for Grant Applications](#)) involves a stakeholder and public engagement process. Additionally, during the application period, CDFA provides application assistance workshops as well as guidance on conducting community outreach about the projects. A summary of these workshops is provided in [Table 3](#).

Table 3. Summary of CDFA DDRDP Outreach.

Program Development Outreach Public Meetings			
Meeting	Date	Location	Number of Attendees
2015 Digester Grant Development - Stakeholder Input	11/6/2014	Modesto	12
2015 Digester Grant Development - Stakeholder Input	11/10/2014	Tulare	7
2015 Digester Grant Development - Stakeholder Input	11/13/2014	Sacramento	14
2015 Digester Research Development – Stakeholder Input	3/4/2015	Sacramento	0
2016 Environmental Justice Listening Session	11/9/2016	Tulare	9
2017 Digester Grant Development - Stakeholder Input	11/17/2016	Clovis	23
2017 Digester Grant Development - Stakeholder Input	11/21/2016	Sacramento	13
2017 Digester Grant Development - Stakeholder Input	11/22/2016	Modesto	10
2017 Digester Grant Development - Stakeholder Input	11/30/2016	Webinar	40
2017 Digester Grant Development - Stakeholder Input on Draft Solicitation	2/6/2017	Webinar	42
2019 Digester Grant Development – Expanding Access and Enhancing Competitiveness	9/17/2018	Tulare	6
2019 Digester Grant Development – Expanding Access and Enhancing Competitiveness	9/18/2018	Modesto	3
2019 Digester Grant Development – Expanding Access and Enhancing Competitiveness	9/19/2018	Webinar	28
2019 Digester Grant Development – Stakeholder Input	10/23/2018	Tulare	2
2019 Digester Grant Development – Stakeholder Input	10/24/2018	Modesto	2
2019 Digester Grant Development – Stakeholder Input	10/26/2018	Webinar	20
2020 Digester Grant Development – Stakeholder Input	09/17/2019	Tulare/Webinar	19
2020 Digester Grant Development – Stakeholder Input	09/18/2019	Petaluma/Webinar	16

2020 Digester Grant Development – Stakeholder Input	09/19/2019	Sacramento/ Webinar	24
2020 Digester Grant Development – Expanding Access and Enhancing Competitiveness	01/06/2020	Sacramento/ Webinar	14
2020 Digester Grant Development – Expanding Access and Enhancing Competitiveness	01/09/2020	Sacramento/ Webinar	10
2022 Digester Grant Development – Stakeholder Input	12/08/2021	Webinar	14
2023 Digester Grant Development - Stakeholder Input	5/17/2023	Webinar	25

Application Assistance Outreach Public Meetings

Meeting	Date	Location	Number of Attendees
2015 Digester Grant - Application Workshop	1/21/2015	Tulare	13
2015 Digester Grant - Application Workshop	1/27/2015	Webinar	26
2015 Digester Grant - Application Workshop	1/28/2015	Sacramento	12
2015 Digester Research - Application Workshop	4/23/2015	Webinar	8
2017 Digester Grant - Application Workshop	5/12/2017	Sacramento	15
2017 Digester Grant - Application Workshop	5/15/2017	Tulare	20
2017 Digester Grant - Application Workshop	5/16/2017	Webinar	22
2017 Digester Grant – Community Outreach Assistance through UC Davis	May 2017	One-on-one Assistance and Consultation	9
2018 Digester Grant – Application Workshop	1/3/2018	Modesto	9
2018 Digester Grant – Application Workshop	1/4/2018	Tulare	14
2018 Digester Grant – Application Workshop	1/8/2018	Webinar	35
2019 Digester Grant – Application Workshop	1/23/2019	Tulare/ Webinar	12
2019 Digester Grant – Application Workshop	1/24/2019	Modesto/ Webinar	10
2020 Digester Grant – Application Workshop	2/18/2020	Modesto/ Webinar	16
2020 Digester Grant – Application Workshop	2/19/2020	Petaluma/ Webinar	9
2020 Digester Grant – Application Workshop	2/20/2020	Fresno/ Webinar	9
2022 Digester Grant – Application Workshop	03/16/2022	Webinar	31
2022 Digester Grant – Application Workshop	03/25/2022	Webinar	30
2023 Digester Grant- Application Workshop	7/11/2023	Webinar	44
2023 Digester Grant- Application Workshop	7/20/2023	Webinar	19

III. Projects Funded by the CDFA DDRDP

A summary of the 140 projects funded to date by CDFA's DDRDP is provided in [Table 5](#). The collective GHG emission reduction estimated from the 140 projects is 24.56 million MTCO₂e over 10 years, and the approximate cost to achieve one MTCO₂e (10-year) reduction is approximately \$29.15. Of this cost, the share of the GGRF or General Funds (i.e., the CDFA grant) is approximately \$9.23 or 31.66 percent, and the remainder is achieved through matching funds provided by the grant recipient. A map showing the locations of the funded projects can be found in [Figure 4](#). As evident from [Figure 4](#), funded projects are primarily located in California's Central Valley, which is home to the majority of large-scale dairy operations in the state. The cost-effectiveness summary of the DDRDP is presented in [Table 6](#). In the case of canceled projects ([Table 5](#)), no grant award funds were allocated to projects and/or grant award funds expended were returned to CDFA. CDFA awarded these funds to next-in-line ranked projects when possible or awarded them in the following rounds of the program.

IV. Community Engagement and Outreach by CDFA DDRDP Award Recipients

California Government Code Section 16428.86(a) (i.e., SB 859 Section 6) requires CDFA to review the applicant's analysis of potential adverse impacts of the proposed project, including a net increase in criteria pollutants, toxic air contaminants, and hazardous air pollutants; groundwater and surface water impacts; and truck traffic and odor. This must occur prior to awarding DDRDP grant funds. Additionally, the statute states that:

- (i) A digester project shall not receive funding unless the applicant has demonstrated to CDFA that the applicant has done all the following:
 - a. Conducted outreach in areas that will potentially be adversely impacted by the project.
 - b. Determined potential adverse impacts of the project.
 - c. Committed to measures to mitigate impacts.
- (ii) In making awards, CDFA shall prioritize projects based on the criteria pollutant emission benefits achieved by the digester project.
- (iii) A digester project funded by CDFA that results in localized impacts in disadvantaged communities shall not be considered to provide a benefit to disadvantaged communities for the purposes of Section 39713 of the

Health and Safety Code.

To meet these requirements, DDRDP applicants are required to conduct community outreach actions and describe community needs. Additionally, they are required to describe how the community was involved in the local planning and environmental review processes for this project, including how neighbors were contacted, public meeting dates and times, the material presented to the community, and whether translation services, transportation, childcare, and/or meals were provided. Applicants are required to summarize the results of this outreach; identify the community's concerns, questions, or comments and how they will be addressed, share the community meeting video recordings, and provide up to three letters of support from community members demonstrating that outreach was conducted being at least one of these letters directly from the local community (e.g., local non-profit associations, local community activists, residents of the area, etc.).

Applicants are encouraged to (a) approach residents, community leaders, elected officials, advocacy organizations, local businesses, members of vulnerable or underserved populations (e.g., elderly, youth, physically and/or mentally disabled, members from disadvantaged communities), and government departments, agencies, jurisdictions, etc. potentially impacted by the project such as local health department, schools/school districts, emergency services, law enforcement, metropolitan planning organization, etc., and (b) use various methods to notify the community of outreach efforts, such as local newspapers, county websites, radio and television. The topics of discussion during outreach efforts must include potential adverse impacts of digester projects, including a net increase in criteria pollutants, toxic air contaminants, hazardous air pollutants, groundwater and surface water impacts, truck traffic, and odor. Additionally, applicants are required to describe what, if any, mitigation measures will be included in the project. This includes, but is not limited to, mitigating the potential impacts mentioned above. Mitigation measures committed by the applicant must be specific to the digester project and be included in the project work plan.

Applicants are also required to explain the economic benefits that will be provided to the community (or communities) where a project is located, such as the number and duration of temporary or permanent jobs, approximate salaries, training provided for these positions, benefits for each job classification and trade, how long these jobs will last, and how they improve on local unemployment rates.

In order to provide guidance on quantification methods and reporting to

administering agencies, CARB developed the [Community Engagement Co-benefit Assessment Methodology](#) in 2018-19. Questions as part of this methodology have been included on the DDRDP application since the 2019 round.

Further, CDFA contracted with the University of California, Davis Extension Collaboration Center in 2017 and 2018, and with California State University, Sacramento in 2019 to assist applicants with planning and executing their community outreach efforts. Since 2020, CDFA has provided applicants with guidelines for community outreach and engagement during the solicitation process.

Among the 11 applications selected for awards in 2023, 14 letters (supporting projects across 6 clusters) from educational institutions and community-based organizations such as counties, Farm Bureaus, the Central Valley Mother Lode Regional Consortium, the San Joaquin Valley Air Pollution Control District, and Self-Help Enterprises were submitted in support of these projects. Within these letters, there is support from institutions of higher education such as the University of California in Merced (UC Merced), College of the Sequoias, and Modesto Junior College, as well as local employment, labor, training, and business organizations, including Proteus Inc. These support letters categorically noted the activities and outreach that were conducted in their local community and highlighted the positive impact of these future projects. Applicants for Blue Sky Dairy, Coelho Dairy, Brasil Dairy, and Barcellos-Brasil Dairy projects went beyond the requirements of the program and partnered with UC Merced and the Center for Information Technology Research in the Interest of Society (CITRIS) to provide 6 need-based scholarships with paid internships leading to potentially long-term careers in renewable energy. Additionally, the applicants for Blue Sky Dairy, Coelho Dairy, Brasil Dairy, and Barcellos-Brasil Dairy projects are contracting with UC Merced student laboratories for additional field research opportunities for their students. Similarly, the applicants for Dairy Avenue, Circle H Dairy, DeJager North Dairy, Delta View Dairy, Felicita Dairy, HD Ranch Dairy, Hidden Valley Dairy, and Moonstone Dairy are advancing a partnership with Self-Help Enterprises by entering into a new Community Benefits Agreement (CBA). This new CBA builds upon prior commitments to provide funds to be used toward initiatives that benefit disadvantaged community residents by improving energy, water, sewer, and other infrastructure or by providing affordable housing. This agreement will also provide scholarship funds to students in financial need, from SB 535 disadvantaged communities, in the agricultural and science, technology, engineering, and mathematics (STEM) fields. For example, each dairy digester application selected for DDRDP funding will provide Self-Help Enterprises

\$5,000 per dairy digester for two years following commercial operations. These are examples of some of the commitments made by the DDRDP recipients that surpass the requirements of the program, and show their commitment in improving the local community where the projects are situated.

The community outreach activities conducted by applicants ranged from conducting public meetings that provided opportunities to learn about the advantages and disadvantages of construction in the community, engagement with local schools and universities to educate students and faculty on dairy digesters, providing paid internships to local students, facilitating interaction with local environmental and other non-profit organizations for feedback on projects, and the facilitation of digester tours for interested local residents.

V. DDRDP Project Co-Benefits

Dairy digesters have the potential to provide several environmental and agronomic co-benefits, notably reduction in odor and flies due to the elimination of open uncovered manure storage lagoons. Additionally, manure solids after digestion can be easier to handle, contain fewer pathogens, and provide a more stabilized form of nutrients for plant uptake, relative to raw manure. The DDRDP requirements below, as noted previously in [Section 1. A.](#), have set the precedent for dairy digester projects to follow the highest air and water quality protection standards across the state, which in many cases are more stringent than local Air District or Water Board requirements:

1. Double-lined ponds consistent with the Tier 1 specification of the Dairy General Order (R52013-0122) of the Central Valley Regional Water Quality Control Board, above-ground or below-ground digester vessels that are considered protective of water quality provided they are designed to be watertight (i.e., vinyl water seals at joints, proper rebar density to minimize cracking) and built-in accordance with a strict construction quality assurance (CQA) program (i.e., any cracks sealed).
2. For power production projects, the total NO_x (nitrogen oxides) emissions must be no greater than 0.50 lb/MW-hr.

Of the 140 DDRDP-funded projects, 10 projects are generating electric power. Of these, six projects funded in 2015 involved internal combustion engines. Three remaining projects have been funded in 2018 and 2019 and propose to employ fuel

cells, and a 2023 project proposes to implement a linear generator, both technologies with much lower criteria pollutant emissions than internal combustion engines. Projects awarded in 2016-17, 2017-18, 2018-19, 2019-20, and 2021-22 did not include electricity generation end-use through internal combustion engines. Instead, these projects involve end-uses such as renewable natural gas (RNG) production and electricity generation to power electric vehicles through fuel cells and linear generators. These technologies have minimal local air quality impacts relative to internal combustion engines.

Since the 2019 round of DDRDP, the CARB methodology for calculation of GHG emission reductions has been revised to include quantification of co-benefits such as fossil fuel use reduction; energy and fuel cost savings; renewable fuel and energy generation; compost production; and reductions in local and remote emissions of reactive organic gases (ROG), nitrogen oxide (NOx), particulate matter (PM) 2.5, and Diesel PM. The summary of some of the quantified co-benefits for DDRDP funded projects since 2019⁷ is provided in [Table 4](#). The co-benefits values are the outcome of 74 RNG and 3 electric-funded projects.

Table 4. Summary of co-benefits created by DDRDP funded projects from 2019 to 2023.

Air Pollutants Emission Reduction	Total (lbs/10 yr)
Total NOx	2,202,635
Total ROG	18,357,581
Total Diesel PM	18,883
Local PM2.5	7,325

All funded projects are also evaluated for benefits to disadvantaged communities based on the criteria provided in [Funding Guidelines for Administering Agencies](#).

As noted in [Section IV](#), DDRDP grant recipients report economic benefits, including job creation. Since 2019, CARB has developed the [Job Co-Benefit Assessment Methodology and Modeling Tool](#), which was utilized to estimate jobs benefits provided by projects at the time of application. These estimates will be updated with data provided by grant recipients through the term of the grant agreement and reported to CARB for inclusion in the [CARB's CCI Annual Report to the](#)

⁷ Quantification Methodology and its accompanying [Benefits Calculator Tools for DDRDP](#) started quantifying the co-benefits of DDRDP projects from 2019 and beyond. Data for the projects before 2019 is not available.

[Legislature](#). Using the CARB Job Co-Benefit Assessment Methodology and Modeling Tool, the DDRDP has generated since 2019 approximately 5,342 full-time jobs, where approximately 2,786 are direct jobs, 767 are indirect jobs, and 1,789 are induced jobs.

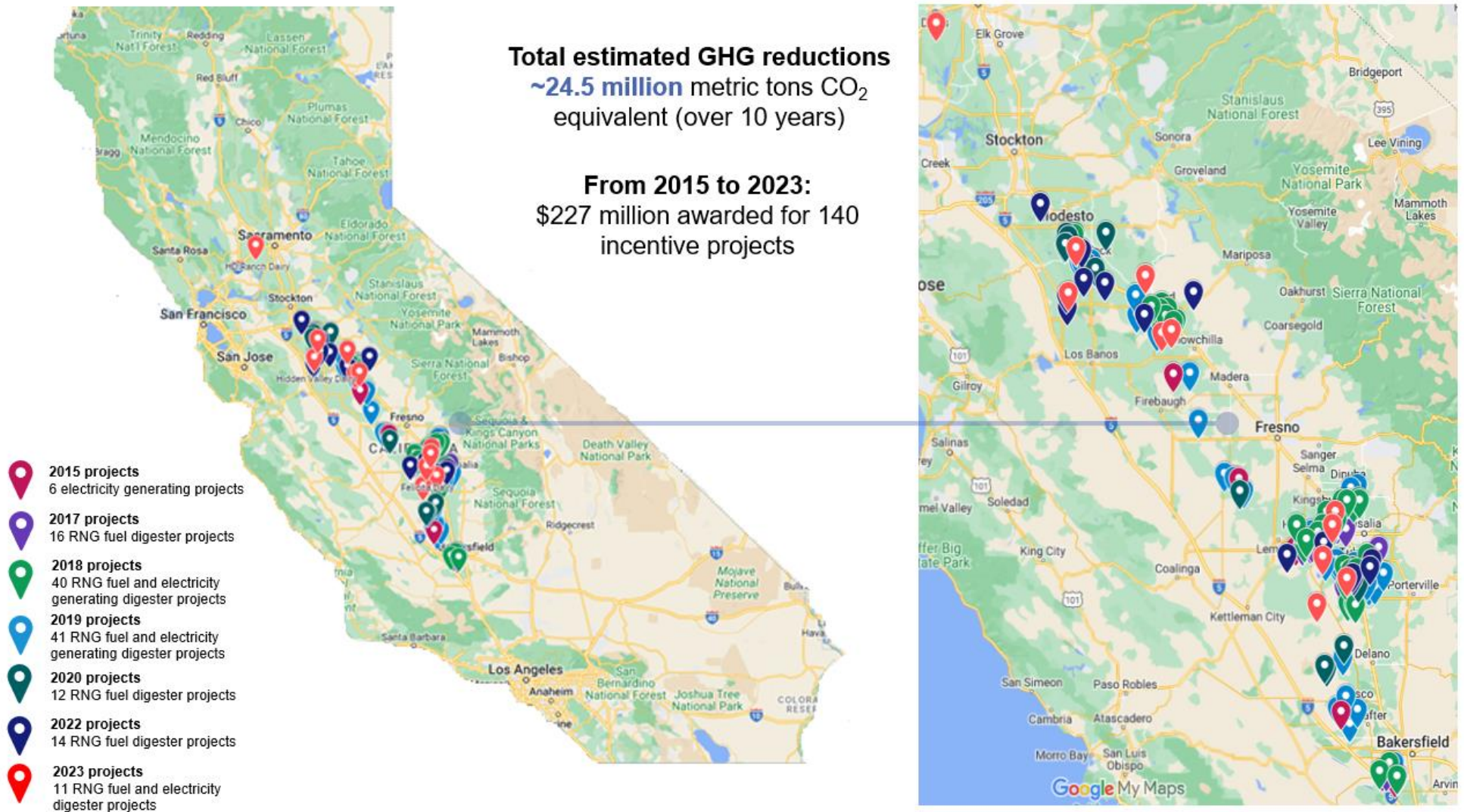


Figure 4. Geographical Distribution of CDFA funded Dairy Digesters in California.

Table 5. Summary of Dairy Digester Projects Funded by CDFA.

Year of Award	Applicant Organization	Project Title	Submitting Organization	Project Location	Cluster	Project Type	Biogas End-Use	Estimated 10 year GHG reductions (MTCO _{2e})*	Grant Funds	Matching Funds**	Total Project Cost	Status
2015	ABEC #4 LLC, dba Carlos Echeverria & Sons Dairy Biogas	Carlos Echeverria & Sons Dairy Biogas Project	California Bioenergy LLC	Bakersfield, Kern Co.	NA	New covered lagoon digester	Combined heat and electrical power generation	201,200	\$1,000,000	\$5,560,375	\$6,560,375	Complete
2015	ABEC #3 LLC, dba Lakeview Farms Dairy Biogas	Lakeview Dairy Biogas Digester	California Bioenergy LLC	Bakersfield, Kern Co.	NA	New covered lagoon digester	Electrical power generation and RNG	144,090	\$2,000,000	\$5,128,324	\$7,128,324	Complete
2015	Open Sky Ranch Inc.	Open Sky Ranch Dairy Digester	Maas Energy Works Inc	Riverdale, Fresno Co.	NA	Retrofit covered lagoon digester*	Electrical power generation	258,911	\$973,430	\$990,486	\$1,963,916	Complete
2015	Philip Verwey Farms	Verwey-Hanford Dairy Digester	Maas Energy Works Inc	Hanford, Kings Co.	NA	New covered lagoon digester	Electrical power generation	535,770	\$3,000,000	\$3,011,595	\$6,011,595	Complete
2015	Philip Verwey Farms	Verwey-Madera Dairy Digester	Maas Energy Works Inc	Madera, Madera Co.	NA	New covered lagoon digester	Electrical power generation	240,000	\$2,281,091	\$2,331,935	\$4,613,026	Complete
2015	ABEC #2 LLC dba West-Star North Dairy Biogas	West-Star North Dairy Digester	California Bioenergy LLC	Buttonwillow, Kern Co.	NA	New covered lagoon digester	Electrical power generation	158,730	\$1,837,005	\$6,381,069	\$8,218,074	Complete
2017	Bos Farms Dairy Biogas	Bos Farms Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	Kern	New covered lagoon digester	RNG***	168,398	\$1,500,000	\$5,199,492	\$6,699,492	Complete
2017	Calgren Dairy Fuels LLC	Circle A Dairy Digester Fuel Pipeline Project	Maas Energy Works Inc	Pixley, Tulare Co.	West Visalia	New covered lagoon digester	Cogeneration (ethanol) and RNG	138,745	\$1,050,000	\$1,429,945	\$2,479,945	Complete
2017	Cloverdale Dairy Biogas	Cloverdale Dairy Biogas	California Bioenergy LLC	Hanford, Kings Co.	Hanford	New covered lagoon digester	RNG	360,851	\$3,000,000	\$5,955,939	\$8,955,939	Complete
2017	Hamstra Dairy Biogas	Hamstra Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	Kern	New covered lagoon digester	RNG	205,115	\$2,000,000	\$6,630,543	\$8,630,543	Complete
2017	Hollandia Farms Dairy Biogas	Hollandia Farms Dairy Biogas	California Bioenergy LLC	Hanford, Kings Co.	Calgren	New covered lagoon digester	RNG	178,426	\$1,500,000	\$6,264,272	\$7,764,272	Complete
2017	Calgren Dairy Fuels LLC	K&M Visser Dairy Digester Fuel Pipeline Project	Maas Energy Works Inc	Pixley, Tulare Co.	Calgren	New covered lagoon digester	Cogeneration (ethanol) and RNG	205,553	\$1,500,000	\$1,902,047	\$3,402,047	Complete

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2017	Calgren Dairy Fuels LLC	Legacy Dairy Digester Fuel Pipeline	Maas Energy Works Inc	Pixley, Tulare Co.	Calgren	New covered lagoon digester	Cogeneration (ethanol) and RNG	207,209	\$1,550,000	\$1,887,320	\$3,437,320	Complete
2017	Maple Dairy Biogas	Maple Dairy Biogas	California Bioenergy LLC	Bakersfield, Kern Co.	Kern	New covered lagoon digester	RNG	342,587	\$3,000,000	\$6,568,257	\$9,568,257	Complete
2017	Moonlight Dairy Biogas	Moonlight Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	South Tulare	New covered lagoon digester	RNG	154,834	\$1,500,000	\$6,440,123	\$7,940,123	Complete
2017	Calgren Dairy Fuels LLC	Pixley Dairy Digester Fuel Pipeline Project	Maas Energy Works Inc	Pixley, Tulare Co.	Calgren	New covered lagoon digester	Cogeneration (ethanol) and RNG	215,321	\$1,600,000	\$1,675,681	\$3,275,681	Complete
2017	Calgren Dairy Fuels LLC	R Vander Eyk Dairy Digester Fuel Pipeline Project	Maas Energy Works Inc	Pixley, Tulare Co.	NA	New covered lagoon digester	Cogeneration (ethanol) and RNG	132,586	\$1,000,000	\$1,604,440	\$2,604,440	Complete
2017	Rancho Teresita Dairy Biogas	Rancho Teresita Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	Hanford	New covered lagoon digester	RNG	236,251	\$2,100,000	\$5,500,336	\$7,600,336	Complete
2017	Aligned Digester Cooperative LLC	Red Top Madera Dairy Digester Project	Aligned Digester Cooperative LLC	Chowchilla, Madera Co.	Hanford	New covered lagoon digester	RNG	282,475	\$3,000,000	\$3,046,875	\$6,046,875	Canceled ****
2017	S&S Dairy Biogas	S&S Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	West Visalia	New covered lagoon digester	RNG	167,417	\$1,600,000	\$5,238,833	\$6,838,833	Complete
2017	T & W Dairy Biogas	T & W Dairy Biogas	California Bioenergy LLC	Bakersfield, Kern Co.	South Tulare	New covered lagoon digester	RNG	294,982	\$2,600,000	\$6,147,941	\$8,747,941	Complete
2017	Trilogy Dairy Biogas	Trilogy Dairy Biogas	California Bioenergy LLC	Bakersfield, Kern Co.	Calgren	New covered lagoon digester	RNG	254,577	\$2,250,000	\$6,528,090	\$8,778,090	Complete
2017	Calgren Dairy Fuels LLC	Williams Family Dairy Digester Fuel Pipeline	Maas Energy Works Inc	Pixley, Tulare Co.	Calgren	New covered lagoon digester	Cogeneration (ethanol) and RNG	201,208	\$1,500,000	\$2,524,659	\$4,024,659	Canceled ****
2017	Wreden Ranch Dairy Biogas	Wreden Ranch Dairy Biogas	California Bioenergy LLC	Hanford, Kings Co.	South Tulare	New covered lagoon digester	RNG	393,915	\$3,000,000	\$5,215,483	\$8,215,483	Complete
2018	Calgren Dairy Fuels LLC	4K Dairy Digester Pipeline Project	Maas Energy Works Inc	Pixley, Tulare Co.	Calgren	New covered lagoon digester	RNG	192,143	\$1,780,588	\$1,875,566	\$3,656,154	Complete
2018	Aemetis Advanced Fuels Inc	Ackerman Dairy Digester Pipeline Project	Maas Energy Works Inc	Ceres, Stanislaus Co.	Aemetis	New covered lagoon digester	RNG	89,574	\$1,331,291	\$1,581,769	\$2,913,060	Complete
2018	Aukeman Farms Dairy Biogas	Aukeman Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	South Tulare	New covered lagoon digester	RNG	207,701	\$1,765,457	\$3,072,438	\$4,837,895	Complete
2018	Belonave Dairy Biogas LLC	Belonave Dairy Biogas LLC	California Bioenergy LLC	Bakersfield, Kern Co.	Kern	New covered lagoon digester	RNG	225,659	\$1,918,099	\$3,561,605	\$5,479,704	Complete

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2018	BV Dairy LLC	BV Dairy Biogas	California Bioenergy LLC	Bakersfield, Kern Co.	Kern	New covered lagoon digester	RNG	205,835	\$1,749,596	\$5,130,445	\$6,880,041	Complete
2018	Calgren Dairy Fuels LLC	Cornerstone Dairy Digester Pipeline Project	Maas Energy Works Inc	Tipton, Tulare Co.	Calgren	New covered lagoon digester	RNG	185,238	\$1,266,053	\$1,275,663	\$2,541,716	Complete
2018	De Groot North Dairy Biogas	De Groot North Dairy Biogas	California Bioenergy LLC	Hanford, Kings Co.	West Visalia	New covered lagoon digester	RNG	169,699	\$1,442,440	\$2,401,778	\$3,844,218	Canceled ****
2018	De Groot South Dairy Biogas	De Groot South Dairy Biogas	California Bioenergy LLC	Hanford, Kings Co.	West Visalia	New covered lagoon digester	EV - Fuel Cell	199,477	\$1,542,697	\$1,581,310	\$3,124,007	Complete
2018	Decade Energy LLC	Decade Centralized Dairy Digester Pipeline Project	Maas Energy Works Inc	Tulare, Tulare Co.	Hanford-Lakeside	New covered lagoon digester	RNG	192,558	\$1,773,587	\$2,176,364	\$3,949,951	Complete
2018	DJ South Dairy Biogas LLC	DJ South Dairy Digester Pipeline Project	Maas Energy Works Inc	Chowchilla, Madera Co.	Merced-South	New covered lagoon digester	RNG	150,175	\$1,810,526	\$1,859,833	\$3,670,359	Complete
2018	Aemetis Advanced Fuels Inc	Double D Dairy Digester Pipeline Project	Maas Energy Works Inc	Ceres, Stanislaus Co.	Aemetis	New covered lagoon digester	RNG	189,850	\$1,822,668	\$2,225,662	\$4,048,330	Complete
2018	Double J Dairy Biogas	Double J Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	North Visalia	New covered lagoon digester	RNG	285,496	\$2,426,716	\$5,051,199	\$7,477,915	Complete
2018	Double L Dairy Biogas LLC	Double L Dairy Digester Pipeline Project	Maas Energy Works Inc	Hanford, Kings Co.	Hanford-Lakeside	New covered lagoon digester	RNG	136,148	\$1,762,347	\$1,767,556	\$3,529,903	Complete
2018	Dykstra Dairy Biogas	Dykstra Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	South Tulare	New covered lagoon digester	RNG	265,936	\$2,260,454	\$3,276,239	\$5,536,693	Complete
2018	The El Monte Dairy Biogas	El Monte Dairy Biogas	California Bioenergy LLC	Tipton, Tulare Co.	South Tulare	New covered lagoon digester	RNG	118,903	\$1,010,674	\$3,026,715	\$4,037,389	Complete
2018	5H Dairy Biogas LLC	Five H Dairy Digester Pipeline Project	Maas Energy Works Inc	Merced, Merced Co.	Merced-South	New covered lagoon digester	RNG	122,183	\$1,851,297	\$1,859,722	\$3,711,019	Complete
2018	FM Jersey Biogas LLC	FM Jerseys Dairy Digester Virtual Pipeline Project	Maas Energy Works Inc	Tipton, Tulare Co.	Calgren	New covered lagoon digester	RNG	161,960	\$2,010,747	\$2,017,330	\$4,028,077	Complete
2018	Hoogendam Dairy Biogas LLC	Hoogendam Dairy Digester Pipeline Project	Maas Energy Works Inc	Merced, Merced Co.	Merced-South	New covered lagoon digester	RNG	142,354	\$1,809,452	\$1,820,121	\$3,629,573	Complete
2018	Horizon Jersey Dairy Biogas	Horizon Jersey Dairy Biogas	California Bioenergy LLC	Tipton, Tulare Co.	South Tulare	New covered lagoon digester	RNG	335,398	\$2,850,886	\$3,788,728	\$6,639,614	Complete

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2018	Jacobus De Groot Biogas LLC	Jacobus De Groot #2 Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	North Visalia	New covered lagoon digester	RNG	61,616	\$523,736	\$2,624,086	\$3,147,822	Complete
2018	Calgren Dairy Fuels LLC	Little Rock Centralized Dairy Digester Pipeline Project	Maas Energy Works Inc	Tipton, Tulare Co.	Calgren	New covered lagoon digester	RNG	146,839	\$2,096,578	\$2,268,895	\$4,365,473	Complete
2018	Lone Oak Energy LLC	Lone Oak #1 Dairy Digester Pipeline Project	Maas Energy Works Inc	Hanford, Kings Co.	Hanford-Lakeside	New covered lagoon digester	RNG	247,703	\$1,869,269	\$2,395,596	\$4,264,865	Complete
2018	Meirinho Dairy Biogas LLC	Meirinho Dairy Digester Pipeline Project	Maas Energy Works Inc	Merced, Merced Co.	Merced-South	New covered lagoon digester	RNG	147,352	\$1,832,358	\$1,975,914	\$3,808,272	Complete
2018	Mellema Dairy Biogas	Mellema Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	North Visalia	New covered lagoon digester	RNG	152,057	\$1,292,485	\$3,342,228	\$4,634,713	Complete
2018	Milky Way Dairy Biogas	Milky Way Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	North Visalia	New covered lagoon digester	RNG	347,462	\$2,953,427	\$4,244,734	\$7,198,161	Canceled ****
2018	Mineral King Dairy Biogas	Mineral King Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	North Visalia	New covered lagoon digester	RNG	194,751	\$1,655,384	\$3,078,995	\$4,734,379	Complete
2018	Rancho Sierra Vista Dairy Biogas	Rancho Sierra Vista Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	North Visalia	New covered lagoon digester	RNG	172,958	\$1,470,143	\$3,045,546	\$4,515,689	Complete
2018	Red Rock Dairy Biogas LLC	Red Rock Dairy Digester Pipeline Project	Maas Energy Works Inc	Merced, Merced Co.	Merced-South	New covered lagoon digester	RNG	156,242	\$2,031,126	\$2,039,438	\$4,070,564	Complete
2018	River Ranch Farms LLC	River Ranch Dairy Digester Pipeline Project	Maas Energy Works Inc	Hanford, Kings Co.	Hanford-Lakeside	New covered lagoon digester	RNG	187,884	\$1,994,860	\$2,115,158	\$4,110,018	Complete
2018	Riverbend Dairy Biogas	Riverbend Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	South Tulare	New covered lagoon digester	RNG	245,930	\$2,090,404	\$2,664,638	\$4,755,042	Complete
2018	Calgren Dairy Fuels LLC	Riverview Dairy Digester Pipeline Project	Maas Energy Works Inc	Pixley, Tulare Co.	Calgren	New covered lagoon digester	RNG	90,093	\$1,332,070	\$1,386,350	\$2,718,420	Complete
2018	Rob Van Grouw Dairy Biogas	Rob Van Grouw Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	North Visalia	New covered lagoon digester	RNG	140,442	\$1,193,757	\$3,366,012	\$4,559,769	Complete
2018	Rocking Horse Dairy Biogas	Rocking Horse Dairy Biogas	California Bioenergy LLC	Hanford, Kings Co.	Hanford	New covered lagoon digester	RNG	119,540	\$1,016,091	\$1,172,419	\$2,188,510	Complete
2018	Rockshar Dairy Biogas LLC	Rockshar Dairy Digester Pipeline Project	Maas Energy Works Inc	Merced, Merced Co.	Merced-South	New covered lagoon digester	RNG	124,664	\$1,679,093	\$1,679,620	\$3,358,713	Complete

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2018	Scheenstra Dairy Biogas	Scheenstra Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	South Tulare	New covered lagoon digester	RNG	220,360	\$1,873,064	\$3,393,707	\$5,266,771	Complete
2018	Calgren Dairy Fuels LLC	Sousa & Sousa Dairy Digester Pipeline Project	Maas Energy Works Inc	Tipton, Tulare Co.	Calgren	New covered lagoon digester	RNG	68,700	\$886,934	\$892,931	\$1,779,865	Complete
2018	Udder Dairy Biogas	Udder Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	West Visalia	New covered lagoon digester	RNG	135,706	\$1,153,459	\$2,126,156	\$3,279,615	Complete
2018	Valadao Dairy Biogas	Valadao Dairy Biogas	California Bioenergy LLC	Hanford, Kings Co.	Hanford	New covered lagoon digester	RNG	121,005	\$1,028,545	\$2,061,008	\$3,089,553	Complete
2018	Calgren Dairy Fuels LLC	Vander Poel Dairy Digester Pipeline Project	Maas Energy Works Inc	Pixley, Tulare Co.	Calgren	New covered lagoon digester	RNG	290,060	\$1,972,485	\$2,222,073	\$4,194,558	Complete
2018	Vander Woude Dairy	Vander Woude Dairy Digester Pipeline Project	Maas Energy Works Inc	Merced, Merced Co.	Merced-South	New covered lagoon digester	RNG	188,575	\$1,863,562	\$1,863,864	\$3,727,426	Complete
2018	Vista Verde Dairy Biogas LLC	Vista Verde Dairy Digester Pipeline Project	Maas Energy Works Inc	Chowchilla, Madera Co.	Merced-South	New covered lagoon digester	RNG	140,653	\$1,594,109	\$1,643,656	\$3,237,765	Complete
2018	Western Sky Dairy Biogas	Western Sky Dairy Biogas	California Bioenergy LLC	Bakersfield, Kern Co.	Kern	New covered lagoon digester	RNG	352,595	\$2,820,762	\$5,315,518	\$8,136,280	Complete
2019	Ahlem Farms Dairy Biogas	Ahlem Farms Dairy Biogas	California Bioenergy LLC	Hilmar, Merced Co.	Hilmar	New covered lagoon digester	RNG	153,151	\$1,546,738	\$4,557,504	\$6,104,242	In Progress
2019	Albert Goyenette Dairy Biogas	Albert Goyenette Dairy Biogas	California Bioenergy LLC	Buttonwillow, Kern Co.	Buttonwillow	New covered lagoon digester	RNG	199,706	\$1,609,316	\$3,588,642	\$5,197,958	Complete
2019	Art Leyendekker Dairy Biogas	Art Leyendekker Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	North Visalia	New covered lagoon digester	RNG	77,697	\$769,784	\$2,612,103	\$3,381,887	Complete
2019	DG Energy LLC	Avalon Dairy Digester Project	Maas Energy Works Inc	Wasco, Kern Co.	Calgren	New covered lagoon digester	RNG	159,758	\$1,917,757	\$2,068,459	\$3,986,216	Complete
2019	Bar 20 Dairy Biogas, LLC	Bar 20 Dairy Biogas	California Bioenergy LLC	Kerman, Fresno Co.	NA	New covered lagoon digester	EV [±] - Fuel Cell	374,390	\$3,000,000	\$6,345,131	\$9,345,131	Complete
2019	Charles Ahlem Ranch Dairy Biogas	Charles Ahlem Ranch Dairy Biogas	California Bioenergy LLC	Hilmar, Merced Co.	Hilmar	New covered lagoon digester	RNG	136,018	\$1,373,697	\$5,758,275	\$7,131,972	In Progress
2019	Clauss and Sunwest Dairy Biogas	Clauss and Sunwest Dairy Biogas	California Bioenergy LLC	Hilmar, Merced Co.	Hilmar	New covered lagoon digester	RNG	155,682	\$1,572,301	\$4,780,296	\$6,352,597	In Progress
2019	Curtimade Dairy Biogas	Curtimade Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	South Tulare	New covered lagoon digester	RNG	174,734	\$1,747,336	\$3,025,858	\$4,773,194	In Progress

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2019	Dairyland Farms Dairy Biogas	Dairyland Farms Dairy Biogas	California Bioenergy LLC	Tipton, Tulare Co.	South Tulare	New covered lagoon digester	RNG	177,475	\$1,760,347	\$1,916,051	\$3,676,398	Complete
2019	Tipton Pipeline LLC	De Boer Dairy Digester Pipeline Project	Maas Energy Works Inc	Tulare, Tulare Co.	Calgren	New covered lagoon digester	RNG	191,647	\$1,825,261	\$2,306,773	\$4,132,034	Complete
2019	Lone Oak Energy LLC	Dixie Creek Dairy Digester Pipeline Project	Maas Energy Works Inc	Hanford, Kings Co.	Lakeside	New covered lagoon digester	RNG	271,176	\$2,436,030	\$2,473,632	\$4,909,662	Complete
2019	El Nido Biogas LLC	Double Diamond Dairy Digester Pipeline Project	Maas Energy Works Inc	El Nido, Merced Co.	Merced	New covered lagoon digester	RNG	290,633	\$2,037,766	\$2,578,783	\$4,616,549	Complete
2019	Elk Creek Dairy Biogas	Elk Creek Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	South Tulare	New covered lagoon digester	RNG	59,555	\$512,706	\$2,247,274	\$2,759,980	Complete
2019	Elkhorn Dairy Biogas	Elkhorn Dairy Biogas	California Bioenergy LLC	Dinuba, Tulare Co.	North Visalia	New covered lagoon digester	RNG	211,940	\$2,125,882	\$4,520,035	\$6,645,917	In Progress
2019	Tipton Pipeline LLC	Fern Oaks Dairy Digester Pipeline Project	Maas Energy Works Inc	Porterville, Tulare Co.	Calgren	New covered lagoon digester	RNG	169,370	\$1,688,894	\$2,590,692	\$4,279,586	Complete
2019	ENV-TWO LLC	Flint Dairy Biogas Project (Demonstration Project)	ENV-TWO LLC	Hanford, Kings Co.	NA	Demonstration Project New up-flow anaerobic sludge blanket digester	RNG	126,990	\$1,750,000	\$3,374,782	\$5,124,782	Canceled ****
2019	Friesian Farms Dairy Biogas	Friesian Farms Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	South Tulare	New covered lagoon digester	RNG	63,145	\$639,602	\$2,365,670	\$3,005,272	Complete
2019	Gerben Leyendekker Dairy Biogas	Gerben Leyendekker Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	North Visalia	New covered lagoon digester	RNG	85,419	\$845,589	\$2,320,839	\$3,166,428	Complete
2019	GP Dairy Biogas	GP Dairy Biogas	California Bioenergy LLC	Visalia, Tulare Co.	North Visalia	New covered lagoon digester	RNG	50,722	\$502,554	\$2,915,623	\$3,418,177	Canceled ****
2019	Calgren Dairy Fuels LLC	Hettinga Centralized Dairy Digester Pipeline Project	Maas Energy Works Inc	Pixley, Tulare Co.	Calgren	New covered lagoon digester	RNG	167,339	\$2,352,909	\$2,576,784	\$4,929,693	Complete
2019	River Ranch Farms LLC	High Roller Dairy Digester Pipeline Project	Maas Energy Works Inc	Hanford, Kings Co.	Lakeside	New covered lagoon digester	RNG	105,257	\$1,412,136	\$2,117,667	\$3,529,803	Complete
2019	Merced Pipeline LLC	Homen Dairy Digester Pipeline Project	Maas Energy Works Inc	Merced, Merced Co.	Merced	New covered lagoon digester	RNG	124,000	\$1,640,419	\$1,755,673	\$3,396,092	Complete
2019	James Ahlem Dairy Biogas	James Ahlem Dairy Biogas	California Bioenergy LLC	Hilmar, Merced Co.	Hilmar	New covered lagoon digester	RNG	82,216	\$830,349	\$4,861,351	\$5,691,700	In Progress

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2019	Lakeside Energy LLC	Lakeside Dairy Digester Pipeline Project	Maas Energy Works Inc	Hanford, Kings Co.	Lakeside	New covered lagoon digester	RNG	218,679	\$2,213,063	\$2,738,518	\$4,951,581	Complete
2019	Maya Dairy Biogas	Maya Dairy Biogas	California Bioenergy LLC	Buttonwillow, Kern Co.	Buttonwillow	New covered lagoon digester	RNG	250,090	\$2,015,393	\$2,938,894	\$4,954,287	Complete
2019	McMoo Farms Dairy Biogas	McMoo Farms Dairy Biogas	California Bioenergy LLC	Bakersfield, Kern Co.	Kern	New covered lagoon digester	RNG	164,384	\$1,598,893	\$3,013,668	\$4,612,561	Complete
2019	Merced Pipeline LLC	Melo Dairy Digester Pipeline Project	Maas Energy Works Inc	Merced, Merced Co.	Merced	New covered lagoon digester	RNG	272,690	\$2,910,554	\$2,910,555	\$5,821,109	In Progress
2019	Newhouse Dairy Biogas	Newhouse Dairy Biogas	California Bioenergy LLC	Bakersfield, Kern Co.	Kern	New covered lagoon digester	RNG	171,098	\$1,665,037	\$3,982,045	\$5,647,082	Complete
2019	Calgren Dairy Fuels LLC	Northstar Dairy Digester Pipeline Project	Maas Energy Works Inc	Tipton, Tulare Co.	Calgren	New covered lagoon digester	RNG	170,658	\$1,576,438	\$1,638,113	\$3,214,551	Complete
2019	Nyman Brothers Dairy Biogas	Nyman Brothers Dairy Biogas	California Bioenergy LLC	Hilmar, Merced Co.	Hilmar	New covered lagoon digester	RNG	68,026	\$687,006	\$4,654,902	\$5,341,908	In Progress
2019	Poplar Lane Dairy Biogas LLC	Poplar Lane Dairy Digester Pipeline Project	Maas Energy Works Inc	Hanford, Kings Co.	Lakeside	New covered lagoon digester	RNG	131,195	\$1,756,966	\$2,181,681	\$3,938,647	Complete
2019	Rib-Arrow Dairy Biogas	Rib-Arrow Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	South Tulare	New covered lagoon digester	RNG	76,343	\$657,231	\$3,069,649	\$3,726,880	Complete
2019	Ribeiro Dairy Biogas	Ribeiro Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	South Tulare	New covered lagoon digester	RNG	132,348	\$1,124,962	\$1,613,882	\$2,738,844	Complete
2019	Rio Blanco Dairy Biogas	Rio Blanco Dairy Biogas	California Bioenergy LLC	Tulare, Tulare Co.	South Tulare	New covered lagoon digester	RNG	100,886	\$1,002,797	\$2,903,422	\$3,906,219	Complete
2019	Calgren Dairy Fuels LLC	Schott Dairy Digester Pipeline Project	Maas Energy Works Inc	Tipton, Tulare Co.	Calgren	New covered lagoon digester	RNG	129,082	\$1,444,592	\$1,527,538	\$2,972,130	Complete
2019	Calgren Dairy Fuels LLC	Simoes Centralized Digester Pipeline Project	Maas Energy Works Inc	Tipton, Tulare Co.	Calgren	New covered lagoon digester	RNG	161,275	\$2,036,460	\$2,043,922	\$4,080,382	Complete
2019	Skyview Dairy Biogas	Skyview Dairy Biogas	California Bioenergy LLC	Shafter, Kern Co.	Buttonwillow	New covered lagoon digester	RNG	85,174	\$686,620	\$3,799,476	\$4,486,096	Complete
2019	Southern Cross Dairy Biogas	Southern Cross Dairy Biogas	California Bioenergy LLC	Buttonwillow, Kern Co.	Buttonwillow	New covered lagoon digester	RNG	125,872	\$1,019,121	\$4,601,953	\$5,621,074	Complete
2019	Southpoint Ranch Dairy Biogas	Southpoint Ranch Dairy Biogas	California Bioenergy LLC	Madera, Madera Co.	NA	New covered lagoon digester	EV - Fuel Cell	484,999	\$3,000,000	\$8,219,174	\$11,219,174	Complete

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2019	Van Der Hoek Dairy Biogas LLC	Van Der Hoek Dairy Digester Pipeline Project	Maas Energy Works Inc	Helm, Fresno Co.	Five Points	New covered lagoon digester	RNG	168,447	\$2,061,968	\$2,721,799	\$4,783,767	Complete
2019	Van Der Kooi Power LLC	Van Der Kooi Dairy Digester Pipeline Project	Maas Energy Works Inc	Riverdale, Fresno Co.	Five Points	New covered lagoon digester	RNG	170,089	\$1,897,438	\$2,052,493	\$3,949,931	Complete
2019	L&J Vanderham Dairy	Vanderham Dairy Digester Pipeline Project	Maas Energy Works Inc	Riverdale, Fresno Co.	Five Points	New covered lagoon digester	RNG	186,037	\$1,984,951	\$2,090,233	\$4,075,184	Complete
2019	Whiteside Dairy Biogas	Whiteside Dairy Biogas	California Bioenergy LLC	Wasco, Kern Co.	Buttonwillow	New covered lagoon digester	RNG	119,137	\$960,043	\$3,773,726	\$4,733,769	Complete
2019	Yosemite Jersey Dairy Biogas	Yosemite Jersey Dairy Biogas	California Bioenergy LLC	Hilmar, Merced Co.	Hilmar	New covered lagoon digester	RNG	93,734	\$946,644	\$4,097,690	\$5,044,334	Canceled ****
2020	Denair Biogas LLC	Ahlem Farms Dairy Digester Project	Maas Energy Works Inc	Denair, Stanislaus Co.	Merced	New covered lagoon digester	RNG	167,761	\$1,195,000	\$3,130,536	\$4,325,536	In Progress
2020	Aemetis Biogas LLC	Ahlem Farms Jerseys - AAFK Central Dairy Digester Cluster	Aemetis Biogas LLC	Crows Landing, Stanislaus Co.	Aemetis Central	New covered lagoon digester	RNG	113,979	\$1,592,287	\$1,672,003	\$3,264,290	Complete
2020	Aemetis Biogas LLC	Albert Mendes Dairy - AAFK Central Dairy Digester Cluster	Aemetis Biogas LLC	Crows Landing, Stanislaus Co.	Aemetis Central	New covered lagoon digester	RNG	99,372	\$1,388,241	\$2,138,645	\$3,526,886	Complete
2020	Boschma Biogas LLC	Boschma Dairy Biogas	California Bioenergy LLC	Wasco, Kern Co.	NA	New covered lagoon digester	RNG	189,947	\$1,723,302	\$4,819,704	\$6,543,006	In Progress
2020	Maas Energy Works Inc	JDS Ranch Digester Project	Maas Energy Works Inc	Wasco, Kern Co.	Calgren	New covered lagoon digester	RNG	159,082	\$1,600,000	\$3,044,536	\$4,644,536	In Progress
2020	Calgren Dairy Fuels LLC	JR Dairy Digester Project	Maas Energy Works Inc	Tipton, Tulare Co.	Calgren	New covered lagoon digester	RNG	191,049	\$1,300,000	\$1,567,224	\$2,867,224	Complete
2020	Aemetis Biogas LLC	Oliveira Dairy - AAFK Central Dairy Digester Cluster	Aemetis Biogas LLC	Hilmar, Merced Co.	Aemetis Central	New covered lagoon digester	RNG	80,857	\$1,056,977	\$2,103,160	\$3,160,137	In Progress
2020	Poso Creek Biogas LLC	Poso Creek Dairy Biogas	California Bioenergy LLC	Wasco, Kern Co.	NA	New covered lagoon digester	RNG	171,854	\$1,464,930	\$5,344,556	\$6,809,486	In Progress
2020	Aemetis Biogas LLC	S&S Dairy - AAFK Central Dairy Digester Cluster	Aemetis Biogas LLC	Ceres, Stanislaus Co.	Aemetis Central	New covered lagoon digester	RNG	90,946	\$1,271,396	\$2,007,109	\$3,278,505	Complete
2020	Aemetis Biogas LLC	Trinkler Dairy - AAFK Central Dairy Digester Cluster	Aemetis Biogas LLC	Ceres, Stanislaus Co.	Aemetis Central	New covered lagoon digester	RNG	85,529	\$1,194,840	\$1,518,621	\$2,713,461	Complete

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2020	Aemetis Biogas LLC	Wickstrom Jersey Farms - AAFK Central Dairy Digester Cluster	Aemetis Biogas LLC	Hilmar, Merced Co.	Aemetis Central	New covered lagoon digester	RNG	121,350	\$1,342,980	\$1,361,430	\$2,704,410	Complete
2020	Wilson Dairy Biogas LLC	Wilson Dairy Digester Project	Maas Energy Works Inc	Riverdale, Fresno Co.	Five Points	New covered lagoon digester	RNG	206,745	\$1,400,000	\$2,060,714	\$3,460,714	Complete
2022	3Machado Dairy Biogas LLC	3 Machados Dairy Digester Project	Maas Energy Works Inc	Merced, Merced Co.	Merced	New covered lagoon digester	RNG	158,441	\$1,200,000	\$3,527,795	\$4,727,795	In Progress
2022	Bar Mac Dairy Biogas LLC	Bar Mac Dairy Biogas	California Bioenergy LLC	Gustine, Merced Co.	Gustine	New covered lagoon digester	RNG	91,235	\$912,352	\$6,844,732	\$7,757,084	In Progress
2022	San Joaquin Valley Energy LLC	CDF Howard Dairy Digester Project	Maas Energy Works Inc	Livingston, Merced Co.	Merced	New covered lagoon digester	RNG	316,585	\$1,600,000	\$8,102,501	\$9,702,501	In Progress
2022	Couco Creek Biogas LLC	Couco Creek Dairy Digester Project	Maas Energy Works Inc	Turlock, Stanislaus Co.	Merced	New covered lagoon digester	RNG	155,255	\$1,600,000	\$4,275,216	\$5,875,216	In Progress
2022	Grand View Dairy	Grand View Dairy Digester Project	Maas Energy Works Inc	Le Grand, Merced Co.	Merced	New covered lagoon digester	RNG	132,103	\$1,600,000	\$4,414,535	\$6,014,535	In Progress
2022	Egbert J DeGroot DBA Lakeshore Dairy	Lakeshore Dairy Digester Project	Maas Energy Works Inc	Hanford, Kings Co.	Merced	New covered lagoon digester	RNG	159,224	\$1,600,000	\$3,972,072	\$5,572,072	In Progress
2022	Calgren Dairy Fuels LLC	LegenDairy Digester Project	Maas Energy Works Inc	Tipton, Tulare Co.	Calgren	New covered lagoon digester	RNG	113,934	\$1,200,000	\$3,940,407	\$5,140,407	In Progress
2022	Lerda-Goni Farms Biogas LLC	Lerda-Goni Farms Biogas	California Bioenergy LLC	Tulare, Tulare Co.	South Tulare	New covered lagoon digester	RNG	45,677	\$502,448	\$3,988,935	\$4,491,383	In Progress
2022	Martins View Jersey Dairy Biogas LLC	Martins View Jersey Dairy Biogas	California Bioenergy LLC	Gustine, Merced Co.	Gustine	New covered lagoon digester	RNG	81,822	\$818,216	\$5,905,782	\$6,723,998	In Progress
2022	Mattos Bros Dairy, L.P.	Mattos Bros Dairy Digester Project	Maas Energy Works Inc	Hanford, Kings Co.	Lakeside	New covered lagoon digester	RNG	119,017	\$1,600,000	\$2,732,819	\$4,332,819	In Progress
2022	Meirinho West Dairy Biogas LLC	Meirinho West Dairy Digester Project	Maas Energy Works Inc	Modesto, Stanislaus Co.	Merced	New covered lagoon digester	RNG	166,952	\$1,600,000	\$3,816,266	\$5,416,266	In Progress
2022	P&M Dairy and VP Farms Biogas	P&M Dairy and VP Farms Biogas	California Bioenergy LLC	Tipton, Tulare Co.	South Tulare	New covered lagoon digester	RNG	154,656	\$1,546,564	\$4,626,524	\$6,173,088	In Progress
2022	Second Street Energy LLC	River Rock Dairy Digester Project	Maas Energy Works Inc	Stevinson, Stanislaus Co.	Merced	New covered lagoon digester	RNG	104,835	\$1,600,000	\$4,115,962	\$5,715,962	In Progress
2022	Top O' The Morn Farms Biogas LLC	Top O' The Morn Farms Biogas	California Bioenergy LLC	Tulare, Tulare Co.	South Tulare	New covered lagoon digester	RNG	132,103	\$1,332,252	\$3,923,771	\$5,256,023	In Progress

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2023	(1) Blue Sky Dairy Digester Project	Blue Sky Dairy Digester Project	Maas Energy Works Inc	Atwater, Merced Co.	Merced	New covered lagoon digester	RNG	203,589	\$1,000,000	\$7,374,475	\$8,374,475	In Progress
2023	(2) Coelho Dairy Digester Project	Coelho Dairy Digester Project	Maas Energy Works Inc	El Nido, Merced, Co.	Merced	New covered lagoon digester	RNG	85,573	\$1,000,000	\$3,158,248	\$4,158,248	In Progress
2023	(7) Brasil Dairy Digester Project	Brasil Dairy Digester Project	Maas Energy Works Inc	Turlock, Stanislaus, Co.	Turlock	New covered lagoon digester	RNG	185,068	\$1,600,000	\$8,266,008	\$9,866,008	In Progress
2023	Barcellos/Brasil Centralized Dairy Digester	Barcellos/Brasil Centralized Dairy Digester	Maas Energy Works Inc	Tipton, Tulare, Co.	Calgren	New covered lagoon digester	RNG	96,990	\$1,600,000	\$5,646,260	\$7,246,260	In Progress
2023	Dairy Avenue and Circle H Biogas LLC	Dairy Avenue and Circle H Biogas	California Bioenergy LLC	Corcoran, Kings Co.	NA	New covered lagoon digester	RNG	226,707	\$1,600,000	\$8,667,957	\$10,267,957	In Progress
2023	DeJager North Biogas LLC	Dejager North Biogas	California Bioenergy LLC	Chowchilla, Merced, Co.	NA	New covered lagoon digester	EV – Linear Generator	346,872	\$1,600,000	\$10,838,371	\$12,438,371	In Progress
2023	Delta View Biogas LLC	Delta View Biogas	California Bioenergy LLC	Visalia, Tulare, Co.	West Visalia	New covered lagoon digester	RNG	121,229	\$1,600,000	\$3,317,273	\$4,917,273	In Progress
2023	Felicita Dairy Biogas LLC	Felicita Dairy Biogas	California Bioenergy LLC	Tulare, Kings Co.	South Tulare	New covered lagoon digester	RNG	124,869	\$1,300,000	\$4,613,649	\$5,913,650	In Progress
2023	HD Ranch Biogas LLC	HD Ranch Biogas	California Bioenergy LLC	Dixon, Solano, Co.	NA	New covered lagoon digester	RNG	189,562	\$1,600,000	\$5,004,015	\$6,604,015	In Progress
2023	Hidden Valley Dairy LLC	Hidden Valley Dairy	California Bioenergy LLC	Gustine, Merced, Co.	Gustine	New covered lagoon digester	RNG	119,686	\$1,150,000	\$6,316,000	\$7,466,000	In Progress
2023	Moonstone Biogas LLC	Moonstone Biogas	California Bioenergy LLC	Hanford, Kings Co.	West Visalia	New covered lagoon digester	RNG	127,474	\$1,600,000	\$4,102,695	\$5,702,695	In Progress
Totals								24,562,528	\$226,691,072	\$489,318,240	\$716,009,313	

*Estimated reductions calculated using the CARB Quantification Methodology and calculator tool. MTCO₂e: Metric tonnes of carbon dioxide equivalent.

**Matching funds are subject to change.

***RNG: Renewable Natural Gas; ‡EV: Electrical Vehicle

****Project canceled due to substantive changes to project scope.

*Defunct digester was non-functional for a minimum of 12 consecutive months.

Table 6. Summary of Dairy Digester Projects Funded by CDFA.

Year Awarded	Project Title	Total cost of 1 MTCO ₂ e GHG reduction (Grant + Matching Funds)	Grant cost per 1 MTCO ₂ e GHG reduction	% of 1 MTCO ₂ e reduction supported cost by Grant
2015	Carlos Echeverria & Sons Dairy Biogas Project	\$32.61	\$4.97	15
2015	Lakeview Dairy Biogas Digester	\$49.47	\$13.88	28
2015	Open Sky Ranch Dairy Digester	\$7.59	\$3.76	50
2015	Verwey-Hanford Dairy Digester	\$11.22	\$5.60	50
2015	Verwey-Madera Dairy Digester	\$19.22	\$9.50	49
2015	West-Star North Dairy Digester	\$51.77	\$11.57	22
2017	Bos Farms Dairy Biogas	\$39.78	\$8.91	22
2017	Circle A Dairy Digester Fuel Pipeline Project	\$17.87	\$7.57	42
2017	Cloverdale Dairy Biogas	\$24.82	\$8.31	33
2017	Hamstra Dairy Biogas	\$42.08	\$9.75	23
2017	Hollandia Farms Dairy Biogas	\$43.52	\$8.41	19
2017	K&M Visser Dairy Digester Fuel Pipeline Project	\$16.55	\$7.30	44
2017	Legacy Dairy Digester Fuel Pipeline	\$16.59	\$7.48	45
2017	Maple Dairy Biogas	\$27.93	\$8.76	31
2017	Moonlight Dairy Biogas	\$51.28	\$9.69	19
2017	Pixley Dairy Digester Fuel Pipeline Project	\$15.21	\$7.43	49
2017	R Vander Eyk Dairy Digester Fuel Pipeline Project	\$19.64	\$7.54	38
2017	Rancho Teresita Dairy Biogas	\$32.17	\$8.89	28
2017	Red Top Madera Dairy Digester Project	\$21.41	\$10.62	50
2017	S&S Dairy Biogas	\$40.85	\$9.56	23
2017	T & W Dairy Biogas	\$29.66	\$8.81	30
2017	Trilogy Dairy Biogas	\$34.48	\$8.84	26
2017	Williams Family Dairy Digester Fuel Pipeline	\$20.00	\$7.45	37
2017	Wreden Ranch Dairy Biogas	\$20.86	\$7.62	37
2018	4K Dairy Digester Pipeline Project	\$19.03	\$9.27	49

2018	Ackerman Dairy Digester Pipeline Project	\$32.52	\$14.86	46
2018	Aukeman Dairy Biogas	\$23.29	\$8.50	36
2018	Belonave Dairy Biogas LLC	\$24.28	\$8.50	35
2018	BV Dairy Biogas	\$33.43	\$8.50	25
2018	Cornerstone Dairy Digester Pipeline Project	\$13.72	\$6.83	50
2018	De Groot North Dairy Biogas	\$22.65	\$8.50	38
2018	De Groot South Dairy Biogas	\$15.66	\$7.73	49
2018	Decade Centralized Dairy Digester Pipeline Project	\$20.51	\$9.21	45
2018	DJ South Dairy Digester Pipeline Project	\$24.44	\$12.06	49
2018	Double D Dairy Digester Pipeline Project	\$21.32	\$9.60	45
2018	Double J Dairy Biogas	\$26.19	\$8.50	32
2018	Double L Dairy Digester Pipeline Project	\$25.93	\$12.94	50
2018	Dykstra Dairy Biogas	\$20.82	\$8.50	41
2018	El Monte Dairy Biogas	\$33.96	\$8.50	25
2018	Five H Dairy Digester Pipeline Project	\$30.37	\$15.15	50
2018	FM Jerseys Dairy Digester Virtual Pipeline Project	\$24.87	\$12.42	50
2018	Hoogendam Dairy Digester Pipeline Project	\$25.50	\$12.71	50
2018	Horizon Jersey Dairy Biogas	\$19.80	\$8.50	43
2018	Jacobus De Groot #2 Dairy Biogas	\$51.09	\$8.50	17
2018	Little Rock Centralized Dairy Digester Pipeline Project	\$29.73	\$14.28	48
2018	Lone Oak #1 Dairy Digester Pipeline Project	\$17.22	\$7.55	44
2018	Meirinho Dairy Digester Pipeline Project	\$25.84	\$12.44	48
2018	Mellema Dairy Biogas	\$30.48	\$8.50	28
2018	Milky Way Dairy Biogas	\$20.72	\$8.50	41
2018	Mineral King Dairy Biogas	\$24.31	\$8.50	35
2018	Rancho Sierra Vista Dairy Biogas	\$26.11	\$8.50	33
2018	Red Rock Dairy Digester Pipeline Project	\$26.05	\$13.00	50
2018	River Ranch Dairy Digester Pipeline Project	\$21.88	\$10.62	49
2018	Riverbend Dairy Biogas	\$19.33	\$8.50	44
2018	Riverview Dairy Digester Pipeline Project	\$30.17	\$14.79	49
2018	Rob Van Grouw Dairy Biogas	\$32.47	\$8.50	26

2018	Rocking Horse Dairy Biogas	\$18.31	\$8.50	46
2018	Rockshar Dairy Digester Pipeline Project	\$26.94	\$13.47	50
2018	Scheenstra Dairy Biogas	\$23.90	\$8.50	36
2018	Sousa & Sousa Dairy Digester Pipeline Project	\$25.91	\$12.91	50
2018	Udder Dairy Biogas	\$24.17	\$8.50	35
2018	Valadao Dairy Biogas	\$25.53	\$8.50	33
2018	Vander Poel Dairy Digester Pipeline Project	\$14.46	\$6.80	47
2018	Vander Woude Dairy Digester Pipeline Project	\$19.77	\$9.88	50
2018	Vista Verde Dairy Digester Pipeline Project	\$23.02	\$11.33	49
2018	Western Sky Dairy Biogas	\$23.08	\$8.00	35
2019	Ahlem Farms Dairy Biogas	\$39.86	\$10.10	25
2019	Albert Goyenette Dairy Biogas	\$26.03	\$8.06	31
2019	Art Leyendekker Dairy Biogas	\$47.43	\$9.91	21
2019	Avalon Dairy Digester Project	\$24.95	\$12.00	48
2019	Bar 20 Dairy Biogas	\$24.96	\$8.01	32
2019	Charles Ahlem Ranch Dairy Biogas	\$52.43	\$10.10	19
2019	Clauss and Sunwest Dairy Biogas	\$40.80	\$10.10	25
2019	Curtimade Dairy Biogas	\$27.32	\$10.00	37
2019	Dairyland Farms Dairy Biogas	\$20.72	\$9.92	48
2019	De Boer Dairy Digester Pipeline Project	\$21.56	\$9.52	44
2019	Dixie Creek Dairy Digester Pipeline Project	\$18.11	\$8.98	50
2019	Double Diamond Dairy Digester Pipeline Project	\$15.88	\$7.01	44
2019	Elk Creek Dairy Biogas	\$46.34	\$8.61	19
2019	Elkhorn Dairy Biogas	\$31.36	\$10.03	32
2019	Fern Oaks Dairy Digester Pipeline Project	\$25.27	\$9.97	39
2019	Flint Dairy Biogas Project (Demonstration Project)	\$40.36	\$13.78	34
2019	Friesian Farms Dairy Biogas	\$47.59	\$10.13	21
2019	Gerben Leyendekker Dairy Biogas	\$37.07	\$9.90	27
2019	GP Dairy Biogas	\$67.39	\$9.91	15
2019	Hettinga Centralized Dairy Digester Pipeline Project	\$29.46	\$14.06	48
2019	High Roller Dairy Digester Pipeline Project	\$33.54	\$13.42	40

2019	Homen Dairy Digester Pipeline Project	\$27.39	\$13.23	48
2019	James Ahlem Dairy Biogas	\$69.23	\$10.10	15
2019	Lakeside Dairy Digester Pipeline Project	\$22.64	\$10.12	45
2019	Maya Dairy Biogas	\$19.81	\$8.06	41
2019	McMoo Farms Dairy Biogas	\$28.06	\$9.73	35
2019	Melo Dairy Digester Pipeline Project	\$21.35	\$10.67	50
2019	Newhouse Dairy Biogas	\$33.00	\$9.73	29
2019	Northstar Dairy Digester Pipeline Project	\$18.84	\$9.24	49
2019	Nyman Brothers Dairy Biogas	\$78.53	\$10.10	13
2019	Poplar Lane Dairy Digester Pipeline Project	\$30.02	\$13.39	45
2019	Rib-Arrow Dairy Biogas	\$48.82	\$8.61	18
2019	Ribeiro Dairy Biogas	\$20.69	\$8.50	41
2019	Rio Blanco Dairy Biogas	\$38.72	\$9.94	26
2019	Schott Dairy Digester Pipeline Project	\$23.03	\$11.19	49
2019	Simoes Centralized Digester Pipeline Project	\$25.30	\$12.63	50
2019	Skyview Dairy Biogas	\$52.67	\$8.06	15
2019	Southern Cross Dairy Biogas	\$44.66	\$8.10	18
2019	Southpoint Ranch Dairy Biogas	\$23.13	\$6.19	27
2019	Van Der Hoek Dairy Digester Pipeline Project	\$28.40	\$12.24	43
2019	Van Der Kooi Dairy Digester Pipeline Project	\$23.22	\$11.16	48
2019	Vanderham Dairy Digester Pipeline Project	\$21.91	\$10.67	49
2019	Whiteside Dairy Biogas	\$39.73	\$8.06	20
2019	Yosemite Jersey Dairy Biogas	\$53.82	\$10.10	19
2020	Ahlem Farms Dairy Digester Project	\$25.78	\$7.12	28
2020	Ahlem Farms Jerseys - AAFK Central Dairy Digester Cluster	\$28.64	\$13.97	49
2020	Albert Mendes Dairy - AAFK Central Dairy Digester Cluster	\$35.49	\$13.97	39
2020	Boschma Dairy Biogas	\$34.45	\$9.07	26
2020	JDS Ranch Digester Project	\$29.20	\$10.06	34
2020	JR Dairy Digester Project	\$15.01	\$6.80	45
2020	Oliveira Dairy - AAFK Central Dairy Digester Cluster	\$39.08	\$13.07	33
2020	Poso Creek Dairy Biogas	\$39.62	\$8.52	22

2020	S&S Dairy - AAFK Central Dairy Digester Cluster	\$36.05	\$13.98	39
2020	Trinkler Dairy - AAFK Central Dairy Digester Cluster	\$31.73	\$13.97	44
2020	Wickstrom Jersey Farms - AAFK Central Dairy Digester Cluster	\$22.29	\$11.07	50
2020	Wilson Dairy Digester Project	\$16.74	\$6.77	40
2022	3 Machados Dairy Digester Project	\$29.84	\$7.57	25
2022	Bar Mac Dairy Biogas	\$85.02	\$10.00	12
2022	CDF Howard Dairy Digester Project	\$30.65	\$5.05	16
2022	Couco Creek Dairy Digester Project	\$37.84	\$10.31	27
2022	Grand View Dairy Digester Project	\$45.53	\$12.11	27
2022	Lakeshore Dairy Digester Project	\$35.00	\$10.05	29
2022	LegenDairy Digester Project	\$45.12	\$10.53	23
2022	Lerda-Goni Farms Biogas	\$98.33	\$11.00	11
2022	Martins View Jersey Dairy Biogas	\$82.18	\$10.00	12
2022	Mattos Bros Dairy Digester Project	\$36.40	\$13.44	37
2022	Meirinho West Dairy Digester Project	\$32.44	\$9.58	30
2022	P&M Dairy and VP Farms Biogas	\$39.91	\$10.00	25
2022	River Rock Dairy Digester Project	\$54.52	\$15.26	28
2022	Top O' The Morn Farms Biogas	\$39.79	\$10.08	25
2023	(1) Blue Sky Dairy Digester Project	\$41.13	\$4.91	12
2023	(2) Coelho Dairy Digester Project	\$48.59	\$11.69	24
2023	(7) Brasil Dairy Digester Project	\$53.31	\$8.65	16
2023	Barcellos/Brasil Centralized Dairy Digester	\$74.71	\$16.50	22
2023	Dairy Avenue and Circle H Biogas	\$45.29	\$7.06	16
2023	DeJager North Biogas	\$35.86	\$4.61	13
2023	Delta View Biogas	\$40.56	\$13.20	33
2023	Felicita Dairy Biogas	\$47.36	\$10.41	22
2023	HD Ranch Biogas	\$34.84	\$8.44	24
2023	Hidden Valley Dairy	\$62.38	\$9.61	15
2023	Moonstone Biogas	\$44.74	\$12.55	28

I. Individual Project Information

This section only contains information on individual projects funded through the CDFA DDRDP in 2023. Information on previous projects listed in past reports can be found on the DDRDP webpage.

(1) Blue Sky Dairy Digester Project
Funded: 2023
Status: In Progress
Expected Completion Date: March 2026

The Blue Sky Dairy Digester Project will construct a new covered lagoon dairy digester facility for the purpose of capturing manure methane emissions to create carbon-negative transportation fuel while increasing the environmental sustainability of the host dairy, Blue Sky Dairy. The Blue Sky Dairy Digester Project will truck the product biomethane to the Merced Pipeline facility and inject it directly into the utility pipeline. This project is being developed by Maas Energy Works LLC.

- Location - Atwater, California (Merced County)
- CDFA DDRDP Funding - \$ 1,000,000
- Matching funds - \$ 7,374,475
- Total project costs - \$ 8,374,475
- Estimated 10-year GHG reductions – 203,589 MTCO₂e
- GHG reductions per CDFA grant dollar – 0.203 MTCO₂e
- GHG reduction per total project dollars – 0.03 MTCO₂e
- Total cost per MTCO₂e - \$41.13

Dairy Avenue and Circle H Biogas
Funded: 2023
Status: In Progress
Expected Completion Date: August 2026

Dairy Avenue and Circle H dairies are part of the developing South Tulare dairy biogas to fuel cluster in Tulare County, CA. The project is committed to building a shared Tier 1 double-lined, manure-only, covered lagoon digester between both dairies. The digester will include integrated gas

storage and pre-treatment. An on-dairy biogas conditioning and upgrading plant will remove hydrogen sulfide and upgrade the biogas to biomethane. The biomethane, meeting SoCalGas Rule 30, will be loaded into tube trailers on-site and transported via a virtual pipeline to be injected into the co-located point of receipt. The project's biomethane will be delivered as R-CNG to California fleets and CNG fueling stations. California Bioenergy is the project developer.

- Location - Corcoran, California (Kings County)
- CDFA DDRDP Funding - \$ 1,600,000
- Matching funds - \$ 8,667,957
- Total project costs - \$ 10,267,957
- Estimated 10-year GHG reductions – 226,707 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.142 MTCO₂e
- GHG reduction per total project dollars – 0.02 MTCO₂e
- Total cost per MTCO₂e - \$45.29

Moonstone Biogas

Funded: 2023

Status: In Progress

Expected Completion Date: August 2026

Moonstone Dairy is part of the developing West Visalia dairy biogas to fuel cluster in Tulare County, CA. The project is committed to building an on-dairy Tier 1 double-lined, manure-only, covered lagoon digester with integrated gas storage and pre-treatment. An on-dairy biogas conditioning system will remove hydrogen sulfide and moisture and then meter and move the clean biogas into a gathering line connecting to the existing centralized biogas upgrading and interconnection facility. Biomethane, meeting SoCalGas Rule 30, will be injected into the co-located point of receipt. The project's biomethane will be delivered as R-CNG to California fleets and CNG fueling stations. This project will also include a vermifiltration system to reduce nutrients and volatile solids in the dairy's wastewater. California Bioenergy is the project developer.

- Location – Hanford, California (Kings County)
- CDFA DDRDP Funding - \$ 1,600,000
- Matching funds - \$ 4,102,695

- Total project costs - \$ 5,702,695
- Estimated 10-year GHG reductions – 127,474 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.078 MTCO₂e
- GHG reduction per total project dollars – 0.03 MTCO₂e
- Total cost per MTCO₂e - \$44.74

DeJager North Biogas
Funded: 2023
Status: In Progress
Expected Completion Date: August 2026

DeJager Dairy North #1 and #2 will install a shared Tier 1 designed manure only covered lagoon digester with integrated gas storage and pre-treatment. An on-dairy biogas conditioning system will remove hydrogen sulfide and meter and move the clean biogas directly into 6 co-located, ultraclean, high-efficiency Mainspring linear generators interconnected to PG&E. CalBio will generate LCFS credits by directly matching generation and supplying the renewable energy credits to in-state electric vehicle re-charging load. This project will also include a vermifiltration system to reduce nutrients and volatile solids in the dairy's wastewater. California Bioenergy is the project developer.

- Location – Chowchilla, California (Merced County)
- CDFA DDRDP Funding - \$ 1,600,000
- Matching funds - \$ 10,838,371
- Total project costs - \$ 12,438,371
- Estimated 10-year GHG reductions – 346,872MTCO₂e
- GHG reductions per CDFA grant dollar - 0.217 MTCO₂e
- GHG reduction per total project dollars – 0.03 MTCO₂e
- Total cost per MTCO₂e - \$35.86

(7) Brasil Dairy Digester Project
Funded: 2023
Status: In Progress
Expected Completion Date: August 2026

The Brasil Dairy Digester Project will construct a new covered lagoon dairy digester facility for the purpose of capturing manure methane emissions to

create carbon-negative transportation fuel while increasing the environmental sustainability of the host dairy, Brasil Dairy. The Brasil Dairy Digester Project will capture the biogas from the digested manure and then transport it to the Turlock Pipeline upgrading facility and inject it directly into the utility pipeline. The project is being developed by Maas Energy Works LLC.

- Location – Turlock, California (Stanislaus County)
- CDFA DDRDP Funding - \$ 1,600,000
- Matching funds - \$ 8,266,008
- Total project costs - \$ 9,866,008
- Estimated 10-year GHG reductions – 185,068 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.116 MTCO₂e
- GHG reduction per total project dollars – 0.02 MTCO₂e
- Total cost per MTCO₂e - \$53.31

Delta View Biogas
Funded: 2023
Status: In Progress
Expected Completion Date: August 2026

Delta View Farms is part of the developing West Visalia dairy biogas to fuel cluster in Tulare County, CA. The project is committed to building an on-dairy Tier 1 double-lined, manure-only, covered lagoon digester with integrated gas storage and pre-treatment. An on-dairy biogas conditioning system will remove hydrogen sulfide and moisture and then meter and move the clean biogas into a gathering line connecting to the existing centralized biogas upgrading and interconnection facility. Biomethane, meeting SoCalGas Rule 30, will be injected into the co-located point of receipt. The project's biomethane will be delivered as R-CNG to fleets and CNG fueling stations in California. This project will also include a vermifiltration system to reduce nutrients and volatile solids in the dairy's wastewater. California Bioenergy is the project developer.

- Location – Visalia, California (Tulare County)
- CDFA DDRDP Funding - \$ 1,600,000
- Matching funds - \$ 3,317,273
- Total project costs - \$ 4,917,273

- Estimated 10-year GHG reductions – 121, 229 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.076 MTCO₂e
- GHG reduction per total project dollars – 0.03 MTCO₂e
- Total cost per MTCO₂e - \$40.56

Hidden Valley Dairy
Funded: 2023
Status: In Progress
Expected Completion Date: August 2026

Hidden Valley Dairy is part of the developing Gustine dairy biogas to fuel cluster in Merced County, CA. The project is committed to building an on-dairy Tier 1 double-lined, manure-only, covered lagoon digester with integrated gas storage and pre-treatment. An on-dairy biogas conditioning system will remove hydrogen sulfide and moisture and then meter and move the clean biogas into a gathering line connecting to a centralized biogas upgrading and interconnection facility. Biomethane, meeting PG&E Rule 29, will be injected into the co-located point of receipt. The project's biomethane will be delivered as R-CNG to fleets and CNG fueling stations in California. California Bioenergy is the project developer.

- Location – Gustine, California (Merced County)
- CDFA DDRDP Funding - \$ 1,150,000
- Matching funds - \$ 6,316,000
- Total project costs - \$ 7,466,000
- Estimated 10-year GHG reductions – 119,686 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.104 MTCO₂e
- GHG reduction per total project dollars – 0.02 MTCO₂e
- Total cost per MTCO₂e - \$62.38

Felicita Dairy Biogas LLC
Funded: 2023
Status: In Progress
Expected Completion Date: March 2026

Felicita Dairy is part of the established South Tulare dairy biogas to fuel cluster in Tulare County, CA. The project is committed to building an on-dairy Tier 1 double-lined, manure-only, covered lagoon digester with integrated gas storage and pre-treatment. An on-dairy biogas conditioning system will remove hydrogen sulfide and moisture and then meter and move the clean biogas into a gathering line connecting to the existing centralized biogas upgrading and interconnection facility. Biomethane, meeting SoCalGas Rule 30, will be injected into the co-located point of receipt. The project's biomethane will be delivered as R-CNG to fleets and CNG fueling stations in California. California Bioenergy is the project developer.

- Location – Tulare, California (Kings County)
- CDFA DDRDP Funding - \$ 1,300,000
- Matching funds - \$ 4,613,650
- Total project costs - \$ 5,913,650
- Estimated 10-year GHG reductions – 124, 869 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.096 MTCO₂e
- GHG reduction per total project dollars – 0.03 MTCO₂e
- Total cost per MTCO₂e - \$47.36

HD Ranch Biogas
Funded: 2023
Status: In Progress
Expected Completion Date: August 2026

HD Ranch is part of the developing Gustine dairy biogas to fuel cluster in Merced County, CA. The project is committed to building an on dairy Tier 1 double-lined, manure-only, covered lagoon digester with integrated gas storage and pretreatment. An on-dairy biogas conditioning and upgrading plant will remove hydrogen sulfide and upgrade the biogas to biomethane. The biomethane, meeting PG&E Rule 29, will be loaded into tube trailers on-site and transported via virtual pipeline to be injected into the co-located point of receipt. The project's biomethane will be delivered as R-CNG to fleets and CNG fueling stations in California. California Bioenergy is the project developer.

- Location – Dixon, California (Solano County)

- CDFA DDRDP Funding - \$ 1,600,000
- Matching funds - \$ 5,004,015
- Total project costs - \$ 6,604,015
- Estimated 10-year GHG reductions – 189,562 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.119 MTCO₂e
- GHG reduction per total project dollars – 0.03 MTCO₂e
- Total cost per MTCO₂e - \$34.84

(2) Coelho Dairy Digester Project
Funded: 2023
Status: In Progress
Expected Completion Date: March 2026

The Coelho Dairy Digester Project will construct a new covered lagoon dairy digester facility for the purpose of capturing manure methane emissions to create carbon-negative transportation fuel while increasing the environmental sustainability of the host dairy, Coelho Dairy. The Coelho Dairy Digester Project will capture the biogas from the digested manure and then transport it to the Merced Pipeline conditioning facility for upgrading to biomethane and inject it directly into the utility pipeline. The project is being developed by Maas Energy Works LLC.

- Location – El Nido, California (Merced County)
- CDFA DDRDP Funding - \$ 1,000,000
- Matching funds - \$ 3,158,248
- Total project costs - \$ 4,158,248
- Estimated 10-year GHG reductions – 85,573 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.086 MTCO₂e
- GHG reduction per total project dollars – 0.02 MTCO₂e
- Total cost per MTCO₂e - \$48.59

Barcellos/Brasil Centralized Dairy Digester
Funded: 2023
Status: In Progress
Expected Completion Date: August 2026

The Barcellos/Brasil Centralized Dairy Digester Project will construct a new covered lagoon dairy digester facility for the purpose of capturing manure methane emissions to create carbon-negative transportation fuel while increasing the environmental sustainability of the participating Barcellos/Brasil dairy facilities. The Barcellos/Brasil Centralized Dairy Digester Project will capture the biogas from the digested manure, transport it via private pipeline to the Calgren Dairy Fuels conditioning facility for upgrading to biomethane and then inject it directly into the SoCalGas utility pipeline. This project is being developed by Maas Energy Works LLC.

- Location – Tipton, California (Tulare County)
- CDFA DDRDP Funding - \$ 1,600,000
- Matching funds - \$ 5,646,260
- Total Projects costs - \$ 7,246,260
- Estimated 10-year GHG reductions – 96,990 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.061 MTCO₂e
- GHG reduction per total project dollars – 0.01 MTCO₂e
- Total cost per MTCO₂e - \$74.71

Appendix A

Greenhouse Gas Calculations– Report of Funded Projects (2015 – 2024) for the Dairy Digester Research and Development Program (DDRDP)

All emissions data were extracted from the CARB Greenhouse Gas Emission Inventory – Query Tool for years 2000 to 2021 (2023 Edition) available at <https://ww2.arb.ca.gov/applications/greenhouse-gas-emission-inventory-0>

1) Greenhouse Gas (GHG) Emissions from California Agriculture as a portion of California's Total Annual GHG Emissions

In 2021, agriculture contributed approximately **30.85 million metric tons** of carbon dioxide equivalents (MMTCO₂e), or **8.1 percent** of California's total annual GHG emissions.

- California Total GHG emissions (all GHGs) in 2021 = 381.289 MMTCO₂e
- CA Agriculture GHG emissions (all GHGs) in 2021 = 30.850 MMTCO₂e
- Thus,

$$\left(\frac{\text{CA Agriculture GHG Emission}}{\text{CA Total GHG Emission}} \right) \times 100 = \left(\frac{30.850}{381.289} \right) \times 100 = 8.091 \approx \mathbf{8.1\%}$$

2) Methane Emissions from Manure Management relative to California's Total Annual GHG Emissions (A), and California's Agricultural GHG Emissions (B)

Methane emissions resulting from manure management, a subset of these total statewide agricultural methane emissions, account for approximately **2.4% percent of the total statewide GHG emissions**, or approximately **30 percent of the agricultural GHG emissions**.

- In 2021, manure management methane emissions from all livestock were equivalent to 9.236MMTCO₂e
- Thus,

$$\mathbf{(A)} \left(\frac{\text{Manure Methane Emission (livestock)}}{\text{CA Total GHG Emission}} \right) \times 100 = \left(\frac{9.236}{381.289} \right) \times 100 = 2.422 \approx \mathbf{2.4\%}$$

of all California GHG emissions come from the methane emissions from manure management and;

$$\mathbf{(B)} \left(\frac{\text{Manure Methane Emission (livestock)}}{\text{CA Agriculture and Forestry GHG Emission}} \right) \times 100 = \left(\frac{9.236}{30.850} \right) \times 100 = 29.938 \approx \mathbf{30\%}$$

of all agricultural GHG emissions in CA come from the methane emissions from manure management.

3) Estimated GHG Emissions Reductions Achieved by DDRDP Funded Projects relative to California's Methane Emissions from Manure Management (in 2021, C and 2013, D), and California's Agricultural GHG Emissions (in 2021, E)

The projects referenced in the report have a cumulative estimated GHG reduction of **24.56 MMTCO₂e over ten years**, or approximately **2.45 MMTCO₂e annually**. The funded projects equate to addressing approximately **23.2 percent** of the methane emissions from manure management in California and **7.9 percent** of the total GHG emissions from the agricultural sector in California.

- DDRDP has 140 funded digester projects (complete and in progress) and those are equivalent to 24.56 MMTCO₂e (over 10 years) or 2.45 MMTCO₂e/year. This value does not include Alternative Manure Management Program (AMMP) funded projects, which is approximately 0.29 MMTCO₂e/year.
- Methane emissions from manure management in 2021 = 9.236 MMTCO₂e
- Methane emissions from manure management in 2013 = 10.545 MMTCO₂e.
- Thus,

$$(C) \left(\frac{\text{DDRDP GHG Annual Emission Reduction}}{\text{Manure Methane Emission (livestock) in 2021}} \right) \times 100 = \left(\frac{2.45}{9.236} \right) \times 100 = 26.5\%$$

and

$$(D) \left(\frac{\text{DDRDP GHG Annual Emission Reduction}}{\text{Manure Methane Emission (livestock) in 2013}} \right) \times 100 = \left(\frac{2.45}{10.545} \right) \times 100 = 23.2\%$$

Therefore, more than **23 percent** of methane emissions reduction from manure management are achieved by DDRDP projects.

and,

$$(E) \left(\frac{\text{DDRDP GHG Annual Emission Reduction}}{\text{CA Agriculture and Forestry GHG Emission}} \right) \times 100 = \left(\frac{2.45}{30.850} \right) \times 100 = 7.94 \approx 7.9\%$$

of GHG emissions reduction from agriculture are achieved by DDRDP projects.