Dairy Digester Research and Development Program (DDRDP)

REPORT OF FUNDED PROJECTS (2015-18)

January 2019
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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 on California dairies and minimize or mitigate adverse environmental impacts.

The Budget Act of 2017-18 (Item 8570-101-3228) required CDFA to provide ongoing updates on the Department’s DDRDP projects in January of each year beginning in 2018 and continuing through 2027. CDFA is required to provide status updates on the implementation of each dairy digester project that was awarded funding in 2014-15 through 2016-17. This legislative mandate is designed to evaluate the efficiency and cost-effectiveness of strategies to reduce emissions of short-lived climate pollutants including methane (a greenhouse gas) from dairy operations. This report includes information on projects funded by the DDRDP in 2017-18. The Budget Act of 2017-18 also required an additional report, which included details on CDFA’s recent funding awards to Alternative Manure Management Program projects. That report was submitted in July 2018 and is available at: https://www.cdfa.ca.gov/oefi/ddrdp/docs/MethaneReduction_July2018.pdf

CDFA was appropriated $12 million in the Budget Act of 2014 to fund dairy digesters, of which $11.1 was awarded to fund six projects in 2015 through the DDRDP competitive grant process. 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 Alternative Manure Management Program (AMMP), which provides financial assistance to California dairy and livestock operations. 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 2017, $35.3 million of the FY 2016-17 allocation were awarded to dairy digester projects and $9.9 million were awarded to alternative manure management projects. In 2018, $72.4 million of the FY 2017-18 allocation were awarded to dairy digester projects and $21.6 million were awarded to non-digester projects. Funds appropriated in FY 2018-19 have not yet been awarded, CDFA began accepting grant applications for these funds on December 28, 2018.

CDFA has funded a total of $114.25 million for dairy digester projects from 2014 through 2018. These projects, collectively, have an estimated greenhouse gas (GHG) reduction of 12.8 million metric tons of carbon dioxide equivalents (MMTCO₂e) over ten years. All funded projects in 2015 are currently operational. Of the 6 funded projects in 2017, 1 is completed and currently operational; 15 are under construction. All of the 42 funded projects in 2018 are under construction.
I. Program Background and Award Selection Process

Methane is a potent 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; climate gases that remain in the atmosphere for a much shorter period of time than longer lived climate pollutants such as carbon dioxide. In California agriculture, methane is primarily emitted from manure lagoons on dairy operations. CDFA’s DDRDP provides financial assistance for the installation of dairy digesters in California to reduce quantifiable GHG emissions including methane.

CDFA was appropriated $12 million in the Budget Act of 2014 to fund dairy digesters, of which $11.1 were awarded to fund six projects in 2015 through the DDRDP competitive grant process. CDFA received $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. $35.3 million of this allocation were awarded to dairy digester projects, and $9.6 million were awarded to alternative manure management (non-digester) projects in 2017. The Budget Act of 2017 allocated $99 million to CDFA to support dairy and livestock methane reduction projects. Of this allocation $72.4 million were awarded to digester and $21.3 million to alternative manure management projects in 2018. A summary of funds allocated to the DDRDP are provided in Table 1.

Table 1. Summary of CDFA DDRDP funding to date

<table>
<thead>
<tr>
<th>Year</th>
<th>Dollar Allocation (millions)</th>
<th>DDRDP Grant Funds Awarded (millions)</th>
<th>Administrative Cost (millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014-15</td>
<td>$12</td>
<td>$11.09</td>
<td>$0.2</td>
</tr>
<tr>
<td>2016-17</td>
<td>$50</td>
<td>$35.25</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2017-18</td>
<td>$99</td>
<td>$72.41</td>
<td>Not applicable</td>
</tr>
<tr>
<td>2018-19</td>
<td>$99</td>
<td>$61-75*</td>
<td>$2*</td>
</tr>
</tbody>
</table>

*Currently accepting applications, Request for Grant Applications released on December 28, 2018.

CDFA has funded a total of $114.25 million to dairy digester projects, with $204 million provided in matching funds by grant awardees. This funding has been awarded to projects that will result in methane emissions reductions from California agriculture sector. Agriculture currently contributes approximately 33.8 million metric tons of carbon dioxide equivalents (MMTCO$_2$e) or 7.9 percent of California’s total annual GHG emissions. Methane emissions resulting from manure management, a subset of these total statewide agricultural methane emissions, account for approximately 2.7 percent of the total statewide GHG emissions, or approximately 34.4 percent of the agricultural GHG emissions. These projects having a cumulative estimated GHG reduction of 12.8 MMTCO$_2$e over ten years, or approximately 1.3 MMTCO$_2$e annually, equate to an 11
percent reduction in methane emissions from manure management in California (Figure 1).

All funded projects since 2016-17 must comply with SB 859 (2016) which requires CDFA, prior to awarding grant funds from moneys from the GGRF, to review the applicant’s analysis identifying potential adverse impacts of a proposed project. The requirements specified in the bill prohibits a project from receiving funding from the department unless the applicant has conducted outreach in areas that will potentially be adversely impacted by the project, determined potential adverse impacts of the projects, and committed to measures to mitigate impacts. The bill requires the CDFA to prioritize projects based on the criteria pollutant emission benefits achieved by the project.

Through the AMMP between 2016-2018, CDFA has funded $31.2 million to 57 projects, with $4.8 million provided in matching funds by awardees. These projects, having a cumulative estimated GHG reduction of 711,400 MTCO$_2$e over five years, or approximately 142,300 MTCO$_2$e annually, equate to 1.2 percent reduction in methane emissions from manure management in California. The AMMP funds a diverse range of manure management practices which provide options to dairy and livestock operations where digesters may not be economically feasible. These practices include pasture-
based management (such as 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 scrape system in conjunction with drying or composting of solids.

A. DDRDP Eligibility and Application Process

Under the DDRDP, CDFA funds up to 50 percent of the total project cost with a maximum grant award up to $3 million per project. Funded projects are required to be completed within 2 years of the execution of the grant agreement. To be eligible for funding, the project site must be located on a commercial California dairy operation. A group of dairy operations can submit one grant application to develop centralized dairy digesters and gas clean up facilities, known as a “cluster” or “hub and spoke” project. Defunct digesters that were constructed in the past and have become entirely non-functional for a minimum of 12 months due to technical or other issues are also considered eligible for funding through the 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 are not eligible for DDRDP funding.

Applicants are required to use the quantification methodology and its associated calculator tool developed by the California Air Resources Board (CARB) for the DDRDP to calculate estimated GHG emission reductions achievable from projects. The quantification methodology and calculator are available on CARB’s website at www.arb.ca.gov/ccit-quantification. Any project benefits provided to AB 1550 Priority Populations are determined and reported to CARB using the methodologies developed by the CARB consistent with the Funding Guidelines for Administering Agencies.

Funded projects must demonstrate protection of water and air quality. The design and construction of digester vessels (i.e., ponds and tanks) under this program must be demonstrated to be protective of surface and ground water 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 Control Board, an above-ground concrete tank, or a below-ground concrete lined tank. The digester system design, construction, and operation must minimize emission of air pollutants. For power production projects, the total NOx (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.

CDFA utilizes the State Water Resources Control Board’s electronic application system, the Financial Assistance Application Submittal Tool (FAAST) for the DDRDP application process.
Starting in December 2018, CDFA will award up to $2 million in competitive grant(s) to California dairy operations and digester developers for the implementation of dairy digester projects that demonstrate innovative technologies to achieve long-term methane emission reductions on California dairies and minimize or mitigate adverse environmental impacts.

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. 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 scoring criteria for the review process is listed in Table 2. The TAC is further assisted in the review process through the following:

(i) The evaluation of the GHG emission reductions calculations and technical soundness of the project by academic experts associated with California universities (University of California and California State University systems), and,

(ii) The review of financial information submitted with the grant application by CDFA’s Audit Office.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digester Project Plan and Long-term Viability</td>
<td>20</td>
</tr>
<tr>
<td>Budget Work Sheet and Financials</td>
<td>10</td>
</tr>
<tr>
<td>Estimated Greenhouse Gas Emissions Reduction</td>
<td>35</td>
</tr>
<tr>
<td>Project Readiness</td>
<td>10</td>
</tr>
<tr>
<td>Environmental Performance</td>
<td>15</td>
</tr>
<tr>
<td>Community Impact</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

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 assistance on conducting community outreach about the projects. Community outreach assistance is provided through a collaboration with the University of California, Davis Extension, Collaboration Center. A summary of these workshops is provided in Table 3.
Table 3. Summary of CDFA DDRDP Outreach.

### Program Development Outreach Public Meetings

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Date</th>
<th>Location</th>
<th>Number of Attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015 Digester Grant Development - Stakeholder Input</td>
<td>11/6/2014</td>
<td>Modesto</td>
<td>12</td>
</tr>
<tr>
<td>2015 Digester Grant Development - Stakeholder Input</td>
<td>11/10/2014</td>
<td>Tulare</td>
<td>7</td>
</tr>
<tr>
<td>2015 Digester Grant Development - Stakeholder Input</td>
<td>11/13/2014</td>
<td>Sacramento</td>
<td>14</td>
</tr>
<tr>
<td>2015 Digester Research Development - Stakeholder Input</td>
<td>3/4/2015</td>
<td>Sacramento</td>
<td>0</td>
</tr>
<tr>
<td>2016 Environmental Justice Listening Session</td>
<td>11/9/2016</td>
<td>Tulare</td>
<td>9</td>
</tr>
<tr>
<td>2017 Digester Grant Development - Stakeholder Input</td>
<td>11/17/2016</td>
<td>Clovis</td>
<td>23</td>
</tr>
<tr>
<td>2017 Digester Grant Development - Stakeholder Input</td>
<td>11/21/2016</td>
<td>Sacramento</td>
<td>13</td>
</tr>
<tr>
<td>2017 Digester Grant Development - Stakeholder Input</td>
<td>11/22/2016</td>
<td>Modesto</td>
<td>10</td>
</tr>
<tr>
<td>2017 Digester Grant Development - Stakeholder Input</td>
<td>11/30/2016</td>
<td>Webinar</td>
<td>40</td>
</tr>
<tr>
<td>2017 Digester Grant Development - Stakeholder Input on Draft Solicitation</td>
<td>2/6/2017</td>
<td>Webinar</td>
<td>42</td>
</tr>
<tr>
<td>2019 Digester Grant Development – Expanding Access and Enhancing Competitiveness</td>
<td>9/17/2018</td>
<td>Tulare</td>
<td>6</td>
</tr>
<tr>
<td>2019 Digester Grant Development – Expanding Access and Enhancing Competitiveness</td>
<td>9/18/2018</td>
<td>Modesto</td>
<td>3</td>
</tr>
<tr>
<td>2019 Digester Grant Development – Expanding Access and Enhancing Competitiveness</td>
<td>9/19/2018</td>
<td>Webinar</td>
<td>28</td>
</tr>
<tr>
<td>2019 Digester Grant Development – Stakeholder Input</td>
<td>10/23/2018</td>
<td>Tulare</td>
<td>2</td>
</tr>
<tr>
<td>2019 Digester Grant Development – Stakeholder Input</td>
<td>10/24/2018</td>
<td>Modesto</td>
<td>2</td>
</tr>
<tr>
<td>2019 Digester Grant Development – Stakeholder Input</td>
<td>10/26/2018</td>
<td>Webinar</td>
<td>20</td>
</tr>
</tbody>
</table>

### Application Assistance Outreach Public Meetings

<table>
<thead>
<tr>
<th>Meeting</th>
<th>Date</th>
<th>Location</th>
<th>Number of Attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015 Digester Grant - Application workshop</td>
<td>1/21/2015</td>
<td>Tulare</td>
<td>13</td>
</tr>
<tr>
<td>2015 Digester Grant - Application workshop</td>
<td>1/27/2015</td>
<td>Webinar</td>
<td>26</td>
</tr>
<tr>
<td>2015 Digester Grant - Application workshop</td>
<td>1/28/2015</td>
<td>Sacramento</td>
<td>12</td>
</tr>
<tr>
<td>2015 Digester Research - Application Workshop</td>
<td>4/23/2015</td>
<td>Webinar</td>
<td>8</td>
</tr>
<tr>
<td>2017 Digester Grant - Application Workshop</td>
<td>5/12/2017</td>
<td>Sacramento</td>
<td>15</td>
</tr>
<tr>
<td>2017 Digester Grant - Application Workshop</td>
<td>5/15/2017</td>
<td>Tulare</td>
<td>20</td>
</tr>
<tr>
<td>2017 Digester Grant - Application Workshop</td>
<td>5/16/2017</td>
<td>Webinar</td>
<td>22</td>
</tr>
<tr>
<td>2017 Digester Grant – Community Outreach Assistance through UC Davis</td>
<td>May 2017</td>
<td>One-on-one Assistance and Consultation</td>
<td>9</td>
</tr>
<tr>
<td>2018 Digester Grant – Application Workshop</td>
<td>1/3/2018</td>
<td>Modesto</td>
<td>9</td>
</tr>
<tr>
<td>2018 Digester Grant – Application Workshop</td>
<td>1/4/2018</td>
<td>Tulare</td>
<td>14</td>
</tr>
</tbody>
</table>
III. Projects Funded by the CDFA DDRDP

A summary of the 64 projects funded to date by the CDFA DDRDP is provided in Table 4. The collective GHG emission reductions estimated from the 64 projects is 12.8 million MTCO₂e over 10 years, and the approximate cost to achieve one MTCO₂e (10-year) reduction is $24.85. Of this cost, the share of the GGRF monies (i.e., the CDFA grant) is approximately $8.92 or 36 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 Image 1. As evident from Image 1, funded projects are primarily located in the Central Valley, which is home to a large number of dairy operations in the state. The Cost Effectiveness Summary of the DDRDP is presented in Table 5. In case of canceled projects (see Table 4 and Section IV), no amount of the grant award funds was invoiced to CDFA. CDFA awarded these funds to subsequently next-in-line ranked projects based on their total scores.

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 identifying 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 prior to awarding DDRDP grant funds from moneys made available from GGRF. Additionally, this legislation states that:

(i) A digester project shall not receive funding unless the applicant has demonstrated to CDFA that the applicant has done all of 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 and 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 whether translation was needed and provided. Applicants are required to summarize the results of this outreach; identify community’s concerns, questions, or comments and how they will be addressed, and to provide up to 3 letters of support from community members demonstrating that outreach was conducted.

Applicants are encouraged to (a) approach residents, community leaders, elected officials, advocacy organizations, local businesses, and members of vulnerable or underserved populations (i.e. elderly, youth, physically and/or mentally disabled, members from disadvantaged communities), departments, agencies, jurisdictions, etc. impacted by the project such as local health department, schools/school districts, emergency services, law enforcement, metropolitan planning organization, etc.; and (b) to use various methods to notify the community of outreach efforts, such as local newspaper, county website, 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, and truck traffic and odor. Additionally, applicants are required to describe what, if any, mitigation measures will be included in the project, including but not limited to: mitigating potential impacts such as toxic air contaminants, hazardous air pollutants, groundwater and surface water impacts, truck traffic, odor; noting that mitigation measures committed to by applicant must be specific to the digester project and be included in the project Work Plan.

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

CDFA contracted with the University of California, Davis Extension Collaboration Center to assist applicants with planning and executing their community outreach efforts during 2017 and 2018.

Projects awarded in 2016-17 and 2017-18 did not include electricity generation end-use and, therefore, are not expected to create local air quality impacts. Furthermore, the requirement to double-line digester vessels (lagoons) is expected to reduce impacts to groundwater quality relative to unlined dairy lagoons. Therefore, these projects will be evaluated for benefits to disadvantaged communities based on the criteria provided in Funding Guidelines for Administering Agencies.

Among the 18 DDRDP applications that were selected for award in 2017, a total of 6 letters from community-based organizations were provided in support of the projects. These included educational institutions such as California State University, Bakersfield – School of Natural Sciences, Mathematics, and Engineering, College of the Sequoias – Tulare College Center, and Lakeside Union School District; and, local employment focused nonprofit organizations such as Proteus, Inc. These letters specifically noted the
activities that were conducted by the applicants in their community. For example, the educational institution College of the Sequoias – Tulare College Center stated that the applicant for projects Rancho Teresita Dairy Biogas, Bos Farms Dairy Biogas, Moonlight Dairy Biogas, S&S Dairy Biogas, and Hamstra Dairy Biogas “reviewed the choice they have in the use of the dairy biogas - as a source for electricity generation or vehicle fuel and the relative environmental impacts of the different approaches” in the community meetings. In addition, the educational institution acknowledged that the same applicant “developed a program to advance our students learning about dairy digesters and provide valuable paid and competitive internship programs, focused on members of disadvantaged communities”.

In 2018, among the 42 DDRDP applications that were selected for award, over 10 letters from community-based organizations were provided in support of the projects. These included organizations such as Project Clean Air; educational institutions such as California State University, Bakersfield – School of Natural Sciences, Mathematics, and Engineering, College of the Sequoias – Tulare College Center, Lakeside Union School District, and a teacher from Linwood Elementary in Visalia; local employment focused and training nonprofit organizations such as Proteus, Inc, Community Services Employment Training and Sequoia Community Corps; and nonprofit community development organizations such as Self-Help Enterprises. These letters specifically noted the activities that were conducted by the applicants in their community and highlighted the positive impact of these future projects to their local community. For example, the nonprofit organization Project Clean Air stated that the applicant for projects Belonave Dairy Biogas LLC, BV Dairy Biogas, and Western Sky Dairy Biogas “in addition of reviewing the environmental benefits of dairy digesters transporting biogas via pipelines, the applicant has discussed the economic development and job creation benefits that will arise with the projects implementation.” Moreover, the educational institutions California State University, Bakersfield – School of Natural Sciences, Mathematics, and Engineering and College of the Sequoias – Tulare College Center acknowledged that this same applicant “is continuing their efforts in developing educational opportunities to teach our students about the history, role and technology of dairy digesters both in classes and field trips, as well as to further expand already established paid and competitive internship programs to students from local disadvantaged communities”.

The breadth of community outreach activities conducted by applicants included conducting public meetings including providing 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 and providing paid internships to local students, engaging with local environmental and other non-profit organizations for feedback on projects, and, facilitation of public digester tours for interested local residents.
Total estimated GHG reductions **12.8 million** metric tons CO₂ equivalent (over 10 years)

Image 1: Geographical Distribution of CDFA funded Dairy Digesters in California.
Table 4. Summary of Dairy Digester Projects Funded by CDFA.

<table>
<thead>
<tr>
<th>Year Awarded</th>
<th>Applicant Organization</th>
<th>Project Title</th>
<th>Submitting Organization</th>
<th>Project Location</th>
<th>Cluster</th>
<th>Project Type</th>
<th>Biogas End-Use</th>
<th>Estimated 10 year GHG reductions (MTCO₂e)*</th>
<th>Grant Funds</th>
<th>Matching Funds</th>
<th>Total Project Cost</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>Philip Verwey Farms</td>
<td>Verwey-Hanford Dairy Digester</td>
<td>Maas Energy Works</td>
<td>Hanford, Kings Co.</td>
<td>NA</td>
<td>New covered lagoon digester</td>
<td>Electrical power generation</td>
<td>535,770</td>
<td>$3,000,000</td>
<td>$3,179,861</td>
<td>Completed</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>Open Sky Ranch Inc.</td>
<td>Open Sky Ranch Dairy Digester</td>
<td>Maas Energy Works</td>
<td>Riverdale, Fresno Co.</td>
<td>NA</td>
<td>Retrofit covered lagoon digester</td>
<td>Electrical power generation</td>
<td>258,911</td>
<td>$973,430</td>
<td>$973,434</td>
<td>$1,946,864</td>
<td>Completed</td>
</tr>
<tr>
<td>2015</td>
<td>Philip Verwey Farms</td>
<td>Verwey-Madera Dairy Digester</td>
<td>Maas Energy Works</td>
<td>Madera, Madera Co.</td>
<td>NA</td>
<td>New covered lagoon digester</td>
<td>Electrical power generation</td>
<td>240,000</td>
<td>$2,281,091</td>
<td>$2,282,754</td>
<td>$4,563,845</td>
<td>Completed</td>
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<td>2015</td>
<td>ABEC #2 LLC dba West-Star North Dairy Biogas</td>
<td>West-Star North Dairy Digester</td>
<td>California Bioenergy, LLC</td>
<td>Buttonwillow, Kern Co.</td>
<td>NA</td>
<td>New covered lagoon digester</td>
<td>Electrical power generation</td>
<td>158,700</td>
<td>$1,837,005</td>
<td>$7,165,995</td>
<td>$9,000,000</td>
<td>Completed</td>
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<td>2015</td>
<td>ABEC #3 LLC, dba Lakeview Farms Dairy Biogas</td>
<td>Lakeview Dairy Biogas Digester</td>
<td>California Bioenergy LLC</td>
<td>Bakersfield, Kern Co.</td>
<td>NA</td>
<td>New covered lagoon digester</td>
<td>Electrical power generation and RCNG</td>
<td>144,090</td>
<td>$2,000,000</td>
<td>$6,500,000</td>
<td>$8,500,000</td>
<td>Completed</td>
</tr>
<tr>
<td>2015</td>
<td>ABEC #4 LLC, dba Carlos Echeverria &amp; Sons Dairy Biogas</td>
<td>Carlos Echeverria &amp; Sons Dairy Biogas Project</td>
<td>California Bioenergy, LLC</td>
<td>Bakersfield, Kern Co.</td>
<td>NA</td>
<td>New covered lagoon digester</td>
<td>Combined heat and electrical power generation</td>
<td>201,200</td>
<td>$1,000,000</td>
<td>$7,969,700</td>
<td>$8,969,700</td>
<td>Completed</td>
</tr>
<tr>
<td>2017</td>
<td>Wreden Ranch Dairy Biogas</td>
<td>Wreden Ranch Dairy Biogas</td>
<td>California Bioenergy, LLC</td>
<td>Hanford, Kings Co.</td>
<td>South Tulare</td>
<td>New covered lagoon digester</td>
<td>RCNG**</td>
<td>393,915</td>
<td>$3,000,000</td>
<td>$4,735,860</td>
<td>$7,735,860</td>
<td>In Progress</td>
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<td>California Bioenergy, LLC</td>
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<td>Combustion in Cogeneration Turbines (ethanol); potential RCNG in future.</td>
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<td>$2,524,659</td>
<td>$4,024,659</td>
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<td>Combustion in Cogeneration Turbines (ethanol); potential RCNG in future.</td>
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<td>$1,793,975</td>
<td>$3,293,975</td>
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<td>Visalia, Tulare Co. West Visalia</td>
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<td>212,622</td>
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<td>$1,847,237</td>
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<td>Combustion in Cogeneration Turbines (ethanol); potential RCNG in future.</td>
<td>207,209</td>
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<td>$1,731,327</td>
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<td>Combustion in Cogeneration Turbines (ethanol); potential RCNG in future.</td>
<td>132,586</td>
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<td>$1,498,381</td>
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<td>Tulare, Tulare Co.</td>
<td>West Visalia</td>
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<td>$1,050,000</td>
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<td>Kern</td>
<td>New covered lagoon digester</td>
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<td>$11,334,030</td>
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<td>$1,780,588</td>
<td>$1,780,588</td>
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<td>$1,780,588</td>
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<td>Calgren</td>
<td>New covered lagoon digester</td>
<td>$1,69,699</td>
<td>$2,401,778</td>
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<td>RCNG</td>
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<td>Hanford-Lakeside</td>
<td>New covered lagoon digester</td>
<td>RCNG</td>
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<td>New covered lagoon digester</td>
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<td>South Tulare</td>
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<td>$3,122,303</td>
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<td>New covered lagoon digester</td>
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<td>California Bioenergy, LLC Tulare, Tulare Co. South Tulare</td>
<td>New covered lagoon digester</td>
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<td>RCNG 90,093</td>
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**Totals**

|                  | $114,250,802 | $203,995,797 | $318,246,599 |

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

**RCNG:** Renewable Compressed Natural Gas

***Project canceled due to substantive changes to project scope.**
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V. Individual Project Information

Information on individual projects funded through the CDFA DDRDP from 2014-2018.

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**Verwey-Hanford Dairy Digester**

*Funded: 2015*  
*Completed: 2017*  
*Status: Operational*

The Verwey-Hanford Dairy Digester project is a new covered lagoon digester at Philip Verwey Farms #2 dairy. The biogas from the digester will be used to produce approximately 7.6 million kWh of renewable electricity per year.

- Location – Hanford, California (Kings County)
- CDFA DDRDP Funding - $3,000,000
- Matching funds - $3,179,861
- Total Project costs - $6,179,861
- Estimated 10-year GHG reductions - 535,770 MTCO₂e.
- GHG reductions per CDFA grant dollar - 0.18 MTCO₂e
- GHG reductions per total project dollars - 0.09 MTCO₂e
- Total cost per MTCO₂e - $11.54

---

*Image 2. View of the covered lagoon digester at Verwey-Hanford Dairy (Source: CDFA).*
The Open Sky Ranch Dairy Digester project recommissioned a defunct covered lagoon digester at Open Sky Ranch. The biogas from the digester will be used to produce approximately 6.4 million kWh of renewable electricity per year.

- Location – Riverdale, California (Fresno County)
- CDFA DDRDP Funding - $973,430
- Matching funds - $973,434
- Total Projects costs - $1,946,864
- Estimated 10-year GHG reductions - 258,911 MTCO$_2$e
- GHG reductions per CDFA grant dollars – 0.27 MTCO$_2$e
- GHG reductions per total projects dollars 0.13 MTCO$_2$e
- Total cost per MTCO$_2$e - $7.52
The Verwey-Madera Dairy Digester project is a new covered lagoon digester to be installed at Philip Verwey Farms #1. The biogas from the digester will be used to produce approximately 4.8 million kWh renewable electricity per year.

- Location – Madera, California (Madera County)
- CDFA DDRDP Funding - $2,281,091
- Matching funds - $2,282,754
- Total Project costs - $4,563,845
- Estimated 10-year GHG reductions - 240,000 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.11 MTCO$_2$e
- GHG reductions per total project dollars - 0.05 MTCO$_2$e
- Total cost per MTCO$_2$e - $19.02


West-Star North Dairy Digester
Funded: 2015
Completed: January 2018
Status: Operational

The West-Star North Dairy digester is a covered lagoon digester project. This project will capture biogas from two covered lagoons at the dairy. Biogas from the digester will produce 7.6 million kWh renewable electricity per year.

- Location – Buttonwillow, California (Kern County)
- CDFA DDRDP Funding - $1,837,005
- Matching funds - $7,165,995
- Total Project costs - $9,000,000
- Estimated 10-year GHG reductions - 158,370 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.09 MTCO$_2$e
Lakeview Dairy Biogas Digester
Funded: 2015
Completed: January 2018
Status: Operational

Lakeview Dairy Biogas Digester is a covered lagoon digester system. The biogas generated by this project will generate 6.7 million kWh of electricity per day.

- Location – Bakersfield, California (Kern County)
- CDFA DDRDP Funding - $2,000,000
- Matching funds - $6,500,000
- Total Project costs - $8,500,000
- Estimated 10-year GHG reductions - 144,090 MTCO₂e
- GHG reductions per grant dollar - 0.07 MTCO₂e
- GHG reductions per total project dollars - 0.02 MTCO₂e
- Total cost per MTCO₂e - $13.88
Carlos Echeverria & Sons Dairy Biogas Project  
Funded: 2015  
Completed: January 2018  
Status: Operational  

ABEC #4 LLC dba Carlos Echeverria & Sons Dairy Biogas is a new covered lagoon dairy digester system and a biogas-fueled combined heat and power (CHP). An estimated of 7.6 million kWh of renewable electricity per year.  
- **Location** – Bakersfield, California (Kern County)  
- **CDFA DDRDP Funding** - $1,000,000  
- **Matching funds** - $7,969,700  
- **Total Project costs** - $8,969,700  
- **Estimated 10-year GHG reductions** - 201,200 MTCO\(_2\)e  
- **GHG reductions per CDFA grant dollars** - 0.2 MTCO\(_2\)e  
- **GHG reductions per total project dollars** - 0.02 MTCO\(_2\)e  
- **Total cost per MTCO\(_2\)e** - $44.58

Circle A Dairy (Calgren Dairy Fuels LLC)  
Funded: 2017  
Completed: October 2018  
Status: Operational

The Circle A Dairy Digester Fuel Pipeline Project is a covered lagoon anaerobic digester. The project is part of the Calgren Dairy Fuels Cluster. The biogas from the digester supplies via private pipeline to fuel two 5MW gas turbines that power the Calgren ethanol refinery. The cluster will install a RCNG station and later connect to the utility pipeline to supply more RCNG stations.  
- **Location** – Pixley, California (Tulare County)  
- **CDFA DDRDP Funding** - $1,050,000  
- **Matching funds** - $1,301,228  
- **Total Project costs** - $2,351,228  
- **Estimated 10-year GHG reductions** - 138,745 MTCO\(_2\)e  
- **GHG reductions per CDFA grant dollar** - 0.13 MTCO\(_2\)e  
- **GHG reductions per total project dollars** - 0.06 MTCO\(_2\)e  
- **Total cost per MTCO\(_2\)e** - $16.95
Wreden Ranch Dairy Biogas
Funded: 2017
Status: In Progress
Expected Completion Date: March 2020

Wreden Ranch will build a covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will add sand lane and screens for pre-digester solid separation. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Hanford, California (Kings County)
- CDFA DDRDP Funding - $3,000,000
- Matching funds – $4,735,860
- Total Project costs - $7,735,860
- Estimated 10-year GHG reductions - 393,915 MTCO_{2e}
- GHG reductions per CDFA grant dollar - 0.13 MTCO_{2e}
- GHG reductions per total project dollars - 0.05 MTCO_{2e}
- Total cost per MTCO_{2e} - $19.64

Trilogy Dairy Biogas
Funded: 2017
Status: In Progress
Expected Completion Date: March 2020

Trilogy Dairy will build a covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Bakersfield, California (Kern County)
- CDFA DDRDP Funding - $2,250,000
- Matching funds - $4,200,840
- Total Project costs - $6,450,840
- Estimated 10-year GHG reductions - 254,577 MTCO_{2e}
- GHG reductions per CDFA grant dollar - 0.11 MTCO_{2e}
- GHG reductions per total project dollars - 0.04 MTCO_{2e}
- Total cost per MTCO_{2e} - $25.34
**Cloverdale Dairy Biogas**  
*Funded: 2017*

**Status: In Progress**  
**Expected Completion Date: March 2020**

Cloverdale Dairy will build a covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will add sand lane and screens for pre-digester solid separation. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- **Location** – Hanford, California (Kings County)
- **CDFA DDRDP Funding** - $3,000,000
- **Matching funds** - $4,836,793
- **Total Project costs** - $7,836,793
- **Estimated 10-year GHG reductions** - 360,851 MTCO$_2$e
- **GHG reductions per CDFA grant dollar** - 0.12 MTCO$_2$e
- **GHG reductions per total project dollars** - 0.05 MTCO$_2$e
- **Total cost per MTCO$_2$e** - $21.72

---

**T&W Dairy Biogas**  
*Funded: 2017*

**Status: In Progress**  
**Expected Completion Date: March 2020**

T & W Farms will build a covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will add sand lane and screens for pre-digester solid separation. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- **Location** – Bakersfield, California (Kern County)
- **CDFA DDRDP Funding** – 2,600,000
- **Matching funds** - $4,695,759
- **Total Project costs** - $7,295,759
- **Estimated 10-year GHG reductions** - 294,892 MTCO$_2$e
- **GHG reductions per CDFA grant dollar** - 0.11 MTCO$_2$e
- **GHG reductions per total project dollars** - 0.04 MTCO$_2$e
- **Total cost per MTCO$_2$e** - $24.73
**Aligned Digester Cooperative LLC**  
**Funded: 2018**  
**Status: Canceled**

Aligned Digester Co., LLC (dba Aligned Digester Cooperative LLC) has partnered with Red Top Jerseys Dairy to develop a covered lagoon digester that would have produced up to 63,000 MMBtu of renewable natural gas (RNG) expanding the market for near-zero emission natural gas vehicles in the San Joaquin Valley.

- Location – Chowchilla, California (Madera County)
- CDFA DDRDP Funding – $3,000,000
- Project canceled due to substantial changes in project scope.

**Williams Family Dairy Digester Fuel Pipeline**  
**Calgren Dairy Fuels LLC**  
**Funded: 2018**  
**Status: Canceled**

The Williams Family Dairy Digester Fuel Pipeline Project is a covered lagoon anaerobic digester. The project was proposed as part of the Calgren Dairy Fuels Cluster to power the Calgren ethanol refinery.

- Location – Pixley, California (Tulare County)
- CDFA DDRDP Funding - $1,500,000
- Project canceled due to substantial change in project objectives and scope.

**K&M Visser Dairy (Calgren Dairy Fuels LLC)**  
**Funded: 2017**  
**Status: In Progress**  
**Expected Completion Date: December 2018**

The K&M Visser Dairy Digester Fuel Pipeline Project is a covered lagoon anaerobic digester. The project is part of the Calgren Dairy Fuels Cluster. The biogas from the digester will be supplied via private pipeline to fuel two 5MW gas turbines that power the Calgren ethanol refinery. The cluster will install a RCNG station and later connect to the utility pipeline to supply more RCNG stations.

- Location – Pixley, California (Tulare County)
- CDFA DDRDP Funding - $1,500,000
- Matching funds - $1,793,975
• Total Project costs - $3,293,975
• Estimated 10-year GHG reductions - 203,416 MTCO$_2$e
• GHG reductions per CDFA grant dollar - 0.14 MTCO$_2$e
• GHG reductions per total dollars - 0.06 MTCO$_2$e
• Total cost per MTCO$_2$e - $16.19

Maple Dairy Biogas
Funded: 2017
Status: In Progress
Expected Completion Date: March 2020

Maple Dairy will build a covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will add pre-digester sand lane and screens for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use. A 1MW generator has been permitted for with an emissions mitigation plan in the event an alternate methane destruction device is required.

• Location – Bakersfield, California (Kern County)
• CDFA DDRDP Funding - $3,000,000
• Matching funds – $5,331,773
• Total Project costs - $8,331,773
• Estimated 10-year GHG reductions - 348,171 MTCO$_2$e
• GHG reductions per CDFA grant dollar - 0.12 MTCO$_2$e
• GHG reductions per total project dollars - 0.04 MTCO$_2$e
• Total cost per MTCO$_2$e - $23.93

S&S Dairy Biogas
Funded: 2017
Status: In Progress
Expected Completion Date: March 2020

S&S Dairy will build a covered lagoon with enhanced gas storage, gas pre-treatment and effluent distribution. The project will add sand lane and screens for pre-digester solid separation. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use. A 1MW generator has been permitted for with an emissions mitigation plan in the event an alternate methane destruction device is required.

• Location – Visalia, California (Tulare County)
• CDFA DDRDP Funding – $1,600,000
• Matching funds - $5,087,926
• Total Project costs - $6,687,926
• Estimated 10-year GHG reductions - 167,417 MTCO$_2$e
• GHG reductions per CDFA grant dollar - 0.1 MTCO$_2$e
• GHG reductions per total project dollars - 0.03 MTCO$_2$e
• Total cost per MTCO$_2$e - $39.94

Pixley Dairy (Calgren Dairy Fuels LLC)
Funded: 2017
Status: In Progress
Expected Completion Date: March 2019

The Pixley Dairy Digester Fuel Pipeline Project is a covered lagoon anaerobic digester. The project is part of the Calgren Dairy Fuels Cluster. The biogas from the digester will be supplied via private pipeline to fuel two 5MW gas turbines that power the Calgren ethanol refinery. The cluster will install a RCNG station and later connect to the utility pipeline to supply more RCNG stations.

• Location – Pixley, California (Tulare County)
• CDFA DDRDP Funding - $1,600,000
• Matching funds - $1,847,237
• Total Project costs - $3,447,237
• Estimated 10-year GHG reductions - 212,622 MTCO$_2$e
• GHG reductions per CDFA grant dollar - 0.13 MTCO$_2$e
• GHG reductions per total project dollars - 0.06 MTCO$_2$e
• Total cost per MTCO$_2$e - $16.21

Legacy Dairy (Calgren Dairy Fuels LLC)
Funded: 2017
Status: In Progress
Expected Completion Date: November 2018

The Legacy Dairy Digester Fuel Pipeline Project is a covered lagoon anaerobic digester. The project is part of the Calgren Dairy Fuels Cluster. The biogas from the digester will be supplied via private pipeline to fuel two 5MW gas turbines that power the Calgren ethanol refinery. The cluster will install a RCNG station and later connect to the utility pipeline to supply more RCNG stations.

• Location – Pixley, California (Tulare County)
• CDFA DDRDP Funding - $1,550,000
• Matching funds - $1,731,327
• Total Project costs - $3,281,327
- Estimated 10-year GHG reductions - 207,209 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.13 MTCO$_2$e
- GHG reductions per total project dollars - 0.06 MTCO$_2$e
- Total cost per MTCO$_2$e - $15.84

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**Moonlight Dairy Biogas**

*Funded: 2017*

*Status: In Progress*

*Expected Completion Date: March 2020*

Moonlight Dairy will build a covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will add sand lane and screens for pre-digester solid separation. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use. A 1MW generator has been permitted for with an emissions mitigation plan in the event an alternate methane destruction device is required.

- Location – Visalia, California (Tulare County)
- CDFA DDRDP Funding - $1,500,000
- Matching funds - $4,855,146
- Total Projects costs - $6,355,146
- Estimated 10-year GHG reductions - 154,834 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.1 MTCO$_2$e
- GHG reductions per total project dollars - 0.02 MTCO$_2$e
- Total cost per MTCO$_2$e - $41.05

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**R Vander Eyk Dairy (Calgren Dairy Fuels LLC)**

*Funded: 2017*

*Status: In Progress*

*Expected Completion Date: September 2018*

The Robert Vander Eyk Dairy Digester Fuel Pipeline Project is a covered lagoon anaerobic digester. The project is part of the Calgren Dairy Fuels Cluster. The biogas from the digester will be supplied via private pipeline to fuel two 5MW gas turbines that power the Calgren ethanol refinery. The cluster will install a RCNG station and later connect to the utility pipeline to supply more RCNG stations.

- Location – Pixley, California (Tulare County)
- CDFA DDRDP Funding - $1,000,000
- Matching funds - $1,498,381
- Total Projects costs - $2,498,381
- Estimated 10-year GHG reductions - 132,586 MTCO$_2$e
• GHG reductions per CDFA grant dollar - 0.13 MTCO$_2$e
• GHG reductions per total project dollars - 0.05 MTCO$_2$e
• Total cost per MTCO$_2$e - $18.84

Bos Farms Dairy Biogas
Funded: 2017
Status: In Progress
Expected Completion Date: June 2019

Bos Farms is a covered lagoon digester project with enhanced gas storage, gas pre-treatment and effluent distribution. The project will add sand lane and screens for pre-digester solid separation. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use. A 1MW generator has been permitted for with an emissions mitigation plan in the event an alternate methane destruction device is required.

• Location – Tulare, California (Tulare County)
• CDFA DDRDP Funding - $1,500,000
• Matching funds - $11,334,030
• Total Project costs - $12,834,030
• Estimated 10-year GHG reductions - 168,398 MTCO$_2$e
• GHG reductions per CDFA grant dollar - 0.11 MTCO$_2$e
• GHG reductions per total project dollars - 0.01 MTCO$_2$e
• Total cost per MTCO$_2$e - $76.21

Hamstra Dairy Biogas
Funded: 2017
Status: In Progress
Expected Completion Date: March 2020

Hamstra Dairy will build a covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will add sand lane and screens for pre-digester solid separation. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use. A 1MW generator has been permitted for with an emissions mitigation plan in the event an alternate methane destruction device is required.

• Location – Tulare, California (Tulare County)
• CDFA DDRDP Funding – $2,000,000
• Matching funds - $4,580,840
• Total Project costs - $6,580,840
• Estimated 10-year GHG reductions 205,115 MTCO$_2$e
• GHG reductions per CDFA grant dollar - 0.1 MTCO$_2$e
• GHG reductions per total project dollars - 0.03 MTCO$_2$e
• Total cost per MTCO$_2$e - $32.08

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**Hollandia Farms Dairy Biogas**
**Funded: 2017**
**Status: In Progress**
**Expected Completion Date: March 2020**

Hollandia Farms will build a covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will add sand lane and screens for pre-digester solid separation. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use. A 1MW generator has been permitted for with an emissions mitigation plan in the event an alternate methane destruction device is required.

- Location – Hanford, California (Kings County)
- CDFA DDRDP Funding - $1,500,000
- Matching funds - $5,816,291
- Total Project costs - $7,316,291
- Estimated 10-year GHG reductions - 178,426 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.12 MTCO$_2$e
- GHG reductions per total project dollars - 0.02 MTCO$_2$e
- Total cost per MTCO$_2$e - $41

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**Rancho Teresita Dairy Biogas**
**Funded: 2017**
**Status: In Progress**
**Expected Completion Date: September 2019**

Rancho Teresita Dairy will build a covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will add sand lane and screens for pre-digester solid separation. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use. A 1MW generator has been permitted with an emissions mitigation plan in the event an alternate methane destruction device is required.

- Location – Tulare, California (Tulare County)
- CDFA DDRDP Funding - $2,100,000
- Matching funds - $10,400,558
- Total Projects costs - $12,500,558
- Estimated 10-year GHG reductions - 236,251 MTCO$_2$e
• GHG reductions per CDFA grant dollar - 0.11 MTCO$_2$e
• GHG reduction per total project dollars - 0.02 MTCO$_2$e
• Total cost per MTCO$_2$e - $52.91

4K Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: January 2020

4K Dairy Digester Pipeline Project will build a new covered lagoon digester. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster's central hub near the Calgren ethanol refinery. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent SoCalGas utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

• Location – Pixley, California (Tulare County)
• CDFA DDRDP Funding - $1,780,588
• Matching funds - $1,780,588
• Total Projects costs - $3,561,176
• Estimated 10-year GHG reductions – 192.143 MTCO$_2$e
• GHG reductions per CDFA grant dollar - 0.11 MTCO$_2$e
• GHG reduction per total project dollars - 0.05 MTCO$_2$e
• Total cost per MTCO$_2$e - $18.53

Ackerman Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: February 2020

Ackerman Dairy Digester Pipeline Project will build a new covered lagoon digester. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster's central hub at the Aetemis ethanol refinery. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be used on site to fuel boilers at the Aemetis ethanol refinery to make very low carbon vehicle fuel.

• Location – Ceres, California (Stanislaus County)
• CDFA DDRDP Funding - $1,331,291
- Matching funds - $1,331,291
- Total Projects costs - $2,662,582
- Estimated 10-year GHG reductions – 89,574 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.07 MTCO$_2$e
- GHG reduction per total project dollars - 0.03 MTCO$_2$e
- Total cost per MTCO$_2$e - $29.72

Aukeman Dairy Biogas
Funded: 2018
Status: In Progress
Expected Completion Date: September 2020

Aukeman Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Tulare, California (Tulare County)
- CDFA DDRDP Funding - $1,765,457
- Matching funds - $3,233,051
- Total Projects costs - $4,998,508
- Estimated 10-year GHG reductions – 207,701 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.12 MTCO$_2$e
- GHG reduction per total project dollars - 0.04 MTCO$_2$e
- Total cost per MTCO$_2$e - $24.07

Belonave Dairy Biogas LLC
Funded: 2018
Status: In Progress
Expected Completion Date: September 2020

Belonave Dairy Biogas LLC will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Bakersfield, California (Kern County)
- CDFA DDRDP Funding - $1,918,099
- Matching funds - $3,540,063
• Total Projects costs - $5,458,162
• Estimated 10-year GHG reductions – 225,659 MTCO2e
• GHG reductions per CDFA grant dollar - 0.12 MTCO2e
• GHG reduction per total project dollars - 0.04 MTCO2e
• Total cost per MTCO2e - $24.19

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**BV Dairy Biogas**  
Funded: 2018  
Status: In Progress  
Expected Completion Date: September 2020

BV Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Bakersfield, California (Kern County)
- CDFA DDRDP Funding - $1,749,596
- Matching funds - $2,085,855
- Total Projects costs - $3,835,451
- Estimated 10-year GHG reductions – 205,835 MTCO2e
- GHG reductions per CDFA grant dollar - 0.12 MTCO2e
- GHG reduction per total project dollars - 0.05 MTCO2e
- Total cost per MTCO2e - $18.63

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**Cornerstone Dairy Digester Pipeline Project**  
Funded: 2018  
Status: In Progress  
Expected Completion Date: August 2019

Cornerstone Dairy Digester Pipeline Project will build a new covered lagoon digester. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster’s central hub near the Calgren ethanol refinery. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent SoCalGas utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.
• Location – Pixley, California (Tulare County)
• CDFA DDRDP Funding - $1,266,053
• Matching funds - $1,266,054
• Total Projects costs - $2,532,107
• Estimated 10-year GHG reductions – 185,238 MTCO2e
• GHG reductions per CDFA grant dollar - 0.15 MTCO2e
• GHG reduction per total project dollars - 0.07 MTCO2e
• Total cost per MTCO2e - $13.67

De Groot North Dairy Biogas
Funded: 2018
Status: In Progress
Expected Completion Date: September 2020

De Groot North Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

• Location – Hanford, California (Kings County)
• CDFA DDRDP Funding - $1,442,440
• Matching funds - $2,401,778
• Total Projects costs - $3,844,218
• Estimated 10-year GHG reductions – 169,699 MTCO2e
• GHG reductions per CDFA grant dollar - 0.12 MTCO2e
• GHG reduction per total project dollars - 0.04 MTCO2e
• Total cost per MTCO2e - $22.65

De Groot South Dairy Biogas
Funded: 2018
Status: In Progress
Expected Completion Date: September 2020

De Groot South Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid
separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Hanford, California (Kings County)
- CDFA DDRDP Funding - $1,542,697
- Matching funds - $1,758,946
- Total Projects costs - $3,301,643
- Estimated 10-year GHG reductions – 181,494 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.12 MTCO$_2$e
- GHG reduction per total project dollars - 0.05 MTCO$_2$e
- Total cost per MTCO$_2$e - $18.19

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Decade Centralized Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: January 2020

Decade Centralized Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure from two dairies. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster's central hub near River Ranch. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent SoCalGas utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Tulare, California (Tulare County)
- CDFA DDRDP Funding - $1,773,587
- Matching funds - $1,773,587
- Total Projects costs - $3,547,174
- Estimated 10-year GHG reductions – 192,558 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.11 MTCO$_2$e
- GHG reduction per total project dollars - 0.05 MTCO$_2$e
- Total cost per MTCO$_2$e - $18.42

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DJ South Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: February 2020
DJ South Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster's central hub at the center of the dairy group. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent PG&E utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Chowchilla, California (Madera County)
- CDFA DDRDP Funding - $1,810,526
- Matching funds - $1,810,525
- Total Projects costs - $3,621,051
- Estimated 10-year GHG reductions – 150,175 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.08 MTCO₂e
- GHG reduction per total project dollars - 0.04 MTCO₂e
- Total cost per MTCO₂e - $24.11

Double D Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: April 2020

Double D Dairy Digester Pipeline Project will build a new covered lagoon digester. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster's central hub at the Aemetis ethanol refinery. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be used on site to fuel boilers at the Aemetis ethanol refinery to make very low carbon vehicle fuel.

- Location – Ceres, California (Stanislaus County)
- CDFA DDRDP Funding - $1,822,668
- Matching funds - $1,822,668
- Total Projects costs - $3,645,336
- Estimated 10-year GHG reductions – 189,850 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.10 MTCO₂e
- GHG reduction per total project dollars - 0.05 MTCO₂e
- Total cost per MTCO₂e - $19.20
Double J Dairy Biogas
Funded: 2018
Status: In Progress
Expected Completion Date: September 2020

Double J Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Visalia, California (Tulare County)
- CDFA DDRDP Funding - $2,426,716
- Matching funds - $4,289,806
- Total Projects costs - $6,716,522
- Estimated 10-year GHG reductions – 285,496 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.12 MTCO$_2$e
- GHG reduction per total project dollars - 0.04 MTCO$_2$e
- Total cost per MTCO$_2$e - $23.53

Double L Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: March 2020

Double L Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster’s central hub near River Ranch. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent SoCalGas utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Hanford, California (Kings County)
- CDFA DDRDP Funding - $1,762,347
- Matching funds - $1,762,347
- Total Projects costs - $3,524,694
- Estimated 10-year GHG reductions – 136,148 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.08 MTCO$_2$e
- GHG reduction per total project dollars - 0.04 MTCO$_2$e
- Total cost per MTCO$_2$e - $25.89
Dykstra Dairy Biogas  
Funded: 2018  
Status: In Progress  
Expected Completion Date: September 2020

Dykstra Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Tulare, California (Tulare County)
- CDFA DDRDP Funding - $2,260,454
- Matching funds - $3,436,033
- Total Projects costs - $5,696,487
- Estimated 10-year GHG reductions – 265,936 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.12 MTCO$_2$e
- GHG reduction per total project dollars - 0.05 MTCO$_2$e
- Total cost per MTCO$_2$e - $21.42

El Monte Dairy Biogas  
Funded: 2018  
Status: In Progress  
Expected Completion Date: September 2020

El Monte Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Tipton, California (Tulare County)
- CDFA DDRDP Funding - $1,010,674
- Matching funds - $3,122,303
- Total Projects costs - $4,132,977
- Estimated 10-year GHG reductions – 118,903 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.12 MTCO$_2$e
- GHG reduction per total project dollars - 0.03 MTCO$_2$e
- Total cost per MTCO$_2$e - $34.76
Five H Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: January 2020

Five H Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster’s central hub at the center of the dairy group. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent PG&E utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Merced, California (Merced County)
- CDFA DDRDP Funding - $1,851,297
- Matching funds - $1,851,297
- Total Projects costs - $3,702,594
- Estimated 10-year GHG reductions – 122,183 MTCO\textsubscript{2}e
- GHG reductions per CDFA grant dollar - 0.07 MTCO\textsubscript{2}e
- GHG reduction per total project dollars - 0.03 MTCO\textsubscript{2}e
- Total cost per MTCO\textsubscript{2}e - $30.30

FM Jerseys Dairy Digester Virtual Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: October 2019

FM Jerseys Dairy Digester Virtual Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be hauled using clean-burning renewable CNG-fueled trucks and compressed natural gas tube trailers to create a virtual pipeline to the cluster’s central hub at the Calgren ethanol refinery. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent SoCalGas utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Tipton, California (Tulare County)
- CDFA DDRDP Funding - $2,010,747
- Matching funds - $2,010,747
- Total Projects costs - $4,021,494
• Estimated 10-year GHG reductions – 161,960 MTCO₂e
• GHG reductions per CDFA grant dollar - 0.08 MTCO₂e
• GHG reduction per total project dollars - 0.04 MTCO₂e
• Total cost per MTCO₂e - $24.83

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**Hoogendam Dairy Digester Pipeline Project**

*Funded: 2018*

*Status: In Progress*

*Expected Completion Date: December 2019*

Hoogendam Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster's central hub at the center of the dairy group. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent PG&E utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Merced, California (Merced County)
- CDFA DDRDP Funding - $1,809,452
- Matching funds - $1,809,453
- Total Projects costs - $3,618,905
- Estimated 10-year GHG reductions – 142,354 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.08 MTCO₂e
- GHG reduction per total project dollars - 0.04 MTCO₂e
- Total cost per MTCO₂e - $25.42

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**Horizon Jersey Dairy Biogas**

*Funded: 2018*

*Status: In Progress*

*Expected Completion Date: September 2020*

Horizon Jersey Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Tipton, California (Tulare County)
- CDFA DDRDP Funding - $2,850,886
- Matching funds - $4,134,949
• Total Projects costs - $6,985,835
• Estimated 10-year GHG reductions – 335,398 MTCO$_2$e
• GHG reductions per CDFA grant dollar - 0.12 MTCO$_2$e
• GHG reduction per total project dollars - 0.05 MTCO$_2$e
• Total cost per MTCO$_2$e - $20.83

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**Jacobs De Groot #2 Dairy Biogas**  
**Funded: 2018**  
**Status: In Progress**  
**Expected Completion Date: September 2020**

Jacobs De Groot #2 Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Visalia, California (Tulare County)
- CDFA DDRDP Funding - $523,736
- Matching funds - $2,857,688
- Total Projects costs - $3,381,424
- Estimated 10-year GHG reductions – 61,616 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.12 MTCO$_2$e
- GHG reduction per total project dollars - 0.02 MTCO$_2$e
- Total cost per MTCO$_2$e - $54.88

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**Little Rock Centralized Dairy Digester Pipeline Project**  
**Funded: 2018**  
**Status: In Progress**  
**Expected Completion Date: September 2019**

Little Rock Centralized Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure from two smaller dairies. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster's central hub at the Calgren ethanol refinery. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent SoCalGas utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.
• Location – Tipton, California (Tulare County)
• CDFA DDRDP Funding - $2,096,578
• Matching funds - $2,096,578
• Total Projects costs - $4,193,156
• Estimated 10-year GHG reductions – 146,839 MTCO$_2$e
• GHG reductions per CDFA grant dollar - 0.07 MTCO$_2$e
• GHG reduction per total project dollars - 0.04 MTCO$_2$e
• Total cost per MTCO$_2$e - $28.56

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**Lone Oak #1 Dairy Digester Pipeline Project**  
*Funded: 2018*  
*Status: In Progress*  
*Expected Completion Date: February 2020*

Lone Oak #1 Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster’s central hub near River Ranch. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent SoCalGas utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

• Location – Hanford, California (Kings County)
• CDFA DDRDP Funding - $1,869,269
• Matching funds - $1,869,269
• Total Projects costs - $3,738,538
• Estimated 10-year GHG reductions – 247,703 MTCO$_2$e
• GHG reductions per CDFA grant dollar - 0.13 MTCO$_2$e
• GHG reduction per total project dollars - 0.07 MTCO$_2$e
• Total cost per MTCO$_2$e - $15.09

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**Meirinho Dairy Digester Pipeline Project**  
*Funded: 2018*  
*Status: In Progress*  
*Expected Completion Date: December 2019*
Meirinho Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster’s central hub at the center of the dairy group. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent PG&E utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Merced, California (Merced County)
- CDFA DDRDP Funding - $1,832,358
- Matching funds - $1,832,357
- Total Projects costs - $3,664,715
- Estimated 10-year GHG reductions – 147,352 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.08 MTCO$_2$e
- GHG reduction per total project dollars - 0.04 MTCO$_2$e
- Total cost per MTCO$_2$e - $24.87

Mellema Dairy Biogas
Funded: 2018
Status: In Progress
Expected Completion Date: September 2020

Mellema Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Visalia, California (Tulare County)
- CDFA DDRDP Funding - $1,292,485
- Matching funds - $3,921,216
- Total Projects costs - $5,213,701
- Estimated 10-year GHG reductions – 152,057 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.12 MTCO$_2$e
- GHG reduction per total project dollars - 0.03 MTCO$_2$e
- Total cost per MTCO$_2$e - $34.29
Milky Way Dairy Biogas  
Funded: 2018  
Status: In Progress  
Expected Completion Date: September 2020

Milky Way Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Visalia, California (Tulare County)
- CDFA DDRDP Funding - $2,953,427
- Matching funds - $4,244,734
- Total Projects costs - $7,198,161
- Estimated 10-year GHG reductions – 347,462 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.12 MTCO₂e
- GHG reduction per total project dollars - 0.05 MTCO₂e
- Total cost per MTCO₂e - $20.72

Mineral King Dairy Biogas  
Funded: 2018  
Status: In Progress  
Expected Completion Date: September 2020

Mineral King Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Visalia, California (Tulare County)
- CDFA DDRDP Funding - $1,655,384
- Matching funds - $3,416,032
- Total Projects costs - $5,071,032
- Estimated 10-year GHG reductions – 194,751 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.12 MTCO₂e
- GHG reduction per total project dollars - 0.04 MTCO₂e
- Total cost per MTCO₂e - $26.04
Rancho Sierra Vista Dairy Biogas
Funded: 2018
Status: In Progress
Expected Completion Date: September 2020

Rancho Sierra Vista Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Visalia, California (Tulare County)
- CDFA DDRDP Funding - $1,470,143
- Matching funds - $3,474,018
- Total Projects costs - $4,944,161
- Estimated 10-year GHG reductions – 172,958 MTCO2e
- GHG reductions per CDFA grant dollar - 0.12 MTCO2e
- GHG reduction per total project dollars - 0.03 MTCO2e
- Total cost per MTCO2e - $28.59

Red Rock Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: January 2020

Red Rock Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster’s central hub at the center of the dairy group. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent PG&E utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Merced, California (Merced County)
- CDFA DDRDP Funding - $2,031,126
- Matching funds - $2,031,126
- Total Projects costs - $4,062,252
- Estimated 10-year GHG reductions – 156,242 MTCO2e
- GHG reductions per CDFA grant dollar - 0.08 MTCO2e
- GHG reduction per total project dollars - 0.04 MTCO2e
- Total cost per MTCO2e - $26.00
River Ranch Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: January 2020

River Ranch Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster's central hub at the center of the dairy. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent SoCalGas utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Hanford, California (Kings County)
- CDFA DDRDP Funding - $1,994,860
- Matching funds - $1,994,861
- Total Projects costs - $3,989,721
- Estimated 10-year GHG reductions – 187,884 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.09 MTCO₂e
- GHG reduction per total project dollars - 0.05 MTCO₂e
- Total cost per MTCO₂e - $21.24

Riverbend Dairy Biogas
Funded: 2018
Status: In Progress
Expected Completion Date: September 2020

Riverbend Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Tulare, California (Tulare County)
- CDFA DDRDP Funding - $2,090,404
- Matching funds - $2,731,981
- Total Projects costs - $4,822,385
- Estimated 10-year GHG reductions – 245,930 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.12 MTCO₂e
- GHG reduction per total project dollars - 0.05 MTCO₂e
- Total cost per MTCO₂e - $19.61
Riverview Dairy Digester Pipeline Project  
**Funded: 2018**  
**Status: In Progress**  
**Expected Completion Date: February 2020**

Riverview Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster's central hub at the Calgren ethanol refinery. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent SoCalGas utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Pixley, California (Tulare County)
- CDFA DDRDP Funding - $1,332,070
- Matching funds - $1,332,070
- Total Projects costs - $2,664,140
- Estimated 10-year GHG reductions – 90,093 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.07 MTCO₂e
- GHG reduction per total project dollars - 0.03 MTCO₂e
- Total cost per MTCO₂e - $29.57

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Rob Van Grouw Dairy Biogas  
**Funded: 2018**  
**Status: In Progress**  
**Expected Completion Date: September 2020**

Rob Van Grouw Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Visalia, California (Tulare County)
- CDFA DDRDP Funding - $1,193,757
- Matching funds - $3,751,897
- Total Projects costs - $4,945,654
- Estimated 10-year GHG reductions – 140,442 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.12 MTCO₂e
- GHG reduction per total project dollars - 0.03 MTCO₂e
- Total cost per MTCO₂e - $35.21
Rocking Horse Dairy Biogas
Funded: 2018
Status: In Progress
Expected Completion Date: September 2020

Rocking Horse Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Hanford, California (Kings County)
- CDFA DDRDP Funding - $1,016,091
- Matching funds - $2,681,538
- Total Projects costs - $3,697,629
- Estimated 10-year GHG reductions – 119,540 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.12 MTCO₂e
- GHG reduction per total project dollars - 0.03 MTCO₂e
- Total cost per MTCO₂e - $30.93

Rockshar Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: February 2020

Rockshar Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster’s central hub at the center of the dairy group. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent PG&E utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Merced, California (Merced County)
- CDFA DDRDP Funding - $1,679,093
- Matching funds - $1,679,093
- Total Projects costs - $3,358,186
- Estimated 10-year GHG reductions – 124,664 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.07 MTCO₂e
- GHG reduction per total project dollars - 0.04 MTCO₂e
- Total cost per MTCO₂e - $26.94
Scheenstra Dairy Biogas
Funded: 2018
Status: In Progress
Expected Completion Date: June 2020

Scheenstra Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Tulare, California (Tulare County)
- CDFA DDRDP Funding - $1,873,064
- Matching funds - $3,596,847
- Total Projects costs - $5,469,911
- Estimated 10-year GHG reductions – 220,360 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.12 MTCO$_2$e
- GHG reduction per total project dollars - 0.04 MTCO$_2$e
- Total cost per MTCO$_2$e - $24.82

Sousa & Sousa Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: December 2019

Sousa & Sousa Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster's central hub at the Calgren ethanol refinery. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent SoCalGas utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Tipton, California (Tulare County)
- CDFA DDRDP Funding - $886,934
- Matching funds - $886,934
- Total Projects costs - $1,773,868
- Estimated 10-year GHG reductions – 68,700 MTCO$_2$e
- GHG reductions per CDFA grant dollar - 0.08 MTCO$_2$e
- GHG reduction per total project dollars - 0.04 MTCO$_2$e
- Total cost per MTCO$_2$e - $25.82
Udder Dairy Biogas
Funded: 2018
Status: In Progress
Expected Completion Date: September 2020

Udder Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation predigester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Visalia, California (Tulare County)
- CDFA DDRDP Funding - $1,153,459
- Matching funds - $2,049,345
- Total Projects costs - $3,202,804
- Estimated 10-year GHG reductions – 135,701 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.12 MTCO₂e
- GHG reduction per total project dollars - 0.04 MTCO₂e
- Total cost per MTCO₂e - $23.60

Valadao Dairy Biogas
Funded: 2018
Status: In Progress
Expected Completion Date: September 2020

Valadao Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation predigester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Hanford, California (Kings County)
- CDFA DDRDP Funding - $1,028,545
- Matching funds - $1,877,850
- Total Projects costs - $2,906,395
- Estimated 10-year GHG reductions – 121,005 MTCO₂e
- GHG reductions per CDFA grant dollar - 0.12 MTCO₂e
- GHG reduction per total project dollars - 0.04 MTCO₂e
- Total cost per MTCO₂e - $24.02
Vander Poel Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: November 2019

Vander Poel Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster's central hub at the Calgren ethanol refinery. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent SoCalGas utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Pixley, California (Tulare County)
- CDFA DDRDP Funding - $1,972,485
- Matching funds - $1,972,485
- Total Projects costs - $3,944,970
- Estimated 10-year GHG reductions – 290,060 MTCO2e
- GHG reductions per CDFA grant dollar - 0.15 MTCO2e
- GHG reduction per total project dollars - 0.07 MTCO2e
- Total cost per MTCO2e - $13.60

Vander Woude Dairy Digester Pipeline Project
Funded: 2018
Status: In Progress
Expected Completion Date: February 2020

Vander Woude Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biomethane from the digester will be transported via private, low-pressure pipeline to the cluster's central hub at the center of the dairy group. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent PG&E utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Merced, California (Merced County)
- CDFA DDRDP Funding - $1,863,562
- Matching funds - $1,863,562
- Total Projects costs - $3,727,124
- Estimated 10-year GHG reductions – 188,575 MTCO2e
- GHG reductions per CDFA grant dollar - 0.10 MTCO2e
- GHG reduction per total project dollars - 0.05 MTCO2e
- Total cost per MTCO2e - $19.76
Vista Verde Dairy Digester Pipeline Project

Funded: 2018
Status: In Progress
Expected Completion Date: March 2020

Vista Verde Dairy Digester Pipeline Project will build a new covered lagoon digester processing dairy manure. Biogas from the digester will be transported via private, low-pressure pipeline to the cluster's central hub at the center of the dairy group. Once at the hub, it will be used to fuel partner and public trucks at an on-site compressed natural gas fueling station. The remainder of the gas will be injected into the adjacent PG&E utility pipeline for delivery to other CNG fueling stations around the Central Valley and the state.

- Location – Chowchilla, California (Madera County)
- CDFA DDRDP Funding - $1,594,109
- Matching funds - $1,594,108
- Total Projects costs - $3,188,217
- Estimated 10-year GHG reductions – 140,653 MTCO2e
- GHG reductions per CDFA grant dollar - 0.09 MTCO2e
- GHG reduction per total project dollars - 0.04 MTCO2e
- Total cost per MTCO2e - $22.67

Western Sky Dairy Biogas

Funded: 2018
Status: In Progress
Expected Completion Date: September 2020

Western Sky Dairy Biogas will build a new covered lagoon digester with enhanced gas storage, gas pre-treatment and effluent distribution. The project will include a sand lane, screens and mechanical separator with screw press for solid separation pre-digester. Biogas will be conditioned to meet the SoCalGas standards for natural gas fuel and will be used for vehicle fuel use.

- Location – Bakersfield, California (Kern County)
- CDFA DDRDP Funding - $2,820,762
- Matching funds - $2,902,189
- Total Projects costs - $5,722,951
- Estimated 10-year GHG reductions – 352,595 MTCO2e
- GHG reductions per CDFA grant dollar - 0.12 MTCO2e
- GHG reduction per total project dollars - 0.06 MTCO2e
- Total cost per MTCO2e - $16.23
The UC Davis Manure Conversion Research Project was funded with $225,909 through the 2014-15 DDRDP. The Project Leaders was designed to evaluate a new method capable of converting large amounts of manure and/or urine from dairy operations into a more stable sterile soil amendment with a predictable nitrogen mineralization response that reduces greenhouse gas (GHG) emissions. This project targets a 25 percent GHG reduction in overall CO$_2$e emission rates from manure and subsequent amended soils, which can be scaled to intensive livestock operations throughout the state of California and beyond.

The objectives of the lab and field research were to measure the effects of ‘converted’ manure on N$_2$O, CH$_4$ and CO$_2$ emissions, as well as the effects of the converted manure on crop productivity, compared to conventionally handled manure and cropland fertility management. The ‘conversion’ process for manure involved the hydrodynamic cavitation of homogenized solid or liquid livestock waste slurry, which was pumped through attenuating tubules that suddenly opened. The over-arching goal of this research was to provide an alternative to business as usual waste management in dairy operations to reduce GHGs while maximizing economic and environmental benefits. The project was canceled due to substantial changes to project timeline.