



**Resource Management
Agency
COUNTY OF TULARE
AGENDA ITEM**

BOARD OF SUPERVISORS

KUYLER CROCKER
District One
PETE VANDER POEL
District Two
AMY SHUKLIAN
District Three
EDDIE VALERO
District Four
DENNIS TOWNSEND
District Five

AGENDA DATE: July 21, 2020

Public Hearing Required	Yes <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
Scheduled Public Hearing w/Clerk	Yes <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
Published Notice Required	Yes <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
Advertised Published Notice	Yes <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>
Meet & Confer Required	Yes <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
Electronic file(s) has been sent	Yes <input checked="" type="checkbox"/>	N/A <input type="checkbox"/>
Budget Transfer (Aud 308) attached	Yes <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
Personnel Resolution attached	Yes <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
Agreements are attached and signature line for Chairman is marked with tab(s)/flag(s)	Yes <input type="checkbox"/>	N/A <input checked="" type="checkbox"/>
CONTACT PERSON: Celeste Perez PHONE: (559) 624-7010		

SUBJECT: 2019 Annual Report of Total Greenhouse Gas Emissions from Dairies and Feedlots

REQUEST(S):

That the Board of Supervisors:

1. Hold a public meeting to receive a presentation to consider the 2019 Annual Report of Total Greenhouse Gas Emissions from Dairies and Feedlots (“2019 Annual Report”) and provide an opportunity for public comment.
2. Accept a Categorical Exemption consistent with the California Environmental Quality Act (“CEQA”) Title 14 California Code of Regulations, Section 15061(b)(3) Common Sense Exemption and Section 15306, Information Collection.

SUMMARY:

On August 2, 2019, a Stipulated Settlement (“Settlement”) was made and became effective by and among all parties to Case No. 272380, namely the Sierra Club, Association of Irrigated Residents and Center for Biological Diversity (collectively “Petitioners” or “Plaintiffs”) and the County of Tulare (“County”).

The Settlement, under Section IV.B., requires the County of Tulare to prepare an Annual Report of Total Dairy Greenhouse Gas (“GHG”) Emissions from 2019–2024. The 2019 Annual Report (see Attachment No. 1) is required to include:

1. Total estimated dairy GHG emissions reduced to date compared to the 1.05 million MT/yr by 2023 Dairy and Feedlot CAP reduction goal, and the total dairy GHG emissions reduced to date compared to the maximum projected

SUBJECT: 2019 Annual Report of Total Greenhouse Gas Emissions from Dairies and Feedlots
DATE: July 21, 2020

SB 1383 potential target.

An Air Quality Consultant has prepared a GHG Emissions Reduction Report (see Exhibit "A" of Attachment No. 1).

2. Report on the State's measures pursuant to SB 1383, including but not limited to digester funding and the Alternative Manure Management Program ("AMMP").

Resource Management Agency (RMA) staff completed an AMMP Spreadsheet (Exhibit "B") with this information on April 8, 2020.

3. Updated Digester Project list for digesters within the County that lists: 1) the operation name, 2) project title, 3) total project cost, 4) CDFA funding award, additional Federal or State public funding awards, 5) project description, 6) project construction state, 7) location, 8) GHG emission reductions over ten years, and 9) how captured methane is used. The report shall also include any reported problems with completed digesters within the County.

RMA staff completed the Updated Digester Project List (Exhibit "C") with this information on April 8, 2020.

Pursuant to the Settlement, the Annual Report shall be completed by May 1 each year, beginning in 2020, and made available to the public (through the County website). The County shall hold a public meeting on the Annual Report and the County Board shall provide the Annual Report to the public not less than ten (10) calendar days prior to a duly-noticed public meeting, where the report is considered by the Board following a staff presentation and opportunity for public comment.

There were delays in getting an agreement in place with the Air Quality Consultant and completion of the 2019 Annual Report, due to the current and ongoing health emergency.

In addition to the 2019 Annual Report, staff will provide an update on the implementation of the Settlement.

ENVIRONMENTAL SUMMARY:

Preparation of the 2019 Annual Report makes no physical change to the environment because it only involves gathering information to prepare a written report. As such, it is exempt from CEQA based on the Common Sense Exemption consistent with CEQA and the State CEQA Guidelines pursuant to Title 14, Cal. Code Regulations Section 15061(b)(3) and Section 15306, Class 6, Information Collection.

Staff has prepared and will file a Notice of Exemption (see Attachment No. 2).

FISCAL IMPACT/FINANCING:

Funding of the implementation of the Stipulated Settlement, including 2019 Annual Report, is through the previously approved RMA annual budget in association with the County Administrative Office.


SUBJECT: 2019 Annual Report of Total Greenhouse Gas Emissions from Dairies and Feedlots

DATE: July 21, 2020


LINKAGE TO THE COUNTY OF TULARE STRATEGIC BUSINESS PLAN:

The County's five-year strategic plan includes the "Economic Well Being Initiative - to promote economic development opportunities, effective growth management and a quality standard of living" and "Quality of Life Initiative - to promote public health and welfare, educational opportunities, natural resource management and continued improvement of environmental quality." The 2019 Annual Report will continue to support the agricultural economy while implementing the County General Plan. In doing so, it will promote sustainability, economic development and prosperity by providing design flexibility, streamline approval process and aid in reducing environmental impacts within unincorporated Tulare County.

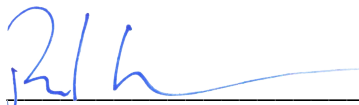
ADMINISTRATIVE SIGN-OFF:



Aaron R. Bock, MCRP, JD, LEED AP
Assistant Director
Economic Development & Planning



Michael Washam
Associate Director



Reed Schenke, P.E.
Director

cc: County Administrative Office

Attachment(s) Attachment No. 1: 2019 Annual Report
Exhibit "A": GHG Emissions Reduction Report
Exhibit "B": AMMP Spreadsheet
Exhibit "C": Updated Digester Project List
Attachment No. 2: Notice of Exemption

**BEFORE THE BOARD OF SUPERVISORS
COUNTY OF TULARE, STATE OF CALIFORNIA**

IN THE MATTER OF THE 2019 ANNUAL)
REPORT OF TOTAL GREENHOUSE) Resolution No. _____
("GHG") EMISSIONS FROM DAIRIES AND)
FEEDLOTS)

UPON MOTION OF SUPERVISOR _____, SECONDED BY
SUPERVISOR _____, THE FOLLOWING WAS ADOPTED BY THE
BOARD OF SUPERVISORS, AT AN OFFICIAL MEETING HELD ON JULY 21, 2020,
BY THE FOLLOWING VOTE:

AYES:
NOES:
ABSTAIN:
ABSENT:

ATTEST: JASON T. BRITT
COUNTY ADMINISTRATIVE OFFICER/
CLERK, BOARD OF SUPERVISORS

BY: _____
Deputy Clerk

* * * * *

1. Held a public meeting to receive a presentation to consider the 2019 Annual Report of Total Greenhouse Gas Emissions from Dairies and Feedlots ("2019 Annual Report") and provided an opportunity for public comment.
2. Accepted a Categorical Exemption consistent with the California Environmental Quality Act ("CEQA") Title 14 California Code of Regulations, Section 15061(b)(3) Common Sense Exemption and Section 15306, Information Collection.

Attachment “1”

2019 Annual Report

**TULARE COUNTY
RESOURCE MANAGEMENT AGENCY**



5961 South Mooney Boulevard
Visalia, CA 93277

2019 ANNUAL REPORT

OF TOTAL GREENHOUSE GAS EMISSIONS FROM
DAIRIES AND FEEDLOTS

July 2020

Prepared by

Tulare County Resources Management Agency
Economic Development & Planning Branch

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I. INTRODUCTION

The 2019 Annual Report of total Greenhouse Gas (“GHG”) emissions from dairies and feedlots is a requirement of a Stipulated Settlement (“Settlement”). The Settlement became effective August 2, 2019, completely resolving Case No. 272380 - Petition for Writ of Mandate and Complaint for Declaratory and Injunctive Relief, Superior Court, State of California, County of Tulare, Visalia Division, challenging the certification by the County of Tulare of the 2017 Environmental Impact Report for the 2017 Animal Facilities Confinement Plan and related General Plan Amendments Zone Changes, and Dairy and Feedlot Climate Action Plan. The ACFP and Dairy CAP are components of the County’s General Plan and are part of the Settlement by and between the Sierra Club, Association of Irrigated Residents, and Center for Biological Diversity (collectively “Petitioners” or “Plaintiffs”) and the County of Tulare, a political subdivision of the State of California and the Board of Supervisors of the County of Tulare (collectively “County”).

A. BACKGROUND

On November 30, 2011, in accordance with the California Environmental Quality Act (“CEQA”), the County of Tulare filed a Notice of Preparation (“NOP”) with the California State Clearinghouse in the Governor’s Office of Planning and Research as notification that a Draft EIR would be prepared for the 2017 ACFP and 2017 Dairy CAP. The NOP was distributed to involved public agencies and other interested parties for a 30-day public review period. The purpose of the public review period was to solicit comments on the scope and content of the environmental analysis to be included in the EIR.

On February 3, 2016, a Notice of Completion for a Draft EIR for the 2017 ACFP and 2017 Dairy CAP was filed with the State Clearinghouse, together with the requisite number of copies of the Draft EIR to be mailed to affected public agencies and interested parties, indicating a 45-day review period commencing on February 4, 2016, and ending on March 21, 2016.

On February 4, 2016, a Notice of Availability of a Draft EIR was duly published in the Visalia Times-Delta, Porterville Recorder, and Dinuba Sentinel, which are newspapers of general circulation in Tulare County, as well as the Bakersfield Californian and Delano Record in Kern County.

On February 4, 2016, a Notice of Availability of a Draft EIR was posted in the office of the Tulare County Clerk for a 45-day public review period commencing on February 4, 2016, and ending on March 21, 2016.

On September 8, 2017, a copy of the written responses to the timely public comments on the Draft EIR was sent to the commenting public agencies and interested parties in a manner that public agencies and interested parties received it at least 10 days before the Board of Supervisors meeting where the Board was scheduled to act upon the Planning Commission’s recommendation to certify the EIR.

On October 12, 2017, a Notice of Availability of a Draft EIR and Notice of Public Hearing was duly published in the Visalia Times-Delta, Porterville recorder, Dinuba Sentinel, Bakersfield Californian, and Delano Record, newspapers of general circulation, for a Planning Commission meeting set for October 25, 2017.

On October 25, 2017, the Planning Commission held a duly notice meeting where staff presented evidence regarding the Final EIR and the Project to the Planning Commission and answered Planning Commission questions, and the Commission held a duly notice public hearing where public testimony was received and recorded regarding the Project and Final EIR.

On October 25, 2017, the Planning Commission reviewed the Final EIR, Findings of Fact, Statement of Overriding Considerations, and Mitigation Monitoring and Reporting Program (“MMRP”) for the Project and recommended by Resolution No. 8358 that the Board of Supervisors certify the Final EIR and adopt the Findings of Fact, Statement of Overriding Considerations, and MMRP.

On December 1, 2017, a Notice of Public Hearing was published in the Visalia Times-Delta for a public hearing before the Board at its regular meeting on December 12, 2017.

On December 12, 2017, public testimony was received and recorded at the Board of Supervisors hearing regarding the Project and Final EIR.

On December 12, 2017, after notice and hearing, the Board adopted the 2017 ACFP as the updated Chapter 12 of the Tulare County 2030 General Plan Update, approved and adopted the 2017 Dairy CAP, and approved and certified a Final Environmental Impact Report (“2017 FEIR”) and adopted the CEQA Findings of Fact, Statement of Overriding Considerations, and Mitigation Monitoring and Reporting Program (“MMRP”) pursuant to CEQA.

The 2017 FEIR formally evaluated the environmental impacts of the 2017 ACFP and 2017 Dairy CAP. The 2017 FEIR was prepared pursuant to CEQA. On December 12, 2017, after notice and hearing, the Board adopted the 2017 ACFP as the updated Chapter 12 of the Tulare County 2030 General Plan Update, approved and adopted the 2017 Dairy CAP, and approved and certified the 2017 FEIR and adopted the CEQA Findings of Fact, Statement of Overriding Considerations, and Mitigation Monitoring and Reporting Program (“MMRP”) pursuant to CEQA.

B. ANNUAL REPORT SUMMARY

Section IV.B. of the Settlement requires the County of Tulare to prepare an Annual Report of total dairy GHG emissions from Fiscal Year (“FY”) 2019-FY2024. The Annual Report (see Attachment No. 1) is required to include:

1. Total estimated dairy GHG emissions reduced to date compared to the 1.05 million MT/yr by 2023 Dairy and Feedlot CAP reduction goal, and the total dairy GHG emissions reduced to date compared to the maximum projected SB 1383 potential target. GHG emissions shall be represented as graphical figures substantially similar to those provided in Attachment B of the Settlement.

The County's Air Quality Consultant has prepared a GHG Emissions Reduction Report (Exhibit "A") with this information. On 4/27/2020 the County's Air Quality Consultant began preparing the 2019 Annual Report of total dairy GHG emissions. There have been delays due to the current health emergency with the COVID-19 virus, which delayed getting an agreement in place with the Air Quality Consultant and also delayed the completion of the Annual Report. The County's Air Quality consultant completed the 2019 Annual Report of total dairy GHG emissions on July 6, 2020. The 2019 Annual Report of total dairy GHG emissions presents the 2018 GHG emissions inventory for dairies and cattle feedlots in Tulare County. It also evaluates the voluntary GHG emission reduction projects implemented at dairies and feedlots since 2013 and quantifies the reductions.

Digester installers indicate that bringing a project to full operation has taken longer than originally expected due to several reasons. One reason is that CDFA funding is partial and it has taken time to secure additional funding. Another reason is that permitting is complex and can involve obtaining permits from up to six different agencies. Another reason is that the "hub and spoke" model where several digesters feed digester gas into a central point facility is complex and components are not always built out simultaneously. Although digester installation may be complete, operation may be delayed until downstream components are built out. These reasons point to the fact that digester technology, at the time of grant funding in 2016 through 2018, was still a new and immature technology and operational start-up projections made at that time were inaccurate. Digester installers also indicated that since the time of the award program, the industry has begun to mature, and operation of the 35 projects in the CDFA database is expected in 2021. Although not subject to this report cycle, it should also be noted that a total of 54 digester projects are included in the CDFA database as of 2020 and are expected to be operational within the next several years.

The 2019 Annual Report of total dairy GHG emissions shows that there were approximately 170,000 additional metric tons per year of CO₂e reductions from digester and AMMP projects that began operating in 2019, and another 704,000 metric tons per year of CO₂e reductions from digester projects currently planned for 2020 and beyond. The complete dairy digester and AMMP project lists, with project descriptions, are included in Appendix B of the 2019 Annual Report of total dairy GHG emissions.

2. Report on the State's measures pursuant to SB 1383, including but not limited to digester funding and the Alternative Manure Management Program ("AMMP").

RMA staff completed an AMMP Spreadsheet (Exhibit "B") with this information on April 8, 2020. The AMMP Spreadsheet contains ten (10) facilities and shows that the CDFA has awarded \$6,043,120.00 in funding for improvements at dairies and feedlots in Tulare County. Two (2) of those facilities are operational after completing improvements, three (3) facilities have improvements that are under construction, three (3) facilities have not yet applied for Building Permits, and the status is unknown for two (2) of the facilities. Once the ten (10) facilities are all operating for five (5) years after completing improvements, the Greenhouse Gas (GHG) reductions will total 135,703 MTCO₂e.

3. Updated Digester Project list for digesters within the County that lists: 1) the operation name, 2) project title, 3) total project cost, 4) CDFA funding award, additional Federal or State public funding awards, 5) project description, 6) project construction state, 7) location, 8) GHG emission reductions over ten years, and 9) how captured methane is used. The report shall also include any reported problems with completed digesters within the County.

RMA staff completed the Updated Digester Project List (Exhibit “C”) with this information on April 8, 2020. The Updated Digester Project List contains fifty-four (54) Digesters and shows that the CDFA has awarded \$78,800,265.00 for Digesters at fifty-one (51) dairies in Tulare County. Three (3) Digesters that are currently operating did not receive CDFA funding. Thirteen (13) Digesters are operational, thirty-eight (38) Digesters are under construction, and three (3) Digesters have not yet applied for Building Permits. Once the fifty-four (54) Digesters are all operating for ten (10) years, the Greenhouse Gas (GHG) reductions will total 9,361,494 MTCO₂e.

The Settlement requires an Annual Report to be completed by May 1 each year, beginning in 2020, and made available to the public (through the County website). The Settlement requires the County to hold a public meeting on the Annual Report and the Board is required to provide the Annual Report to the public not less than ten (10) calendar days prior to a duly noticed public meeting, where the report is considered by the Board following a staff presentation and opportunity for public comments.

There have been delays due to the current health emergency with the COVID-19 virus, which delayed getting an agreement in place with the Air Quality Consultant. On April 27, 2020 the Air Quality Consultant began preparing the 2019 Annual Report of total dairy GHG emissions. The Air Quality Consultant completed the 2019 Annual Report of total dairy GHG emissions, on July 6, 2020.

C. CEQA FRAMEWORK ANNUAL REPORT

Common Sense Exemption consistent with CEQA and the Guidelines for Implementation of the California Environmental Quality Act (“CEQA Guidelines”) pursuant to Title 14, Cal. Code Regulations Section 15061(b)(3). Section 15061(b)(3) states that a project is exempt from CEQA if “The activity is covered by the common sense exemption that CEQA applies only to projects which have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA.” Preparing an Annual Report of total dairy GHG emissions will not make any physical change to the environment because it only involves gathering information to prepare a written report concerning whether or not the County of Tulare is in compliance with the 2017 Animal Confinement Facilities Plan (“2017 ACFP”) and the 2017 Dairy and Feedlot Climate Action Plan (“2017 Dairy CAP”).

Categorical Exemption consistent with CEQA and the CEQA Guidelines pursuant to Title 14, Cal. Code Regulations Section 15306, Class 6, pertaining to basic data collection, research,

experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. The use of Section 15306 is applicable and appropriate because preparing an Annual Report of total dairy GHG emissions will not make any physical change to the environment because it only involves gathering information to prepare a written report concerning whether or not the County of Tulare is in compliance with the 2017 ACFP and the 2017 Dairy CAP.

- Exhibits:
- “A” 2019 Annual Report of total dairy GHG emissions
 - “B” Alternative Manure Management Program Spreadsheet
 - “C” Updated Digester Project List

Exhibit "A"



Tulare County

Dairy and Feedlot Annual GHG Report, 2018



Prepared by:

Castle Environmental, LLC
iLanco Environmental, LLC

July 2020

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List of Acronyms

ACFP	Animal Confined Facilities Plan
ACFP DEIR	Draft Environmental Impact Report for the Animal Confinement Facilities Plan, And Dairy and Feedlot Climate Action Plan
ACR	annual compliance report
AMMP	Alternative Manure Management Program
AR4	IPCC Fourth Assessment Report
BAU	business-as-usual
CARB	California Air Resources Board
CDFA	California Department of Food and Agriculture
CEC	State Energy Resources Conservation and Development Corporation
CEFM	Cattle Enteric Fermentation Model
CH ₄	methane
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
County	County of Tulare
CSI	California Solar Initiative
Dairy CAP or Dairy and Feedlot CAP	Tulare County Dairy and Feedlot Climate Action Plan
DDRDP	Dairy Digester Research and Development Program
EIR	Environmental Impact Report
FY	fiscal year
GHG	greenhouse gas
HFCs	hydrofluorocarbons
IPCC	Intergovernmental Panel on Climate Change
kW	kilowatts
kWh/yr	kW-hours per year
MBtu/hr	thousand British thermal units per hour
MT	metric tons
MTCO ₂ e/year	metric tons of CO ₂ e per year
N ₂ O	nitrous oxide
NREL	National Renewable Energy Laboratory
PUC	Public Utilities Commission
RMA	Tulare County Resource Management Agency
SB	Senate Bill
Settlement	Stipulated Settlement
SLCP	short-lived climate pollutants
SLCP Plan	Short-Lived Climate Pollutant Reduction Strategy

Executive Summary

This report presents the 2018 greenhouse gas (GHG) emissions inventory for dairies and cattle feedlots in the County of Tulare (County). It also evaluates the voluntary GHG emission reduction projects implemented at dairies and feedlots since 2013. The GHG inventory and evaluation of emission reductions were prepared pursuant to the 2019 Settlement Agreement, entered into by the Sierra Club, Association of Irrigated Residents, Center for Biological Diversity, and County of Tulare.

The voluntary emission reduction projects operating in 2018 included 58 solar panel projects, 3 solar thermal hot water systems, 4 digester projects, and 1 alternative manure management program (AMMP) project. These projects provided 50,611 metric tons of carbon dioxide equivalent (CO₂e) reductions in calendar year 2018. These reductions constituted 5 percent of the annual emission reductions needed to achieve the Dairy and Feedlot Climate Action Plan (CAP) target of 1,050,000 metric tons per year of annual reductions by 2023. At the time of this study, the known additional projects scheduled for post-2018 start-up could provide further reductions of up to 870,000 metric tons per year by the end of 2021.

In 2018, the overall operation of Tulare County dairies and feedlots and their support crops produced an estimated 7.18 million metric tons of CO₂e emissions. This quantity is 4 percent less than the 7.49 million metric tons of CO₂e emissions in the 2013 baseline year, despite a 9 percent increase in the reported total cattle population. Most of the emission reductions were related to lower emission factors for electricity use and support crops.

In 2018, manure management operations at Tulare County dairies and feedlots produced an estimated 6.02 million metric tons of methane CO₂e emissions (these emissions are a subset of the overall emissions discussed in the preceding paragraph). This quantity is 4 percent greater than the 5.78 million metric tons of methane CO₂e emissions in the 2013 baseline year, primarily due to increases in dairy cow and feedlot cattle populations. An additional 2.55 million metric tons of methane CO₂e emission reductions would be needed by 2030 to reach the Senate Bill (SB) 1383 goal of 40 percent below 2013 baseline emissions.

1 Introduction

This report presents the 2018 greenhouse gas (GHG) emissions inventory for dairies and cattle feedlots in the County of Tulare. This report also documents the voluntary GHG emission reduction projects initiated at dairies and feedlots since 2013 and quantifies the reductions. The estimated 2018 emission reductions are compared to 2013 base year emissions and emission reduction targets set by the Dairy and Feedlot Climate Action Plan (“Dairy CAP” or “Dairy and Feedlot CAP”) (Tulare County RMA, 2017a) and Senate Bill (SB) 1383 (SB 1383, Lara, 2016). This report was prepared pursuant to the 2019 Settlement Agreement, entered into by the Sierra Club, Association of Irrigated Residents, Center for Biological Diversity, and County of Tulare.

Section 2 of this report provides background information on the Settlement Agreement as well as the Animal Confined Facilities Plan (ACFP), Dairy CAP, and SB 1383. Section 3 provides information concerning the animal population for dairies and feedlots in Tulare County. Section 4 presents the 2013 base year emissions, which provide the benchmark for measuring progress toward the emission reduction targets. Section 5 presents the 2018 business-as-usual (BAU) emissions, which represent what the dairy and feedlot emissions would have been without implementation of the GHG emission reduction projects. Section 6 identifies the GHG emission reduction projects and presents the estimated emission reductions achieved by those projects. Section 6 also evaluates the progress of the 2018 emission reductions toward meeting the 2023 target set by the Dairy CAP. Section 7 presents the actual 2018 GHG emissions, which result from applying the emissions reductions to the BAU emissions. Section 7 also evaluates the progress of the actual emissions toward meeting the 2030 goal set by SB 1383.

This report presents emissions for four GHGs: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), and hydrofluorocarbons (HFCs). For the dairy and feedlot industry, CO₂ is a product of fuel combustion by on-road trucks and automobiles, off-road dairy and farming equipment, and power plants providing electricity to the dairies (this report generally uses “dairy” to mean dairies and feedlots). CH₄ is primarily produced from anaerobic manure decomposition and enteric digestion (also called enteric fermentation). N₂O is primarily produced from manure decomposition and the use of nitrogen-based fertilizers, including manure, on dairy support crops. HFCs are used in milk refrigeration systems. They are potent GHGs emitted through normal system leakage.

The combined emissions of all four GHGs evaluated in this report are expressed as carbon dioxide equivalent (CO₂e) emissions. CO₂e is a common metric used to compare emissions of various GHGs. CO₂e represents the amount of CO₂ that would result in an equivalent amount of global warming as another GHG. CO₂e is computed by multiplying the mass of each GHG by its global warming potential (GWP)¹ and summing the products over all GHGs. By definition, CO₂ has a GWP of 1. The GWPs of the remaining three GHGs were obtained from the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) (IPCC, 2007). Under AR4 guidance, the GWPs for CH₄, N₂O, and HFCs are 25, 298, and 14,800, respectively.² The use of AR4 GWPs is consistent with the CARB California 2000-

¹ GWP is a measurement of how much heat a GHG can trap in the atmosphere, over a specific amount of time, as compared to CO₂. CO₂ is used as a benchmark for this measurement, so its GWP is 1. All other gases are represented in comparison to this value.

² The GWP of 14,800 for HFCs used in this report corresponds to HFC-23. HFC-23 is one of several types of

2017 Greenhouse Gas Emission Inventory Program (CARB, 2020a). The GHG emissions in this report are reported in units of metric tons (MT). One MT is equivalent to 1.1 U.S. (short) tons or 2,205 pounds.

2 Background

This section provides background information on the ACFP, Dairy CAP, SB 1383, California's actions related to SB 1383, and the Settlement Agreement.

2.1 Animal Confined Facilities Plan

The ACFP, included in the County's General Plan governing dairies and cattle feedlots, was originally adopted in 2001 and updated in 2017 (ACFP, 2017). The 2017 ACFP serves as the guiding document to regulate the County's bovine facilities and projected growth through 2023 in response to statewide climate change regulations and reduction targets. Under the ACFP, the County tracks existing dairies and bovine facilities and defines permitted herd sizes. The ACFP's Conformance Checklist Review serves to streamline the CEQA process for expanding facilities that meet specific eligibility requirements. The ACFP also requires that dairies and feedlots submit Annual Compliance Reports and recommends voluntary, incentivized GHG reduction strategies.

2.2 Dairy and Feedlot CAP

When the County revised the General Plan in 2012 (2030 General Plan Update), it retained the ACFP but provided for a subsequent process to update the ACFP with its own CEQA review and Environmental Impact Report (EIR). Under the General Plan Update, the County directed the preparation of a separate climate action plan as part of the ACFP Update to specifically address dairies and feedlots. The Dairy and Feedlot CAP serves that purpose and is used to implement the ACFP Update and its application to new and expanding dairies and feedlots (Tulare County RMA, 2017a; Tulare County RMA, 2017c).

The Dairy and Feedlot CAP includes an inventory of dairy and feedlot GHG emissions for the 2013 baseline year, approaches for reducing GHG emissions in accordance with statewide requirements and reduction targets, and projections through 2023. The CAP sets a reduction target of 1.05 million metric tons of GHG emissions per year by 2023. Section 6.4 tracks the progress of dairy and feedlot GHG reductions made through the reporting year 2018 relative to the CAP target.

2.3 Senate Bill 1383

Short-lived climate pollutants (SLCPs) are powerful climate forcers that have relatively short atmospheric lifetimes. These pollutants include CH₄, HFCs, and anthropogenic black carbon. SB 1383 authorized the California Air Resources Board (CARB) to set goals for reducing SLCPs and specifically for adopting regulations to reduce CH₄ emissions from dairy and livestock manure management operations by 40 percent below 2013 levels by 2030 (SB 1383, Lara, 2016). In adopting such regulations, CARB is directed to coordinate with the Department of Food and Agriculture (CDFA), the Public Utilities Commission (PUC) and the California Energy Commission (CEC). Notably, any regulations to reduce dairy

refrigerants used in industrial refrigeration equipment. HFC-23 was conservatively selected as the refrigerant for quantification purposes because of its high GWP.

emissions cannot take effect sooner than January 1, 2024, and then only if CARB, in consultation with CDFA, determines the regulations to be technologically feasible, economically feasible, and cost-effective. Section 7.1 tracks the progress of dairy and feedlot GHG reductions made through the reporting year 2018 to the SB 1383 goal. Although not the focus of this study, Senate Bill 1383 also specifies a goal of a 40 percent reduction in statewide HFC emissions below 2013 levels by 2030.

2.4 California's Actions Pursuant to SB 1383

The Settlement Agreement requires the County to “report on the State’s measures pursuant to SB 1383, including but not limited to digester funding and the Alternative Manure Management Program (AMMP). This section describes the State’s regulatory framework adopted pursuant to SB 1383 as well as funding and incentive programs.

On March 24, 2017, CARB adopted the Short-Lived Climate Pollutant Reduction Strategy (SLCP Plan), outlining future steps for implementing SB 1383 and the need for cooperation between regulatory agencies (CARB, 2017a). Of note is SB 1383 direction that CARB and CDFA are to evaluate the dairy sector’s progress toward meeting the SLCP 2030 reduction goal on a voluntary basis, and, if sufficient progress has not been attained due to insufficient funding or market or technical barriers, CARB may revise the SLCP Strategy’s CH₄ emission reduction goal for dairies to a less stringent level.

To help the industry meet SLCP reduction goals, California established several incentive programs. The centerpiece of these efforts is two state-funded incentive programs implemented by the CDFA: the Dairy Digester Research and Development Program (DDRDP) and AMMP. Both programs are funded under California’s Climate Investment Program through Cap-and-Trade auction proceeds or the Greenhouse Gas Reduction Fund.

Since 2015, CDFA has awarded more than \$183 million to 108 dairy digester projects in California under the DDRDP, with \$369.7 million provided by matching funds by grant awardees. The DDRDP projects have an anticipated cumulative statewide GHG reduction of 19.9 million metric tons of CO₂e over ten years, or approximately 1.99 million metric tons of CO₂e annually, and equate to a 17 percent reduction in CH₄ emissions from manure management in California (CDFA, 2020a).

Since 2015, CDFA has awarded \$63.2 million to 108 AMMP projects in California. Approximately \$9 million has been provided in matching funds by awardees. The AMMP projects have an anticipated cumulative GHG reduction of approximately 1 million metric tons of CO₂e over five years, or approximately 0.2 metric tons of CO₂e annually, and equate to a 1.8 percent reduction in CH₄ emissions from manure management in California. Unlike digesters which capture CH₄, AMMP projects are designed to avoid CH₄ production. The AMMP funds a diverse range of manure management practices that provide options to dairy and livestock operations where digesters may not be economically feasible (CDFA, 2020b).

2.5 Settlement Agreement

On August 2, 2019, a stipulated settlement (“Settlement Agreement”) was entered into by the Sierra Club, Association of Irrigated Residents, Center for Biological Diversity, and County of Tulare. The Settlement Agreement became effective on August 2, 2019, and completely resolved Case No. 272380 - Petition for Writ of Mandate and Complaint for Declaratory and Injunctive Relief, Superior Court, State

of California, County of Tulare, Visalia Division, challenging the certification by the County of Tulare of the Environmental Impact Report for the Animal Facilities Confinement Plan (Tulare County RMA, 2017b) and related General Plan Amendments Zone Changes, and Dairy CAP.

Section IV.B. of the Settlement Agreement requires the County to prepare annual reports of total dairy GHG emissions from fiscal year (FY) 2019 to FY 2024. The annual reports are required to include:

1. The total estimated dairy GHG emissions reduced to date compared to the 1.05 million metric tons per year Dairy CAP reduction target set for 2023, and the total dairy GHG emissions reduced to date compared to the maximum projected SB 1383 potential goal of 40 percent below 2013 CH₄ levels by 2030.

Sections 6.4 and 7.1 of this report satisfy Item 1.

2. A report on the State's measures pursuant to SB 1383, including but not limited to digester funding and the AMMP.

Tulare County Resource Management Agency (RMA) staff completed an AMMP List with this information on April 8, 2020. This list, together with Section 2.4 of this report, satisfies Item 2.

3. An updated digester project list for digesters within the County that lists: 1) the operation name, 2) project title, 3) total project cost, 4) CDFA funding award, additional federal or state public funding awards, 5) project description, 6) project construction state, 7) location, 8) GHG emission reductions over ten years, and 9) how captured methane is used. The report must also include any reported problems with completed digesters within the County.

RMA staff completed the updated digester project list with this information on April 8, 2020. This list, together with Section 6.5 of this report, satisfies Item 3.

3 Animal Population

Cattle population data compiled by the Tulare County RMA served as the basis for the GHG emission inventories for both the 2013 baseline year and the 2018 reporting year. The 2013 Tulare County data were used to generate the baseline year emissions in the Dairy CAP and were represented by 330 reporting facilities. The 2018 Tulare County data were used to generate the 2018 BAU emissions in this report. Tulare County RMA compiled the 2018 data from the FY 2019 annual compliance reports (ACRs) prepared by the individual dairies and feedlots. The 2018 data were represented by 283 reporting facilities with non-zero cattle populations. Table 3-1 presents the cattle population data upon which this report is based.

The table shows that the reported populations of dairy cows, dairy heifers (12-24 months), feedlot cattle, and total animals increased in 2018 compared to 2013. The populations of dairy heifers (0-12 months) and dairy calves decreased. Tulare County is presently working to identify facilities that did not submit reports and to fill in missing 2018 data. Any substantial revisions to the 2018 data made after release of this report will be noted in the subsequent year's GHG emission inventory report.

Table 3-1. Dairy and Feedlot Animal Populations

Year	Dairy Cows ⁽³⁾	Dairy Heifers 0-12 mos.	Dairy Heifers 12-24 mos.	Dairy Calves	Feedlot Cattle	Total Animals
2013 (baseline year) ⁽¹⁾	543,431	137,985	148,928	65,770	133,886	1,030,000
2018 (reporting year) ⁽²⁾	569,140	125,636	167,099	59,636	204,272	1,125,783

Legend: mos. = months of age.

Notes:

1. Source: Dairy CAP. Appendix A, Tables A-1 and A-3.
2. Source: Tulare County RMA. Annual compliance reports.
3. Includes milk cows and dry cows.

4 Baseline Year (2013) Emissions

Table 4-1 presents the dairy and feedlot emissions for the 2013 baseline year. This table matches Table 3.7-1 of the *Draft Environmental Impact Report for the Animal Confinement Facilities Plan, And Dairy and Feedlot Climate Action Plan (ACFP DEIR)* (Tulare County RMA, 2017b) and Table 3 of the Dairy CAP. The 2013 GHG emissions represent the baseline to which the actual 2018 emissions are compared in Section 7.

Table 4-1. Dairy and Feedlot 2013 Baseline GHG Emissions

Source Category	CO ₂ (MT/yr)	CH ₄ (MT/yr)	N ₂ O (MT/yr)	HFCs (MT/yr)	CO ₂ e (MT/yr)
Farm Equipment Exhaust	38,054	3	0	0.0	38,129
Farm Agricultural Soil	0	0	2,725	0.0	812,050
Farm Electricity Consumption	79,107	3	1	0.0	79,480
Dairy Equipment Exhaust	99,106	12	0	0.0	99,406
Truck Trips	23,137	0	0	0.0	23,137
Automobile Trips	14,882	3	3	0.0	15,851
Dairy Electricity Consumption	144,792	6	1	0.0	145,335
Dairy Refrigeration	0	0	0	4.3	63,640
Dairy Manure Decomposition	0	123,329	1,385	0.0	3,496,077
Dairy Enteric Digestion	0	98,523	0	0.0	2,463,071
Feedlot Manure Decomposition	0	388	67	0.0	29,598
Feedlot Enteric Digestion	0	9,083	0	0.0	227,068
Total Emissions	399,078	231,350	4,182	4.3	7,492,843

Legend: CO₂ = carbon dioxide; CH₄ = methane; N₂O = nitrous oxide; HFCs = hydrofluorocarbons; CO₂e = carbon dioxide equivalent; MT/yr = metric tons per year.

Source: ACFP DEIR, Table 3.7-1. Consistent with Table 3 of the Dairy CAP.

Table 4-2 presents the 2013 baseline emissions of CH₄ from the manure management source categories (i.e., manure decomposition and enteric digestion). These emissions are a subset of the emissions in Table 4-1. They were used to determine the year 2030 SB 1383 goal, which is defined as 40 percent below 2013 CH₄ emissions by 2030. Therefore, the 2030 SB 1383 goal for Tulare County dairies and

feedlots is 3,470,000 metric tons per year of methane CO₂e from manure management (the goal is rounded to the nearest thousand).

Table 4-2. Dairy and Feedlot 2013 Baseline CH₄ Emissions from Manure Management

Source Category	CH ₄ (MT/yr)	CO ₂ e (MT/yr)
Dairy Manure Decomposition	123,329	3,083,219
Dairy Enteric Digestion	98,523	2,463,071
Feedlot Manure Decomposition	388	9,710
Feedlot Enteric Digestion	9,083	227,068
Total Emissions	231,323	5,783,068

Legend: CH₄ = methane; CO₂e = carbon dioxide equivalent; MT/yr = metric tons per year.

Source: ACFP DEIR, Table 3.7-1. Consistent with Table 3 of the Dairy CAP.

5 Business-As-Usual Emissions in 2018

The development of 2018 BAU emissions was the first step in estimating 2018 actual emissions. In this study, BAU represents a hypothetical operating condition consisting of 2018 animal populations coupled with the continuation of 2013 manure management practices. BAU emissions exclude the emission reductions from the voluntary projects implemented at the dairies and feedlots since 2013. Section 6 describes these voluntary projects and quantifies their emission reductions. Section 7 applies the voluntary emission reductions to the BAU emissions to produce the estimated 2018 actual emissions.

5.1 Quantification Methodology

For the 2018 BAU emissions, this report quantified the same emission source categories as the 2013 baseline categories shown in Table 4-1. Where applicable, the quantification of 2018 BAU emissions generally used the same methodologies, and the most recent available equations and variables, that CARB used for the California 2000-2017 Greenhouse Gas Emission Inventory Program (CARB, 2020a). The California Greenhouse Gas Emission Inventory Program used methodologies published by the IPCC (2006) and U.S. EPA (2013). The BAU emission quantification methodologies are described below. Appendix A includes the detailed calculation tables for all source categories.

5.1.1 Farm Equipment Exhaust

During farming operations for the dairy and feedlot support crops, diesel-powered equipment is used to perform routine tasks such as plowing and crop harvesting. Annual fuel use for the farm equipment was estimated using a factor of 25 gallons per year per acre, from CARB's *Analysis of California's Diesel Agricultural Equipment Inventory according to Fuel Use, Farm Size, and Equipment Horsepower* (CARB, 2018a). The 2018 cultivated acreage for support crops was estimated by scaling the 2013 acreage by the relative number of animal units.³ The 2013 acreage was obtained from Appendix E2 of the ACFP DEIR.

³ Tulare County defines an animal unit as a common animal denominator, based on feed consumption, where one mature Holstein milking cow (1,400 pounds) represents one animal unit.

Year 2018 emissions were calculated by multiplying the 2018 fuel use by CO₂, CH₄ and N₂O emission factors obtained from The Climate Registry (TCR, 2020a; TCR, 2020b).

5.1.2 Farm Agricultural Soil

Various agricultural soil management practices contribute to greenhouse gas emissions. The use of synthetic and organic fertilizers adds nitrogen to soils, thereby increasing natural emissions of N₂O. Emissions of N₂O from support crop agricultural soil were calculated using equations published by the IPCC (2019). The equations estimate N₂O emissions due to direct emissions from soils, indirect emissions from runoff, and indirect emissions from volatilization and subsequent conversion to N₂O. The emission calculations used the 2018 cultivated acreage described in Section 5.1.1.

5.1.3 Farm Electricity Consumption

The use of electricity by agricultural irrigation pumps for support crops generates indirect GHG emissions from regional power plants burning fossil fuels. Appendix E2 of the ACFP DEIR estimated an average electricity usage rate of 1.59 megawatt-hours per acre per year for agricultural irrigation pumps in the San Joaquin Valley. Year 2018 electricity usage was estimated by multiplying this factor by the 2018 cultivated acreage described in Section 5.1.1. Year 2018 GHG emissions were estimated using eGRID (CAMX Subregion) emission factors from The Climate Registry (TCR, 2020c).

5.1.4 Dairy Equipment Exhaust

During dairy and feedlot operations, diesel-powered mobile equipment is used to perform routine tasks such as distribution of cattle feed and corral scraping. Annual equipment usage for 2018 was scaled from the 2013 usage in proportion to the relative number of animal units, except for standby generator usage, which was scaled in proportion to the relative number of facilities. The 2013 equipment usage was obtained from Appendix E2 of the ACFP DEIR. Year 2018 emissions were calculated by converting the equipment usage (in horsepower-hours) to fuel use (in gallons) and multiplying by CO₂, CH₄ and N₂O emission factors obtained from The Climate Registry (TCR, 2020a; TCR, 2020b).

5.1.5 Truck and Automobile Trips

Operation of dairies and feedlots generates a variety of truck trips, including silage trucks, hay trucks, concentrated feed trucks, calf milk replacer trucks, and cattle trucks. The facilities also generate light vehicle trips from employees and visitors (veterinarians, breeders, sales, and delivery). Trips in 2018 were scaled from 2013 in proportion to the number of animal units for trucks and the number of facilities for automobiles. The 2013 trips and trip lengths (assumed unchanged in 2018) were obtained from Appendix E2 of the ACFP DEIR. The EMFAC2017 mobile source emission factor program was used to generate truck and automobile emission factors (CARB, 2020e). The emission factors include contributions from running exhaust, idle exhaust, and starting exhaust.

5.1.6 Dairy Electricity Consumption

Electricity is used at dairies for lighting, operation of the milking equipment, operation of electric pumps for water supply, and other uses. The use of electricity by dairy facilities generates indirect GHG emissions from regional power plants burning fossil fuels. Appendix E2 of the ACFP DEIR estimated an average electricity usage rate of 0.49 megawatt-hours per cow (dairy cows and heifers) per year for dairies in the San Joaquin Valley. Year 2018 electricity usage was estimated by multiplying this factor by

the 2018 animal population of dairy cows and dairy heifers (0-12 months and 12-24 months) from Table 3-1. Year 2018 GHG emissions were estimated using eGRID (CAMX Subregion) emission factors from The Climate Registry (TCR, 2020c).

5.1.7 Dairy Refrigeration

Dairies refrigerate milk prior to pick-up by milk trucks. HFC emissions are produced by normal refrigerant leakage from the refrigeration equipment. The Climate Registry (TCR, 2020d) lists a default upper bound annual refrigerant loss rate of 25 percent for industrial refrigeration. The total 2018 refrigerant charge was scaled from 2013 in proportion to the number of dairy cows as shown in Table 3-1. The total 2013 refrigerant charge was obtained from Appendix E2 of the ACFP DEIR. The 2018 HFC emissions were estimated by multiplying the total refrigerant charge by the 25 percent loss rate. HFC-23 is one of several types of refrigerants used in industrial refrigeration equipment. HFC-23 was conservatively selected as the refrigerant for quantification purposes because of its high GWP of 14,800.

5.1.8 Manure Decomposition

Manure is primarily composed of organic material and water. Under anaerobic conditions, the organic material is decomposed by anaerobic bacteria. The primary end products of anaerobic decomposition are CH₄ and stabilized organic material. N₂O is also produced during manure storage and treatment.

The key factors affecting CH₄ production from livestock manure are the quantity of manure produced, manure characteristics (which in turn depend on the composition and digestibility of the animal diet), the manure management system, and climate. Production of N₂O during manure storage and treatment occurs via combined nitrification-denitrification of nitrogen contained in the manure. The amount of N₂O released depends on the manure management system, duration of waste management, nitrogen concentration, temperature, volatilization fraction, runoff fraction, biochemical oxygen demand, and other variables.

Emissions associated with manure decomposition were calculated using the methodology developed for the CARB statewide 2000-2017 GHG Emission Inventory, which also reflects the 2006 IPCC Guidelines for National Emission Inventories (CARB, 2019a; IPCC, 2006). The methodology takes into consideration the percent distribution of animals in each type of manure management system and specifies the variables used in emission calculations.

The calculation of 2018 BAU emissions assumed a distribution of animals in each type of manure management system that was consistent with the CARB statewide GHG Emission Inventory, 2013 distribution (in terms of percent of animals in each system). This 2013 distribution was chosen to ensure that emissions calculated to describe the BAU conditions do not inadvertently account for any reductions from digester projects, which are project-specific and are calculated and discussed in Section 6. Nevertheless, CARB's statewide distributions of animals in each manure system in years 2013 through 2017 (the most recent available statewide emissions year) have not changed.

CH₄ emissions from manure decomposition were estimated using Equation 1.

Equation 1: $CH_{4,man} = V_{ex} \times B_0 \times MCF \times c_1$

$CH_{4,man}$ = methane emissions from manure [kg CH₄/yr]

V_{ex} = volatile solids excreted [kg VS/yr]

B_0 = maximum methane producing capacity [$m^3 CH_4/kg VS$]

MCF = methane conversion factor [%]

c_1 = conversion factor representing density of methane at 25°C.

Volatile solids excreted were estimated using Equation 2.

Equation 2: $V_{ex} = VS \times (WMS \times N_{animals})$

VS = volatile solids excreted per animal [kg VS/animal/yr]

$(WMS \times N_{animals})$ = number of animals per waste management system

N_2O emissions from manure decomposition were estimated using Equation 3.

Equation 3: $N_2O = WMS \times N_{animals} \times N_{excreted} \times [D_{EF} + (V_{frac} \times V_{EF}) + (R_{frac} \times R_{EF})] \times 1.5711$

N_2O = nitrous oxide emissions from manure [kg N_2O/yr]

$N_{excreted}$ = nitrogen excreted per animal [kg N/animal/yr]

D_{EF} = direct nitrogen as N_2O-N [g $N_2O-N/g N$]

V_{frac} = volatilization fraction of N [fraction]

V_{EF} = indirect nitrogen as N_2O-N [g N_2O-N/g]

R_{frac} = runoff fraction of nitrogen [fraction]

R_{EF} = indirect nitrogen as N_2O-N for runoff N [g N_2O-N/g]

The following factors were obtained from CARB's GHG Emissions Inventory from the most recent emissions inventory year available (2017): MCF, c_1 , B_0 , VS, $N_{excreted}$, D_{EF} , V_{frac} , V_{EF} , R_{frac} , R_{EF} .

5.1.9 Enteric Digestion

Enteric digestion (also referred to as fermentation) is a natural part of the digestive process in ruminant animals such as cattle. Microbes in the digestive tract, or rumen, decompose and ferment food, producing CH_4 as a by-product.

Tulare County CH_4 emissions from enteric digestion were estimated by scaling the 2017 CARB statewide enteric CH_4 emissions (2017 being the most recent statewide emissions year available) by the 2018 Tulare County animal counts (see Equation 4). Since CARB uses the IPCC methodology as implemented in the Cattle Enteric Fermentation Model (CEFM), it is appropriate to estimate emissions from enteric digestion by assuming that Tulare County emissions are proportional to the California emissions based on animal population.⁴

Year 2017 statewide animal counts and enteric digestion CH_4 emissions were obtained from the CARB 2000-2017 GHG Inventory using the web-based Inventory Query Tool (CARB, 2019a). Tulare County animal counts for 2018 were obtained the County's ACR reports (see Table 3-1).

⁴ This analysis conservatively does not take into account CARB's proposed 2019 update that would reduce enteric digestion emissions by 5 percent due to differences in diets fed to California cattle compared to cattle in other states (CARB, 2019c).

$$\text{Equation 4: } \text{CH}_{4,\text{ent}} = \text{CH}_{4,\text{ent,CA}} \times (\text{Pop}_{\text{Tulare}}/\text{Pop}_{\text{CA}})$$

$\text{CH}_{4,\text{ent}}$ = 2018 Tulare County CH_4 emissions from enteric digestion

$\text{CH}_{4,\text{ent,CA}}$ = Statewide 2017 CH_4 emissions from enteric digestion

$\text{Pop}_{\text{Tulare}}$ = Tulare County 2018 animal count

Pop_{CA} = Statewide 2017 animal count

5.2 Estimated 2018 BAU Emissions

Table 5-1. presents the dairy and feedlot BAU emissions for 2018. As discussed at the beginning of Section 5, the BAU emissions reflect 2018 animal populations but exclude the emission reductions from voluntary projects implemented at the dairies and feedlots since 2013. These BAU emissions were used in the development of the 2018 actual emissions in Section 7.

Table 5-1. Dairy and Feedlot 2018 Business-as-Usual GHG Emissions

Source Category	CO ₂ (MT/yr)	CH ₄ (MT/yr)	N ₂ O (MT/yr)	HFCs (MT/yr)	CO ₂ e (MT/yr) ⁽¹⁾
Farm Equipment Exhaust	41,292	2	0	0.0	41,434
Farm Agricultural Soil	0	0	982	0.0	292,639
Farm Electricity Consumption	57,928	4	0	0.0	58,167
Dairy Equipment Exhaust	118,230	5	1	0.0	118,635
Truck Trips	23,340	1	4	0.0	24,457
Automobile Trips	11,175	1	1	0.0	11,374
Dairy Electricity Consumption	95,111	7	1	0.0	95,503
Dairy Refrigeration	0	0	0	5.7	84,496
Dairy Manure Decomposition	0	129,306	1,430	0.0	3,658,872
Dairy Enteric Digestion	0	99,443	0	0.0	2,486,066
Feedlot Manure Decomposition	0	554	106	0.0	45,476
Feedlot Enteric Digestion	0	12,714	0	0.0	317,843
Total Emissions	347,077	242,035	2,525	5.7	7,234,962

Legend: CO₂ = carbon dioxide; CH₄ = methane; N₂O = nitrous oxide; HFCs = hydrofluorocarbons; CO₂e = carbon dioxide equivalent; MT/yr = metric tons per year.

Notes:

1. BAU emissions reflect 2018 dairy and feedlot cattle populations coupled with baseline year (2013) manure management practices. Emission calculations used methodologies consistent with the CARB California Greenhouse Gas Emission Inventory Program. BAU emissions exclude the voluntary GHG reduction projects implemented since the baseline year (see Table 6-1).

6 Emission Reductions Achieved in 2018

This section presents the GHG emission reductions associated with projects implemented at Tulare County dairies and feedlots from 2013 through 2018. The projects consist of solar panels, solar thermal hot water systems, dairy digesters, and AMMP projects.

6.1 Emission Reduction Projects

The Tulare County RMA provided a list of 58 solar panel projects and 3 solar thermal hot water systems at dairies for which it issued permits between 2013 and December 2018 (Tulare County RMA, 2020). The list of Tulare County solar projects is included in Appendix B.

CDFA maintains lists of dairy digester projects in California for which it has awarded grant funds annually since 2016 (CDFA, 2020a). The CDFA database shows 35 Tulare County projects since the start of the award program and through the end of 2018, of which 32 had received CDFA funding and an additional 3 had not. Digester installers MAAS and CalBio were contacted to identify which digester projects had begun operating and were providing emission reductions. The digester installers indicated that, of the projects included in the CDFA database, four digester projects were operational as of the end of 2018. These four digester projects are identified in Appendix B.

The CDFA also maintains lists of AMMP projects in California for which it has awarded grant funds annually since 2016. AMMP projects are non-digester manure management practices that result in reduced GHG emissions. For example, converting from flushed feed lanes and anaerobic lagoons to scraped feed lanes and solar dried manure substantially reduces CH₄ emissions. The CDFA indicates that since the start of the award program and through the end of 2018, four Tulare County projects had received CDFA funding (CDFA, 2020b). Of those, one project was operational as of the end of 2018. The operational AMMP project is identified in Appendix B.

6.2 Quantification Methodology

GHG emission reductions associated with the 58 solar panel projects were quantified using the California Air Resources Board's (CARB's) Benefits Calculator Tool for the Community Solar Pilot (CARB, 2020b). Calculations were made for a single hypothetical 1000 kW project, and the corresponding emission reductions were scaled by actual project size for each of the dairy projects. One of the inputs required by the Benefits Calculator Tool is annual system output in kW-hours per year (kWh/yr). System output was quantified using the National Renewable Energy Laboratory (NREL) PVWatts Calculator (NREL, 2018). The inputs to the Benefits Calculator Tool and PVWatts Calculator were developed in consultation with Tulare County RMA staff (Tulare County RMA, 2020) and CARB's Quantification Methodology for the Department of Community Services and Development Low-Income Weatherization Program Community Solar Pilot (CARB, 2019b). The outputs from the Benefits Calculator Tool and PVWatts Calculator are included in Appendix B.

Emission reductions associated with the three solar thermal hot water systems were determined using CARB's *Greenhouse Gas Quantification Methodology for the Low-Income Weatherization Program: Single-Family Energy Efficiency and Solar Photovoltaics Multi-Family Energy Efficiency and Renewables* (CARB, 2019b). This methodology provides an average annual GHG reduction rate of 0.68 metric tons of CO₂e per year (MTCO₂e/year) per residential system in California, developed by the California Solar Initiative (CSI)-Thermal Program (CSI, 2020). According to Tulare County RMA staff, the three dairy projects are approximately residential-sized (Tulare County RMA, 2020).

Emission reductions from the four dairy digester projects and one AMMP project that were operational prior to the end of 2018 were estimated by the grant fund award recipients using CARB's CCI Quantification, Benefits, and Reporting Materials (CARB, 2018b).

6.3 Estimated Emission Reductions

Table 6-1 summarizes the estimated 5-year, annual, and calendar year 2018 GHG emission reductions at Tulare County dairies and feedlots by project category. Calendar year 2018 reductions are less than the annual reductions because some projects became operational during 2018 and therefore had partial-year reductions. The estimated emission reductions by individual project are presented in Appendix B.

Table 6-1. Dairy and Feedlot GHG Emission Reductions from Solar, Digester, and AMMP Projects Operating in 2018

Project Type	5-Year CO ₂ e Reductions (MT/5-yrs) ⁽¹⁾	Annual CO ₂ e Reductions (MT/yr)	CY 2018 CO ₂ e Reductions (MT/yr) ⁽²⁾
Solar Panels	-90,634	-18,127	-17,786
Solar Thermal Hot Water Systems	-10	-2	-2
Digesters	-333,810	-66,762	-25,813
Alternative Manure Management Program	-35,050	-7,010	-7,010
Total	-459,504	-91,901	-50,611

Legend: CO₂e = carbon dioxide equivalent; MT/5-yrs = metric tons per five years; MT/yr = metric tons per year; CY = calendar year.

Notes:

1. Reductions are shown as negative values.
2. CY 2018 reductions are less than the annual reductions because some projects became operational during 2018 and therefore had partial-year reductions.

6.4 Progress Toward the Dairy CAP Target

Table 6-2 shows the progress of the voluntary GHG emission reductions from Tulare County dairies and feedlots compared to the Dairy CAP target of 1.05 million metric tons of CO₂e reductions by 2023. The first table column shows the year. The second column shows the accumulation of emission reductions needed from 2017 to 2023 to meet the 2023 target, assuming a linear trend. This trajectory is merely a guide to serve as a reference for assessing the rate of progress of the emission reductions.

The third column in Table 6-2 shows the actual calendar year emission reductions achieved by year for the Tulare County dairies and feedlots. The 2018 emission reductions were obtained from Table 6-1. The 2017 emission reductions reflect operation of 53 solar panel projects and one digester project in 2017 (see Appendix B, Tables B.2 and B.4).

The fourth table column shows the deviation of the actual emission reductions from the reference trajectory in the second column. The data show that the actual emission reductions through 2018 are higher than the reference trajectory and therefore behind schedule (hence the negative number). The slow start to the emission reductions is due primarily to delayed startups of numerous digester and AMMP projects for the reasons articulated in Section 6.5. At the time of this analysis, data show that there were approximately 170,000 additional metric tons of annual CO₂e reductions from digester and AMMP projects that began operating in 2019, and another 704,000 metric tons of annual CO₂e reductions from digester projects currently planned for 2020 and beyond.

The fifth table column shows the additional emission reductions needed by 2023 to reach the Dairy CAP target. The last table column shows the percent of the Dairy CAP target that has been achieved. As of 2018, approximately 5 percent of the needed emission reductions have been achieved. Each subsequent version of this annual GHG emissions inventory report will populate an additional year of data in the table.

Table 6-2. Progress of GHG Emission Reductions in Relation to the 2023 Dairy CAP Target

Year	Dairy CAP Emission Reduction Trajectory (MT CO ₂ e/yr) ⁽¹⁾⁽²⁾	Actual Emission Reductions Achieved (MT CO ₂ e/yr) ⁽¹⁾⁽³⁾	Deviation from the Target Trajectory (MT CO ₂ e/yr) ⁽⁴⁾	Additional Reductions Needed to Reach the 2023 Target (MT CO ₂ e/yr) ⁽¹⁾	Percent of Target Reached
2017	0	-26,379	26,379	-1,023,621	3%
2018	-175,000	-50,611	-124,389	-999,389	5%
2019	-350,000	TBD	TBD	TBD	TBD
2020	-525,000	TBD	TBD	TBD	TBD
2021	-700,000	TBD	TBD	TBD	TBD
2022	-875,000	TBD	TBD	TBD	TBD
2023	-1,050,000	TBD	TBD	TBD	TBD

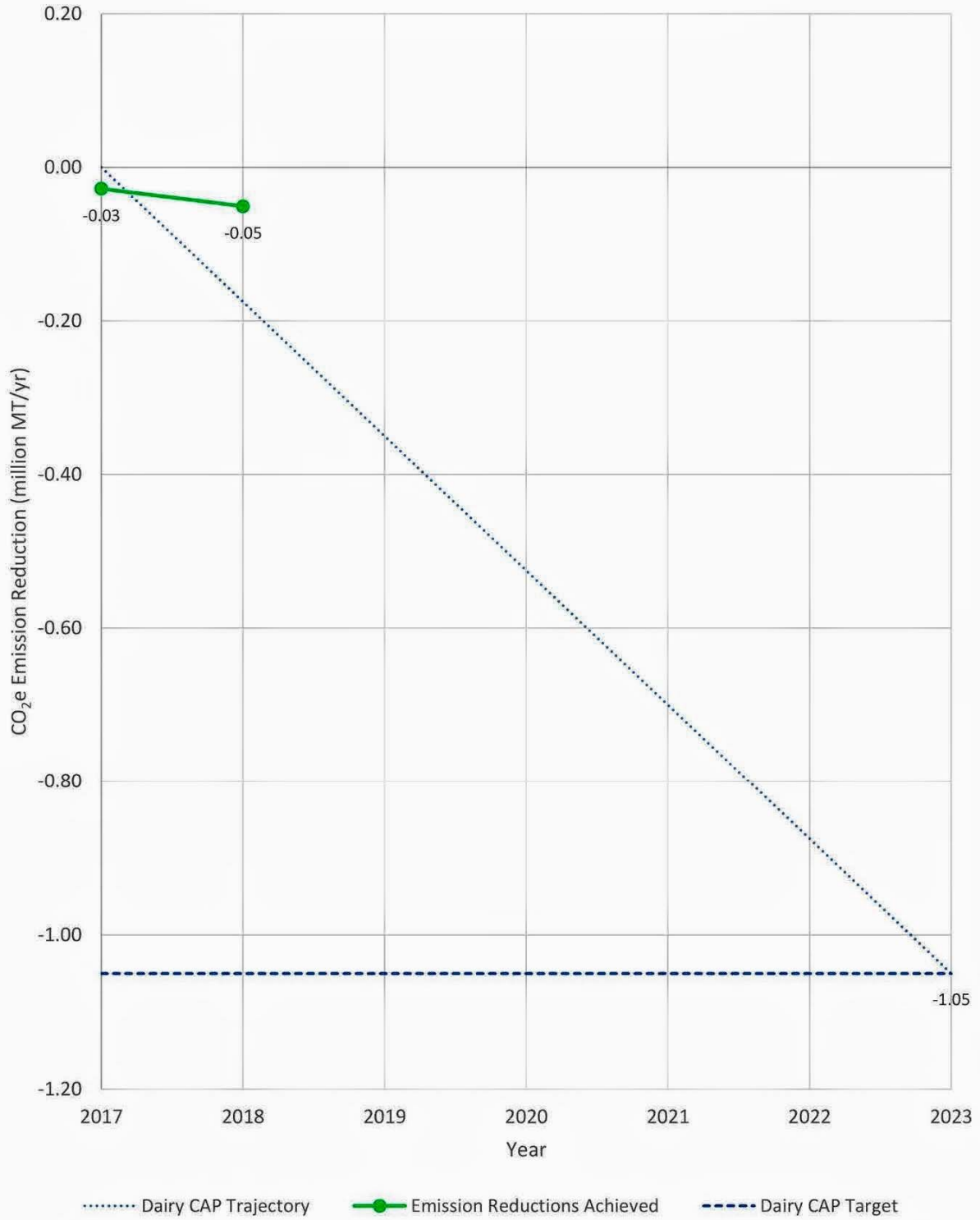
Legend: MT CO₂e/yr = metric tons of carbon dioxide equivalent per year; TBD = to be determined in a future analysis.

Notes:

1. Reductions are shown as negative values.
2. The Dairy CAP trajectory assumes a linear path from 2017 to 2023. The value of -1,050,000 MT/yr in year 2023 is the Dairy CAP target.
3. CY 2018 emission reductions were obtained from Table 6-1. CY 2017 emissions were obtained from Appendix B, Tables B.2 and B.4 (53 solar panel projects and one digester project operated in 2017). Emissions for projects that began operating part-way through the year reflect only that portion of the year the projects operated.
4. A positive value means ahead of schedule; a negative value means behind schedule.

Figure 6-1 shows the progress of the Tulare County dairies and feedlots toward meeting the 2023 Dairy CAP target in graphical format. The short line near the top left of the figure shows the actual emission reductions by year. The diagonal dotted line represents the reference trajectory that would meet the target by 2023. The horizontal dashed line across the bottom of the figure represents the Dairy CAP target.

Figure 6-1
Progress of GHG Emission Reductions
in Relation to the 2023 Dairy CAP Target



6.5 Emission Reduction Project Impediments

The Settlement Agreement requires that the County identify any reported problems with installed digesters. Although specific problems were not reported on the CDFA database, conversations with digester installers, MAAS and CalBio, indicated that, of the digester projects included in the CDFA database, only four were operational by the end of 2018.

MAAS and CalBio indicated that bringing a project to full operation has taken longer than originally expected due to several reasons. One reason is that CDFA funding is partial and it has taken time to secure additional funding. Another reason is that permitting is complex and can involve obtaining permits from up to six different agencies. Another reason is that the “hub and spoke” model, where several digesters feed digester gas into a central facility, is complex and components are not always built out simultaneously. Although digester installation may be complete, operation may be delayed until downstream components are built out. These reasons point to the fact that digester technology, at the time of grant funding in 2016 through 2018, was still a new and immature technology and operational start-up projections made at that time were inaccurate. Both installers indicated that since the time of the award program, the industry has begun to mature, and operation of the 35 projects in the CDFA database is expected in 2021. Although not subject to this report cycle, it should also be noted that 54 digester projects are included in the CDFA database as of 2020 and are expected to be operational within the next several years.

At the time of this analysis, data show that there were approximately 170,000 additional metric tons per year of CO₂e reductions from digester and AMMP projects that began operating in 2019, and another 704,000 metric tons per year of CO₂e reductions from digester projects currently planned for 2020 and beyond. The complete dairy digester and AMMP project lists, with project descriptions, are included in Appendix B.

7 Actual Emissions in 2018

This section presents the 2018 actual emissions and compares the emissions to the 2030 SB 1383 goal. Table 7-1 presents the estimated actual dairy and feedlot GHG emissions for calendar year 2018. The emissions were determined by subtracting the calendar year 2018 emission reductions in Table 6-1 from the 2018 BAU emissions in Table 5-1.

Table 7-1. Dairy and Feedlot 2018 Actual GHG Emissions

Source Category ⁽¹⁾	CO ₂ (MT/yr)	CH ₄ (MT/yr)	N ₂ O (MT/yr)	HFCs (MT/yr)	CO ₂ e (MT/yr)
Farm Equipment Exhaust	41,292	2	0	0.0	41,434
Farm Agricultural Soil	0	0	982	0.0	292,639
Farm Electricity Consumption	57,928	4	0	0.0	58,167
Dairy Equipment Exhaust	118,230	5	1	0.0	118,635
Truck Trips	23,340	1	4	0.0	24,457
Automobile Trips	11,175	1	1	0.0	11,374
Dairy Electricity Consumption	77,323	7	1	0.0	77,715
Dairy Refrigeration	0	0	0	5.7	84,496
Dairy Manure Decomposition	0	127,993	1,430	0.0	3,626,049
Dairy Enteric Digestion	0	99,443	0	0.0	2,486,066
Feedlot Manure Decomposition	0	554	106	0.0	45,476
Feedlot Enteric Digestion	0	12,714	0	0.0	317,843
Total Emissions	329,289	240,722	2,525	5.7	7,184,351

Legend: CO₂ = carbon dioxide; CH₄ = methane; N₂O = nitrous oxide; HFCs = hydrofluorocarbons; CO₂e = carbon dioxide equivalent; MT/yr = metric tons per year.

Notes:

1. Emission reductions from solar panels and solar thermal hot water systems were subtracted from the BAU dairy electricity consumption CO₂ emissions. Emission reductions from digesters and AMMP projects were subtracted from the BAU dairy manure decomposition CH₄ emissions.

Table 7-2 compares the 2018 actual GHG emissions to the 2013 baseline emissions. The table shows that, from 2013 to 2018, the total CO₂e emissions decreased by 308,492 metric tons per year. Some source categories increased emissions while others decreased emissions. Some of the emissions changes since 2013 are primarily a result of changes in animal populations. For example, the increases in emissions from manure decomposition and enteric digestion reflect increases in the dairy cow and feedlot populations (see Table 3-1). Other emissions changes are primarily a result of the effects of climate change-related regulations. For example, the decreases in emissions from farm and dairy electricity consumption reflect a decrease in carbon intensity factors from the electric utilities (PG&E and Edison) in response to the California Renewables Portfolios Standard (CPUC, 2020).⁵ Additionally, the decreases in automobile emissions reflect the effects of California's Low Carbon Fuel Standard (CARB, 2020c) and Greenhouse Gas Vehicle Emission Standards (CARB, 2020d).

Finally, some emissions changes are primarily a result of changes in quantification methodologies rather than actual emissions changes. Specifically, the 2018 emissions of N₂O from farm agricultural soil are substantially lower than the 2013 emissions because of updated IPCC emission factors for direct emissions, indirect runoff, and indirect volatilization (IPCC, 2019). A portion of the CO₂e increase from dairy refrigeration resulted from a GWP revision for HFC-23 from 11,700 to 14,800 (IPCC, 2007).

⁵ The Renewables Portfolio Standard mandates that 20 percent of electricity retail sales must be served by renewable resources by 2017, 60 percent by 2030, and 100 percent from carbon-free resources by 2045 (CPUC, 2020).

Table 7-2. Comparison of 2018 Actual GHG Emissions to 2013 Baseline GHG Emissions

Source Category	2013 Baseline CO ₂ e Emissions (MT/yr)	2018 Actual CO ₂ e Emissions (MT/yr)	2018 Actual minus 2013 Baseline CO ₂ e Emissions (MT/yr)
Farm Equipment Exhaust	38,129	41,434	3,305
Farm Agricultural Soil	812,050	292,639	-519,411
Farm Electricity Consumption	79,480	58,167	-21,313
Dairy Equipment Exhaust	99,406	118,635	19,229
Truck Trips	23,137	24,457	1,320
Automobile Trips	15,851	11,374	-4,477
Dairy Electricity Consumption	145,335	77,715	-67,620
Dairy Refrigeration	63,640	84,496	20,856
Dairy Manure Decomposition	3,496,077	3,626,049	129,972
Dairy Enteric Digestion	2,463,071	2,486,066	22,994
Feedlot Manure Decomposition	29,598	45,476	15,878
Feedlot Enteric Digestion	227,068	317,843	90,774
Total Emissions	7,492,843	7,184,351	-308,492

Legend: CO₂e = carbon dioxide equivalent; MT/yr = metric tons per year.

Table 7-3 presents the estimated dairy and feedlot CH₄ emissions for calendar year 2018 from the manure management source categories only. These emissions are a subset of the emissions shown in Table 7-1. They were used in the assessment of progress toward the 2030 SB 1383 goal (see Section 7.1).

Table 7-3. Dairy and Feedlot 2018 Actual CH₄ Emissions from Manure Management

Source Category	CH ₄ (MT/yr)	CO ₂ e (MT/yr)
Dairy Manure Decomposition	127,993	3,199,822
Dairy Enteric Digestion	99,443	2,486,066
Feedlot Manure Decomposition	554	13,853
Feedlot Enteric Digestion	12,714	317,843
Total Emissions	240,703	6,017,583

Legend: CH₄ = methane; CO₂e = carbon dioxide equivalent; MT/yr = metric tons per year.

Table 7-4 compares the 2018 actual CH₄ emissions to the 2013 baseline CH₄ emissions for the manure management source categories only (isolating CH₄ from manure management is consistent with SB 1383). The 2018 emissions include the reductions from the four digesters and one AMMP project that were operational in 2018. The table shows that, from 2013 to 2018, CH₄ emissions from manure management increased by 234,515 metric tons per year (as CO₂e). This emissions increase is primarily a result of the increases the dairy cow and feedlot populations relative to the 2013 population data (see Table 3-1).

Table 7-4. Comparison of 2018 Actual CH₄ Emissions to 2013 Baseline CH₄ Emissions from Manure Management

Source Categories ⁽¹⁾	2013 Baseline CH ₄ Emissions (MT CO ₂ e/yr) ⁽²⁾	2018 Actual CH ₄ Emissions (MT CO ₂ e/yr) ⁽²⁾	2018 Actual minus 2013 Baseline CH ₄ Emissions (MT CO ₂ e/yr) ⁽²⁾
Dairy Manure Decomposition	3,083,219	3,199,822	116,603
Dairy Enteric Digestion	2,463,071	2,486,066	22,994
Feedlot Manure Decomposition	9,710	13,853	4,143
Feedlot Enteric Digestion	227,068	317,843	90,774
Total Emissions	5,783,068	6,017,583	234,515

Legend: CH₄ = methane; MT CO₂e/yr = metric tons of carbon dioxide equivalent per year.

Notes:

1. Consistent with SB 1383, this table includes only CH₄ emissions from manure decomposition and enteric digestion.
2. CH₄ emissions are expressed as CO₂e.

7.1 Progress Toward the SB 1383 Goal

Table 7-5 shows the progress of the Tulare County dairies and feedlots toward meeting the SB 1383 goal of 40 percent below 2013 CH₄ levels by 2030 for manure management operations. The first table column shows the year. The second column shows the progression of year-to-year emissions needed from 2017 to 2030 to meet the 2030 goal of 3,470,000 metric tons, assuming a linear trend. This trajectory is merely a guide to serve as a reference for assessing the rate of progress of the actual emissions. For the purposes of establishing this trajectory, the 2017 starting year was assigned emissions equal to the 2018 BAU emissions (2017 BAU emissions were not quantified in this study).

The third table column in Table 7-5 shows the BAU emissions by year for the Tulare County dairies and feedlots. Its purpose is to show what the dairy and feedlot emissions would be without the voluntary emission reduction projects described in Section 6. For the purposes of establishing two data points for plotting a line, the 2017 BAU emissions (not quantified) were assumed to be equal to the 2018 BAU emissions.

The fourth table column shows the actual emissions by year for the Tulare County dairies and feedlots. The 2018 emissions include the reductions from the four digesters and one AMMP project that operated in that year. For the purposes of establishing two data points for plotting a line, the 2017 actual emissions (not quantified) were assumed to equal the 2018 BAU emissions minus the emissions reduction from one digester project that began operating in 2017 (see Appendix B, Table B.4).

The fifth table column shows the deviation of the actual CH₄ emissions from the reference trajectory in the second column. The data show that the actual emissions through 2018 are higher than the reference trajectory and therefore behind schedule (hence the negative number). As discussed in Sections 6.5 and 7.1, the primary reasons for the slow start to the emission reductions are (1) increases in the dairy cow and feedlot populations relative to the 2013 population data; and (2) the delayed startups of numerous digester and AMMP projects for the reasons articulated in Section 6.5. At the time of this analysis, data show that there were approximately 170,000 additional metric tons of annual CO₂e reductions from

digester and AMMP projects that began operating in 2019, and another 704,000 metric tons of annual CO₂e reductions from digester projects currently planned for 2020 and beyond.

The last table column shows the additional CH₄ emission reductions needed by 2030 to meet the SB 1383 goal. Each subsequent version of this annual GHG emissions inventory report will populate an additional year of data in the table.

Table 7-5. Progress of CH₄ Emissions in Relation to the 2030 SB 1383 Goal

Year	SB 1383 Emissions Trajectory (MT CO ₂ e/yr) ⁽¹⁾⁽²⁾	BAU Emissions (MT CO ₂ e/yr) ⁽¹⁾⁽³⁾	Actual Emissions (MT CO ₂ e/yr) ⁽¹⁾⁽⁴⁾	Deviation of Actual from Goal Trajectory (MT CO ₂ e/yr) ⁽⁵⁾	Additional Reductions Needed to Reach 2030 Goal (MT CO ₂ e/yr) ⁽⁶⁾
2017	6,050,406	6,050,406	6,039,528	10,879	-2,569,687
2018	5,852,000	6,050,406	6,017,583	-165,682	-2,547,743
2019	5,653,000	TBD	TBD	TBD	TBD
2020	5,455,000	TBD	TBD	TBD	TBD
2021	5,256,000	TBD	TBD	TBD	TBD
2022	5,058,000	TBD	TBD	TBD	TBD
2023	4,859,000	TBD	TBD	TBD	TBD
2024	4,661,000	TBD	TBD	TBD	TBD
2025	4,462,000	TBD	TBD	TBD	TBD
2026	4,264,000	TBD	TBD	TBD	TBD
2027	4,065,000	TBD	TBD	TBD	TBD
2028	3,867,000	TBD	TBD	TBD	TBD
2029	3,668,000	TBD	TBD	TBD	TBD
2030	3,470,000	TBD	TBD	TBD	TBD

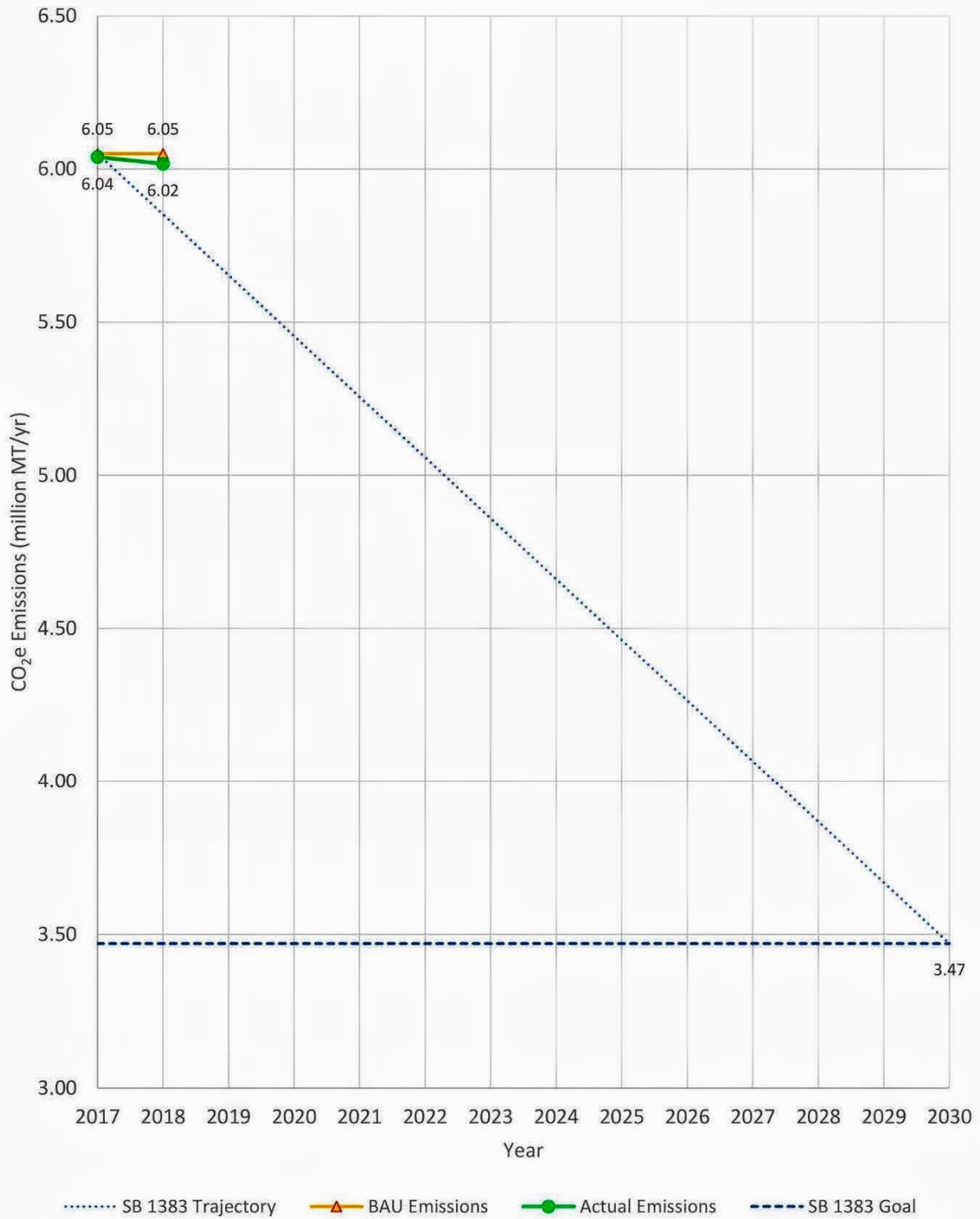
Legend: MT CO₂e/yr = metric tons of carbon dioxide equivalent per year; TBD = to be determined in a future analysis.

Notes:

1. Emissions are CH₄ presented as CO₂e. Manure decomposition and enteric digestion emissions only.
2. The SB 1383 trajectory assumes a linear path from 2017 to 2030. For graphing purposes, the 2018 BAU emissions were used as the 2017 starting point. The value of 3,470,000 MT/yr in year 2030 is the SB 1383 goal (40 percent below the 2013 baseline emissions).
3. BAU 2017 emissions were not directly quantified. For graphing purposes, BAU 2017 emissions were assumed to be equal to BAU 2018 emissions.
4. Actual 2017 emissions were not directly quantified. For graphing purposes, actual 2017 emissions were assumed to equal 2018 BAU emissions minus the reduction from one digester project that began operating in 2017 (see Appendix B, Table B.4; emissions reflect the number of operating days in 2017).
5. A positive value means ahead of schedule; a negative value means behind schedule.
6. Reductions are shown as negative values.

Figure 7-1 shows the progress of the Tulare County dairies and feedlots toward meeting the SB 1383 goal in graphical format. The two short lines near the top left of the figure show the BAU CH₄ emissions by year (higher line) and actual CH₄ emissions by year (lower line). The diagonal dotted line represents the reference trajectory that would meet the goal by 2030. The horizontal dashed line across the bottom of the figure represents the SB 1383 goal, which is 40 percent below 2013 CH₄ emissions.

Figure 7-1
Progress of CH₄ Emissions
in Relation to the 2030 SB 1383 Goal



8 References

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Appendix A – 2018 Business-As-Usual Emission Calculations

Appendix A - Annual GHG Emission Calculations

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Table A.26	CH ₄ 2018 Business-As-Usual Emissions from Manure Management - Dairy Cows
Table A.27	CH ₄ 2018 Business-As-Usual Emissions from Manure Management - Dairy Heifers
Table A.28	N ₂ O 2018 Business-As-Usual Emissions from Manure Management - Dairy Cows
Table A.29	N ₂ O 2018 Business-As-Usual Emissions from Manure Management - Dairy Heifers
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Table A.33	Feedlot Cattle Herd Counts for Enteric Fermentation and Manure Management Calculations
Table A.34	Emissions from Enteric Digestion and Manure Management - Feedlots
Table A.35	CARB GHG Inventory - Manure Management
Table A.36	Global Warming Potentials

Table A.1
Dairy and Feedlot 2018 Business-As-Usual Emissions

Source Category	CO ₂ (MT/yr)	CH ₄ (MT/yr)	N ₂ O (MT/yr)	HFCs (MT/yr)	CO ₂ e (MT/yr)
Farm Equipment Exhaust	41,292	2	0	0.0	41,434
Farm Agricultural Soil	0	0	982	0.0	292,639
Farm Electricity Consumption	57,928	4	0	0.0	58,167
Dairy Equipment Exhaust	118,230	5	1	0.0	118,635
Truck Trips	23,340	1	4	0.0	24,457
Automobile Trips	11,175	1	1	0.0	11,374
Dairy Electricity Consumption	95,111	7	1	0.0	95,503
Dairy Refrigeration	0	0	0	5.7	84,496
Dairy Manure Decomposition	0	129,306	1,430	0.0	3,658,872
Dairy Enteric Digestion	0	99,443	0	0.0	2,486,066
Feedlot Manure Decomposition	0	554	106	0.0	45,476
Feedlot Enteric Digestion	0	12,714	0	0.0	317,843
Total Emissions	347,077	242,035	2,525	5.7	7,234,962

Notes:

1. BAU emissions reflect 2018 actual dairy and feedlot cattle populations. BAU emissions also reflect the use of manure management systems in the same proportions as the 2013 baseline year. Emission calculations used methodologies consistent with the most recent available CARB California GHG Emission Inventory (year 2017). BAU emissions exclude the GHG reduction projects implemented since the 2013 baseline year.
2. CO₂e was quantified using global warming potentials from the IPCC fourth assessment report (AR4), which are consistent with the CARB California GHG Emission Inventory.

Table A.2
Dairy and Feedlot Emission Reductions from Solar, Digester, and AMMP Projects Operating in 2018

Project Type	5-Year CO ₂ e Reductions (MT/5-yrs) ⁽¹⁾	Annual CO ₂ e Reductions (MT/yr)	CY 2018 CO ₂ e Reductions (MT/yr) ⁽²⁾
Solar Panels	-90,634	-18,127	-17,786
Solar Thermal Hot Water Systems	-10	-2	-2
Digesters	-333,810	-66,762	-25,813
Alternative Manure Management Program	-35,050	-7,010	-7,010
Total	-459,504	-91,901	-50,611

Notes:

1. Reductions are shown as negative values.
2. Calendar year (CY) 2018 reductions are less than the annual reductions because some projects became operational during 2018 and therefore had partial-year reductions.

Table A.3
Progress of GHG Emission Reductions in Relation to the 2023 Dairy CAP Target

Year	Dairy CAP Emission Reduction Trajectory (MT CO ₂ e/yr) ⁽¹⁾⁽²⁾	Actual Emission Reductions Achieved (MT CO ₂ e/yr) ⁽¹⁾⁽³⁾	Deviation from Trajectory (MT CO ₂ e/yr) ⁽⁴⁾	Additional Reductions Needed to Reach 2023 Target (MT CO ₂ e/yr) ⁽¹⁾	Percent of Target Reached
2017	0	-27,825	27,825	-1,022,175	3%
2018	-175,000	-50,611	-124,389	-999,389	5%
2019	-350,000	TBD	TBD	TBD	TBD
2020	-525,000	TBD	TBD	TBD	TBD
2021	-700,000	TBD	TBD	TBD	TBD
2022	-875,000	TBD	TBD	TBD	TBD
2023	-1,050,000	TBD	TBD	TBD	TBD

Legend: TBD = To be determined in a future analysis.

Notes:

1. Reductions are shown as negative values.
2. The Dairy CAP trajectory assumes a linear path from 2017 to 2023.
3. CY 2018 emissions were obtained from Table XX. CY 2017 emissions were obtained from Appendix B, Tables B.2 (60 solar panel projects operating in 2017) and B.4 (one digester project operating in 2017).
4. A positive value means ahead of schedule; a negative value means behind schedule.

Table A.4
Dairy and Feedlot 2018 Actual GHG Emissions

Source Category	CO ₂ (MT/yr)	CH ₄ (MT/yr)	N ₂ O (MT/yr)	HFCs (MT/yr)	CO ₂ e (MT/yr)
Farm Equipment Exhaust	41,292	2	0	0.0	41,434
Farm Agricultural Soil	0	0	982	0.0	292,639
Farm Electricity Consumption	57,928	4	0	0.0	58,167
Dairy Equipment Exhaust	118,230	5	1	0.0	118,635
Truck Trips	23,340	1	4	0.0	24,457
Automobile Trips	11,175	1	1	0.0	11,374
Dairy Electricity Consumption	77,323	7	1	0.0	77,715
Dairy Refrigeration	0	0	0	5.7	84,496
Dairy Manure Decomposition	0	127,993	1,430	0.0	3,626,049
Dairy Enteric Digestion	0	99,443	0	0.0	2,486,066
Feedlot Manure Decomposition	0	554	106	0.0	45,476
Feedlot Enteric Digestion	0	12,714	0	0.0	317,843
Total Emissions	329,289	240,722	2,525	5.7	7,184,351

Notes:

1. Emission reductions from Table XX were applied to the BAU emissions from Table YY to produce the 2018 Actual Emissions. Emissions reductions from solar panels and solar thermal hot water systems were applied to the Dairy Electricity Consumption CO₂ emissions. Emission reductions from digesters and AMMP projects were applied to the Dairy Manure Decomposition CH₄ emissions.

Table A.5
Dairy and Feedlot 2018 Actual CH₄ Emissions from Manure Management

Source Category	CH ₄ (MT/yr)	CO ₂ e (MT/yr)
Dairy Manure Decomposition	127,993	3,199,822
Dairy Enteric Digestion	99,443	2,486,066
Feedlot Manure Decomposition	554	13,853
Feedlot Enteric Digestion	12,714	317,843
Total Emissions	240,703	6,017,583

Table A.6
Progress of CH4 Emissions in Relation to the 2030 SB 1383 Target

Year	SB 1383 Emissions Trajectory (MT CO ₂ e/yr) ⁽¹⁾⁽²⁾	BAU Emissions (MT CO ₂ e/yr) ⁽¹⁾⁽³⁾	Actual Emissions (MT CO ₂ e/yr) ⁽¹⁾⁽⁴⁾	Deviation from Target Trajectory (MT CO ₂ e/yr) ⁽⁵⁾	Additional Reductions Needed to Reach 2030 Target (MT CO ₂ e/yr) ⁽⁶⁾
2017	6,050,406	6,050,406	6,039,528	10,879	-2,569,528
2018	5,852,000	6,050,406	6,017,583	-165,583	-2,547,583
2019	5,653,000	TBD	TBD	TBD	TBD
2020	5,455,000	TBD	TBD	TBD	TBD
2021	5,256,000	TBD	TBD	TBD	TBD
2022	5,058,000	TBD	TBD	TBD	TBD
2023	4,859,000	TBD	TBD	TBD	TBD
2024	4,661,000	TBD	TBD	TBD	TBD
2025	4,462,000	TBD	TBD	TBD	TBD
2026	4,264,000	TBD	TBD	TBD	TBD
2027	4,065,000	TBD	TBD	TBD	TBD
2028	3,867,000	TBD	TBD	TBD	TBD
2029	3,668,000	TBD	TBD	TBD	TBD
2030	3,470,000	TBD	TBD	TBD	TBD

Legend: ND = no data; TBD = To be determined in a future analysis.

Notes:

1. Emissions are CH₄ presented as CO₂e. Manure decomposition and enteric digestion emissions only.
2. The SB 1383 trajectory assumes a linear path from 2017 to 2030. The 2018 BAU emissions were used as the 2017 starting point. The value of 3,467,000 MT/yr in year 2030 is the SB 1383 target (40 percent below the 2013 baseline emissions). Values after 2017 are rounded to the nearest thousand.
3. BAU 2017 emissions were not directly quantified. For the purposes of graphing the SB 1383 progress, BAU 2017 emissions were assumed to be equal to BAU 2018 emissions.
4. Actual 2017 emissions were not directly quantified. For the purposes of graphing the SB 1383 progress, actual 2017 emissions were assumed to equal 2018 BAU emissions minus the reduction from one digester project that began operating in 2017 (see Appendix B, Table B.4; emissions reflect number of operating days in 2017).
5. A positive value means ahead of schedule; a negative value means behind schedule.
6. Reductions are shown as negative values.

Table A.7
Dairy and Feedlot Animal Population

Year	Dairy Cows ⁽³⁾	Dairy Heifers 0-12 mos.	Dairy Heifers 12-24 mos.	Dairy Calves	Feedlot Cattle	Total Animals
2013 (baseline year) ⁽¹⁾	543,431	137,985	148,928	65,770	133,886	1,030,000
2018 (reporting year) ⁽²⁾	569,140	125,636	167,099	59,636	204,272	1,125,783

Notes:

1. Source: *County of Tulare Dairy and Feedlot Climate Action Plan* . August 2017. Appendix A, Tables A-1 and A-3.
2. Source: Tulare County Resource Management Agency. 2018 ACR and dairy vs feedlot breakdown.
3. Includes milk cows and dry cows.

Table A.8
No. of Active Dairy and Feedlot Animal Confined Facilities

Year	No. of Facilities
2013 (baseline year) ⁽¹⁾	330
2018 (reporting year) ⁽²⁾	283

Notes:

1. Source: Tulare County RMA. *Draft EIR for the Animal Confinement Facilities Plan, and Dairy and Feedlot Climate Action Plan* . January 2016. Appendix G, Page 1-2.
2. Source: Tulare County Resource Management Agency. Includes all facilities that reported non-zero herd sizes.

Table A.9
Dairy and Feedlot Animal Units

Year	Total Animal Units
2013 (baseline year) ⁽¹⁾	741,040
2018 (reporting year) ⁽²⁾	745,337

Notes:

1. Source: Tulare County RMA. *Draft EIR for the Animal Confinement Facilities Plan, and Dairy and Feedlot Climate Action Plan* . January 2016. Appendix G, Page 1-2.
2. Source: Tulare County Resource Management Agency.

Table A.10
California 2017 Dairy Cattle Population

Dairy Cows	Dairy Heifers 0-12 mo	Dairy Heifers 12-24 mo	Dairy Calves
1,731,338	216,808	510,080	886,202

Notes:

Used in annual emission calculations for Enteric (dairies and feedlots) and Manure Management (feedlots only).

Source: CA GHG Emissions Inventory, Online Query Tool, Enteric Fermentation, most recent year available (2017).

Table A.11
California 2017 Total Cattle Population

Cattle Type	Total Population	Dairy Cows Population	Dairy Heifers Population	Feedlot
Beef calves	264,965			264,965
Beef cows	655,000			655,000
Beef replacements 0-12 months	26,590			26,590
Beef replacements 12-24 months	61,676			61,676
Bulls	70,000			70,000
Dairy calves	886,202		886,202	
Dairy cows	1,731,338	1,731,338		
Dairy replacements 0-12 months	216,808		216,808	
Dairy replacements 12-24 months	510,080		510,080	
Heifer feedlot	174,028			174,028
Heifer stockers	113,678			113,678
Steer feedlot	287,478			287,478
Steer stockers	260,137			260,137
Total dairy population:	3,344,428	1,731,338	1,613,090	1,913,552
Total feedlot population:	1,913,552			
Total population:	5,257,980			

Notes:

Used in annual emission calculations for Enteric (dairies and feedlots) and Manure Management (feedlots only).

Source: CA GHG Emissions Inventory, Online Query Tool, Enteric Fermentation, most recent year available (2017).

Table A.12
2018 Tulare Dairy and Feedlot Herd Counts

Facility Type	Cows in Milk	Mature Bulls ¹⁾	Dry Cows	Heifers/Bulls 1-2 yrs	Heifers/Bulls 3 months - 1 yr	Calves under 3 months	Total
Dairies	433,717	0	135,423	167,099	125,636	59,636	921,511
Feedlots	7,100	2,070	7,949	15,663	55,191	116,299	204,272
Total	440,817	2,070	143,372	182,762	180,827	175,935	1,125,783

Note:

¹⁾ For emission calculation purposes, all mature bulls were assigned to the feedlot category even if the bulls were actually reported on a dairy.

Table A.13
Emission Factors for Diesel Farm Equipment

Emission Factor (kg/gal)		
CO ₂ ⁽¹⁾	CH ₄ ⁽²⁾	N ₂ O ⁽²⁾
10.21	4.14E-04	8.28E-05

Notes:

1. The CO₂ emission factor is from The Climate Registry, 2020 Emission Factors, Table
2. CH₄ and N₂O emission factors were scaled from the CO₂ emission factor in proportion to the emission factors from The Climate Registry, 2020 Emission Factors. Table 1.9 for CH₄ and N₂O.

Table A.14
2018 Emissions Associated with Farm Equipment

2013 Cultivated Acres	2018 Cultivated Acres ⁽¹⁾	Fuel Usage Factor (gal/yr per acre) ⁽²⁾	2018 Fuel Use (gal/yr) ⁽¹⁾	2018 Annual Emissions (metric ton/yr)			
				CO ₂	CH ₄	N ₂ O	CO ₂ e
160,839	161,772	25	4,044,289	41,292	1.7	0.3	41,434

Notes:

1. The 2018 cultivated acreage was scaled from 2013 in proportion to the total number of animal units.
2. Source: CARB, 2018. *Analysis of California's Diesel Agricultural Equipment Inventory according to Fuel Use, Farm Size, and Equipment Horsepower*. October 3. Available: <https://ww3.arb.ca.gov/msei/ordiesel/agfuelstudy2018.pdf>. Accessed July 2020. Figure 3.3: Fuel per Acre, by Commodity. Hay, Forage, Pasture, Row Crops.

Table A.15
Emissions of N₂O from Agricultural Soil

Crop Type	2018 Cultivated Acres	Nitrogen Requirement per Crop (lb/acre/yr)	No. of Crops per Year ⁽¹⁾	N _f Nitrogen in Fertilizer (ton/yr)	CF Conversion Factor N ₂ O-N to N ₂ O ⁽²⁾	N ₂ O Emission Factor (kg N ₂ O-N/kg N)			F _{leach} Fraction of N Lost through Leaching & Runoff ⁽⁴⁾	F _{gasm} Fraction of N Volatilization as NH ₃ and NO _x ⁽⁴⁾	2018 Annual GHG Emissions (metric ton/yr) ⁽⁵⁾	
						EF ₁ Direct from Soils ⁽³⁾	EF ₅ Indirect from Runoff ⁽⁴⁾	EF ₄ Indirect from Volatilization ⁽⁴⁾			N ₂ O	CO ₂ e
Corn Silage (double)	161,772	250	2	40,443	1.57	0.005	0.011	0.005	0.24	0.21	501	149,306
Alfalfa	161,772	480	1	38,825	1.57	0.005	0.011	0.005	0.24	0.21	481	143,333
Total	--	--	--	79,268	--	--	--	--	--	--	982	292,639

Notes:

1. Assume the support crop acreage has 2 summer crops of corn and 1 winter crop of alfalfa (alfalfa was conservatively selected over wheat because it has a higher nitrogen requirement).

2. Source: IPCC, 2019. *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories*. Volume 4, Chapter 11. May 12, 2019. Available: <https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html>. Accessed 7/1/2020.

3. Source: IPCC, 2019. Table 11.1. Dry climate.

4. Source: IPCC, 2019. Table 11.3. Dry climate.

5. The N₂O emission rate is calculated based on Equations 11.1 (direct), 11.9 (volatilization), and 11.10 (runoff) in IPCC, 2019. The combined equation is:

$$Emission\ Rate = N_f \times CF \times [EF_1 + (EF_5 \times F_{leach}) + (EF_4 \times F_{gasm})] \times 0.9072$$

Table A.16
GHG Emissions Associated with Support Crop Irrigation

2018 Cultivated Acres	Usage Factor for Electric Irrigation Pumps (MWh/acre/yr) ^[1]	2018 Electricity Usage (MWh/yr) ^[2]	2018 Emission Factors (lb/MWh) ^[3]			Annual Emissions (metric ton/yr)			
			CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O	CO ₂ e
161,772	1.59	257,217	496.5	0.034	0.004	57,928	4.0	0.5	58,167

Notes:

1. Source: Tulare County RMA. *Draft EIR for the ACFP and Dairy CAP*. January 2016. Appendix E.2.
2. Calculations assume all ACF support crop irrigation pumps are electric.
3. Source: The Climate Registry. *2020 Default Emission Factor Document*. April 2020. Table 3.1. 2018 Emission Rates. eGRID CAMX Subregion.

Table A.17
Emission Factors for Diesel Dairy Equipment

Emission Source	Emission Factor (kg/gal)		
	CO ₂ ⁽¹⁾	CH ₄ ⁽²⁾	N ₂ O ⁽²⁾
Agricultural Tractor 51-120 hp	10.21	4.14E-04	8.28E-05
Rubber Tired Loader 121-175 hp	10.21	4.14E-04	8.28E-05
Off-Highway Truck 251-500 hp	10.21	4.14E-04	8.28E-05
Generator Set 251-500 hp	10.21	4.14E-04	8.28E-05

Notes:

1. The CO₂ emission factor is from The Climate Registry, 2020 Emission Factors, Table 1.1.
2. CH₄ and N₂O emission factors were scaled from the CO₂ emission factor in proportion to the emission factors from The Climate Registry, 2020 Emission Factors. Table 1.9 for CH₄ and N₂O.

Table A.18
2018 Emissions Associated with Dairy Equipment

Emission Source	2013 Equipment Annual Work Done (hp-hr/yr)	2018 Equipment Annual Work Done (hp-hr/yr) ⁽²⁾	2018 Fuel Use (gal/yr) ⁽¹⁾	2018 Annual Emissions (metric ton/yr)			
				CO ₂	CH ₄	N ₂ O	CO ₂ e
Dairy Tractor 51-120 hp	80,652,507	81,120,148	4,187,862	42,758	1.7	0.3	42,905
Loader 121-175 hp	54,730,496	55,047,835	2,841,868	29,015	1.2	0.2	29,115
Feed Mixer Truck 251-500 hp	87,599,377	88,107,297	4,548,577	46,441	1.9	0.4	46,600
Standby Generator 251-500 hp	33,600	28,815	1,488	15	0.0	0.0	15
Total	223,015,980	224,304,095	11,579,795	118,230	4.8	1.0	118,635

Notes:

1. Fuel use (gal/yr) = Annual Work (hp-hr/yr) x BSFC (lb/hp-hr) / Fuel Conversion (lb/gallon)
Brake specific fuel consumption (BSFC) (lb/hp-hr): 0.367
Diesel Fuel conversion (lb/gallon) 7.1089
 CARB, MSEI Documentation Off-Road Diesel Equipment, 2017 Off-road Diesel Emission Factors. *ordas_ef_fcf_2017_v7.xlsx*.
 Available: <https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road>. Accessed July 2020.
2. Annual work done in 2018 was scaled from 2013 in proportion to the No. of facilities for standby generators and the No. of animal units for all other source categories.

Table A.19
On-Road Vehicle Emissions

Vehicle Description	Vehicle Type ⁽¹⁾	2013 Round Trips (trips/yr)	2018 Round Trips (trips/yr) ⁽²⁾	One-Way Trip Length (mi/trip)	2018 Annual VMT (mi/yr)	2018 Annual Emissions (metric ton/yr) ⁽³⁾			
						CO ₂	CH ₄	N ₂ O	CO ₂ e
Silage Truck 3-axle, 10-ton	T6 Ag	573,151	576,474	1	1,152,949	1,315	0.0	0.2	1,377
Silage Truck 5-axle, 20-ton	T7 Ag	71,644	72,059	1	144,119	261	0.0	0.0	273
Hay Truck 3-axle, 10-ton	T6 Ag	12,882	12,957	2	51,827	59	0.0	0.0	62
Hay Truck 5-axle, 20-ton	T7 Ag	57,972	58,308	20	2,332,325	4,221	0.2	0.7	4,423
Concentrated Feed Truck 5-axle, 20-ton	T7 Ag	202,104	203,276	20	8,131,034	14,714	0.6	2.3	15,419
Calf Milk Replacer Truck 2-axle, 10-ton	T6 Ag	817	822	20	32,869	37	0.0	0.0	39
Cattle Truck - baby calves from dairies to calf ranches	T6 Ag	12,607	12,680	10	253,602	289	0.0	0.0	303
Cattle Truck - weaned heifer calves from calf ranches to dairies	T6 Ag	6,380	6,417	10	128,340	146	0.0	0.0	153
Cattle Truck - weaned bull calves from calf ranches to foothill pasture	T6 Ag	1,418	1,426	25	71,311	81	0.0	0.0	85
Cattle Truck - weaned bull calves from calf ranches to background feed	T7 Ag	1,588	1,597	50	159,721	289	0.0	0.0	303
Cattle Truck - other cattle trips from calf ranches	T7 Ag	1,418	1,426	20	57,049	103	0.0	0.0	108
Cattle Truck - beef cattle from foothill pasture to finishing feedlots	T6 Ag	4,721	4,748	75	712,256	812	0.0	0.1	851
Cattle Truck - dairies to beef processing facilities - gooseneck trailers	T6 Ag	17,008	17,107	20	684,265	780	0.0	0.1	817
Cattle Truck - dairies to beef processing facilities - semi tractor/trailers	T7 Ag	1,278	1,285	50	128,541	233	0.0	0.0	244
Total - Trucks		964,988	970,583		14,040,207	23,340	1.0	3.7	24,457
Dairy Employee trips	LDT1-2	1,349,040	1,156,904	10	23,138,080	9,015	0.6	0.5	9,176
Dairy Visitor trips (vet, breeder, sales, delivery)	LDT1-2	161,616	138,598	20	5,543,919	2,160	0.1	0.1	2,198
Total - Automobiles		1,510,656	1,295,502		28,681,999	11,175	0.8	0.6	11,374

Notes:

1. All trucks are assumed to be Medium-Heavy Duty Diesel Agriculture Trucks (T6; 14,000-33,000 lbs GVWR) and Heavy-Heavy Duty Diesel Agriculture Trucks (T7; 33,000-60,000 lbs GVWR). All employees and visitors are conservatively assumed to drive light-duty trucks (LDT1; 0-3,750 lbs and LDT2; 3,751-5,750 lbs).
2. Trips in 2018 were scaled from 2013 in proportion to the number of animal units for trucks and the number of facilities for automobiles.
3. Emissions include running, idle, and starting exhaust.

Table A.20**EMFAC 2017 Output**

EMFAC2017 (v1.0.2) Emissions Inventory

Region Type: County

Region: TULARE

Calendar Year: 2018

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1000 gallons/day for Fuel Consumption. Note 'day' in the unit is operation day.

Region	Calendar Year	Vehicle Category	Model Year	Speed	Fuel	Population	VMT	Trips	CO2_RUNEX	CO2_IDLEX	CO2_STREX	CO2_TOTEX	CH4_RUNEX
TULARE	2018	LDT1	Aggregated	Aggregated	GAS	19516.16	661456.55	84812.5547	256.846419	0	7.1030732	263.949492	0.0128499
TULARE	2018	LDT1	Aggregated	Aggregated	DSL	23.478797	466.587481	78.0097307	0.20367981	0	0	0.20367981	6.397E-06
TULARE	2018	LDT1	Aggregated	Aggregated	ELEC	6.5237901	243.376973	32.5618177	0	0	0	0	0
TULARE	2018	LDT2	Aggregated	Aggregated	GAS	61970.998	2301874.65	282492.402	985.386769	0	26.048203	1011.43497	0.0238754
TULARE	2018	LDT2	Aggregated	Aggregated	DSL	163.07795	7366.04818	777.851528	2.41202803	0	0	2.41202803	1.222E-05
TULARE	2018	LDT2	Aggregated	Aggregated	ELEC	119.51421	4352.04404	614.372816	0	0	0	0	0
TULARE	2018	T6 Ag	Aggregated	Aggregated	DSL	54.893586	680.956756	241.531778	0.81617477	0.0396285	0	0.85580327	2.861E-05
TULARE	2018	T7 Ag	Aggregated	Aggregated	DSL	59.796195	862.532848	263.10326	1.60736703	0.1131306	0	1.72049763	6.219E-05

Source: EMFAC2017 Web Database (v1.0.2). Available:

<https://arb.ca.gov/emfac/2017/>. Accessed 7/1/2020.

Only GHG emissions were included in the EMFAC output.

Table A.20**EMFAC 2017 Output**

EMFAC2017 (v1.0.2) Emissions Inventory

Region Type: County

Region: TULARE

Calendar Year: 2018

Season: Annual

Vehicle Classification: EMFAC2011 Categories

Units: miles/day for VMT, trips/day for Trips, tons/day for Emissions, 1

Region	Calendar Year	Vehicle Category	Model Year	Speed	CH4_IDLEX	CH4_STREX	CH4_TOTEX	N2O_RUNE X	N2O_IDLEX	N2O_STREX	N2O_TOTE X	Fuel Consumption
TULARE	2018	LDT1	Aggregated	Aggregated	0	0.0139318	0.0267817	0.0148745	0	0.0037898	0.0186643	27.8607142
TULARE	2018	LDT1	Aggregated	Aggregated	0	0	6.397E-06	3.202E-05	0	0	3.202E-05	0.018152562
TULARE	2018	LDT1	Aggregated	Aggregated	0	0	0	0	0	0	0	0
TULARE	2018	LDT2	Aggregated	Aggregated	0	0.0357381	0.0596135	0.0360189	0	0.0140929	0.0501118	106.7602006
TULARE	2018	LDT2	Aggregated	Aggregated	0	0	1.222E-05	0.0003791	0	0	0.0003791	0.214967248
TULARE	2018	LDT2	Aggregated	Aggregated	0	0	0	0	0	0	0	0
TULARE	2018	T6 Ag	Aggregated	Aggregated	1.73525E-06	0	3.034E-05	0.0001283	6.229E-06	0	0.0001345	0.076271781
TULARE	2018	T7 Ag	Aggregated	Aggregated	1.00093E-05	0	7.219E-05	0.0002527	1.778E-05	0	0.0002704	0.153335962

Source: EMFAC2017 Web Database (v1.0.2). Available:

<https://arb.ca.gov/emfac/2017/>. Accessed 7/1/2020.

Only GHG emissions were included in the EMFAC output.

Table A.21
Calculation of Vehicle GHG Emission Factors

Region	Calendar Year	Vehicle Category ⁽¹⁾	Model Year	Speed	Fuel	VMT (mi/day)	CO2_TOTEX (ton/day) ⁽²⁾	CH4_TOTEX (ton/day) ⁽²⁾	N2O_TOTEX (ton/day) ⁽²⁾	CO2 (g/mi)	CH4 (g/mi)	N2O (g/mi)
TULARE	2018	LDT1-2	Aggregated	Aggregated	Aggregated	2,975,759	1,278	0.086	0.069	390	0.026	0.021
TULARE	2018	T6 Ag	Aggregated	Aggregated	Aggregated	681	0.86	0.000030	0.00013	1,140	0.040	0.179
TULARE	2018	T7 Ag	Aggregated	Aggregated	Aggregated	863	1.72	0.000072	0.00027	1,810	0.076	0.284

Notes:

1. LDT1-2 = Light-Duty Trucks (LDT1; 0-3,750 lbs and LDT2; 3,751-5,750 lbs). T6 Ag = Medium-Heavy Duty Diesel Agriculture Trucks (14,000-33,000 lbs GVWR). T7 Ag = Heavy-Heavy Duty Diesel Agriculture Trucks (33,000-60,000 lbs GVWR).
2. Emission factors include running, idle, and starting exhaust. Source: EMFAC2017 Web Database (v1.0.2). Tulare County.

Table A.22
Emissions Associated with Dairy Electricity Use

2018 Population (Dairy Cows and Heifers)	Dairy Electricity Usage per Cow (MWh/cow/yr) ⁽¹⁾	2018 Electricity Usage (MWh/yr)	2018 Emission Factors (lb/MWh) ⁽²⁾			2018 Annual Emissions (metric ton/yr)			
			CO ₂	CH ₄	N ₂ O	CO ₂	CH ₄	N ₂ O	CO ₂ e
861,875	0.49	422,319	496.5	0.034	0.004	95,111	6.513	0.766	95,503

Notes:

1. Source: Tulare County RMA. *Draft EIR for the ACFP, and Dairy CAP*. January 2016. Appendix E.2.
2. Source: The Climate Registry. *2020 Default Emission Factor Document*. April 2020. Table 3.1. 2018 Emission Rates. eGRID CAMX Subregion.

Table A.23
GHG Emissions Associated with Dairy Refrigeration Equipment

2013 Total Refrigerant Charge (lb)	2018 Total Refrigerant Charge (lb) ⁽¹⁾	Refrigerant Type ⁽²⁾	Global Warming Potential ⁽³⁾	Annual Refrigerant Loss Rate ⁽⁴⁾	2018 Annual Emissions (metric ton/yr)	
					HFCs	CO ₂ e
48,072	50,346	HFC-23	14,800	25%	5.71	84,496

Notes:

1. The 2018 refrigerant charge was scaled from 2013 in proportion to the number of dairy cows.
2. HFC-23 was conservatively selected as a worst case refrigerant for industrial refrigeration in terms of its global warming potential.
3. GWP is from the IPCC fourth assessment report (AR4). GWP is consistent with the CARB California Greenhouse Gas Emission Inventory Program.
4. Source: The Climate Registry. *2020 Default Emission Factor Document*. April 2020. Table 4.1. Industrial Refrigeration.

Table A.24
California Herd Distribution Fractions by Manure Management System

Manure Management System	Herd Fraction	
	Dairy Cows	Dairy Heifers
Anaerobic Digester	1.19E-02	0.00E+00
Anaerobic Lagoon	5.82E-01	0.00E+00
Daily Spread	1.06E-01	1.08E-01
Deep Pit	1.04E-03	0.00E+00
Dry Lot	0.00E+00	8.74E-01
Liquid/Slurry	2.02E-01	8.74E-03
Pasture	6.71E-03	9.25E-03
Solid Storage	9.10E-02	0.00E+00
Total	1.00E+00	1.00E+00

Source: *California's 2000-2014 GHG Emissions Inventory. Technical Support Document. 2016 Edition*. Annex 3B. Manure Management (IPCC 3A2). The herd distribution fractions reflect 2013 conditions to preserve business-as-usual manure management practices for the 2018 BAU emission calculations. Nevertheless, the distribution fractions have not changed in the CARB GHG Emission Inventories through the most recent available year (2017).

Table A.25
Tulare County 2018 Dairy Cattle Herd Counts

Dairy Cows	Dairy Heifers
569,140	352,371

Note: 2018 year cattle populations were provided by Tulare County. Dairy Cows category includes milk cows and dry cows. Dairy Heifers category includes all heifers and calves.

Table A.26
CH₄ 2018 Business-As-Usual Emissions from Manure Management - Dairy Cows

	Tulare Reporting Year (2018) ^[a]			VS (kg VS/animal/yr) ^[e]	B _o (m ³ CH ₄ /kg VS) ^[f]	MCF (%) ^[g]	c ₁ (kg/m ³) ^[h]
	CH _{4,man} (kg/yr) ^[b]	V _{ex} (kg/yr) ^[c]	WMS*N _{animals} (animals) ^[d]				
Anaerobic Digester	557,486	19,385,917	6,785	2,857	0.24	0.181	0.662
Anaerobic Lagoon	109,883,828	946,122,067	331,159	2,857	0.24	0.731	0.662
Daily Spread	136,308	171,585,718	60,058	2,857	0.24	0.005	0.662
Deep Pit	86,421	1,684,014	589	2,857	0.24	0.323	0.662
Dry Lot	0	0	0	2,857	0.24	0.015	0.662
Liquid/Slurry	16,850,471	328,352,478	114,929	2,857	0.24	0.323	0.662
Pasture	26,011	10,914,397	3,820	2,857	0.24	0.015	0.662
Solid Storage	940,496	147,988,387	51,799	2,857	0.24	0.04	0.662
Total	128,481,021	--	569,140	--	--	--	--

Table A.27
CH₄ 2018 Business-As-Usual Emissions from Manure Management - Dairy Heifers

	Tulare Reporting Year (2018) ^[a]			VS (kg VS/animal/yr) ^[e]	B _o (m ³ CH ₄ /kg VS) ^[f]	MCF (%) ^[g]	c ₁ (kg/m ³) ^[h]
	CH _{4,man} (kg/yr) ^[b]	V _{ex} (kg/yr) ^[c]	WMS*N _{animals} (animals) ^[d]				
Anaerobic Digester	0	0	0	1,252	0.17	0.181	0.662
Anaerobic Lagoon	0	0	0	1,252	0.17	0.731	0.662
Daily Spread	26,815	47,654,890	38,063	1,252	0.17	0.005	0.662
Deep Pit	0	0	0	1,252	0.17	0.323	0.662
Dry Lot	650,890	385,575,666	307,968	1,252	0.17	0.015	0.662
Liquid/Slurry	140,164	3,855,910	3,080	1,252	0.17	0.323	0.662
Pasture	6,891	4,082,026	3,260	1,252	0.17	0.015	0.662
Solid Storage	0	0	0	1,252	0.17	0.04	0.662
Total	824,761	--	352,371	--	--	--	--

Notes:

^[a] 2018 BAU emission calculations used the 2018 herd population and the most recent available factors (2017) from the California GHG Inventory Query Tool.

^[b] CH_{4,man}: Methane emissions estimated using Equation 1 (see below).

$$\text{Equation 1} \quad CH_{4,man} = V_{ex} \times B_o \times MCF \times c_1$$

^[c] V_{ex}: Volatile solids excreted estimated using Equation 2 (see below).

$$\text{Equation 2} \quad V_{ex} = VS \times (WMS \times N_{animals})$$

^[d] WMS*N_{animals}: Number of animals per waste management system. Assumes Tulare has the same distribution of waste management systems as California.

^[e] VS: Volatile solids excreted per animal.

^[f] B_o: Maximum methane producing capacity.

^[g] MCF: Methane conversion factor.

^[h] c_1 : Conversion factor representing density of methane at 25C.

Abbreviations:

B_o - maximum methane producing capacity	CO_2e - carbon dioxide equivalent	MMT - million metric tonnes	yr - year
c_1 - density of methane at 25C	GWP - global warming potential	$N_{animals}$ - animal population	
CARB - California Air Resources Board	kg - kilogram	V_{ex} - amount of volatile solids excreted in each WMS	
CFR - Code of Federal Regulations	m^3 - cubic meters	VS - volatile solids production rate	
$CH_{4,man}$ - methane emissions from manure management	MCF - methane conversion factor	WMS - waste management system	

Table A.28
N₂O 2018 Business-As-Usual Emissions from Manure Management - Dairy Cows

	Tulare Reporting Year (2018) ^[a]							
	N ₂ O _{man} ^[b] (kg/yr)	WMS*N _{animals} ^[c] (animals)	N _{ex} ^[d] (g/yr)	Direct N as N ₂ O ^[e] (g N ₂ O-N/g)	Volatilization fraction ^[f] (fraction)	Indirect N as N ₂ O, volatilized ^[g] (g N ₂ O-N/g)	Runoff fraction ^[h] (fraction)	Indirect N as N ₂ O, runoff ^[i] (g N ₂ O-N/g)
Anaerobic Digester	7,374	6,785	158,656	0	0.43	0.01	0.008	0.0075
Anaerobic Lagoon	359,902	331,159	158,656	0	0.43	0.01	0.008	0.0075
Daily Spread	14,970	60,058	158,656	0	0.10	0.01	0	0.0075
Deep Pit	646	589	158,656	0.002	0.24	0.01	0	0.0075
Dry Lot	0	0	158,656	0.02	0.15	0.01	0.02	0.0075
Liquid/Slurry	219,442	114,929	158,656	0.005	0.26	0.01	0.008	0.0075
Pasture	0	3,820	158,656	0	0.00	0.01	0	0.0075
Solid Storage	99,419	51,799	158,656	0.005	0.27	0.01	0	0.0075
Total	701,753	569,140	--	--	--	--	--	--

Table A.29
N₂O 2018 Business-As-Usual Emissions from Manure Management - Dairy Heifers

	Tulare Reporting Year (2018) ^[a]							
	N ₂ O _{man} ^[b] (kg/yr)	WMS*N _{animals} ^[c] (animals)	N _{ex} ^[d] (g/yr)	Direct N as N ₂ O ^[e] (g N ₂ O-N/g)	Volatilization fraction ^[f] (fraction)	Indirect N as N ₂ O, volatilized ^[g] (g N ₂ O-N/g)	Runoff fraction ^[h] (fraction)	Indirect N as N ₂ O, runoff ^[i] (g N ₂ O-N/g)
Anaerobic Digester	0	0	68,911	0	0.43	0.01	0.008	0.0075
Anaerobic Lagoon	0	0	68,911	0	0.43	0.01	0.008	0.0075
Daily Spread	4,121	38,063	68,911	0	0.10	0.01	0	0.0075
Deep Pit	0	0	68,911	0.002	0.24	0.01	0	0.0075
Dry Lot	721,864	307,968	68,911	0.02	0.15	0.01	0.02	0.0075
Liquid/Slurry	2,554	3,080	68,911	0.005	0.26	0.01	0.008	0.0075
Pasture	0	3,260	68,911	0	0.00	0.01	0	0.0075
Solid Storage	0	0	68,911	0.005	0.27	0.01	0	0.0075
Total	728,539	352,371	--	--	--	--	--	--

Notes:

[a] 2018 BAU emission calculations used the 2018 herd population and the most recent available factors (2017) from the California GHG Inventory Query Tool.

[b] N₂O_{man}: Nitrous oxide emissions estimated using Equation 1 (see below).

$$\text{Equation 1} \quad N_2O = WMS * N_{animals} * N_{ex} * [D_{EF} + (V_{frac} * V_{EF}) + (R_{frac} * R_{EF})] * 1.5711 * X \text{ (g to kg)}$$

[c] WMS*N_{animals}: Number of animals per waste management system. Assumes Tulare has the same distribution of waste management systems as California.

[d] N_{ex}: Nitrogen excreted per animal.

[e] Direct N a N₂O: Emission factor representing direct nitrogen as N₂O-N for the particular waste management system.

[f] Volatilization fraction of N for the animal group.

^[g] Emission factor representing indirect nitrogen as N_2O -N for redeposited volatilized N.

^[h] Runoff fraction of N for the animal group.

^[i] Emission factor representing indirect nitrogen as N_2O -N for runoff N.

Abbreviations:

CARB - California Air Resources Board	GWP - global warming potential	N_2O - nitrous oxide	WMS - waste management system
CFR - Code of Federal Regulations	kg - kilogram	$N_{2O_{man}}$ - nitrous oxide emissions from manure management	
CO_2e - carbon dioxide equivalent	MMT - million metric tonnes	$N_{animals}$ - animal population	yr - year
g - gram	N - nitrogen	N_{ex} - nitrogen excreted per animal	

Table A.30
Dairy Cattle Herd Counts for Enteric Fermentation Calculation

Category	Dairy Cows	Dairy Heifers 0-12 mo	Dairy Heifers 12-24 mo	Dairy Calves
California (2017) ^[1]	1,731,338	216,808	510,080	886,202
Tulare County (2018) ^[2]	569,140	125,636	167,099	59,636

Notes:

1. California populations are from the CARB 2000-2017 GHG Inventory Query Tool, most recent year available (2017).
2. 2018 year cattle populations were provided by Tulare County. Dairy cows include cows in milk and dry cows.

Table A.31
Emissions from Enteric Fermentation - Dairies

Source	CH ₄ (MT/yr)				Total
	Dairy Cows	Dairy Heifers 0-12 mo	Dairy Heifers 12-24 mo	Dairy Calves	
California (2017) ^[1]	250,360	9,437	33,517	10,309	303,623
Tulare County (2018) ^[2]	82,301	5,469	10,980	694	99,443

Notes:

1. California CH₄ emissions are from the CARB 2000-2017 GHG Inventory Query Tool, most recent year available (2017).
2. CARB and EPA use the same methodology to estimate emissions from enteric fermentation. As such, this table assumes that Tulare emissions are proportional to the California emissions based on animal population.

Abbreviations:

CARB - California Air Resources Board

CH₄ - methane

CO₂e - carbon dioxide equivalents

kg - kilogram

mo - months old

MT - metric tonne

yr - year

Table A.32
CARB GHG Inventory - Enteric Fermentation
 GHG Emission Inventory Summary [2000 - 2017]
 Main Sector: Agriculture & Forestry
 Sub Sector Level 1: Enteric Fermentation
 Sub Sector Level 2: Cattle
 Inventory Accounting: Included
 Measurement: CO2Eq
 GWP: AR4
 Unit: tonnes

Inventory Accounting: Included	Main Sector	Sub Sector Level 1	Sub Sector Level 2	Sub Sector Level 3	Main Activity	Activity Subset	GHG	2011	2012	2013	2014	2015	2016	2017
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Beef calves	CH4	84,949.94	85,349.03	82,084.74	82,736.46	71,101.64	71,101.64	71,101.64
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Beef cows	CH4	1,479,400.47	1,503,261.77	1,455,539.17	1,431,677.88	1,407,816.58	1,431,677.88	1,562,915.01
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Beef replacements 0-12 months	CH4	40,393.81	42,092.10	41,851.80	40,697.58	40,697.58	40,697.58	40,697.58
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Beef replacements 12-24 months	CH4	109,171.74	114,036.45	113,621.36	108,799.75	108,799.75	108,799.75	108,799.75
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Bulls	CH4	172,708.91	172,708.91	172,708.91	172,708.91	172,708.91	172,708.91	172,708.91
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Dairy calves	CH4	260,459.21	267,381.79	267,106.10	265,780.64	259,591.51	258,153.76	257,732.26
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Dairy cows	CH4	6,630,218.15	6,563,822.59	6,398,370.80	6,454,459.21	6,304,156.71	6,269,241.23	6,259,005.22
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Dairy replacements 0-12 months	CH4	246,365.16	266,887.75	250,322.99	243,291.52	237,626.08	236,310.00	235,924.16
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Dairy replacements 12-24 months	CH4	877,507.00	965,933.41	897,716.68	864,081.32	843,959.79	839,285.54	837,915.21
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Heifer feedlot	CH4	164,115.00	170,444.21	166,251.99	178,404.53	178,404.53	178,404.53	178,404.53
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Heifer stockers	CH4	160,057.55	160,389.58	164,950.21	173,616.61	173,616.61	173,616.61	173,616.61
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Steer feedlot	CH4	289,863.04	300,710.12	299,269.07	333,701.66	286,774.87	286,774.87	286,774.87
Included	Agriculture & Forestry	Enteric Fermentation	Cattle	None	Livestock population	Steer stockers	CH4	400,193.45	416,319.75	419,760.57	445,002.49	382,424.02	382,424.02	382,424.02

California 2017 Enteric Fermentation Emissions				
Total	Dairy Cows	Dairy Heifers 0-12 mo	Dairy Heifers 12-24 mo	Dairy Calves
303,623	250,360	9,437	33,517	10,309
7,590,577	6,259,005	235,924	837,915	257,732

Dairy
 Total CH4 (tonnes):
 Total CO2e (tonnes):

Feedlot:
 Total CH4 (tonnes):
 Total CO2e (tonnes):

119,098
2,977,443

GWP:
 CH4

Table A.33
Feedlot Cattle Herd Counts for Enteric Fermentation and Manure Management Calculations

Category	Feedlot Cattle ^[1]
California (2017) ^[2]	1,913,552
Tulare County (2018) ^[3]	204,272

Notes:

1. California inventory: Reflects all cattle other than dairy cows, replacement dairy heifers (0-24 months), and dairy calves. Tulare inventory: Reflects all animals in feedlot facilities and mature bulls identified in dairies.
2. California populations are from the CARB 2000-2017 GHG Inventory Query Tool, 12th edition. Available at: <https://ww2.arb.ca.gov/ghg-inventory-data>. Accessed July 2020. Used most recent year available (2017).
3. 2018 year cattle populations were provided by Tulare County.

Table A.34
Emissions from Enteric Digestion and Manure Management - Feedlots

Source	Enteric Digestion	Manure Management	
	CH ₄ (MT/yr)	CH ₄ (MT/yr)	N ₂ O (MT/yr)
California (2017) ^[1]	119,098	5,191	994
Tulare County (2018) ^[2]	12,714	554	106

Notes:

1. California CH₄ and N₂O emissions are from the CARB 2000-2017 GHG Inventory Query Tool, most recent year available (2017).
2. CARB and EPA use the same methodology to estimate emissions from enteric fermentation and manure management. As such, this table assumes that Tulare emissions are proportional to the California emissions based on animal population.

Table A.35
CARB GHG Inventory - Manure Management
 GHG Emission Inventory Summary [2000 - 2017]
 Main Sector: Agriculture & Forestry
 Sub Sector Level 1: Manure Management
 Sub Sector Level 2: Cattle
 Inventory Accounting: Included
 Measurement: CO2Eq
 GWP: AR4
 Unit: million tonnes

Inventory Accounting: Included	Main Sector	Sub Sector Level 1	Sub Sector Level 2	Sub Sector Level 3	Main Activity	Activity Subset	GHG	2011	2012	2013	2014	2015	2016	2017
Included	Agriculture & Forestry	Manure Management	Cattle	Anaerobic digester	Livestock population	Dairy cows	CH4	0.0439334	0.0441243	0.04269463	0.04376396	0.0427448	0.0425081	0.0424387
Included	Agriculture & Forestry	Manure Management	Cattle	Anaerobic digester	Livestock population	Dairy cows	N2O	0.0069349	0.0069642	0.00675003	0.00689387	0.0067333	0.0066961	0.0066851
Included	Agriculture & Forestry	Manure Management	Cattle	Anaerobic lagoon	Livestock population	Dairy cows	CH4	8.6289664	8.9403626	8.41136353	8.62203551	8.4212575	8.3746165	8.360943
Included	Agriculture & Forestry	Manure Management	Cattle	Anaerobic lagoon	Livestock population	Dairy cows	N2O	0.3384578	0.339889	0.32943367	0.33645469	0.3286198	0.3267997	0.3262662
Included	Agriculture & Forestry	Manure Management	Cattle	Daily spread	Livestock population	Dairy cows	CH4	0.0107316	0.0107782	0.010429	0.01069021	0.0104413	0.0103834	0.0103665
Included	Agriculture & Forestry	Manure Management	Cattle	Daily spread	Livestock population	Dairy cows	N2O	0.0140783	0.0141379	0.01370296	0.013995	0.0136691	0.0135934	0.0135712
Included	Agriculture & Forestry	Manure Management	Cattle	Daily spread	Livestock population	Dairy heifers	N2O	0.0026488	0.0029098	0.00270924	0.00261239	0.0025516	0.0025374	0.0025333
Included	Agriculture & Forestry	Manure Management	Cattle	Daily spread	Livestock population	Dairy heifers	CH4	0.0014464	0.0015886	0.00147925	0.00142656	0.0013933	0.0013856	0.0013834
Included	Agriculture & Forestry	Manure Management	Cattle	Deep pit	Livestock population	Dairy cows	N2O	0.0006078	0.0006104	0.00059159	0.0006042	0.0005901	0.0005869	0.0005859
Included	Agriculture & Forestry	Manure Management	Cattle	Deep pit	Livestock population	Dairy cows	CH4	0.0061655	0.0068662	0.00661825	0.00678401	0.006626	0.0065893	0.0065786
Included	Agriculture & Forestry	Manure Management	Cattle	Dry lot	Livestock population	Dairy heifers	CH4	0.0351098	0.0385595	0.03590607	0.03462707	0.0338207	0.0336334	0.0335785
Included	Agriculture & Forestry	Manure Management	Cattle	Dry lot	Livestock population	Dairy heifers	N2O	0.4639949	0.5097071	0.47458228	0.4576158	0.4469595	0.444484	0.4437583
Included	Agriculture & Forestry	Manure Management	Cattle	Dry lot	Livestock population	Feedlot - heifers 500+ lb	CH4	0.0087483	0.0090768	0.00893258	0.00959378	0.0095938	0.0095938	0.0095938
Included	Agriculture & Forestry	Manure Management	Cattle	Dry lot	Livestock population	Feedlot - heifers 500+ lb	N2O	0.0895792	0.0935808	0.09261009	0.09944129	0.0994413	0.0994413	0.0994413
Included	Agriculture & Forestry	Manure Management	Cattle	Dry lot	Livestock population	Feedlot - steers 500+ lbs	CH4	0.0154071	0.0159727	0.01604187	0.01792339	0.0179234	0.0179234	0.0179234
Included	Agriculture & Forestry	Manure Management	Cattle	Dry lot	Livestock population	Feedlot - steers 500+ lbs	N2O	0.1662845	0.1735719	0.17531271	0.1959238	0.1959238	0.1959238	0.1959238
Included	Agriculture & Forestry	Manure Management	Cattle	Liquid/slurry	Livestock population	Dairy cows	N2O	0.206367	0.2072396	0.20086472	0.20514564	0.2003685	0.1992587	0.1989334
Included	Agriculture & Forestry	Manure Management	Cattle	Liquid/slurry	Livestock population	Dairy cows	CH4	1.202458	1.3391073	1.290752	1.32308032	1.2922703	1.285113	1.2830148
Included	Agriculture & Forestry	Manure Management	Cattle	Liquid/slurry	Livestock population	Dairy heifers	CH4	0.0068525	0.0083448	0.00774081	0.00746508	0.0072912	0.0072509	0.007239
Included	Agriculture & Forestry	Manure Management	Cattle	Liquid/slurry	Livestock population	Dairy heifers	N2O	0.0016417	0.0018034	0.00167911	0.00161909	0.0015814	0.0015726	0.0015701
Included	Agriculture & Forestry	Manure Management	Cattle	Liquid/slurry	Livestock population	Feedlot - heifers 500+ lb	CH4	0.0029083	0.0033312	0.0032095	0.00344707	0.0034471	0.0034471	0.0034471
Included	Agriculture & Forestry	Manure Management	Cattle	Liquid/slurry	Livestock population	Feedlot - heifers 500+ lb	N2O	0.0003918	0.0004092	0.00040498	0.00043487	0.0004349	0.0004349	0.0004349
Included	Agriculture & Forestry	Manure Management	Cattle	Liquid/slurry	Livestock population	Feedlot - steers 500+ lbs	CH4	0.0029083	0.0033312	0.0032095	0.00344707	0.0034471	0.0034471	0.0034471
Included	Agriculture & Forestry	Manure Management	Cattle	Liquid/slurry	Livestock population	Feedlot - steers 500+ lbs	N2O	0.0003918	0.0004092	0.00040498	0.00043487	0.0004349	0.0004349	0.0004349
Included	Agriculture & Forestry	Manure Management	Cattle	Pasture	Livestock population	Dairy cows	CH4	0.0020479	0.0020568	0.00199019	0.00204004	0.0019925	0.0019815	0.0019783
Included	Agriculture & Forestry	Manure Management	Cattle	Pasture	Livestock population	Dairy heifers	CH4	0.0003717	0.0004082	0.00038012	0.00036658	0.000358	0.0003561	0.0003555
Included	Agriculture & Forestry	Manure Management	Cattle	Pasture	Livestock population	Not on feed - beef cows	CH4	0.0494887	0.0502869	0.04869051	0.04789231	0.0470941	0.0478923	0.0478923
Included	Agriculture & Forestry	Manure Management	Cattle	Pasture	Livestock population	Not on feed - bulls 500+	CH4	0.0057774	0.0057774	0.00577744	0.00577744	0.0057774	0.0057774	0.0057774
Included	Agriculture & Forestry	Manure Management	Cattle	Pasture	Livestock population	Not on feed - calves <500	CH4	0.0170489	0.0173311	0.01714743	0.01711761	0.0171176	0.0171176	0.0171176
Included	Agriculture & Forestry	Manure Management	Cattle	Pasture	Livestock population	Not on feed - heifers 500	CH4	0.0098922	0.0101092	0.01024331	0.01032028	0.0103203	0.0103203	0.0103203
Included	Agriculture & Forestry	Manure Management	Cattle	Pasture	Livestock population	Not on feed - steers 500	CH4	0.0127809	0.0132932	0.01344585	0.01425295	0.014253	0.014253	0.014253
Included	Agriculture & Forestry	Manure Management	Cattle	Solid storage	Livestock population	Dairy cows	CH4	0.0740458	0.0743675	0.07195791	0.07376017	0.0720425	0.0716435	0.0715266
Included	Agriculture & Forestry	Manure Management	Cattle	Solid storage	Livestock population	Dairy cows	N2O	0.0934949	0.0938902	0.09100208	0.09294155	0.0907772	0.0902745	0.0901271

California 2017 Manure Management Emissions - Feedlot

GWP:			
CH4	25	Total CO2e from CH4:	129,772 tonnes
N2O	298	Total CO2e from N2O:	296,235 tonnes
		Total CH4:	5,191 tonnes
		Total N2O:	994 tonnes

Table A.36
Global Warming Potentials

CO ₂	CH ₄	N ₂ O	HFC-23
1	25	298	14,800

Note: Values are 100-yr GWPs from the IPCC fourth assessment report (AR4). GWPs are consistent with the CARB California Greenhouse Gas Emission Inventory Program. Available: <https://ww2.arb.ca.gov/our-work/programs/ghg-inventory-program>. Accessed June 30, 2020.

Appendix B – 2018 Emission Reduction Calculations

Appendix B - GHG Emission Reductions

- Table B.1 GHG Emission Reductions from a Hypothetical 1,000 kW Solar Panel Project in Tulare County
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Table B.1
GHG Emission Reductions from a Hypothetical 1,000 kW Solar Panel Project in Tulare County

Description	DC System Size (kW)	System Output (kWh/year) ⁽¹⁾	GHG Reduction Over 30-Year Lifetime (MT CO ₂ e) ⁽²⁾	GHG Reduction Over 5 Years (MT CO ₂ e) ⁽³⁾	GHG Reduction Over 1 Year (MT CO ₂ e) ⁽³⁾
Standard module, fixed array (open rack), 20 deg tilt, 180 deg azimuth	1,000	1,601,566	10,604	1,767	353

Notes:

1. Source: National Renewable Energy Laboratory (NREL) PVWatts Calculator, version 6.1.3. <https://pvwatts.nrel.gov>. Website accessed 6/2020.
2. Source: CARB, Low-Income Weatherization Program: Single-Family Energy Efficiency and Solar Photovoltaics Multi-Family Energy Efficiency and Renewables. January 1, 2019. Website: <https://ww2.arb.ca.gov/resources/documents/cci-quantification-benefits-and-reporting-materials>. Accessed: June, 2020.
3. GHG reductions over 5 and 1 years were scaled from the 30-year reductions.

Table B.2
GHG Emission Reductions from Solar Panel Projects at Tulare County Dairies

Facility Name ⁽¹⁾	Permit #	Permit Issue Date	Size (kW)	5-Year GHG Reduction (MT CO ₂ e) ⁽²⁾	Annual GHG Reduction (MT CO ₂ e) ⁽²⁾	CY 2018 GHG Reduction (MT CO ₂ e) ⁽³⁾	Installed in 2018 or prior?
Fern Oak Farms	A1301506	7/2/2013	922	1,630	326	326	yes
SBS Ag Dairy	A1402386	9/25/2014	962	1,701	340	0	no
Rancho Teresita Dairy	A1402852	11/19/2014	1,122	1,983	397	397	yes
DG Farms	A1403104	12/9/2014	1,109	1,960	392	392	yes
Four Star Fruit	A1403112	12/3/2014	1,269	2,242	448	448	yes
Ron Verhoeven Family Dairy	A1403278	1/26/2015	820	1,449	290	290	yes
Moonlight Dairy	A1500022	2/10/2015	1,109	1,960	392	392	yes
Terra Linda Dairy	A1500299	3/9/2015	830	1,467	293	293	yes
Pete Vander Poel Dairy	A1500778	4/2/2015	1,098	1,941	388	388	yes
Bar VP Dairy	A1500799	4/16/2015	1,098	1,941	388	388	yes
Legacy Ranch #2 Dairy	A1500954	4/21/2015	840	1,485	297	297	yes
Curtimade Dairy	A1501019	5/17/2016	412	728	146	0	no
Lemstra Dairy	A1501662	6/11/2015	840	1,485	297	297	yes
Robert Vander Eyk & Sons Dairy	A1503907	12/1/2015	1,107	1,957	391	391	yes
5 Star Dairy	A1503908	12/1/2015	1,110	1,962	392	392	yes
Dystra Dairy	A1504116	12/1/2015	1,046	1,849	370	370	yes
Parreira Gaspar Dairy	A1600266	3/9/2016	539	952	190	190	yes
S&S Dairy	A1600425	4/25/2016	1,100	1,944	389	389	yes
Vanderham West Dairy	A1600476	3/15/2016	1,105	1,953	391	391	yes
Riverbend Farms Dairy	A1600733	3/16/2016	1,107	1,957	391	391	yes
Arthur Leyendekker Dairy	A1600755	3/31/2016	544	961	192	192	yes
F&L Barcellos Dairy	A1601056	4/13/2016	573	1,013	203	203	yes
SBS AG	A1601142	5/10/2016	762	1,346	269	269	yes
Avenue 128 Dairy	A1601191	5/24/2016	600	1,060	212	0	no
Manuel C Leal Dairy	A1601333	5/10/2016	520	919	184	184	yes
Friesian Farms ^c	A1601590	6/15/2016	1,107	1,957	391	391	yes
JR Dairy ^c	A1601592	6/15/2016	1,107	1,957	391	391	yes
Felicita Dairy	A1601593	6/15/2016	1,109	1,960	392	392	yes
T]Bar Dairy	A1601861	7/8/2016	682	1,206	241	241	yes
Oakview Dairy	A1601996	8/3/2016	1,107	1,957	391	391	yes
Horizon Dairy]Tipton (Horizon Jerseys)	A1602130	7/20/2016	840	1,485	297	297	yes
GTA Dairy	A1602329	8/2/2016	696	1,230	246	0	no
KG Farms	A1602619	8/31/2016	254	449	90	90	yes
Four J Farms and Jerseys	A1602867	10/3/2016	962	1,700	340	340	yes
Cornerstone Dairy	A1603456	11/8/2016	1,116	1,972	394	394	yes
Mario Simoes Family Dairy	A1603927	12/29/2016	1,111	1,964	393	393	yes
Mendonca Dairy	A1603966	12/29/2016	480	848	170	0	no
Rob Van Grouw Dairy	A1603967	1/18/2017	1,107	1,957	391	391	yes
Aukeman Farms	A1603968	2/2/2017	1,107	1,957	391	391	yes
R&M Cattle	A1604445	2/2/2017	1,107	1,957	391	391	yes
Schott Dairy	A1604446	2/2/2017	1,107	1,957	391	391	yes

Table B.2
GHG Emission Reductions from Solar Panel Projects at Tulare County Dairies

Facility Name ⁽¹⁾	Permit #	Permit Issue Date	Size (kW)	5-Year GHG Reduction (MT CO ₂ e) ⁽²⁾	Annual GHG Reduction (MT CO ₂ e) ⁽²⁾	CY 2018 GHG Reduction (MT CO ₂ e) ⁽³⁾	Installed in 2018 or prior?
Junio Dairy	A1604447	2/2/2017	306	540	108	0	no
Airoso Dairy	A1700087	2/2/2017	1,111	1,964	393	393	yes
Skyline Dairy	A1700088	2/2/2017	803	1,418	284	284	yes
Decade Dairy LLC	A1700354	2/22/2017	928	1,640	328	328	yes
Sierra Cattle Company	A1700593	3/7/2017	1,101	1,946	389	389	yes
Heritage Dairy	A1700739	4/5/2017	737	1,303	261	261	yes
Boertje & Sons Dairy	A1700740	4/10/2017	556	982	196	196	yes
Jer]Z Boyz Ranch	A1700741	4/10/2017	1,107	1,957	391	391	yes
Vander Tuig Dairy	A1700780	4/5/2017	670	1,184	237	237	yes
Joe Simoes Family Dairy	A1700781	4/5/2017	522	923	185	185	yes
John Mendonca & Son Dairy	A1700782	4/5/2017	365	645	129	129	yes
Willem De Boer Dairy	A1700783	4/5/2017	1,101	1,946	389	389	yes
Scheenstra Dairy	A1700857	4/5/2017	928	1,641	328	328	yes
Tom Dejong Dairy	A1700859	4/5/2017	1,111	1,964	393	393	yes
John Scheenstra Dairy	A1701020	4/5/2017	180	317	63	63	yes
Riverbend Dairy	A1701277	5/10/2017	678	1,198	240	240	yes
Edwin Brasil Dairy	A1702384	Ready To Issue	679	1,201	240	0	no
Rijlaarsdam Dairy	A1701785	7/3/2017	1,330	2,351	470	0	no
Rijlaarsdam Dairy	A1701786	7/3/2017	653	1,154	231	231	yes
Richard Westra Dairy	A1702954	10/24/2017	1,107	1,956	391	391	yes
Vander Eyk Dairy	A1800879	4/12/2018	1,107	1,957	391	283	yes
Nunes & Sons Dairy	A1801196	6/14/2018	790	1,396	279	154	yes
Will De Groot	A1801463		376	665	133	133	yes
Will De Groot	A1801464		376	665	133	133	yes
Bosman Dairy	A1801627	7/10/2018	662	1,169	234	0	no
Jongsma Dairy	A1802264	7/10/2018	582	1,029	206	99	yes
Milk Maid Dairy	A2000293		1,084	1,916	383	0	no
D & V Dairy	A2000454		1,085	1,918	384	0	no
Total 2018 Operational Solar Projects	58	--	51,281	90,634	18,127	17,786	--
Total All Projects	69	--	59,576	105,295	21,059	17,786	--

Notes:

- Source for project list: Tulare County Resource Management Agency. *Dairy Solar List Updated 5-21-2020.xlsx*. Email from Jason Garcia-LoBue, MPA, Chief Planner. May 21, 2020.
- GHG reductions were estimated using CARB's Benefits Calculator Tool for the Low-Income Weatherization Program: Single-Family Energy Efficiency and Solar Photovoltaics Multi-Family Energy Efficiency and Renewables.
- The calendar year 2018 emission reductions for Projects with permits issued in 2018 were prorated by the number of days remaining in 2018.

Table B.3
GHG Emission Reductions from Solar Thermal Hot Water Systems at Tulare County Dairies

Facility Name ^a	Permit #	Size (MBtu)	5-Year GHG Reduction (MT CO ₂ e) ^b	Annual GHG Reduction (MT CO ₂ e) ^b	CY 2018 GHG Reduction (MT CO ₂ e) ^b	Installed in 2018 or prior?
Nunes and Sons Dairy	A1702065	1,005	3.4	0.68	0.68	yes
Souza Dairy	A1702083	1,005	3.4	0.68	0.68	yes
Aveline Partners Dairy	A1702084	1,005	3.4	0.68	0.68	yes
Total 2018 Operational Projects	3	3,015	10.2	2.0	2.0	--

Notes:

1. Source for project list: Tulare County Resource Management Agency. *Dairy Solar List Updated 5-21-2020.xlsx*. Email from Jason Garcia-LoBue, MPA, Chief Planner. May 21, 2020.
2. An average annual GHG reduction rate of 0.68 MT CO₂e/year per residential system was obtained from California Solar Initiative (CSI)-Thermal Program Data. CSI-Thermal Program Data.xlsx. Website: <http://www.csithermalstats.org/download.html>. Accessed June 8, 2020.

Table B.4
GHG Emission Reductions from Digester Projects at Tulare County Dairies

Facility Name ⁽¹⁾	Facility ID Number	Project Title	Location	Start of Full Operation	10-Year GHG Reduction (MT CO ₂ e) ⁽²⁾	5-Year GHG Reduction (MT CO ₂ e) ⁽³⁾	Annual GHG Reduction (MT CO ₂ e) ⁽³⁾	CY 2018 GHG Reduction (MT CO ₂ e) ⁽⁴⁾
2018 Operation								
GJ TeVelde Ranch	246	GJ Te Velde Tipton Dairy Digester	Tipton	6/5/2017	189,080	94,540	18,908	18,908
Circle A Dairy	358	Circle A Dairy Digester Fuel Pipeline Project	Pixley	8/30/2018	138,745	69,373	13,875	4,714
R Vander Eyk Dairy	265A	R Vander Eyk Dairy Digester Fuel Pipeline Project	Pixley	12/17/2018	132,586	66,293	13,259	545
Legacy Dairy	241	Legacy Dairy Digester Fuel Pipeline	Pixley	12/3/2018	207,209	103,605	20,721	1,646
2019 New Projects								
Van Beek	256	Van Beek Brothers Dairy Digester	Tipton	1/7/2019	106,240	53,120	10,624	0
Cornerstone Dairy	313	Cornerstone Dairy Digester Pipeline Project	Tipton	4/17/2019	185,238	92,619	18,524	0
Sousa & Sousa Dairy	236	Sousa & Sousa Dairy Digester Pipeline Project	Tipton	7/17/2019	68,700	34,350	6,870	0
Vander Poel Dairy	330	Vander Poel Dairy Digester Pipeline Project	Pixley	8/6/2019	290,060	145,030	29,006	0
Hilarides	346	Hilarides Dairy Digester Renovation	Lindsay	8/30/2019	564,000	282,000	56,400	0
K&M Visser Dairy	326	K&M Visser Dairy Digester Fuel Pipeline Project	Pixley	9/3/2019	203,416	101,708	20,342	0
Riverview Dairy	328	Riverview Dairy Digester Pipeline Project	Pixley	10/3/2019	90,093	45,047	9,009	0
Little Rock Dairy; Blue Moon Dairy	40	Little Rock Centralized Dairy Digester Pipeline Project	Tipton	12/13/2019	146,839	73,420	14,684	0
2020+ Projected New Projects								
S&S Dairy Biogas	226	S&S Dairy Biogas	Visalia	TBD	167,417	83,709	16,742	0
Pixley Dairy		Pixley Dairy Digester Fuel Pipeline Project	Pixley	TBD	212,622	106,311	21,262	0
Moonlight Dairy Biogas	298	Moonlight Dairy Biogas	Visalia	TBD	154,834	77,417	15,483	0
Bos Farms Dairy Biogas	33	Bos Farms Dairy Biogas	Tulare	TBD	168,398	84,199	16,840	0
Hamstra Dairy Biogas	118	Hamstra Dairy Biogas	Tulare	TBD	205,115	102,558	20,512	0
Rancho Teresita Dairy Biogas	139	Rancho Teresita Dairy Biogas	Tulare	TBD	236,251	118,126	23,625	0
4K Dairy	218	4K Dairy Digester Pipeline Project	Pixley	TBD	192,143	96,072	19,214	0
Aukeman Farms Dairy Biogas	61	Aukeman Dairy Biogas	Tulare	TBD	207,701	103,851	20,770	0
Decade Energy LLC	359	Decade Centralized Dairy Digester Pipeline Project	Tulare	TBD	192,558	96,279	19,256	0
Double J Dairy Biogas	245	Double J Dairy Biogas	Visalia	TBD	285,496	142,748	28,550	0
Dykstra Dairy Biogas	323	Dykstra Dairy Biogas	Tulare	TBD	265,936	132,968	26,594	0
The El Monte Dairy Biogas	255	El Monte Dairy Biogas	Tipton	TBD	118,903	59,452	11,890	0
FM Jersey Biogas LLC	185	FM Jerseys Dairy Digester Virtual Pipeline Project	Tipton	TBD	161,960	80,980	16,196	0
Horizon Jersey Dairy Biogas	336	Horizon Jersey Dairy Biogas	Tipton	TBD	335,398	167,699	33,540	0
Jacobus De Groot #2 Dairy	63	Jacobus De Groot #2 Dairy Biogas	Visalia	TBD	61,616	30,808	6,162	0
Mellema Dairy Biogas	177	Mellema Dairy Biogas	Visalia	TBD	152,057	76,029	15,206	0
Milky Way Dairy Biogas	67	Milky Way Dairy Biogas	Visalia	TBD	347,462	173,731	34,746	0
Mineral King Dairy Biogas	364	Mineral King Dairy Biogas	Visalia	TBD	194,751	97,376	19,475	0
Rancho Sierra Vista Dairy Biogas	108	Rancho Sierra Vista Dairy Biogas	Visalia	TBD	172,958	86,479	17,296	0
Riverbend Dairy Biogas	189	Riverbend Dairy Biogas	Tulare	TBD	245,930	122,965	24,593	0
Rob Van Grouw Dairy Biogas	261	Rob Van Grouw Dairy Biogas	Visalia	TBD	140,442	70,221	14,044	0
Udder Dairy Biogas	19	Udder Dairy Biogas	Visalia	TBD	135,701	67,851	13,570	0
Scheenstra Dairy	300	Scheenstra Dairy Biogas	Tulare	TBD	220,360	110,180	22,036	0
Clearlake Dairy	151	Clearlake Dairy Digester Pipeline Project	Tulare	TBD	95,510	47,755	9,551	0
JR Dairy	TBD	JR Dairy Digester Pipeline	Tulare	TBD	168,134	84,067	16,813	0
Fern Oaks Dairy	346	Fern Oaks Dairy Digester Pipeline Project	Tulare	TBD	169,370	84,685	16,937	0

Table B.4
GHG Emission Reductions from Digester Projects at Tulare County Dairies

Facility Name ⁽¹⁾	Facility ID Number	Project Title	Location	Start of Full Operation	10-Year GHG Reduction (MT CO ₂ e) ⁽²⁾	5-Year GHG Reduction (MT CO ₂ e) ⁽³⁾	Annual GHG Reduction (MT CO ₂ e) ⁽³⁾	CY 2018 GHG Reduction (MT CO ₂ e) ⁽⁴⁾
Mario Simoes Family Dairy; Joe M Simoes Family Dairy	TBD	Simoes Centralized Digester Pipeline Project	Tipton	TBD	161,275	80,638	16,128	0
Schott Dairy	342	Schott Dairy Digester Pipeline Project	Tulare	TBD	129,082	64,541	12,908	0
Hettinga Dairy Farm; Avenue 128 Dairy	122	Hettinga Centralized Dairy Digester Pipeline Project	Tulare	TBD	167,339	83,670	16,734	0
Northstar Dairy	299	Northstar Dairy Digester Pipeline Project	Tulare	TBD	170,658	85,329	17,066	0
Gerben Leyendekker Dairy	11	Gerben Leyendekker Dairy Biogas	Visalia	TBD	85,419	42,710	8,542	0
Friesian Farms Dairy	101	Friesian Farms Dairy Biogas	Tulare	TBD	63,145	31,573	6,315	0
Ribeiro Dairy	215	Ribeiro Dairy Biogas	Tulare	TBD	132,348	66,174	13,235	0
GP Dairy		GP Dairy Biogas	Tulare	TBD	50,722	25,361	5,072	0
Rio Blanco Dairy	289	Rio Blanco Dairy Biogas	Tulare	TBD	100,886	50,443	10,089	0
Curtimade Dairy	56	Curtimade Dairy Biogas	Tulare	TBD	174,734	87,367	17,473	0
Elk Creek Dairy	50	Elk Creek Dairy Biogas	Tulare	TBD	59,555	29,778	5,956	0
Rib-Arrow Dairy	213	Rib-Arrow Dairy Biogas	Tulare	TBD	76,343	38,172	7,634	0
Art Leyendekker Dairy	76	Art Leyendekker Dairy Biogas	Tulare	TBD	77,697	38,849	7,770	0
Elkhorn Dairy	324	Elkhorn Dairy Biogas	Tulare	TBD	211,940	105,970	21,194	0
Dairyland Farms Dairy	352	Dairyland Farms Dairy Biogas	Tulare	TBD	177,475	88,738	17,748	0
De Boer Dairy	60	De Boer Dairy Digester Pipeline Project	Tulare	TBD	191,647	95,824	19,165	0
Total 2018 Operational Digester Projects	--	--	4	--	667,620	333,810	66,762	25,813
Total 2019 New Digester Projects	--	--	8	--	1,654,586	827,293	165,459	--
Total 2020+ Projected New Digester Projects	--	--	42	--	7,039,288	3,519,644	703,929	--
Total All Projects	--	--	54	--	9,361,494	4,680,747	936,149	25,813

Notes:

1. Source for project lists: California Department of Food and Agriculture. Dairy Digester Research and Development Program. Projects Selected for Award of Funds. Online: <https://www.cdffa.ca.gov/oefi/ddrdp/>. Accessed: April 8, 2020.
2. The 10-year GHG reductions were estimated by the recipient.
3. 5-Year and annual GHG reductions were scaled from the 10-year reductions by the number of years.
4. The calendar year 2018 emission reductions for Projects that started full operation in 2018 were prorated by the number of days remaining in 2018.

Table B.5
GHG Emission Reductions from Alternative Manure Management Projects at Tulare County Dairies

Facility Name ⁽¹⁾	Project Title	Start of Full Operation	5-Year GHG Reduction (MT CO ₂ e) ⁽²⁾	Annual GHG Reduction (MT CO ₂ e) ⁽³⁾	CY 2018 GHG Reduction (MT CO ₂ e) ⁽⁴⁾
2018 Operation					
Sierra View Dairy	Sierra View Dairy AMMP Grant (pasture based management; conversion from flush to scrape; solar drying)	1/1/2018	35,050	7,010	7,010
2019 New Projects					
Milk River	Milk River GHG Reduction Project (conversion from flush to scrape; solar drying)	4/1/2019	16,012	3,202	0
SBS AG	Solid Separation (conversion from settling ponds to processing pit and separating system)	5/1/2019	7,887	1,577	0
Total 2018 Operational AMMP Projects		--	35,050	7,010	7,010
Total 2019 New AMMP Projects		--	23,899	4,780	--
Total All Projects		--	58,949	11,790	7,010

Notes:

1. Source for project lists: California Department of Food and Agriculture. 2017 and 2018 Alternative Manure Management Program: Projects Selected for Award. Online: <https://www.cdfa.ca.gov/oefi/AMMP/>. March 27, 2018 (2017 list) and September 5, 2018 (2018 list).
2. The 5-year GHG reductions were estimated by the recipient.
3. Annual GHG reductions were assumed to be 1/5 of the 5-year reductions.
4. The calendar year 2018 emission reductions for Projects that started full operation in 2018 were prorated by the number of days remaining in 2018.

Exhibit "B"

ALTERNATIVE MANURE MANAGEMENT PROGRAM FOR TULARE COUNTY

Dairy Facility ID Number	Year Awarded Grant	Project Title	Project Description	Total Cost	CDFA Funding	Matching Funds	Construction Status	Location	GHG Reduction (5 years) (in MTCO _{2e})
64	2017	Sierra View Dairy AMMP Grant	Remodel Existing Dairy, with both Open Lot corrals and Covered milk cow Feed Lanes flushed facility to a bed-pack compost barn (pasture based management) and collect manure from feed lanes through scraping with mobile equipment with scraper (conversion of flush to scrape). All scraped material will be dried utilizing open solar drying.	\$ 1,627,520.00	\$ 750,000.00	\$ 877,520.00	Construction Complete	13376 Avenue 224, Tulare County	35,050
25	2017	Milk River GHG Reduction Project	Reducing greenhouse gas emissions by 72% by introducing a vacuum scraping system into our previously flushed lanes to collect lactating cow manure. This scraped product will be run through screw presses to reduce the moisture content. This manure will then be solar dried for future use as bedding or field nutrient/amendments. This process will prevent the manure from entering the anaerobic conditions present in the manure lagoons.	\$ 395,358.00	\$ 395,358.00	\$ -	Began operating in April of 2019	34292 Road 124, Tulare County	16,012
104	2018	Henry A. Garcia Dairy	Converting flush lanes to a vacuum scrape system utilizing a Loewen Honey Vac. Collected manure will be deposited in a newly constructed concrete bunker, processed through a de-watering screw press and then receiving a second treatment through the existing sloped screen separator. Separated solids will then be spread on a concrete solar drying pad for final drying and stock piled and covered to prevent re-watering. By reducing the organic matter entering the lagoon system we will reduce our greenhouse gas emissions by 79% annually. The total estimated mtCO _{2e} reduction over a 5 year period is 25,720 and reductions should continue to accumulate after.	\$ 503,501.00	\$ 503,501.00	\$ -	Not Yet Applied to County	12521 Avenue 200, Tulare, Tulare County	25,720
58	2018	SBS AG	Change of Waste Water Handling and Solid Collection Management for the reduction of GHG produced. Converting from Settling Ponds to Processing pit and Separating System to capture volatile solids before the lagoons.	\$ 786,308.00	\$ 385,404.00	\$ 400,904.00	Began operating in May of 2019	7123 Avenue 204, Tulare County	7,887
	2019	Creekside Dairy	Solid Separation	\$ 611,642.00	\$ 611,642.00	\$ -		Tulare County	9,150
194	2019	Rainimaid	Compost Bedded Pack Barn	\$ 1,188,883.00	\$ 749,820.00	\$ 439,063.00	Applications to County and Construction to begin Q3 2020	33640 Road 124, Tulare County	8,930
20	2019	Jesse & James Jongsma Dairy	Solid Separation	\$ 816,117.00	\$ 750,000.00	\$ 66,117.00	Not Yet Applied to County	6780 Avenue 144, Tulare County	7,193
144	2019	Westwood Farms	Compost Bedded Pack Barn	\$ 1,058,201.00	\$ 749,698.00	\$ 308,503.00		Tulare County	20,422

133	2019	James Jongsma Dairy	Solid Separation	\$ 727,508.00	\$ 727,508.00	\$ -	Not Yet Applied to County	9229 Road 164, Tulare County	2,719
28	2019	A&L Dairy	Solid Separation	\$ 420,189.00	\$ 420,189.00	\$ -	Will began operating in October1 of 2020	23929 Road 48, Tulare County	2,620
				\$ 8,135,227.00	\$ 6,043,120.00	\$ 2,092,107.00			135,703

Exhibit "C"

UPDATED 2019 DIGESTER PROJECT LIST FOR TULARE COUNTY

Dairy No.	Operation Name	Project Title	Total Cost	CDFA Funding	Matching Funds	Construction Status	Location	GHG Reduction (10 years) (in MTCO ₂ e)	How Captured Methane is Used	Reported Problems	Year of Application	Developer or Vendor for Project Implementation and/or Operation
60	De Boer Dairy	De Boer Dairy Digester Pipeline Project	\$ 3,650,523.00	\$ 1,825,261.00	\$ 1,825,262.00	Not yet applied to Tulare County	14799 and 14976 Avenue 168 ,Tulare County	191,647	RNG generation and pipeline injection for vehicle fuel use	None	2019	Maas Energy Works
352	Dairyland Farms Dairy	Dairyland Farms Dairy Biogas	\$ 4,900,813.00	\$ 1,760,347.00	\$ 3,140,466.00	Under Construction	15920 Road 152, Tulare County	177,475	RNG generation and pipeline injection for vehicle fuel use	None	2019	California Bioenergy
324	Elkhorn Dairy	Elkhorn Dairy Biogas	\$ 6,645,917.00	\$ 2,125,882.00	\$ 4,520,035.00	Under Construction	10400 Avenue 368, Tulare County	211,940	RNG generation and pipeline injection for vehicle fuel use	None	2019	California Bioenergy
76	Art Leyendekker Dairy	Art Leyendekker Dairy Biogas	\$ 3,685,068.00	\$ 769,784.00	\$ 2,915,284.00	Under Construction	8651 Avenue 388, Dinuba, Tulare County	77,697	RNG generation and pipeline injection for vehicle fuel use	None	2019	California Bioenergy
213	Rib-Arrow Dairy	Rib-Arrow Dairy Biogas	\$ 4,175,150.00	\$ 657,231.00	\$ 3,517,919.00	Under Construction	18287 Road 136, Tulare County	76,343	RNG generation and pipeline injection for vehicle fuel use	None	2019	California Bioenergy
50	Elk Creek Dairy	Elk Creek Dairy Biogas	\$ 4,109,208.00	\$ 512,706.00	\$ 3,596,502.00	Under Construction	17993 Road 96, Tulare County	59,555	RNG generation and pipeline injection for vehicle fuel use	None	2019	California Bioenergy
56	Curtimade Dairy	Curtimade Dairy Biogas	\$ 4,773,194.00	\$ 1,747,336.00	\$ 3,025,858.00	Under Construction	18337 Road 24, Tulare County	174,734	RNG generation and pipeline injection for vehicle fuel use	None	2019	California Bioenergy
289	Rio Blanco Dairy	Rio Blanco Dairy Biogas	\$ 3,558,815.00	\$ 1,002,797.00	\$ 2,556,018.00	Under Construction	5041 Avenue 192, Tulare County	100,886	RNG generation and pipeline injection for vehicle fuel use	None	2019	California Bioenergy
	GP Dairy	GP Dairy Biogas	\$ 3,418,177.00	\$ 502,554.00	\$ 2,915,623.00	Under Construction	Tulare County	50,722	RNG generation and pipeline injection for vehicle fuel use	None	2019	California Bioenergy
215	Ribeiro Dairy	Ribeiro Dairy Biogas	\$ 3,814,042.00	\$ 1,124,962.00	\$ 2,689,080.00	Under Construction	17983 Road 128, Tulare, Tulare County	132,348	RNG generation and pipeline injection for vehicle fuel use	None	2019	California Bioenergy

101	Friesian Farms Dairy	Friesian Farms Dairy Biogas	\$ 3,814,785.00	\$ 639,602.00	\$ 3,175,183.00	Under Construction	5593 Avenue 176, Tulare, Tulare County	63,145	RNG generation and pipeline injection for vehicle fuel use	None	2019	California Bioenergy
11	Gerben Leyendekker Dairy	Gerben Leyendekker Dairy Biogas	\$ 3,748,357.00	\$ 845,589.00	\$ 2,902,768.00	Under Construction	8517 Avenue 360, Visalia, Tulare County	85,419	RNG generation and pipeline injection for vehicle fuel use	None	2019	California Bioenergy
299	Northstar Dairy	Northstar Dairy Digester Pipeline Project	\$ 3,152,876.00	\$ 1,576,438.00	\$ 1,576,438.00	Under Construction - Approved by County in 2020	12718 Road 144, Tulare County	170,658	RNG generation and pipeline injection for vehicle fuel use	None	2019	Maas Energy Works
121 and/or 122	Hettinga Dairy Farm; Avenue 128 Dairy	Hettinga Centralized Dairy Digester Pipeline Project	\$ 4,705,818.00	\$ 2,352,909.00	\$ 2,352,909.00	Under Construction	13002 Avenue 128 and/or 13400 Avenue 120, Tipton, Tulare County	167,339	RNG generation and pipeline injection for vehicle fuel use	None	2019	Maas Energy Works
342	Schott Dairy	Schott Dairy Digester Pipeline Project	\$ 2,889,184.00	\$ 1,444,592.00	\$ 1,444,592.00	Applied to County in 2020	13602 Road 96, Tulare County	129,082	RNG generation and pipeline injection for vehicle fuel use	None	2019	Maas Energy Works
43, 90, 97, 231, 232, 233, and/or 234	Mario Simoes Family Dairy; Joe M Simoes Family Dairy	Simoes Centralized Digester Pipeline Project	\$ 4,072,920.00	\$ 2,036,460.00	\$ 2,036,460.00	Applied to County in 2020	13185 Avenue 136, Tipton, and 13585 Road 136, Tipton, Tulare County	161,275	RNG generation and pipeline injection for vehicle fuel use	None	2019	Maas Energy Works
346	Fern Oaks Dairy	Fern Oaks Dairy Digester Pipeline Project	\$ 3,377,788.00	\$ 1,688,894.00	\$ 1,688,894.00	Not yet applied to Tulare County	24163 Road 188, Tulare County	169,370	RNG generation and pipeline injection for vehicle fuel use	None	2019	Maas Energy Works
207 and/or 249?	JR Dairy	JR Dairy Digester Pipeline	\$ 3,506,370.00	\$ 1,753,185.00	\$ 1,753,185.00	Approved by Tulare County in 2019	13806 Avenue 152 Tipton and/or 3800 Avenue 176 Tulare, Tulare County	168,134	RNG generation and pipeline injection for vehicle fuel use	None	2019	Maas Energy Works
151	Clearlake Dairy	Clearlake Dairy Digester Pipeline Project	\$ 2,789,296.00	\$ 1,394,648.00	\$ 1,394,648.00	Not yet applied to Tulare County	24643 Road 36, Tulare County	95,510	RNG generation and pipeline injection for vehicle fuel use	None	2019	Maas Energy Works
330	Vander Poel Dairy	Vander Poel Dairy Digester Pipeline Project	\$ 3,944,970.00	\$ 1,972,485.00	\$ 1,972,485.00	Operational	19493 Road 140, Pixley, Tulare County	290,060	RNG generation and pipeline injection for vehicle fuel use	None	2018	Maas Energy Works

19	Udder Dairy	Udder Dairy Biogas	\$ 3,202,804.00	\$ 1,153,459.00	\$ 2,049,345.00	Applications to County and Construction to begin Q2 2020	28723 Road 56, Visalia, Tulare County	135,701	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
236	Sousa & Sousa Dairy	Sousa & Sousa Dairy Digester Pipeline Project	\$ 1,773,860.00	\$ 886,934.00	\$ 886,926.00	Operational	13510 Road 72, Tipton, Tulare County	68,700	RNG generation and pipeline injection for vehicle fuel use	None	2018	Maas Energy Works
300	Scheenstra Dairy	Scheenstra Dairy Biogas	\$ 5,469,911.00	\$ 1,873,064.00	\$ 3,596,847.00	Applications to County and Construction to begin Q2 2020	16900 Road 96, Tulare, Tulare County	220,360	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
261	Rob Van Grouw Dairy	Rob Van Grouw Dairy Biogas	\$ 4,945,654.00	\$ 1,193,757.00	\$ 3,751,897.00	Applications to County and Construction to begin Q2 2020	32843 Road 76, Visalia, Tulare County	140,442	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
328	Riverview Dairy	Riverview Dairy Digester Pipeline Project	\$ 2,664,140.00	\$ 1,332,070.00	\$ 1,332,070.00	Operational	9599 Avenue 88, Pixley, Tulare County	90,093	RNG generation and pipeline injection for vehicle fuel use	None	2018	Maas Energy Works
189	Riverbend Dairy	Riverbend Dairy Biogas	\$ 4,822,385.00	\$ 2,090,404.00	\$ 2,731,981.00	Applications to County and Construction to begin Q2 2020	20799 Road 132, Tulare, Tulare County	245,930	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
108	Rancho Sierra Vista Dairy	Rancho Sierra Vista Dairy Biogas	\$ 4,944,161.00	\$ 1,470,143.00	\$ 3,474,018.00	Applications to County and Construction to begin Q2 2020	32866 Road 108, Visalia, Tulare County	172,958	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
364	Mineral King Dairy	Mineral King Dairy Biogas	\$ 5,071,416.00	\$ 1,655,384.00	\$ 3,416,032.00	Applications to County and Construction to begin Q2 2020	33803 Road 108, Visalia, Tulare County	194,751	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
67	Milky Way Dairy	Milky Way Dairy Biogas	\$ 7,198,161.00	\$ 2,953,427.00	\$ 4,244,734.00	Applications to County and Construction to begin Q3 2020	34800 Road 80, Visalia, Tulare County	347,462	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
177	Mellema Dairy	Mellema Dairy Biogas	\$ 5,213,701.00	\$ 1,292,485.00	\$ 3,921,216.00	Applications to County and Construction to begin Q2 2020	9420 Avenue 320, Visalia, Tulare County	152,057	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
40	Little Rock Dairy; Blue Moon Dairy	Little Rock Centralized Dairy Digester Pipeline Project	\$ 4,193,156.00	\$ 2,096,578.00	\$ 2,096,578.00	Operational	13955 Road 80, Tipton, Tulare County	146,839	RNG generation and pipeline injection for vehicle fuel use	None	2018	Maas Energy Works

63	Jacobus De Groot #2 Dairy	Jacobus De Groot #2 Dairy Biogas	\$ 3,381,424.00	\$ 523,736.00	\$ 2,857,688.00	Applications to County and Construction to begin Q2 2020	8827 Avenue 312, Visalia, Tulare County	61,616	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
336	Horizon Jerseys Dairy	Horizon Jerseys Dairy Biogas	\$ 6,985,835.00	\$ 2,850,886.00	\$ 4,134,949.00	Applications to County and Construction to begin Q2 2020	8798 Avenue 160, Tipton, Tulare County	335,398	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
185	FM Jersey Dairy	FM Jersey Dairy Digester Vitural Pipeline Project	\$ 4,021,494.00	\$ 2,010,747.00	\$ 2,010,747.00	Under Construction	11595 Avenue 164, Tipton, Tulare County	161,960	RNG generation and pipeline injection for vehicle fuel use	None	2018	Maas Energy Works
256 and/or 352	El Monte Dairy	El Monte Dairy Biogas	\$ 4,132,977.00	\$ 1,010,674.00	\$ 3,122,303.00	Applications to County and Construction to begin Q2 2020	10410 Avenue 160 and/or 15920 Road 152, Tipton, Tulare County	118,903	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
323	Dykstra Dairy	Dykstra Dairy Biogas	\$ 5,696,457.00	\$ 2,260,454.00	\$ 3,436,003.00	Applications to County and Construction to begin Q3 2020	6801 Avenue 176, Tulare, Tulare County	265,936	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
245	Double J Dairy	Double J Dairy Biogas	\$ 6,716,522.00	\$ 2,426,716.00	\$ 4,289,806.00	Under Construction	6656 Avenue 328, Visalia, Tulare County	285,496	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
359	Decade Dairy; Richard Westra Dairy	Decade Centralized Dairy Digester Pipeline Project	\$ 3,547,174.00	\$ 1,773,587.00	\$ 1,773,587.00	Approved by Tulare County	3313 Avenue 256, Tulare, Tulare County	192,558	RNG generation and pipeline injection for vehicle fuel use	None	2018	Maas Energy Works
313	Cornerstone Dairy	Cornerstone Dairy Digester Pipeline Project	\$ 2,532,107.00	\$ 1,266,053.00	\$ 1,266,054.00	Operational	8769 Avenue 128, Tipton, Tulare County	185,238	RNG generation and pipeline injection for vehicle fuel use	None	2018	Maas Energy Works
50 and/or 61	Aukeman Dairy	Aukeman Dairy Biogas	\$ 4,998,508.00	\$ 1,765,457.00	\$ 3,233,051.00	Applications to County and Construction to begin Q2 2020	17993 Road 96 and/or 17297 Road 96, Tulare, Tulare County	207,701	RNG generation and pipeline injection for vehicle fuel use	None	2018	California Bioenergy
218	4K Dairy	4K Dairy Digester Pipeline Project	\$ 3,561,176.00	\$ 1,780,588.00	\$ 1,780,588.00	Operational	5147 Avenue 228, Pixley, Tulare County	192,143	RNG generation and pipeline injection for vehicle fuel use	None	2018	Maas Energy Works
	Pixley Dairy	Pixley Dairy Digester Fuel Pipeline Project	\$ 3,447,237.00	\$ 1,600,000.00	\$ 1,847,237.00	Construction	Pixley, Tulare County	212,622	RNG combustion in cogeneration turbines for bioethanol production	None	2017	Maas Energy Works

226	S&S Dairy	S&S Dairy Biogas	\$ 6,687,926.00	\$ 1,600,000.00	\$ 5,087,926.00	Under Construction	5311 Avenue 272, Visalia, Tulare County	167,417	RNG generation and pipeline injection for vehicle fuel use	None	2016	California Bioenergy
358	Circle A Dairy	Circle A Dairy Digester Fuel Pipeline Project	\$ 2,351,228.00	\$ 1,050,000.00	\$ 1,301,228.00	Operational	11275 Road 96, Pixley, Tulare County	138,745	RNG combustion in cogeneration turbines for bioethanol production	None	2016	Maas Energy Works
265A	R Vander Eyk Dairy	R Vander Eyk Dairy Digester Fuel Pipeline Project	\$ 2,498,381.00	\$ 1,000,000.00	\$ 1,498,381.00	Operational	9993 Road 80, Pixley, Tulare County	132,586	RNG combustion in cogeneration turbines for bioethanol production	None	2016	Maas Energy Works
298	Moonlight Dairy	Moonlight Dairy Biogas	\$ 6,355,146.00	\$ 1,500,000.00	\$ 4,855,146.00	Under Construction	5061 Avenue 280, Visalia, Tulare County	154,834	RNG generation and pipeline injection for vehicle fuel use	None	2016	California Bioenergy
241	Legacy Dairy	Legacy Dairy Digester Fuel Pipeline	\$ 3,281,327.00	\$ 1,550,000.00	\$ 1,731,327.00	Operational	8660 Ave 96, Pixley, CA 93256	207,209	RNG combustion in cogeneration turbines for bioethanol production	None	2016	Maas Energy Works
33	Bos Farms Dairy	Bos Farms Dairy Biogas	\$ 12,834,030.00	\$ 1,500,000.00	\$ 11,334,030.00	Under Construction	20397 Road 152, Tulare, Tulare County	168,398	RNG generation and pipeline injection for vehicle fuel use	None	2016	California Bioenergy
118	Hamstra Dairy	Hamstra Dairy Biogas	\$ 6,580,840.00	\$ 2,000,000.00	\$ 4,580,840.00	Under Construction	7590 Avenue 260, Tulare, Tulare County	205,115	RNG generation and pipeline injection for vehicle fuel use	None	2016	California Bioenergy
139	Rancho Teresita Dairy	Rancho Teresita Dairy Biogas	\$ 12,500,558.00	\$ 2,100,000.00	\$ 10,400,558.00	Under Construction	21744 Road 152, Tulare, Tulare County	236,251	RNG generation and pipeline injection for vehicle fuel use	None	2016	California Bioenergy
326	K&M Visser Dairy	K&M Visser Dairy Digester Fuel Pipeline Project	\$ 3,293,975.00	\$ 1,500,000.00	\$ 1,793,975.00	Operational	9279 Avenue 96, Pixley, Tulare County	203,416	RNG combustion in cogeneration turbines for bioethanol production	None	2016	Maas Energy Works

	GJ TeVelde Ranch	Te Velde Tipton Dairy Digester	\$ 2,500,000.00	N/A	N/A	Operational	5850 Avenue 160, Tipton, California 93,272	189,080	Electrical generation	None		Maas Energy Works
256	Van Beek	Van Beek Brothers Dairy Digester	\$ 2,700,000.00	N/A	N/A	Operational	14808 Road 152, Tipton, California 93272	106,240	Electrical generation	None		Maas Energy Works
346	Hilarides	Hilarides Dairy Digester Renovation	\$ 1,300,000.00	N/A	N/A	Operational	24163 Road 188, Lindsay, California 93247	564,000	Electrical generation	None		Maas Energy Works

\$ 233,636,942.00 \$ 78,800,265.00 \$ 154,836,677.00

9,361,494

Attachment “2”

Notice of Exemption

Notice of Exemption

To: Office of Planning and Research
1400 Tenth Street, Room 121
Sacramento, CA 95814

Tulare County Clerk
Room 105, Courthouse
221 South Mooney Boulevard
Visalia, CA 93291

Lead Agency: Tulare County Resource Management Agency
5961 South Mooney Blvd.
Visalia, CA 93277
Attn: Sandy Roper, Project Planner
Phone: (559) 624-7101 Email: sroper@co.tulare.ca.us

Applicant(s): Tulare County Resource Management Agency
5961 South Mooney Blvd.
Visalia, CA 93277 Ph: (559) 624-7000

Project Title: 2019 Annual Report of total Greenhouse Gas (“GHG”) emissions from dairies and feedlots
Project Location - Specific: The project would apply to the unincorporated area of Tulare County that is zoned
Project Location- Section, Township, Range: N/A
Project Location - City: N/A **Location - County:** Tulare

Description of Nature, Purpose, and Beneficiaries of Project:
2019 Annual Report of total GHG emissions from dairies and feedlots

Exempt Status: (check one)

- Ministerial (Sec. 21080(b)(1); 15268);
- Declared Emergency (Sec. 21080(b)(3); 15269(a));
- Emergency Project (Sec. 21080(b)(4); 15269(b)(c));
- Common Sense Exemption: CEQA Guidelines Section 15061 (b)(3)
- Categorical Exemption: CEQA Guidelines Class 6, Section 15306
- Statutory Exemptions:

Reasons why project is exempt:

This action is consistent with Section 15061(b)(3), which states that a project is exempt from CEQA if “The activity is covered by the common sense exemption that CEQA applies only to projects which have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA.” The use of Section 15061(b)(3) is applicable and appropriate because preparing the 2019 Annual Report of total dairy GHG emissions will not make any physical change to the environment since it only involves gathering information to prepare a written report concerning whether or not the County of Tulare is in compliance with the 2017 Animal Confinement Facilities Plan (“2017 ACFP”) and the 2017 Dairy and Feedlot Climate Action Plan (“2017 Dairy CAP”).

This action is consistent with Section 15306 Class 6, pertaining to basic data collection, research, experimental management, and resource evaluation activities which do not result in a serious or major disturbance to an environmental resource. The use of Section 15306 is applicable and appropriate because preparing an Annual Report of total dairy GHG emissions will not make any physical change to the environment because it only involves gathering information to prepare a written report concerning whether or not the County of Tulare is in compliance with the 2017 ACFP and the 2017 Dairy CAP.

Name of Public Agency Approving Project: County of Tulare, Board of Supervisors

Signature: _____ Date: _____ Title: Chief Environmental Planner
Hector Guerra

Signature: _____ Date: _____ Title: Environmental Assessment Officer
Reed Schenke, P.E. Director

Signed by Lead Agency

Date received for filing at OPR: N/A

Dated filed at Tulare County Clerk's Office