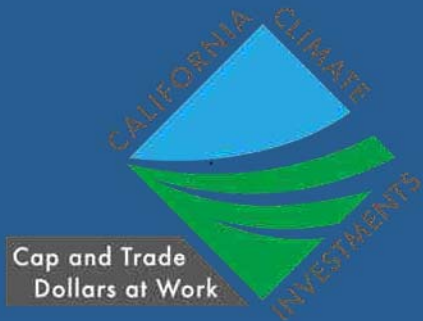


CA DEPT FOOD & AGRICULTURE



DAIRY METHANE INITIATIVES



BIOCYCLE REFOR17
OCTOBER 17, 2017

Jenny Lester Moffitt, Deputy Secretary

DAIRY INDUSTRY KEY STATISTICS

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CA #1
dairy
state in US

- 1.7 million milking cows
- 1,400 dairies
- 1215 avg. herd size
- 20% of US milk

Recent
Legislation

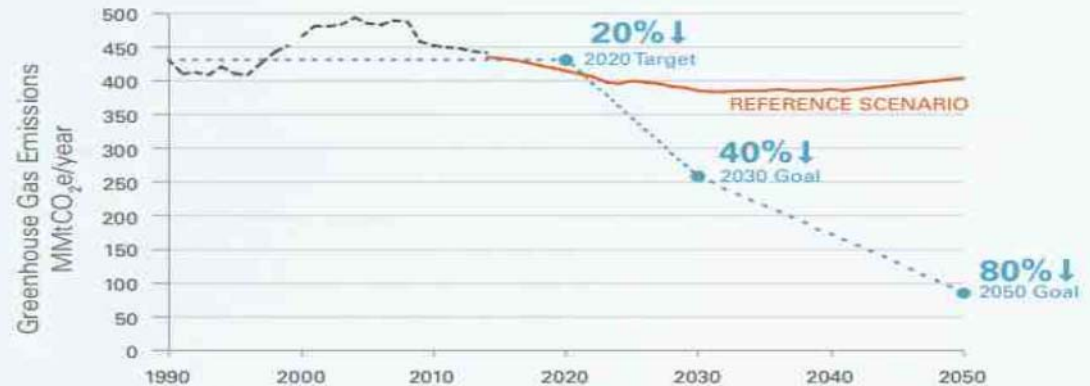
- SB 1383 Reduce dairy and livestock methane emissions by 40 percent from 2013 levels by 2030

California's Climate Strategy

3

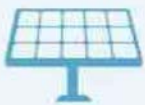
Vision for 2030

REDUCING GREENHOUSE GAS EMISSIONS TO
40% ↓
1990 LEVELS



Goals

50%
RENEWABLE
ELECTRICITY



DOUBLE ENERGY
EFFICIENCY SAVINGS
AT EXISTING BUILDINGS



REDUCED
SHORT-LIVED
CLIMATE POLLUTANTS



50%
REDUCTION
IN PETROLEUM
USE IN VEHICLES

CARBON
STORAGE IN THE
LAND BASE

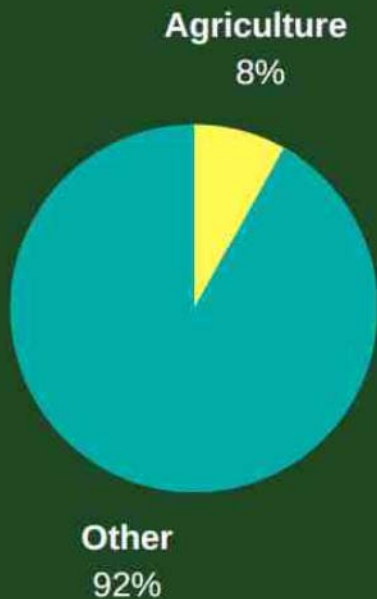


SAFEGUARD
CALIFORNIA

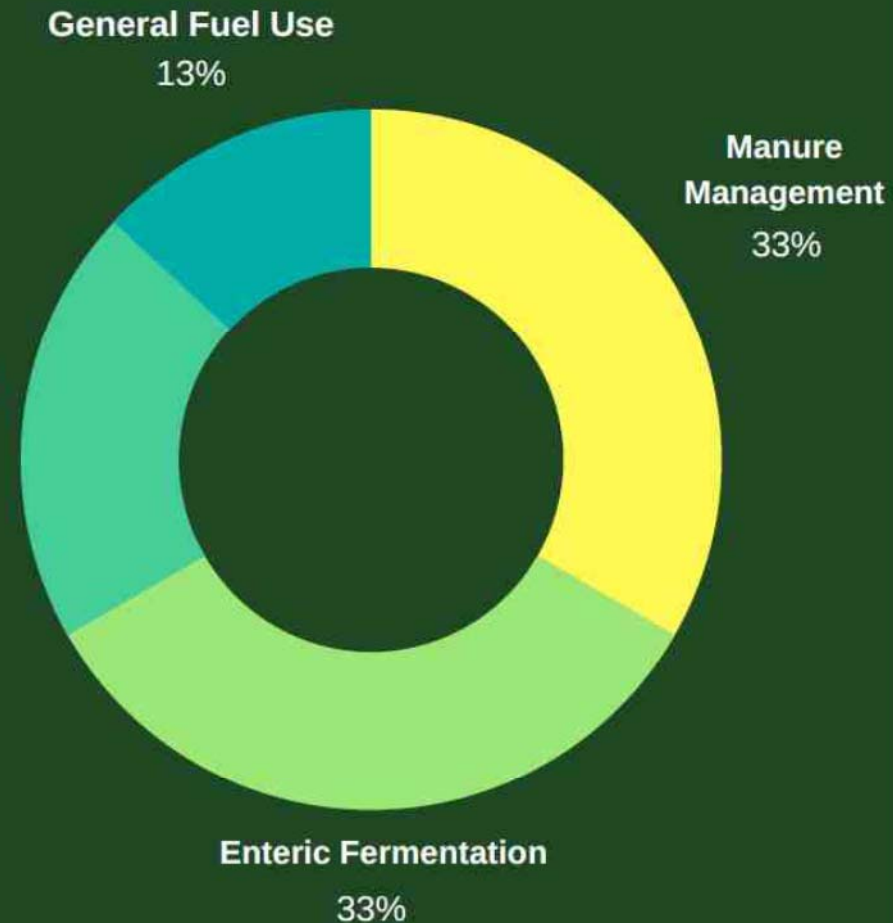


CA GHG Emissions by Sector

4



INDUSTRY EMISSIONS AS PART OF TOTAL STATEWIDE EMISSIONS



AGRICULTURE GHG EMISSIONS BY ACTIVITY

CALIFORNIA'S DAIRY REGIONS

5

Vary by overall population, dairying style, climate, and environmental conditions.

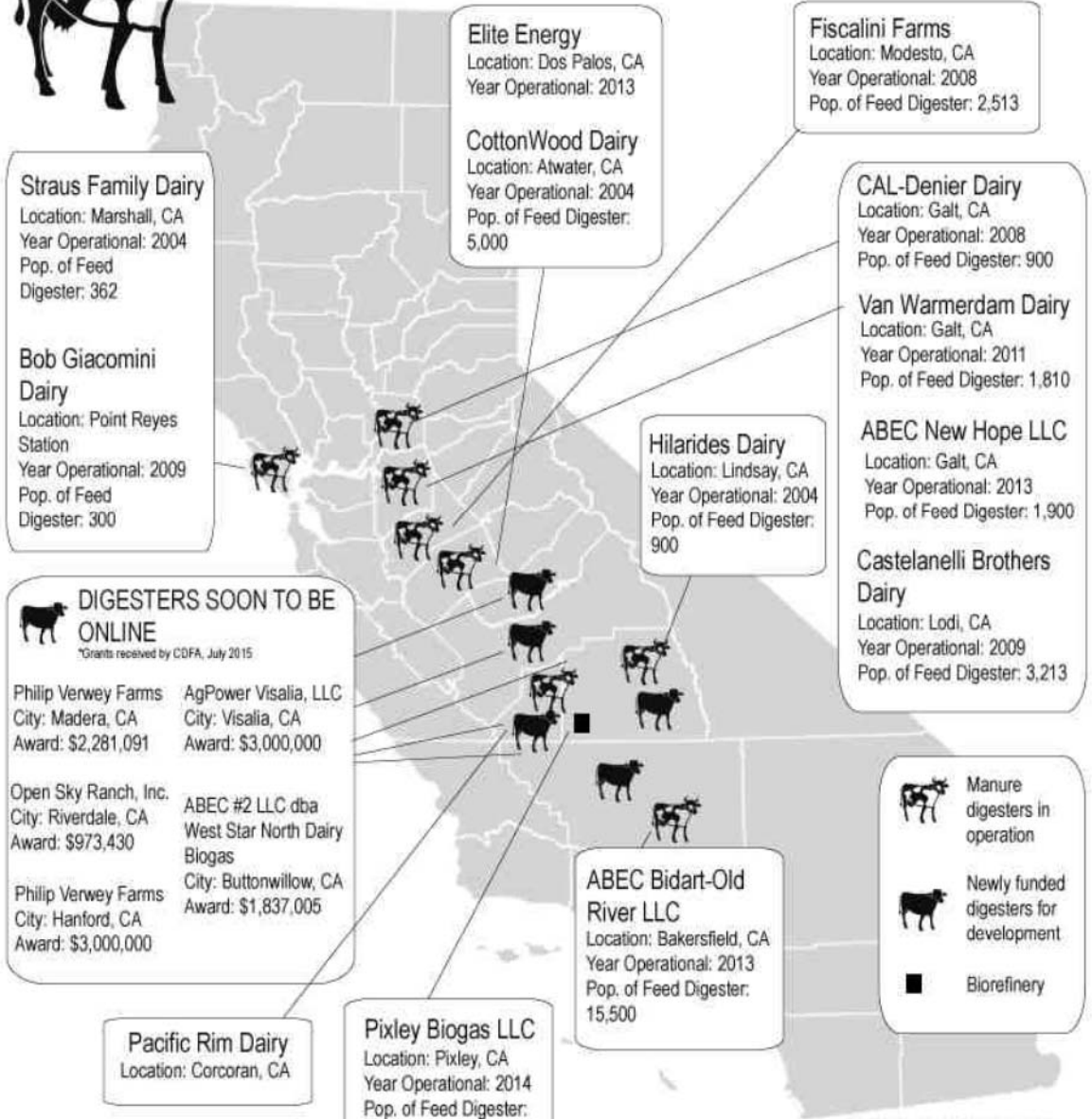
Approximately 91 percent of state's dairy cows and more than 80 percent of dairies are in the Central Valley (primarily freestall barns with flush systems or drylots).

~3 percent of state's dairy cows are in North Coast region, such as Humboldt, Marin and Del Norte counties, primarily on pasture.

~5.6 percent of dairy cows are in Southern California, including Riverside, Imperial, and San Diego counties, primarily on drylots.



METHANE DIGESTERS ON CALIFORNIA DAIRY FARMS



Source: Environmental Protection Agency. <http://gispub4.epa.gov/AgSTAR/index.html>, California Department of Food and Agriculture Western United Dairymen

TYPICAL FLUSH LAGOON



CDFA's Dairy Methane Programs

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Dairy Digester R&D Program

- Potential for 12 + new projects to be built by 2020
- \$29-\$36 million



Alt. Manure Mgmt. Practices

- Switch to scrape or solid manure management & composting
- \$ 9 - \$16 million

Dairy Digester Research & Development Program

9

Grant size

- A maximum of 50% of the total cost of project, up to \$3 million.
- 2-year project term

Eligibility:

- Existing milk producers, dairy digester developers.
- Cluster projects.
- Eligible bio-methane uses:
On-site use or into electrical grid/pipeline (electricity generation or transportation fuel/RCNG), utilization of thermal energy on site or at neighboring facility

Environmental Quality Requirements:

- Water Quality Protection:
Double-lined ponds consistent with the Tier 1 specification of the Dairy General Order Central Valley Regional Water Quality Control Board, or, above-ground tank, or, below-ground concrete lined tank.
- Air Quality Protection:
Total NO_x emissions no greater than 0.50 lb/ MW-hr.

In 2015 - 6 Dairy Digesters Funded

10

| Project | Amount awarded | Biogas end-use | Status |
|--|----------------|-----------------------------|--------------------------------|
| Verwey-Hanford Dairy Digester | \$3,000,000 | Electricity | Completed. |
| Open Sky Ranch | \$973,430 | Electricity | Completed. |
| Verwey-Madera Dairy Digester | \$2,281,091 | Electricity | In progress. |
| West-Star North Dairy Biogas Project | \$1,837,005 | Electricity, RCNG in future | In progress. |
| Lakeview Dairy Biogas Project* | \$2,000,000 | Electricity, RCNG in future | In progress. |
| Carlos Echeverria & Sons Dairy Biogas Project* | \$1,000,000 | Electricity, RCNG in future | In progress. * Kern cluster |

Completed Covered Lagoon Digester

11



In 2017 – Awards Pending

12

- CDFA Received 36 applications for \$29 - \$36 million.
- Funding Recommendations to be released later this month
- Additional appropriation of \$99 million for 2017-2018.
- New requirements for criteria pollutants and community outreach.

Electricity versus Fuel (RCNG)

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Electricity +/-



- Developers more experienced
- Approx. \$20/MMBTU (Elec + carbon credit)
- BioMAT contracts with utility (10 - 20 yrs)
- Concerns with NO_x emissions

Fuel (RCNG) +/-

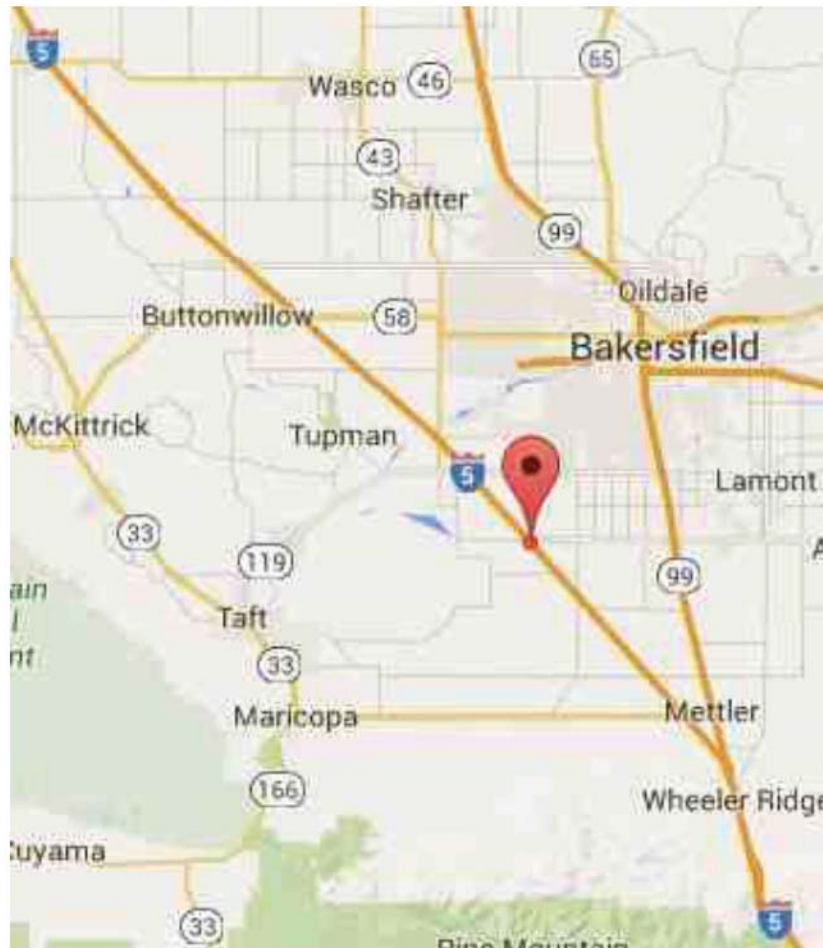


- New in CA—but proven elsewhere
- Approx: \$40-60/MMBTU (LCFS and RINs)
- Potentially very lucrative
- No long term contracts
- Addresses NO_x

California Bioenergy - Kern Co.

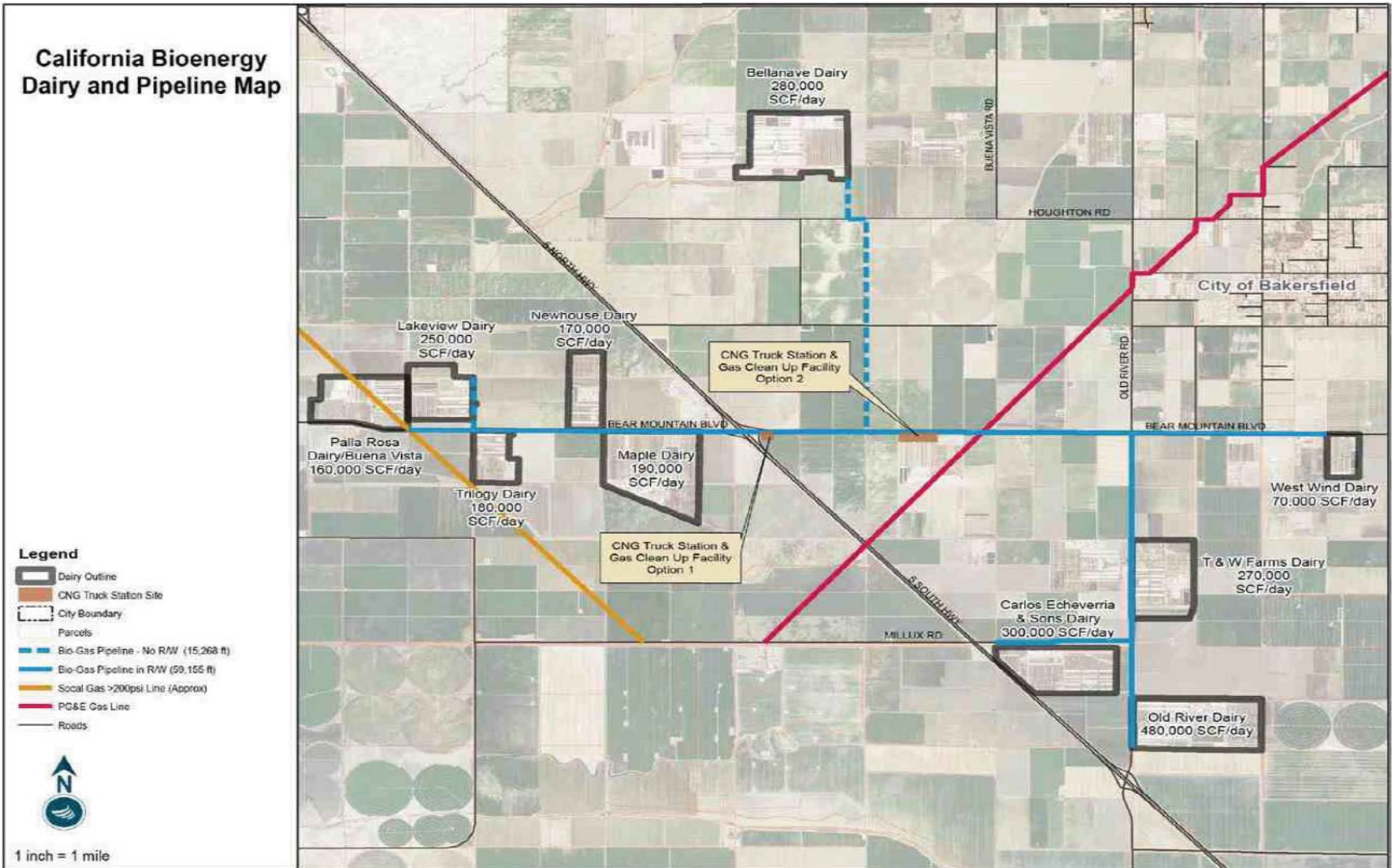
Dairy Cluster

14



- Finalist –Sustainable Freight Action Plan
- 15 modern, large dairies
- 1 built digester; 2 in construction
- Pioneer –combine electricity and fuel
- Methane potential: 12 MW base load (30 MW peaking)
- 5M diesel gallon equivalents

Map of Kern Cluster



Policy Efforts Dairy & Livestock GHG Reduction Working Group

16

DAIRY AND LIVESTOCK GREENHOUSE GAS REDUCTION WORKING GROUP



MANURE RESEARCH EFFORTS

17

- 1. Converting Manure to Reduce Greenhouse Gas Emissions, Minimize Environmental Impacts, and Enhance the Economic Feasibility of Dairy Operations:** Dr. William R. Horwath and Dr. Xia Zhu-Barker, UC Davis
- 2. Producing Valuable Co-Products and Improving Nutrient Management for Dairy Manure Digester Systems: 2014-16:** Dr. Ruihong Zhang, UC Davis
- 3. Effect of Solid Separation on Mitigation of Methane Emission in Dairy Manure Lagoons: 2016-17** Dr. Ruihong Zhang, UC Davis
- 4. Benchmarking of pre-Alternative Manure Management Program Dairy Emissions –** Dr. Frank Mitloehner, UC Davis



Thank You

Questions

