



Plugging Dairies into a Renewable Future.

Presentation for the CEC Workshop:

CE&S Dairy Biogas

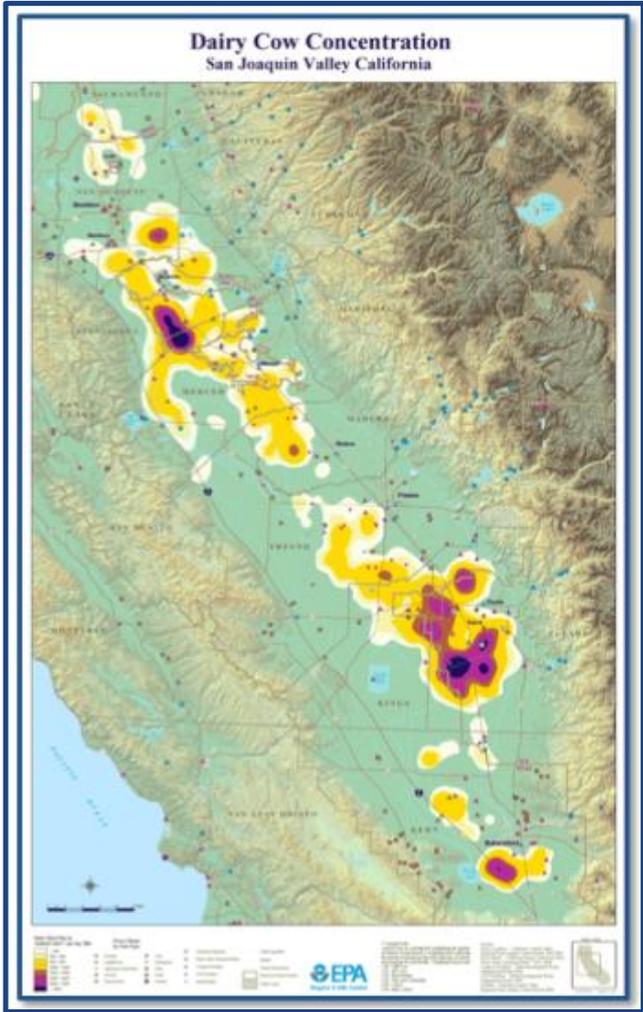
a Community-Scale Renewable Project

(PON 14-307 recipient)

September 23, 2015



California Dairy Industry Key Statistics



- Largest dairy industry in America, 20 percent of the nation's milk
- 1.8M milking cows on 1,500 modern dairies
- Majority of farms concentrated in the Central Valley
- Generate approximately 50% of California's methane emissions
- Potential for approximately 350 MW base load and 700 MW of storage

California Dairy Bioenergy Industry Status



- The potential is far from realized. Approximately 20 operating digesters. Most are small. Limited use of CHP
- Grants, integrated with the SB 1122 BioMAT (approved by CPUC last week) or Net Metering, are critical to incubating the industry, expanding learning, building experience, and realizing the potential



About California Bioenergy LLC (“CalBio”)

- Focused on dairy biogas in California’s Central Valley
- Established in 2006
- Technology neutral – project specific
- Partner with the dairy farmer. Advise, design, build, finance, operate, and own (jointly) projects.
- By necessity a multifaceted team. Expertise:
 - Project operations and maintenance
 - Electricity generation and management
 - Dairy farming including nutrient management
 - Energy and environmental policy: SB 1122 and AB 32
 - Finance

ABEC #4 – Carlos Echeverria & Sons Dairy



CE&S Dairy

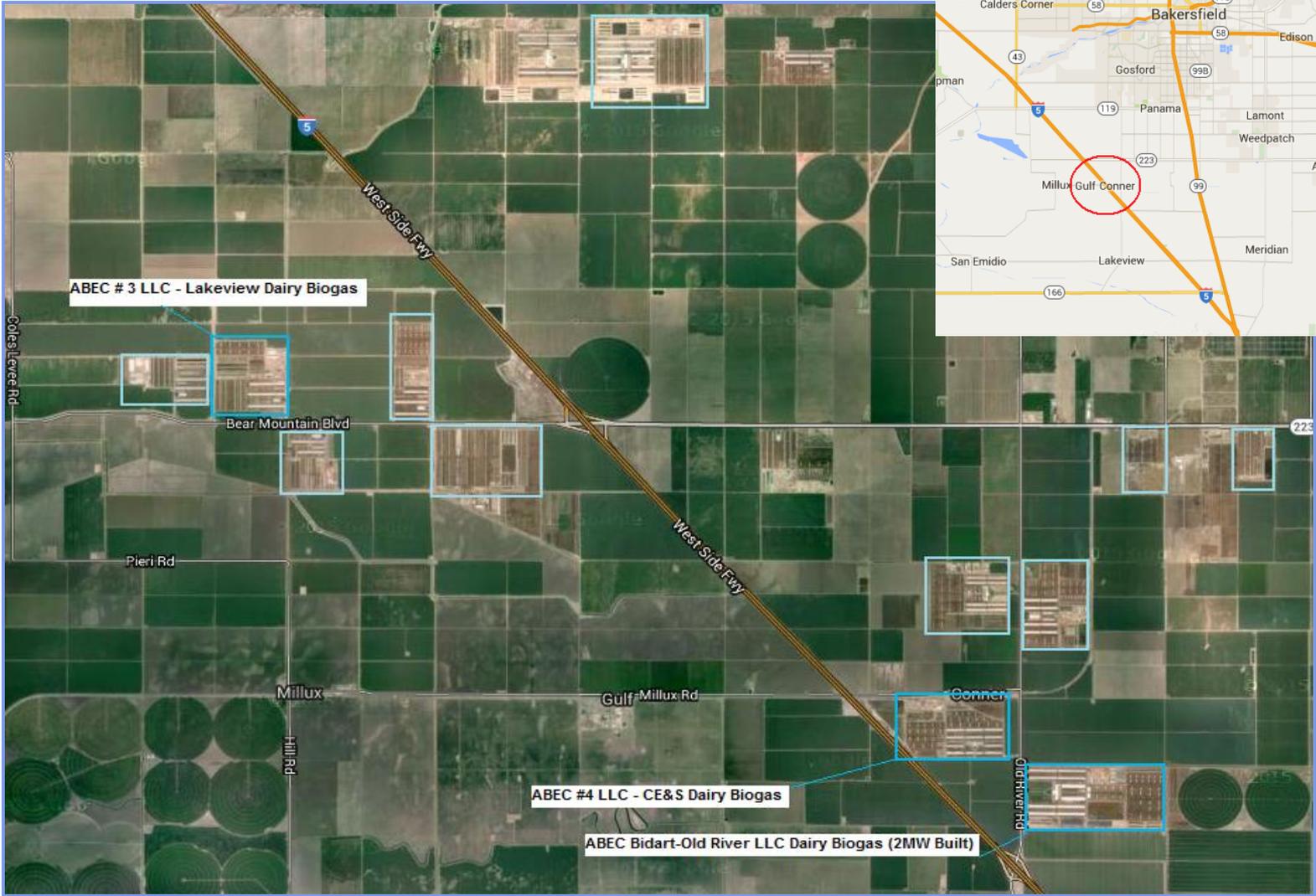
The project, recipient of a CEC PON 14-307 award, is located in a cluster of dairies outside of Bakersfield. It will serve as a demonstration facility utilizing waste heat from the engine to advance energy efficiency and project economics.

QUICK FACTS

- 1 MW of community scale, renewable electricity capacity, off-setting the dairy's load
- Generation of ~6-7 MWh per year,
- Waste heat harnessed through an absorption chiller to cool milk
- Potential future phase contribution to R-CNG transportation fuel



Bakersfield Dairy Cluster





CE&S Milking Parlor





CE&S – Milk Storage



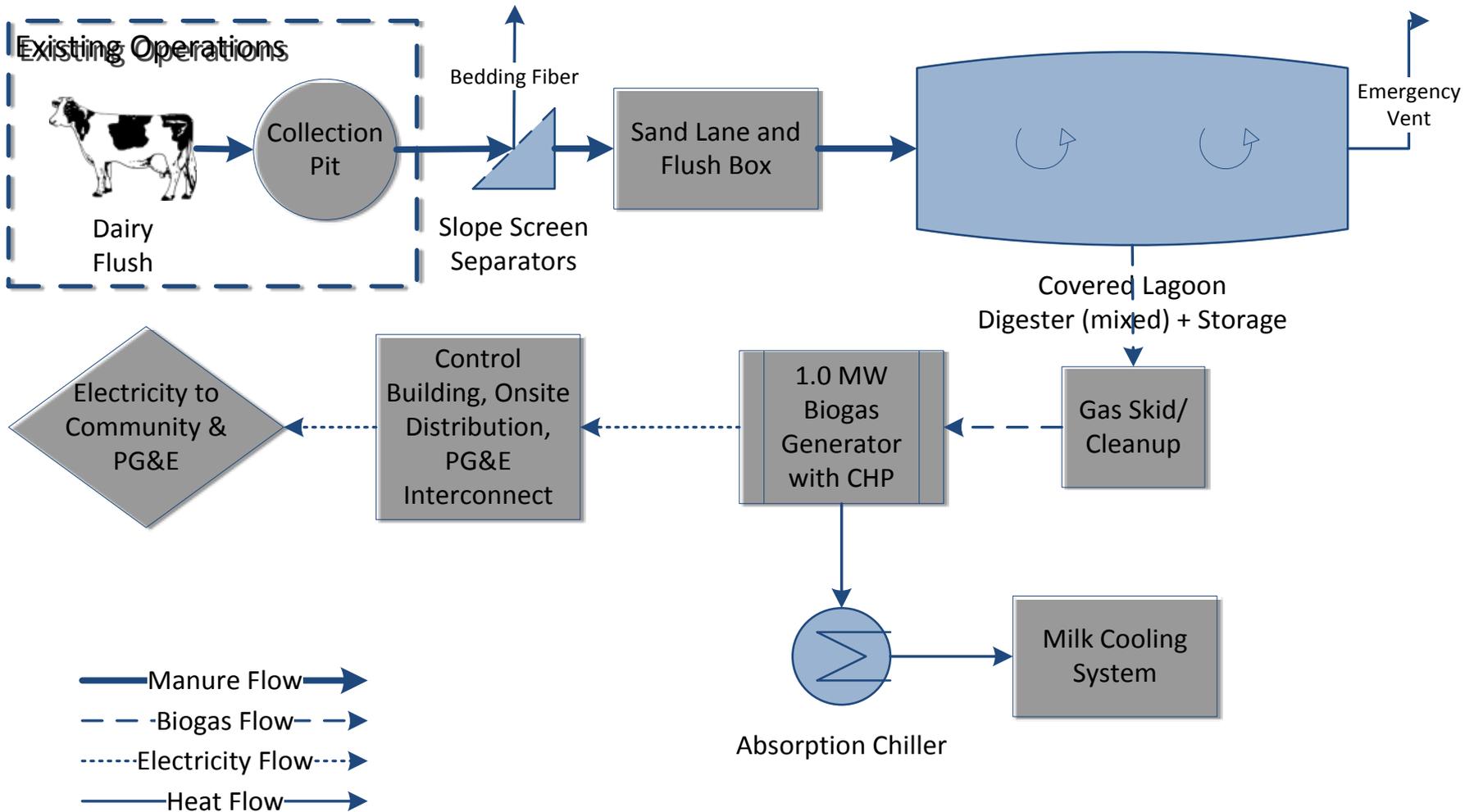


CE&S Project Highlights

1. Accept approx. 1 million gallons/day of manure water and produce over 350,000 scf of biogas/day
2. Install 1 MW engine and generate 6 -7 million kWh/yr
 - Nearly offsets dairy's electricity use of ~ 8 million kWh
3. Produce approximately 100 tons of waste heat-fired cooling capacity to be used on site for milk chilling – potential to offset approximately 1 million kWh/year
4. Demonstrate energy management strategies: biogas storage and heat driven chilling
5. Destroy methane – estimated ~ 15,000 MT of CO₂/yr
6. Spoke in future CNG fuel program



How the Project Works





Separator and Sand Removing Lane





Lagoon Digester – Liner installation





Covered Lagoon and Old Lagoon





Biogas Gas Conditioning Unit





Caterpillar Engine





Engine Building and Interconnection





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