

California Manure Methane Emission Reduction Efforts An Overview

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SB 1383 requirements

- ❑ Requires a 40% reduction in dairy manure methane by 2030
 - ✓ No regulation until 2024
 - ✓ Progress report in 2020
- ❑ Based on a voluntary and incentive based approach to achieving reductions
 - ✓ Critical given high leakage potential of industry
 - ✓ Zero ability to pass on costs
 - ✓ Key is developing projects that provide a return on investment



Dairy diversity

- ❑ Fewer than 1,400 family-owned and operated dairies in California. These dairy operators vary greatly in size, manure handling practices and location
 - ✓ What works for dairies on the North Coast may be different from what works for dairies in the San Joaquin Valley
 - ✓ Roughly 1050 in San Joaquin Valley
- ❑ No silver bullet to reducing emissions due to diversity of dairy operations. As a result, dairy operations will need a suite of solutions
- ❑ CDFA's and ARB's analysis have both shown that we can't get there with just digesters and certainly can't get there by converting all dairies to pasture



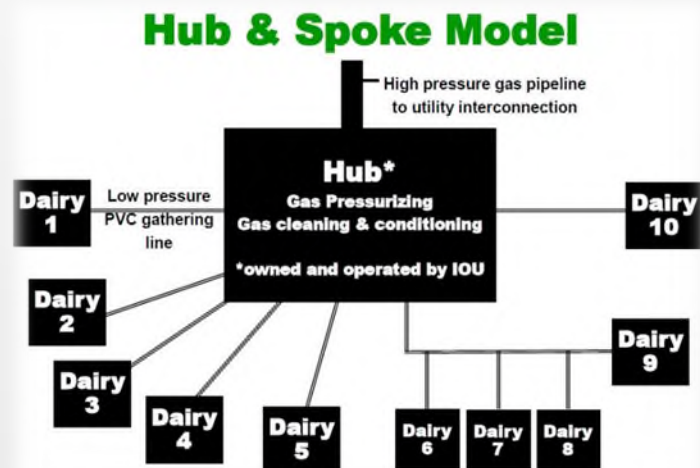
Role of digesters

- ❑ While not the only solution, digesters will prove critical to achieving large scale reductions sought by state
 - ✓ Digesters not only have the potential to reduce GHG/ methane, they can also create flexible and dispatchable renewable energy
- ❑ Transportation fuel projects also have potential to dramatically reduce NOx and diesel PM in addition to GHG/methane
- ❑ Digester development must be accelerated to achieve state's goals
 - ✓ 100 to 200 digesters by 2030



Cluster opportunities

- Tremendous opportunity with dairy cluster projects to demonstrate how we move from concept to pipeline injection and carbon negative transportation fuel
- CPUC development of 5 dairy biomethane projects critical



Dairy Manure Digester Development in California



1. ABEC-Bidart-Old River
 2. ABEC-Bidart-Stockdale
 3. Blakes Landing Farms/ Straus Family Creamery
 4. Castelanelli Brothers Dairy
 5. Cottonwood Dairy/ Joseph Gallo Farms
 6. Denier Dairy*
 7. Fiscalini Farms
 8. Giacomini Dairy
 9. Hilarides Dairy
 10. New Hope Dairy*
 11. Open Sky Ranch
 12. Pacific Rim Dairy
 13. Pixley Biogas**
 14. Van Steyn Dairy
 15. Van Warmerdam Dairy
 16. Verwey Dairy- Hanford
 17. Verwey Dairy- Madera
 18. GJ TeVelde Ranch
 19. Carlos Echeverria & Sons Dairy
 20. Lakeview Dairy
 21. West Star Dairy
- *Temporarily Offline
**Undergoing Repairs
Updated August 2017

Incentive Funding

Dairy Methane Reduction Projects

- ❑ \$50 million in CDFA funding for dairy methane reduction projects including
 - ✓ Anaerobic digesters
 - ✓ Solids separation technologies
 - ✓ Conversion to dry manure management
 - ✓ Open solar drying and onsite composting
 - ✓ **\$29-\$36 million for digesters currently available (DDRDP)**
 - ✓ \$9-\$16 million for Alternative Manure Management Practices (AMMP) Program being developed



Integration of incentives

- ❑ Numerous programs designed to incentivize dairy methane reductions generally and digesters specifically
 - ✓ One goal of this effort should be to provide better coordination and integration



Existing incentive programs

- ❑ Dairy Digester Research and Development Program
 - ✓ Up to \$36 million available now
 - ✓ More expected in 2017 and 2018 GGRF Expenditure Plans
- ❑ BioMat FiT – up to 90 megawatts
 - ✓ Current price @ 17-18 cents kwh
- ❑ CPUC Biomethane Interconnection Incentive Program
 - ✓ \$40 million available across all projects
 - ✓ 50% match up to \$3 million
 - Up \$5 million for dairy cluster projects
- ❑ CEC Alternative and Renewable Fuels and Vehicle Technology Program (ARFVTP), AB 118, and EPIC Programs
 - ✓ Digesters
 - ✓ Fueling infrastructure
 - ✓ NG Vehicle incentives
- ❑ ARB Dairy Digester GHG offset protocol
- ❑ ARB LCFS – dairy biomethane transportation fuel pathway
 - ✓ Federal RIN credits also generated under RFS

New State Incentive Programs

- ❑ Dairy biomethane pilot projects/CPUC/R.17-06-015
 - ✓ Expected implementation 1/1/2018
- ❑ LCFS dairy pilot financial mechanism/ARB
 - ✓ Program identification by early 2018
- ❑ CEC 2017 IEPR requires CEC to develop recommendations for the development and use of renewable gas
 - ✓ Proposed recommendations by 4th quarter 2017
- ❑ ARB also has broad authority under SB 1383 to “... establish energy infrastructure development and procurement policies needed to encourage dairy biomethane projects...”

Where we are headed

- ❑ 36 grant applications submitted to CDFA
 - ✓ Totaling over \$75 million
 - ✓ Available funding just \$27-\$36 million
- ❑ Breakdown of projects seeking funding
 - ✓ Electricity – 9
 - ✓ RNG and transportation fuel – 17
 - ✓ Combo – 10
- ❑ New projects by county:
 - ✓ Tulare – 16
 - ✓ Kern – 4
 - ✓ Kings – 6
 - ✓ Madera – 4
 - ✓ Fresno – 4
 - ✓ San Joaquin – 1
 - ✓ Merced – 1
- ❑ Several clusters being proposed

Conclusion

- ❑ Achieving state's ambitious 40 percent manure methane reduction target will take concerted effort and partnership between industry, state and stakeholders.