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Senate Bill 1383 and Dairy Biomethane Pilot Projects

Disadvantaged Communities Advisory Group

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Senate Bill 1383

- California Air Resources Board to implement strategy to reduce short-lived climate pollutants below 2013 levels by 2030:
  - Methane by 40%.
  - Hydrofluorocarbon gases by 40%.
  - Anthropogenic black carbon by 50%.

SB 1383 and Dairies

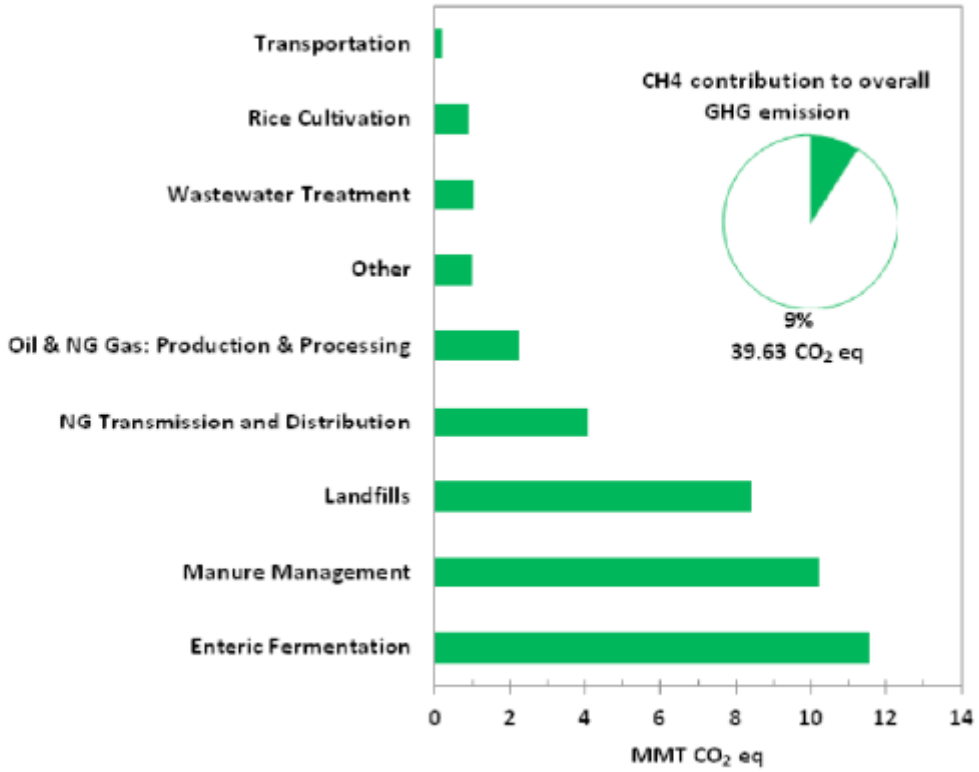
- California Air Resources Board in consultation with the California Department of Food and Agriculture:
  - Adopt regulations to reduce methane emissions from livestock manure management operations and dairy management operations no earlier than 1/1/24.
- California Public Utilities Commission:
  - Develop dairy pipeline pilot projects to demonstrate interconnection to the common carrier pipeline system.

SB 1383 and IEPR

- California Energy Commission to analyze renewable gas as part of its 2017 Integrated Energy Policy Report (IEPR) and discuss:
  - Cost-effective strategies.
  - Prioritize end uses of renewable gas.
  - Provide recommendations to other state agencies.

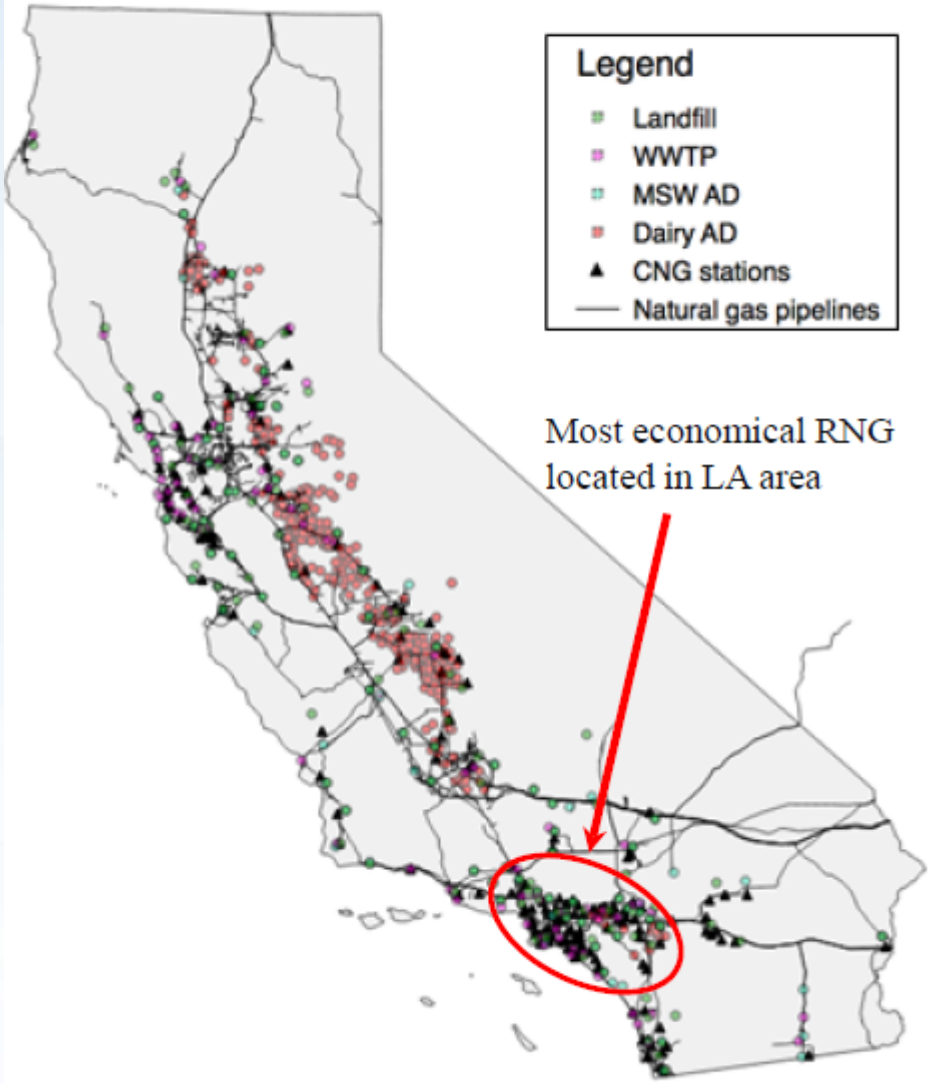
Chapter 9: Renewable Gas

2015 California Methane Emissions Inventory (100-Year GWP)



Source: California GHG Emission Inventory- 2017 edition, released June 6, 2017

Renewable Gas Estimation Data



Geolocated Data:

- **Dairies: 1,369 sites**, Central Valley and Santa Ana Regional Water Quality Control Boards
- **Landfills: 147 sites**, Landfill Methane Outreach Program
- **WWTP: 86 sites**, California Association of Sanitation Agencies
- **MSW: 38 sites**, California Biomass Collaborative, Solid Waste Information Systems, CalRecycle

In-State Renewable Gas Potential

Annual Technically Available and Economically Feasible Biomethane Renewable Gas Production Potential From California Biomass Resources

FEEDSTOCK	AMOUNT TECHNICALLY AVAILABLE	RENEWABLE GAS POTENTIAL FROM AMOUNT TECHNICALLY AVAILABLE [UC DAVIS CALIFORNIA BIOMASS COLLABORATIVE]		RENEWABLE GAS POTENTIAL FROM AMOUNT TECHNICALLY AVAILABLE [ICF]		ECONOMICALLY FEASIBLE RENEWABLE GAS POTENTIAL* [UCD ITS]	
		(BCF)	(MILLION MMBTU)	(BCF)	(MILLION MMBTU)	(BCF)	(MILLION MMBTU)
Animal Manure (Dairy & Poultry)	3.4 MM BDT	19.5	18.9	12.3-18.7	11.9-18.7	10.1	9.8
Municipal Solid Waste (food, leaves, grass fraction)	1.2 MM BDT	12.7	12.2	22.5-50.1	21.8-48.4	16.3	15.8
Municipal Solid Waste (lignocellulosic fraction)	6.7 MM BDT	65.9	63.7				
Landfill Gas	106 Bcf	53	51.2	22-54.8	21.3-53.0	50.1	48.4
Wastewater Treatment Plants	11.8 Bcf	7.7	7.4	4.1-7.2	4.0-7.0	5.6	5.4
Fats, Oils, and Greases	207,000 tons	1.9	1.8	N/A	N/A	N/A	N/A
Agricultural Residue (Lignocellulosic)	5.3 MM BDT	51.8	50.1	29.6-32.5	28.6-31.4	N/A	N/A
Forestry and Forest Product Residue	14.2 MM BDT	139	134	14.5-44.9	14-43.4	N/A	N/A
Total		351	339	104.9-208.3	101.4-201.4	82	79.4

*Economically feasible renewable gas is determined at a natural gas market price of $3/MMBtu, LCFS credit price of $120/MT-CO2e, and RIN price of $1.78/gallon of ethanol equivalent.

Source: Williams, R. B., B. M. Jenkins and S. Kaffka (California Biomass Collaborative). 2015. *An Assessment of Biomass Resources in California, 2013 – DRAFT.* Contractor report to the California Energy Commission. Contract 500-11-020; Sheehy, Phil (Forthcoming 2017) Design Principles for a Renewable Gas Standard. ICF International; and Jaffe, Amy Myers, Rosa Dominguez-Faus, Nathan C. Parker, Daniel Scheitrum, Justin Wilcock, Marshall Miller .2016. *The Feasibility of Renewable Natural Gas as a Large-Scale, Low Carbon Substitute.* Institute of Transportation Studies, University of California, Davis, Research Report UCD-ITS-RR-16-20.

Renewable Gas Potential from Amount Technically Available (UC Davis)	Renewable Gas Potential from Amount Technically Available (ICF)	Renewable Gas Potential from Amount Technically Available (UCD ITS)
339 Million MMBTU	101.4-201.4 Million MMBTU	79.4 Million MMBTU

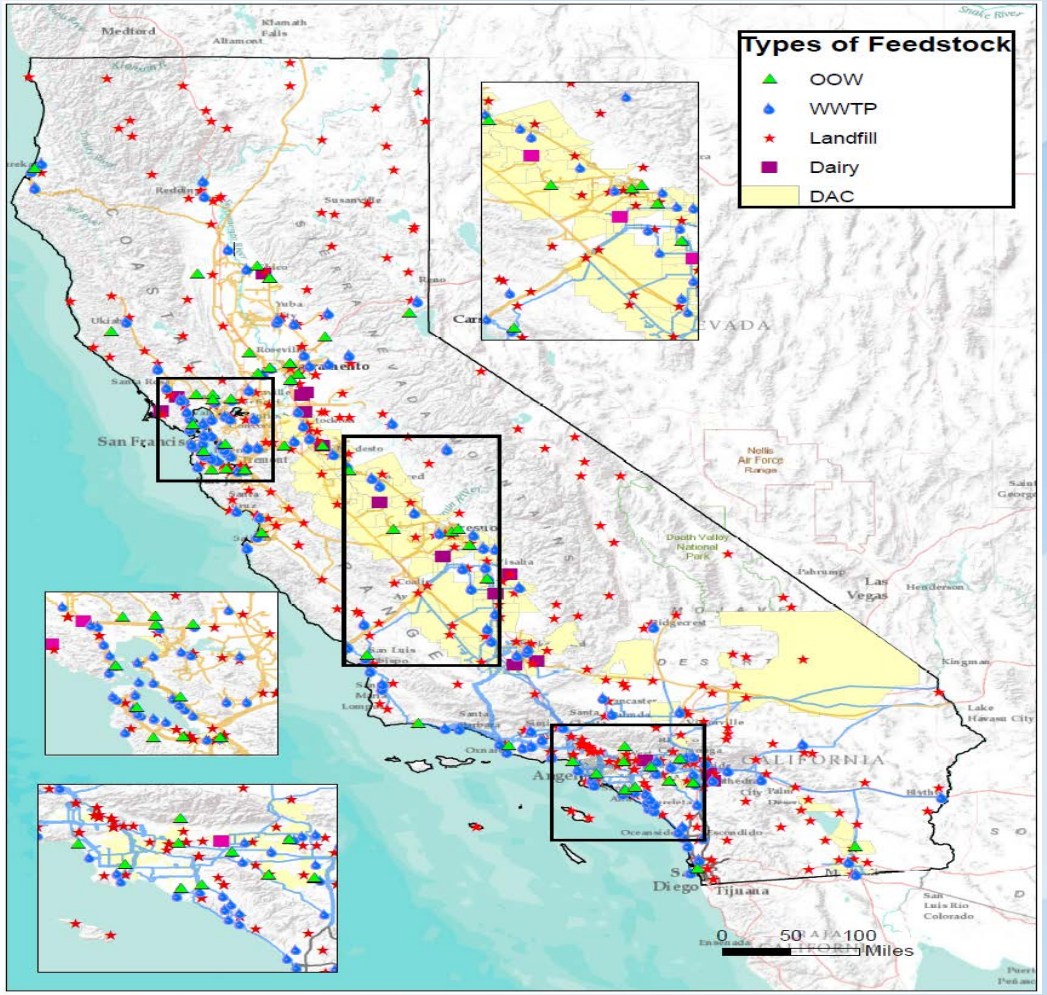
https://ww2.energy.ca.gov/2017_energypolicy/, page 254

RNG Production Potential

- **ICF estimates between 105—208 BCF per year of RNG production potential in California.**
  - Most near-term potential is via anaerobic digestion technologies: LFG, WWT gas, MSW/SSO, and animal manure

Feedstock	RNG Production Potential in CA (BCF/y)					
	UC Davis	AGF[a]		DOE BT[b, c]		ICF Estimates
		low	high	low	high	
Agricultural Residue	29.9	4.1	10.2	29.6	32.5	29.6-32.5
Animal Manure	18.7	8.4	28.0	2.2	9.9	12.3-18.7
Energy Crops[d]	70.9	0.0	0.0	0.0	0.0	n/a
Fats, Oils and Greases	6.2	n/a	n/a	n/a	n/a	n/a
Forestry and Forest Product Residue	78.0	4.7	11.8	8.9		14.5-44.9
Landfill Gas	50.2	27.4	54.8	n/a	n/a	22-54.8
MSW, food, leaves, grass	11.7	7.5	22.5	11.7	13.6	22.5-50.1
MSW, lignocellulosic	38.5			9.9	17.1	
WWT Gas	7.2	0.3	0.8	n/a	n/a	4.1-7.2
Total Potential	**311.3**	**52.4-128**		**62.3-73.1**		***104.9-208.3***

Location of Waste Resources and Disadvantaged Communities



Recommendations

- Focusing on near term opportunities
- Encouraging the use of renewable gas in state fleets
- Extending the Low Carbon Fuel Standard
- Working with local partners
- Prioritizing disadvantaged communities
- Implementing policies to build commercial markets
- Continuing to develop long-term market certainty

Next Steps

- The Energy Commission should re-examine the status of renewable gas, including power-to-gas, as part of the 2021 IEPR.
- Agencies convened a Dairy and Livestock Greenhouse Gas Emissions Working Group in May 2017. Final Recommendations Proposed by the 3 subgroups and after 28 public meetings: https://ww3.arb.ca.gov/cc/dairy/dairy_subgroup_recommendations_to_wg_11-26-18.pdf.
- CARB, CDFA, CPUC, and CEC are also working together to analyze the data coming out of the pipeline pilot projects.

Data Collection

- **Project Overview and Implementation Report**
  - Provides project baseline information including:
    - Project, dairy technology and modifications overview
    - Capital Costs
    - Baseline emissions, energy and water usage
    - Outreach and Community Engagement Strategy

- **On-Going Reporting**
  - Quarterly Reporting
    - Operating Costs
    - Production
    - Technology Monitoring
    - Outreach Efforts
  - Annual Reporting
    - Cost Effectiveness
    - Annual biomethane injection
    - GHG Monitoring

Data Collection (continued)

- **Final Post-Pilot Reporting**
  - Project Results
  - Lessons Learned
  - Scalability and Replication Potential

THANK YOU

Contact Information

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