

# California's Efforts to Reduce Dairy Methane

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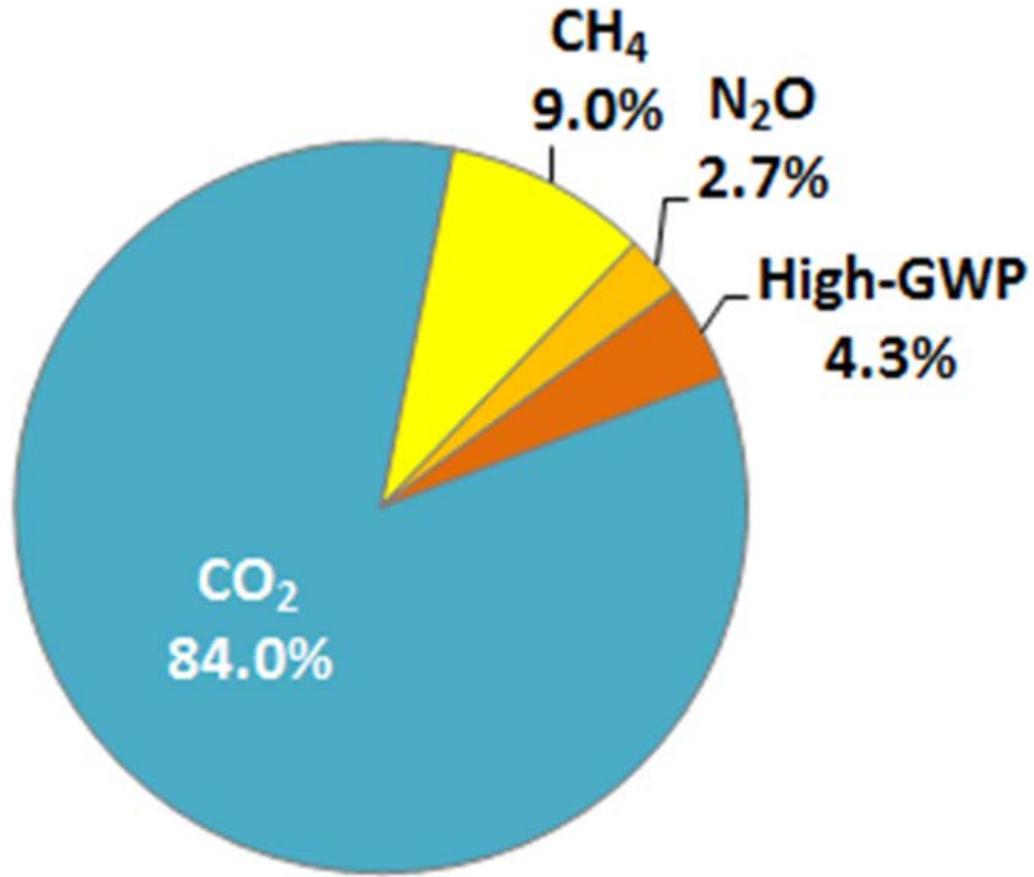
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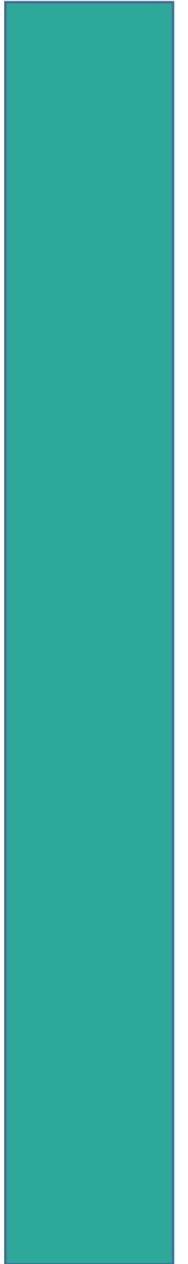
**CALIFORNIA**  
AIR RESOURCES BOARD



# California Greenhouse Gas Inventory



**2015 Total CA Emissions: 440.4 MMTCO<sub>2</sub>e**

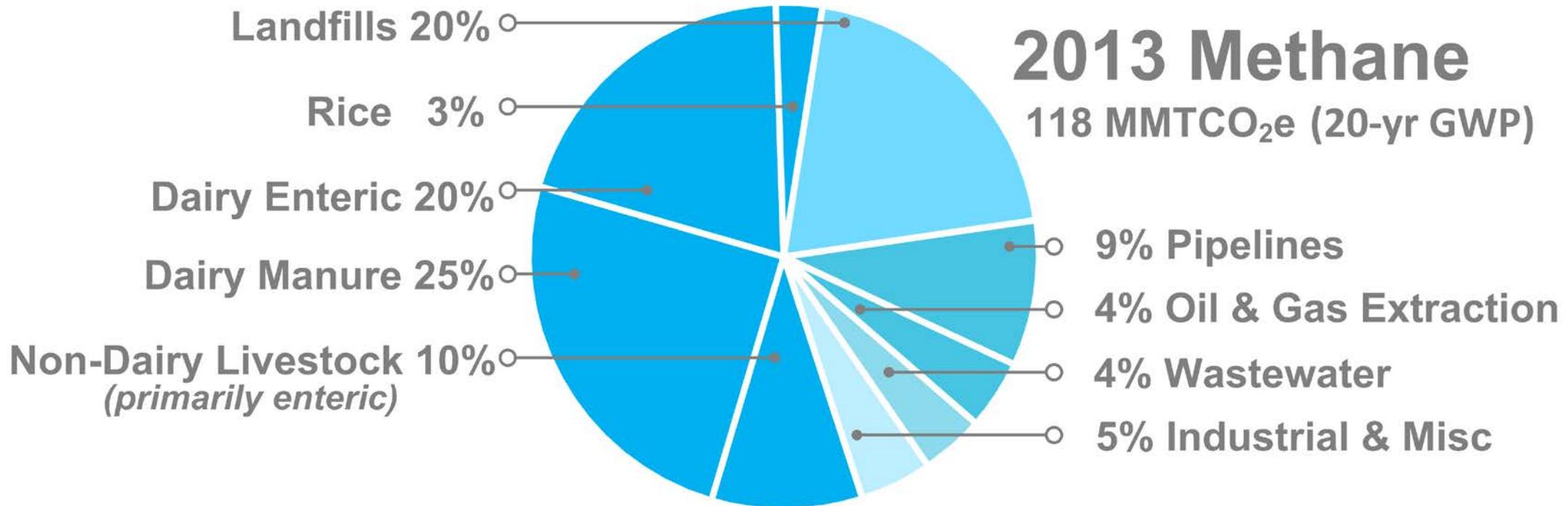


# Why does California care about methane?

## IPCC 5<sup>th</sup> Assessment Report, 2014 (AR5)

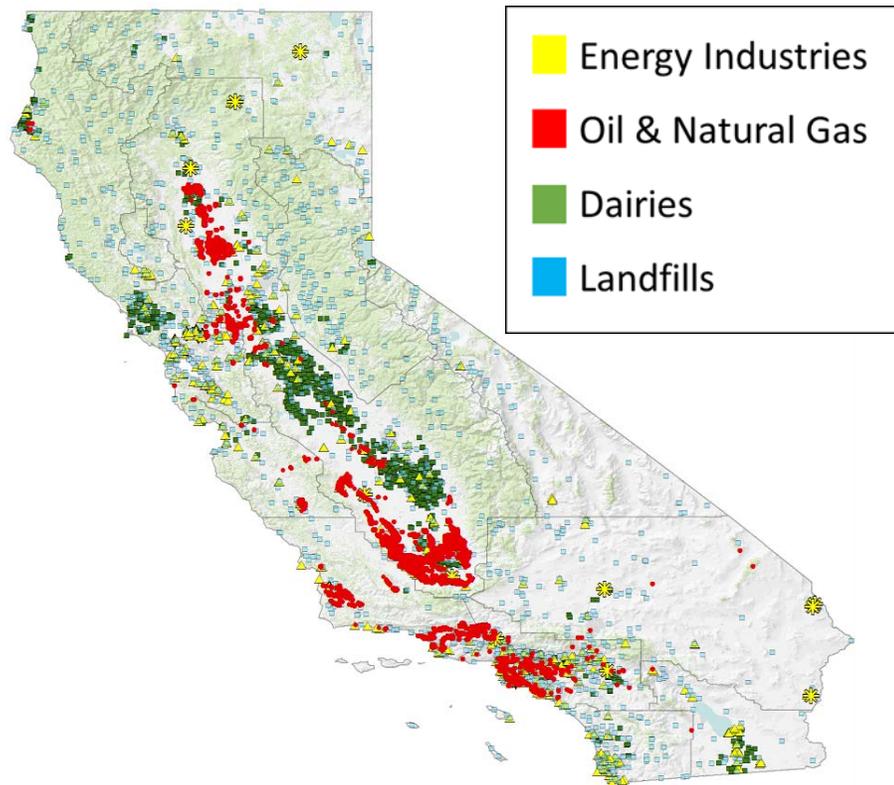
	GWP for 100-year time horizon	GWP for 20-year time horizon
Carbon Dioxide	1	1
Methane	28	84

# California Methane Inventory

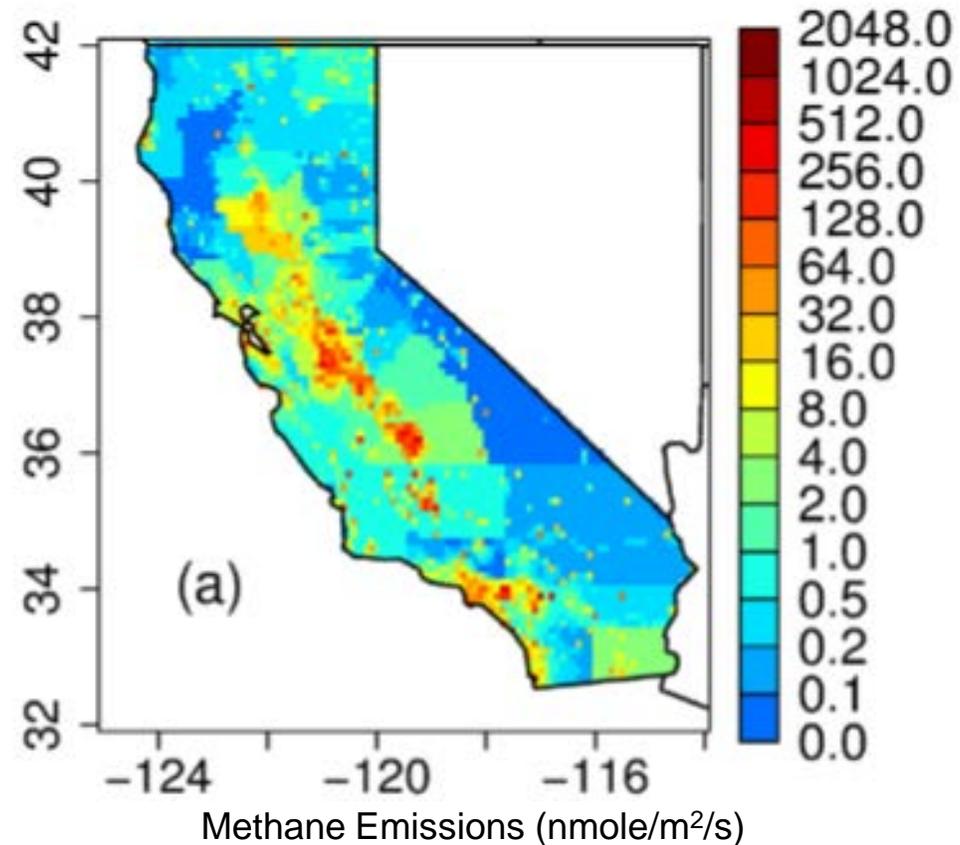


# California Methane Surveys

## Sources



## Emissions



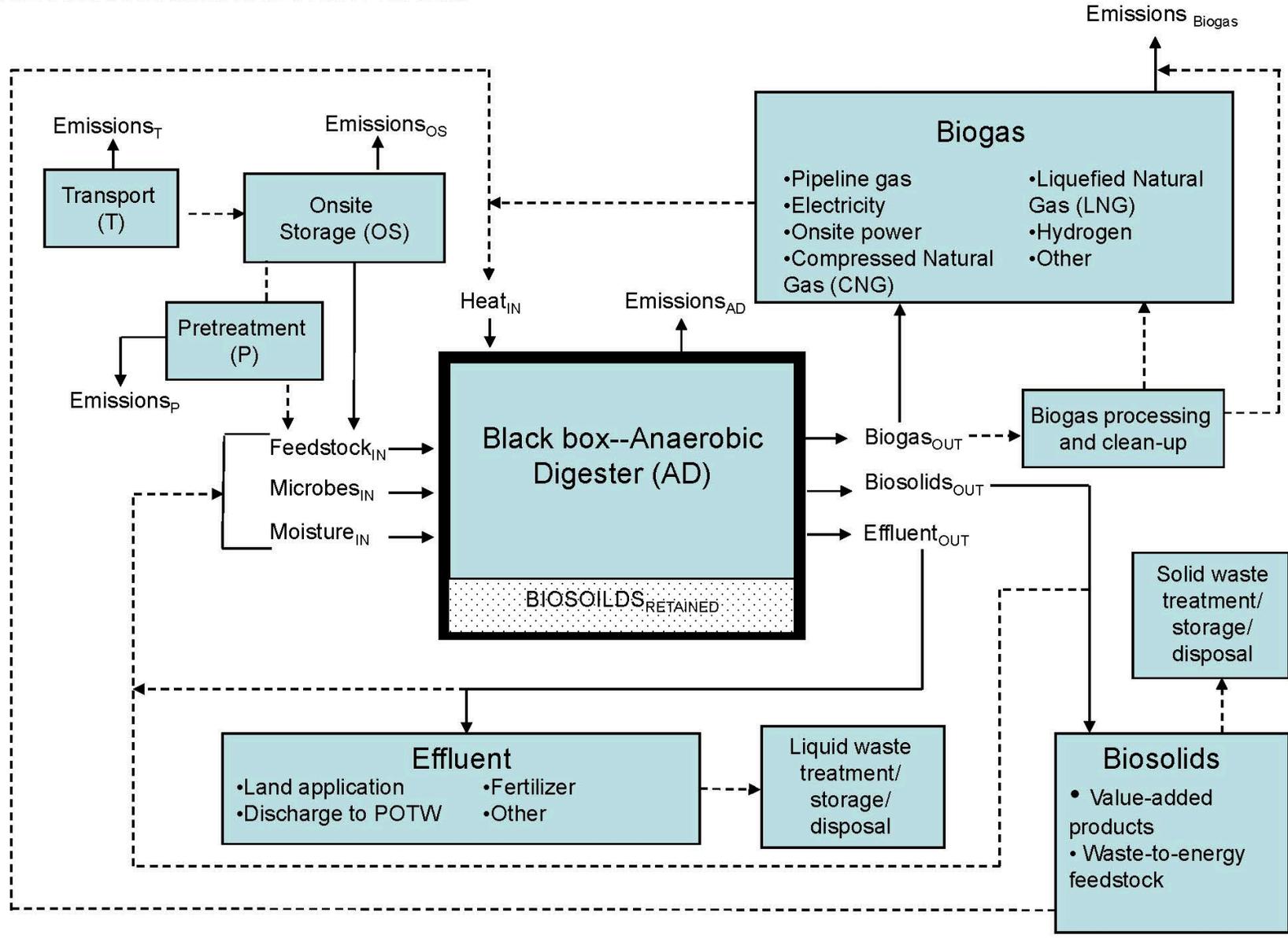
# Dairies and bioenergy

- 1,400 dairies in California
- Anaerobic digester technology:
  - covered lagoons, engine/conditioning facility
- Produces biogas for:
  - Pipeline gas
  - Onsite, off-site electric generation
  - Liquefied/compressed natural gas
  - Hydrogen
- 16 digesters in California generating electricity

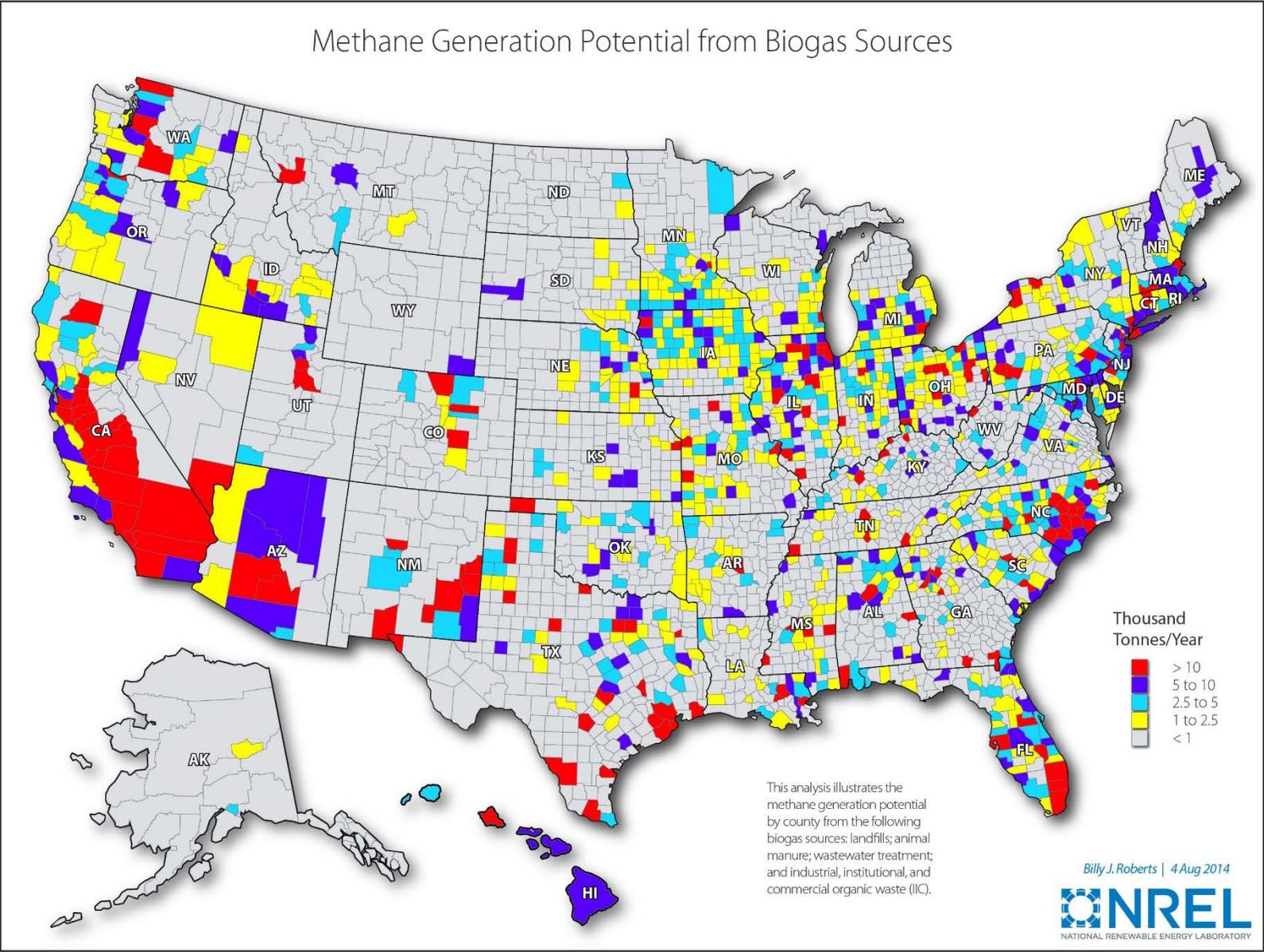


Source: <https://www.flickr.com/photos/usdagov/7599593386>

OVERALL ANAEROBIC DIGESTION PROCESS



# Methane Generation Potential from Biogas Sources



Source: <https://www.afdc.energy.gov/data/10721>

# California laws to promote bioenergy

## State agency strategies

- SB 605 (2014), SB 1383 (2016): SLCP Strategy
- AB 1257 (2013): Natural Gas Act Report
- Bioenergy Action Plan
- Sustainable Freight Action Plan

## Financial incentives

- AB 995 (1999), AB 970 (2000), SB X5 (2002), AB 2228 (2002)
- Executive Order S-01-07: LCFS
- AB 32 Cap & Trade Offsets
- AB 1122 (2012) (BioMAT)
- Proposition 1B, AFIP, AQIP, ARFVTP, EPIC

## Grants to build biomethane projects

- SB 5X (2001)
- SB 852 (2014), AB 1613 (2016): CDFA grants
- AB 2313 (2016)

## Procurement requirements

- Executive Order S-06-06
- SB 350 (2015)

## Develop and review CPUC pipeline standards

- AB 1900 (2012), SB 840 (2016)

# Market uncertainty

## Barriers:

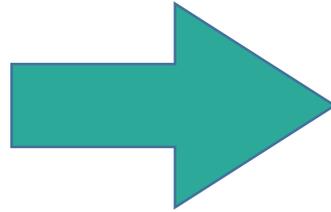
Uncertain revenue

No operational history

Lack of private capital

Unclear demand

Regulatory uncertainty



## Efforts by State:

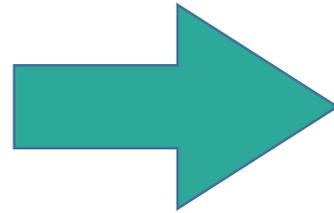
- BioMAT
- RPS
- LCFS credits, RINS
- Guidance on offsets, LCFS
- Pilot financial mechanism
- Public grants
- Streamlined permitting
- Agency coordination

# Pipeline infrastructure costs

Costs

- CCST study of standards

CPUC Standards



- Rate-base “pipeline infrastructure” for pilot projects

Time

- 50% cost reimbursement

# Community and environmental concerns

Air pollution (Ammonia, VOCs)

➤ Outreach requirements

Water quality

Odor

➤ Community benefit agreements

Animal health

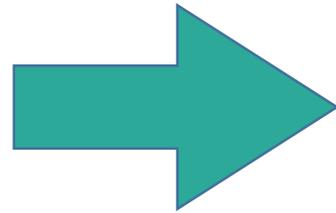
➤ CEQA mitigation

Costs to rate-base

➤ Monitoring

Access to clean energy and transportation for low-income residents

➤ Public funding



# Efforts going forward

## Learn:

- Dairy composition
- Methane reduction technologies
- Persistence and episodic nature of dairy methane emissions
- Environmental impacts and mitigation methods
- Drivers for market certainty and sustainable operation

## Do:

- Continue agency coordination
- Establish new and updated policies
- Implement pre-regulation requirements of SB 1383
- CARB regulations of dairy methane

# Connections and implications

- Co-benefits
- Environmental justice
- Industry transformation
- Significant agency and stakeholder pre-regulation collaboration
- Market transformation vs. command and control regulation
- Global recognition for SB 1383: 2017 Climate and Clean Air Award for Policy in Bonn, Germany (Nov. 12, 2017)
- Global technology transfer

# Resources and contact

CARB website:

<https://ww2.arb.ca.gov/>

CARB Short-Lived Climate Pollutant website:

<https://www.arb.ca.gov/cc/shortlived/shortlived.htm>

Contact:

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