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THE PROMISE OF RENEWABLE GAS IN CALIFORNIA

- Why Biogas?
- Potential Production in California
- How to Reach that Potential

Why Biogas ?

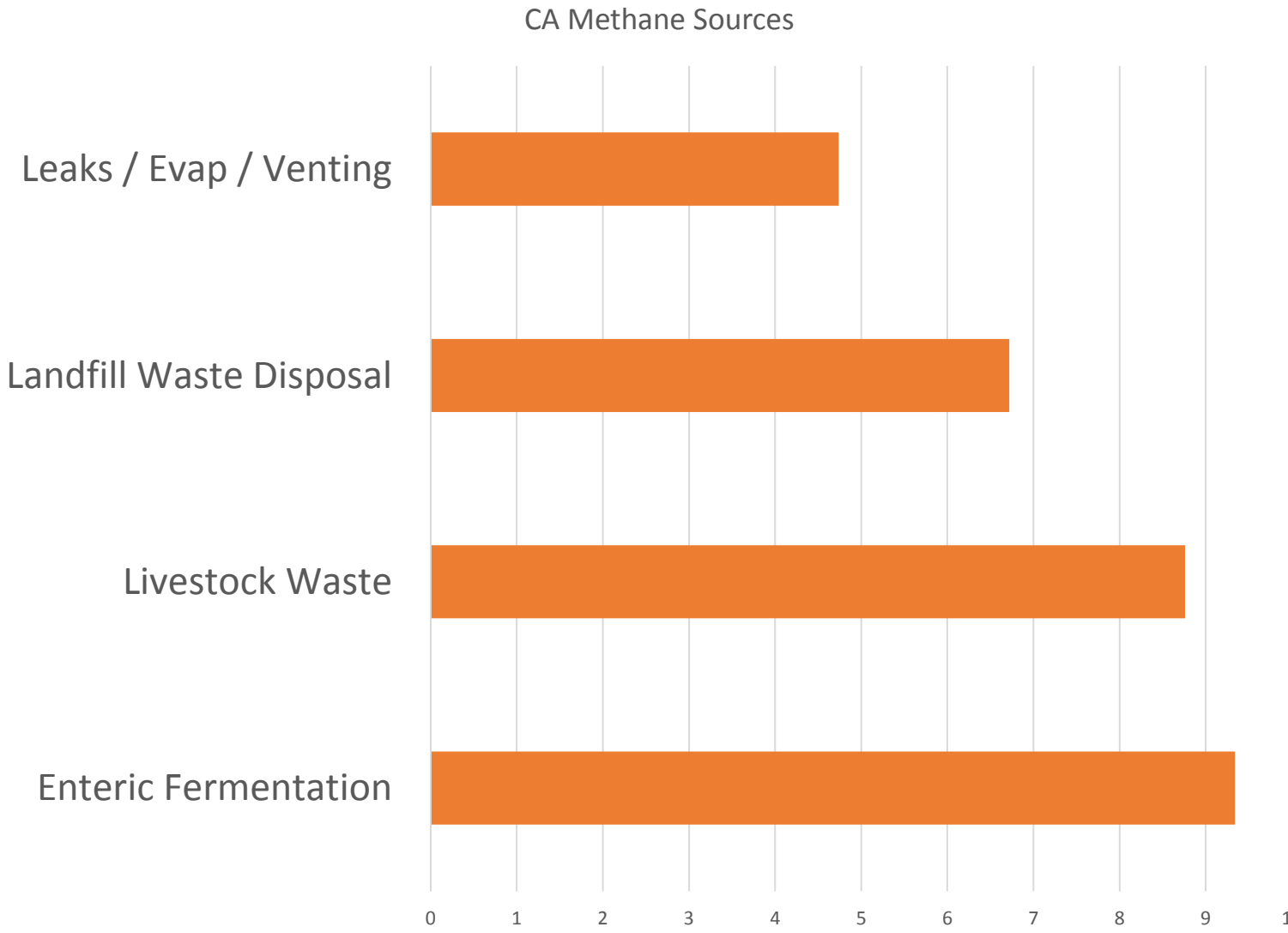
- Reduce:
  - ✓GHG emissions and SLCP's
  - ✓Air and water pollution
  - ✓Petroleum and natural gas use
  - ✓Landfilling
  - ✓Catastrophic Wildfires
- Generate Renewable Energy and Low Carbon Fuels
- Produce Jobs and Economic Development
- Improve Agricultural Productivity

Potential to Reduce Climate Pollution

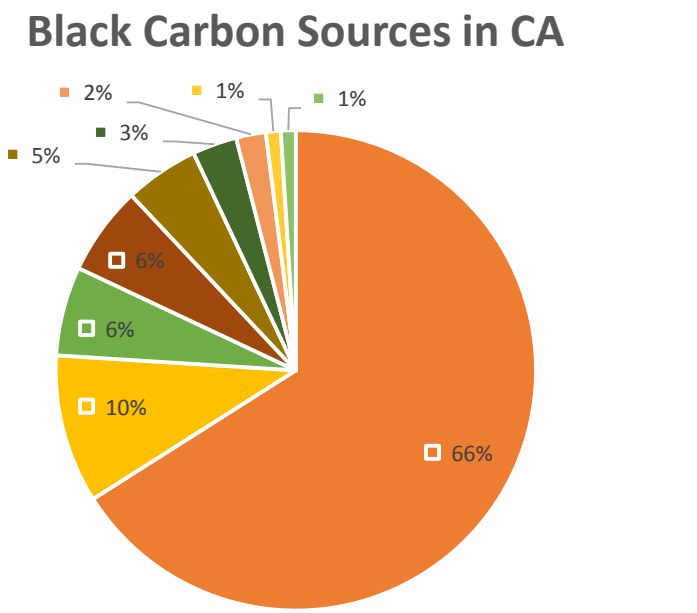
1. Downstream: reduce GHG emissions
   - ➢ Natural gas causes 25% of CA's greenhouse gas emissions
2. Upstream: reduce Short-Lived Climate Pollutants
   - ➢ Reducing SLCP's is the **ONLY** way to immediately slow global warming and begin to reverse its impacts
   - ➢ Provide immediate public health benefits

Potential to Reduce SLCP's - Methane

- Methane = 28-84 times more potent than CO_2
- Organic Waste = 3 of 4 biggest methane sources in CA



Potential to Reduce SLCP's – Black Carbon



- 900 – 3,200 x more potent than CO_2
- 66% comes from wildfire in CA
- Major source of air pollution, rainfall disruption, crop and forest damage

Reduce Air Pollution

- Biomethane can replace diesel in heavy-duty vehicles
- Cut NO_x and PM by up to 90%
- Reduce air pollution from wildfires and open field burning
- Reduce air, water and odor pollution from dairies
- Reduce air quality impacts from landfilling

Reduce Landfilling

- Organic waste = 2/3 of all landfill waste (22 million tons / year)
- Includes wood and construction debris, yard and green waste, food and food processing waste, agricultural waste, etc.
- AB 1826 (Chesbro, 2014) requires diversion of commercial organic waste by 2020
- SLCP Plan calls for 90% landfill diversion by 2025

Produce Renewable Energy and Fuels

- Lowest Carbon Transportation of Any Kind
- Can replace diesel powered heavy duty vehicles
- Flexible generation, renewable power
- Needed to complement wind and solar
- Low carbon, renewable gas for heating, cooling and industrial purposes

Gasoline	99.18
Diesel	98.3
Biodiesel from Midwest soy beans	83.25
Corn ethanol	74.70 to 120.99
Natural Gas	68
Sugarcane ethanol	58.4 to 78.94
Fuel Cell (non-renewable hydrogen)	39.42
Electric vehicles (CA power grid)	30.80
Renewable Diesel	19 to 39
Landfill gas	11.26 to 15.56
Dairy Biogas	13.45
Wastewater biogas (large facilities)	7.89
Biogas from diverted food and green waste	- 15

Improve Soils and Water Conservation

- Beneficial co-products = digestate, biosolids, biochar
- Co-products provide:
  - Carbon sequestration
  - Water conservation
  - Non-petroleum based fertilizers
  - Treatment for fire-ravaged lands

Create Jobs and Economic Development

- 2 to 6 times more jobs than natural gas
- Reduce gas imports
  - CA imports 91% of its gas supply
  - Costs CA $9 billion/year
- Produce jobs and economic development in every region, including disadvantaged and rural regions

Organic Waste in California

- More than 500 WWTP's
- 278 landfills
- 1600 dairies
- 22 million tons of organic waste landfilled per year

Potential Biogas Production in CA

- Nearly 300 billion cubic feet of biogas per year
- 5 to 6,000 MW of power
  - Enough to power 2 to 3 million homes
- 2.4 Billion gallons of fuel
  - Enough to replace 3/4 of diesel used in CA vehicles

Achieving the Promise of Biogas

- Pipeline and transmission line access
- Align incentives with the level of GHG reductions
- Quantify benefits, especially GHG reductions
- Market for co-products
- Market certainty for biogas – Renewable Gas Standard

THANK YOU

Julia Levin, Executive Director

jlevin@bioenergyca.org

510-610-1733

www.bioenergyca.org

Bioenergy Association of California