Short-Lived Climate Pollutants

JUNE 2021
Overview – Short-Lived Climate Pollutants

• SLCPs are potent, climate forcing gases with relatively short atmospheric lifetimes
  o Methane
    ▪ Dairy & Livestock
    ▪ Landfill Organic Waste
    ▪ Oil & Gas
  o HFCs
  o Black carbon
Short-Lived Climate Pollutants Policy Framework

• Senate Bill 1383 (Lara, 2016) requires CARB to adopt and begin implementing the Short-Lived Climate Pollutant (SLCP) Reduction Strategy

• In 2017, CARB approved and began implementing the comprehensive SLCP Reduction Strategy to reduce statewide emissions to below 2013 levels by 2030 for:
  ◦ methane by 40 percent
  ◦ hydrofluorocarbon gases by 40 percent, and
  ◦ anthropogenic black carbon by 50 percent.
Methane Emissions

Statewide Total Methane Emissions in 2018: 39.8 MMTCO₂e

- Leading emission sources:
  - Dairy and Livestock Sector (54%)
  - Landfilled Organic Waste (22%)
  - Oil & Gas (14%)

* California Methane Inventory for 2000-2018; using 100-year AR4 Global Warming Potential
Dairy and Livestock Methane Sources

- Dairy and livestock methane comprises 55% of the 40 MMTCO$_2$e methane emissions annually
  - 10 MMTCO$_2$e from manure management
  - 11 MMTCO$_2$e from enteric fermentation
  - 18 MMTCO$_2$e from other sources

2018 Methane Emissions

- 26% Dairy Manure  
  ~10 MMTCO$_2$e
- 18% Dairy Enteric  
  ~7 MMTCO$_2$e
- 46% All Other Sources  
  ~18 MMTCO$_2$e
- 10% Non-Dairy (primarily enteric)  
  ~4 MMTCO$_2$e
Actions to Reduce Dairy and Livestock Methane Emissions

- **Manure Management**
  - Install an anaerobic digester
  - Implement an alternative manure management practice
- **Enteric Fermentation**
  - Developing strategies including the use of methane inhibiting feed additives
- **Research**
  - Conduct methane emissions reduction research into new and emerging methane reduction strategies for manure management and enteric fermentation
Dairy and Livestock Methane Emissions Reduction Programs

- Cap-and-Trade
  - Low Carbon Fuel Standard

- Dairy Digester Research and Development Program
  - Alternative Manure Management Program

- Bioenergy Market Adjusting Tariff (BioMAT)
  - SB 1383 Dairy Biomethane Pipeline Injection Pilot Projects
  - AB 2313

- Renewable Fuel Standard (RFS)
Landfill Methane

- Californians disposed of approximately 22 million tons of organic waste in 2018, making up over half of all landfilled waste
  - Landfill gas capture systems (required under CARB’s Landfill Methane Regulation) avoid the release of up to 80% of methane generated
  - Landfill fugitive methane makes up over 8 MMTCO₂e statewide, the second largest source of methane emissions (22%)

CalRecycle (May 2020) 2018 Characterization of Solid Waste in California
Actions to Reduce Methane Emissions from Organic Waste

**Prevention**
- Food waste prevention and rescue programs to recover 20% of edible food

**Recycling**
- Expand Organics Recycling and Recovery Infrastructure
- Ensure best management practices are instituted at compost and AD facilities; promote use of compost to restore soil health and reduce fertilizer use.

**Gas Capture**
- Improve landfill operations and cover practices to control fugitive emissions
- Explore automated monitoring and control systems to improve capture efficiency

**Monitor and Respond**
- Develop remote sensing capabilities to monitor and respond to methane leaks
- Methane Source Finder and Carbon Mapper Projects
Organic Waste Methane Emissions Reduction Programs

- Organic Waste Grants and Loans
- Landfill Methane Regulation
- Low Carbon Fuel Standard
Fugitive Methane from Oil & Gas Systems

- In 2018, California’s oil and gas systems were responsible for ~6 MMTCO2e
- CA has an extensive oil and gas industry that contributes to fugitive methane emissions, including:
  - *Oil and gas production*
  - *Oil and gas storage*
  - *Natural gas transmission and distribution*
Oil & Gas Methane Emissions Reduction Programs

GHG Emission Standards for Crude Oil and Natural Gas Facilities
(Oil and Gas Methane Regulation, 2017)

Decision (D.17-06-015, June 2017)
Hydrofluorocarbon (HFC) Emissions

Statewide Total HFC Emissions in 2018:

21 MMTCO$_2$e
# HFC Emissions Reduction Programs

**Regulations Adopted Under AB32**
- The Refrigerant Management Program (RMP)
- Motor Vehicle AC: Advanced Clean Cars Low-GWP AC, and Small Can Recycling for DIYers
- Consumer Product Aerosol Propellants
- Semiconductor Manufacturing F-gas Reductions

**Cap-and-Trade ODS Offset Protocol**
- Provides methods to quantify and report GHG emission reductions from destruction of high GWP ozone depleting substances

**California SNAP**
- CARB Regulation
- SB 1013 (Lara, 2018)

**F-gas Reduction Incentive Program (FRIP)**
- Increase adoption of low-GWP refrigerant technologies in the supermarket and industrial sector.
- SB 1013 is the first State law to authorize incentive funding for this purpose
Mitigation Actions to Achieve the 2030 Target for HFC Emissions
Anthropogenic Black Carbon

Statewide Total Anthropogenic Black Carbon Emissions in 2013: 10.7 MMTCO$_2$e

* 2013 emissions from 2017 SLCP Inventory; using 100-year Global Warming Potential
Anthropogenic Black Carbon Emissions Reduction Programs

Fuel Combustion at On-road, Off-Road, and Stationary Sources

- Engine certification standards and in-use rules for on-road and off-road fleets
- Clean fuel requirements and incentives including California Climate Investments and Low Carbon Fuel Standard credits
- Investments in Research and Technology

Residential Wood Smoke

- SB 563 established the Woodsmoke Reduction Program: $7 million (2018-2020) through California Climate Investments
- USEPA Targeted Air Shed Grants: $11 million (2018-2020)
- Additional funding through Local Air District grant programs
What’s Next for SLCPs?

- Implementation continues, including for incentive programs that support methane reductions from livestock and waste, for deploying low-GWP refrigerants, and for black carbon reductions;

- Deployment of new monitoring technologies to identify, quantify, track, and respond to methane leaks;

- And in support of carbon neutrality and for the upcoming Scoping Plan:
  - Evaluation of progress towards the 2030 targets for SLCPs
  - Identification of post-2030 SLCP emissions and mitigation opportunities
Thank You