## California Greenhouse Gas Emission Inventory January 15, 2016

# Presentation Outline

- GHG Emission Inventory Background & Framework
- Classification of Emissions
- Potential GHG Inventory Updates
- Future Tracking of Impacts of AB 32 Programs

#### GHG Emission Inventory Background

- In 2006, AB1803 (H&SC §39607.4) gave ARB the responsibility to develop and maintain a state-wide greenhouse gas (GHG) emission inventory.
- The inventory follows Intergovernmental Panel on Climate Change (IPCC) Guidelines to ensure consistency and comparability with other national inventories.
  - Provides estimates of the amount of GHGs emitted to the atmosphere by human activities within California.
- AB 32 provided additional instruction to GHG Inventory compilation:
  - Explicitly name 7 GHGs: CO<sub>2</sub>, CH<sub>4</sub>, N<sub>2</sub>O, HFCs, PFCs, SF<sub>6</sub>, NF<sub>3</sub>
  - Also include emissions from generation of imported electricity
  - Establishment of 1990 emission level and 2020 emission limit

#### GHG Emission Inventory Development

- □ In 2007, ARB published the 1990-2004 GHG Inventory.
- Starting in 2010, ARB publishes the GHG Inventory annually covering the time series from 2000 to the latest year of data availability.
  - Some activity data from other agencies are available >1 year after the end of calendar year
  - 2015 edition of the inventory covers 2000-2013 emissions
- Inventory development process:
  - Undertake inventory improvement projects based on latest research, inventory methods and data
  - Perform emissions estimation calculations
  - Compile inventory database and perform data checks
  - Analyze trends in emissions, emitting activities, and indicators

#### GHG Emission Inventory Improvements

- In accordance to IPCC Guidelines, update the entire time series from 2000 to current year with the latest methods, science, and data sources each year.
  - Emissions estimates from older years may be revised if data source agencies revise the data series or if methods are updated
- Routine method & data updates:
  - Use better emissions estimation methodology
  - Use more accurate activity data and emission factor
  - Incorporate latest knowledge about emission sources
  - Consolidate or disaggregate existing inventory categories

#### Prior Updates to the Inventory

Emitting activities added to the Inventory since the establishment of 1990 emission level (2013 emissions in  $MMTCO_2e$  are shown in parenthesis):

- $\square$  NF<sub>3</sub> added as a new AB 32 pollutant (0.02)
- Composting added as a new category (0.5)
- Added CH<sub>4</sub> from pulp & paper manufacturing wastewater treatment (0.6)
- Included additional fugitive emissions from oil & gas production and natural gas pipelines that were not captured by Mandatory GHG Reporting Regulation (MRR) (3)
- Added lead smelting process emissions that were added to MRR (0.07)

#### GHG Emission Inventory Framework

- The inventory accounts for approx. 1200 emitting activities from the following sector categories:
  - Transportation
  - Industrial
  - Electric Power
  - Commercial and Residential
  - Agriculture
  - High GWP
  - Recycling and Waste
- In development: a separate inventory for forests and other lands



#### GHG Emission Inventory Framework

- The Mandatory GHG Reporting Regulation (MRR) is the cornerstone data source for the inventory. The inventory also accounts for emission sources not captured by MRR:
  - Agriculture, forestry, and waste sectors
  - Industrial/commercial facilities below MRR reporting threshold
  - Biofuel combustion in residential and commercial sector
  - Jet fuel and bunker fuel
  - High-GWP gases
- Non-anthropogenic sources of emissions are not part of the accounting
- Use Global Warming Potentials (GWP) values from IPCC 4th Assessment Report, consistent with national and international organizations

## Classification of Emissions: Included

#### Emissions Included in the Inventory

- In-State Emissions:
  - Fossil fuel combustion
    - Stationary and mobile sources (on-road vehicles, rail, intrastate aviation, and ship & boat emissions within 24 nautical miles from California coast)
  - Industrial process emissions
  - CH<sub>4</sub> and N<sub>2</sub>O from biomass-derived fuel combustion
  - Emissions from the agriculture, residential/commercial, and waste sectors
  - Fugitive emissions from oil & gas production, pipelines, and industrial sources
  - High-GWP Ozone Depleting Substance (ODS) substitutes
- Imported Electricity

## Classification of Emissions: Excluded

#### Emissions Excluded From the Inventory (But Tracked)

- Biogenic CO<sub>2</sub>
  - CO<sub>2</sub> from biomass-derived fuel combustion
  - Crop residue burning
  - Landfill gas and composting
- Interstate/International transportation sources
  - Interstate/international aviation
  - Ship & boat emissions occurring within 24-100 nautical miles from California coast
- Federal military mobile/portable sources

#### Current Classification of Transportation Biofuel Emissions

- In 2015 edition of the GHG Inventory, all emissions from biofuel combustion by vehicles are classified as "included."
  - Ethanol is listed separate from gasoline
  - Biodiesel and renewable diesel are a part of the generic "diesel" fuel category
  - Biomethane used in natural gas vehicles is a part of the generic "natural gas" fuel category
- Transportation biofuel is an emerging sector. We are starting to see large volume of biofuels and significant growth in recent years.

#### Proposed Update to Classification of Transportation Biofuel Emissions

- Planned updates to 2016 edition of the GHG Inventory:
  - Break out biodiesel, renewable diesel, and biomethane into their own fuel category
  - Re-classify CO<sub>2</sub> from transportation biofuels as biogenic CO<sub>2</sub>
- IPCC Guidelines offers instruction for nations to break out biofuel feedstock from transportation fuel, and report the biogenic CO<sub>2</sub> separate from their national GHG inventory<sup>1</sup>
- In accordance to IPCC Guidelines, update the entire time series from 2000 to 2014 in 2016 edition (CH<sub>4</sub> and N<sub>2</sub>O are still classified as "included" emissions)
- Potential data sources for breaking out biofuel components:
  - 2011 and after: MRR
  - 2000-2010: California Energy Commission
- <sup>1.</sup> 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2, Chapter 3

# California GHG Emissions with Re-classification of Ethanol $CO_2$



#### Other Potential GHG Inventory Updates

- Re-classify natural petroleum seeps as excluded emissions
  - IPCC Guidelines does not identify seeps as an emission source to be quantified in national GHG inventories
  - U.S.EPA's national GHG inventory does not quantify seeps
  - Re-classify 0.6 MMTCO<sub>2</sub>e of (2013) emissions from "included" to "excluded"

#### Other Potential GHG Inventory Updates

- Evaluate the potential to incorporate the CH<sub>4</sub> reductions from Landfill Regulation
- Update estimate of domestic wastewater anaerobic digesters and pulp & paper manufacturing using California-specific activity data
- Update cattle population estimate using US Dept. of Agriculture's Census data and California Dept. of Food and Agriculture data
- Continue to improve existing inventory categorization to better support program data needs (no change to method or data source)

#### Future Tracking of Impacts of AB 32 Programs

- Maintain a GHG inventory for purposes of time series and consistency with IPCC/US EPA GHG inventories
- Consider an additional framework to effectively track the broader GHG emission reductions of AB 32 programs
  - Reconcile top-down accounting with bottom-up program data
  - Potential accounting for out-of-state GHG reductions due to AB 32 programs

## Next Steps

- Public comments welcome
- Links to submit both written comments and view all comments received can be found at:

http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm