

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: CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, NF₃
 - 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

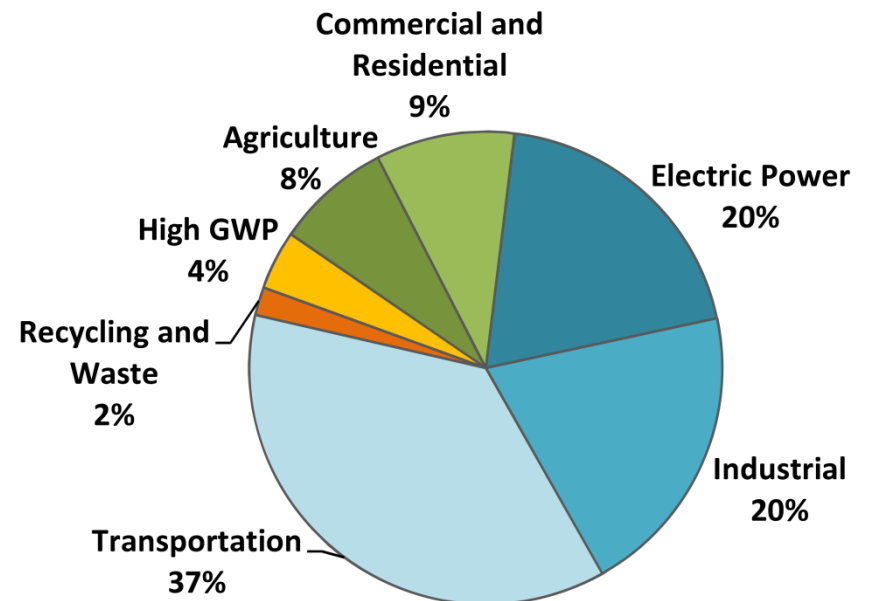
Emitting activities added to the Inventory since the establishment of 1990 emission level (*2013 emissions in MMTCO₂e are shown in parenthesis*):

- NF₃ added as a new AB 32 pollutant (0.02)
- Composting added as a new category (0.5)
- Added CH₄ 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



2013 Total CA Emissions: 459.3 MMTCO₂e

- 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
- ▣ CH₄ and N₂O 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 CO₂
 - ▣ CO₂ 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

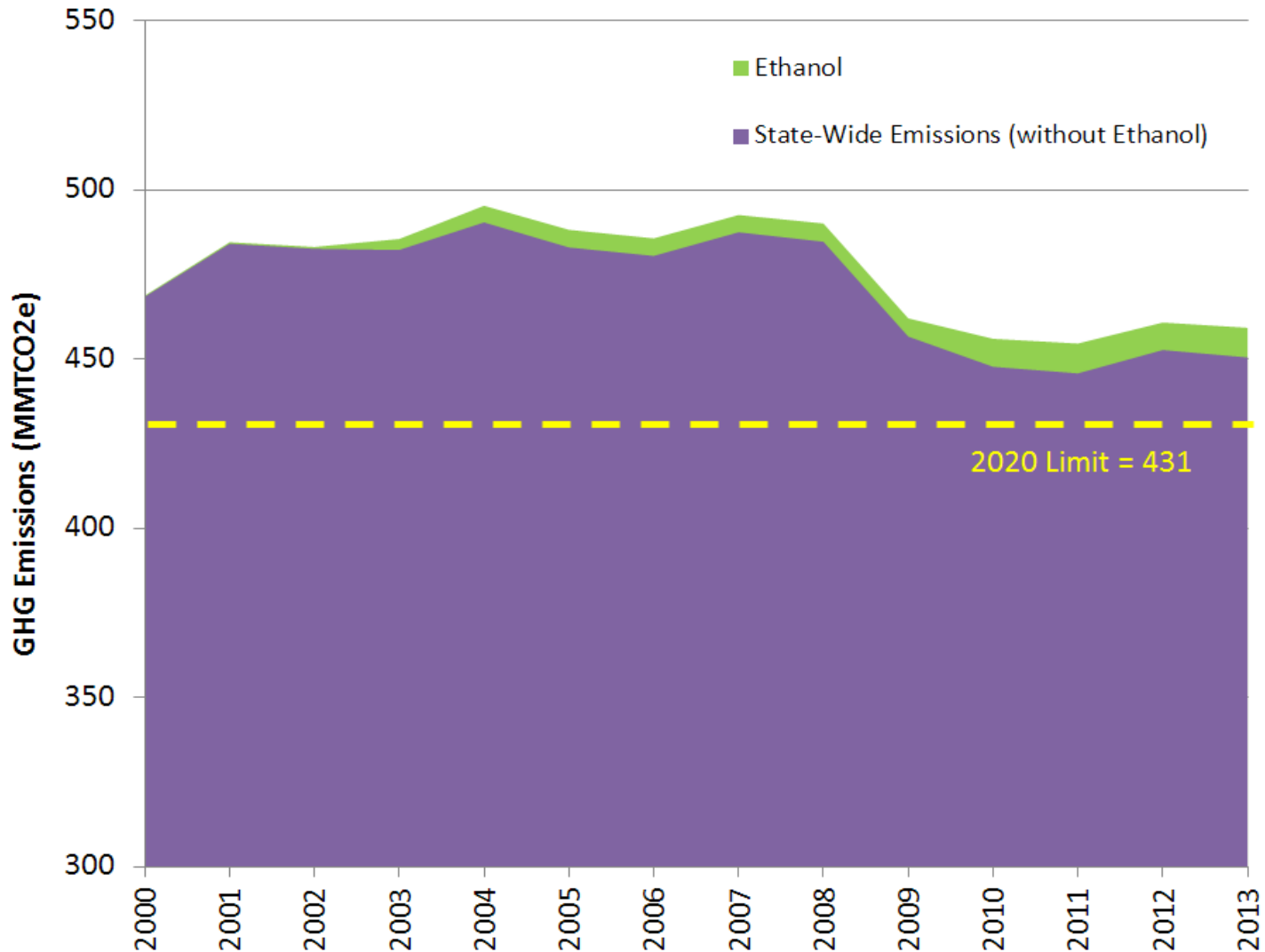
- In 2015 edition of the GHG Inventory, all emissions from biofuel combustion by vehicles are classified as “included.”
 - Ethanol is listed separate from gasoline
 - Biodiesel and renewable diesel are a part of the generic “diesel” fuel category
 - Biomethane used in natural gas vehicles is a part of 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 CO₂ from transportation biofuels as biogenic CO₂
- IPCC Guidelines offers instruction for nations to break out biofuel feedstock from transportation fuel, and report the biogenic CO₂ separate from their national GHG inventory¹
- In accordance to IPCC Guidelines, update the entire time series from 2000 to 2014 in 2016 edition (CH₄ and N₂O are still classified as “included” emissions)
- Potential data sources for breaking out biofuel components:
 - 2011 and after: MRR
 - 2000-2010: California Energy Commission

¹. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Vol. 2, Chapter 3

California GHG Emissions with Re-classification of Ethanol CO₂



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 MMTCO₂e of (2013) emissions from “included” to “excluded”

Other Potential GHG Inventory Updates

- Evaluate the potential to incorporate the CH₄ 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>