Downstream Natural Gas Initiative

October 26, 2017

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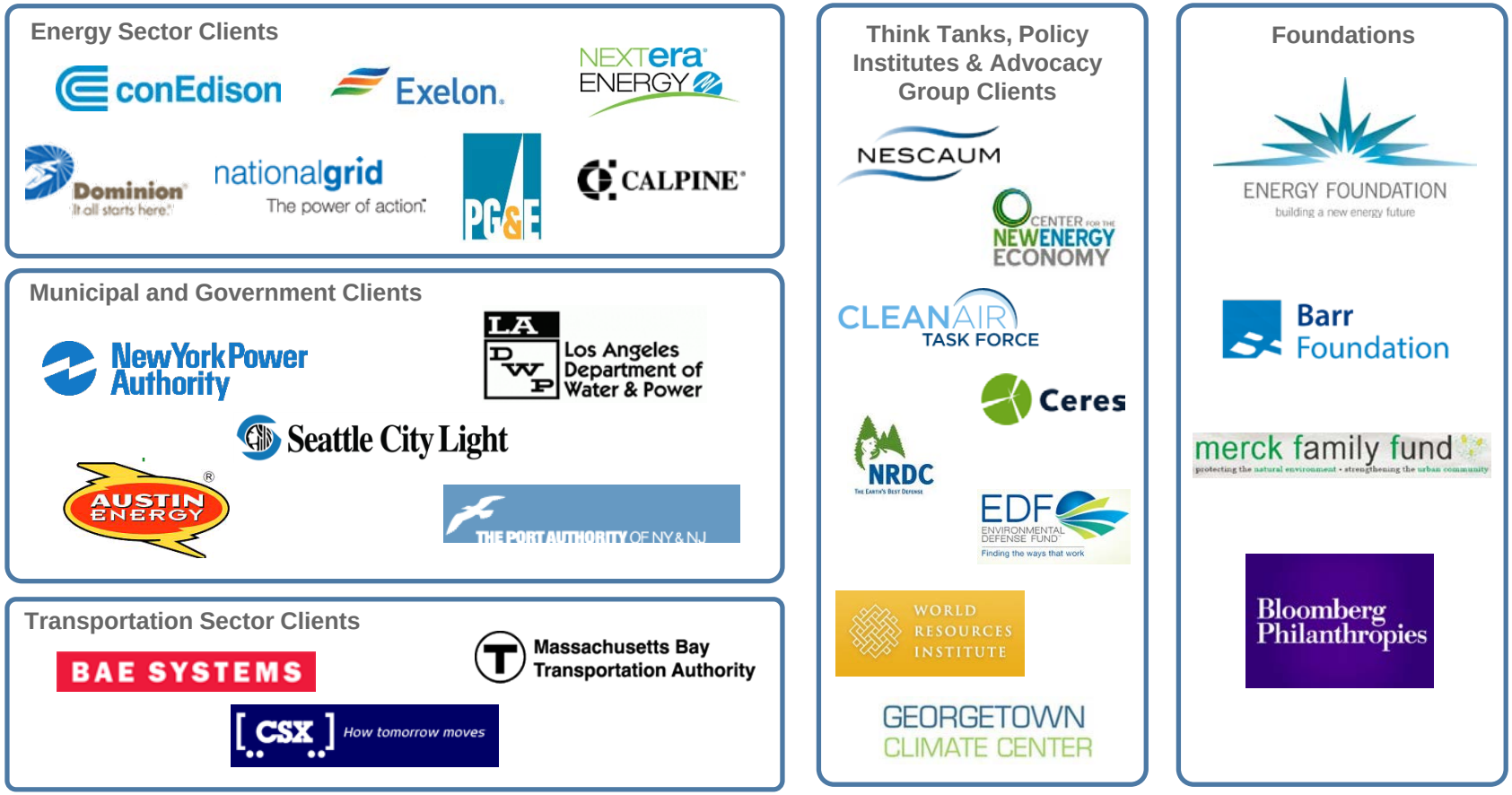
MJB & A

Outline

- **MJB&A Collaboratives**
- **Background on DSI**
- **LDC progress reducing methane emissions**
- **Role of natural gas and LDCs in a low carbon future**

Representative Clients

Our clients are multi-national in scope and include energy and clean technology firms, environmental groups, transportation companies, and government agencies.



MJB&A Coalitions

Facilitated Collaboration

- Clean Energy Group
- Downstream Natural Gas Initiative
- Natural Gas Supply Collaborative
- East Coast Utility EV Initiative

Downstream Natural Gas Initiative

PG&E, conEdison, nationalgrid The power of action., Xcel Energy RESPONSIBLE BY NATURE

Key Focus Areas:

- Methane emissions quantification
- State-of-the-art leak detection technologies
- Key regulatory policy

Utility EV Initiative

EVERSOURCE ENERGY, Exelon, New York Power Authority, AVANGRID, LIPA Long Island Power Authority, PSEG, nationalgrid The power of action., Orange & Rockland, conEdison

The Utility EV Initiative is a group of leading east coast electric utilities collaborating to address key market, regulatory and technical factors affecting the growth of the regional electric vehicle market.

The mission of the Utility EV Initiative is to advance the electrification of the transportation segment through consumer engagement and education, making the case for utility programs to help accelerate EV charging infrastructure deployment, and integration of EVs into the electric grid for the benefit of all electric customers.

Natural Gas Supply Collaborative

Objectives

- NGSC is finalizing a report that will identify a concise set of non-financial performance indicators that respond to stakeholder questions. NGSC is highlighting the key topic areas of interest from the perspective of natural gas purchasers.
- Broader information sharing supports a virtuous cycle where companies highlight their approaches to managing natural gas development, companies and stakeholders benefit from having more information on leading practices, and stakeholders and the public gain greater insights into how companies are protecting the environment and local communities.
- NGSC participants intend to promote the use of the final performance indicators by natural gas producers.

Natural Gas Supply Collaborative

About:

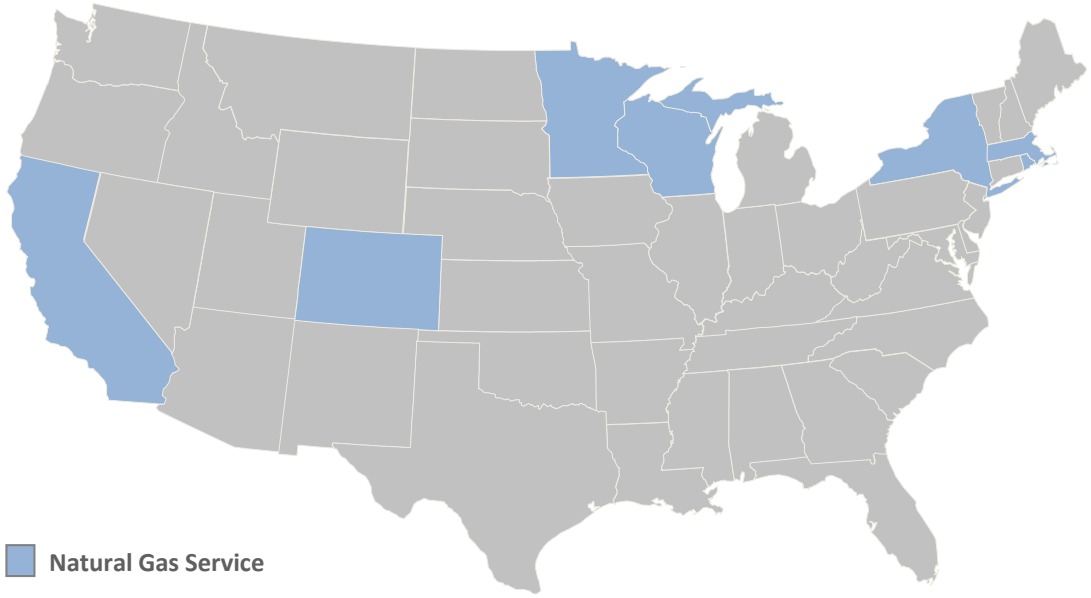
- Voluntary collaborative of natural gas purchasers, including natural gas distribution companies and electric generating companies, that are interested in promoting safe and sustainable practices for the supply of natural gas.

Downstream Natural Gas Initiative

A coalition of natural gas utility companies dedicated to promote outstanding operations to manage and substantially reduce methane emissions within natural gas distribution systems.

Our members deliver natural gas to more than 11 million customers accounting for nine percent of the total natural gas deliveries in the U.S.

We have nearly 115,000 miles of natural gas distribution mains throughout the U.S.



nationalgrid

conEdison, inc.

PG&E Pacific Gas and Electric Company

Xcel Energy

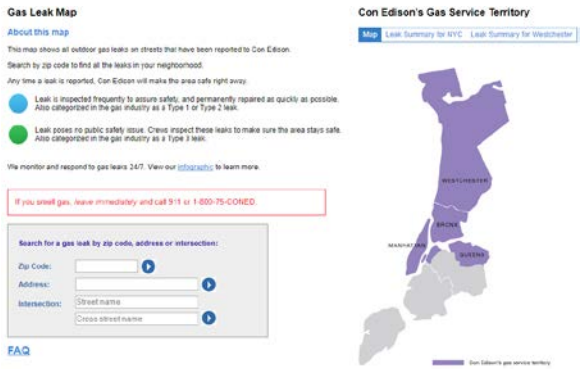
DSI Member Activity

PG&E Mobile Surveys

Methane Challenge Founding Partners

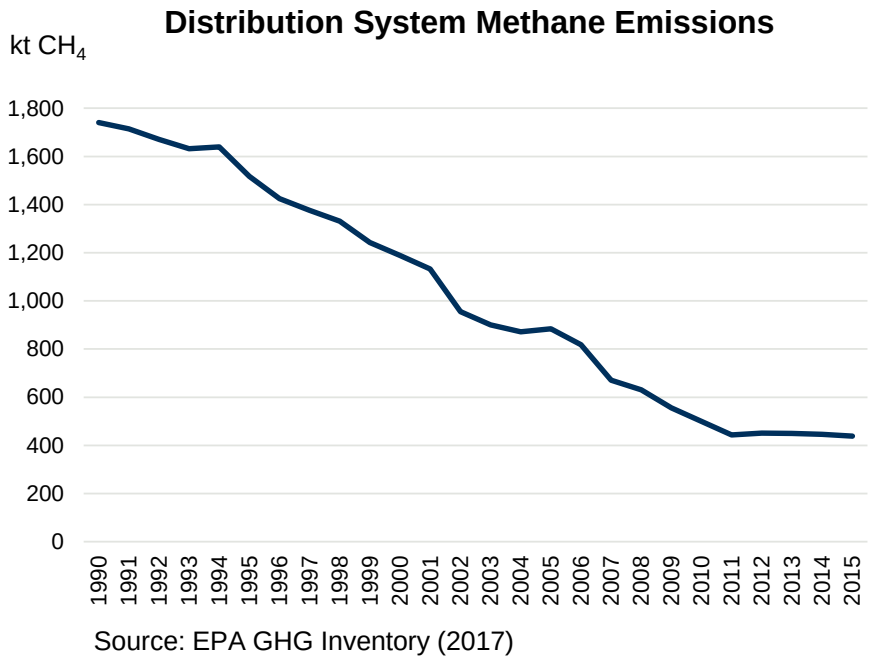
National Grid EDF/Google Earth NY Leak Data

Xcel Energy Blowdown Mitigation

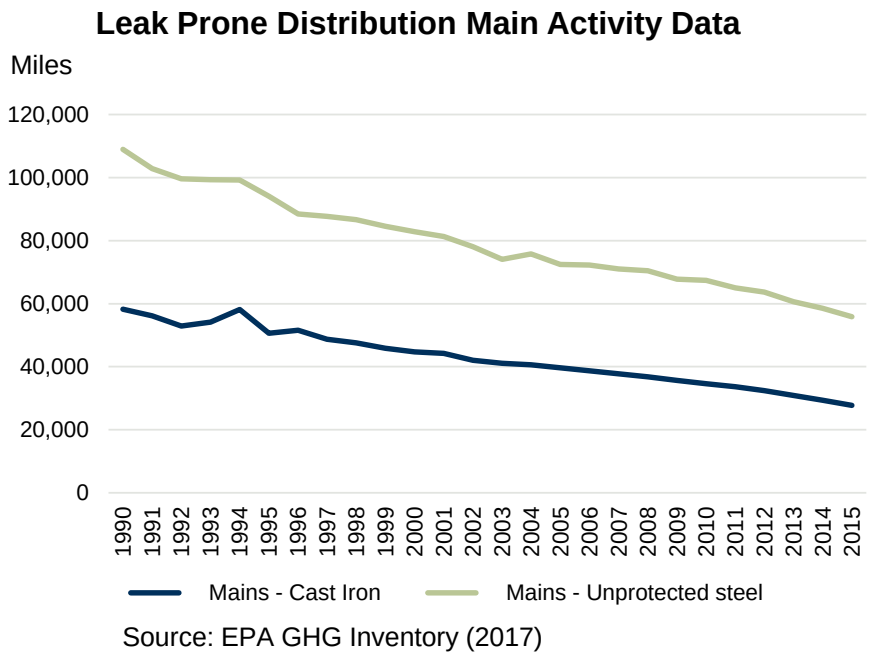


Con Edison Gas Leak Map

Distribution Methane Emissions in Decline



Source: EPA GHG Inventory (2017)



Source: EPA GHG Inventory (2017)

Drivers for Continued Collaboration on Methane Emissions

- **Grade 3 leaks**
- **Leak quantification**
- **Incorporating leak data into pipeline repair and replacement plans**

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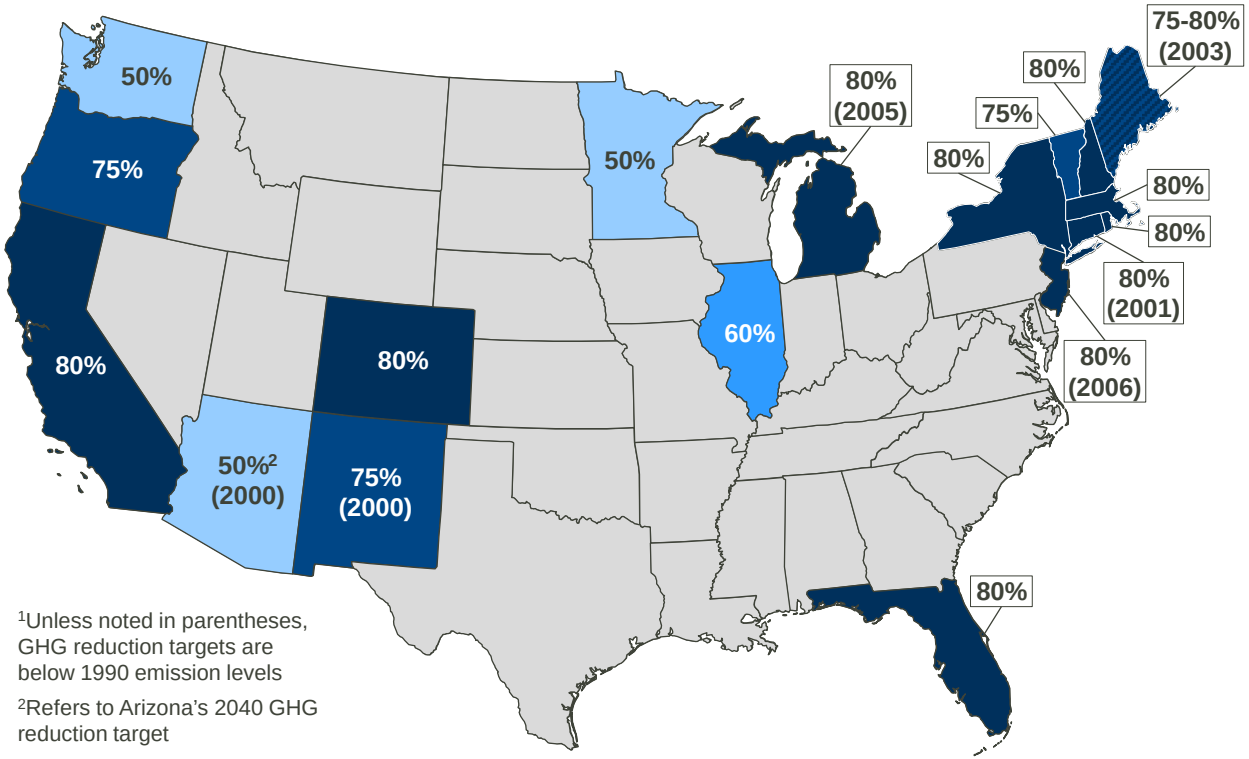
Low Carbon Future: LDC Pressures

State 2050 GHG Reduction Targets



[1]Unless noted in parentheses, GHG reduction targets are below 1990 emission levels

[2]Refers to Arizona's 2040 GHG reduction target

Regulations

- California Short Lived Climate Pollutant Strategy
- California natural gas leakage abatement best practices
- Massachusetts leak classification and prioritization
- Massachusetts declining methane caps
- New York methane strategy

Renewable Natural Gas

Obstacles

- Regulatory and market
- Costs: who pays for what?
- Technical: gas quality and interconnection standards

Potential Solutions

- Voluntary customer offerings
- Incentives for use outside of transportation and power generation
- State programs and policies
  - Gas quality/interconnection standards
  - Regulatory consideration of factors besides cost
  - Renewable gas standards
  - Direct contracting with large end-users

American Gas Foundation RNG Potential Estimates as a Percentage of 2015 U.S. Natural Gas Deliveries, by Customer Type (based on estimated potential of 2.4 tcf/year)

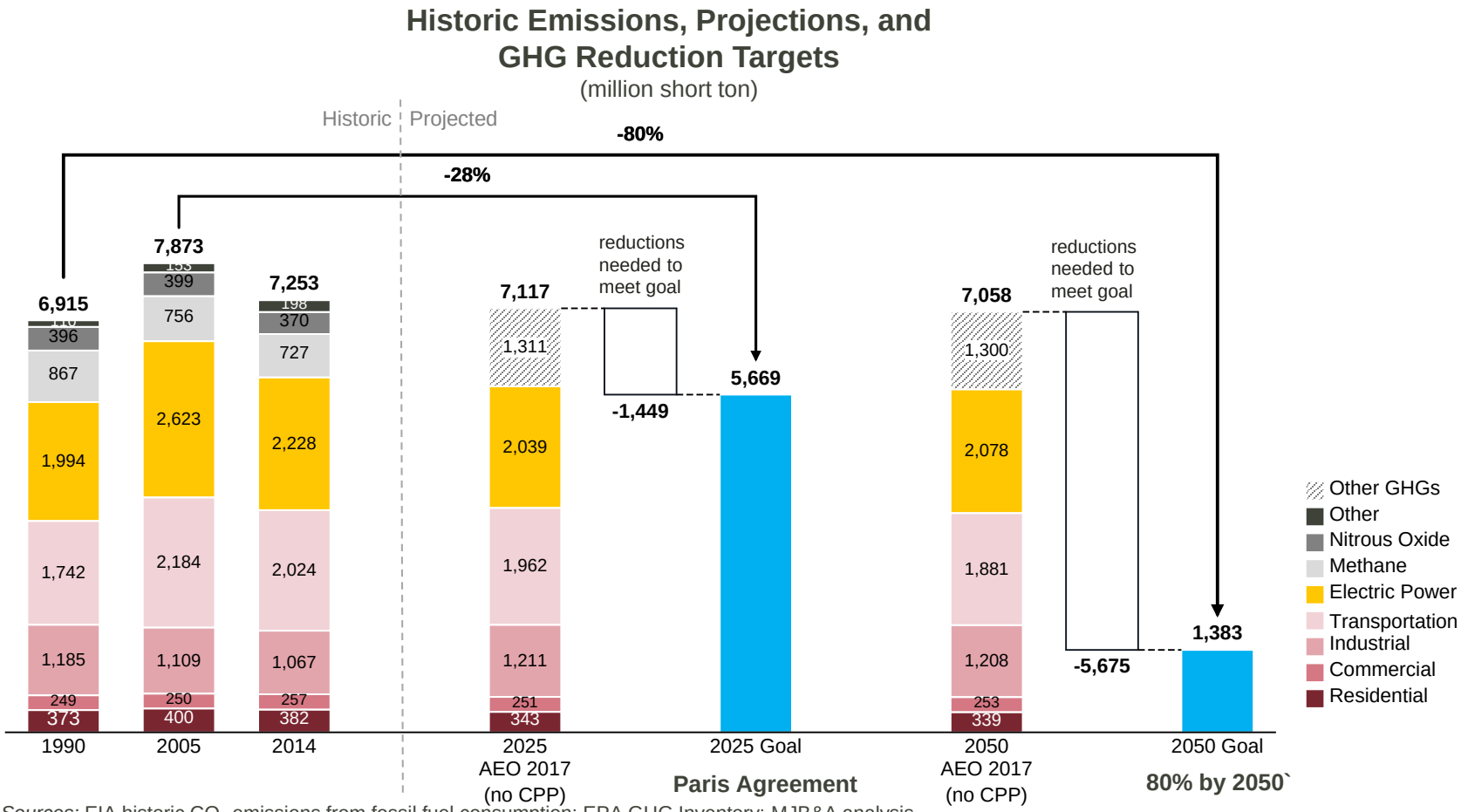
Customer Type	Natural Gas Delivered (Mscf)	RNG Potential as % of 2015 Deliveries
Residential	4,609,669,883	52%
Commercial	3,198,797,217	75%
Industrial	7,534,589,246	32%
Electricity Generation	9,689,827,433	25%
Vehicle Fuel	39,348,210	6119%
Total	25,072,231,989	10%

California Low-Carbon Fuel Standard Carbon Intensities

Gas Source	Carbon Intensity (g CO_2e/MJ)
California Natural Gas (traditional)	78.37
Landfill Gas	46.42
Dairy Digester Waste	-276.24
Wastewater Treatment	19.34
Municipal Solid Waste	-22.93

Low Carbon Future

Policy makers are increasingly interested in economy-wide strategies to achieve GHG reduction goals



Sources: EIA historic CO_2 emissions from fossil fuel consumption; EPA GHG Inventory; MJB&A analysis

Notes:

1. Sector emissions account for CO_2 emissions from fossil fuel consumption, which represents roughly 94% of total CO_2 emissions
2. "Other" includes emissions from HFCs, PFCs, SF_6, NF_3
3. "Other GHGs" estimated using EPA GHG Inventory historic 2014 non-CO_2 emissions' share of total GHG emissions

Source: EIA

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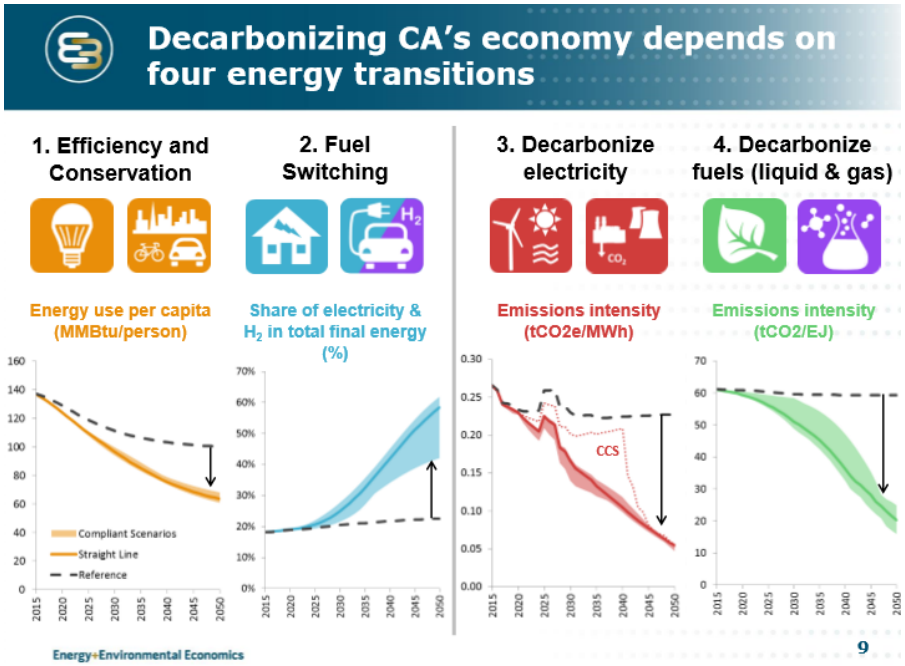
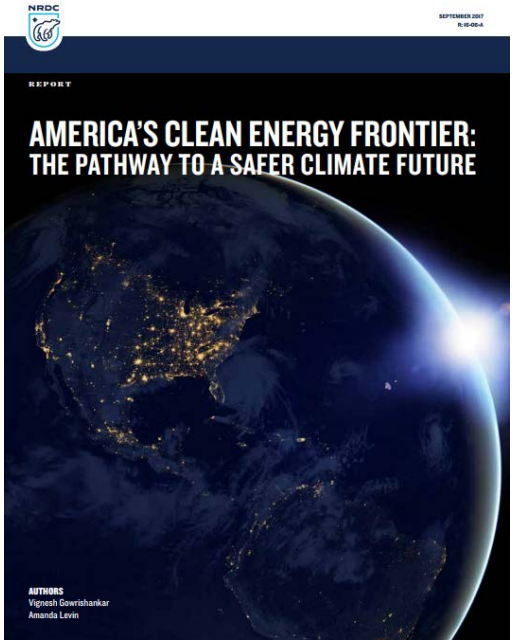
Decarbonization Analyses

Several state and national studies identify the key strategies for economy-wide decarbonization:

- Energy Efficiency - Energy intensity of GDP must decline by 70% to 2050 (Nationally)
- Decarbonized electricity - Near complete decarbonization of electricity
- Fuel switching – Electrification where possible
- Decarbonize fuels – Liquid and gas

PATHWAYS is a California-wide, economy-wide infrastructure-based GHG and cost analysis tool





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