DOCKETED

Docket Number:	16-IEPR-02
Project Title:	Natural Gas
TN #:	211767
Document Title:	Presentation - Methane Research Initiatives and Needs
Description:	Jorn Herner of ARB
Filer:	Raquel Kravitz
Organization:	California Air Resources Board
Submitter Role:	Public Agency
Submission Date:	6/9/2016 12:46:40 PM
Docketed Date:	6/9/2016

California Environmental Protection Agency
Air Resources Board

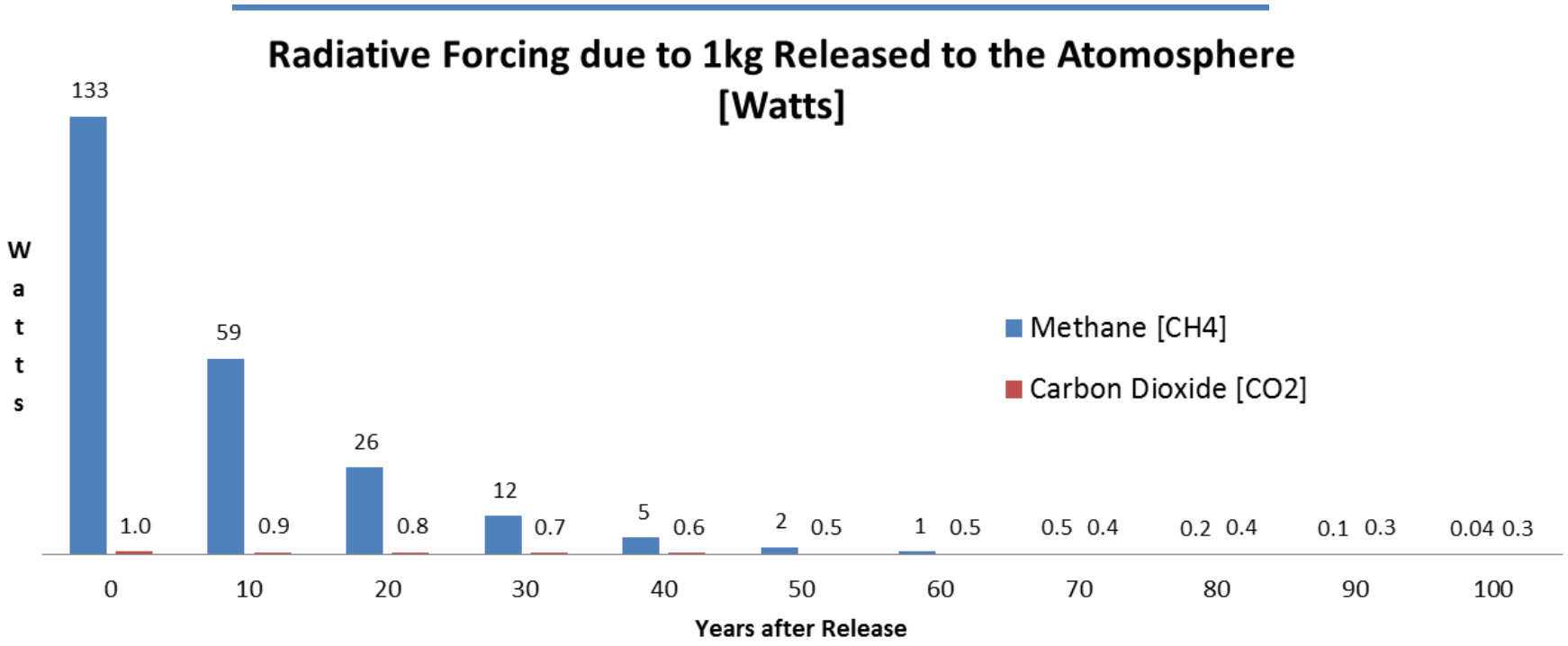
Methane Research Initiatives and Needs

Methane Emissions from California's Natural Gas System: Challenges and Solutions

Sacramento June 6-7, 2016

Why the concern with Methane?

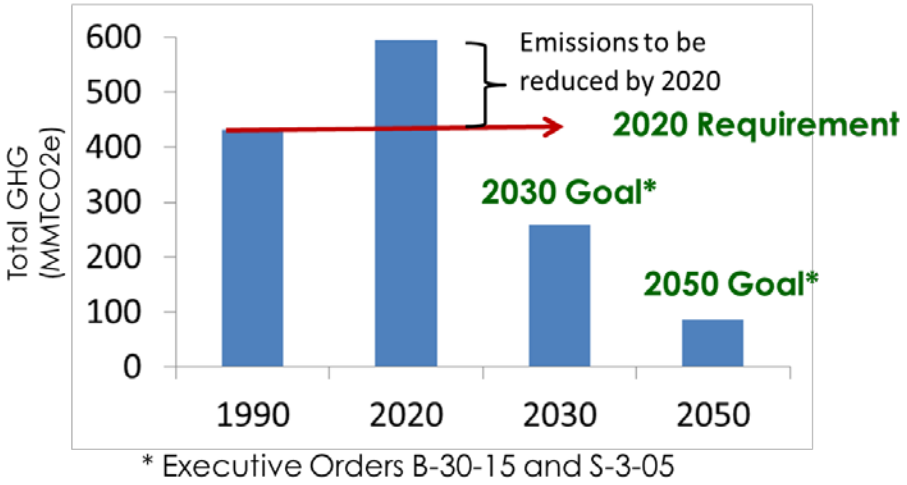
- Often emitted with other VOCs that are toxic or participate in photochemistry (ozone formation)
- Is a potent greenhouse gas
  - 100 year GWP = 28, 20 year GWP = 84



State Climate and Methane Reductions

GHGs

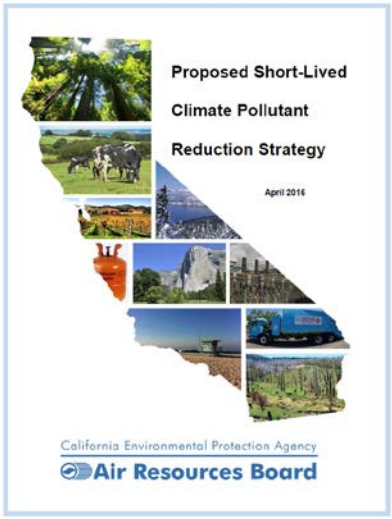
- Reduce GHGs to 1990 levels by 2020 (AB32)
- Executive Orders for 2030 and 2050



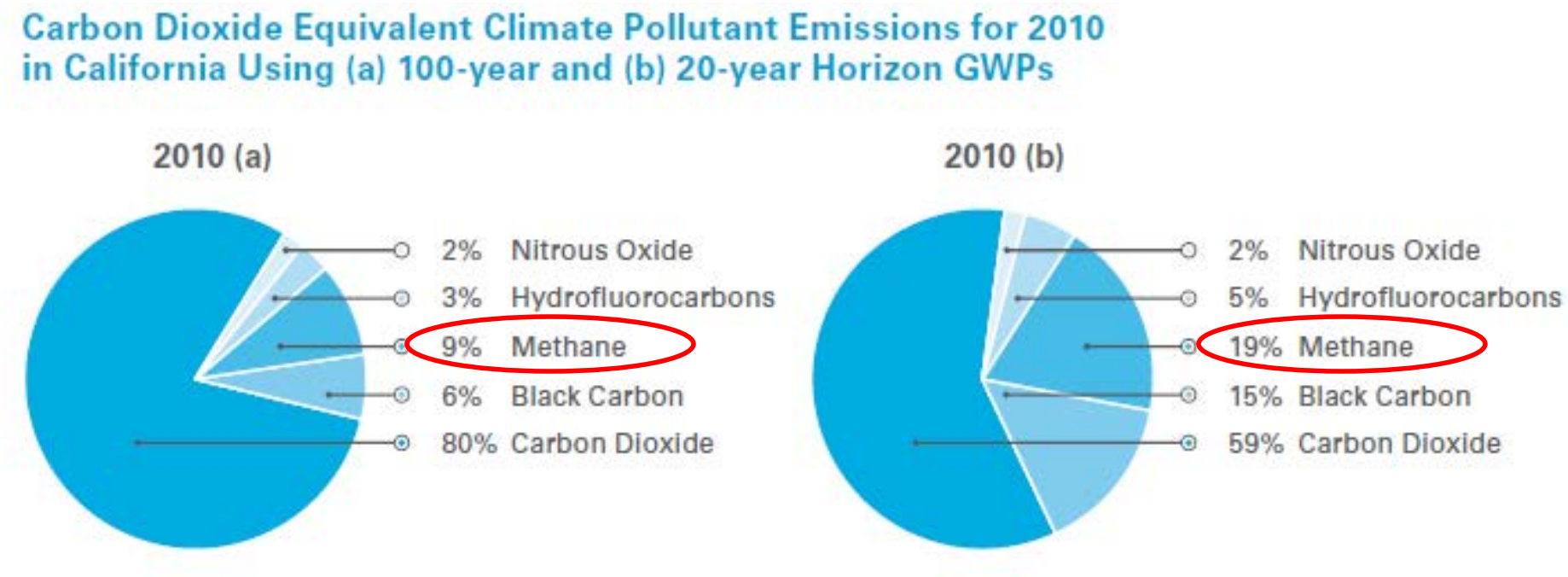
* Executive Orders B-30-15 and S-3-05

Methane

- Plan for reductions in Short Lived Climate Pollutants (SB605)
- Goal of reducing methane by 40% by 2030



California GHG Inventory



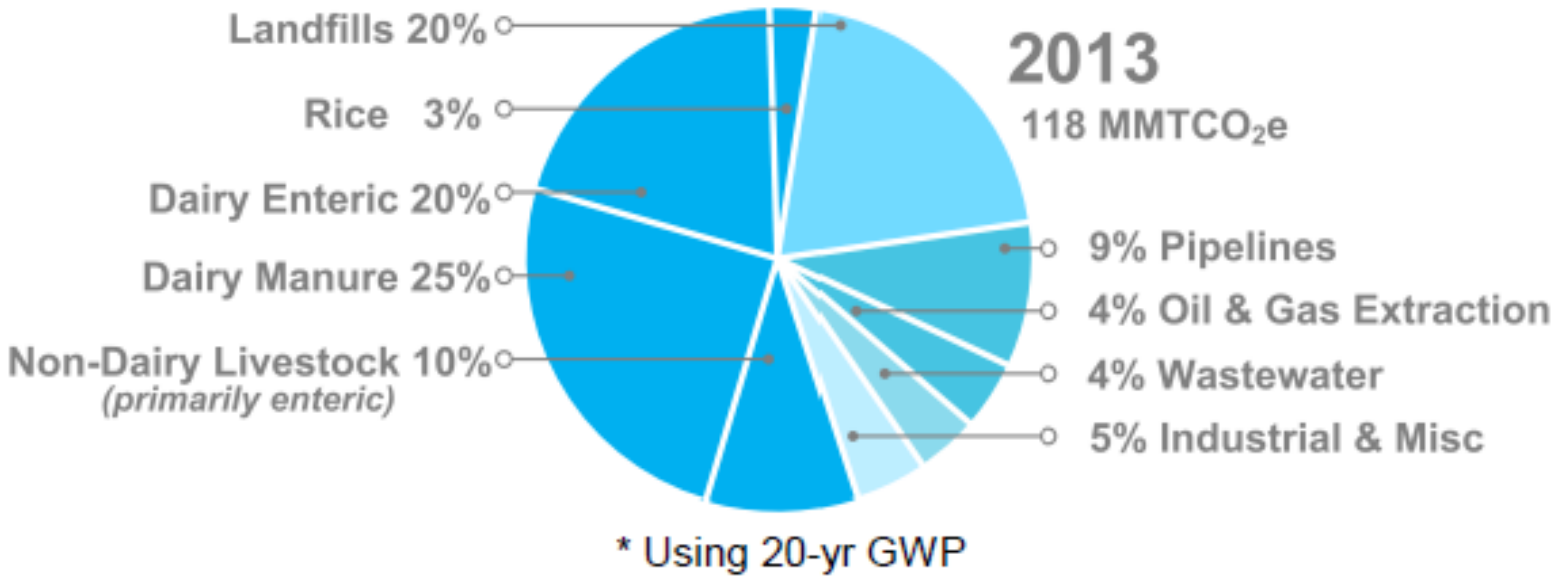
Using 100 yr GWP

Using 20 yr GWP

Source: Scoping Plan Update May 2014

Methane by Source in California

Figure 6: California 2013 Methane Emission Sources*



Source: SLCP Reduction Strategy April 2016

California Environmental Protection Agency
Air Resources Board

Broad Goals

- Improve understanding of emissions
  - Inform our inventories
  - Provide California specific emission factors
  - Provide emission factors for sectors that are poorly understood

- Find opportunities for emission reductions
  - High emitters
  - Unknown or under-represented sources

ARB Research Efforts

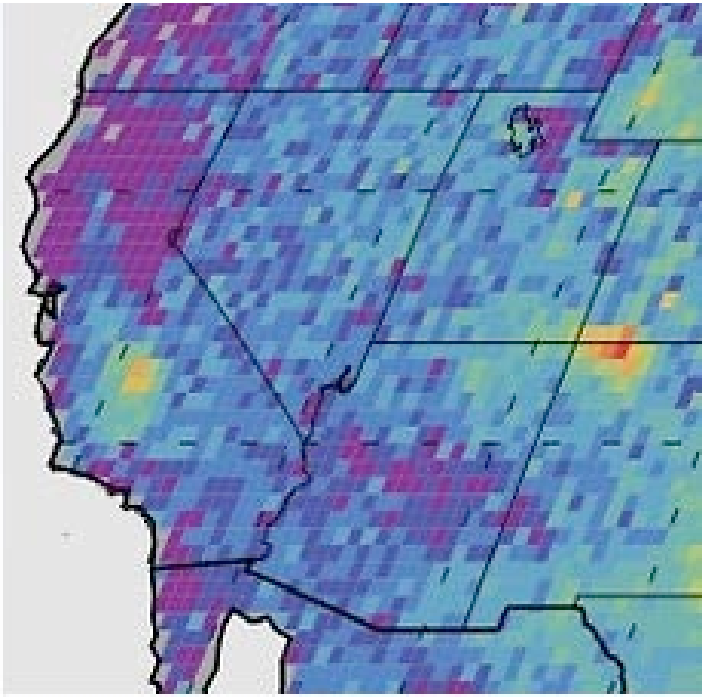
- Methane monitoring network since 2010
- Ambient measurements have consistently suggested methane inventory to be underestimated by approximately 50%
- Work continues to improve the network and the utility of the modeling

GHG Monitoring Stations

AB1496 – Methane Emissions

- <u>Undertake monitoring and measurements of high emission methane "hot spots"</u>
- Life-cycle greenhouse gas emissions analysis of natural gas produced and imported into California.
- Update relevant policies and programs to incorporate new information
- Review and assess the atmospheric reactivity of methane as a precursor to the formation of photochemical oxidant.

Kort et al 2014
(2003-2009 SCIAMACHY data)

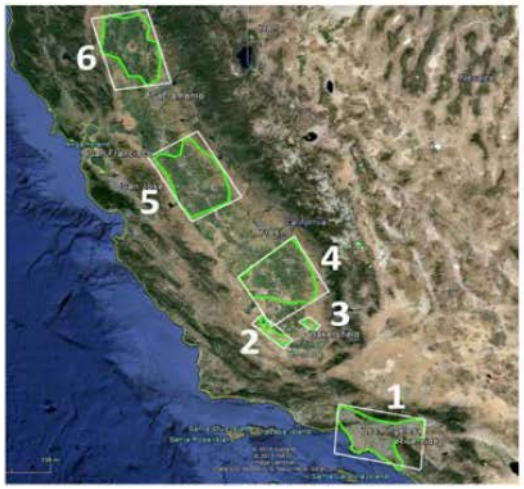


Methane hotspots in Southwest USA

NASA/JPL Airborne Survey

California Environmental Protection Agency
Air Resources Board

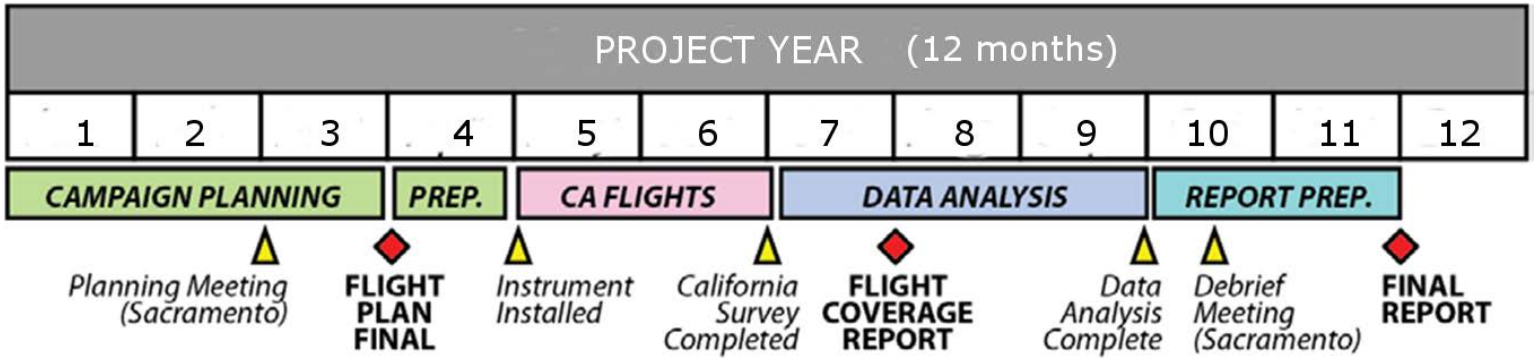
Expected to start June 2016



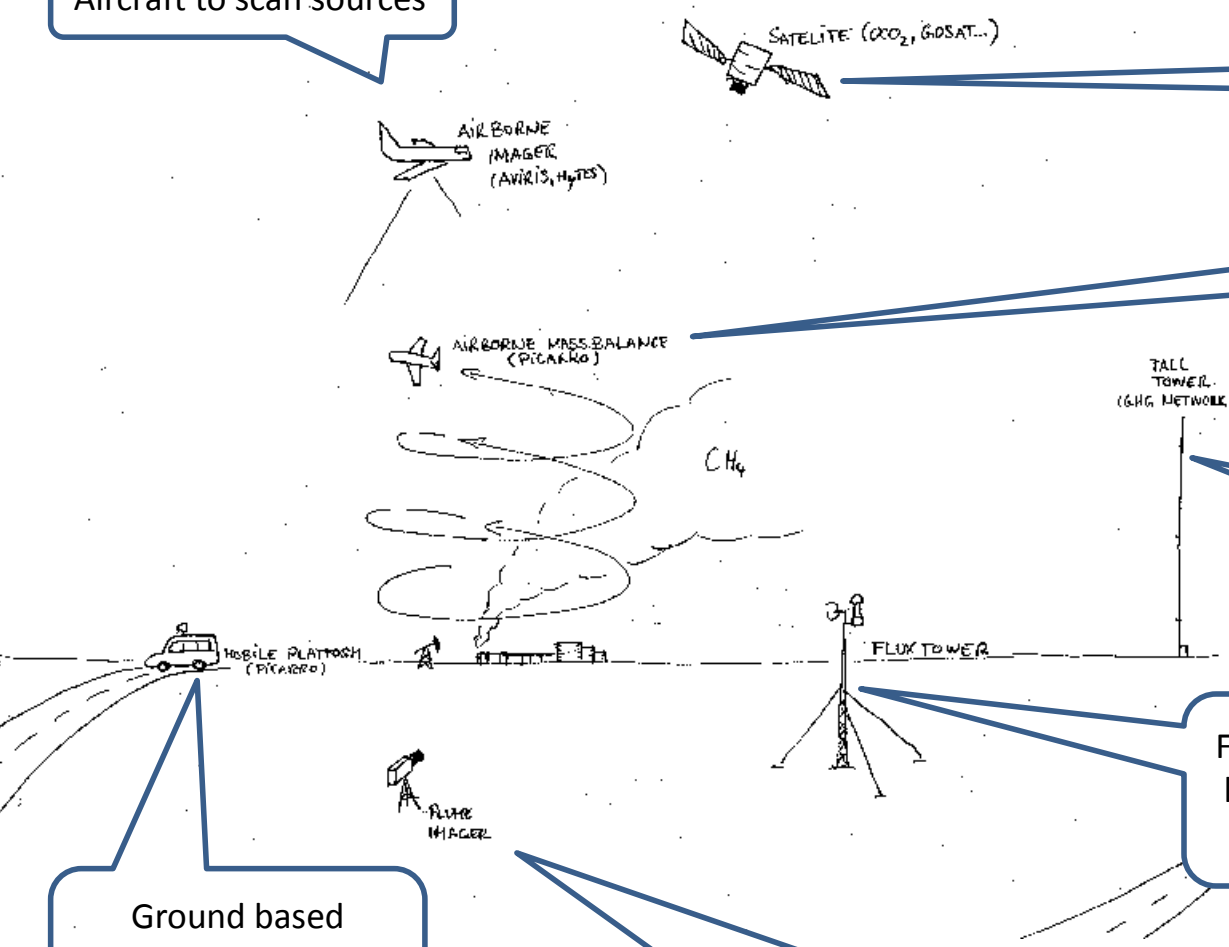
Area	Flight Hours
1	45
2	8
3	4
4	46
5	41
6	41
TOTAL	185

NOTE: Area 1 is over the entire LA area, making flying difficult due to Air Traffic. Altitudes over 12,000 feet MSL will be considered.

Pilot studies suggest as many as 5,000 emitters in California will be identified



Tiered observation system



Aircraft to scan sources

Satellite to show hot spots

Aircraft to conduct area-wide flux estimates

Tower network and inverse modeling to identify sources

Flux towers and flux chambers to measure land-based fluxes (important for landfills, dairies, rice fields, waste water)

Ground based mobile monitoring to scan local sources

Infrared imaging to identify sources

Extramural Research Efforts

- Characterize Physical and Chemical Properties of Manure in California Dairy Systems to Improve GHG Emission Estimates

- Characterize California-specific Cattle Feed Rations and Improve Modeling of Enteric Fermentation for California's GHG Inventory

- Measure emission rates at Natural Gas Storage Facilities(CEC)

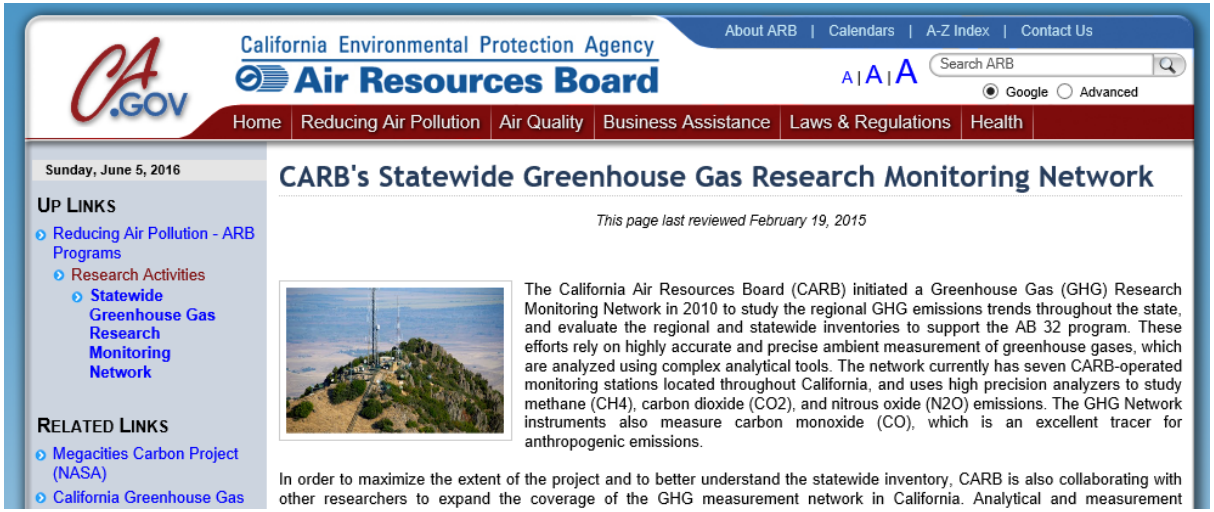
California Environmental Protection Agency
Air Resources Board

Extramural Research Efforts

- Characterize emissions during well simulation and from percolation ponds
- Measurement of emission rates of pipelines in California
- Testing of natural gas meters in residential homes
- Comparison of methane measurement methods and their utility in oil and gas methane regulations
- Life cycle model for imported natural gas

Moving forward

- Expanded website with information and data from our research activities.



Current GHG Network webpage which will be expanded to be a general methane portal

- Methane receiving attention by both local and federal agencies
- Research efforts shedding new light on sources and solutions, but we are not done
- Appropriate policy and response is being developed