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METHANE LEAKS IN THE NATURAL GAS SYSTEM



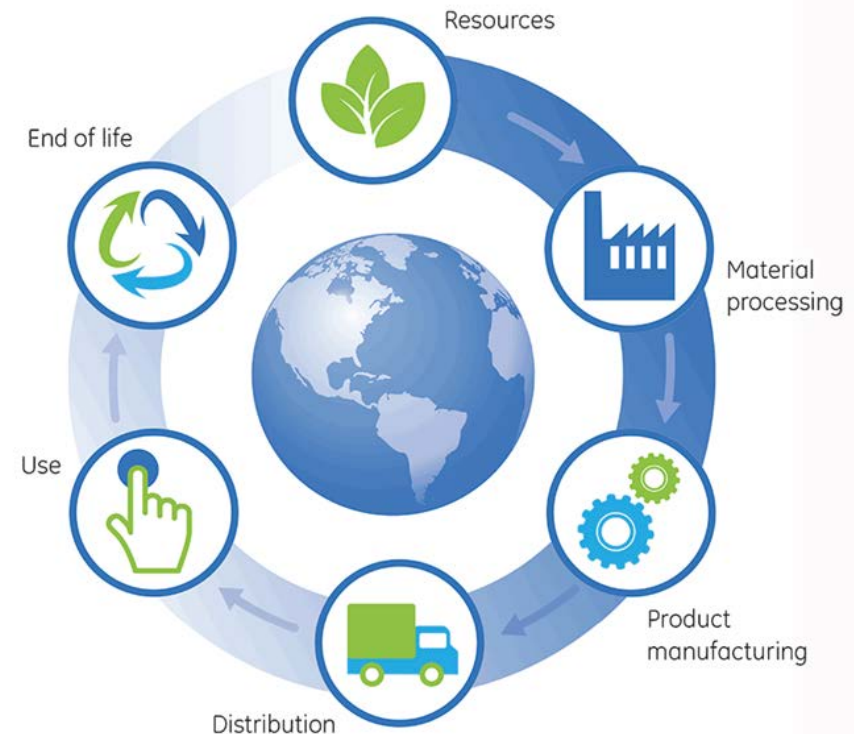
Andrew Mrowka, P. E.
Integrated Energy Policy Report Workshop
June 14th, 2018



Life Cycle Analysis of Natural Gas

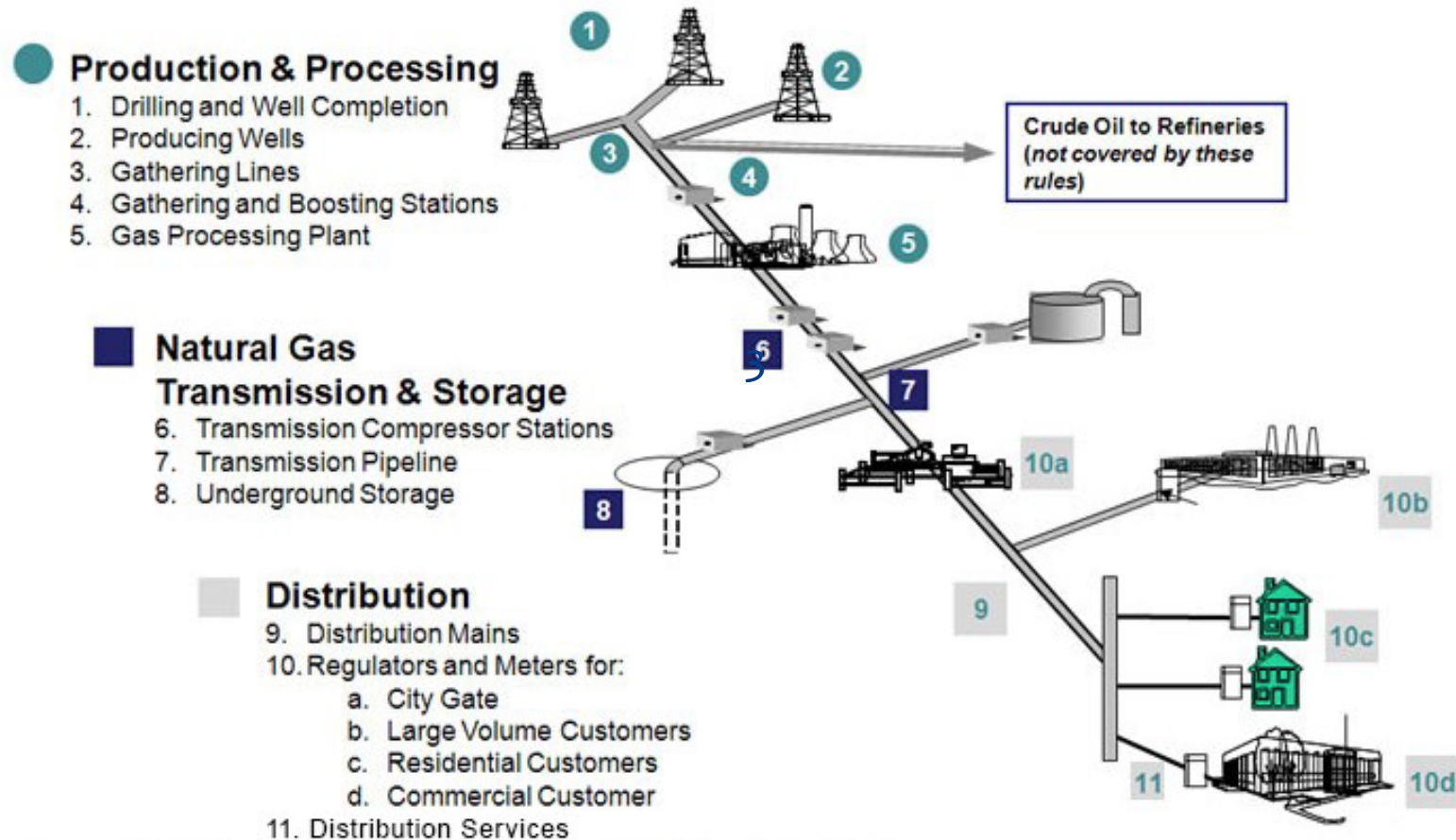
- 90% of natural gas used in CA is imported
- Model currently being developed at Stanford considers emissions associated with in-state and out-of-state natural gas

<https://eao.stanford.edu/research-areas/opgee>



Natural Gas System

Natural gas systems encompass wells, gas gathering and processing facilities, storage, and transmission and distribution pipelines.



Upstream Oil & Gas Emissions

- CARB's Oil & Gas Methane Regulation reduces fugitive and vented methane emissions from:
 - ✓ Oil and Gas Production, Processing, and Storage
 - ✓ NG Gathering and Boosting Stations
 - ✓ NG Underground Storage Facilities
 - ✓ NG Transmission Compressor Stations

Upstream Oil & Gas Emissions 2016

System Categories	2016 Category Total [MTCO ₂ e] [from AR4, 20-year, GWP = 72]	Methane Emission Reductions [MTCO ₂ e] [from AR4, 20-year, GWP = 72]
Separator & Tank Systems	570,000	540,000
Circulation Tanks	5,300	5,000
Reciprocating Compressors	504,000	68,000
Centrifugal Compressors	3,200	3,000
Pneumatic Devices and Pumps	320,000	320,000
Leak Detection and Repair (LDAR)	820,000	490,000
Remaining Emissions	1,000,000	-
Total Emissions	3,223,000	1,426,000

<https://www.arb.ca.gov/cc/oil-gas/oil-gas.htm>

Downstream Emissions 2015-2016

System Categories	2015 Category Total [MTCO ₂ e] [from AR4, 20-year, GWP = 72]	2016 Category Total [MTCO ₂ e] [from AR4, 20-year, GWP = 72]
Transmission Pipeline	708,000	559,000
Transmission Meter and Regulator Stations	1,299,000	1,274,000
Transmission Compressor Stations	210,000	187,000
Distribution Mains and Services Pipelines	2,196,000	2,045,000
Distribution Meter and Regulator Stations	1,738,000	1,701,000
Customer Meters	2,113,000	2,141,000
Underground Storage (without Aliso Canyon)	249,000	183,000
Total Emissions	8,512,000	8,091,000

<http://www.cpuc.ca.gov/General.aspx?id=8829>

CPUC Decision

(June 2017)

- CPUC Decision (D.17-06-015):
 - ✓ Reporting method for methane emissions (9 detailed reporting templates)
 - ✓ Biennial compliance plans (starting 2018)
 - ✓ Use of twenty six best practices, including training, public awareness, and new technologies
 - ✓ “Soft” target methane reduction
 - ✓ Cost recovery process

Research Contracts

- CARB/GTI Studies:
 - ✓ Update existing emission factors: pipeline (2016), residential gas meter (2018)
 - ✓ Randomly selected samples: PG&E, SoCal Gas and SDG&E
- Other Studies
 - ✓ Senate Bill 1371 best practice compliance plans
 - ✓ California Energy Commission Contracts
 - A Survey of Methane Emissions from the California Natural Gas System (CEC-500-2017-033, LBNL)

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