EPA's Greenhouse Gas Reporting Program & Geologic Sequestration

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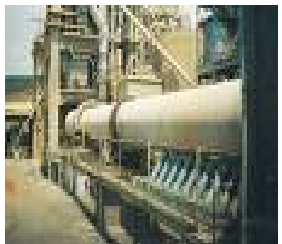
Overview of the GHG Reporting Program

Goal of GHG Reporting Program: To collect accurate GHG data to inform future policy decisions

- Covers 41 source categories for reporting
  - 33 types of direct emitters
  - 6 types of suppliers of fuel and industrial GHG
  - Facilities that inject CO2 underground for geologic sequestration, enhanced oil recovery, or any other purpose
- 25,000 metric tons CO_2 equivalent (CO_2e) or more per year reporting threshold for most sources
- Reporting only, no control or use requirements
- Monitoring began in 2010 for 29 source categories and an additional 12 source categories began collecting data in 2011



Source Categories Covered by GHG Reporting Program

Power	Refining & Petrochem	Other Chemicals	Combustion	Waste	Metals	Minerals	Pulp & Paper	High GWP Gases
- Electricity Generation - Electrical Equipment Mfg. - Electrical Equipment Use	- Petroleum Refineries - Petrochem. Production	- Adipic Acid - Ammonia - Hydrogen Production - Nitric Acid - Phosphoric Acid - Titanium Dioxide	- Stationary Combustion	- Industrial Waste Landfills - Industrial Wastewater Treatment - MSW Landfills	- Aluminum - Ferroalloy - Iron & Steel - Lead - Magnesium - Silicon Carbide - Zinc	- Cement - Glass - Lime - Misc. Carbonate Use - Soda Ash	- Pulp & Paper	- Electronics Mfg. - Fluorinated GHG Production - HCFC-22 Prod./HFC-23 Destruction - Pre-Charged Equipment Import/Export - Industrial Gas Suppliers

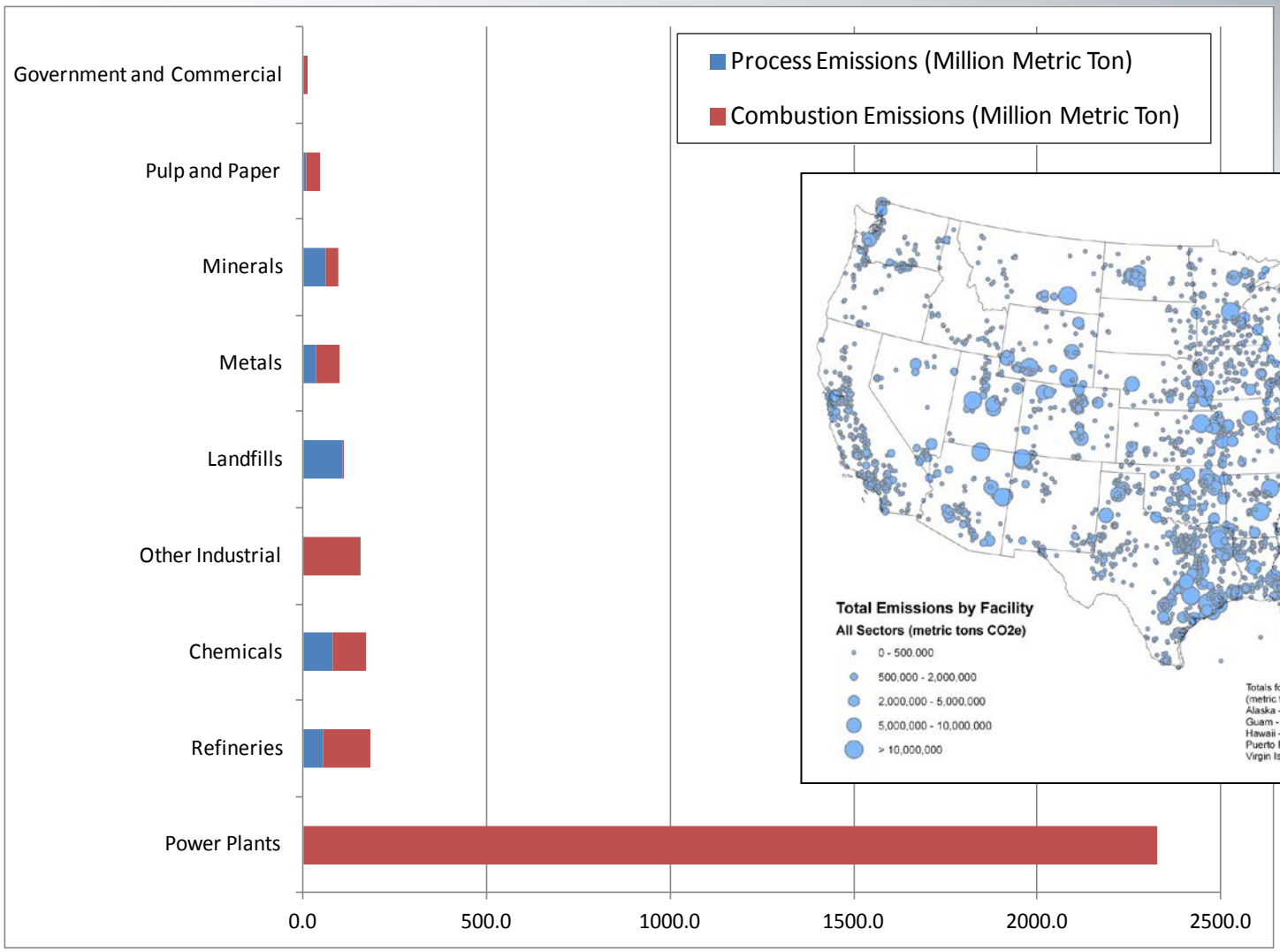
Petroleum & Natural Gas Systems	Fuel Suppliers	Carbon Capture & Sequestration	Mining
- Onshore Production - Offshore Production - Natural Gas Processing - Natural Gas Transmission/Compression - Natural Gas Distribution - Underground Natural Gas Storage - Liquefied Natural Gas Storage - Liquefied Natural Gas Import/Export	- Coal-Based Liquid Fuels Suppliers - Natural Gas and Natural Gas Liquids Suppliers - Petroleum Product Suppliers	- Geologic Sequestration of CO2 - Injection of CO2 - CO2 Suppliers	- Underground Coal Mines

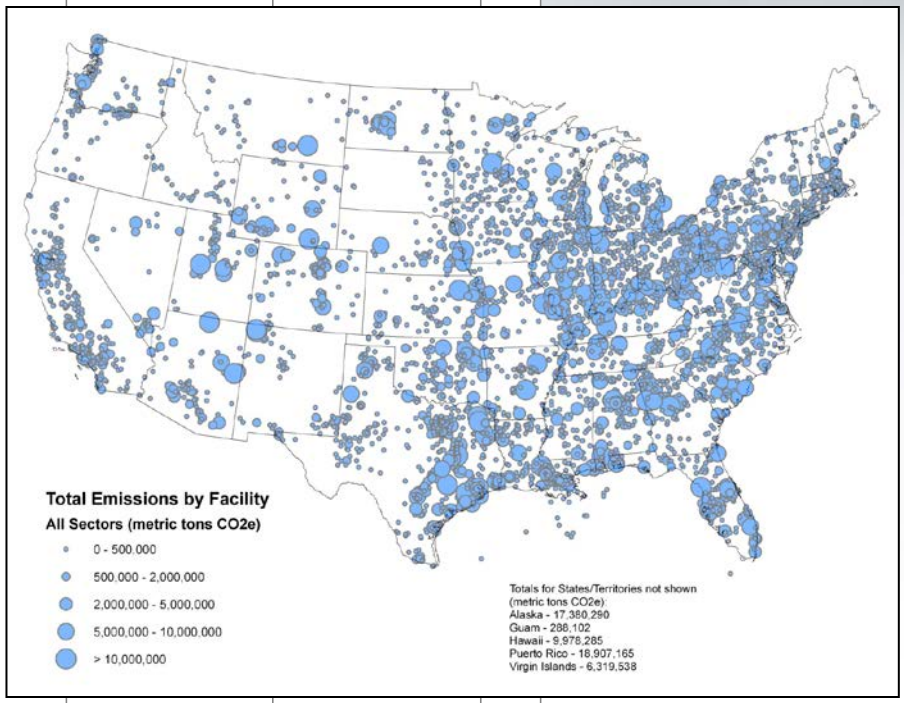
Direct Emitters
Suppliers
CO2 Injection

Data Publication

- Data publication tool allows stakeholders and the public to access the key data elements quickly and easily and to sort data by location, sector, and by gas
- GHGRP data available at: http://ghgdata.epa.gov

GHGRP RY 2010 Data Summary: Emissions by Facility and Sector

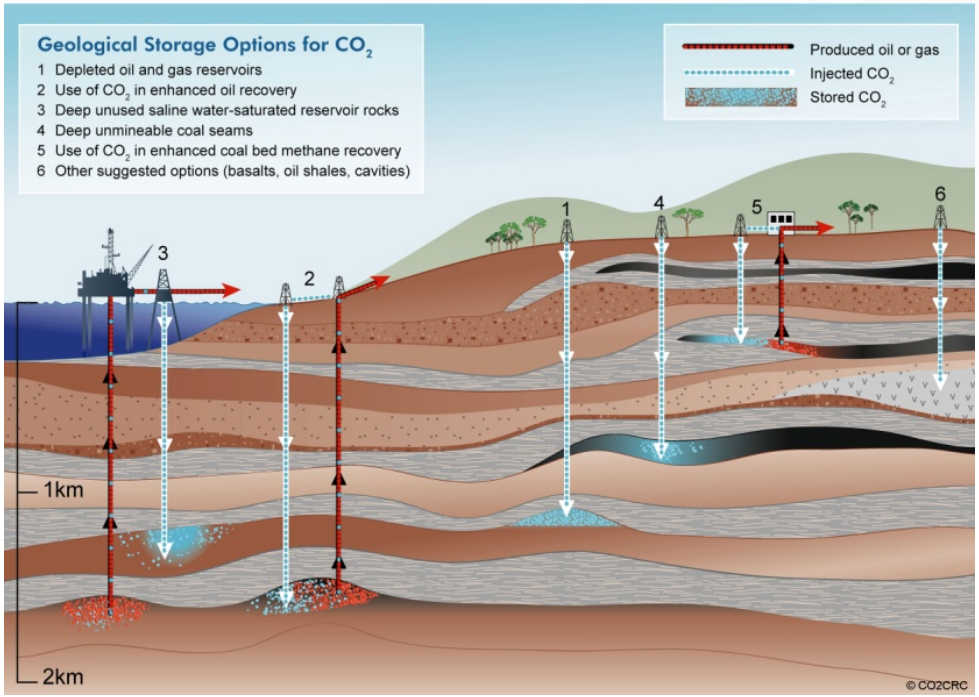




RY 2010 data presented here reflects data reported to the GHGRP as of April 6, 2012

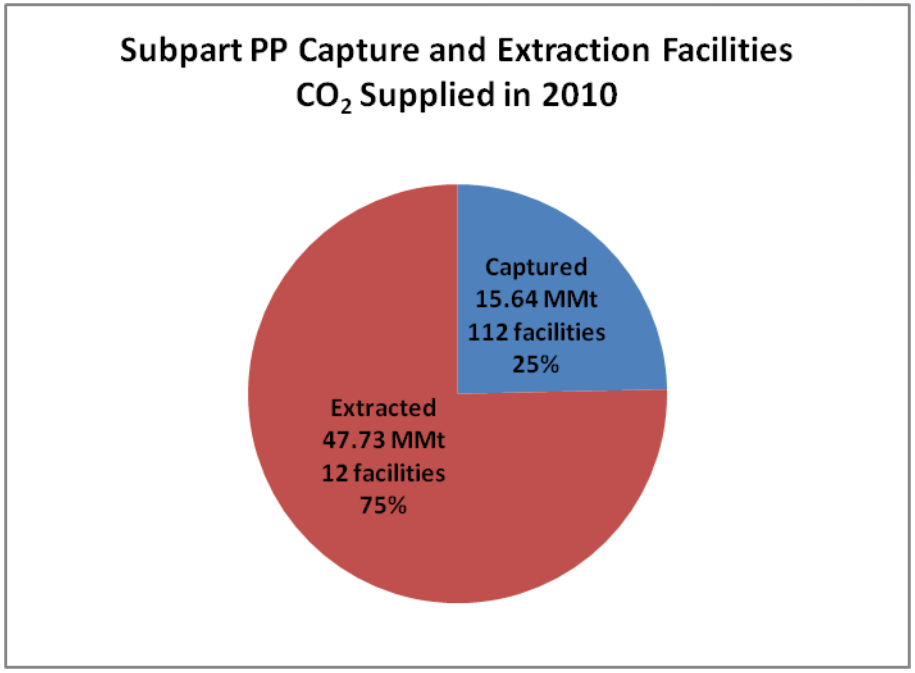
Subparts Related to CCS

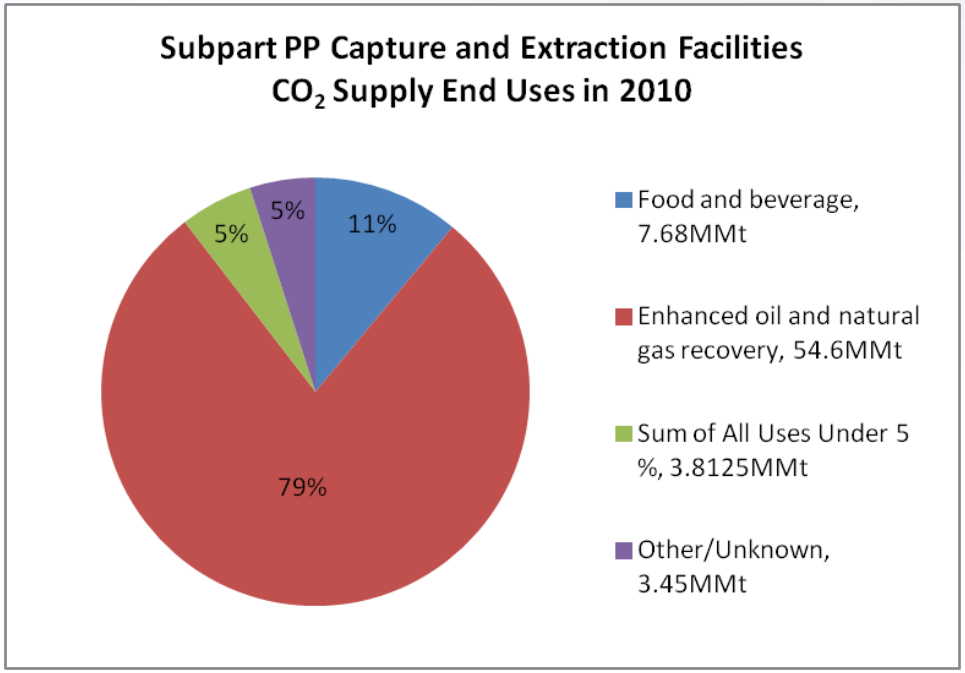
- Subpart PP – Suppliers of CO2 (capture facilities)
- Subpart UU –Injection of CO2
- Subpart RR – Geologic Sequestration of CO2



Subpart PP –Suppliers of CO2

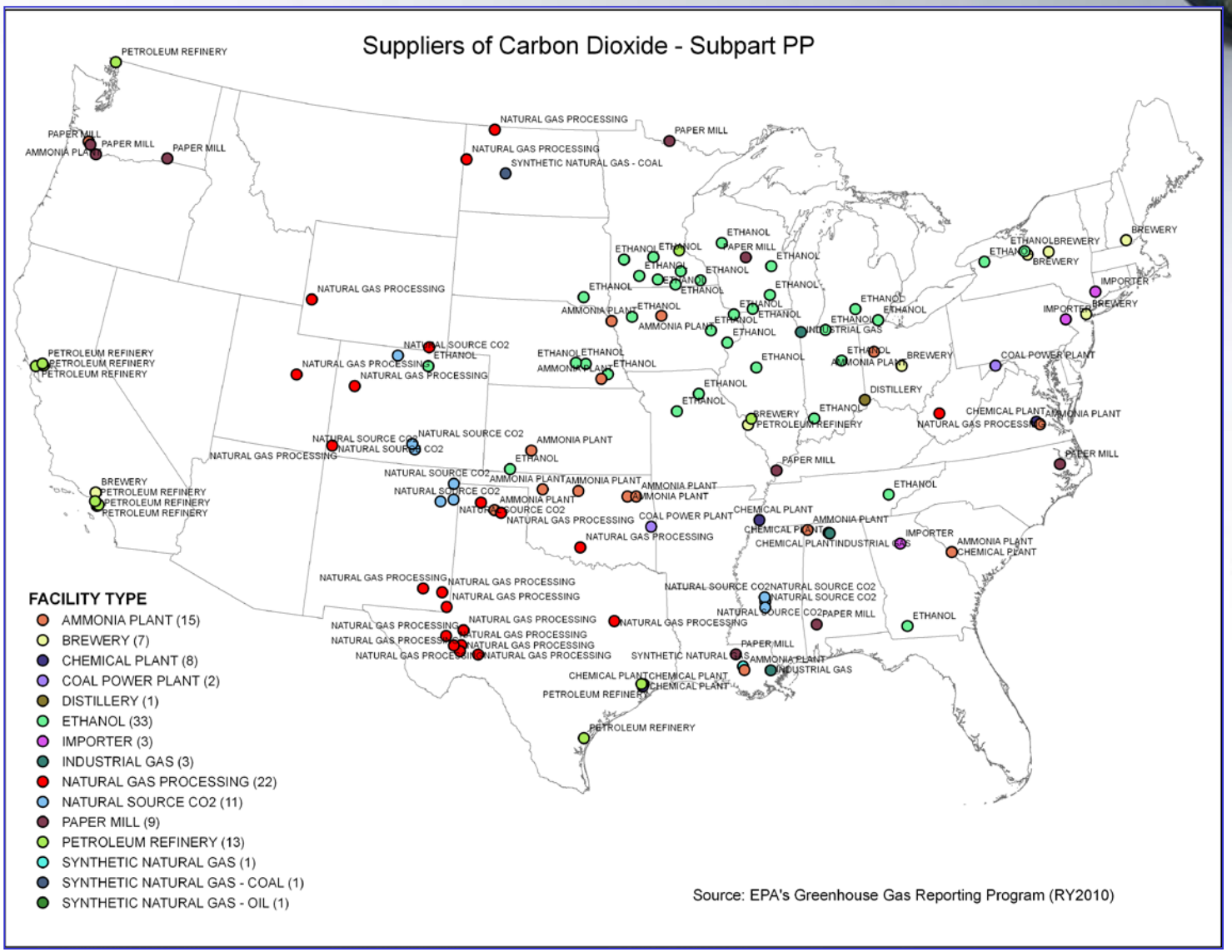
- The Subpart PP source category includes facilities that capture a CO2 stream for supplying to the economy or injecting underground
  - CO_2 capture (ethanol, natural gas processing, etc)
  - CO_2 production wells (extraction)
- Over 120 facilities reported data for 2010





* Source: *EPA Greenhouse Gas Reporting Data. Based on reporting year 2010 data.*
MMt = million metric tons; Mt = metric tons

Subpart PP - Facilities



Subpart UU – Injection of CO_2

- The Subpart UU source category includes facilities with any well or group of wells that inject a CO_2 stream into the subsurface (and that do not report under Subpart RR)
  - UIC Class II, enhanced oil and gas recovery (EOR) projects
  - Projects that received an R&D exemption from Subpart RR
  - Other facilities injecting CO2 (e.g., acid waste disposal, gas plants)
- Annually reported data includes:
  - the amount of CO_2 received for injection
  - data used to calculate the amount
  - the source of CO_2 (if known)
- Data collection began in 2011 and the 1st reports were submitted to EPA in September 2012

Subpart RR – Geologic Sequestration of CO2

- The Subpart RR source category includes:
  - Any well or group of wells that inject a CO_2 stream for long-term containment in subsurface geologic formations
  - All wells permitted as UIC Class VI wells
- Facilities that conduct enhanced oil and gas recovery are **not** required to report geologic sequestration under Subpart RR unless:
  - The owner or operator chooses to opt-in to Subpart RR, or
  - The facility holds a UIC Class VI permit for the well or group of wells used to enhance oil and gas recovery
- All facilities subject to Subpart RR must develop and implement an EPA-approved monitoring, reporting and verification (MRV) plan
- Subpart RR is complementary to and builds on UIC requirements

Subpart RR - R&D Project Exemption

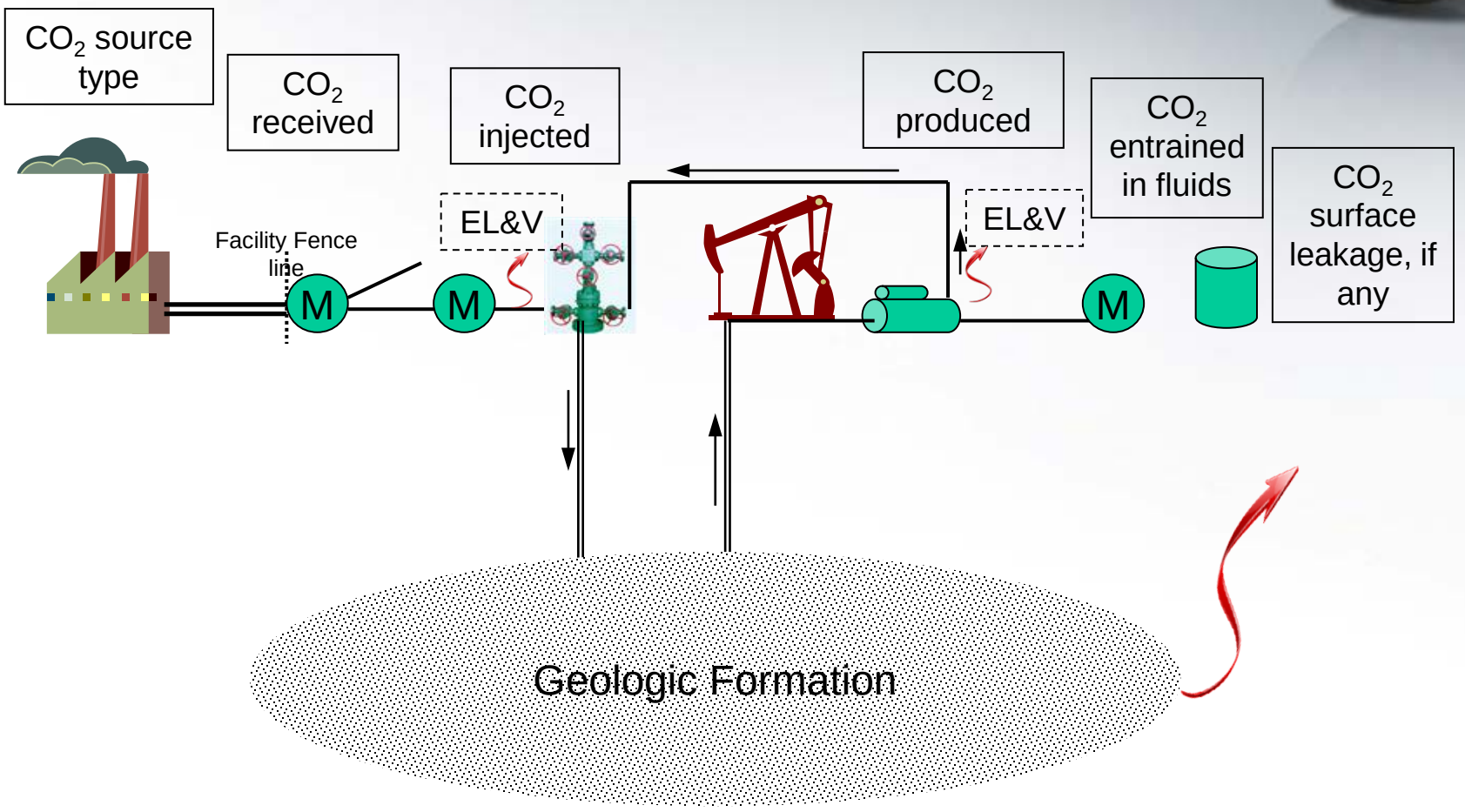
- R&D projects may receive an exemption from Subpart RR provided they meet the eligibility requirements
- A project is eligible for the exemption if it meets the Subpart RR definition of R&D project:
  - *"a project for the purpose of investigating practices, monitoring techniques, or injection verification, or engaging in other applied research, that will enable safe and effective long-term containment of a CO_2 stream in subsurface geologic formations, including research and short duration CO_2 injection tests conducted as a precursor to long-term storage"*
- R&D projects that are exempt from Subpart RR **<u>are</u>** required to report under Subpart UU*

* Unless the R&D Project also meets the separate definition of exempt "research and development" under 40 CFR Part 98, Subpart A

Subpart RR - Data Collection and Reporting Requirements

- The following quantities are required to be reported annually:
  - CO_2 received
  - CO_2 injected
  - CO_2 produced
  - CO_2 emitted by surface leakage
  - CO_2 emitted from equipment leaks
- These quantities (with the exception of CO_2 received) are used to calculate the amount of CO_2 sequestered, which is reported annually and cumulatively over the Subpart RR reporting lifetime of the facility.
- The source of the received CO_2, if known, must also be reported.
- Facilities must submit an annual monitoring report, which includes: a narrative history of monitoring efforts; non-material changes to MRV Plan; a narrative history of monitoring anomalies; and a description of surface leakage of CO_2, if any

Illustrative Example of GHGs to be Reported for Subpart RR



M = Meter
EL&V = Equipment Leaks and Vented Emissions

Subpart RR - MRV Plan: Major Elements

1. Delineation of the maximum monitoring area (MMA) and active monitoring areas (AMAs)
2. Identification of potential surface leakage pathways for CO_2 in the MMA
3. A strategy for detecting and quantifying surface leakage of CO_2
4. A strategy for establishing the expected baseline for monitoring CO_2 surface leakage
5. Site-specific variables for the mass balance equation

Monitoring Areas

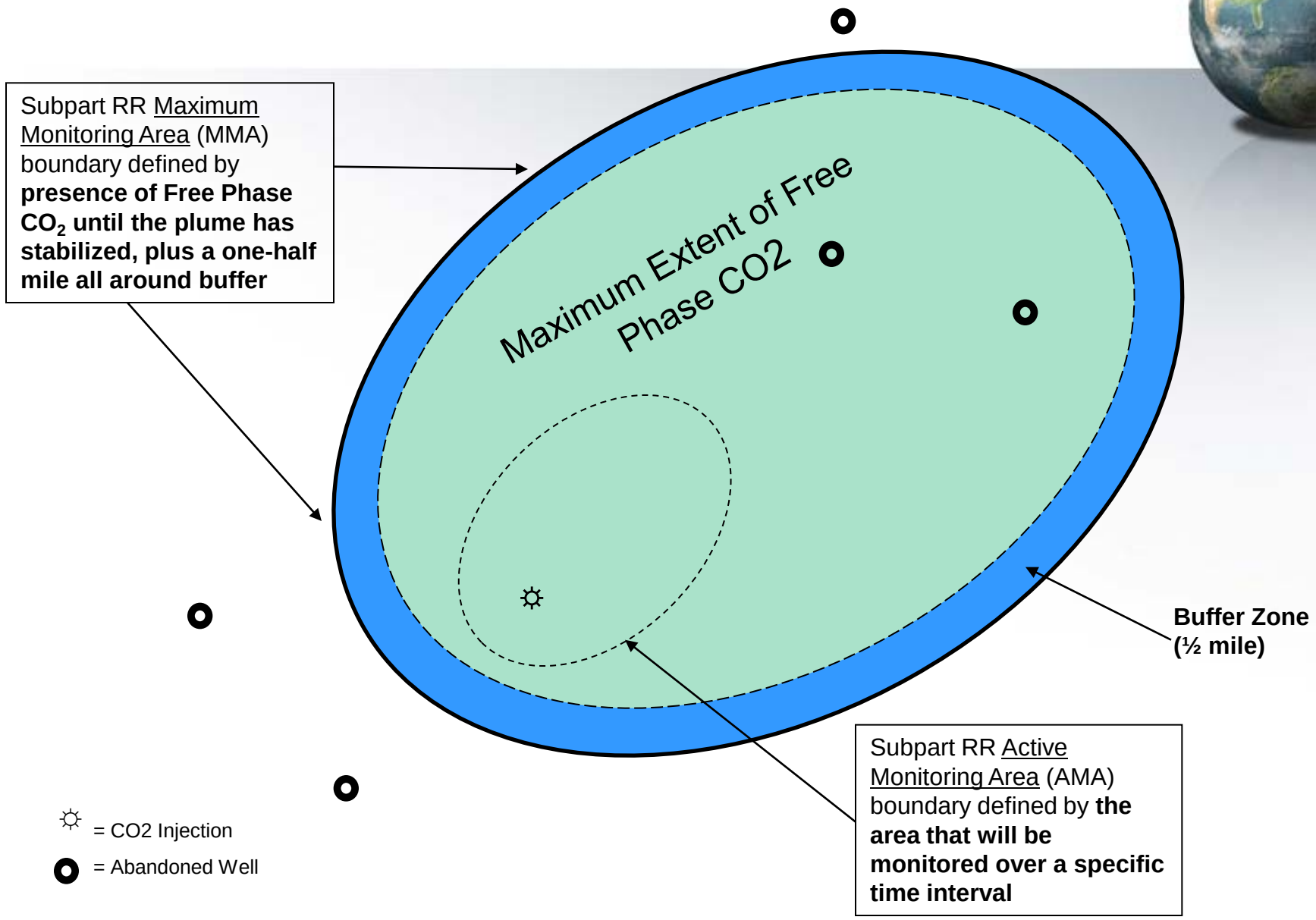
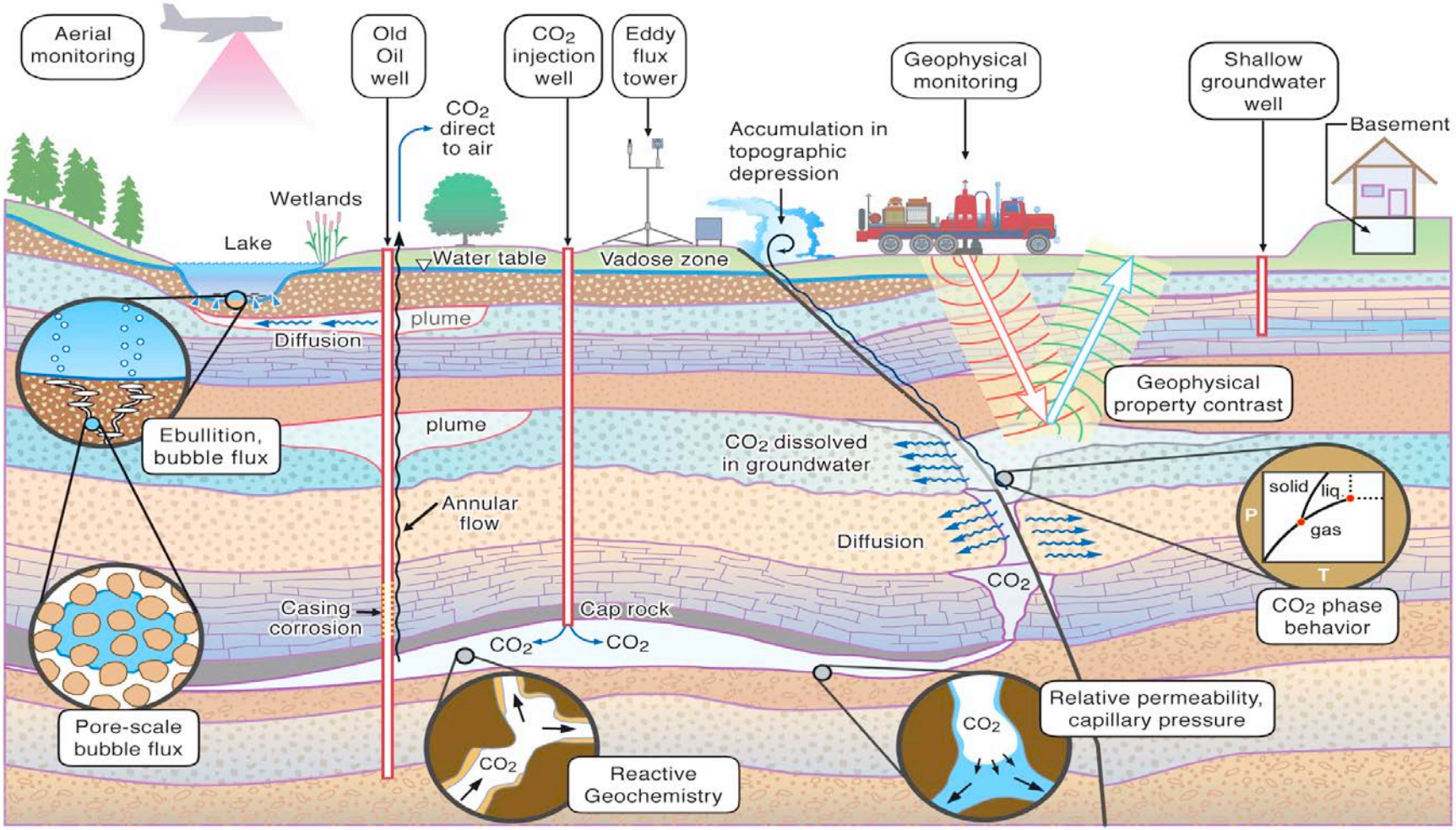


Illustration of GS Site Monitoring Detection, Verification, Quantification



Source: Lawrence Berkley National Laboratory (LBNL)

Strategy for Establishing Baselines

Primary goal: to discern whether or not the results of monitoring are attributable to leakage of injected CO_2

- Includes environmental and operational parameters
- Approaches should be: reliable, representative of site conditions, and accurate enough to minimize false (+/-) readings
- Methods that can be used to establish expected baselines
  - Pre-injection monitoring of environmental variables
  - Contemporaneous monitoring (reference or control location(s))
  - Use of predictive models

For More Information

GHG Reporting Program:
http://www.epa.gov/ghgreporting/

Published Data:
http://ghgdata.epa.gov

Resources by Subpart (i.e., PP, UU, RR):
http://www.epa.gov/ghgreporting/reporters/subpart/index.html