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Thursday, October 25, 2012

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Air & Climate Forecast:
October 2012

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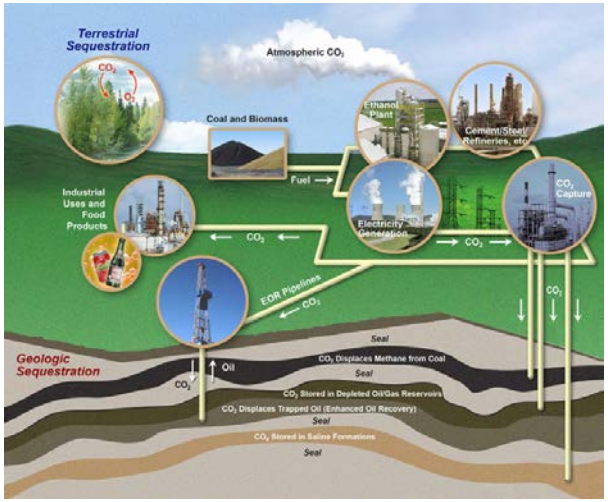
Unique Issues Facing Carbon Capture And Sequestration Plants

Presented by: Marc Campopiano

What is Carbon Capture and Sequestration (CCS)?

CCS involves:

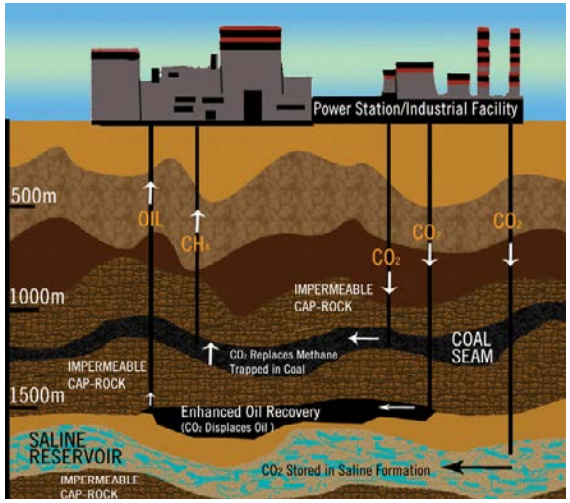
- *Capturing* CO_2 from stationary source
- *Transporting* CO_2 to a sequestration site
- *Sequestering* CO_2, typically in underground formations



Source: http://www.globalccsinstitute.com/ccs/what-is-ccs, http://meic.org/issues/montana-coal-facts/coal-plants-in-montana/carbon-capture-and-sequestration-in-montana/

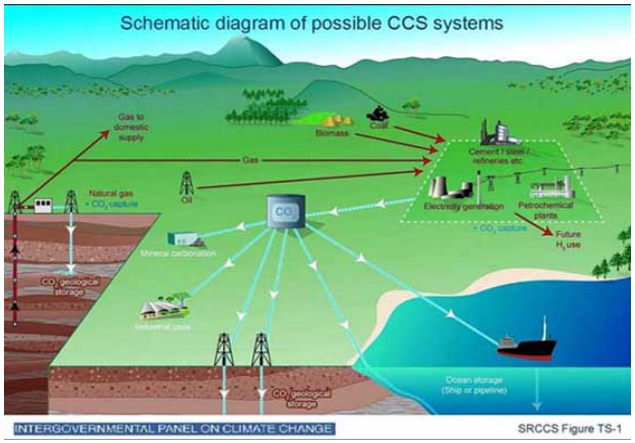
Is It New?

- CCS primarily involves combining *existing* and *proven* technologies in new ways
- For example, a CCS project may involve:
  - Power plant or other industrial facility
  - CO_2 capture technology
  - Pipelines to transport
  - Injection wells to sequester CO_2 underground
  - Enhanced oil recovery (EOR) facilities associated with CO_2 injection
  - Ancillary products, such as urea fertilizer



Unique Aspects of CCS

- Matters of scale
  - Amount of CO_2 that needs to be sequestered
  - Location of source compared to sequestration area
  - Duration of time that CO_2 sequestration needs to be ensured
    - Ongoing monitoring requirements
- Combining components in cost-competitive manner



Why CCS?

- Climate change regulation and policies
- CCS can significantly reduce CO_2 emissions from major industrial sources
- CCS can facilitate reliance on carbon-intense industrial sources while advancing climate change policies
- Vast potential for CCS to capture CO_2
  - As much as 3,600 billion tons of CO_2 could be stored in the U.S. and Canada, while large stationary sources produce about 13 billion tons of CO_2 each year

Source: http://www.epa.gov/climatechange/ccs/index.htm, http://www.globalccsinstitute.com/ccs/FAQs/frequently-asked-questions l, http://science.howstuffworks.com/environmental/green-science/carbon-capture.htm

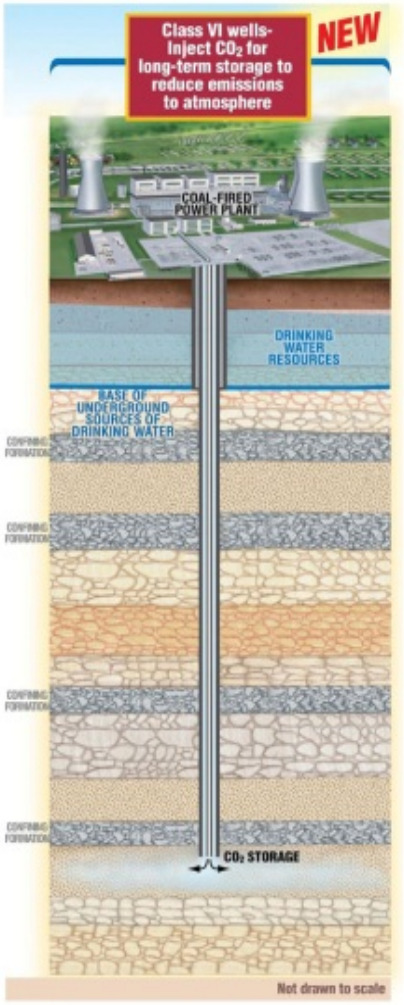
CCS Regulatory Framework

- **Clean Air Act**
  - New Source Review
  - New Source Performance Standard (NSPS)
- **Safe Drinking Water Act**
  - Injection well permits required if impact water supplies
  - Class II or VI well permit (see below)
- **National Environmental Policy Act (NEPA)**
  - State-equivalents to NEPA (e.g., California Environmental Quality Act (CEQA))
- **State and local permits**
  - States may have separate permitting requirements for large industrial sources, such as power plants (e.g., California Energy Commission)

Source: http://www.epa.gov/carbonpollutionstandard/pdfs/20120327proposalRIA.pdf, http://yosemite.epa.gov/opa/admpress.nsf/79c090e81f0578738525781f0043619b/9b4e8033d7e641d9852579ce005ae957!OpenDocument , http://www.epa.gov/carbonpollutionstandard/pdfs/20120327factsheet.pdf

Which Class Well?

- **Safe Drinking Water Act: Which Class Well?**
- **Class VI (Geologic Sequestration)**
  - New EPA class designed for CCS
  - Criteria for Class VI wells include use of materials compatible with geologic sequestration, broad monitoring, and financial responsibility requirements
  - No states have been delegated Class VI permitting authority
- **Class II [Enhanced Oil Recovery (EOR)]**
  - Industry has used CO_2 EOR for many years
  - CO_2 EOR allows further extraction of oil from fields that are otherwise exhausted



Source: http://water.epa.gov/type/groundwater/uic/class6/gsclass6wells.cfm

Monitoring Requirements

- EPA imposes certain Monitoring, Reporting, and Verification (MRV) requirements for Class VI wells as part of EPA's GHG Reporting Program
- Some facilities that inject CO_2 via a Class II may choose to opt-in to the MRV program
- EPA is not prescribing specific monitoring technologies.
- Major components of an MRV plan may include:
  - Identification of potential surface leakage pathways for CO2
  - Delineation of the maximum monitoring area and active monitoring areas
  - A strategy for detecting and quantifying any surface leakage of CO2
  - A summary of how the facility will calculate site-specific variables for the mass balance equation, such as considerations for calculating CO surface leakage

Benefits of EOR

- Injected CO_2 for EOR is permanently sequestered (CO_2 is injected, captured and re-injected until sequestered)
- EOR produces revenue stream for facility: sell CO_2 and increase oil production
- CO_2 EOR can revitalize and extend life of existing oil fields
- CO_2 EOR touted by DOE as "un-mined gold" by enhancing domestic energy supplies and reducing oil imports
- The EIA estimates domestic CO_2 EOR production of over 4 billion barrels of oil from 2011 to 2035

Source: http://www.uwyo.edu/eori/, http://www.fossil.energy.gov/programs/oilgas/eor/index.html, http://www.netl.doe.gov/technologies/oil-gas/publications/EP/CO2_EOR_Primer.pdf, http://www.eia.gov/forecasts/aeo/pdf/0383(2012).pdf

CCS Projects: Domestic

- As of September 2012, there were 8 large-scale integrated CCS projects operating or under construction in the U.S.
- Another 16 large-scale integrated CCS projects are in planning or development in the U.S.
- Majority of projects are using or plan to use CO_2-EOR

Source: http://cdn.globalccsinstitute.com/sites/default/files/publications/47936/global-status-ccs-2012.pdf

CCS: United States

Source: http://cdn.globalccsinstitute.com/sites/default/files/publications/47936/global-status-ccs-2012.pdf

CCS Projects: International

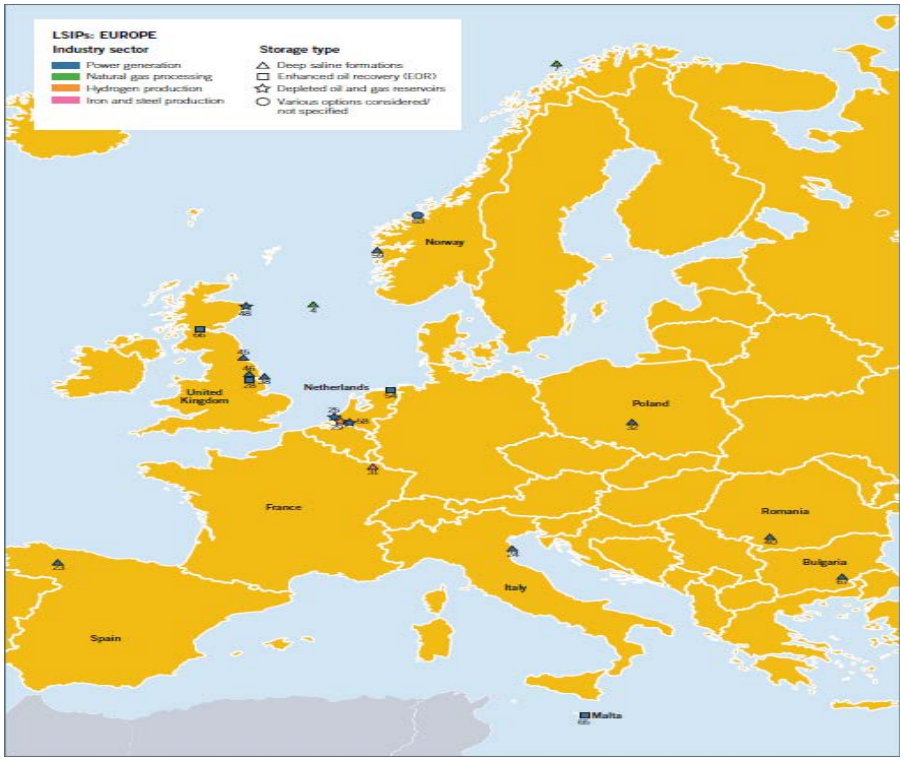
- Internationally, there are 8 large-scale integrated CCS projects in operation or under construction
- 43 large-scale integrated CCS projects are in development outside the U.S., including 11 in China, 19 in Europe, 4 in Canada, 4 in Australia and New Zealand, 3 in the Middle East, and 2 in other parts of Asia
- Of the international CCS projects in operation or under construction, approximately 3 are using or plan to use CO_2-EOR

Source: http://cdn.globalccsinstitute.com/sites/default/files/publications/47936/global-status-ccs-2012.pdf

CCS: China

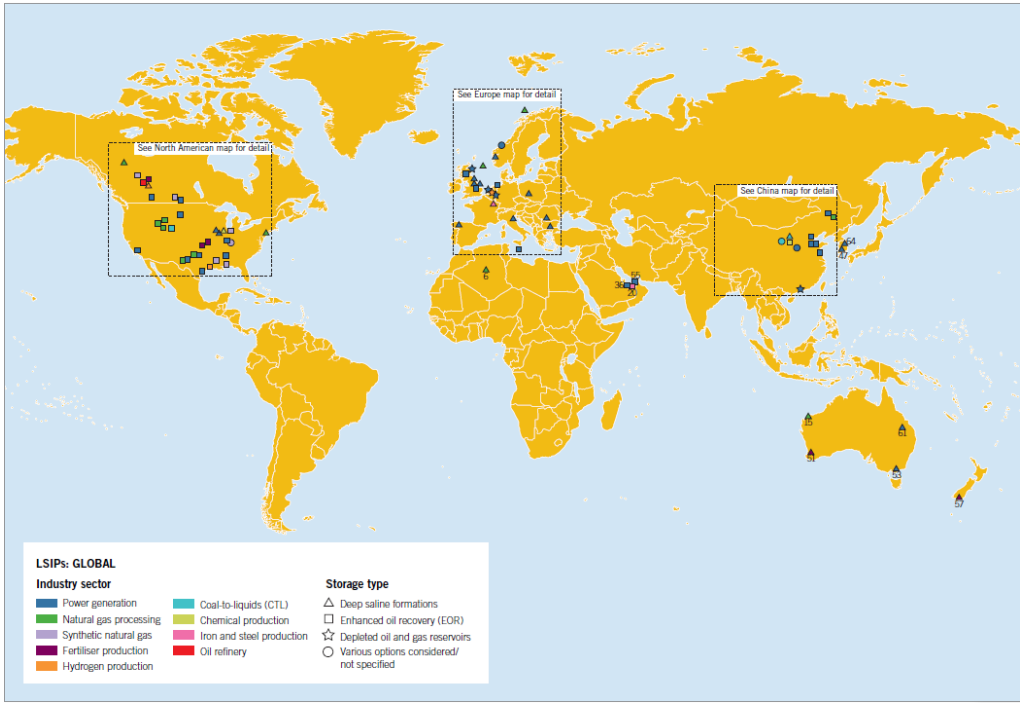
Source: http://cdn.globalccsinstitute.com/sites/default/files/publications/47936/global-status-ccs-2012.pdf

CCS: Europe



Source: http://cdn.globalccsinstitute.com/sites/default/files/publications/47936/global-status-ccs-2012.pdf

CCS: Worldwide



Source: http://cdn.globalccsinstitute.com/sites/default/files/publications/47936/global-status-ccs-2012.pdf

Constraints To CCS

- Additional costs reduce competiveness of CCS projects compared to non-CCS facilities
- Absence of comprehensive domestic or international climate change regulations that were previously anticipated
- Uncertainty over prices in the carbon market
- Existing governmental incentives may not support rapid development of facilities using CCS
- Financing hurdles associated with bringing new technologies to market

Source: http://cdn.globalccsinstitute.com/sites/default/files/publications/47936/global-status-ccs-2012.pdf, http://pubs.usgs.gov/circ/c1143/html/fig3.html

Drivers

- Grants / Loan guarantee programs
  - Demonstration project programs
- Regulatory requirements
- Multiple revenue streams for CCS facilities
  - Electricity generation
  - CO_2 sales and EOR revenue
  - Other byproduct sales, such as urea
- Technology advancements that reduce costs and enhance revenue
  - "Next generation" CO_2 facilities

Source: http://cdn.globalccsinstitute.com/sites/default/files/publications/47936/global-status-ccs-2012.pdf, https://lpo.energy.gov/?page_id=31, http://www.c2es.org/blog/falwellp/energy-solution-with-true-bipartisan, http://www.sseb.org/files/ccs-legislation-full-version.pdf

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Issues in Implementation of AB 32: The Run-Up to the First Cap-and-Trade Auction and ARB's Continuing Adjustments to the Trading Program

Presented by: Joshua Bledsoe

Cap-and-Trade Program in Context

- 80 MMTCO$_2$e of total reductions needed
  - ARB's revised BAU projection for 2020 = 507 MMTCO$_2$e
  - 1990 emissions = 427 MMTCO$_2$e
- ARB projects a reduction of 18 MMTCO$_2$e from the cap-and-trade program
- Cap-and-trade represents 22.5% of needed reductions
  - ARB built in substantial cushion via Scoping Plan since original BAU projection for 2020 = 596 MMTCO$_2$e
- Legislative Analyst's Office (LAO) estimates 2012-2013 auctions to generate $600 million to $3 billion

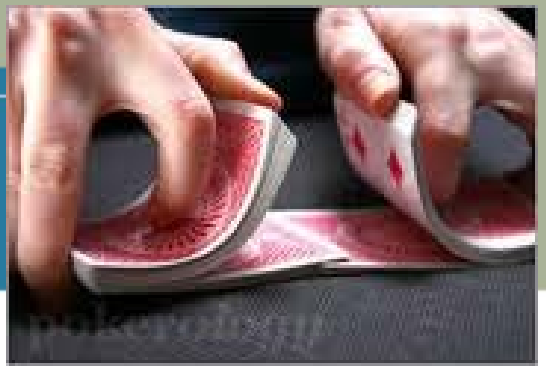
Inaugural Auction

- Will be held November 14, 2012 from 10:00 AM Pacific Time (PT) until 1:00 PM PT
- Approximately 21.8 million vintage 2013 allowances and 39.45 vintage 2015 allowances to be auctioned
- Results likely posted November 19, 2012
- Deadline to apply for auction has passed (October 15, 2012)
- Must have registered with Compliance Instrument Tracking System Service (CITSS) and applied for an account
  - Attestations and disclosure of personal information
  - Disclosure of corporate associations
- Bid guarantees due 12 days before auction (November 2, 2012)
  - Cash
  - Irrevocable LC
  - Bond

Auction Hiccups

- GHG Allowance Auction and Reserve Sale Platform lacks full functionality
  - One way street for consolidation: accounts can be consolidated, but not divided
  - Advisors cannot participate on behalf of entities with compliance obligation
    - Prohibition on beneficial holding (e.g., custodial services)
    - More difficult to find turn-key solutions
- CITSS Trading Module release October 8, 2012
- General lack of confidence in ARB's ability to run auction
- August 30, 2012 practice auction not terribly reassuring
  - Settlement price, allowances sold, successful or unsuccessful bids, and total amount due not disclosed
  - Only 88 covered entities, covered source, or opt-in entities participated (out of approximately 350 entities and 600 facilities)
  - Tepid survey results

Resource Shuffling



- Resource Shuffling is "any plan, scheme, or artifice to receive credit based on emissions reductions that have not occurred, involving the delivery of electricity to the California grid." 17 CCR § 95802(a)(250).
  - Annual attestations by first deliverers of electricity, under penalty of perjury. 17 CCR § 95852(b)(2).
- August 6, 2012 – Critique by FERC Commissioner Philip D. Moeller: regulations were "creating uncertainty and great concern among entities that sell [electricity] into California."
- August 16, 2012 – ARB Chairman Mary D. Nichols suspends the attestation requirement for 18 months
- September 20, 2012 – Emissions Market Assessment Committee (EMAC) Policy Paper
  - Need to clarify what is and what is not resource shuffling

Resource Shuffling

- September 24, 2012 – IOUs float new definition to EMAC
  - Focuses on what is not resource shuffling
- October 18, 2012 – ARB offers preliminary guidance and commits to consideration of regulatory amendment mid-2013
  - Forthcoming guidance to clarify what is and what is not resource shuffling
- Probable "Safe Harbors"
  - Changes in imports needed to meet RPS goals
  - Compliance with state or federal laws and regulations (including SB 1368, sort of)
  - Retirement or divestiture of resources, or contract expiration
  - Transmission constraints, or emergencies
  - Short-term trading activity
  - Termination of a contract for reasons other than reducing GHG compliance obligation

Other ARB Tweaks to Program

- Adjustments to performance benchmarks re: allocation of allowances to industry (17 CCR § 95891)
  - Allocation scheduled for November 1, 2012

$$A_t = \sum_{a=1}^{n} O_{a,initial} * B_a * AF_{a,t} * c_{a,t} + \sum_{a=1}^{n} O_{a,trueup} * B_a * AF_{a,t-2} * c_{a,t-2}$$

- Exempt Waste-to-Energy Plants
- Recognize universities' early actions
- Exempt "but-for" CHP units
- Assist generators with legacy Power Purchase Agreements

Unresolved Issues

- Use of free allowances auction revenue by IOUs
  - Electric Distribution Utility allowances allocated September 14, 2012
  - Allowances deposited into accounts October 8, 2012
  - Estimated value of allocation to IOUs from 2013-2020 = $5.8 billion to $23.4 billion
  - While revenue must benefit ratepayers, CPUC has not decided precisely how revenue will be used
    - Importance of price signal
    - SB 1018 addresses <u>who</u> but not <u>how</u>

Unresolved Issues

- Linkage with Quebec
  - Purposes: (1) reduce compliance costs long-term; and (2) set template for international model
  - Would expand market by approximately 17%
  - EMAC is skeptical
- Price Containment
  - Allowance Price Containment Reserve
    - October 18, 2012 ARB direction to Staff
  - Multi-year compliance periods
  - Banking
  - Offsets
- Program sunsets in 2020?
  - Scoping Plan aspirations
  - EMAC: "post-2020 reserve"

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Kivalina: The End of Federal Common Law of Nuisance Climate Change Litigation?

Presented by: Michael Romey

Background

- Two Previous Cases
  - *Comer et al. v. Murphy Oil USA, et al.* (5th Circuit)(appeal dismissed)
  - *American Electric Power Co. Inc. v. Connecticut* (U.S.S.C.)
- Supreme Court *AEP* Decision
  - Plaintiffs sought injunctive relief to restrict Defendants' GHG emissions
  - Court held that Clean Air Act displaced the federal common law right of action for nuisance created by GHG emissions

Village of Kivalina v. ExxonMobil Corp. (9th Cir.)

- Plaintiffs: Coastal tribe and city of 400 Inupiat Eskimos near Arctic Circle
- Defendants: Over 20 energy and utility companies
- Claims: Federal common law, state common law
- Sought compensatory damages caused by storm waves and surges that will require village to be relocated
- Ninth Circuit Ruling: AEP dispositive: federal common law claim for damages displaced by Clean Air Act
- State law claims for nuisance not addressed

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Questions?

Contact Information

Joshua Bledsoe
Associate (Orange County)
Email: joshua.bledsoe@lw.com
Telephone: +1.714.755.8049

Marc Campopiano
Associate (Orange County)
Email: marc.campopiano@lw.com
Telephone: +1.714.755.2204

Claudia O'Brien
Partner (Washington, D.C.)
Email: claudia.o'brien@lw.com
Telephone: +1.202.637.2181

Michael Romey
Partner (Los Angeles)
Email: michael.romey@lw.com
Telephone: +1.213.485.1234

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