

Rethinking CCS  
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# Issues discussed

- Uncertainties about national climate legislation and incentives for CCS deployment
- “Generation gap” resulting from pending EPA CAA/MACT regulations
- Potential job benefits of CCS development
- Alternative CCS incentives under EPA GHG regulatory authority
- The international climate context

# Climate legislation provided significant CCS incentives

- Bonus allowance concept originated in 1990 CAA acid rain program, carried forward to climate legislation
- 2007 Bingaman-Specter bill allocated 8% of allowances to CCS
- 2009 Waxman-Markey bill allocated 4.8% (~\$150B) to CCS plus ~10 GW demonstration thru \$1 Bil/yr wires charge\*
- 2010 Kerry-Lieberman bill allocated 3.8%, ~72 GW new and retrofit capacity plus ~20 GW demonstration funding via \$2 Bil/yr wires charge\*

\*Subject to state PUC approvals.

# What now?

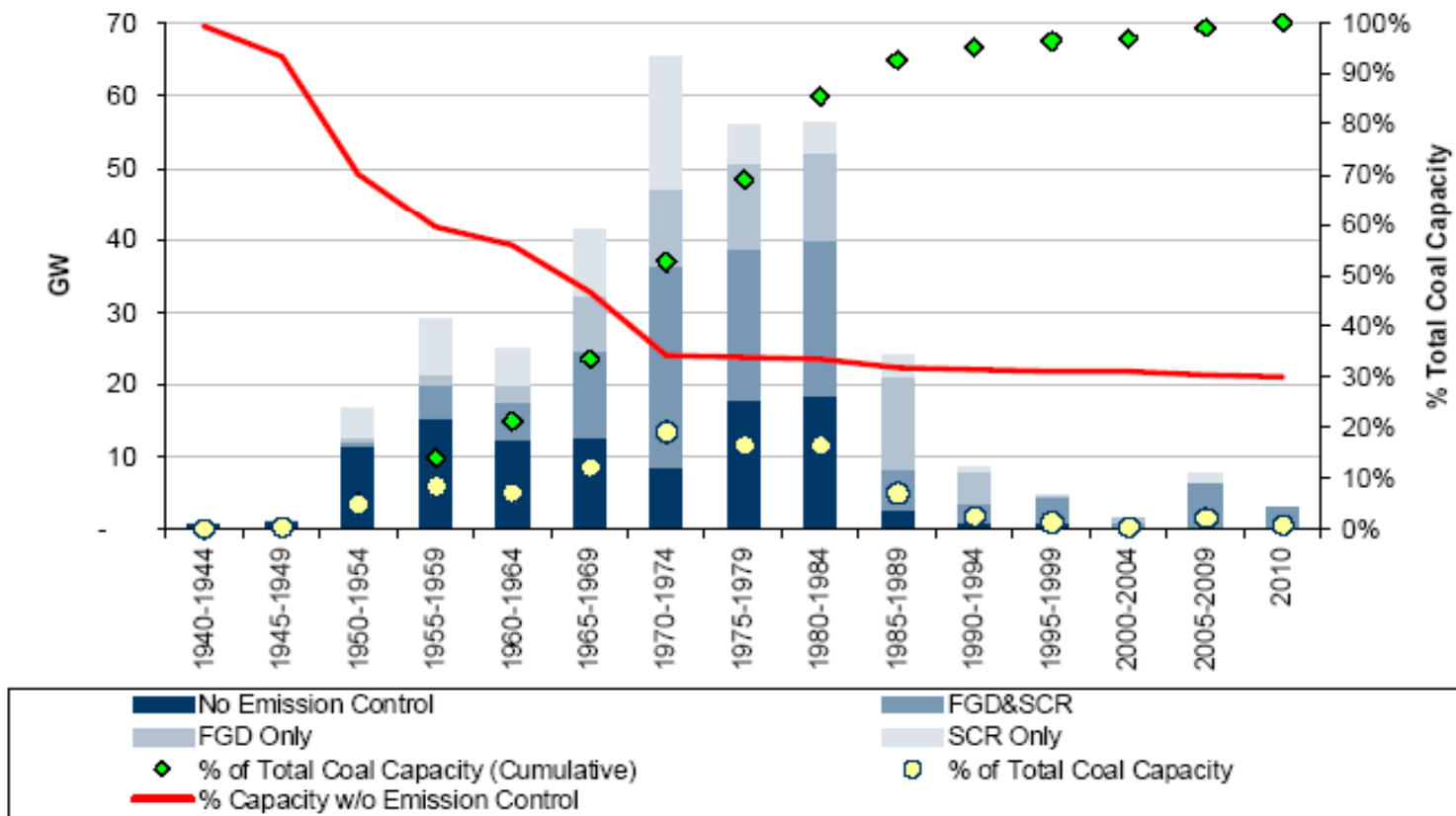
- Congressional cap-and-trade legislation in doubt
- Rockefeller wires charge approach remains an option for 20 GW demonstration plants
- EPA assuming GHG regulatory authority under 2007 Supreme Court decision
- Administrator Jackson plans to move GHG regulations for existing stationary sources in 2011 – new Congress will have a say
- Rockefeller 2-year GHG moratorium in play

## The “generation gap”: coal capacity “at risk” in 2015-18 due to pending EPA regulations

Source	Gigawatts	Coal tons (million)	Regulations
Credit Suisse (9/10)	35-103	157-324 MM	MACT CATR
Bernstein Research (10/10)	65	108 MM (68 MM East, 40 MM West)	MACT CATR
NERC (10/10)	9-34	?	316b water, MACT, CATR, CCR
UMWA (2/10)	56	134 MM	MACT

# Scrubbers and SCRs concentrated in post-1970 units

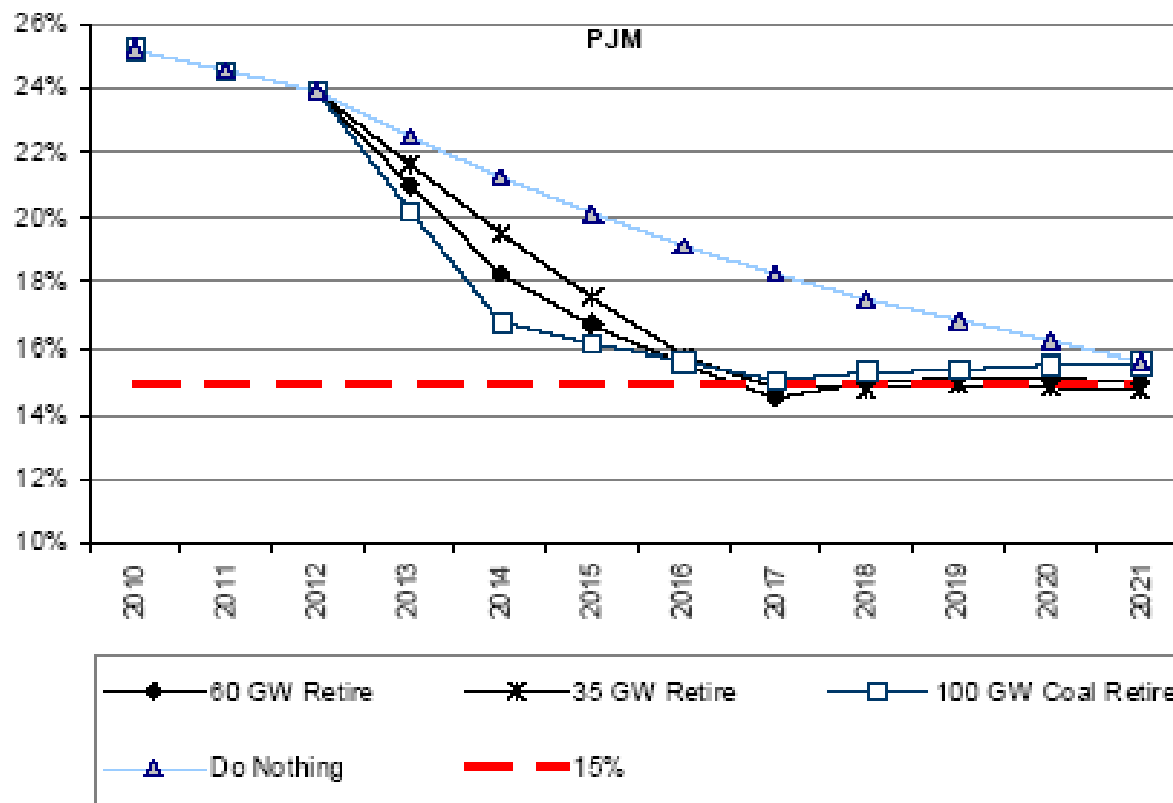
**Exhibit 26: Coal Plant Vintage (Including Planned Emission Control)**



Source: Energy Velocity, Company data, Credit Suisse estimates

# Reserve margins revert to 15% with stringent MACT

Exhibit 18: PJM Reserve Margin



Source: Company data, Credit Suisse estimates

# CCS is job-intensive!



## Economic Benefits from Construction and O&M for 65 GW of Advanced Coal Facilities with CCS

Economic Benefits from Construction (one-time)		
Economic Measure	Direct Benefit	Total Benefit
Output	\$254.8 Billion	\$711.9 Billion
Value-added	\$108.6 Billion	\$343.9 Billion
Employment	1.7 Million Job-years	4.5 Million Job-years
Labor Income	\$94.5 Billion	\$240.1 Billion

Economic Benefits from Operations & Maintenance (annual)		
Economic Measure	Direct Benefit	Total Benefit
Output	\$16.0 Billion	\$35.9 Billion
Value-added	\$9.5 Billion	\$19.9 Billion
Employment	31.6 Thousand Jobs	152.5 Thousand Jobs
Labor Income	\$4.0 Billion	\$10.4 Billion

Source: BBC Research & Consulting (2009, sponsored by ACCCE, AFL-CIO Industrial Union Council, IBEW, IBB, and UMWA).

# Man-years per 1 Gigawatt of new capacity: coal and nuclear create 5-10x more direct jobs than wind or natural gas

## Man-Years per Gigawatt of New Generation Capacity, Development plus Construction Phases

Technology	Salaried Workforce	Hourly Workforce	Total Man-Years
Nuclear	4,785	9,575	14,360
Supercritical PC coal with CCS	2,140	8,435	10,575
IGCC gasified coal with CCS	2,795	8,145	10,940
Natural gas combined cycle (NGCC)	495	1,270	1,765
Onshore wind	305	1,180	1,485

Source: NCEP, Task Force Report on America's Future Energy Jobs (2009).

# A new focus for CCS

- Given: Meeting future carbon limits will require deployment of CCS on new and existing coal units – as well as new gas units if targets are aggressive
- Unresolved issues include liability and incentives to defray incremental costs
- New focus on existing plant retrofits (and brownfield reconstructions) as lower-cost options for carbon reduction

# Incentives via GHG regulation

- Potential EPA regulation of stationary source GHG emissions can (in theory) provide incentives for CCS at new and existing sources
- Bonus allowances, allowance set-asides and similar measures can defray incremental CCS costs
- Allowance-based mechanisms more reliable than appropriations-based incentives

# The international context

- Copenhagen Accord merged into negotiating text for FCCC LCA
- US commitments in Accord pegged to congressional legislation
- EPA lacks clear basis for regulatory targets tied to Accord, absent legislation
- No FCCC agreement before Johannesburg December 2011
- Extension of Kyoto targets to 2020 for EU et al. most likely outcome, with G-20 role beyond 2020

# Thanks to ...

- ACCCE for supporting this presentation
- UMWA for engaging US labor in the UN FCCC process
- NARUC for the invitation today - and
- Views expressed are my own

# Questions?

