

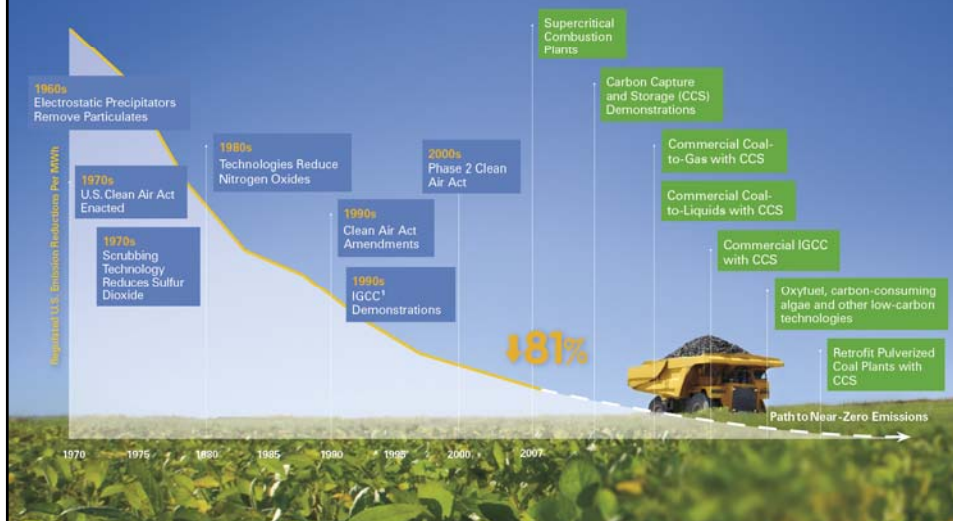
The Reality of Clean Coal

Critical Commodities Conference
 Port of New Orleans &
 American Institute for International Steel
 Energy Panel: The New, The Old & The Unknown
 April 29, 2009 ~ New Orleans



Clean Coal... Green Coal...

Coal use triples as regulated emissions decline 80%+;
 Green coal now provides a path to near-zero emissions.



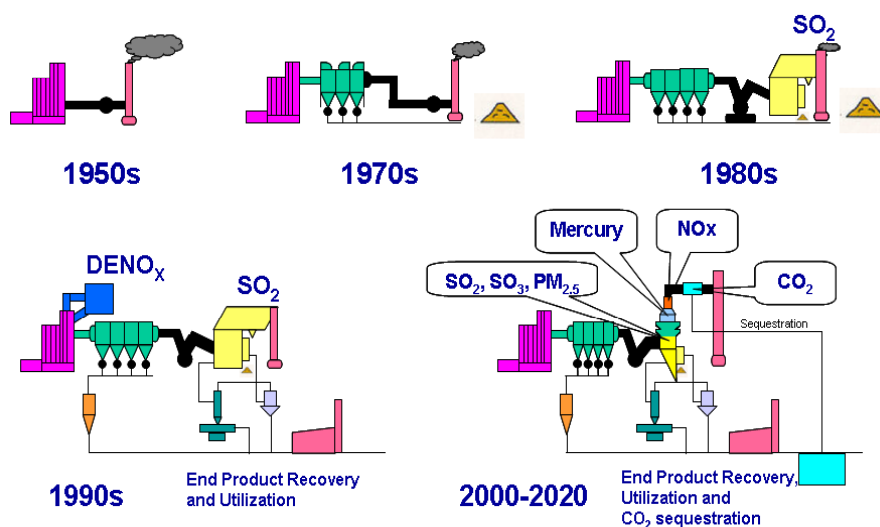
What is Clean Coal Technology?

- Pre-Combustion
- Combustion
- Post-combustion
- Conversion/Gasification
- Efficiency Improvements
- Carbon Capture & Storage



Evolution of Emissions Control Equipment on PC Boilers

Source: Institute of Clean Air Companies (ICAC) - www.icac.com



Current CCTs

- **Pre-Combustion**
 - Coal cleaning
 - Coal enhancement & beneficiation
 - Blending
- **Combustion**
 - Low NO_x Burners
 - Fluidized Bed Combustion
- **Post-Combustion**
 - SCR/NSCR (NO_x)
 - FGD/Scrubbers (SO₂)
 - ESP & FF (PM & HG)
 - Coal Ash
- **Efficiency**
 - Existing Fleet Retrofits



Emergent CCTs

- **Combustion**
 - Oxy-fuel PC Technology
- **Post-Combustion**
 - ACI (Hg)
- **Efficiency**
 - Super Critical (SC) & Ultra Super Critical (USC)
- **Conversion/Gasification**
 - Coal-to-Liquids & Coal to Synthetic NG
 - IGCC
- **Carbon Capture & Storage**



CO₂ Management

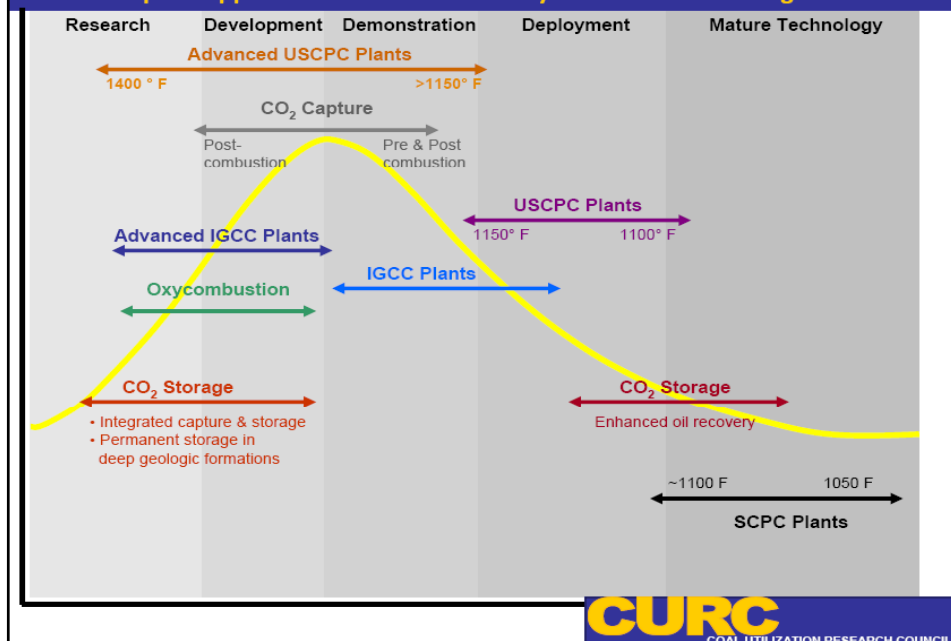


What needs to be done?

- Increase Efficiency of Coal Power Plants
- Develop, Demonstrate & Deploy CCS Technology
 - CO₂ Capture } ~ 80% of total CCS cost
 - CO₂ Transportation
 - CO₂ Injection & Long-term Storage
 - CO₂ Monitoring & Verification



Chart Depicts Approximate Level of Maturity of Various Technologies in 2008



Why CCS?

- “CCS is the single most important new technology for CO₂ savings.” IEA
- “CCS provides 1/5 of needed CO₂ reductions in 2050.” IEA
- “Without CCS the cost of stabilisation rises by 70%.” IEA
- “CSS is the only low-carbon solution for gas/coal, cement and iron and steel sectors.” IEA
- “Coal with CCS is the low-cost, low-carbon solution, capable of powering a green economy at 15 to 50 percent less cost than wind, nuclear or natural gas with CCS.” CarnegieMellon

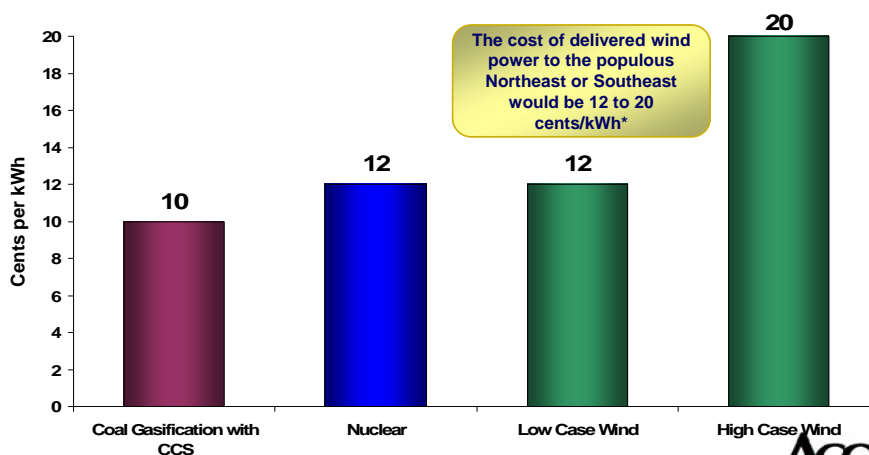


CarnegieMellon



Coal with CCS ~ The Low Cost, Low Carbon Option

Coal with CCS: 15% - 50% Less Expensive than Alternatives



* Apt. et al., "A National Renewable Portfolio Standard? Not Practical." Carnegie Mellon University, 2008.



Support for CCS

American Recovery & Reinvestment Act

H.R. 1 ~ February 17, 2009

\$3.4 Billion DOE Fossil Energy

- **\$1 Billion ~ Fossil Energy Research**
 ?FutureGen
- **\$800 Million ~ CCPI – Round 3**
- **\$1.52 Billion ~ CCS Demonstration**
- **\$50 Million ~ CCS Site Characterization**
- **\$20 Million ~ University Grants CCS Research & Training**
- **\$10 Million ~ Administration**



Support for CCS

American Clean Energy & Security Act (ACES)

Waxman/Markey ~ March 31, 2009

- **Requires CO₂ emissions reduced 3% below 2005 levels in 2012, 20% in 2020 and 83% in 2050**
- **Establishes performance standards ~ retrofits (permitted 2009-2014) & new plants (beginning 2015 & 2020)**
- **Encompasses Boucher CCS Early Deployment Act ~ \$1 billion/year for 10 years**
- **Incentives for demonstration & deployment of CCS**
- **Authorizes funding for commercial deployment of CCS, subject to appropriations**
- **Scheduled for reporting out of E&C Committee before Memorial Day 2009**



Support for CCS

Senate Clean Energy Bank

ENR Committee ~ Pending

- **Create financial institution within DOE to finance innovative energy projects, including clean coal**
- **Intended to “shore up” existing DOE loan guarantee program in short-term**
- **Eventually to be phased out of DOE as a new agency**
- **May be authorized to make direct loans**
- **Similar bill in US House**



Conclusion

- **The “Old”**
~ Successful track record in clean coal technology development & in achieving emissions reductions
- **The “New”**
~ Willingness & initiative to meet new clean coal technology challenges
- **The “Unknown”**
~ Do we have the political will & public commitment to work toward realistically meeting our national security, economic, energy & environmental goals?



American Coal Council

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