



ELECTRIC POWER  
RESEARCH INSTITUTE

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## **FIRST TECHNOLOGY PILOT DEDICATED TO CAPTURE CO<sub>2</sub> WITH CHILLED AMMONIA**

**11 A.M. CST, WEDNESDAY, FEB. 27, 2008**

**CALL-IN INFO: 1-800-909-5202; password: 5394260**

**Webcast Info: Meeting URL:**

<https://www.livemeeting.com/cc/epripremier/join>

**Meeting ID: DWM6ZR**

**Meeting Key: 7qMP&"dqT**

**Downloadable press kit:**

[www.epri.com](http://www.epri.com)



# *Developing tomorrow's technology*

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Chairman, President and Chief Executive Officer  
Wisconsin Energy Corporation

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Henry A. “Hank” Courtright serves as Senior Vice President of Member Services at the Electric Power Research Institute (EPRI). He is responsible for member/client relations, technology innovation and EPRI’s Energy Technology Assessment Center. He has previously served as Vice President, Environment overseeing EPRI environmental sciences research; as Vice President, Generation overseeing research on fossil, hydro and renewable generation; and as a Technical Director on energy efficiency programs.

Courtright has over 30 years of experience in the electric utility industry with EPRI and Pennsylvania Power and Light Company.

# Chilled Ammonia Process P4 Pilot Project Press Conference

27 February, 2008

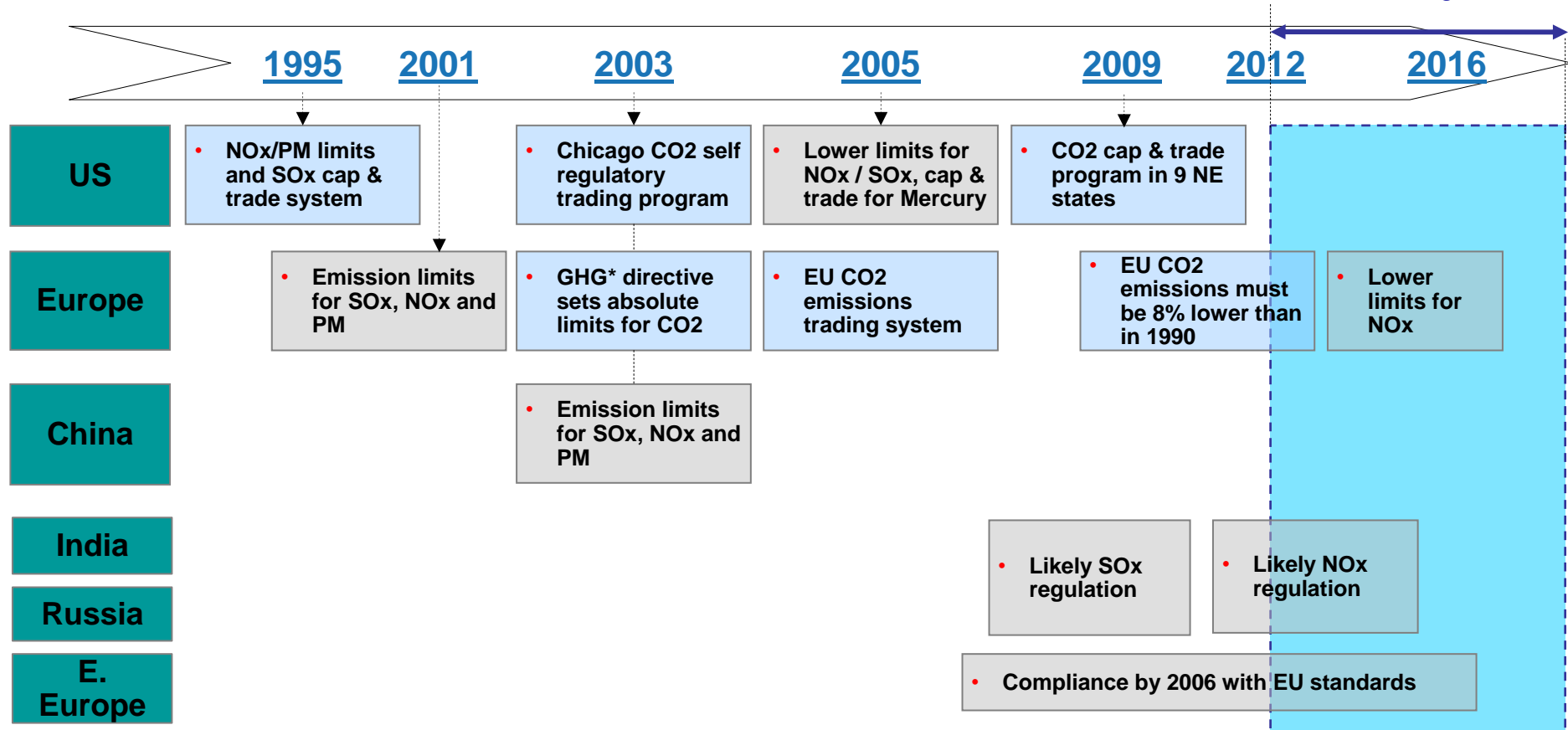
Jean-Michel Aubertin

**ALSTOM**

# Environmental legislation - a key driver for change



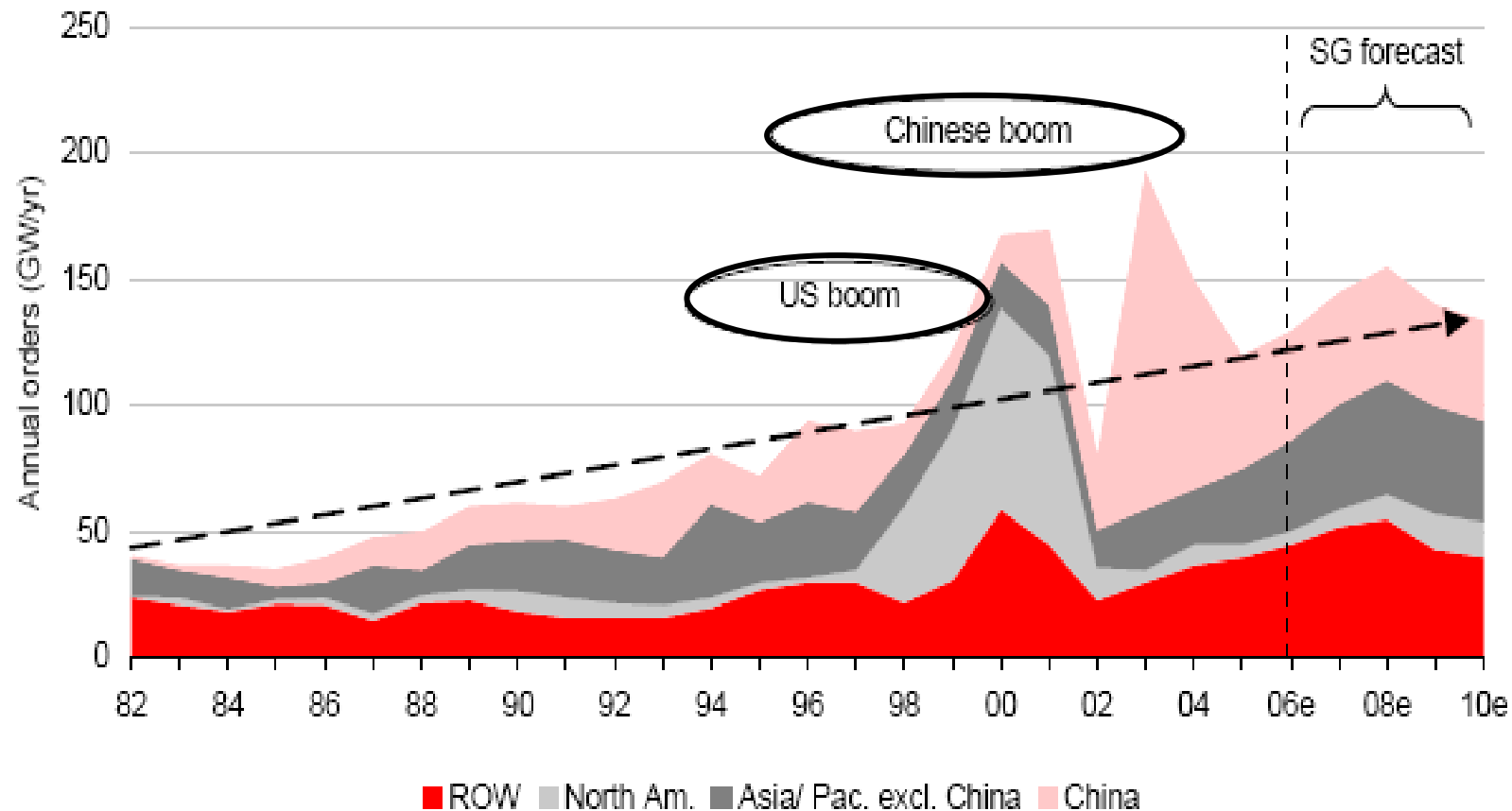
*Likely post Kyoto CO2 worldwide agreement*



**Traditional pollutant legislation driving US/Europe market  
CO2 constraints are becoming the driving factor worldwide**

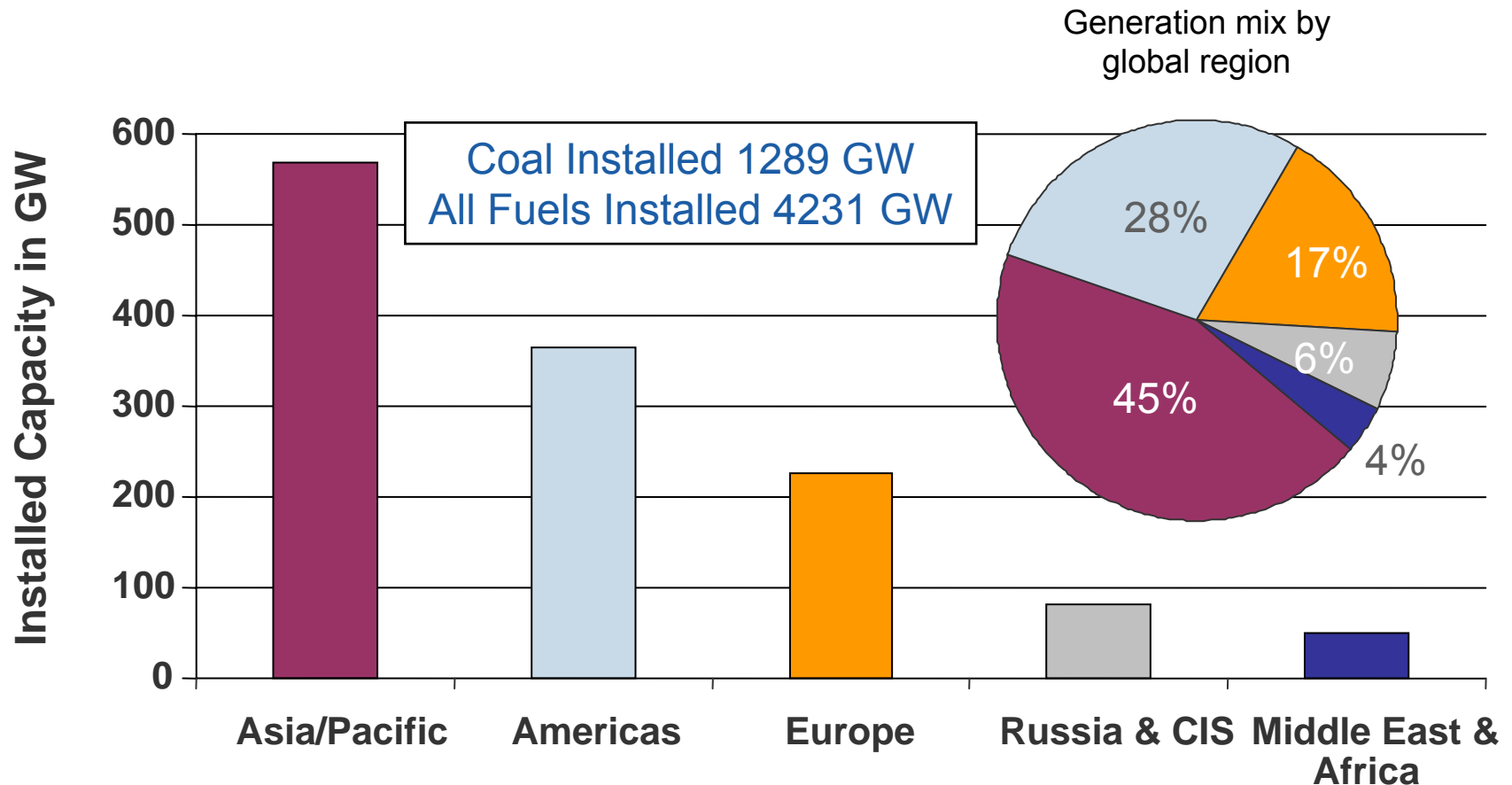
# Electricity demand drives continued growth for power generation equipment

## World New Equipment Market - 1982-2010e



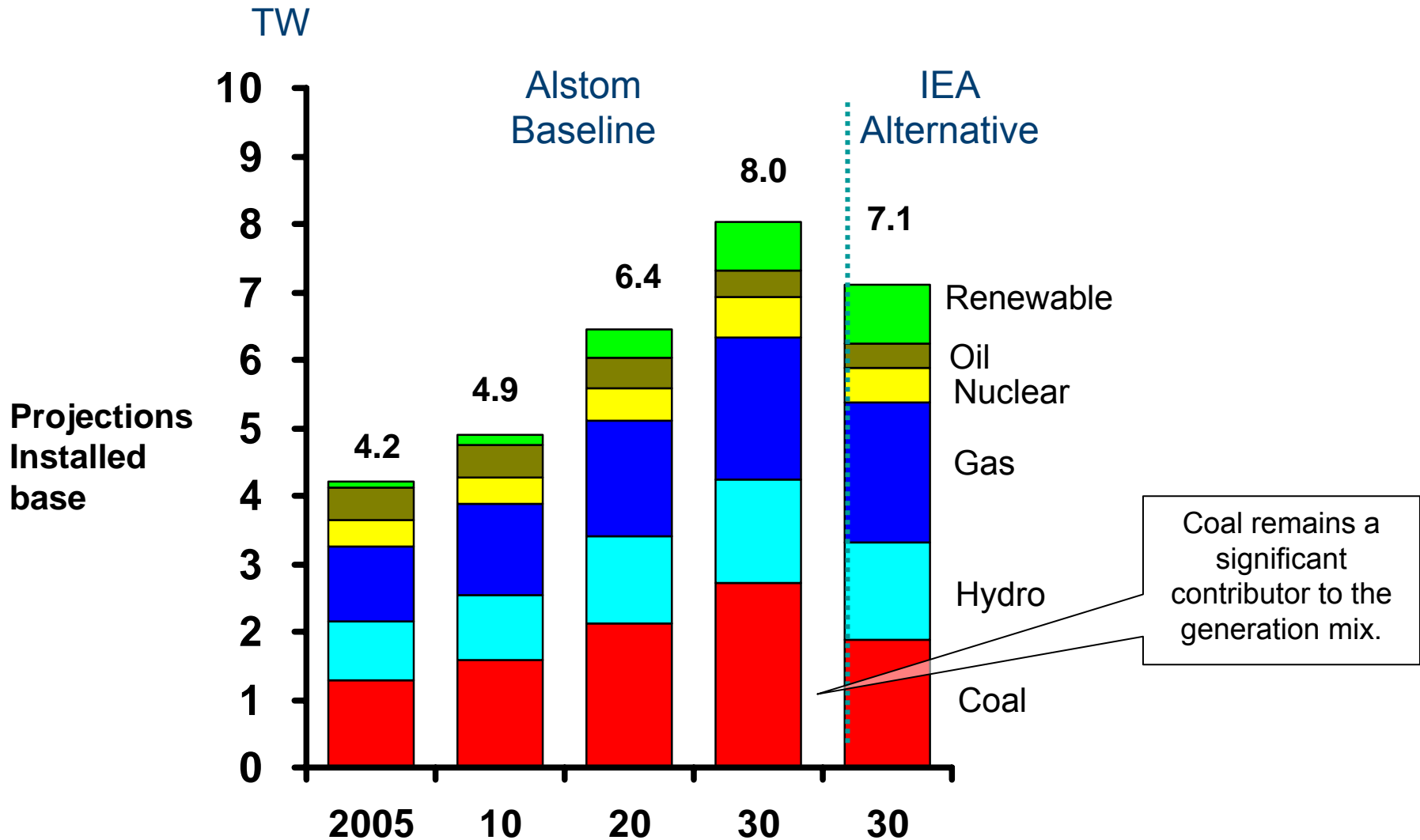
# Power Generation Market

## - 30% of Global Installed Base is Coal Fired



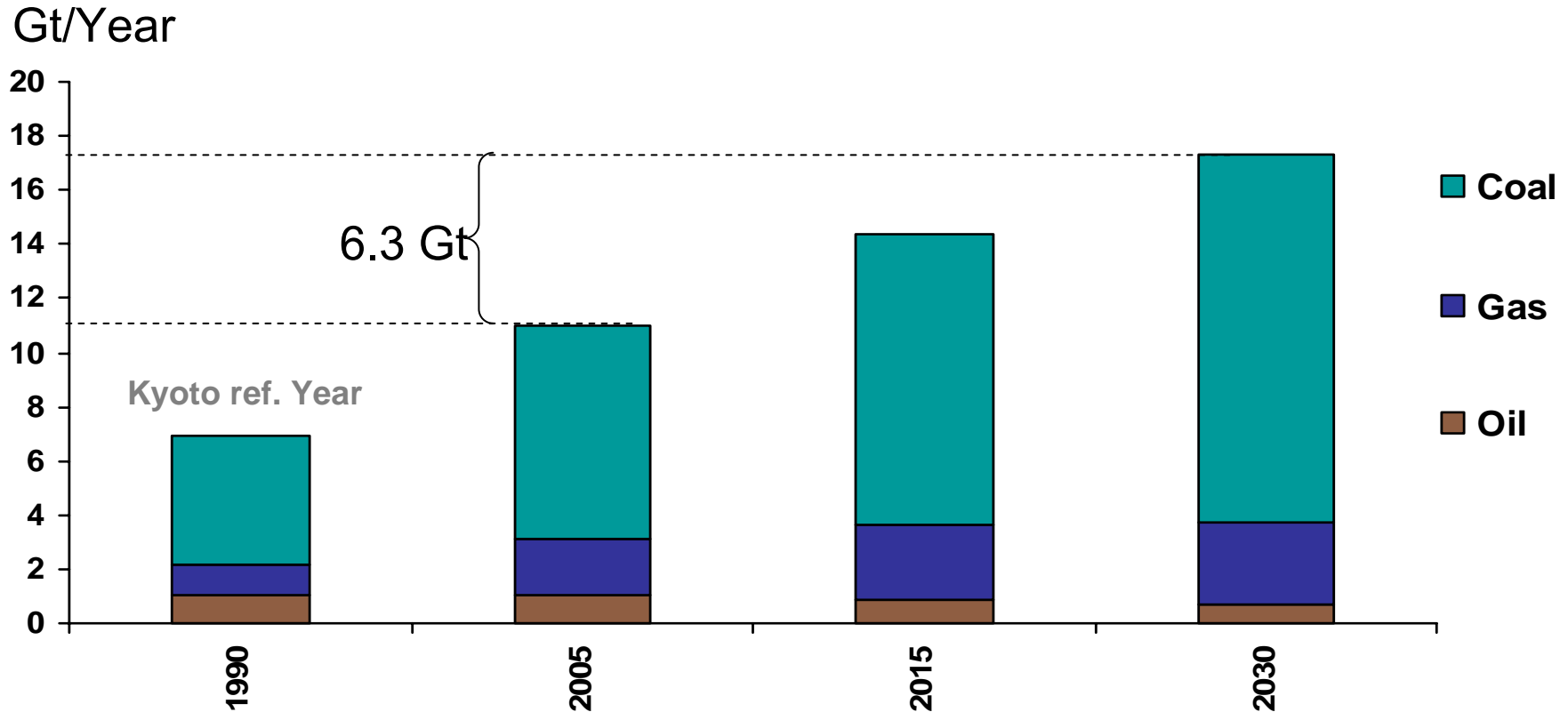
Source: Alstom, UDI 2006

# Fossil fuels will stay dominant in power generation





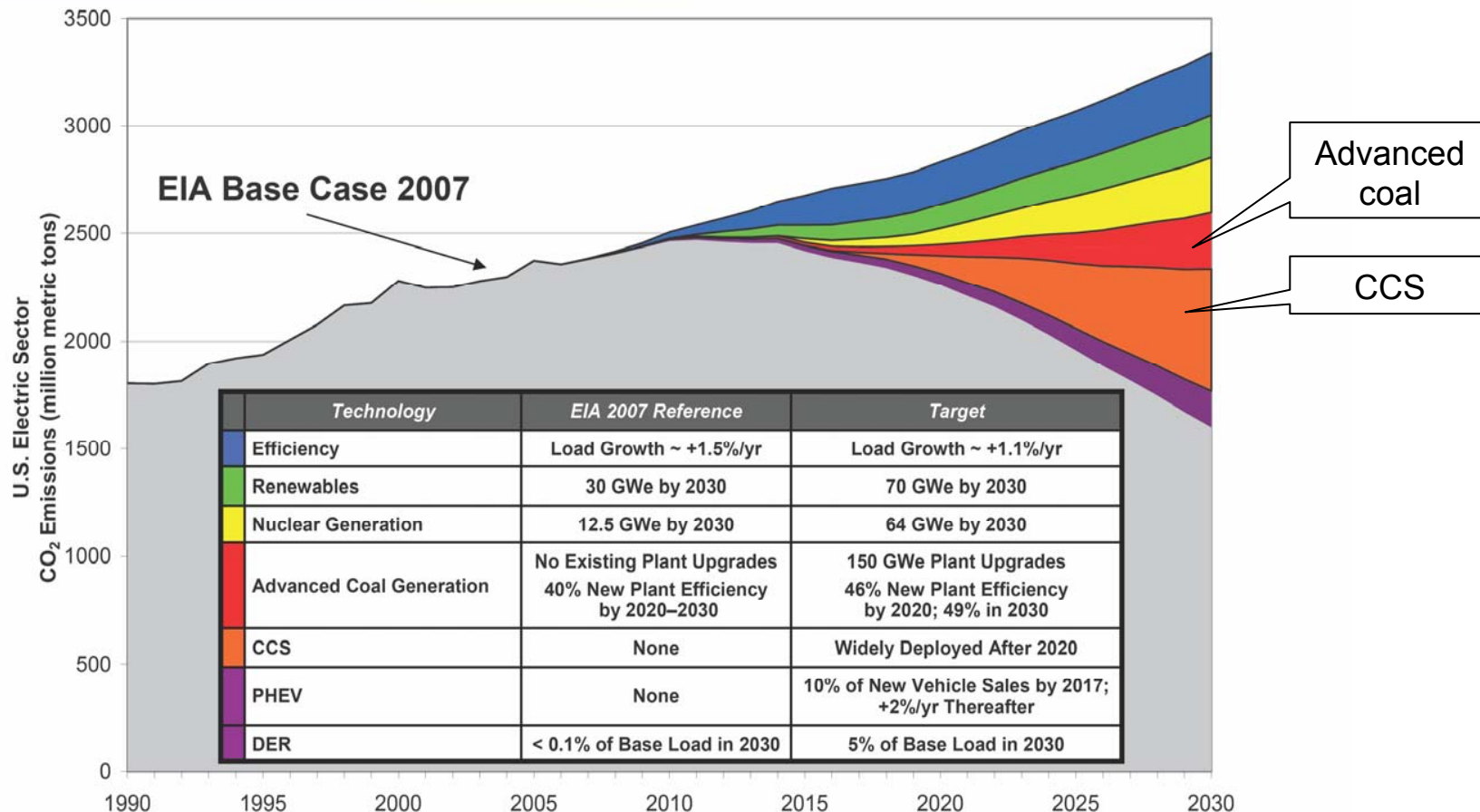
# CO<sub>2</sub> emissions will increase significantly



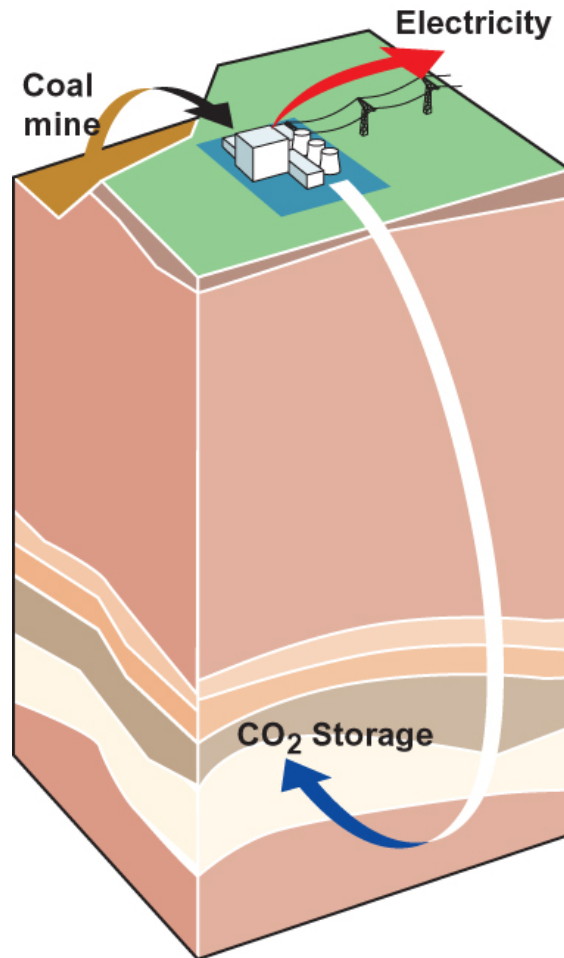
Without CO<sub>2</sub> capture, 2030 emissions are > 6 GT above 2005 levels

# Advanced coal and CCS are an essential part of the future generation mix

The US Government is committed to balanced energy portfolio that includes nuclear and clean coal



\* Achieving all targets is very aggressive, but potentially feasible.



## CO<sub>2</sub> Storage options:

- Enhanced Oil Recovery (EOR)
- Deep Saline Aquifers
- Depleted Gas Fields

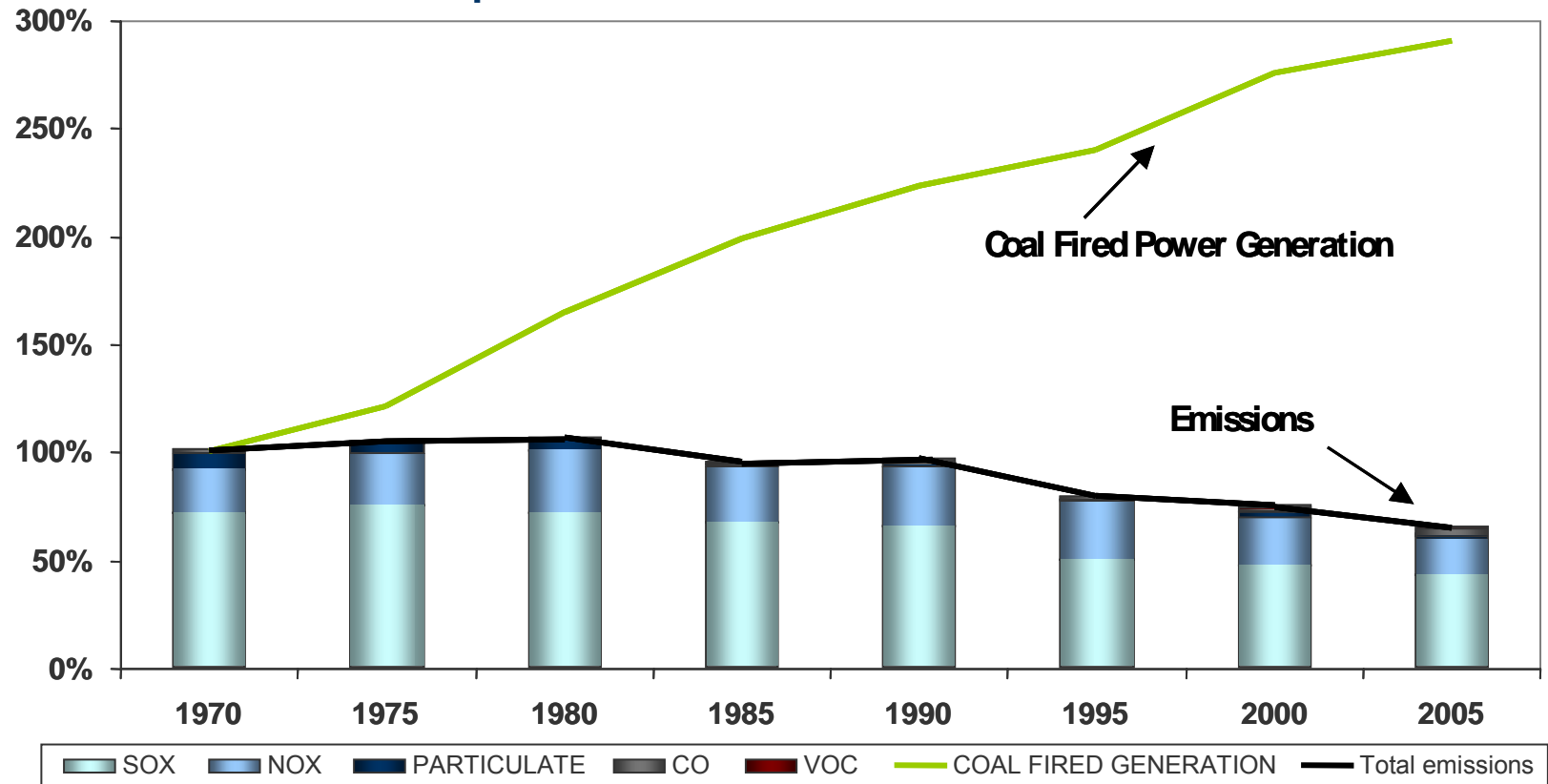
Picture: Vattenfall

# The industry has a track record of success in meeting clean air challenges



Criteria Pollutants\*

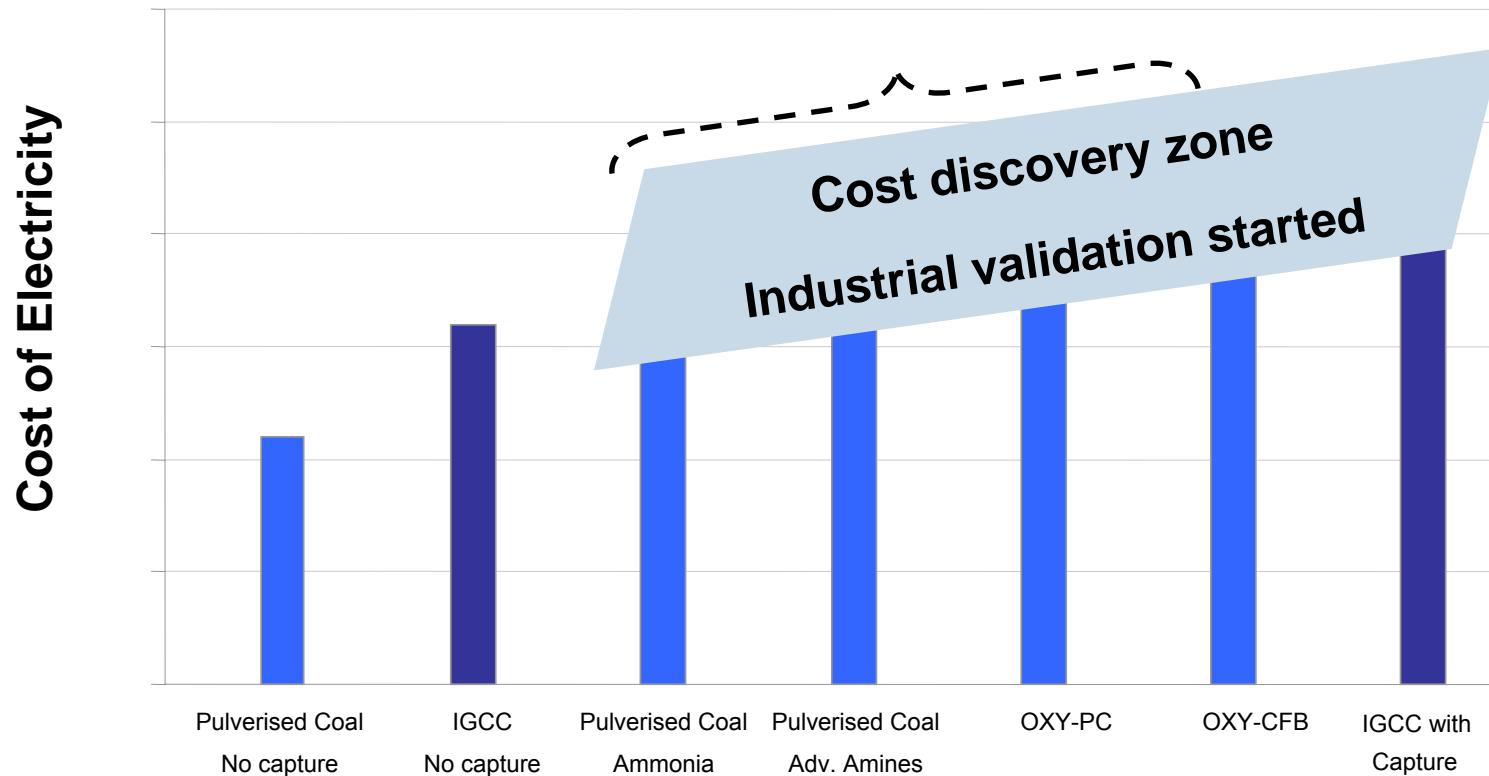
**3x the power with 1/3 lower emissions**



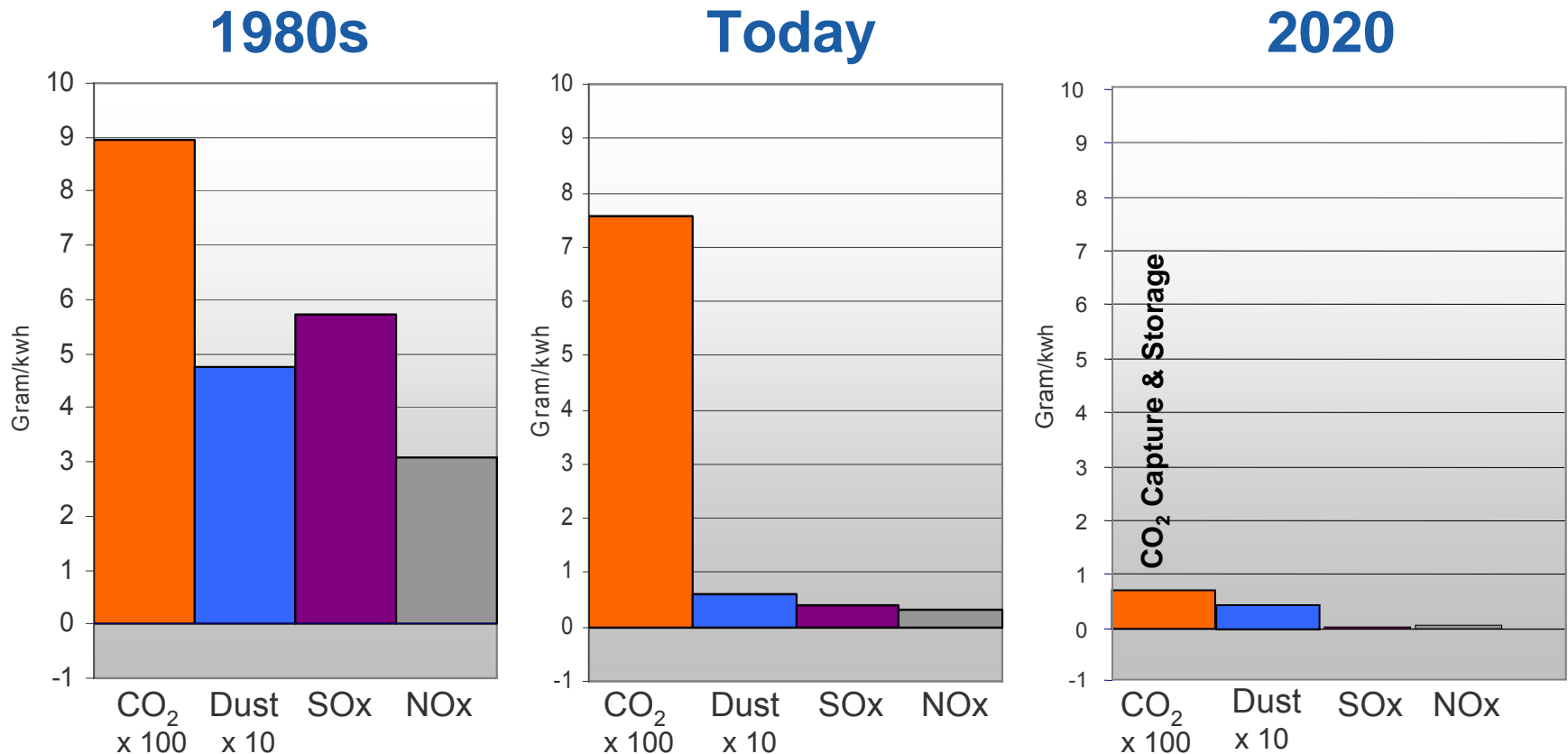
- \*Sum of NOx, SOx, CO, Particulate and VOC emissions from all US power plants
- Coal power generation is 2.9 X that of 1970 while power plant emissions are 36% lower
- All numbers are compared to 1970 which is taken as 100%

# New technologies now promise CCS at a reasonable cost

## Cost of electricity comparison



# CCS enables the industry to evolve towards a “zero emission” target



- ➡ Large reserves of low cost coal driving technology to solve coal's carbon management penalty
  - Power emissions cannot be stabilized without CCS
  - Retrofittable CCS technologies are a must
- ➡ Driving technologies to higher efficiency, particularly ultra-supercritical PC, is a solid strategy for lower CO<sub>2</sub> in the near and longer term
- ➡ Carbon Management solutions are promising for both the Existing Fleet and the New Fleet through:
  - Efficiency improvements
  - Carbon neutral fuel
  - Post combustion capture
  - Alternate combustion techniques.

***We are moving beyond paper.....only demonstration will determine the “real” lowest cost solution***

## Equipment & services for power generation



## Equipment & services for rail transport





# Technologies adapted to all energy sources



## Present in all markets

Gas



Coal



Hydro



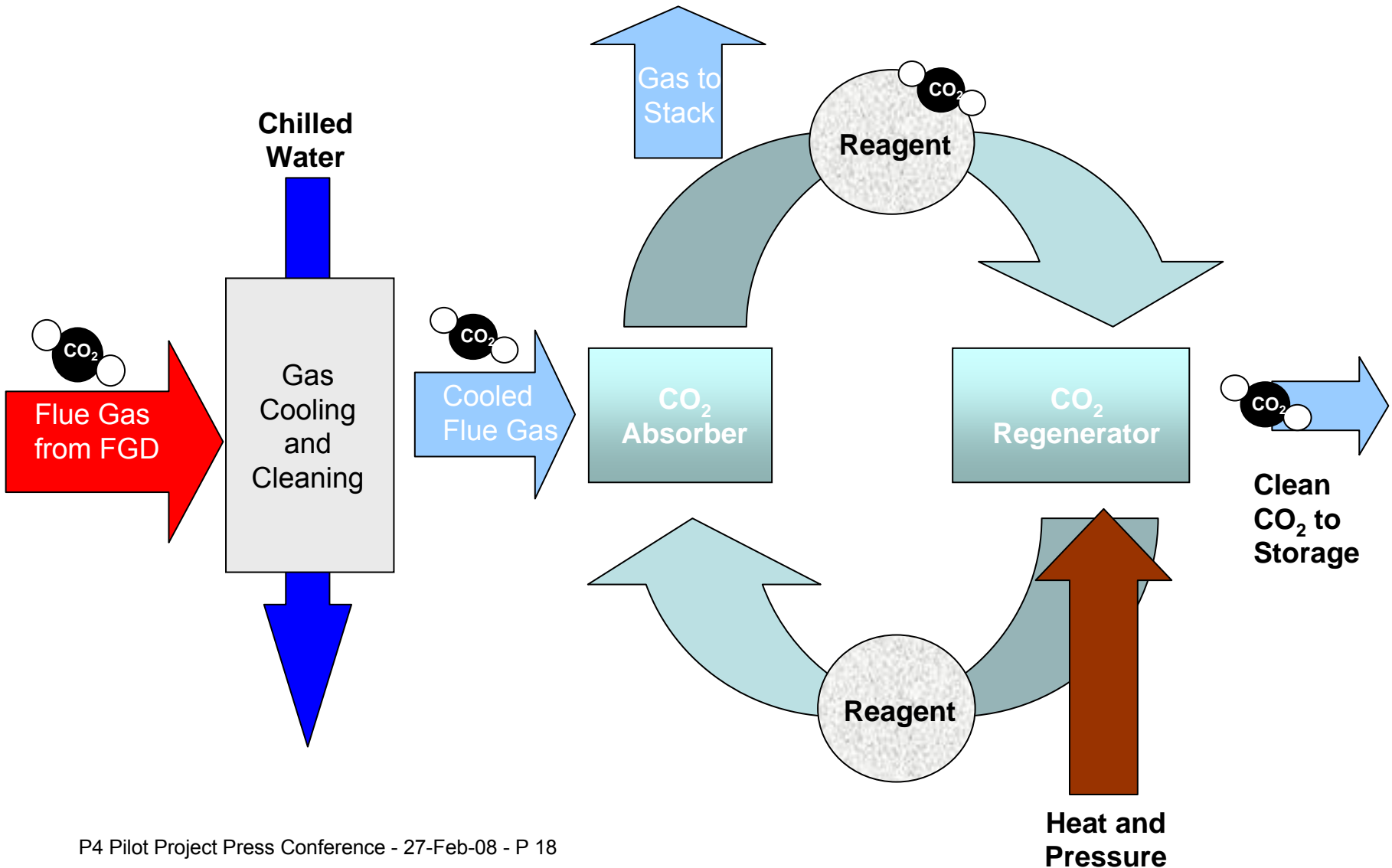
Nuclear (conventional part)



Wind



# Chilled Ammonia Process Description





- More than 30 national and international utilities funding this project through EPRI
- Designed to capture up to 15,000 tons/year of CO<sub>2</sub>
- Testing to continue through 2008
- Key Objectives:
  - Proof of Concept
  - Conduct long-term tests to establish process integrity
  - Measure energy consumption
  - Develop techno-economic analysis to scale the system for commercial applications



We Energies Pleasant Prairie Power Plant (P4)



# Chilled Ammonia field pilot at We Energies



P4 Pilot Project Press Conference - 27-Feb-08 - P 20

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