



## ***Update on Power Plant Design Activities***

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May 8, 2007**

# ***FutureGen***

## **Push the Technology Envelope**

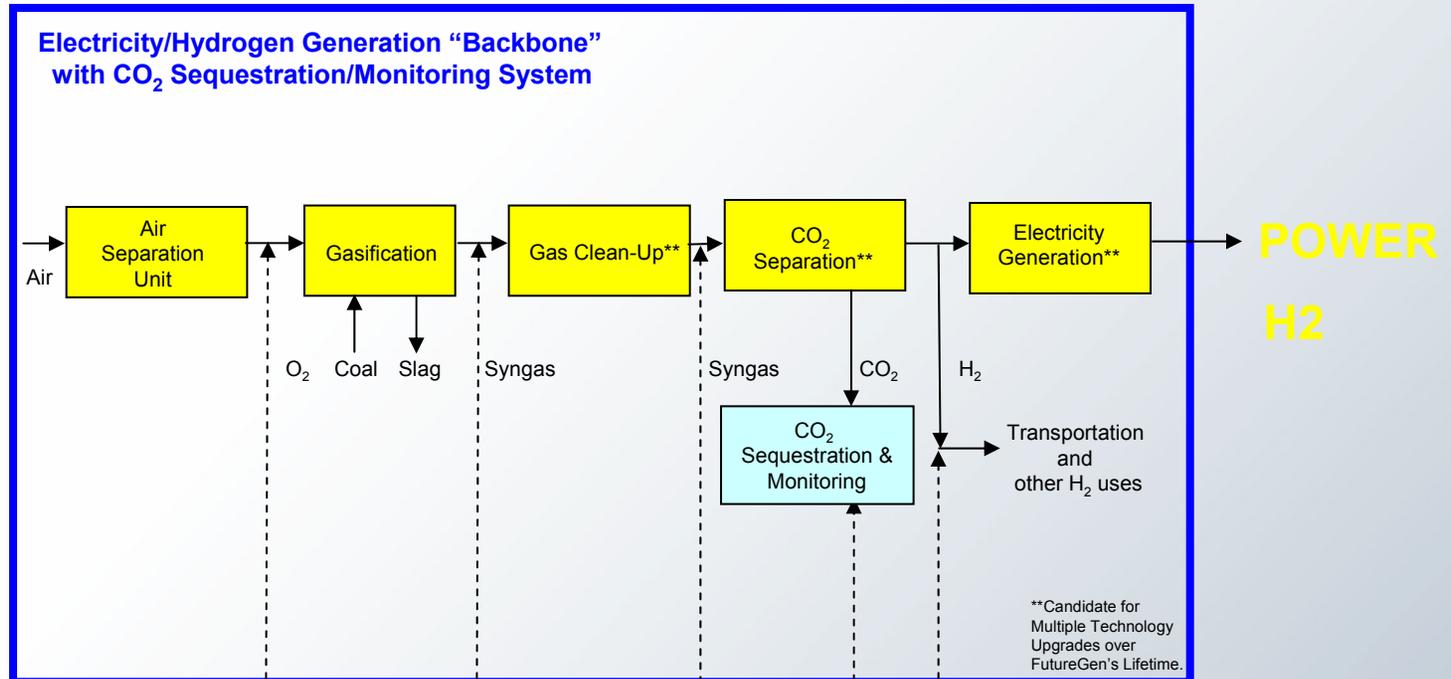
- **Establish the technical, economic, and environmental viability of “zero-emission” coal plants by 2015; thus, creating the option for multiple commercial deployments by 2020**
- **Industry to validate DOE suggested goals:**
  - Sequester >90% CO<sub>2</sub> with potential for ~100%
  - >99% sulfur removal
  - <0.05 lb/MMBtu NO<sub>x</sub>
  - <0.005 lb/MMBtu PM
  - >90% Hg removal
  - With potential for a N<sup>th</sup> plant commercial cost no more than 10% greater than that of a conventional power plant

# FutureGen

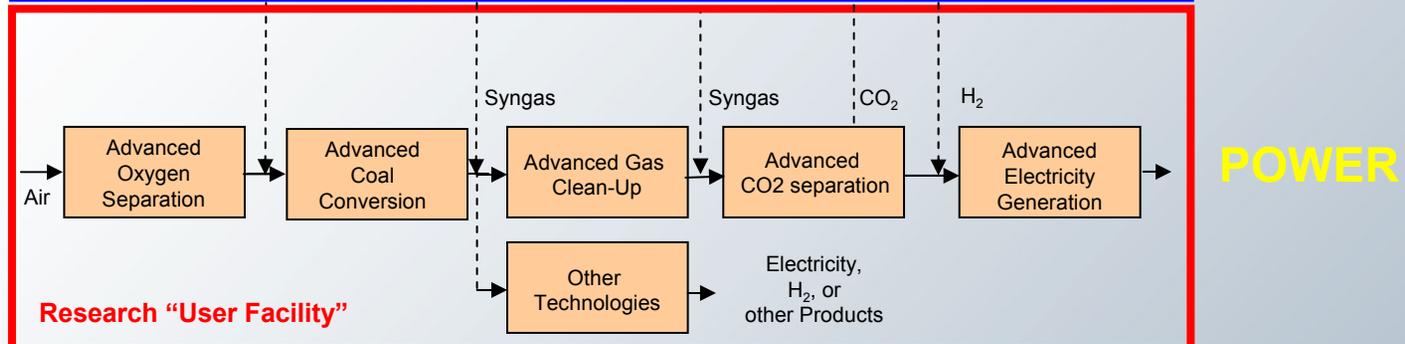
## Industry's View of the Facility

**Full-Scale  
Gasification  
Research  
Platform**

**Sequestration**



**Sub-scale  
Research  
User Facility**



# ***Design and Cost Estimate***

## **Facility Goals**

### Key Goals

- Generate 1 to 2.5 million tons per year CO<sub>2</sub>; (target 90% CO<sub>2</sub> capture)
- Design for all U.S. coals (primarily bituminous and sub-bituminous).
  - Maybe other coals.
- Push the technology (“prototype plant of the future”)
- Commercial-scale (275-MW nominal rating)

# Design and Cost Estimate

## Plant Design for Fuel Flexibility

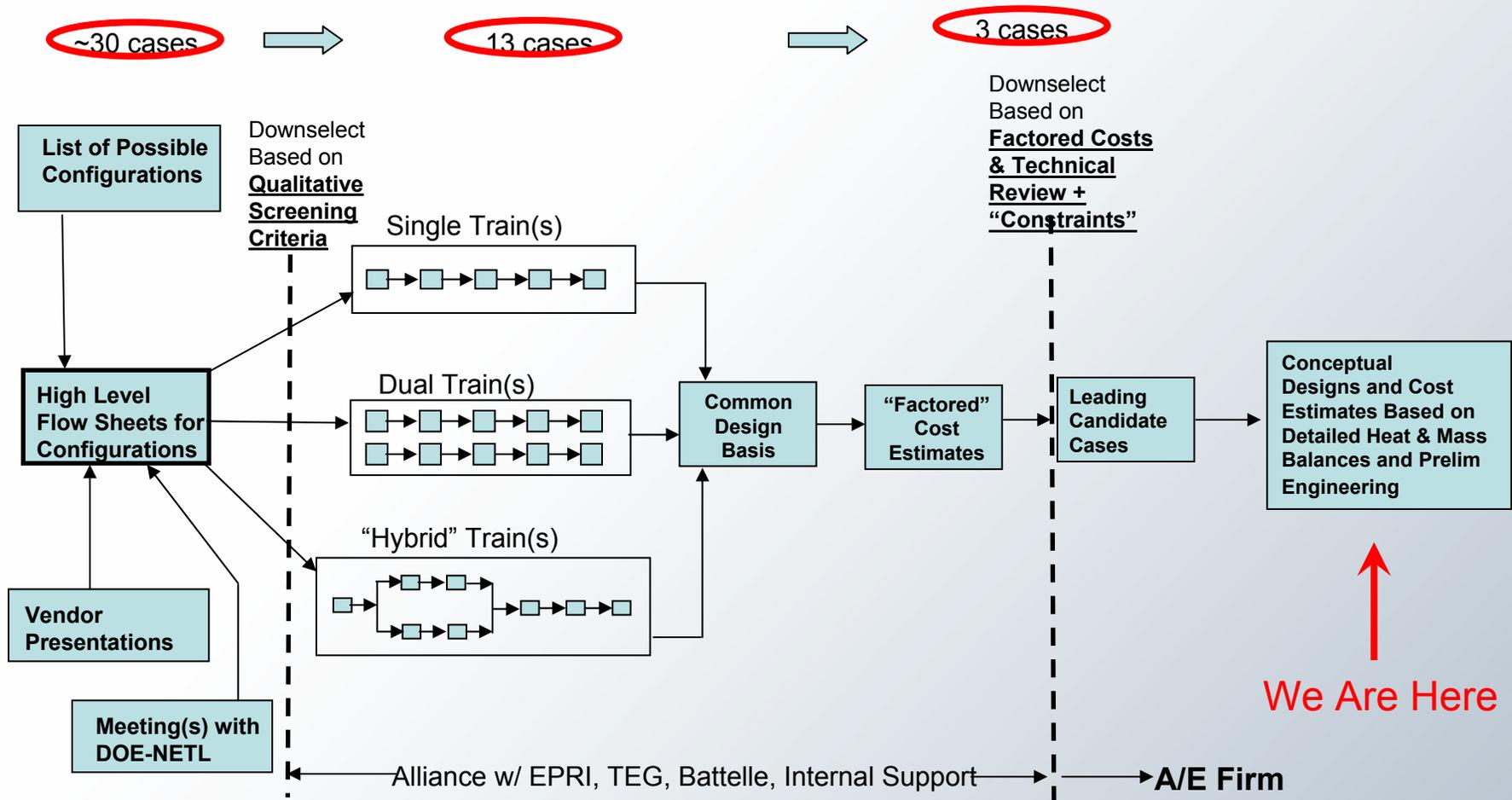
<b>COAL SPECIFICATIONS</b>			
	Mean Property Values		
	Northern Appalachian	Illinois Basin	PRB
<b>AS-RECEIVED (wt%)</b>			
Total Moisture	7	11.5	29
Equilibrium Moisture	2	7.8	27.6
<b>DRY BASIS (wt%)</b>			
Fixed Carbon	53.44	49.3	44.4
Volatile Matter	38.94	40.3	48.9
Ash	7.62	10.4	6.7
<b>DRY BASIS (wt%)</b>			
Ash	7.62	10.4	6.7
Carbon	77.67	71.6	70.3
Hydrogen	5.14	4.9	4.9
Nitrogen	1.47	1.5	0.9
Chlorine	0.1	0.19	0.01
Sulfur	2.49	3.5	0.5
Oxygen	5.51	7.87	17.2
HHV (Dry Basis), Btu/lb	13,980	13,000	12,941

# ***Design and Cost Estimate Screening Criteria***

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- **Economic Criteria**
  - **Capex Overrun Potential**
  - **COE Reduction Potential**
  
- **Technical Criteria**
  - **Coal Flexibility**
  - **Step-Outs**
  - **Schedule Risk**
  - **Mission Risk**
  - **Technical Risk**
  
- **Programmatic Criteria**
  - **Vendor Alignment**
  - **DOE-Developed Backbone Technologies**

# Design and Cost Estimate Conceptual Design Decision Process



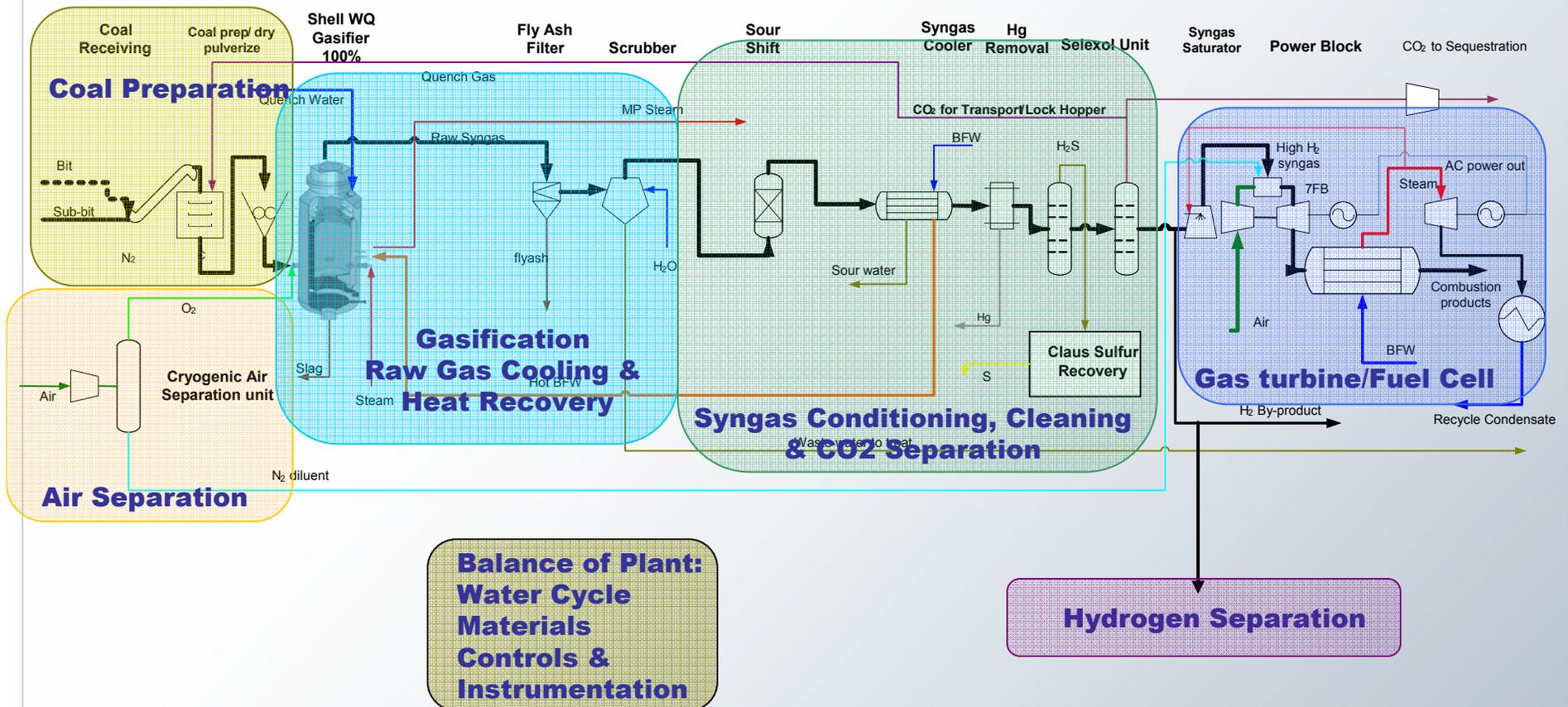
# ***Design and Cost Estimate***

## **Design Cases**

- **Two Single Trains:**
  - Slurry feed water quench
  - Dry feed water quench
- **One Multiple Stream Hybrid:**
  - 100% full slurry quench
  - 30% transport gasifier with ITM air separation
- **Three coal types:**
  - Northern Appalachian
  - Illinois Basin
  - PRB

**These are design configurations for the conceptual design and cost estimate, not the final designs. The actual designs will be established through competitive bids in 2007.**

# Technology Packages for RFPs



# ***Power Plant Design***

## **Current Activities**

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- **DOE technology meetings**
- **Technology due diligence**
- **Technology specifications**
- **Base design documents**
- **Site specific analyses**
- **Heat & Material Balances**

- **Acknowledgement**

This material is based upon work supported by the U.S. Department of Energy under Award Number DE-FC26-06NT42073.

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