

# The status of the FutureGen zero emission coal power plant



**Briefing to representatives of the  
CSLF Technical Group**

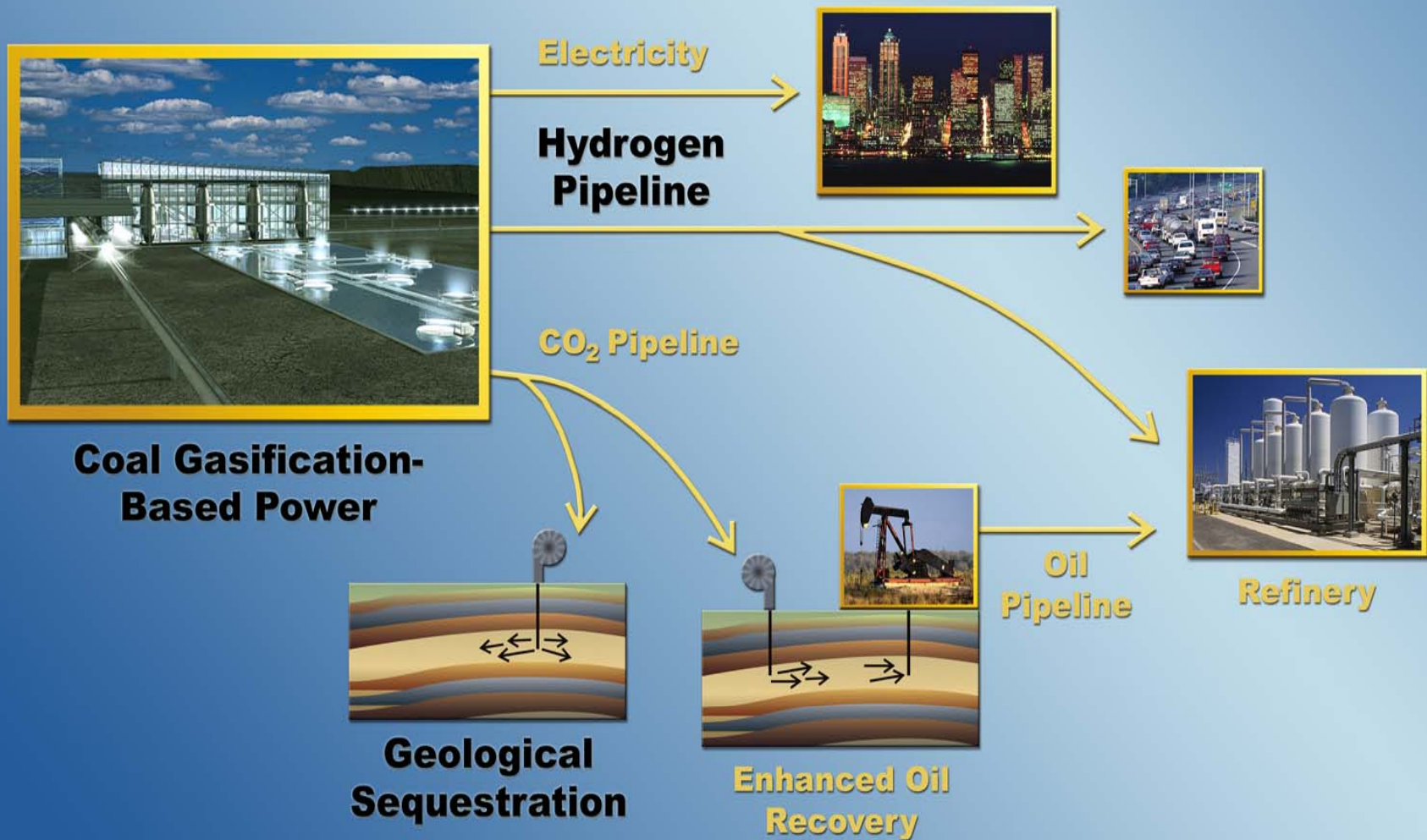
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U.S. Department of Energy**



# FutureGen

Energy Independence through Carbon Sequestration and Hydrogen



# Tomorrow's Energy Plant



**The goal of the FutureGen research project is to establish the technical feasibility, economic viability and broad acceptance of co-producing electricity and hydrogen from coal with essentially zero emissions, including carbon (sequestration).**

# RD&D to Meet Technology Challenge

## Traditional Advanced Technology

**Cryogenic Separation**



**Amine Scrubbers**



**Gas Stream Clean-Up**



**Syngas Turbine**



**Fuel Cell (\$4,000/kW)**



**EOR based**



**Existing Gasifier**



**System Integration**



**Plant Controls**



## Research Inventions

**O<sub>2</sub> Membranes**

**H<sub>2</sub> Membranes, “Clathrate” CO<sub>2</sub>  
Separation or Advanced Soloxol**

**“Dirty” Shift Reactor**

**Hydrogen Turbine**

**SECA Fuel Cell (\$400/kW design)**

**Sequestration Technology**

(including in-situ CO<sub>2</sub> monitoring)

**Advanced Transport Reactor**

**“First of a Kind” System Integration**

**“Smart” Dynamic Plant Controls &  
CO<sub>2</sub> Management Systems**

# The FutureGen “Alliance”

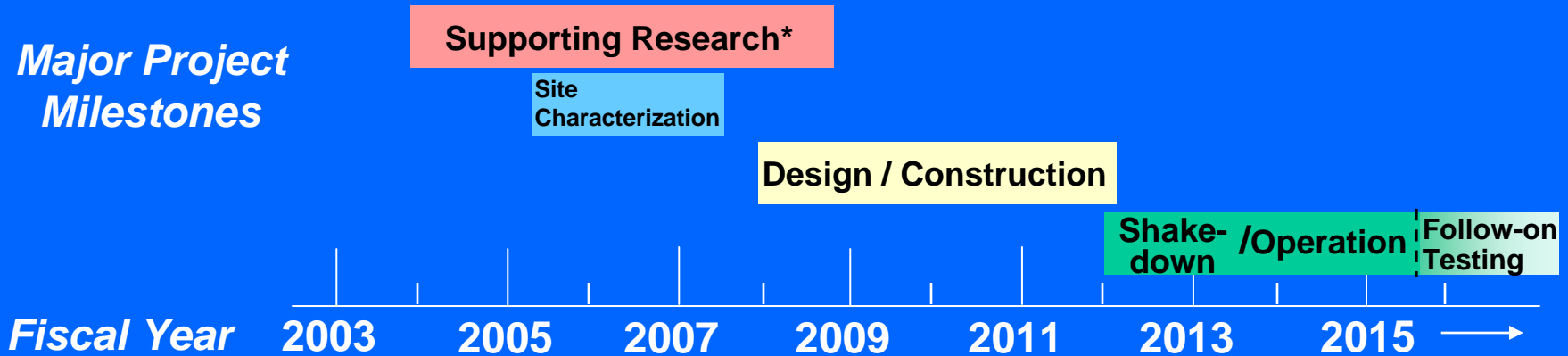


•The Alliance presently consists of nine organizations representing over 15% of the U.S. coal-fired electricity generation and over 40% of the U.S. coal production, plus a coal-based utility in China.

•As an open consortium (both domestically and internationally) the Alliance is geographically diverse, currently including both eastern and western domestic coal producers and coal-fueled electricity generators, as well as a utility in China. It includes producers and users of a full range of coal types.

- American Electric Power
- CONSOL Energy Inc.
- Kennecott Energy Company, a member of the Rio Tinto group
- BHP Billiton
- Anglo American
- Peabody Energy
- Foundation Coal Holdings (Formerly RAG)
- Southern Company
- China Huaneng Group

# Project Schedule - Key Events



\* Supporting research includes research embedded in the FutureGen project and additional research in FE's carbon sequestration, IGCC, turbines, and fuel cell R&D programs.



# Progress and Next Steps

- **A cooperative agreement has been signed with the FutureGen Industrial Alliance Inc. to initiate the first phase of the project.**
- **The Alliance issued a draft RFP Solicitation on February 14, 2006, and a Final RFP was issued on March 7, 2006**
- **The DOE issued an Advanced NOI on February 16, 2006**
- **Top priority for FutureGen is to base-line the plant design and start the site selection/evaluation process through the issuance of a competitive site solicitation**
- **Assess cutting-edge technology readiness for inclusion**
- **Start preliminary design work**
- **Develop test scope for validating FutureGen**
- **Conduct planning activities for permitting process (some preliminary work has already begun)**
- **Continue NEPA (environmental compliance) activities including plans for public scoping**
- **Conduct outreach to garner public acceptance and to bring additional participants into the project both domestically and internationally (coordinated team effort of DOE/Alliance)**



# Back-up Slides

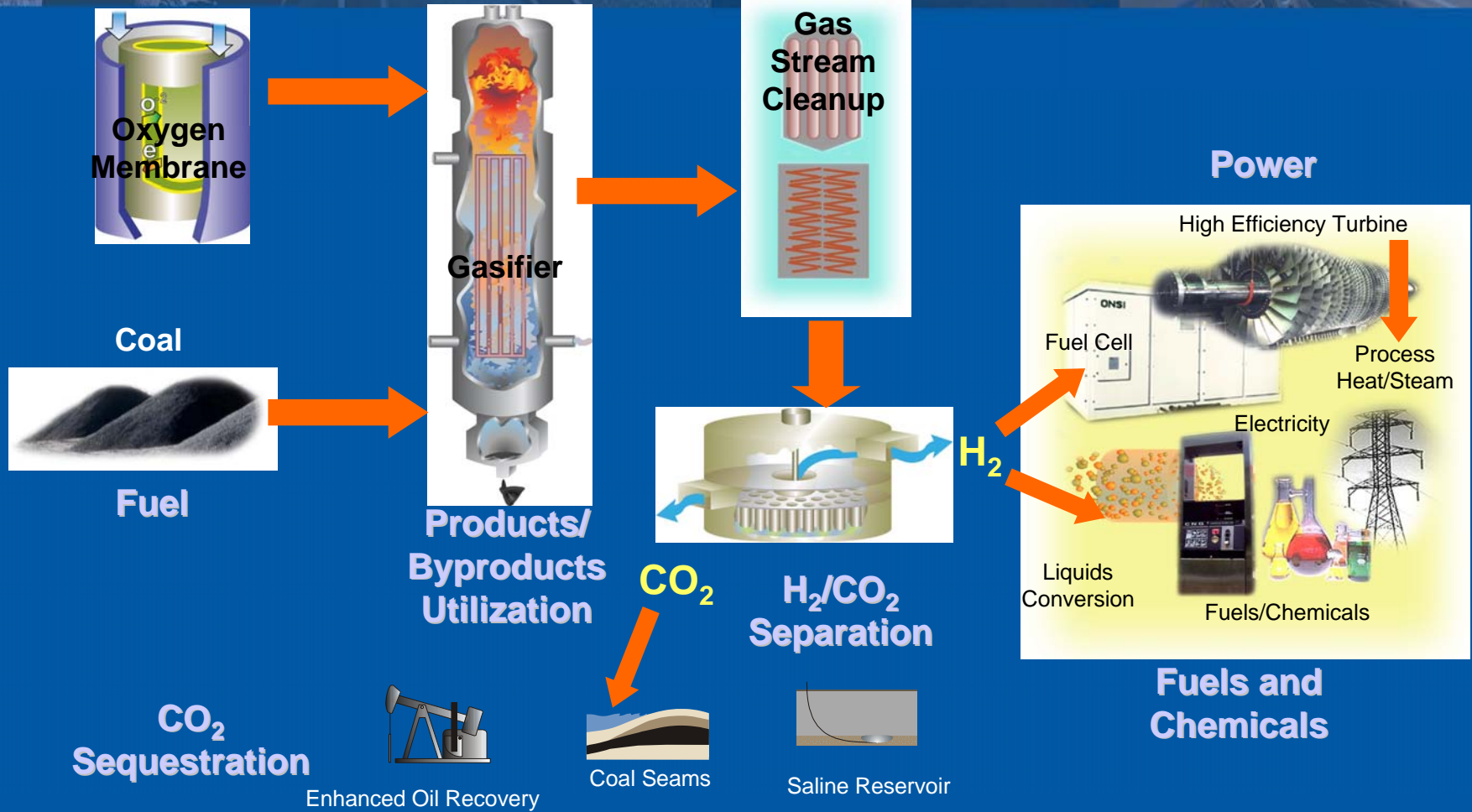


# FutureGen Systems

Oxygen

Gasification

Gas Cleaning





# FutureGen Goals

- **Design, construct and operate a 275 MW prototype plant that produces electricity and hydrogen fuel while sequestering CO<sub>2</sub> at an annual rate of 1-2 million metric tons.**
- **Sequester at least 90 percent of CO<sub>2</sub> initially and up to 100 percent sequestered eventually**
- **Prove the effectiveness, safety, and permanence of CO<sub>2</sub> sequestration through validating the technology at large scale under real world conditions.**
- **Establish technology standards and protocols for CO<sub>2</sub> measuring, mitigation, and verification**
- **Validate the engineering, economic, and environmental viability of advanced coal-based, zero emission technologies for commercial readiness in 2020**

# Summary Remarks



- **FutureGen is a key research step towards proving the feasibility of a zero-emission coal option.**
- **A cooperative agreement has been signed with the FutureGen Industrial Alliance to initiate the first phase of the project.**
- **The cooperation and support of all international stakeholders (government, industry, environmental) will be needed for FutureGen to be successful and accepted.**
- **The potential benefits of a zero-emission coal option are enormous with respect to energy, environmental and economic security.**
- **We invite your participation in FutureGen**

# Additional Information

- **MAIN FUTUREGEN WEBSITES**

<http://fossil.energy.gov/programs/powersystems/futuregen/>

<http://www.futuregenalliance.org/>

- **GENERAL**

[www.netl.doe.gov](http://www.netl.doe.gov)

[www.eia.doe.gov](http://www.eia.doe.gov)

[www.epa.gov](http://www.epa.gov)

[www.climate-science.gov](http://www.climate-science.gov)





# Potential benefits to International Government Partners in *FutureGen*

- For 1% of the project investment, the government would get the following through their participation in the Government Steering Committee (GSC):
  - First hand information for government officials
  - Opportunity to get info translated and dispersed for its use within its public domain.
  - Detailed site tours of the plant, construction, and operations to get first hand experience
  - The opportunity to sit on technical sub-committees under the GSC in several specific areas - to provide technical advice
  - Make suggestions, influence and advise on the testing scope
  - Advocacy for test articles in platform from their laboratories,
  - Opportunity to know first hand the type of equipment to be ordered (competitively)
  - Promotion of a government's international image as a leader on Climate Change and coal sustainability.