

The status of the FutureGen zero emission coal power plant



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

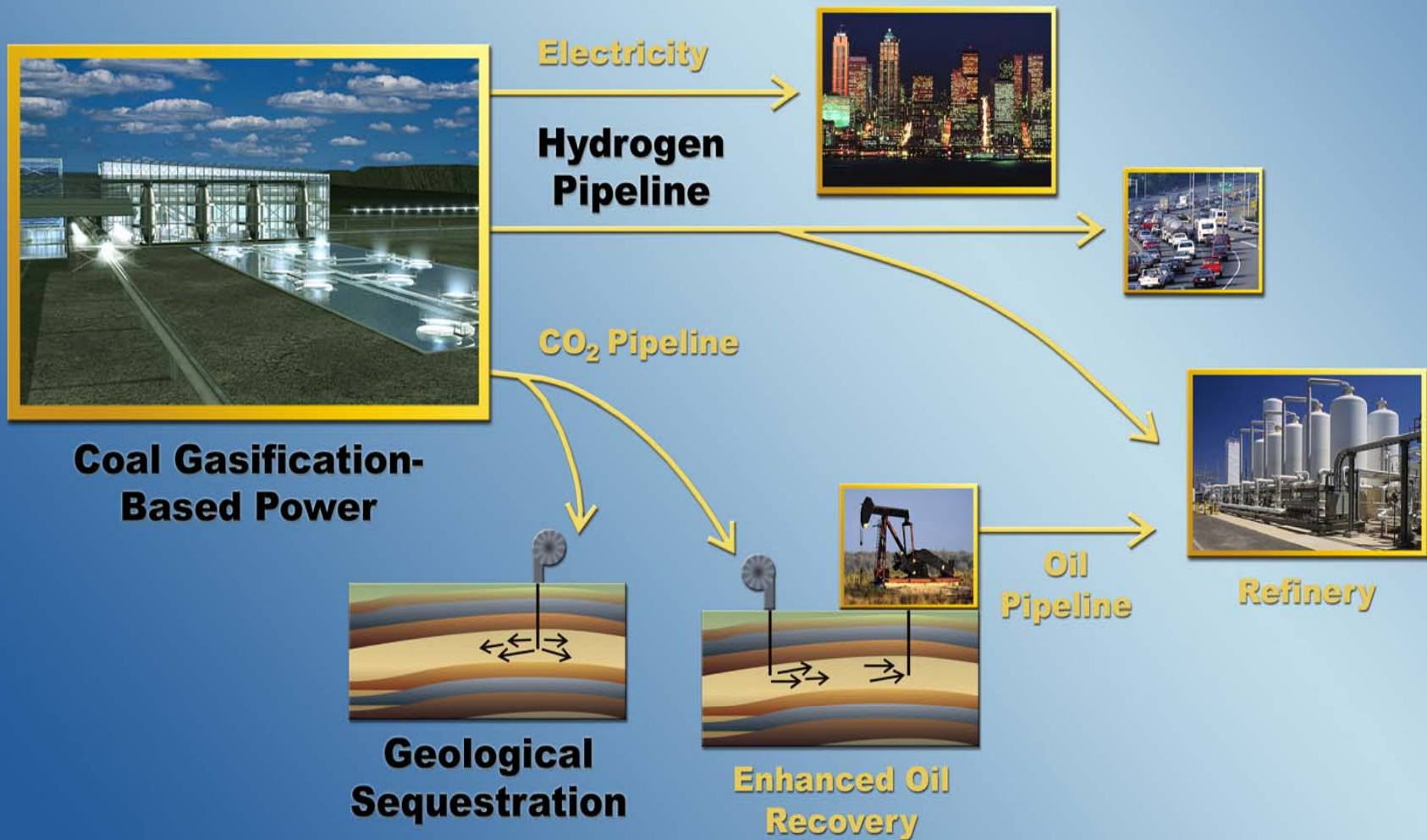
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U.S. Department of Energy**



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

O₂ Membranes

**H₂ Membranes, “Clathrate” CO₂
Separation or Advanced Soloxol**

“Dirty” Shift Reactor

Hydrogen Turbine

SECA Fuel Cell (\$400/kW design)

Sequestration Technology

(including in-situ CO₂ monitoring)

Advanced Transport Reactor

“First of a Kind” System Integration

**“Smart” Dynamic Plant Controls &
CO₂ Management Systems**

The FutureGen “Alliance”

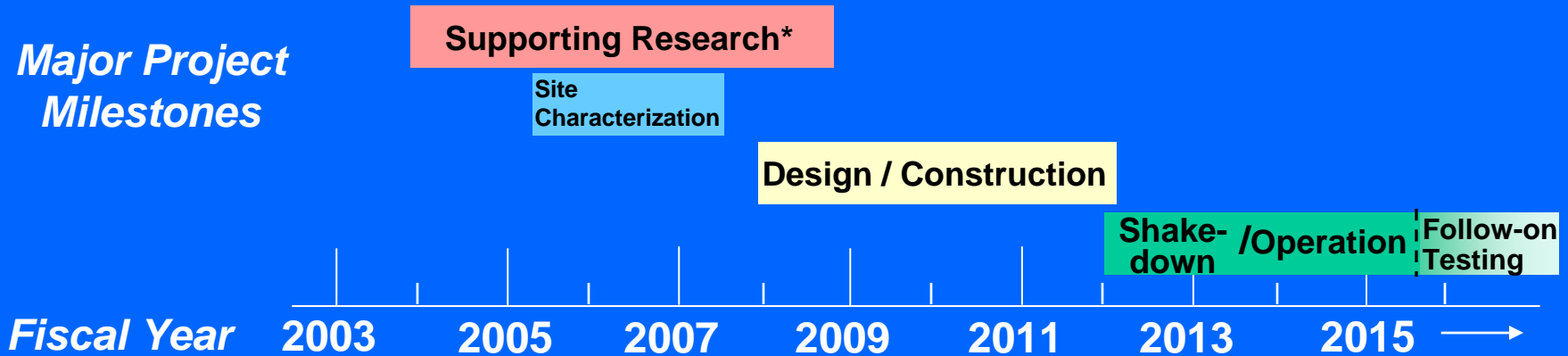


•The Alliance presently consists of nine organizations representing over 15% of the U.S. coal-fired electricity generation and over 40% of the U.S. coal production, plus a coal-based utility in China.

•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)**



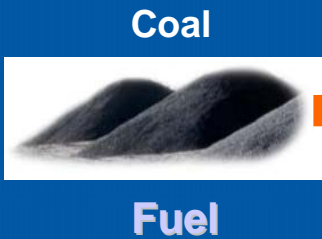
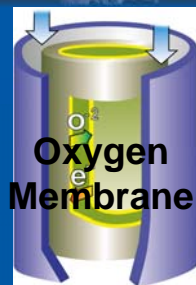
Back-up Slides

FutureGen Systems

Oxygen

Gasification

Gas Cleaning

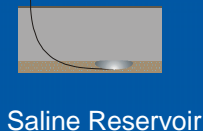


Power

A collection of images related to power generation. It includes a "High Efficiency Turbine" (a large industrial turbine), a "Fuel Cell" (a white rectangular unit), "Process Heat/Steam" (represented by a red arrow), "Electricity" (represented by a power line tower), "Liquids Conversion" (represented by a smartphone), and "Fuels/Chemicals" (represented by laboratory glassware).

Fuels and Chemicals

CO₂ Sequestration





FutureGen Goals

- **Design, construct and operate a 275 MW prototype plant that produces electricity and hydrogen fuel while sequestering CO₂ at an annual rate of 1-2 million metric tons.**
- **Sequester at least 90 percent of CO₂ initially and up to 100 percent sequestered eventually**
- **Prove the effectiveness, safety, and permanence of CO₂ sequestration through validating the technology at large scale under real world conditions.**
- **Establish technology standards and protocols for CO₂ 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

www.eia.doe.gov

www.epa.gov

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.