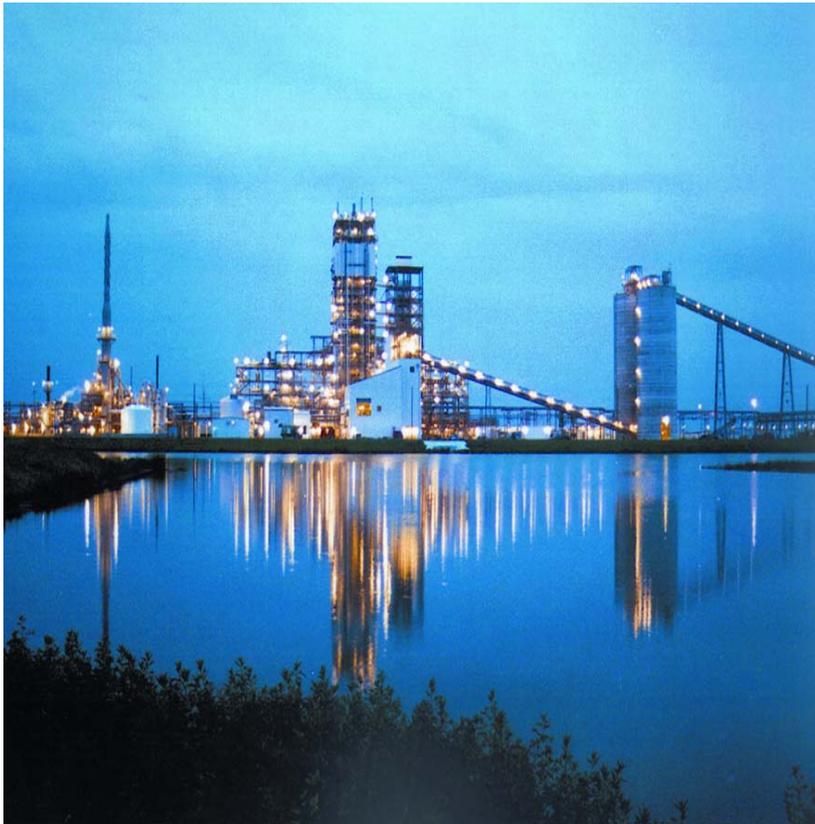


# Clean Coal Power Initiative



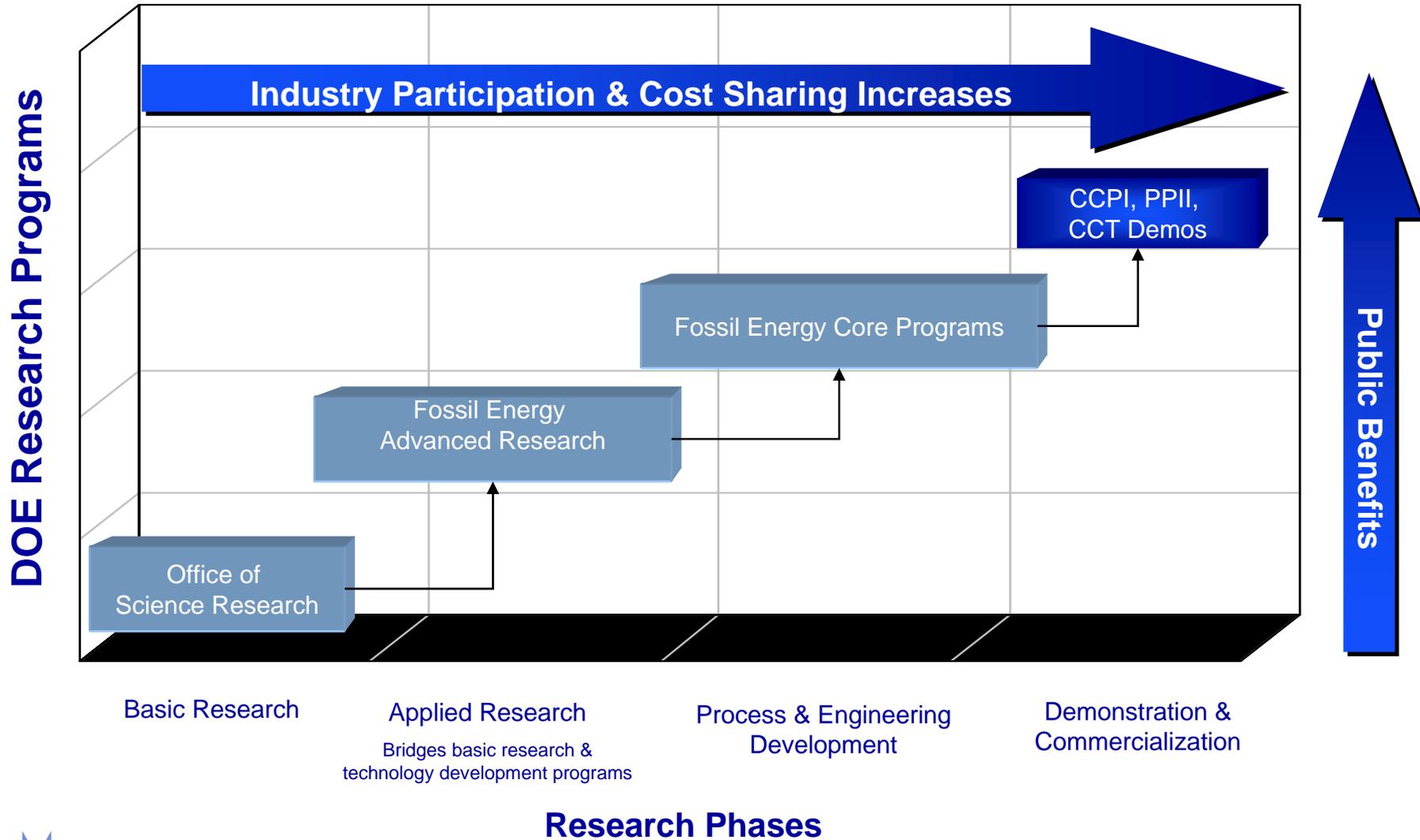
*Tackling Coal's  
Environmental Challenges*

*National Coal Council  
Washington, DC  
December 4, 2003*

Thomas A. Sarkus, Coal Power Projects Division  
National Energy Technology Laboratory



# Stages of Energy RD&D



# DOE Clean Coal Programs

- **Clean Coal Technology (CCT) Program**
  - 1986-2008; US\$4.8 billion
- **Power Plant Improvement Initiative (PPII)**
  - 2000-2008; US\$102 million
- **Clean Coal Program (CCPI)**
  - 2001-2015; US\$5+ billion





Wabash River IGCC Plant  
near Terre Haute, Indiana

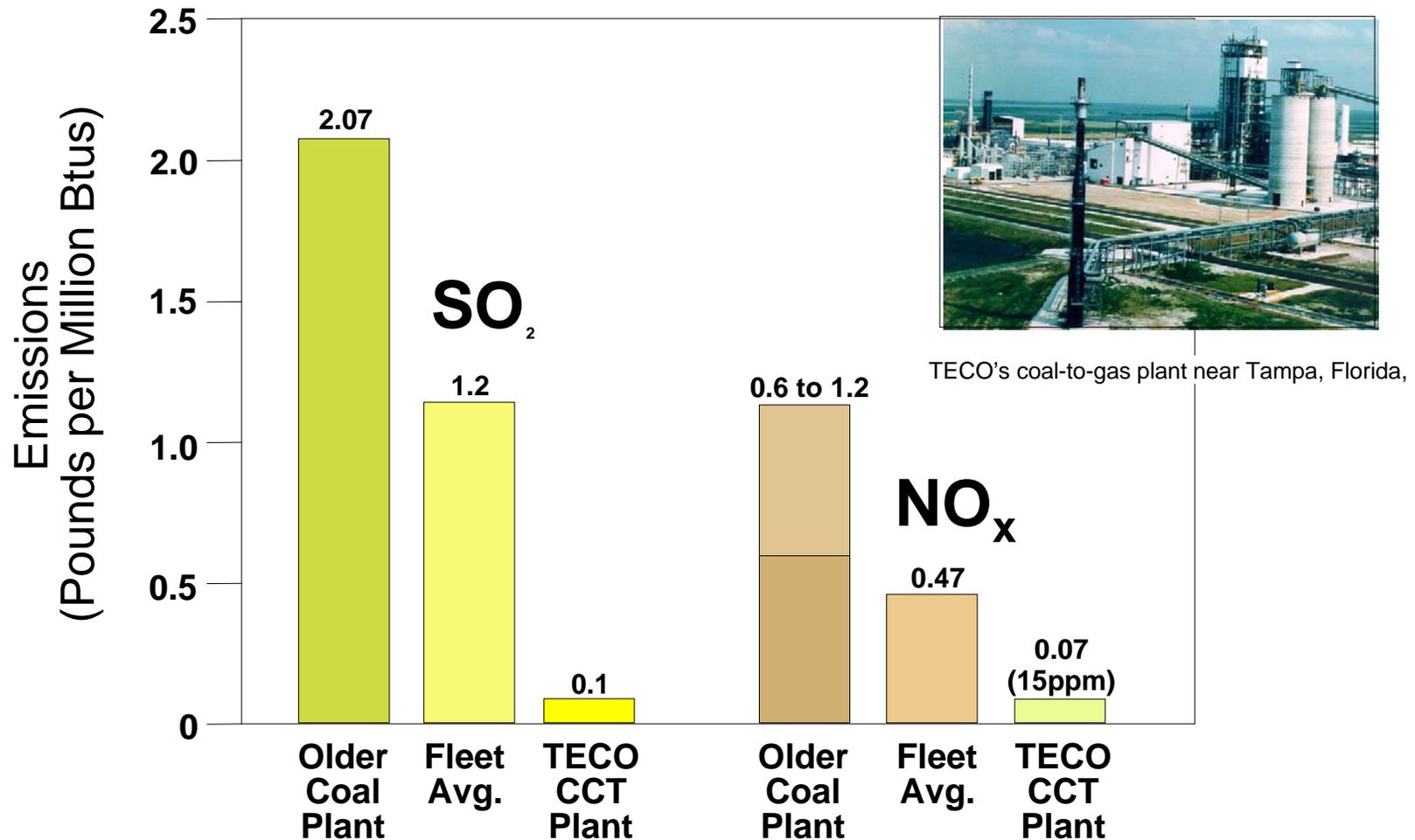
## CCT Program Summary

- **\$4.8 billion industry/government cost-shared effort (68% / 32%)**
- **36 projects**
  - 32 completed
  - Scrubbers for SO<sub>2</sub> control
  - NO<sub>x</sub> control: LNBS, reburning, SNCR & SCR
  - Advanced power generation: FBC & IGCC
  - Hazardous air pollutant & Hg data
  - Remaining projects extend to 2008



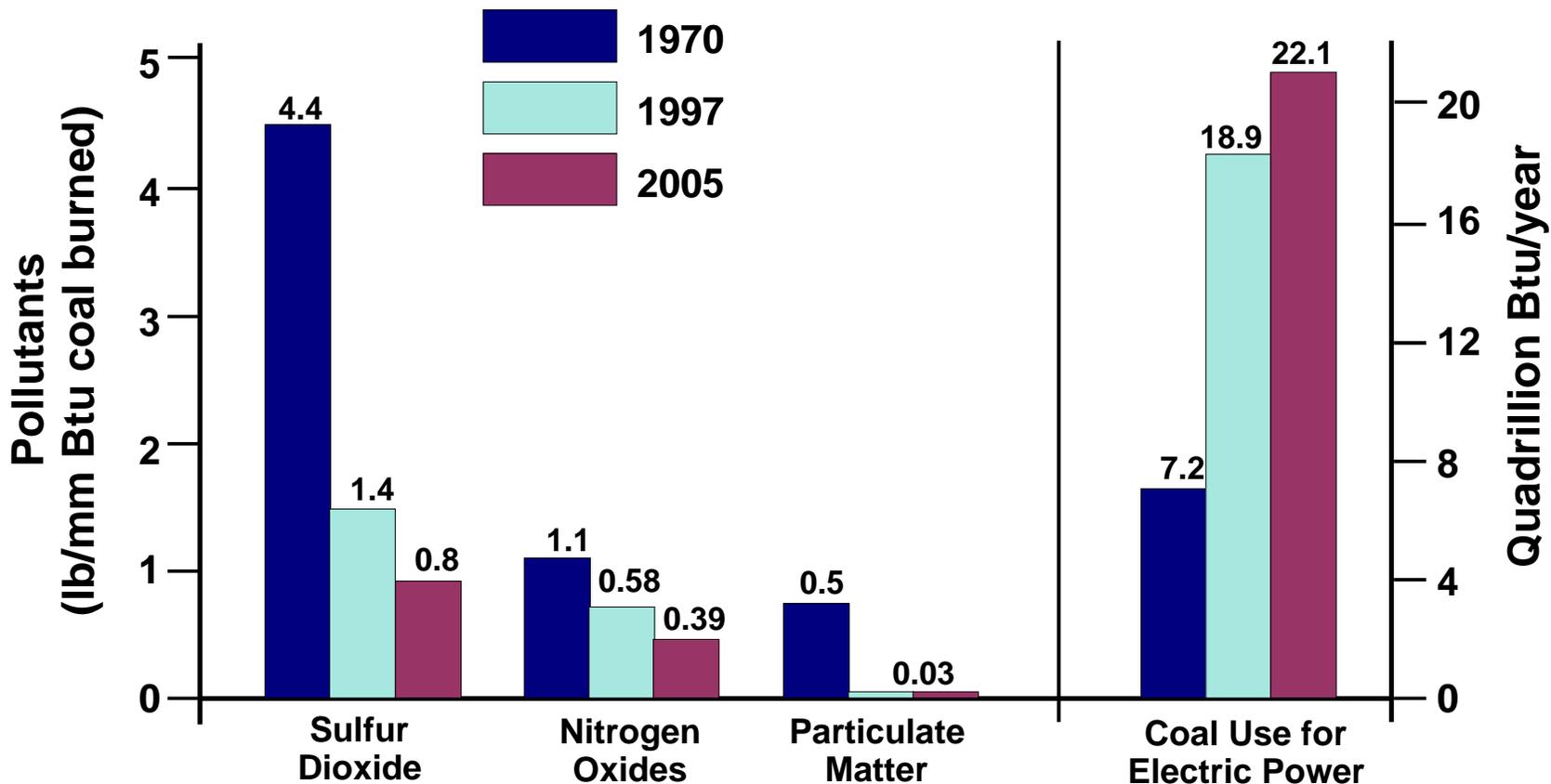
# Tampa Electric (TECO) Clean Coal Project

## A New Path to Clean Air



# Emissions from Coal Power Plants

## *New Technology is Working*



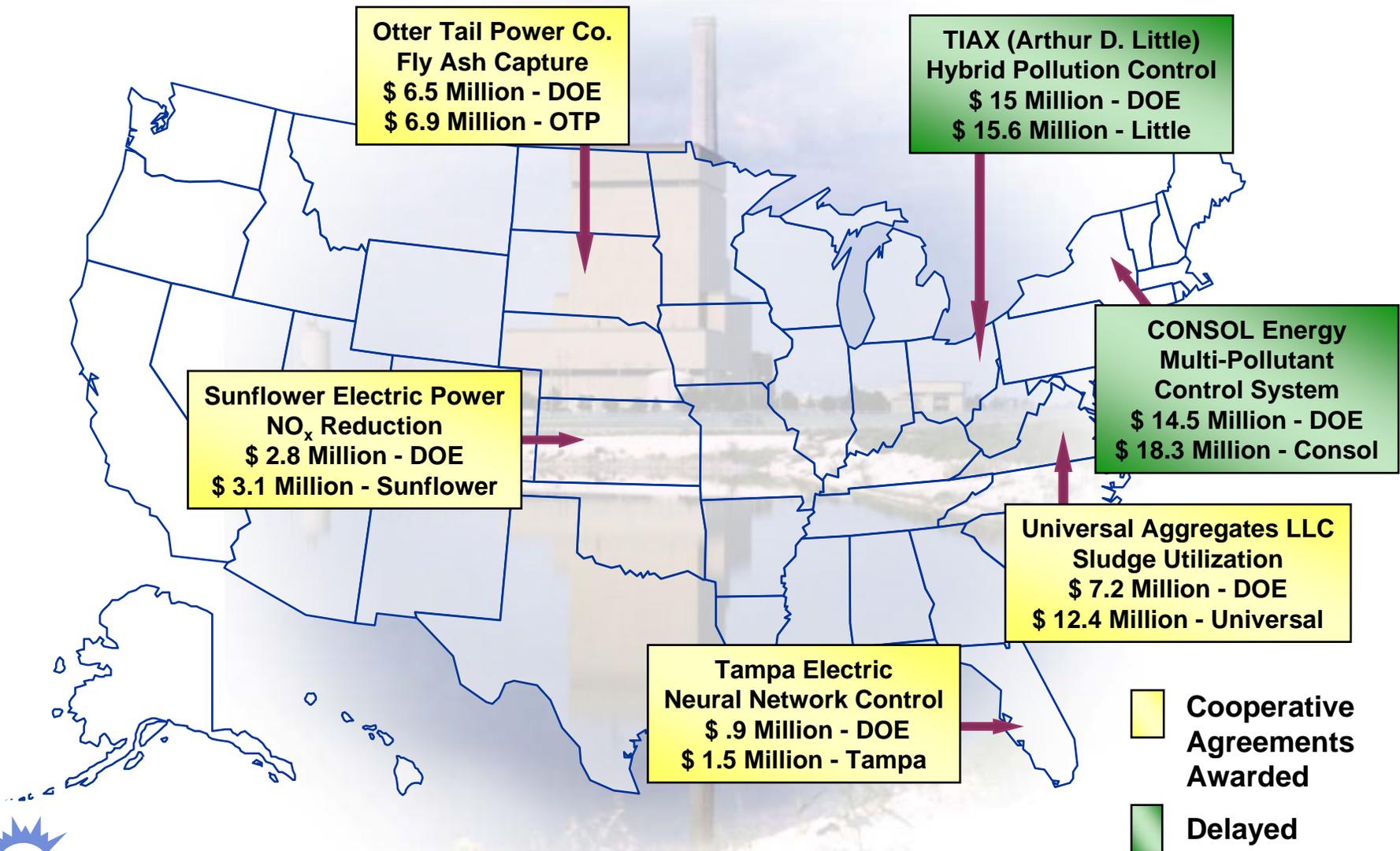
# Power Plant Improvement Initiative (PPII)

## *Near-term technologies for coal-fired electric power generation*

- Congressionally mandated redirection of funds in FY 2001
- 24 proposals received; 8 proposals selected- 2 withdrawn
- Multi-pollutant control, advanced control systems & by-product utilization
- US\$102 million (\$55 million Industry + \$47 million DOE)
- 4 Cooperative Agreements awarded + 2 under negotiation

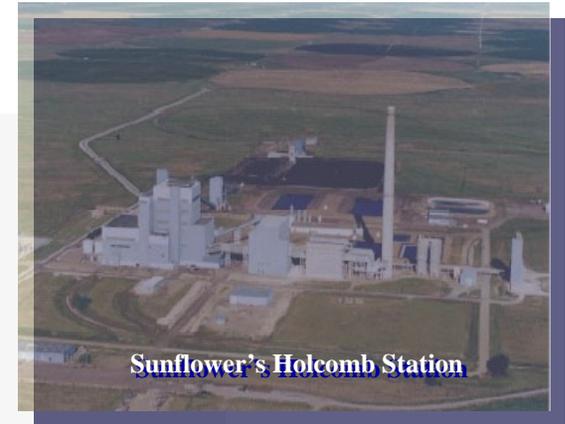
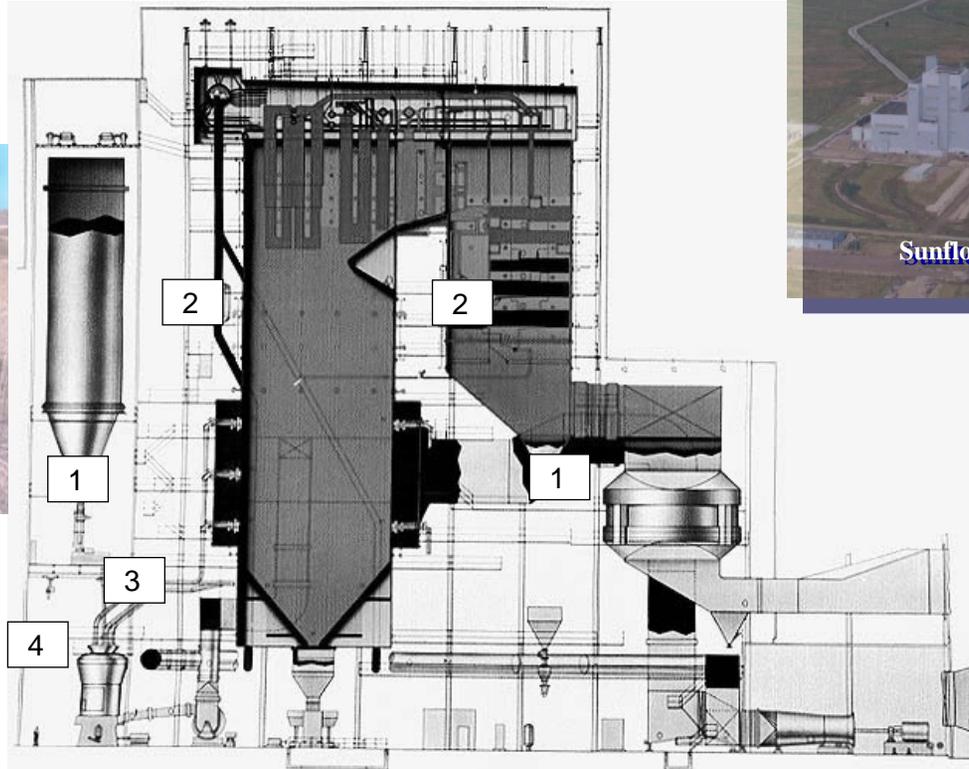


# Power Plant Improvement Initiative (PPII)



# Sunflower Electric Power Company

- A 360 MWe demonstration of an Integrated Combustion Optimization System on a PC wall-fired boiler using Powder River Basin (PRB) coal
- This technology significantly reduces NOx emissions while simultaneously increasing power output
- Total Project funding: \$5.9 million (\$2.8 million DOE)



## LEGEND

- 1 Low NOx burners (25 quantity)
- 2 Separated over-fire with ports (14 quantity)
- 3 ETC probes (25 quantity)
- 4 Coal flow controls (25 quantity)
- Neural controls – not shown (located plant control tower adjacent to boiler room)

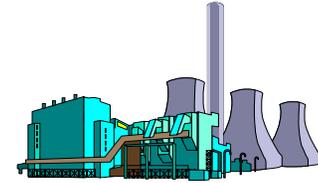
## A PPII Clean Coal Project



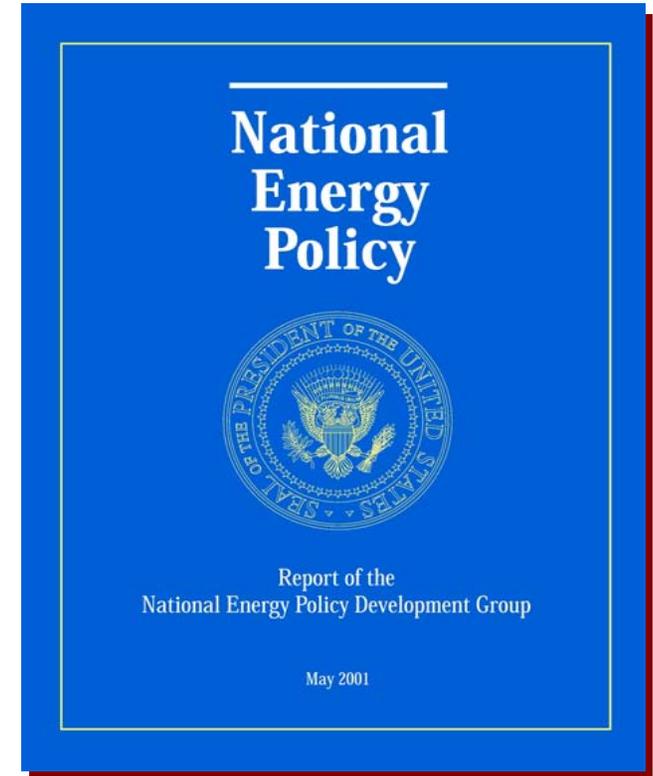
# Clean Coal Power Initiative (CCPI)

Cooperative, cost-shared  
program between  
government & industry to:

- Demonstrate emerging technologies in coal-based power generation
- Accelerate technology deployment to commercial use



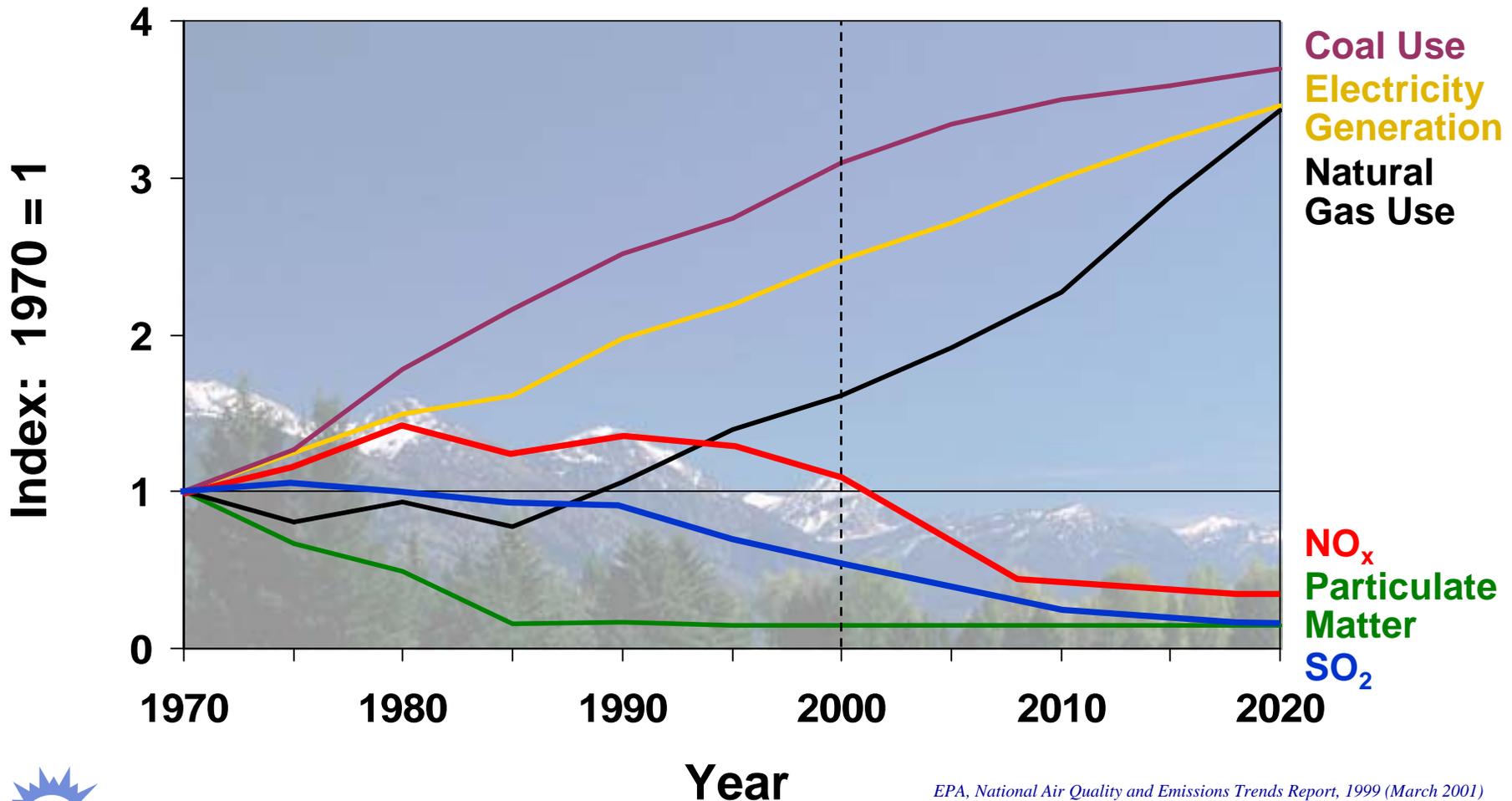
Clean, Reliable & Affordable Electricity  
for America's Future



***CCPI is a key component of  
the National Energy Policy***



# “Clear Skies” Initiative Would Sharply Reduce Criteria Pollutant Emissions *U.S. Power Plants*



EPA, National Air Quality and Emissions Trends Report, 1999 (March 2001)  
DOE, EIA Annual Energy Review

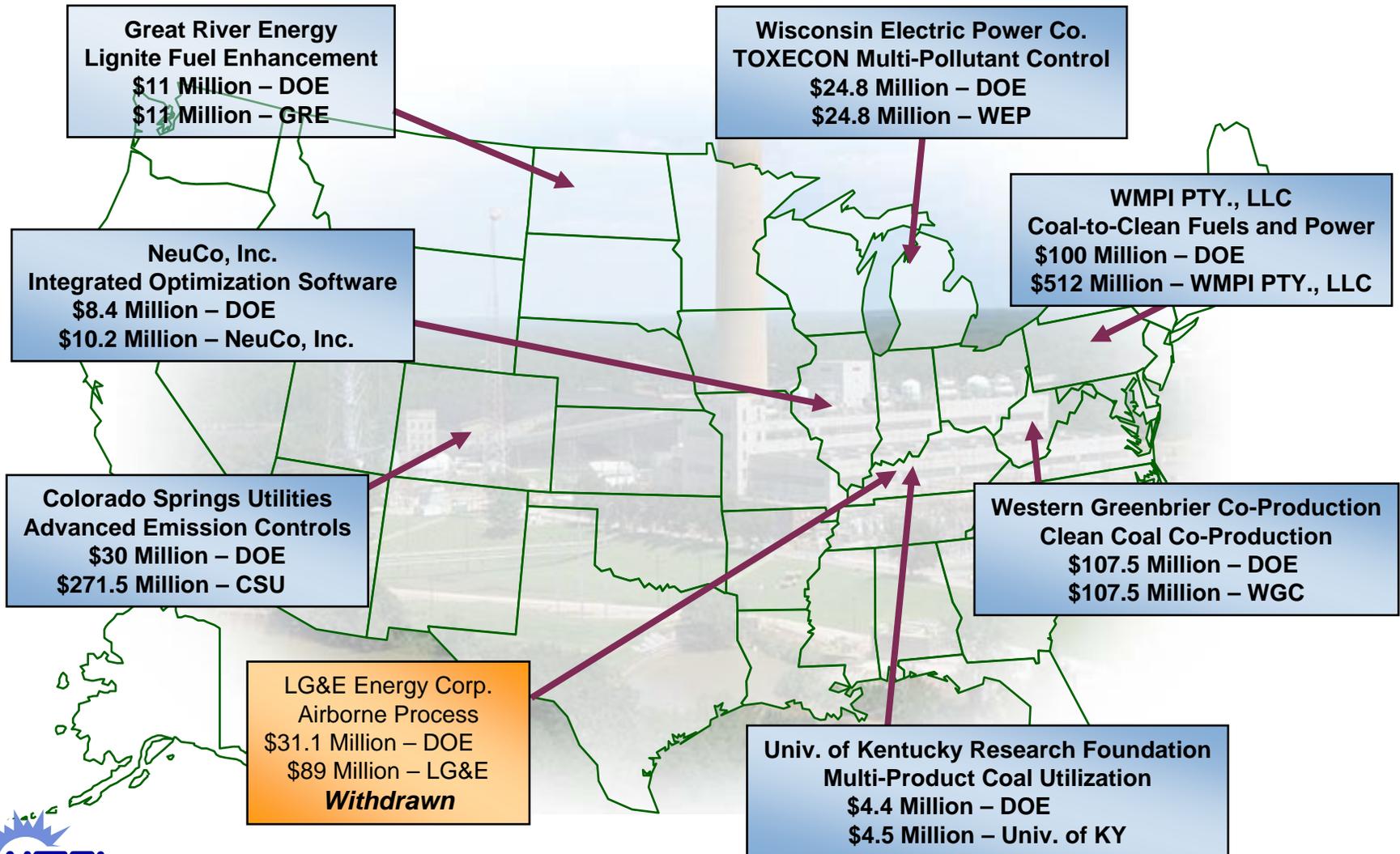
TAS 12/4/03

# CCPI Status

- **January 2003 – 8 of 36 proposals selected**
- **Power generation, co-production, multi-pollutant emissions control, advanced control systems & by-product utilization**
- **Total value US\$1.35 billion; DOE share US\$317 million (or 24%)**
- **Negotiations are under way**



# Clean Coal Power Initiative (CCPI) – Round 1 Projects



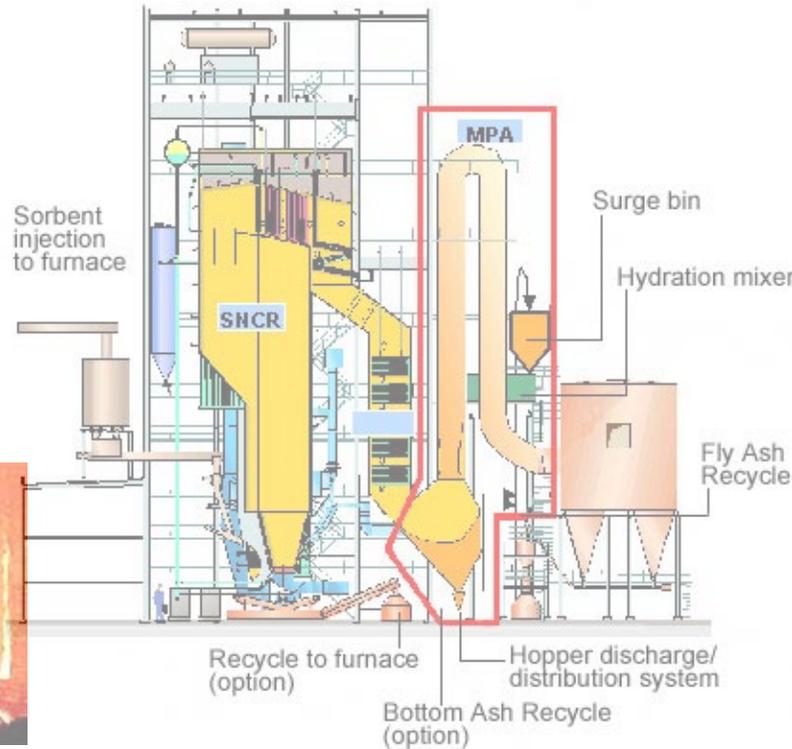
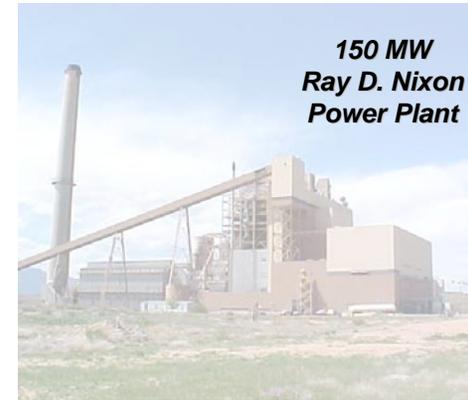
# Colorado Springs Utilities

- One of cleanest U.S. coal-fired power plants for SO<sub>x</sub>, NO<sub>x</sub> and mercury control.
- Helps achieve compliance with upcoming regulations, such as Clear Skies Initiative.
- Uses variety of fuels: bituminous, subbituminous, coal wastes, and wood wastes.
- Total project funding: \$301.5 million (DOE share: \$30 million).

Coal



150 MW  
Ray D. Nixon  
Power Plant



Forest Management Issues

Healthy Forest



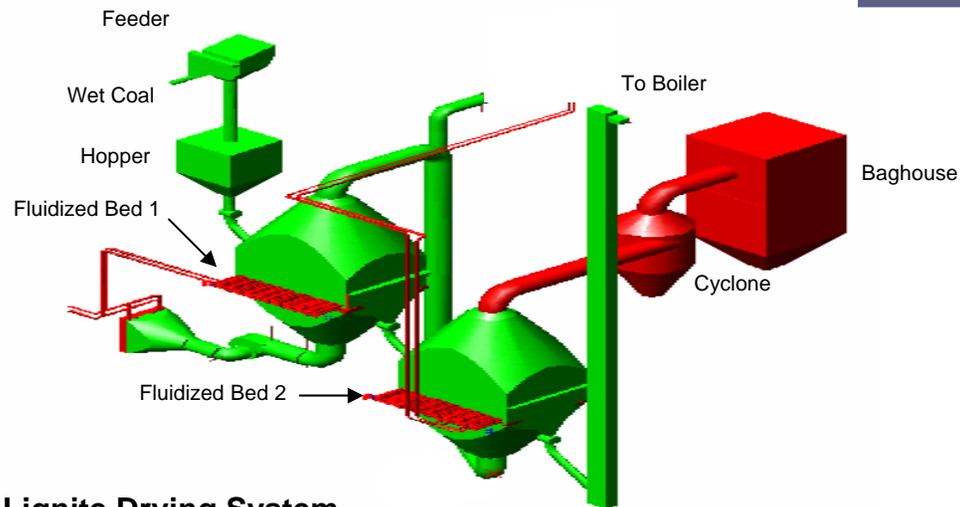
## A CCPI Round 1 Project



# Great River Energy

- Lignite fuel enhancement - applicable to power plants burning inherently high-moisture coals.
- Achieving higher efficiencies to help meet Climate Change goals.
- Total project funding: 22 million (DOE share: \$11 million).

## Two-Stage Fluidized Bed Dryer System using Waste Heat



Lignite Drying System



546 MW  
Coal Creek Station  
Underwood, ND

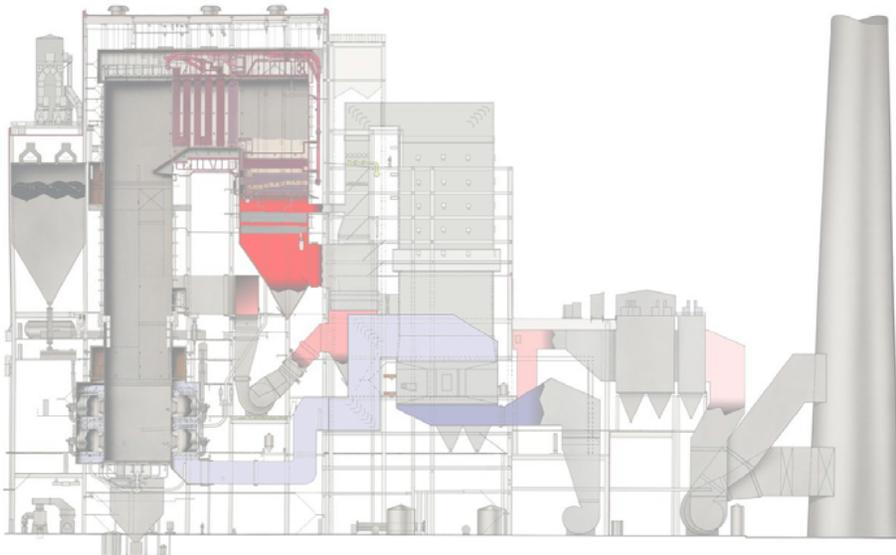


## A CCPI Round 1 Project



# NeuCo, Inc.

- Integrated optimization software on three 600 MW units reduces emissions, increases efficiency, and increases reliability.
- Five optimization modules: cyclone combustion, sootblowing, SCR operations, thermal performance, and profit optimization.
- Higher efficiencies help to meet Climate Change goals.
- Total project funding: \$18.6 million (DOE share: \$8.4 million).



Dynegy Midwest Generation's Baldwin Energy Complex

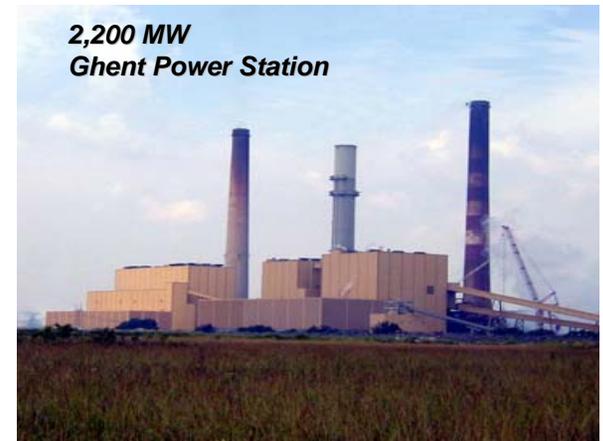
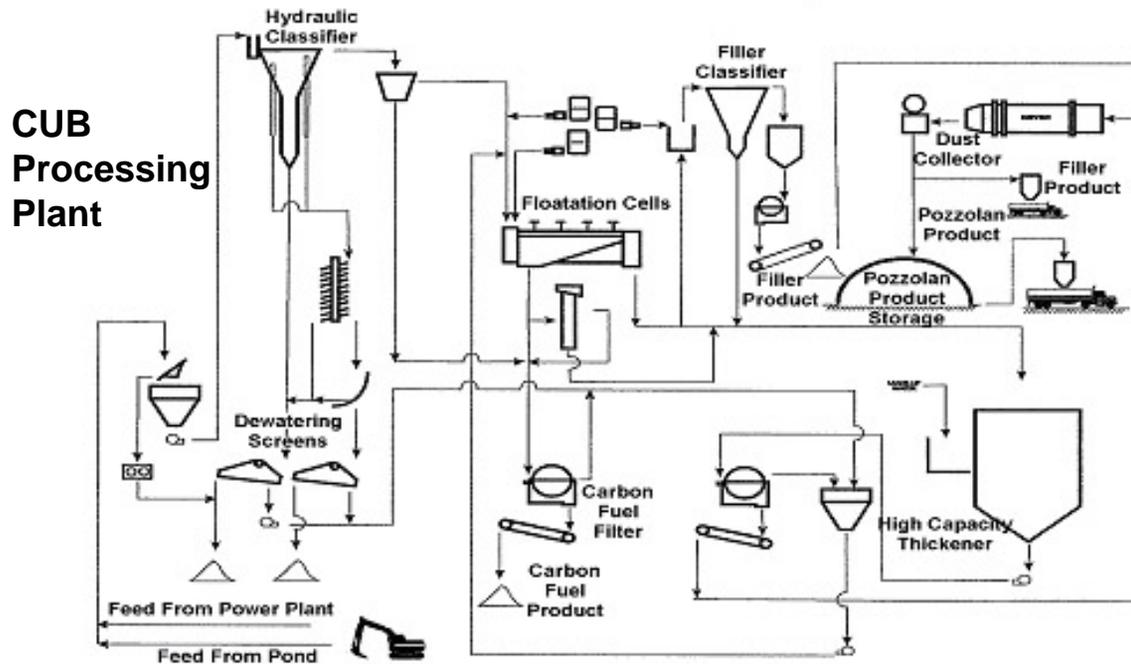


**A CCPI Round 1 Project**



# University of Kentucky Research Foundation

- Next generation coal ash beneficiation processing plant addressing entire coal utilization by-product (CUB) stream and producing a variety of value-added products.
- Helps meet Climate Change goals: reduces emissions in cement manufacturing.
- Total project funding: \$8.9 million (DOE share: \$4.4 million).

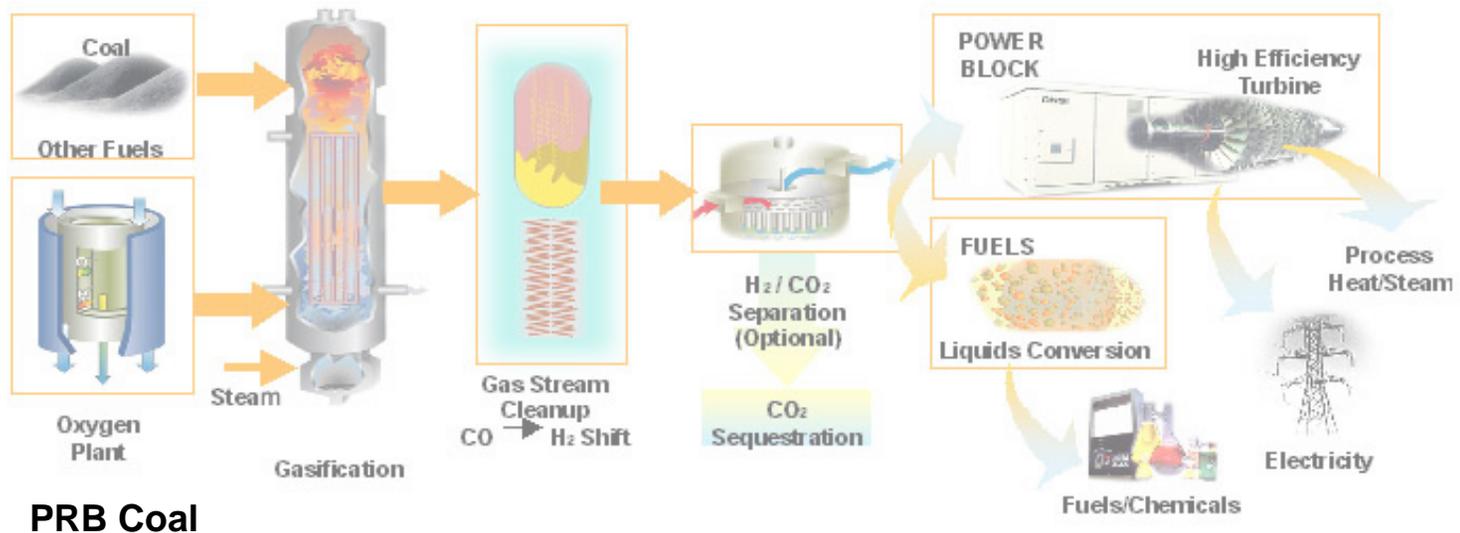


**A CCPI Round 1 Project**



# Waste Management and Processors Inc. (WMPI PTY., LLC)

- First power plant in U.S. gasifying waste-coal and low-value resources to produce clean electrical power, thermal energy, and liquid fuels.
- Project enhances Nation's energy security by producing liquid transportation fuels.
- Converts 4,700 tpd of coal waste into 41 MWe and 5,000 bpd of fuel.
- Total project funding: \$612 million (DOE share: \$100 million).

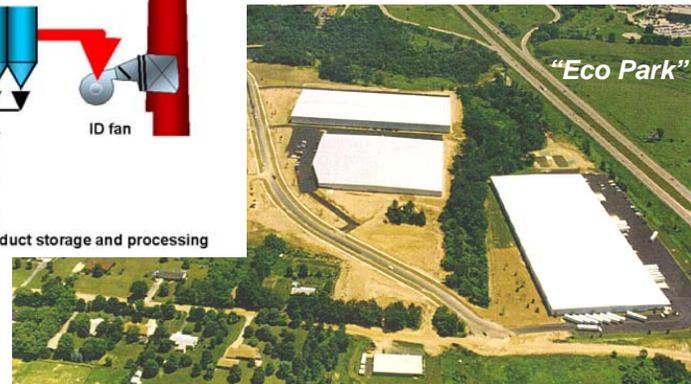
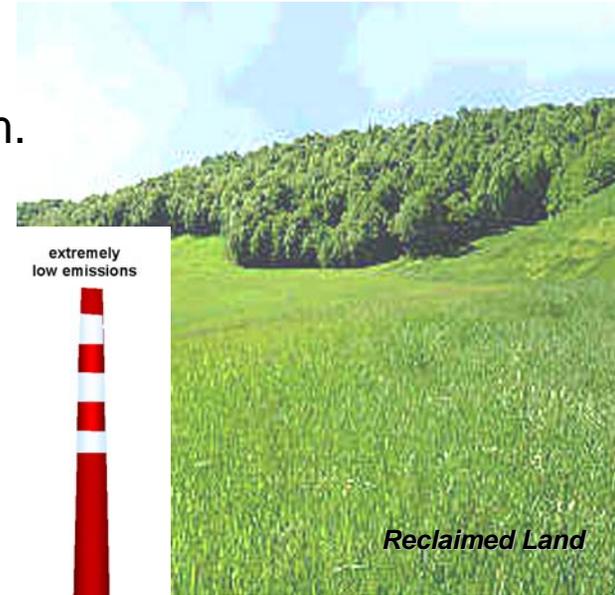
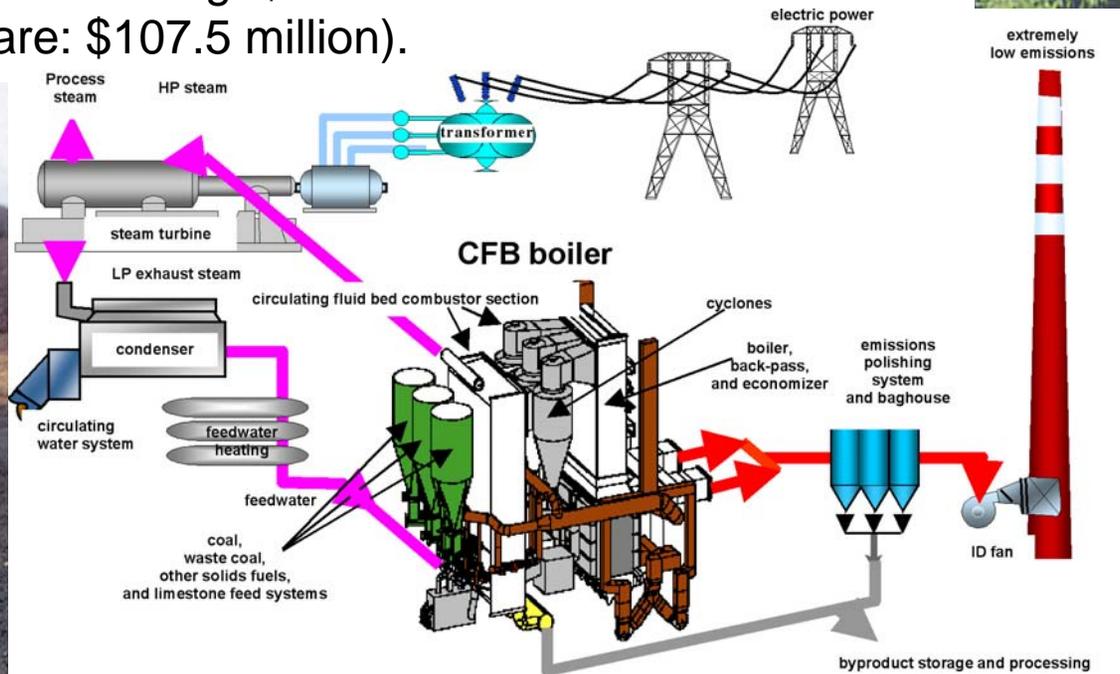


A CCPI Round 1 Project



# Western Greenbrier Co-Generation, LLC

- Anchor tenant in a proposed environmentally balanced industrial “Eco Park”; remediation model for State/Local Governments.
- 85 MW waste-coal to clean energy circulating fluid bed combustor with advanced multi-pollutant control system.
- Total project funding: \$215 million (DOE Share: \$107.5 million).

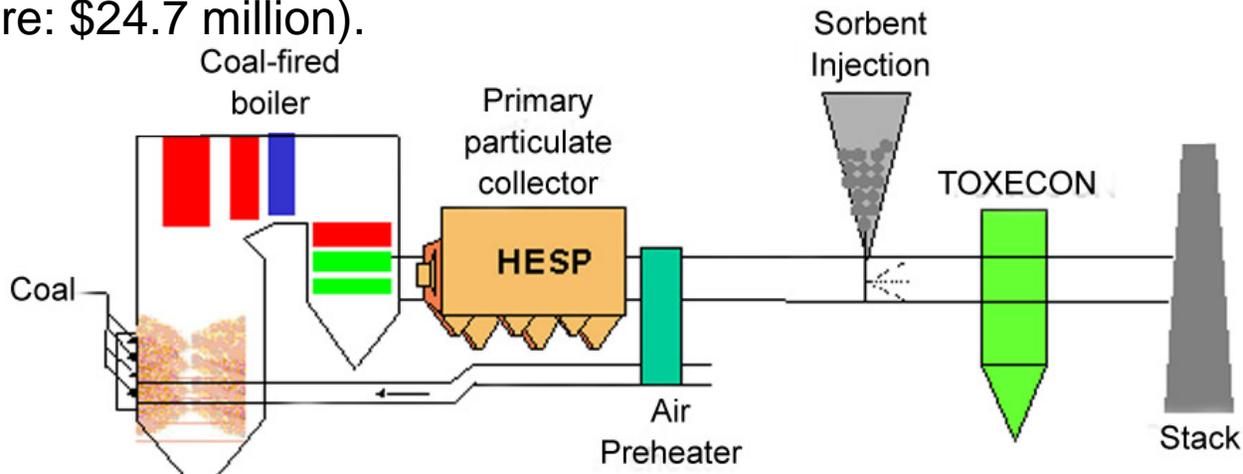
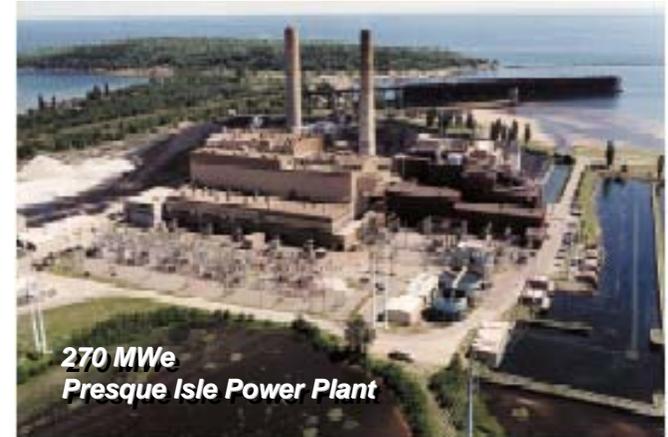


A CCPI Round 1 Project



# Wisconsin Electric Power Company

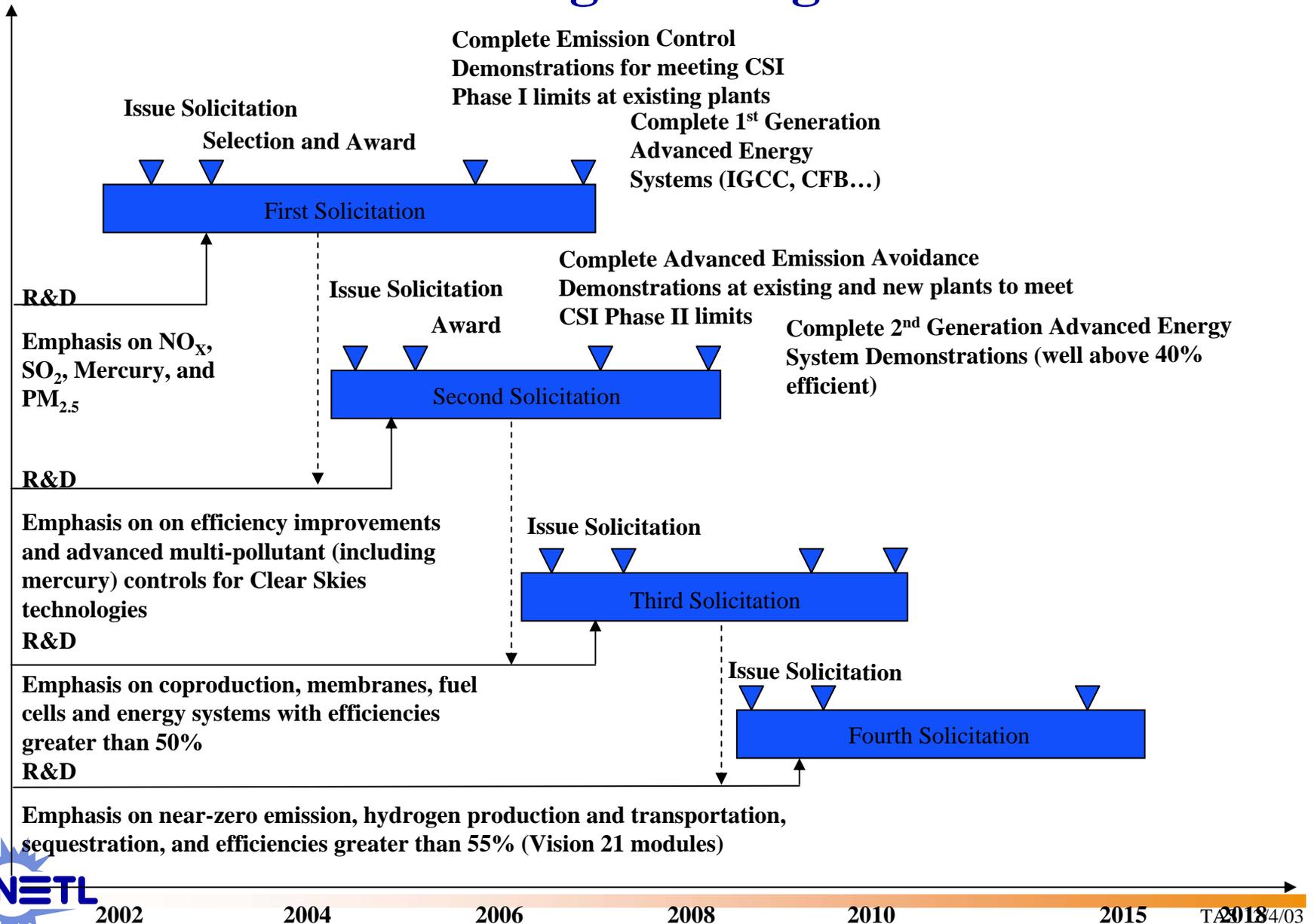
- An integrated emission control approach installed on combined flue gas for units 7, 8, and 9.
- Maximizes use of coal combustion by-products.
- Provides for timely compliance with future mercury regulations, such as Clear Skies Initiative.
- Total project funding: \$49.5 million (DOE share: \$24.7 million).



**A CCPI Round 1 Project**



# CCPI Program Logic Chart





# Visit Our NETL Website

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

# Visit Our OCES Website

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

**NATIONAL ENERGY TECHNOLOGY LABORATORY**  
 United States Department of Energy

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January 25, 2002

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**TOP NEWS STORIES**

**CCPI WEBCAST**

**The CCPI Draft Solicitation Meeting & Web Cast was Held Jan. 17, 2002**

This "Clean Coal Power Initiative (CCPI) Draft Solicitation Meeting & Web Cast" was held Jan. 17, 2002 to solicit comments and questions regarding a draft solicitation document that was released on Dec. 21, 2001.

- [Archived Audio File](#) (Need [RealPlayer](#))
- [Questions & Answers](#)
- [Additional CCPI Information](#)

**The Draft CCPI Solicitation Has Been Released!**

**SPECIAL ANNOUNCEMENTS**

**Workshop Will Assist Native Americans in Applying for Federal Grants to Apply Petroleum Technologies**

A January 29 workshop in Las Vegas will demonstrate how applicants can respond to the Energy Department's most recent solicitation to provide federal support for applying petroleum technologies to Native American and Alaskan native corporation properties. [Read More!](#)

**Carbon Sequestration Technology Roadmap**

The [Carbon Sequestration Technology Roadmap](#) (PDF-11025KB) represents a general consensus to on what major science and technology pathways have potential for achieving the goals of carbon sequestration. The roadmap will evolve as more information becomes available from ongoing policy and technology planning efforts.

**NETL Pursuing ISO 14001 Certification**

As part of the ISO 14001 certification process, NETL will be focusing on implementing its **Environment Policy** (Approved 4/25/01) and conducting internal audits of the laboratory to help promote employee awareness of the policy and NETL's environmental management system. To view NETL's Environment

**What's New**  
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**NATIONAL ENERGY TECHNOLOGY LABORATORY**  
 OFFICE OF COAL & ENVIRONMENTAL SYSTEMS

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**Office of Coal & Environmental Systems**

Playing a central planning and coordination role in ensuring that coal is sustained as an abundant, affordable, and acceptable resource for satisfying our country's need for energy, now and well into the future.

Welcome to NETL's [Office of Coal and Environmental Systems](#) webpage. From promoting gasification and combustion technologies, to funding and fostering carbon sequestration and advanced research, we take the steps necessary to ensure coal is sustained as a clean and affordable energy supply.

Through this website, we hope to answer your questions about using coal as a reliable, stable, and sustainable source for electric power. We will share with you the technologies in place now to make this a reality, and the planning, funding, and development efforts to make tomorrow's technologies a reality, today.

**Tracking New Coal-Fired Power Plants** (PDF-445KB)

Advanced Research  
 Carbon Sequestration  
**Clean Coal Power Initiative (CCPI)**  
 Combustion Technologies  
 Environmental & Water Resources  
 Gasification Technologies  
 Mining Industry of the Future  
 Vision 21

**BUSINESS SECTORS**

Strategic Center for Natural Gas  
 Electric Power Using Coal  
 Climate Change Policy Support  
 Fuels  
 Oil Supply  
 Enviro. Mgt. & Defense Programs

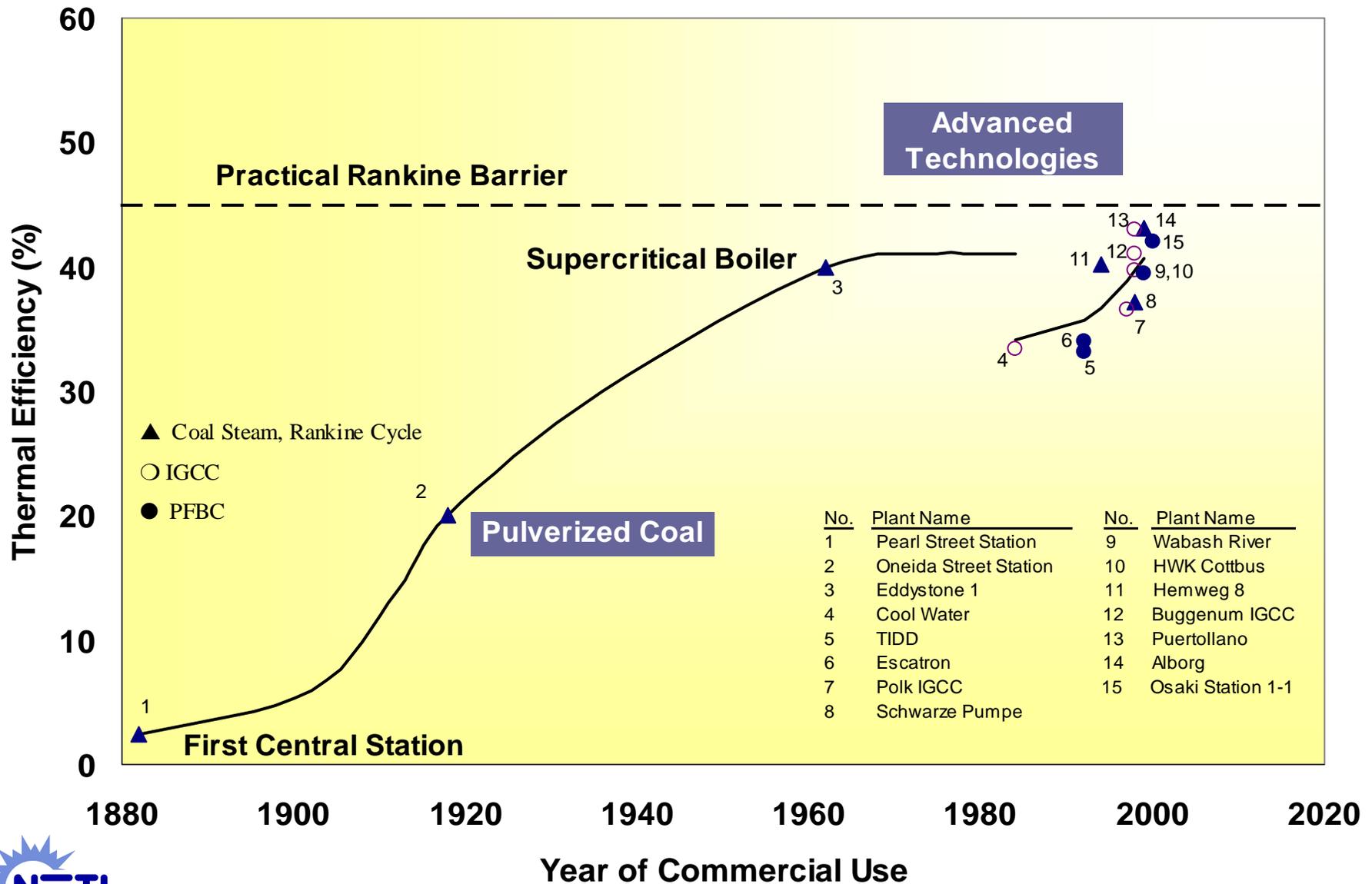
Introduction  
 Vision  
 Goal  
 Marketplace  
 Organization  
 Funding  
 Roadmap  
 Benefits  
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 U.S. Department of Energy



# Evolution of Coal-Fired Power Plants



# Thank you for your kind attention!

