The Case for IGCC

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Duke Energy Indiana is estimated to need 300-500 MW of additional base load capacity in 2010-2015 timeframe.

The 2005 State Utility Forecasting Group report projects electricity usage to grow by 2.22% annually.
IGCC’s “Perfect Storm”

- Need for base load
- Abundant coal reserves
- Continuation of stringent emission reduction standards
- Rising energy commodity prices
- Future carbon constraints
Edwardsport – Preferred IGCC Site

- Existing 160 MW fossil steam plant (units circa 1940s-1950s) Near Edwardsport, IN
- Replace with 600 MW Class IGCC Plant
- Duke Energy Indiana and Vectren have petitioned IURC for study costs
“Arriving” At Edwardsport

- One of 5 sites in Indiana and 1 in Kentucky included in site study
- GE/Bechtel analysis indicating its feasibility
- Enables use of high sulfur regional coals
- Geologically well-suited for possible carbon sequestration
IGCC Process Diagram

Coal Gasification

Combined Cycle Generation
The Big Deal

- Currently, 160 MW Edwardsport runs about 30% of the time and emits (annually):
  - Approximately 11,000 metric tons of SO$_2$, NO$_x$, and particulates
- The 600 MW class IGCC plant operating 100% of the time will emit:
  - less than 2,900 tons of these pollutants

More is Less!
General Environmental Performance Comparison
New Source Performance Standards (NSPS) vs. IGCC

Actual SO2 emission rate will depend on type of coal burned, and IGCC emission permit limits may be greater than that shown for operating margin. Approximate conversion of NSPS lb/MWh (gross) to lb/MMBtu for SO2 and NOx.
Additional Advantages of IGCC

- Less Water Used
- Less Solid Waste Generated
- Overall Higher Efficiency than a Conventional PC Plant with Currently Required Pollution Control Equipment
- Ability to Use Local Indiana and Midwestern Higher Sulfur coals
Advantages of IGCC (cont’d)

- Potential to Control Hg at a Lower Cost than is Possible with Other Coal-Based Generation Technologies
- Potential to Tap into Future Poly-generation Capabilities – Including Production of Fertilizer and Transportation Fuels
- Potential for Future Capture of CO$_2$ at a Significantly Lower Cost than Conventional PC Because CO$_2$ can be Separated Prior to Combustion
  - Dependent upon ability to technologically sequester carbon economically in the future
Potential to Capture CO$_2$ Economically in the Future

| Effect of CO$_2$ Capture on Capital Cost (% Increase Resulting from CO$_2$ Capture) |
| IGCC | PC | NGCC |
| 30% | 87% | 98% |

| Effect of CO$_2$ Capture on Cost of Electricity (% Increase Resulting from CO$_2$ Capture) |
| IGCC | NGCC | PC |
| 25% | 60% | 72% |

Source – National Energy Technology Lab
Additional Benefits

- Local/regional economy
  - Estimated property taxes years 1-10: $22.2 M
  - Estimated property taxes years 11-30: $52.6 M
  - 1.5 M tons of coal/year valued at about $40 M annually

- Jobs
  - An average of 800-900 construction jobs during 3-year period (as many as 2000 during peak)
  - Creation of 77-97 permanent jobs
  - Estimated annual payroll of $5-7 million

- By-products
  - Elemental sulfur and vitrified slag can be sold
Costs and Considerations

- Typical 600 MW class IGCC plant is estimated to cost up to $1.2 billion
- IGCC capital cost is estimated to be 15-20% higher than a PC plant
- Incentives needed to bridge the gap
Financial Incentives

- **State and Local**
  - Indiana SB 29 Provides for Timely Recovery of IGCC Construction and Operating Costs
  - Indiana SB 378 Provides Investment Tax Credit of 10% of Project Cost for the First $500 million and 5% of the Remaining Cost Above $500 million
  - 10 year real and personal property tax abatement and a 45% tax increment finance district was approved by the Knox County Council on April 11, 2006

- **Federal – 2005 Energy Bill**
  - 20% Investment Tax Credit for IGCC Capped at $800 million and Split Across Three Coal Types. Process will be Very Competitive
  - Some Type of Loan Guarantee Program May Also be Available in the future
Status of Proposed Project

- Vectren participating with Duke Energy Indiana on preliminary studies
- A Feasibility Study was completed in September 2005
- A CPCN filing at the IURC & environmental permits necessary
- The Front-End Engineering and Design (FEED) Study is to be completed around second quarter of 2007
- Decision whether to build by third quarter 2007 (Dates subject to change)
Tentative IGCC Timeline

- **Jan 2005 - IGCC Feasibility Study Started (Completed Sept 2005)**
- **2005**
  - **Jan 2005**
    - IGCC Feasibility Study Started (Completed Sept 2005)
  - **2006**
    - 1st Quarter 2007 - Determine price - review contract approach - make recommendations
    - 2nd Quarter 2007 - Board Review and Approval
    - 3rd Quarter 2007 - Air and IURC Approvals secured
    - 4th Quarter 2007 - Construction Mobilization
- **March 2006 - Front end engineering study kick-off**
- **May 2006 - Hearing on front end engineering study cost & settlement agreement. Order expected July/August 2006**
- **June 2006 - File Integrated Resource Plan (IRP) in Indiana**
- **July 2006 - File Air Permit Application**
- **Late Summer / Early Fall 2006 - File for Certificate of Public Convenience and Necessity (CPCN) in Indiana**

- **2007**
  - **1st Quarter 2007**
    - Determine price - review contract approach - make recommendations
  - **2nd Quarter 2007**
    - Board Review and Approval
  - **3rd Quarter 2007**
    - Air and IURC Approvals secured
  - **4th Quarter 2007**
    - Construction Mobilization

- **2008**
  - **2nd Quarter 2008**
    - Commercial Operation

- **2009**
  - **2nd Quarter 2009**
    - Commercial Operation

- **2010**
  - **2nd Quarter 2010**
    - Commercial Operation

- **2011**
  - **2nd Quarter 2011**
    - Commercial Operation
Conclusions

- Many factors make IGCC a desirable way to meet the need for new capacity
- IGCC enhances our commitment to provide reliable, affordable electricity for customers in an environmentally responsible manner
- If regulatory, engineering and economic factors come together, an IGCC plant at Edwardsport will benefit all stakeholders