Powering the Future:  
A Forecast of Indiana’s Electricity Consumption, Prices and Resource Requirements

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Presented to:  
Program on Law and State Government Fellowship Symposium  
October 2, 2009
State Utility Forecasting Group

• Executive Order 3-84, which was issued in January 1984 by Indiana’s Governor Robert D. Orr, created a special committee designated to address Indiana’s utility future. In December 1984, that committee produced a report providing options and specific recommendations.

• The committee recommended four alternatives models for a forecasting system
  – utilities produce their own forecasts independently
  – utilities work together to produce forecasts as a group
  – the Utility Regulatory Commission produces the forecasts
  – another public or quasi-public entity produces the forecasts

• The 4th option was chosen and Purdue was chosen to house the State Utility Forecasting Group.
Indiana Code 8-1 To 8-5 (Amended in 1985)

“The commission shall establish a permanent forecasting group to be located at a state-supported college or university within Indiana … This group shall develop and keep current a methodology for forecasting the probable future growth of electricity within Indiana and within this region of the nation.”
SUFG Forecasts

• Roughly every 2 years, SUFG produces a long-term (20 year) set of projections of electricity sales, prices, and resource requirements for Indiana

• Most recent forecast was released in December 2007

• 2009 forecast is in the process of being examined prior to its release
2007 Forecast Highlights

• Significant real electricity price increase through 2012, then leveling off

• Electricity requirements and peak demand projections were projected to grow at an average compound rate of 2.46 percent
  – similar to recent historical observations

• Resource requirements were projected to grow an average of 585 MW per year
  – baseload, intermediate, and peaking resources were all indicated as being needed in the future
Indiana Electricity Requirements

- Retail sales by investor owned and not-for-profit utilities
- Includes estimated transmission and distribution losses
- Growth rates
  - 2007 forecast: 2.46%
  - 2005 forecast: 2.22%
  - 2003 forecast: 2.16%
Indiana Peak Demand Requirements

- Peak demand is net of DSM and interruptible loads
- Growth rates
  - 2007 forecast: 2.46%
  - 2005 forecast: 2.24%
  - 2003 forecast: 2.07%
Indiana Resource Requirements

- Resources may be provided by conservation measures, contractual purchases, purchases of existing assets, or new construction.
- Existing resources are adjusted into the future for retirements, contract expirations, and IURC approved new resources:
  - Did not include Duke IGCC, Sugar Creek and Holland natural gas plants, or wind purchases.
## Indiana Resource Requirements

<table>
<thead>
<tr>
<th>Year</th>
<th>Uncontrolled Peak Demand 1</th>
<th>Interruptible Net Peak Demand 2</th>
<th>Existing/Approved Capacity 3</th>
<th>Incremental Change in Capacity 4</th>
<th>Projected Additional Resource Requirements 5</th>
<th>Total Resources 6</th>
<th>Reserve Margin</th>
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<tr>
<td>2005</td>
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<td>20,803 2.277</td>
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<td>21,777 21,166</td>
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<td>2007</td>
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<td>2008</td>
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<td>2009</td>
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<td>2010</td>
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<td>2019</td>
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<td>2023</td>
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<td>2024</td>
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<td>21,777 21,166</td>
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<td>15</td>
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</table>

1. Uncontrolled peak demand is the peak demand with DSM in place but without any interruptible loads being called upon.
2. Net peak demand is the peak demand after interruptible loads are taken into account.
3. Existing/approved capacity includes installed capacity plus approved new capacity plus firm purchases minus firm sales.
4. Incremental change in capacity is the change in existing/approved capacity from the previous year. The change is due to new, approved capacity becoming operational, retirements of existing capacity, and changes in firm purchases and sales.
5. Projected additional resource requirements is the cumulative amount of additional resources needed to meet future requirements.
6. Total resource requirements are the total statewide resources required including existing/approved capacity and projected additional resource requirements.
Indiana Real Price Projections (2005 $)

- Effect of inflation removed
- Included the cost of meeting CAIR and CAMR
- Did not include costs associated with CO2 or RPS
- Included the cost of new resources
Alternative Scenarios

• Any forecast contains uncertainty
• CEMR provides alternative low and high growth econometric forecasts
• Low and high growth scenarios are intended to give a plausible bound to uncertainty
SUFG’s Modeling System

SUFG’s Modeling System Diagram

1. Scenarios
   - Demographics
   - Economic Activity
   - Fossil Fuel Prices

2. Electric Energy Simulation
   - Energy
     - Residential
     - Commercial
     - Industrial
     - Other
   - LMSTM
     - Demand
     - Supply
     - DSM
     - Rates
     - Finances

3. Resource Requirements
   - Statewide Demand
   - Statewide Resource Requirements
   - Utility Resource Requirements
Incremental DSM and Interruptible Loads

MW

Year

2010 2015 2020 2025

DSM  Interruptible
What has Changed?

• Economy
• New resources added to the state’s jurisdictional generation fleet
  – Edwardsport IGCC
  – Sugar Creek NGCC
  – Holland NGCC
  – wind purchase power agreements
• Clean Air Mercury Rule
Indiana - an Industrial State

• In 2007, Indiana accounted for 2.9% of the nation’s retail electricity sales
  – 11th most in the U.S.

• But Indiana accounted for 4.9% of the nation’s industrial sector retail electricity sales
  – 4th most in the U.S.
2007 Residential Electricity Sales (million MWh)
2007 Commercial Electricity Sales (million MWh)
2007 Industrial Electricity Sales (million MWh)
2007 Total Electricity Sales (million MWh)
Changes in Electricity Sales from 2007 to 2008

- Investor-owned utilities: -3.0%
- Not-for-profit utilities: +1.8%
- All utilities: -2.0%
Was it the Economy?

- Indiana Gross Domestic Product dropped by 0.6% from 2007 to 2008.
- But 2008 was an exceptionally cool summer, which reduces electricity demand.
  - Cooling degree days in Indianapolis dropped by 30% from 2007.
For the Investor-Owned Utilities:

- Residential electricity sales dropped by 2.4% from 2007 to 2008
  - More sensitive to weather than other sectors

- Commercial and industrial sales dropped by 3.3% from 2007 to 2008
  - More sensitive to economic factors than the residential sector
U.S. Gross Domestic Product (trillions of 2005 dollars)
This Year – Effects are More Pronounced

- Economic impact largely confined to last quarter of 2008
- Economic impact will be felt across all 4 quarters of 2009
- The mild summer of 2008 has been repeated
Impact on 2009 Forecast

- Price trajectory should have similar shape (increase in early years, relatively constant in later years)
- Electricity sales and peak demand projections relatively stagnant in early years, then growing
- Resource requirements lower than previous projections (combination of new resources and delayed growth in demand)
Potential Future Resources

- Energy efficiency/demand-side management/price responsive demand
  - recent renewed interest in efficiency
  - smart grid may enhance opportunities (but at some cost)

- Purchases from non-jurisdictional generators (either in or out of Indiana)
  - opportunities becoming more limited
Fuel Sources for New Resources

- Coal
  - permitting, construction time, CO$_2$ uncertainty
- Natural gas
  - fuel cost variability
- Nuclear
  - permitting, public opposition, construction time
- Wind
  - limited resource, intermittent supply
- Solar
  - limited resource, cost, intermittent supply
- Biogas
  - limited resource
## Wind Developments

<table>
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<tr>
<th>Project Name</th>
<th>Counties</th>
<th>Developer</th>
<th>Rated Capacity (MW)</th>
<th>Construction Schedule</th>
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<td>Fowler Ridge Wind Farm III</td>
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<td>Hoosier Wind Project</td>
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<td>Tri-County Wind Energy Center</td>
<td>Tippecanoe, Montgomery, Fountain</td>
<td>Invenergy</td>
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## Indiana Utility Wind PPAs

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<th>Utility</th>
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Further Information

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