Indiana Electricity Projections and Renewable Energy

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2011 Forecast

- Electricity demand
- Peak demand
- Resource needs
- Electricity prices

PURDUE UNIVERSITY

2011 Forecast

Indiana Electricity Projections

State Utility Forecasting Group

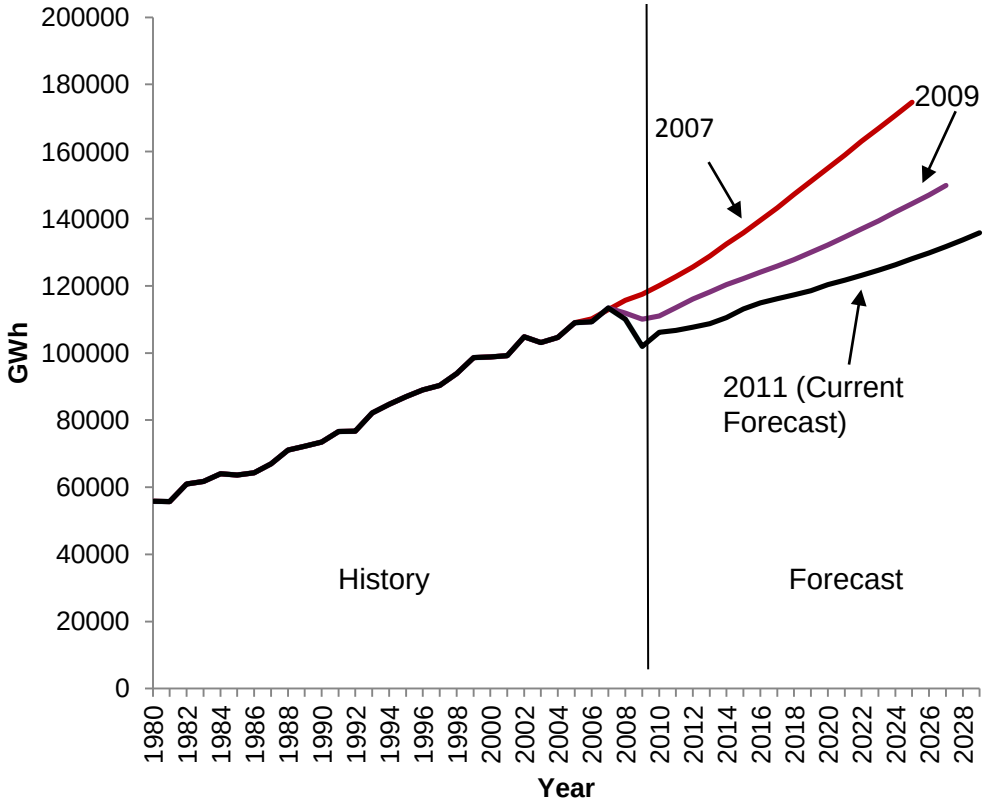
PURDUE UNIVERSITY Discovery Park Energy Center

West Lafayette, Indiana

September 2011

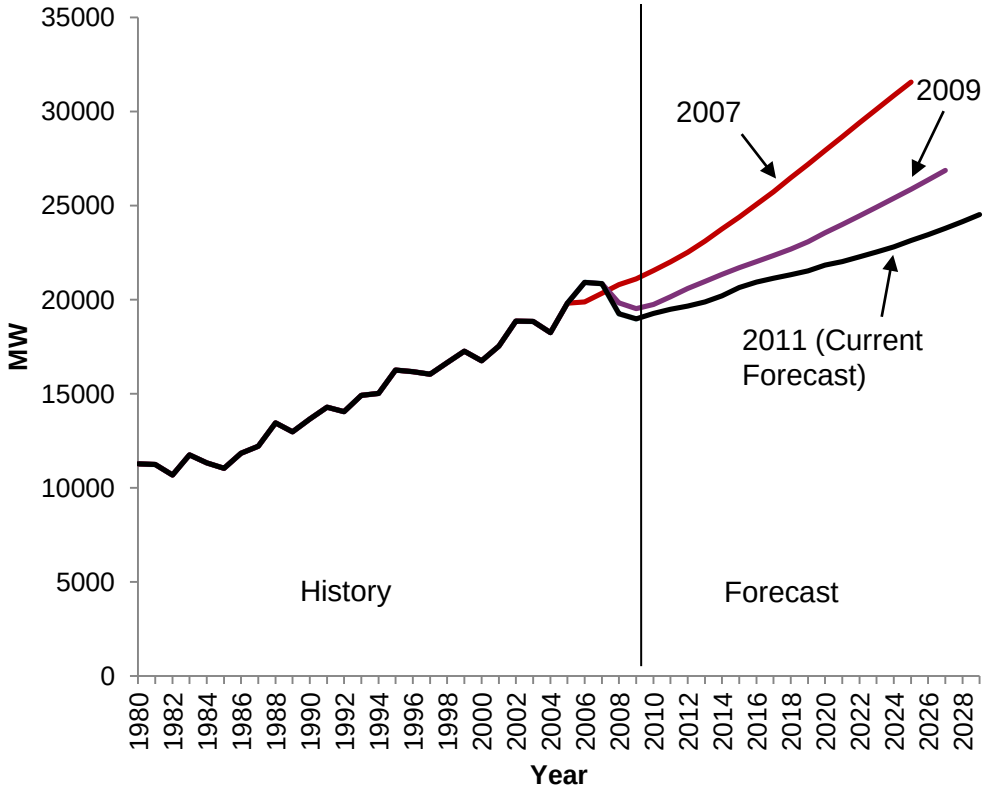
Indiana Electricity Requirements

- Retail sales by investor owned and not-for-profit utilities
- Includes estimated transmission and distribution losses
- Growth rates
  - 2011 forecast: 1.30%
  - 2009 forecast: 1.55%
  - 2007 forecast: 2.46%



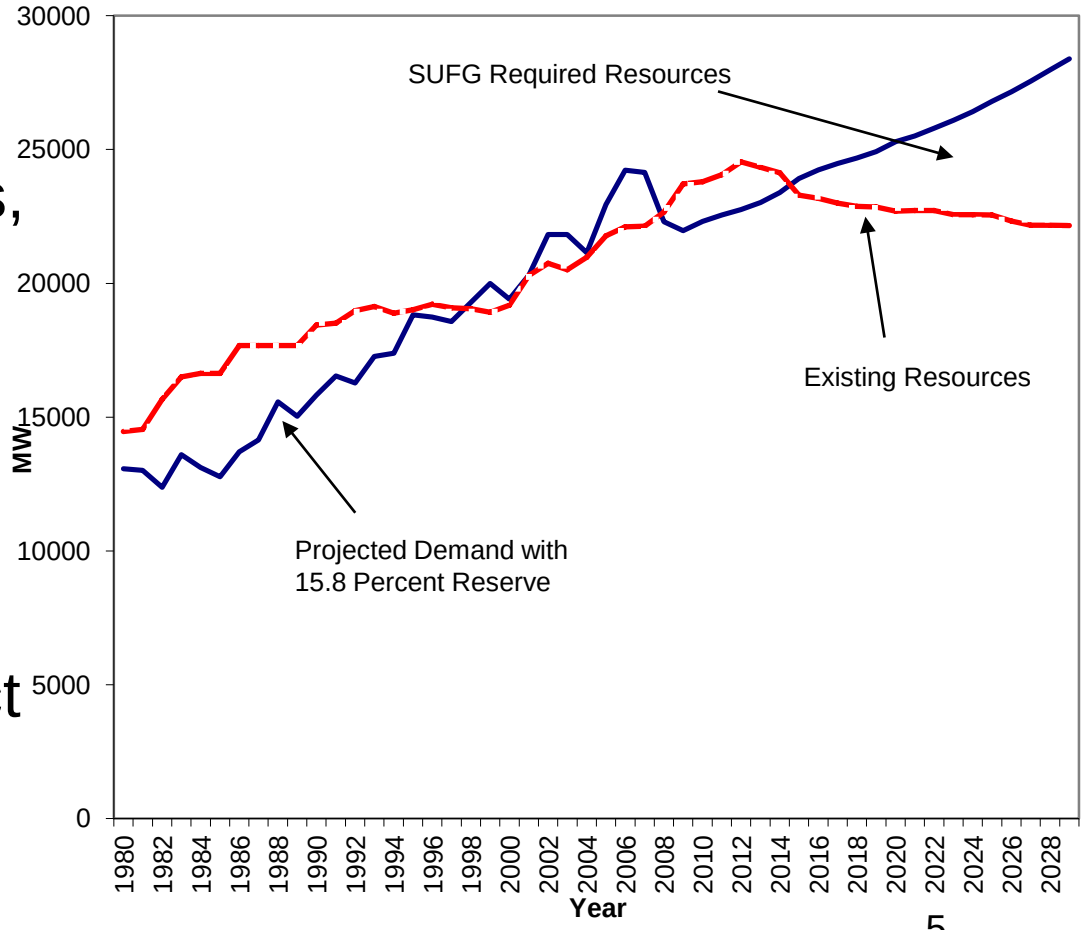
Indiana Peak Demand Requirements

- Peak demand is net of DSM and interruptible loads
- Growth rates
  - 2011 forecast: 1.28%
  - 2009 forecast: 1.61%
  - 2007 forecast: 2.46%



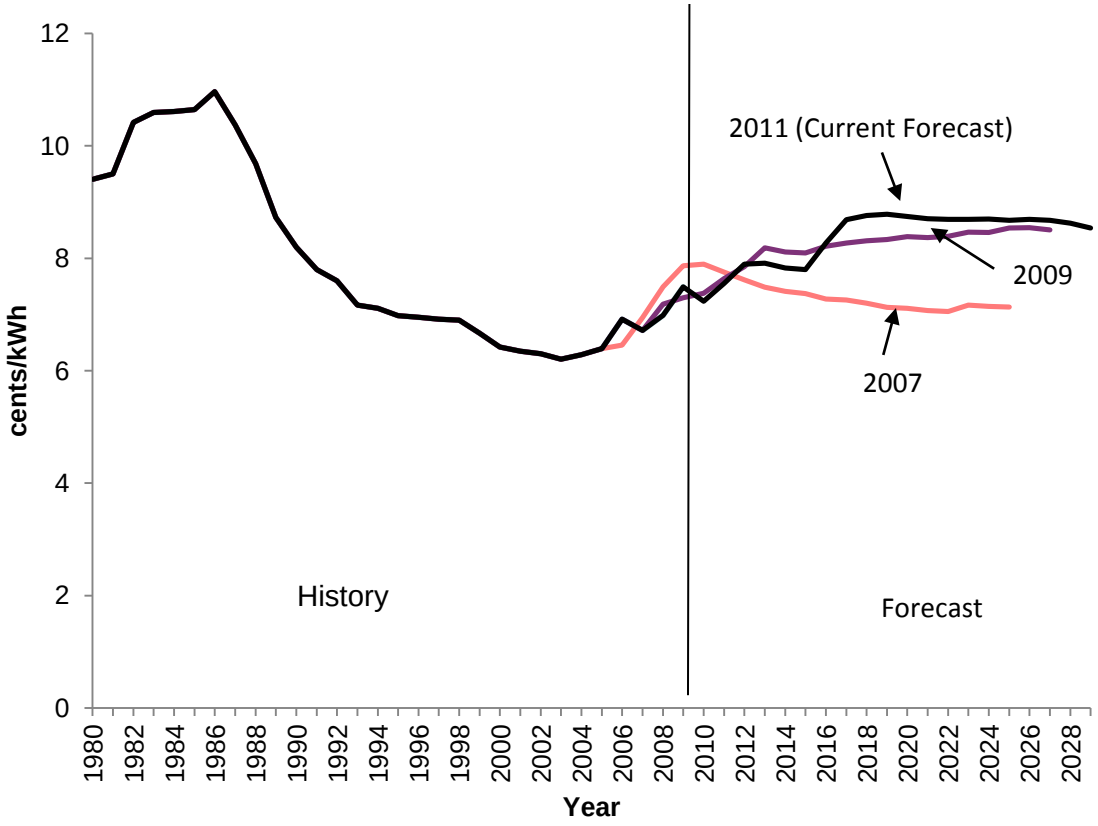
Indiana Resource Requirements

- 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



Indiana Real Price Projections (2009 $)

- Effect of inflation removed
- Includes the cost of new resources
- Does not include cost of expected EPA regulations
  - unless utility has already taken steps or included costs in data request



Environmental Regulations

- SUFG performed a follow up study of the expected impacts of recent, proposed, and expected EPA regulations
  - Cross-State Air Pollution Rule
  - Mercury and Air Toxics Standards
  - Greenhouse gases
  - Cooling water
  - Coal ash

Cross-State Air Pollution Rule

- Final rule issued in July 2011
- August 2012 - Court of Appeals (D.C. Circuit) vacates rule
- October 2012 - U.S. (EPA) requests rehearing from full Court of Appeals
- Reduces emissions caps for sulfur dioxide (SO_2) and nitrogen oxides (NO_x) in 2012
- Further reductions in 2014

Mercury and Air Toxics Standards

- Final rule issued in December 2011
- Replaces court vacated Clean Air Mercury Rule
- Reduces emissions from mercury, acid gases, and other pollutants
- Prevents release of 91% of mercury
- Expected to go into effect in 2015-16

Greenhouse Gases

- Final rule issued in March 2012
  - after SUFG study released
- Establishes carbon dioxide (CO_2) emissions standards for new sources

Cooling Water Intake Structures

- Proposed rule issued in April 2011
- Final rule expected in June 2013
- Intended to reduce damage to aquatic life
  - impingement – trapping against inlet screen
  - entrainment – drawn into cooling system
- Compliance actions include enhanced screening, reducing water flow rate, and installing cooling towers
- Uncertainty over timing

Coal Combustion Residuals

- Proposed rule issued in June 2010
- No date has been released for final rule
- In response to concerns over the potential failure of coal ash facilities
- Two options
  - classify as special hazardous waste (~2020)
  - regulate as non-hazardous waste (~2018)

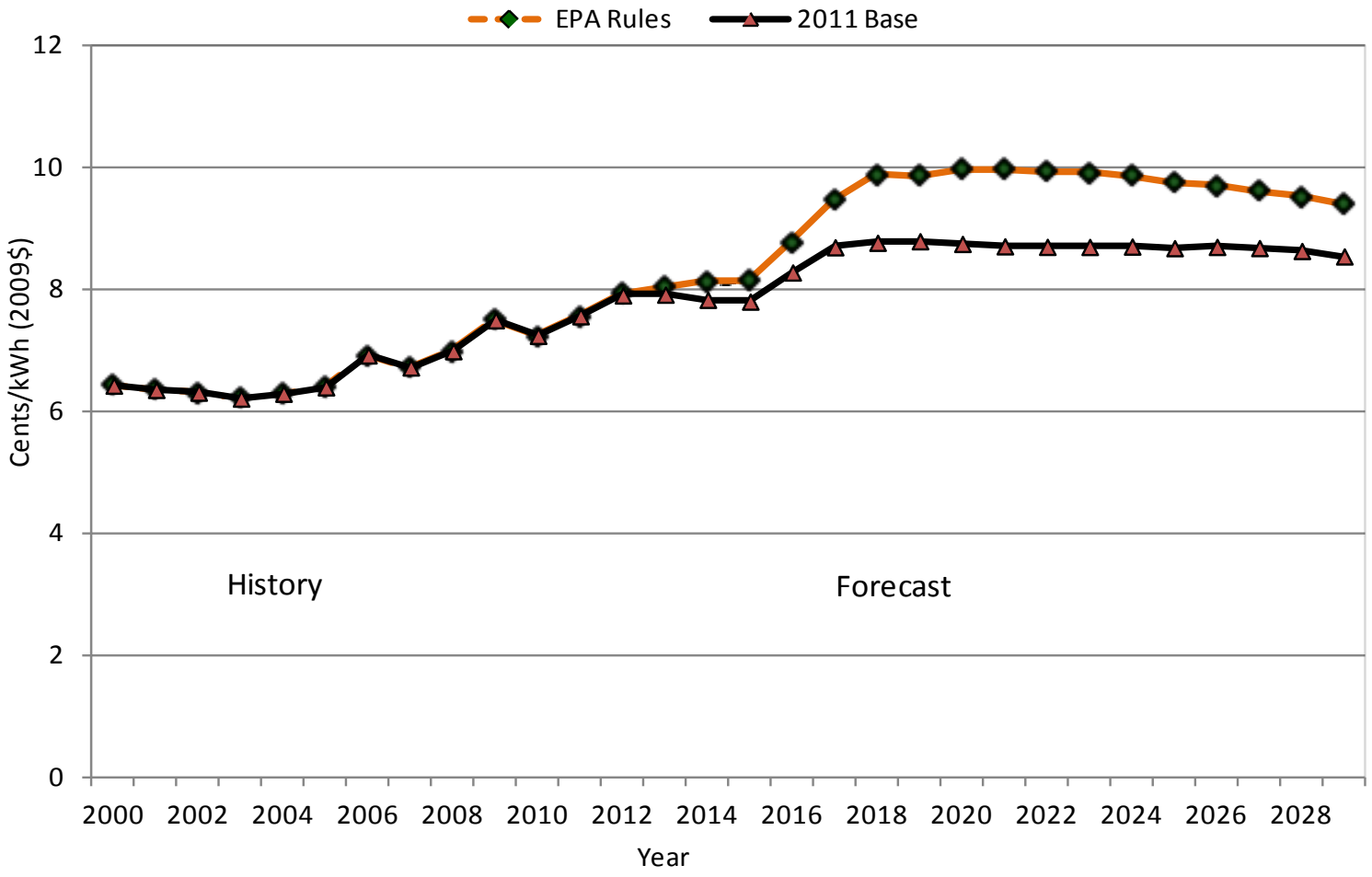
SUFG Study Inputs

- Model inclusion of SO_2 scrubbers (wet FGD), NO_x control (SCR), and mercury control (activated charcoal injection with bag house)
- Conversion of cooling water systems to recirculating
- Conversion of ash disposal from wet to dry

Retire vs. Retrofit

- For each unit, if the cost of retrofitting was greater than the cost of replacing it with a natural gas combined cycle facility, the unit was considered retired for the study
- If not, the retrofit costs were included
- Approximately 2,280 MW modeled as retired

Results


EPA Rules
2011 Base
Cents/kWh (2009$)
12
10
8
6
4
2
0
History
Forecast
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022
2024
2026
2028
Year

Comparison to Base Forecast (2009 cents/kWh)

Year	2011 Base	EPA Rules	Change
2015	7.80	8.14	4.4%
2020	8.74	9.96	13.9%
2025	8.67	9.76	12.5%

Caveats

- Uncertainty in EPA rules
- Impact on transmission investment
- Fuel switching option
- Accuracy of price elasticity modeled
- Macroeconomic effects
- Technological innovations
- Compliance strategies
- Engineering considerations
- Materials and labor premiums
- Efficiency and outage impacts

Further Information

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