

HISTORY AND FUNCTIONS OF THE STATE UTILITY FORECASTING GROUP

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History of the State Utility Forecasting Group

- **Marble Hill and Bailly – early 1980s**
- **Public Law 85.5 – 1985**
- **SUFG forecasts – 1987, 1988, 1990, 1993, 1994, 1996, 1999, 2001, 2003, 2005**
- **Regulatory and legislative testimony**
- **Air emissions studies – 1989, 2000, 2001, 2006**
- **Demand-side management – early 1990s**
- **Electricity deregulation – 1996-2001**
- **Renewable resources studies – 2003-present**
- **Natural gas modeling – 2003-present**

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.”

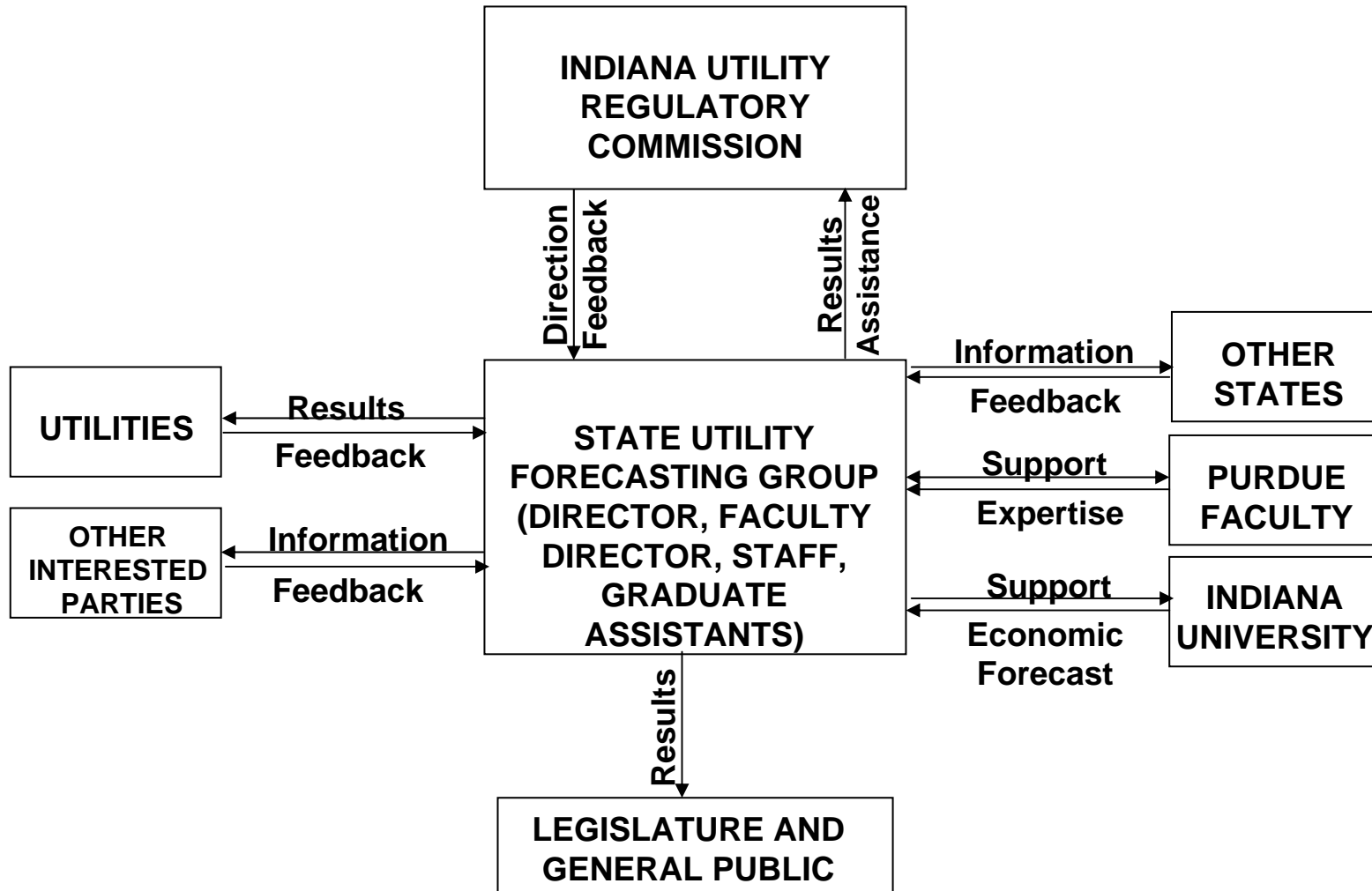
Special Studies

- **Air emissions regulations**
 - **1990 Clean Air Act controls on SO₂ and NO_x emissions expected to cost Indiana electricity utilities 1.0-1.5 billion dollars and lead to rate increases of 10-15 percent to recover cost of compliance.**
 - **Additional restrictions on NO_x emissions that began in 2004 expected to lead to rate increases of 6 to 8 percent.**
 - **New restrictions on SO₂, NO_x, and mercury expected to lead to rate increases of 7 to 15 percent.**
- **Demand-side management – Cautioned against impact of one class of ratepayers subsidizing another. Programs that benefit society should be encouraged with compensation structured such that both participants and non-participants benefit or at least are unharmed.**

Special Studies

- **Deregulation – Deregulation would decrease Indiana electricity prices in the short run, but increase them in the long run because of increased exports to more expensive jurisdictions and because of higher cost of capital with riskier investments. If suppliers could exercise market power, prices would rise further.**
- **Natural gas – Construction of new natural gas-fired electricity generators were not expected to increase overall demand enough to result in an inability of the natural gas system to deliver its product, but could result in increased costs.**

Interactions with other Entities



SUFG Structure

- **Director, staff, and students at Purdue University**
- **Under contract with Indiana Utility Regulatory Commission (IURC)**
- **Subcontract with Indiana University:**
 - **Economic forecasts**
 - **Special topic studies**
- **Access to faculty expertise through Energy Center**
- **Feedback from utilities and other interested parties**

The Energy Center: Nine Areas of Focus



SEPAE



Clean Coal



Solar Energy



Bio Energy



Wind Energy



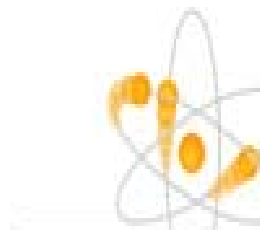
Electrochemical



Power Electronics



Hydrogen



Nuclear

Relationship with IURC

- **Cooperative**
 - **SUFG takes direction from the Commission as to what topics need to be addressed**
 - **The Commission provides feedback and constructive criticism to SUFG**
- **Independent**
 - **While SUFG works under contract with the Commission, it is part of the university**
 - **SUFG has developed working relationships with the utilities that are separate from the regulator-utility relationship**
 - **SUFG is responsible for the quality of its models and reports**

Relationship with Utilities and Other Interested Parties

- Cooperative
 - SUFG operates under a “no surprises” policy
 - Access to sensitive data
 - Constructive feedback
- Independent
 - SUFG has no financial connection to any of the parties
 - Independence is crucial to SUFG’s credibility

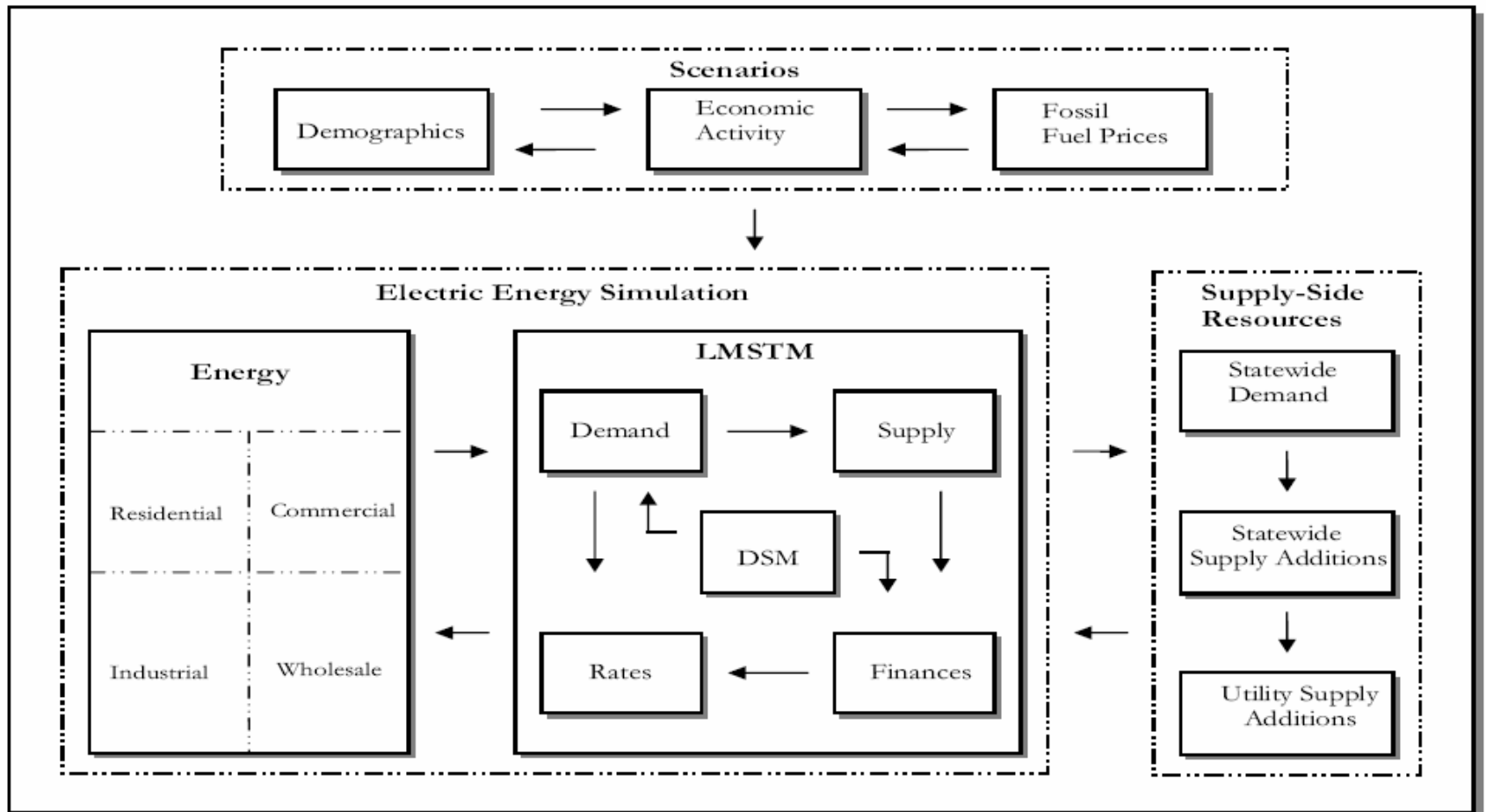
Education

- **Workshops, short courses, and tutorials**
 - **For IURC**
 - **SUFG's models**
 - **Electric power systems**
 - **Risk management**
 - **Regional interest**
 - **Market power workshop**
- **Presentations to the legislature and general public**
- **Graduate student support**

2005 SUFG Forecast

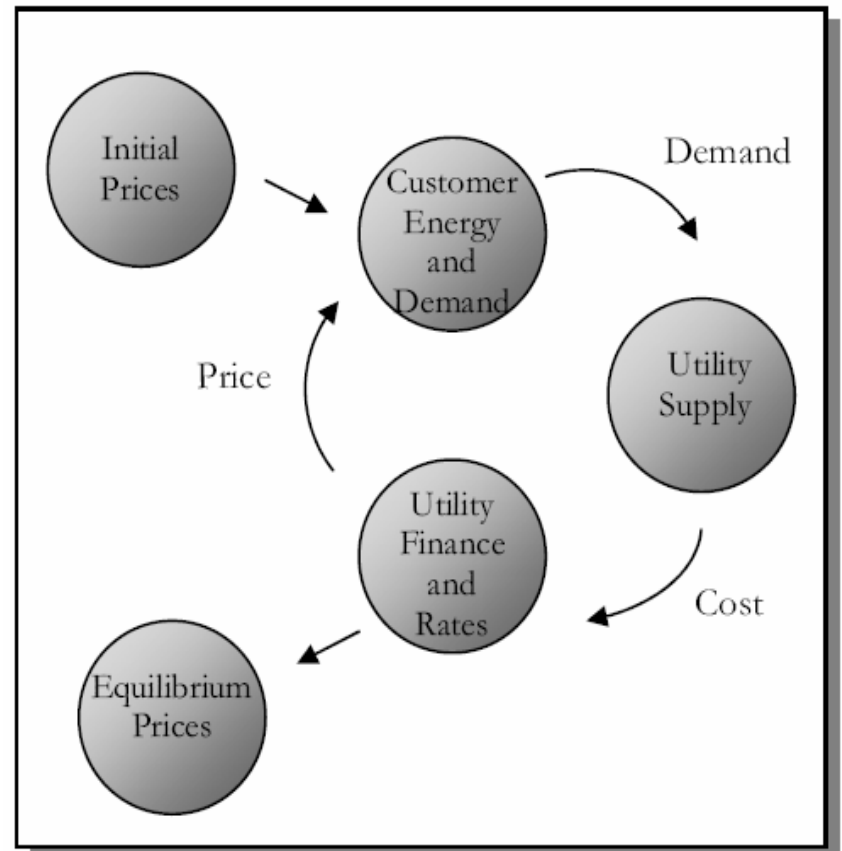
- **Forecast modeling system**
- **Indiana electricity requirements**
- **Indiana peak demand projections**
- **Indiana resource requirements**
- **Indiana real price projections**
- **Alternative scenarios**

SUFG's Modeling System



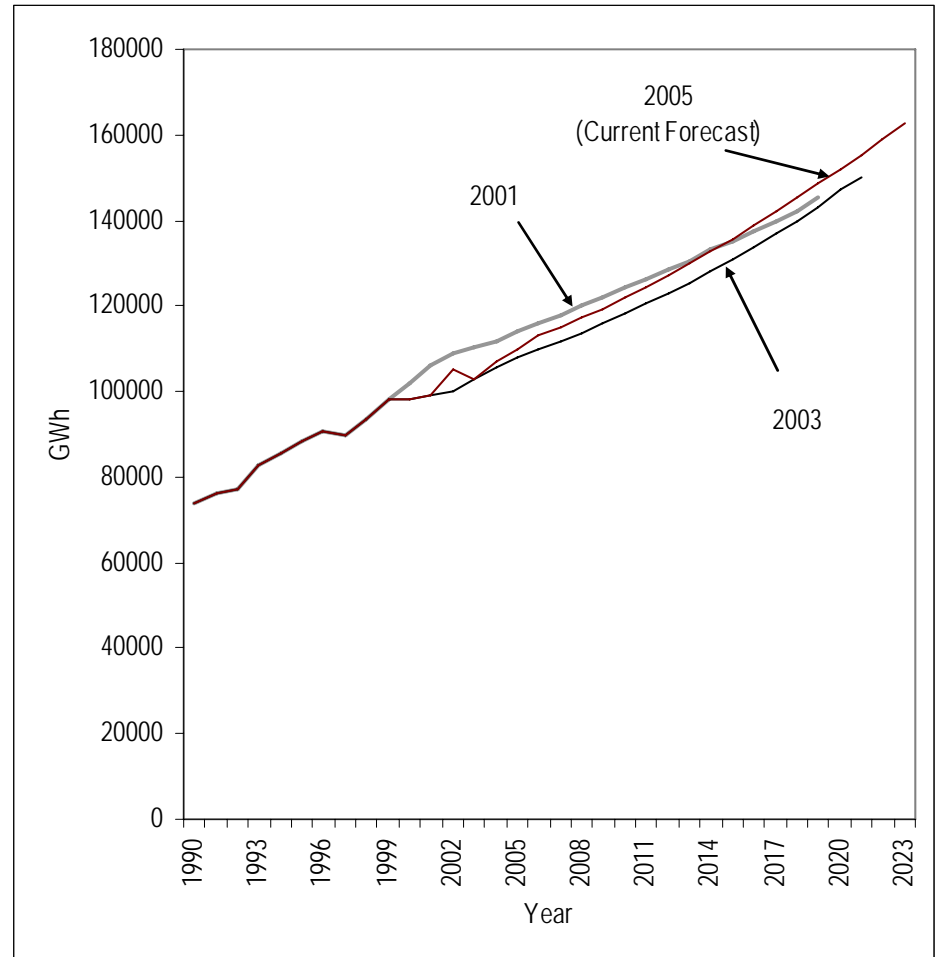
Cost-Price-Demand Feedback Loop

- **Prices effect customer demand**
- **Demand effects utility supply costs**
- **Costs effect prices**
- **System is solved iteratively by going through the loop until the results are stable (no change in price from one iteration to the next)**



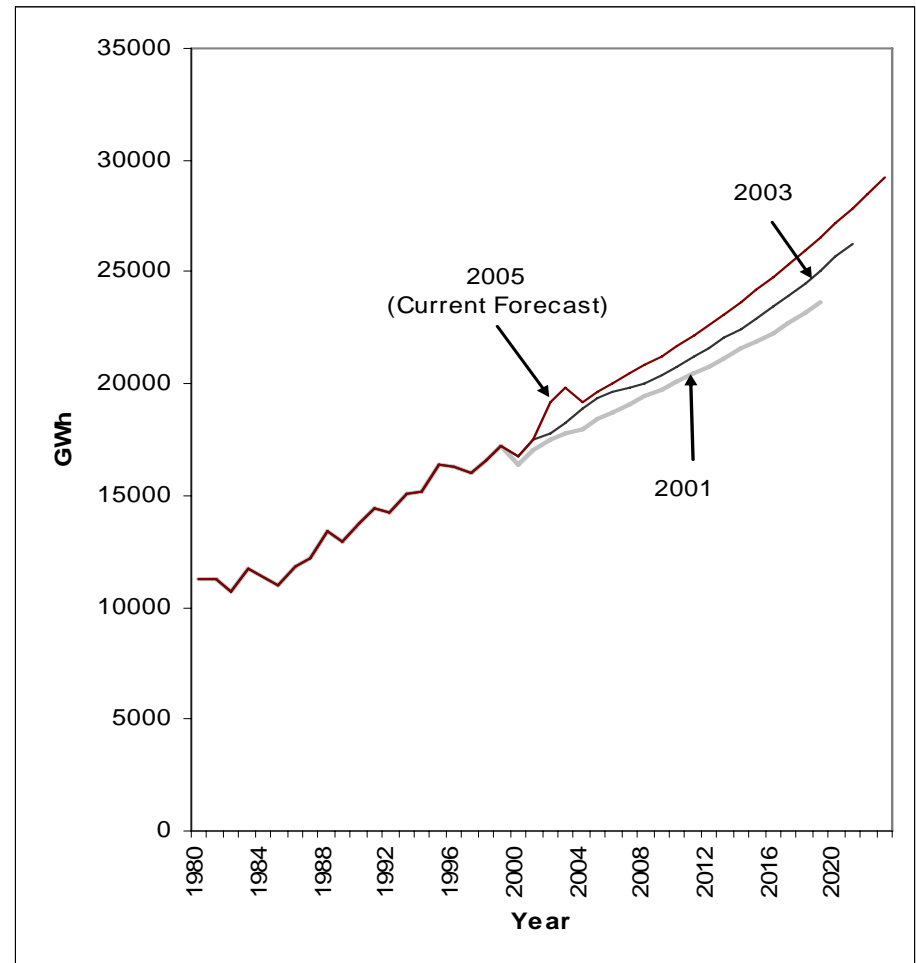
Indiana Electricity Requirements

- **Retail sales by investor owned and not for profit utilities**
- **Includes estimated transmission and distribution losses**
- **Growth rates**
 - **2005 forecast: 2.22%**
 - **2003 forecast: 2.16%**



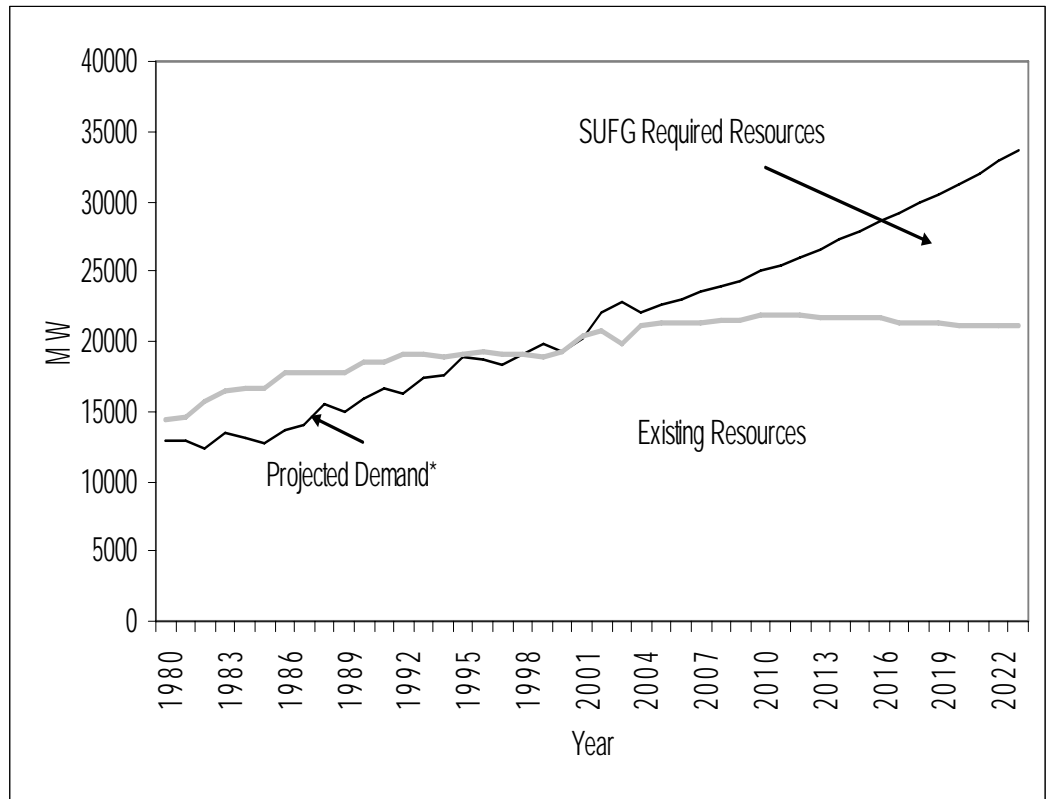
Indiana Peak Demand Projections

- **Peak demand is net of DSM and interruptible loads**
- **Growth rates**
 - **2005 forecast: 2.24%**
 - **2003 forecast: 2.07%**



Indiana Resource Requirements

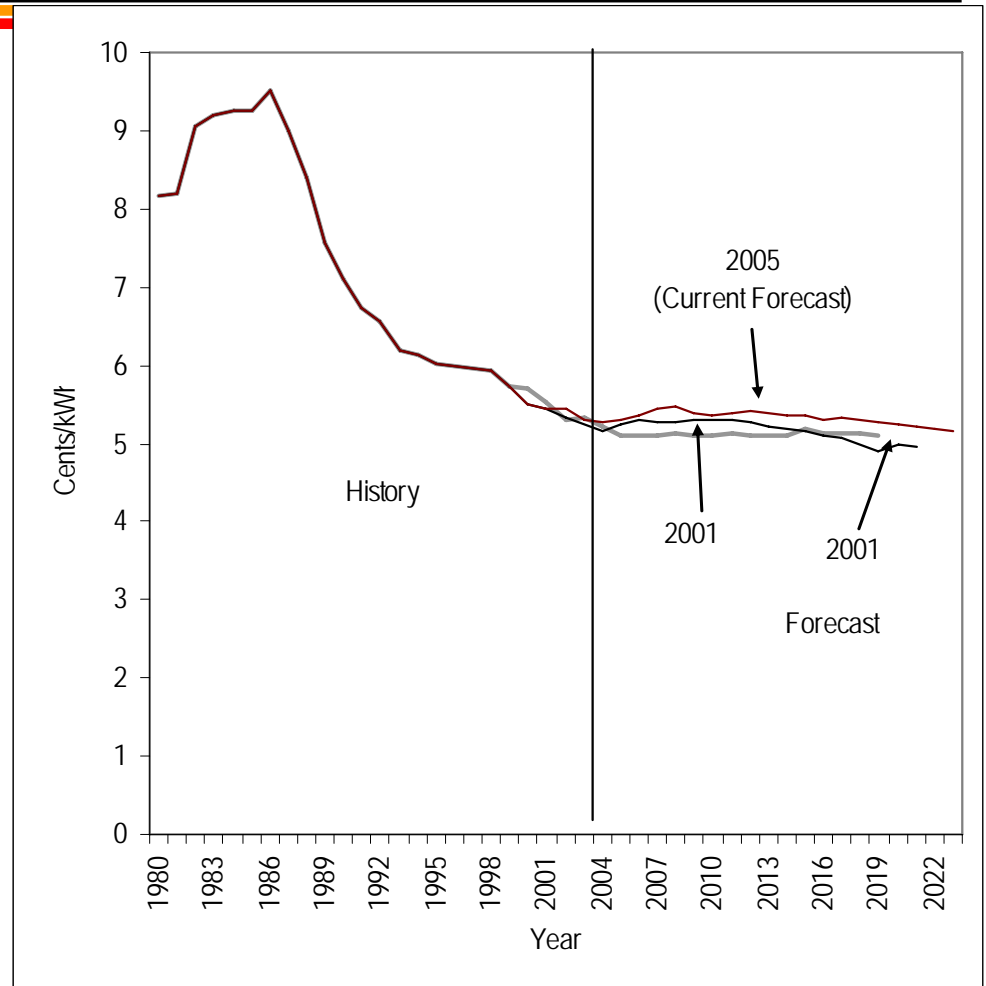
- Resources may be provided by conservation measures, contractual purchases, purchases of existing assets, or new construction
- This forecast identifies a relatively balanced need for the three types of resources (peaking, cycling and baseload) in the short term



* Projected Demand includes 15% Reserve margin

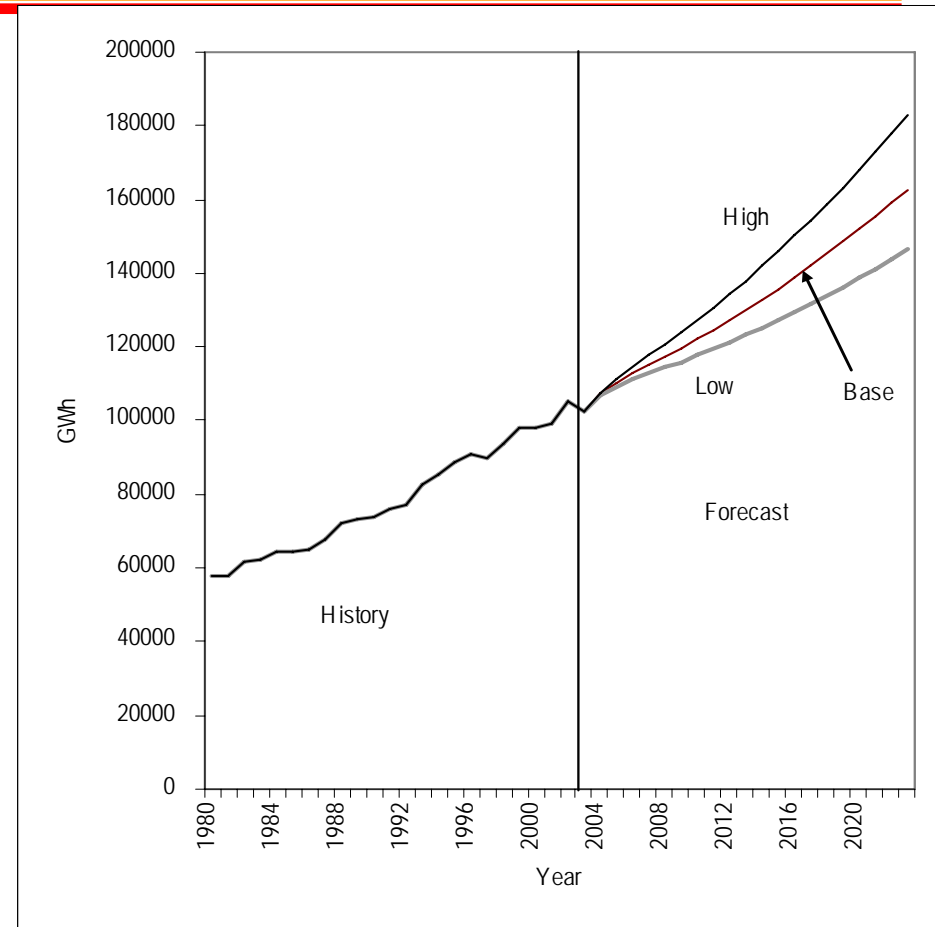
Indiana Real Price Projections (2003 \$)

- **Effect of inflation removed**
- **Does not include cost of new emissions control devices for CAIR and CAMR**
 - **SUFG is working with IDEM to estimate the cost impact**
- **Does include the cost of new resources**



Alternative Scenarios

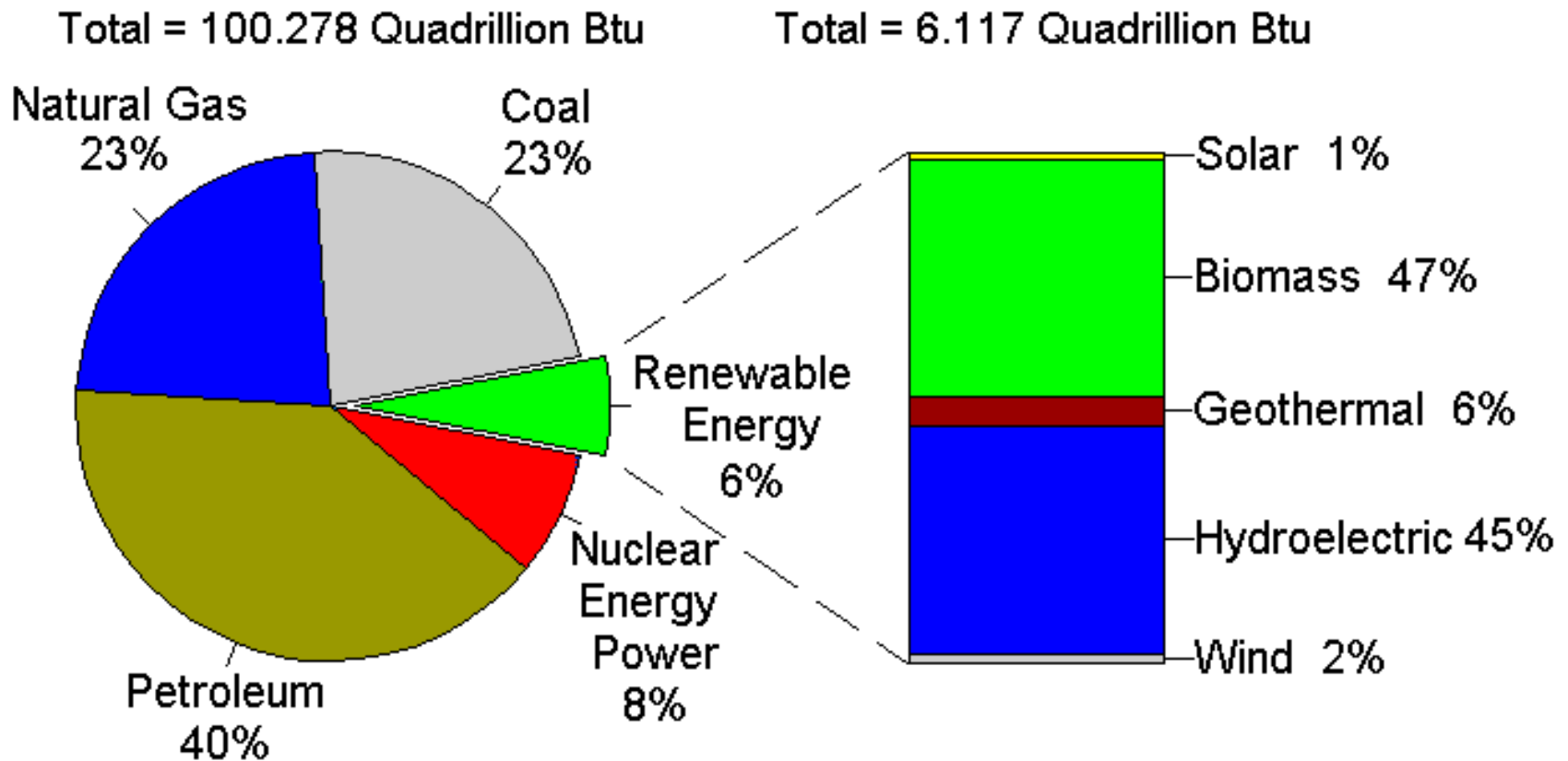
- **Any forecast contains uncertainty**
- **CEMR provides alternative low and high growth econometric forecasts**
- **Low and high growth scenarios are intended to give a plausible bound to uncertainty**



2006 Renewable Resources Study

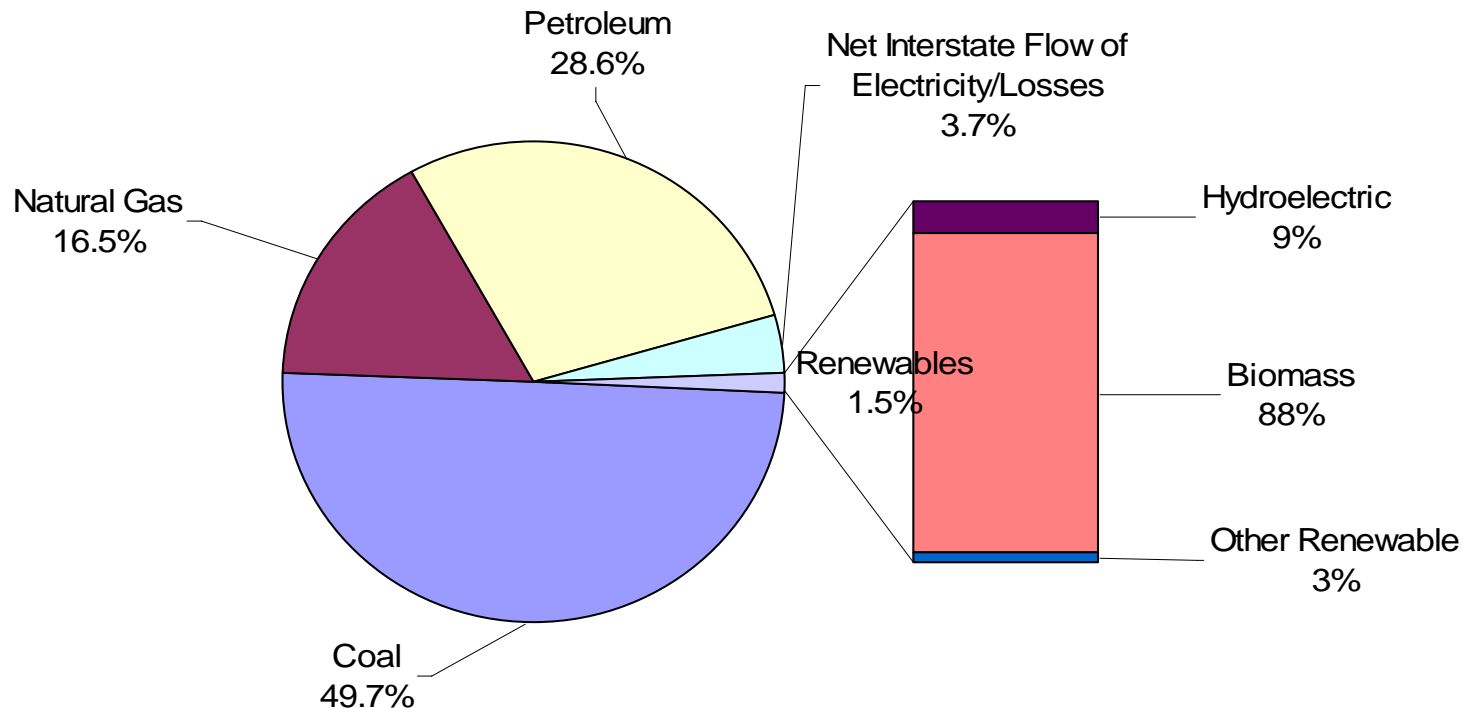
- **Renewable energy trends**
- **Barriers and incentives**
- **Individual renewable resources**
 - wind
 - energy crops
 - organic waste
 - solar/photovoltaics
 - hydropower

2004 U.S. Total Energy Consumption by Energy Source



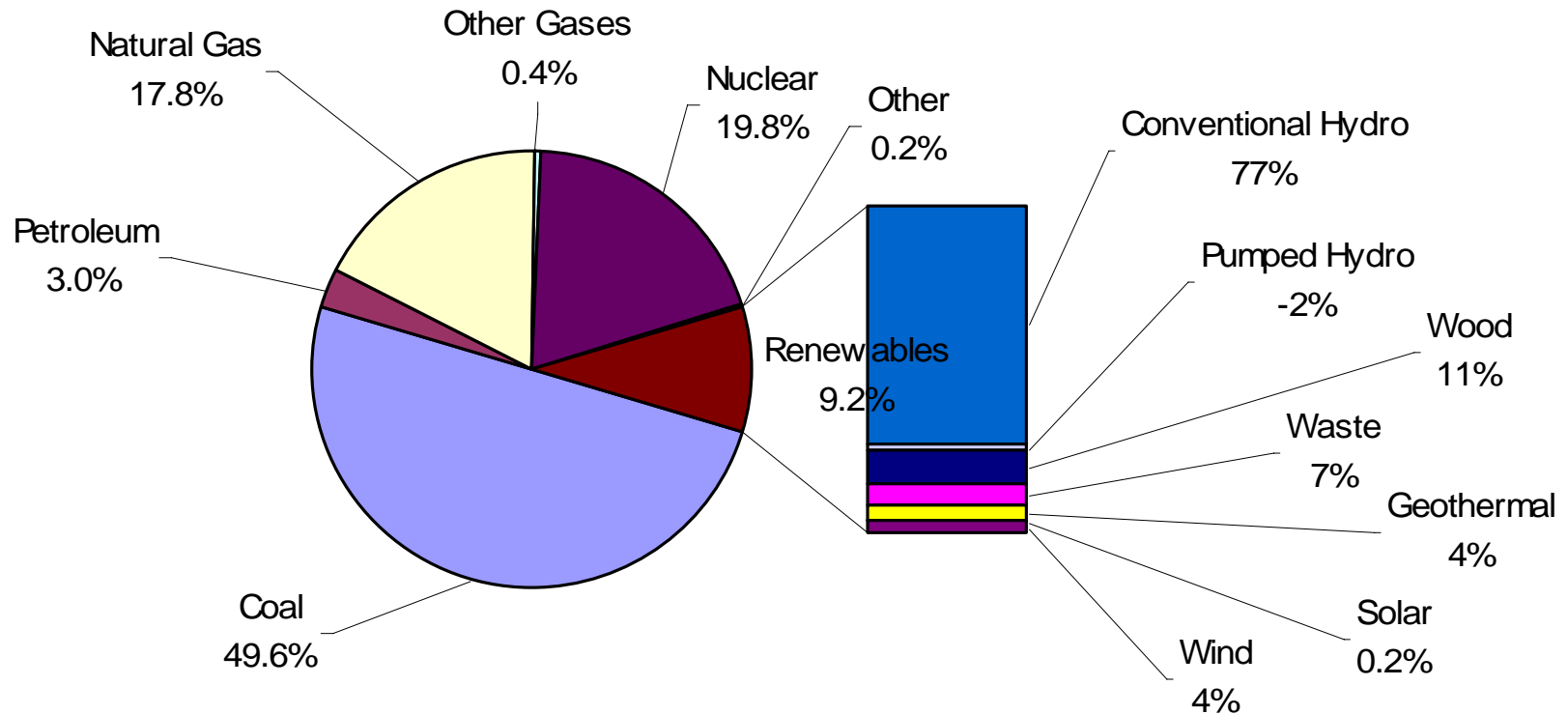
2002 Indiana Total Energy Consumption by Energy Source

2002 Total Indiana Energy Consumption = 2.88 quadrillion Btu



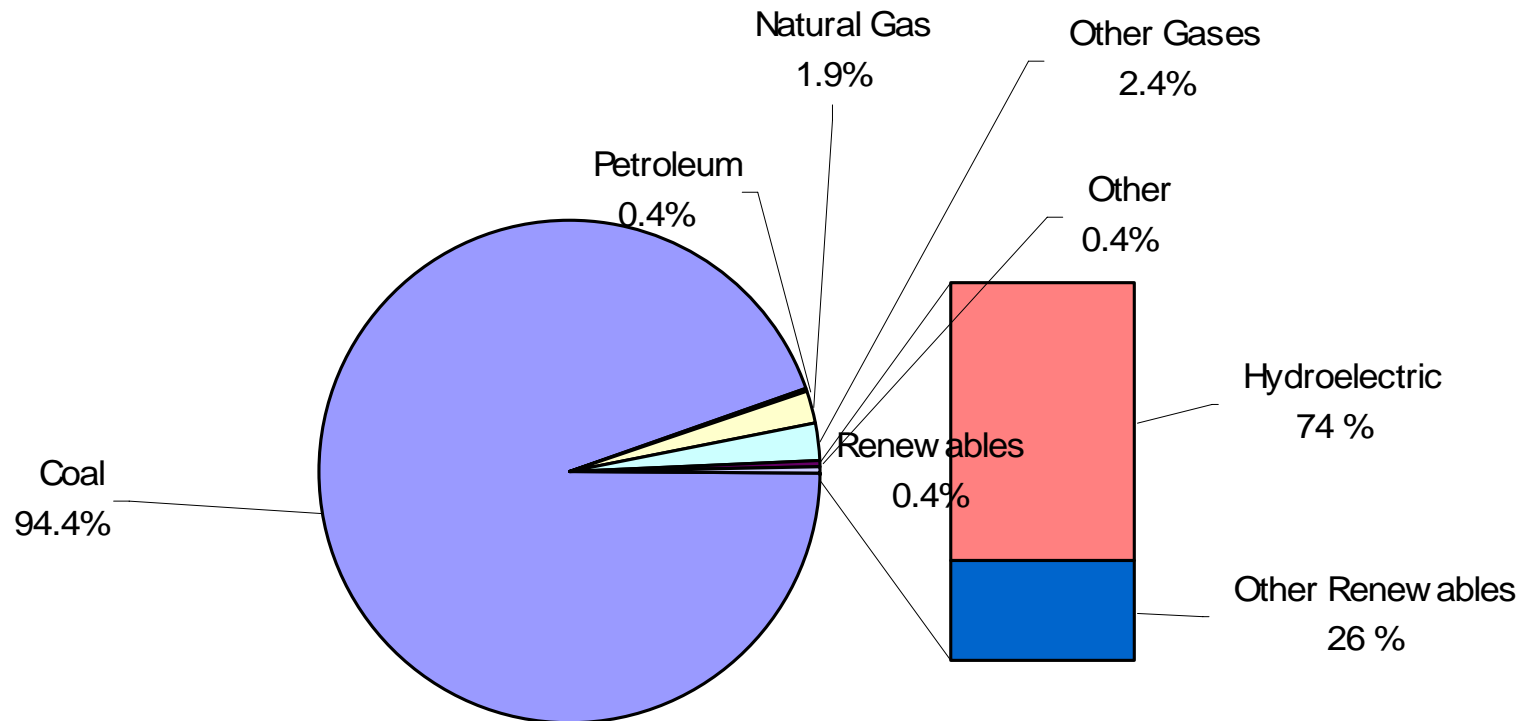
2004 U.S. Electricity Generation by Energy Source

2004 Total U. S. Generation = 3,970,555 GWh



2004 Indiana Electricity Generation by Energy Source

2004 Total Indiana Electricity Generation = 127,770 GWh



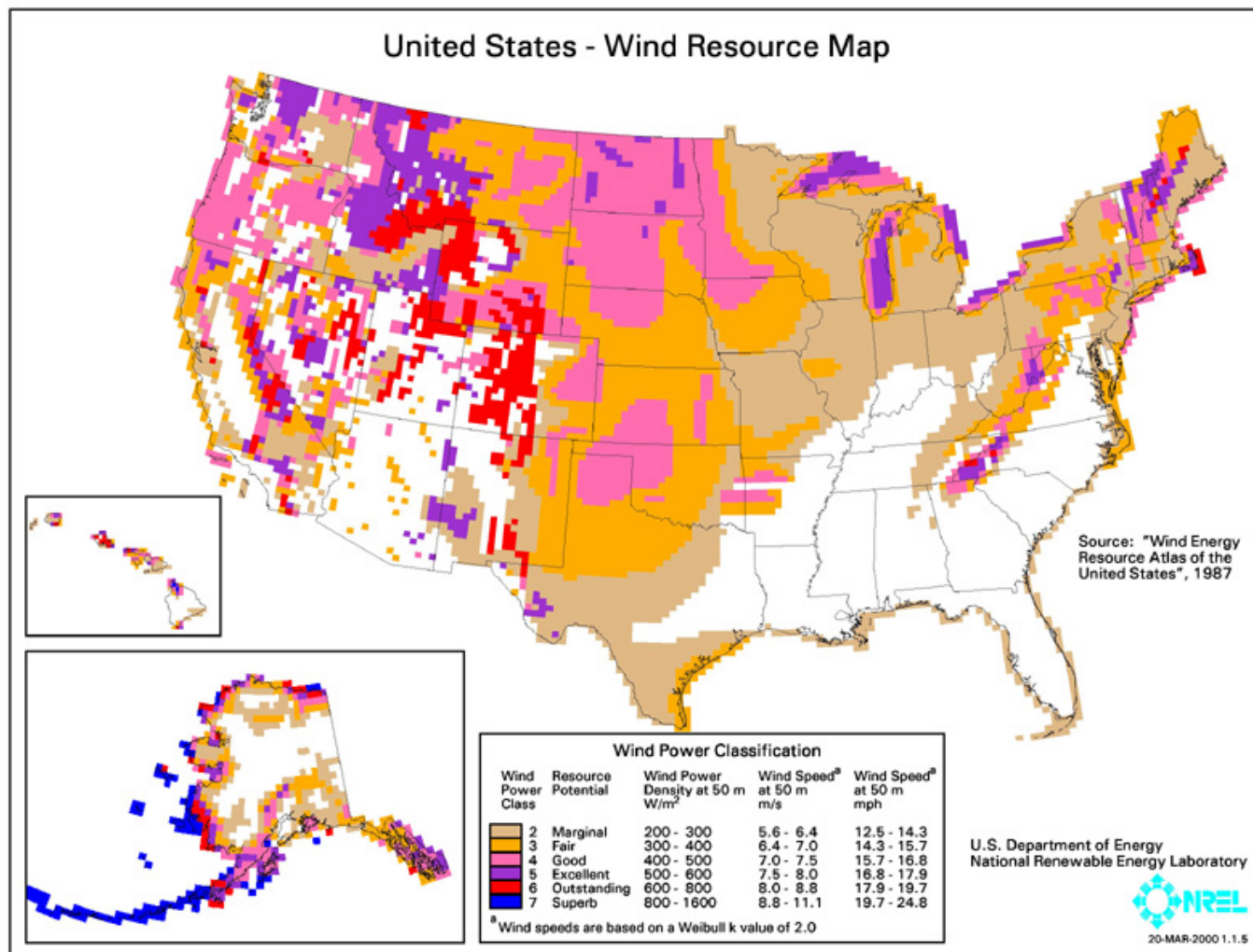
Barriers to Renewables

- **Major barrier is cost**
 - most renewable technologies have high capital costs
 - Indiana had the 5th lowest electricity rates in the country in 2004, according to the Energy Information Administration (5.58 cents/kWh vs. national average 7.47 cents/kWh)
 - only ID, KY, WV, WY were lower
- **Limited resources are also a problem for some technologies**
 - solar/photovoltaics, hydropower, wind

Incentives for Renewables

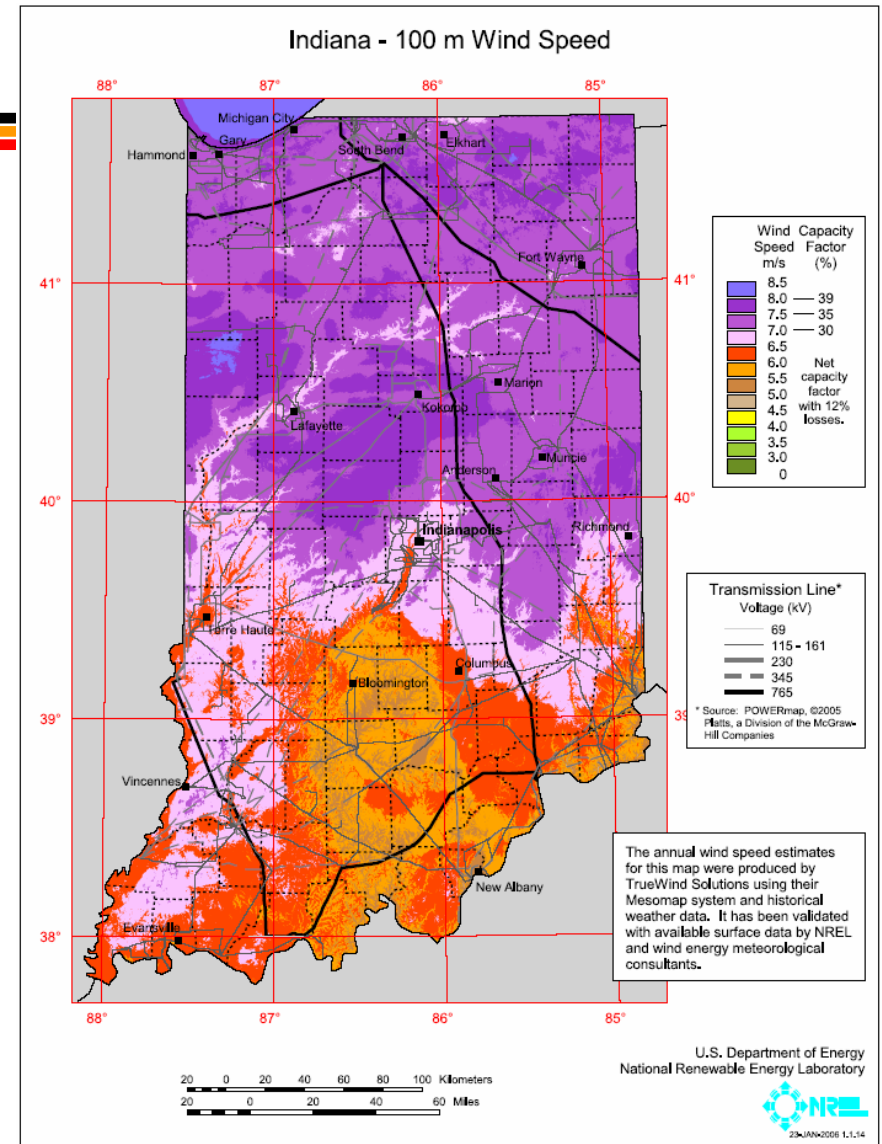
- **Federal**
 - tax credits and exemptions (production tax credit)
 - grant programs
- **State**
 - net metering rule
 - grant programs
 - tax credits
 - emissions credits
- **Utilities**
 - green pricing programs

Wind Resources



Indiana Wind Power

- Most recent wind map shows some potential areas in the northern half of the state
- Two wind farms have been proposed for Benton County in the western part of the state



Energy Crops

- **Transportation fuels**
 - ethanol
 - soy diesel
- **Other possibilities**
 - fast growing hardwood trees (hybrid poplar/willow)
 - grasses (switchgrass)
- **Barriers to be overcome**
 - other high-value uses for the land
 - harvesting and transportation costs
 - price of competing fossil fuels

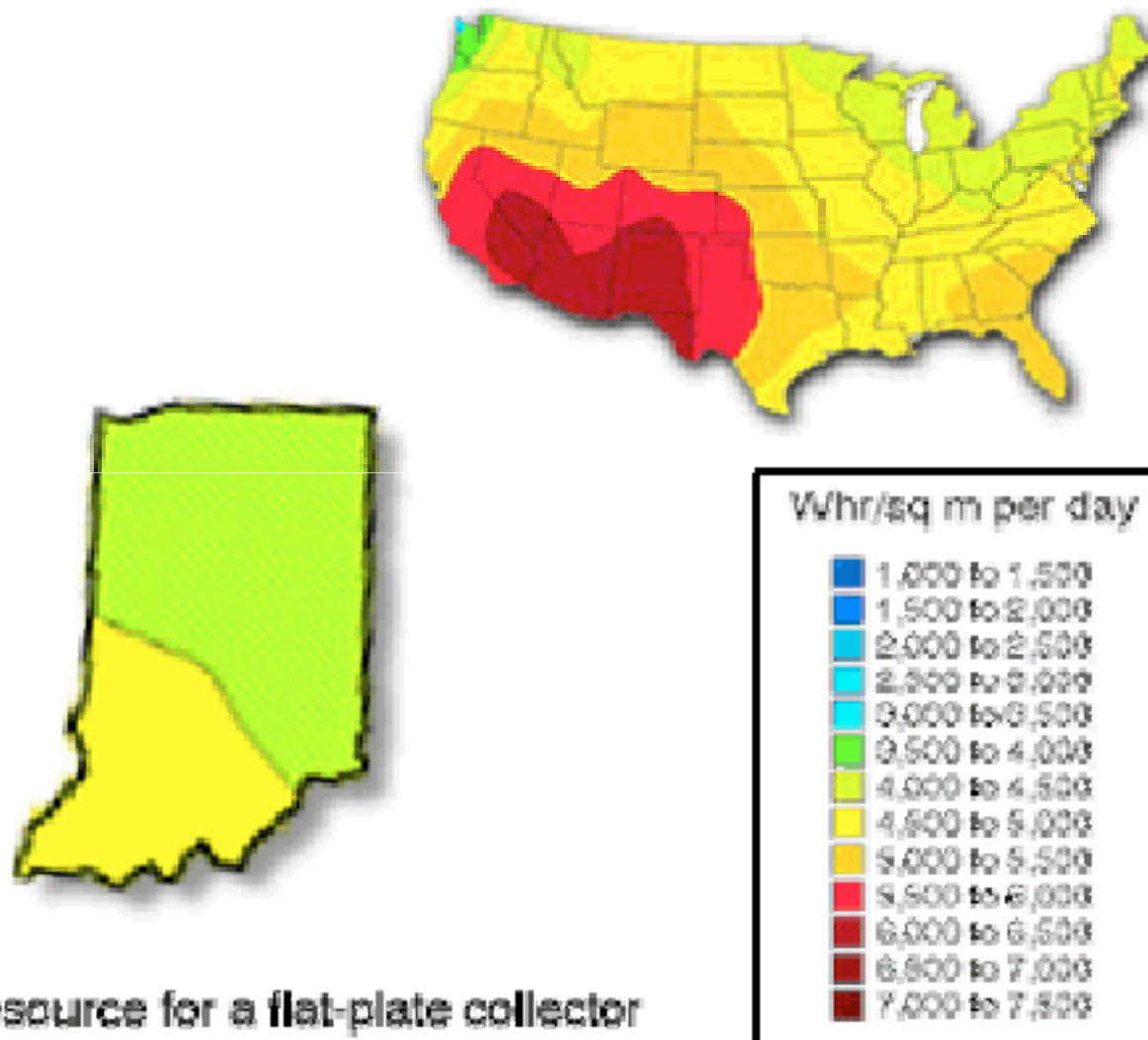
Ethanol in Indiana

- **One operating plant (New Energy)**
 - **102 million gallons per year (1980)**
- **Four plants under construction**
 - **295 million gallons per year**
- **Another fourteen plants announced (ten of them in 2006)**
 - **1,200 million gallons per year**

Organic Waste Biomass

- **This resource is the single largest source of renewable energy in Indiana**
 - primarily due to the use of wood waste
- **It is the second largest source of renewable electricity generation in the state**
 - landfill gas
 - municipal solid waste
 - animal waste biogas
 - wastewater treatment

Solar Energy / Photovoltaics



Hydroelectric Power

- **Indiana has about 60 MW of hydroelectric generating capacity.**
 - **mostly run-of-the-river (no dam)**
 - **largest source of renewable electricity**
- **The U.S. Department of Energy identified another 66 MW of potential hydropower at existing dams**
 - **Only about 42 MW was considered viable (spread out over 27 sites)**