2011 Indiana Renewables Study & 2011 Forecast

Presented by:
Douglas J. Gotham, Director
State Utility Forecasting Group
Purdue University

Presented to:
Regulatory Flexibility Committee
Indiana General Assembly

September 21, 2011
2011 Renewable Resources Study

- Renewable energy trends
- Barriers to development
- Individual renewable resources
  - Wind
  - Energy crops
  - Organic waste
  - Solar
  - Photovoltaics
  - Hydropower
Renewables Share of U.S. Energy Consumption

Source: Energy Information Administration (EIA)
Renewables Share of Indiana Energy Consumption

Source: EIA
2010 U.S. Electricity Generation by Energy Source

- Coal: 45%
- Natural Gas: 24%
- Petroleum: 1%
- Nuclear: 20%
- Renewables: 10%
- Hydro: 60%
-Wind: 22%
-Wood: 9%
-Geothermal: 4%
-Solar: 0.3%
-Pumped Storage: -1%

Source: EIA
Renewables Share of Indiana Electricity Generation

Source: EIA
Barriers to Renewables

• Major barrier is cost
  – Most renewable technologies have high capital costs
  – According to EIA Indiana’s average electric rate in 2009 was 7.62 cents/kWh vs. the national average of 9.82 cents/kWh

• Limited availability for some resources
  – Solar/photovoltaics, hydropower

• Intermittency for some resources
  – Solar/photovoltaics, wind
Wind

- Annual capacity installed
- Cumulative capacity

**Chart:**
- Year 2008: 131 MW
- Year 2009: 1038 MW
- Year 2010: 1339 MW

**Map:**
- Indiana 100 m Wind Speed
- Wind Capacity Speed Factor (%)
- Transmission Lines

*Source: National Renewable Energy Laboratory (NREL)*

The annual wind speed estimates for this map were produced by TrueWind Solutions using their Mesoscale model and historical wind data. It has been validated with available surface data by NREL and wind energy meteorological consultants.
Energy Crops

• Transportation fuels
  – Ethanol
  – Biodiesel
• 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
Organic Waste Biomass

• Until the recent increase in ethanol production, this resource was the largest source of renewable energy in Indiana
  – Primarily due to the use of wood waste
• It is the 3rd largest source of renewable electricity generation in the state
  – Landfill gas
  – Municipal solid waste
  – Animal waste biogas
  – Wastewater treatment
Solar Energy

Source: DOE
Photovoltaics

- Growing rapidly in Indiana, but still a small contributor overall
- 75 installations totaling over 2.6 MW of capacity
  - Fort Harrison Federal Compound
  - Johnson Melloh
Hydroelectric Power

• Indiana has 73 MW of hydroelectric generating capacity.
  – mostly run-of-the-river (no dam)
  – 2\textsuperscript{nd} largest source of renewable electricity

• American Municipal Power is constructing an 84 MW facility at the Cannelton Locks on the Ohio River
  – expected to be operational in Fall 2013
2011 Forecast

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

![Graph showing energy resource requirements and projections.](image)
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 will be doing a 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
Further Information

State Utility Forecasting Group
765-494-4223
sufg@ecn.purdue.edu
http://www.purdue.edu/dp/energy/SUFG/

Douglas Gotham
765-494-0851
gothenburg@purdue.edu