

State  
Utility  
Forecasting  
Group

# 2005 Indiana Renewable Resources Study

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Presented by:

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Presented to:

**Regulatory Flexibility Committee  
Indiana State Legislature**

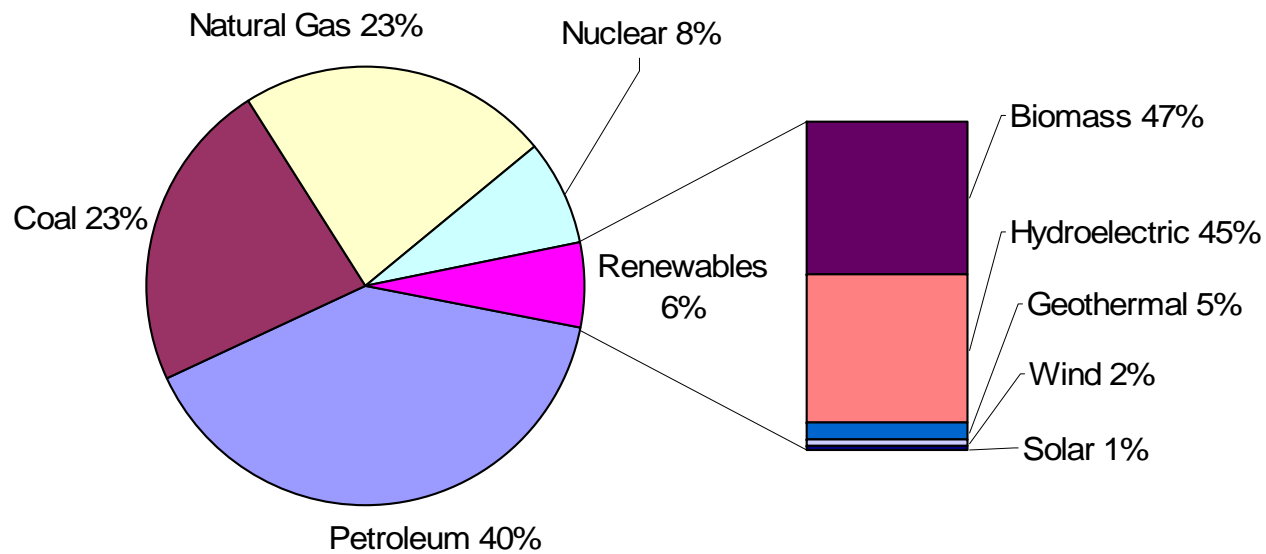
**September 8, 2005**

# Overview

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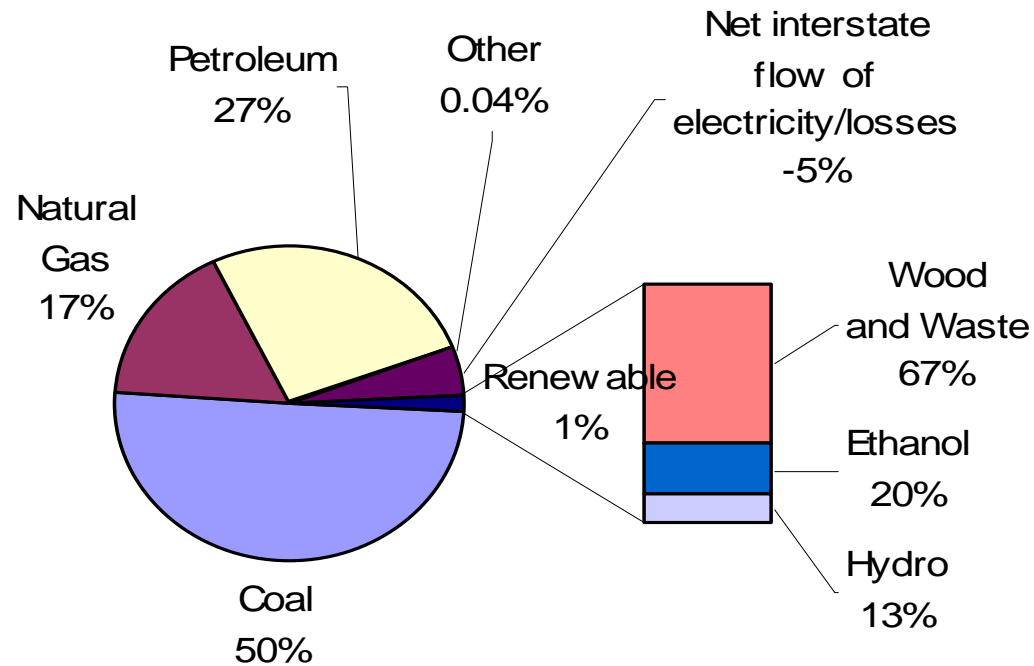
- **Renewable energy trends**
- **Barriers and incentives**
- **Summary of Energy Policy Act of 2005**
- **Individual renewable resources**
  - wind
  - energy crops
  - organic waste
  - solar/photovoltaics
  - fuel cells
  - hydropower

# 2003 U.S. Total Energy Consumption by Energy Source



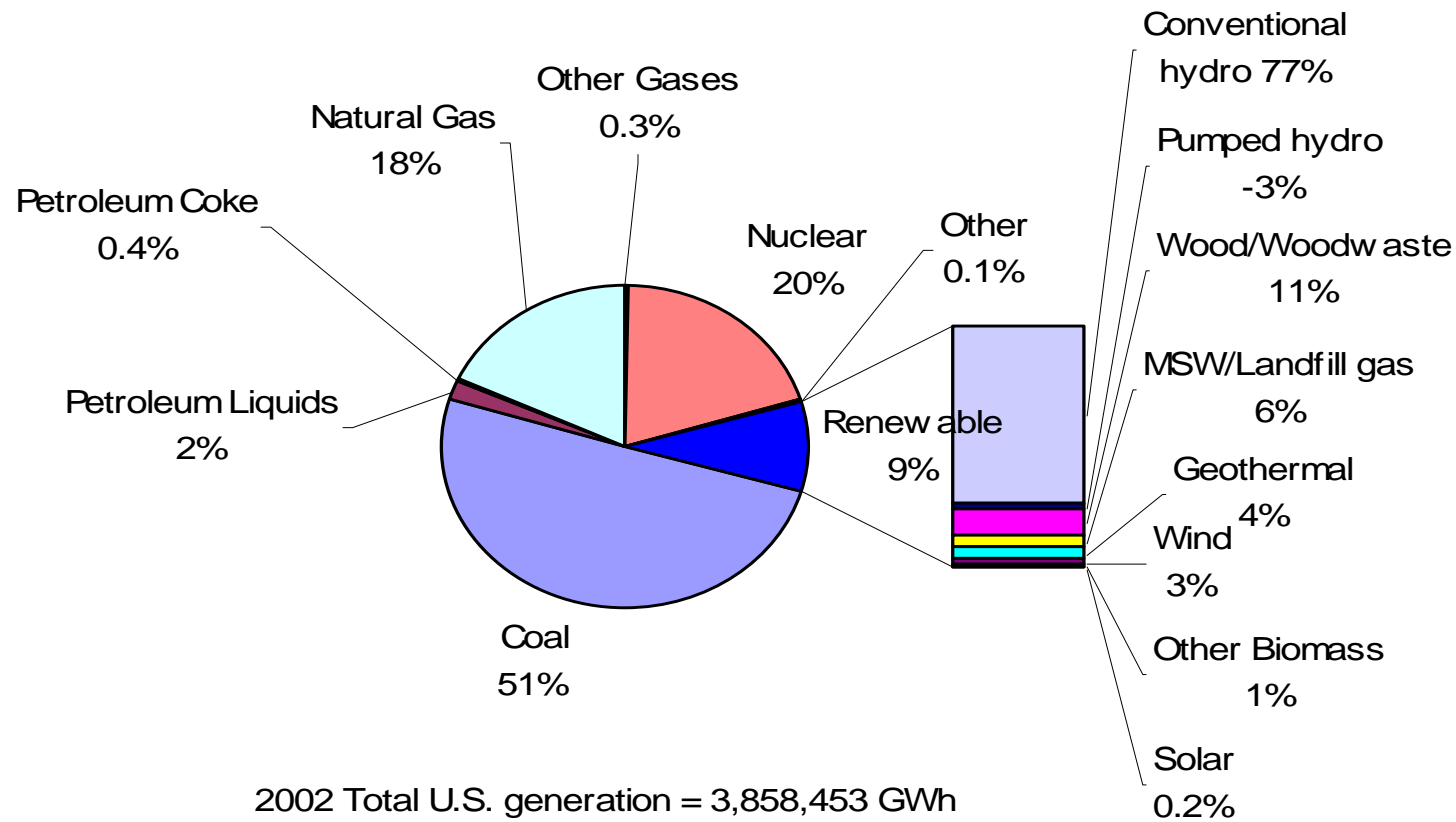
2003 total US energy consumption = 98 Quadrillion Btu

# 2001 Indiana Total Energy Consumption by Energy Source

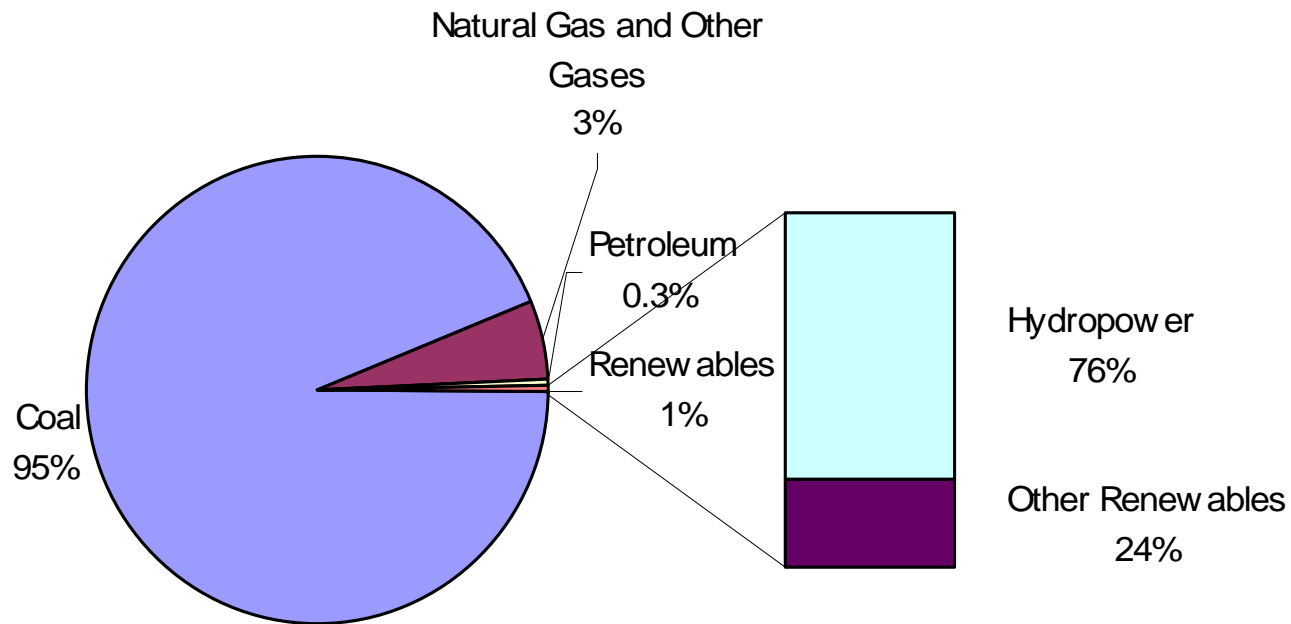


2001 total Indiana energy consumption = 2802 trillion Btu

# 2002 U.S. Electricity Generation by Energy Source

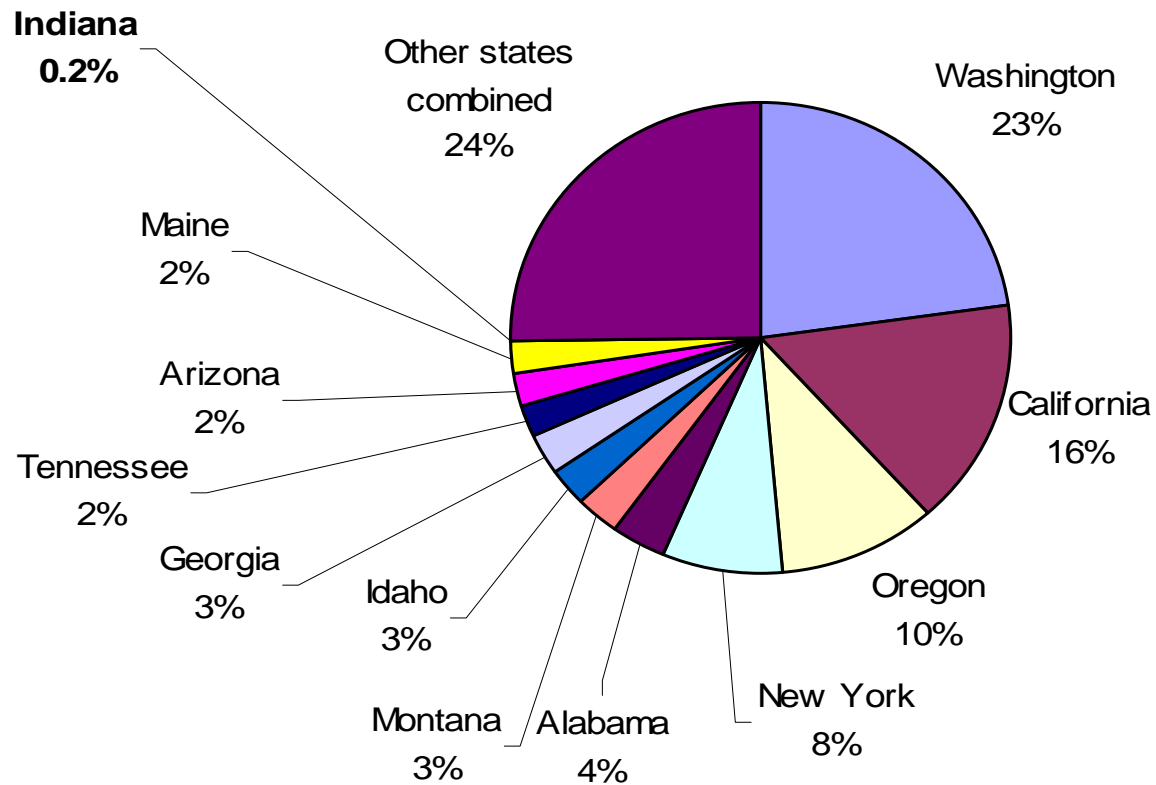


# 2001 Indiana Electricity Generation by Energy Source



Total Electricity Generation in Indiana in 2002 = 125,608 GWh

# 2002 Share of Renewable Electricity Generation by State



2002 Total U.S. Generation by renew ables = 351,251 GWh

## Barriers to Renewables

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- **Major barrier is cost**
  - most renewable technologies have high capital costs
  - Indiana had the 4<sup>th</sup> lowest electricity rates in the country in 2002, according to the Energy Information Administration (5.34 cents/kWh vs. national average 7.21 cents/kWh)
    - only KY, WY, WV were lower
- **Limited resources are also a problem for some technologies**
  - solar/photovoltaics, hydropower, wind



# Incentives for Renewables

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

## Energy Policy Act of 2005

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- **Production Tax Credit**
  - **Extended the expiration by two years to December 31, 2007**
  - **Expanded full credit to some technologies that previously received partial credit**
    - **geothermal**
    - **open-loop biomass**
    - **landfill gas**
  - **Extended to some technologies that were previously not covered**
    - **hydropower from existing dams**
    - **wave/tidal**

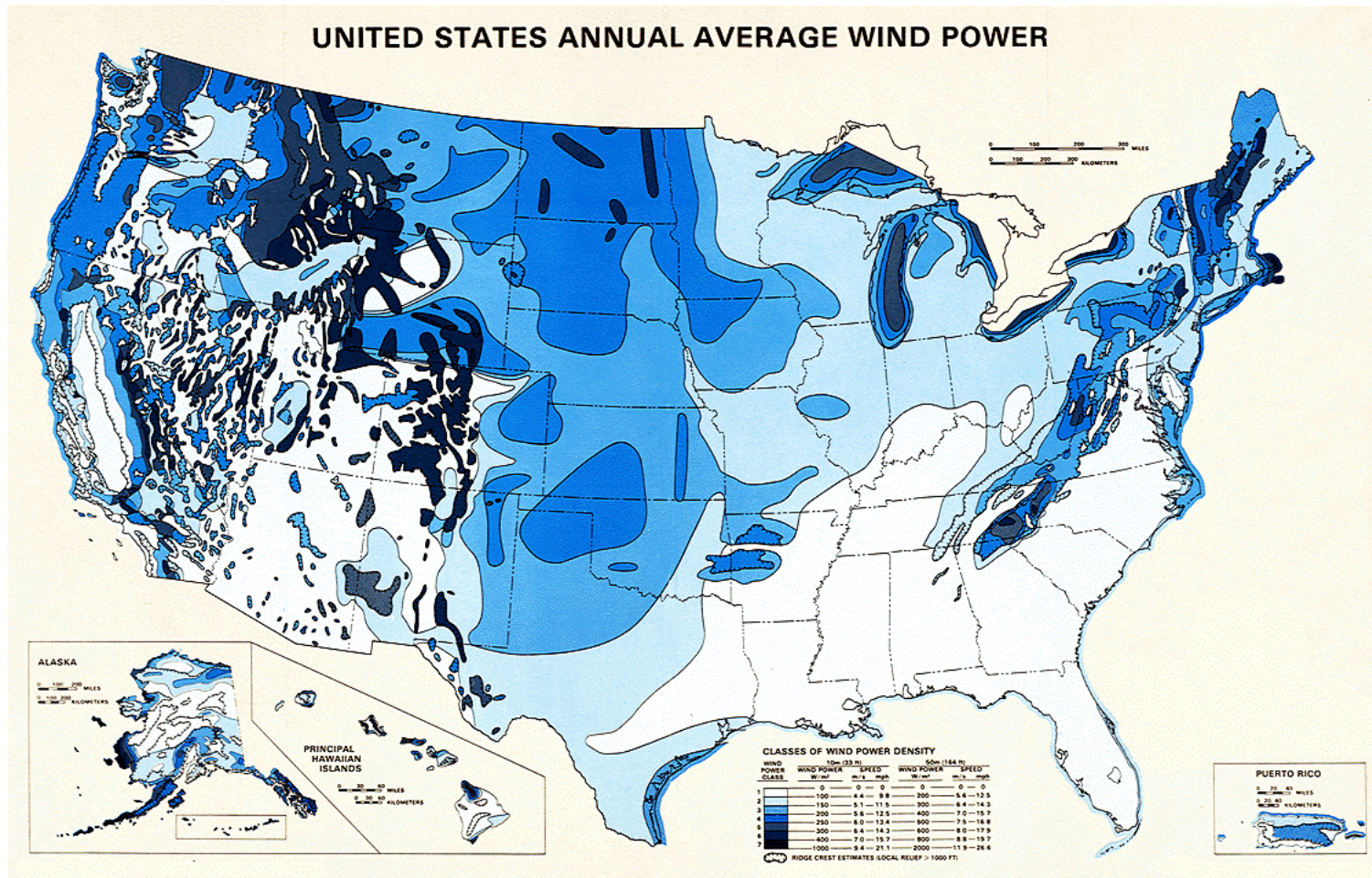
## Energy Policy Act of 2005

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- **Research and development**
  - **\$2.2 billion through 2009**
  - **\$590 million for biomass specifically**
- **No national renewable portfolio standard**
  - **Federal government has a soft requirement to implement renewables**
    - **up to 7.5 percent by 2013**
    - **subject to economic/technical feasibility**

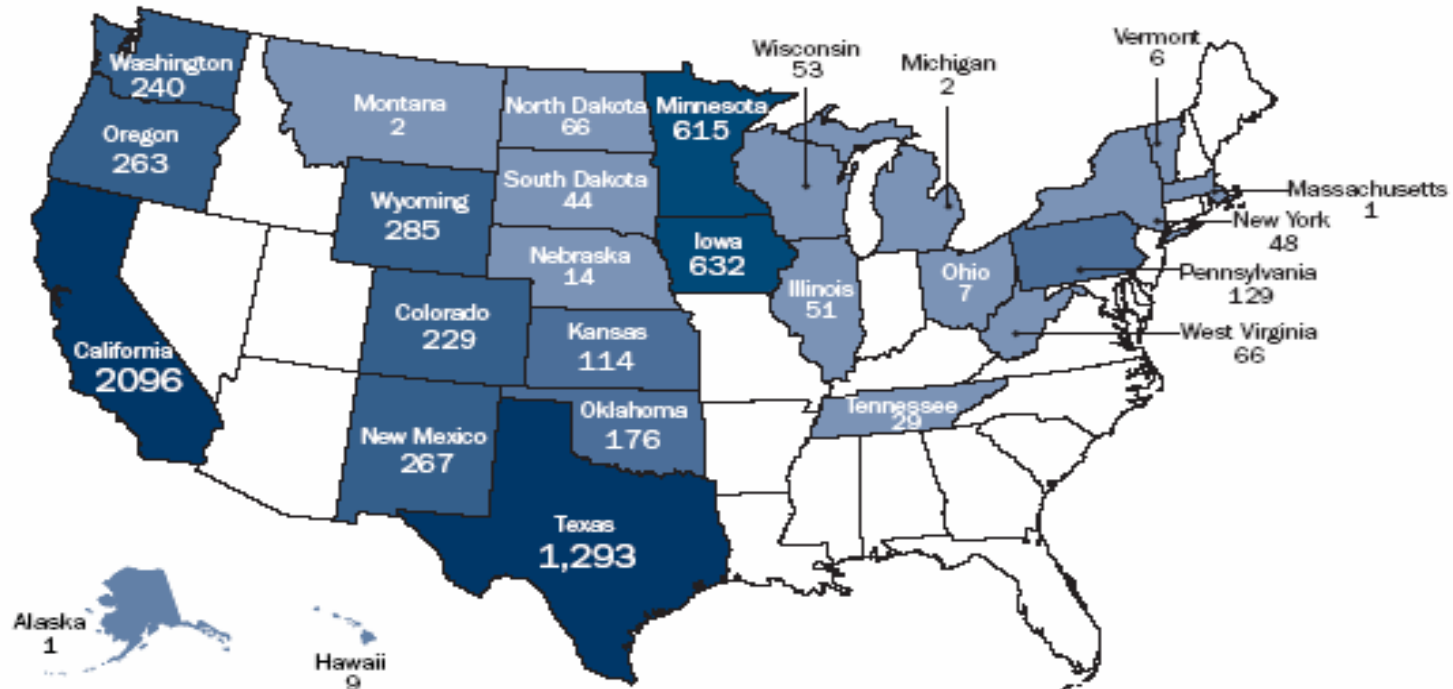
# Wind Resources



# Wind Power Capacity

## United States Wind Power Capacity (MW)

6,740MW as of 12/31/04

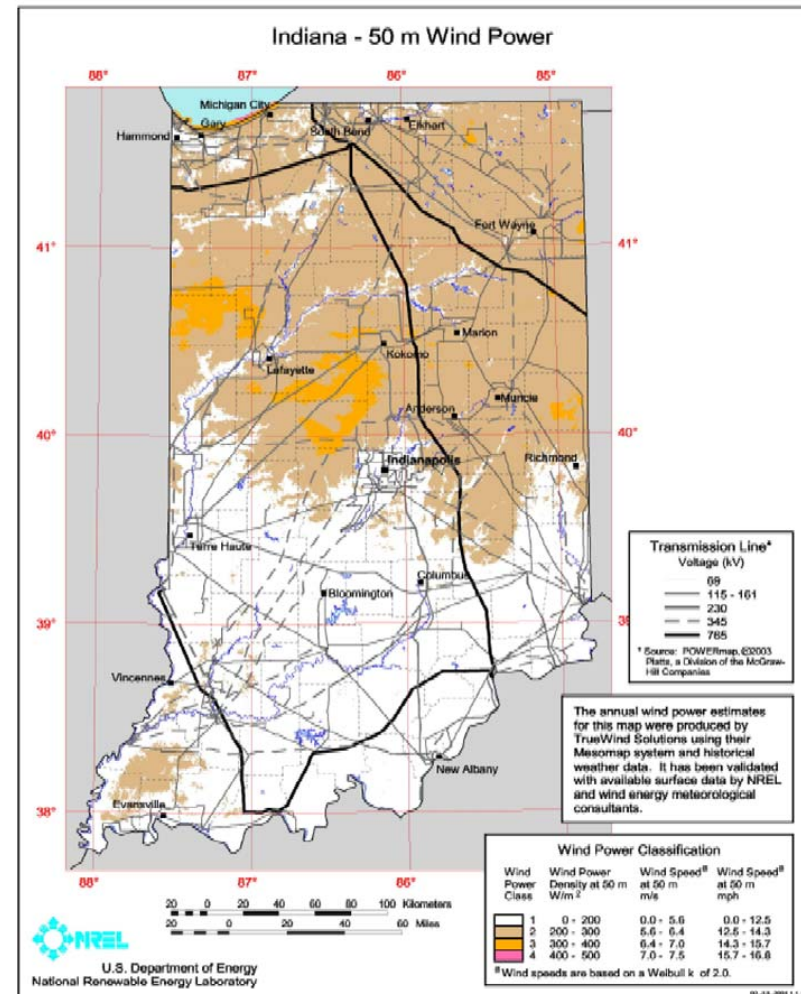


Wind farms across the U.S. are expected to produce close to 18 billion kWh in 2005 (about 0.5% of U.S. electricity generation), enough electricity to serve more than 1.6 million households.



# Indiana Wind Power

- Most recent wind map shows some potential areas in the northern half of the state
- In 2003 enXco proposed a 100 MW wind farm in Benton County, with little progress to date



# Energy Crops

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- **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

## Organic Waste Biomass

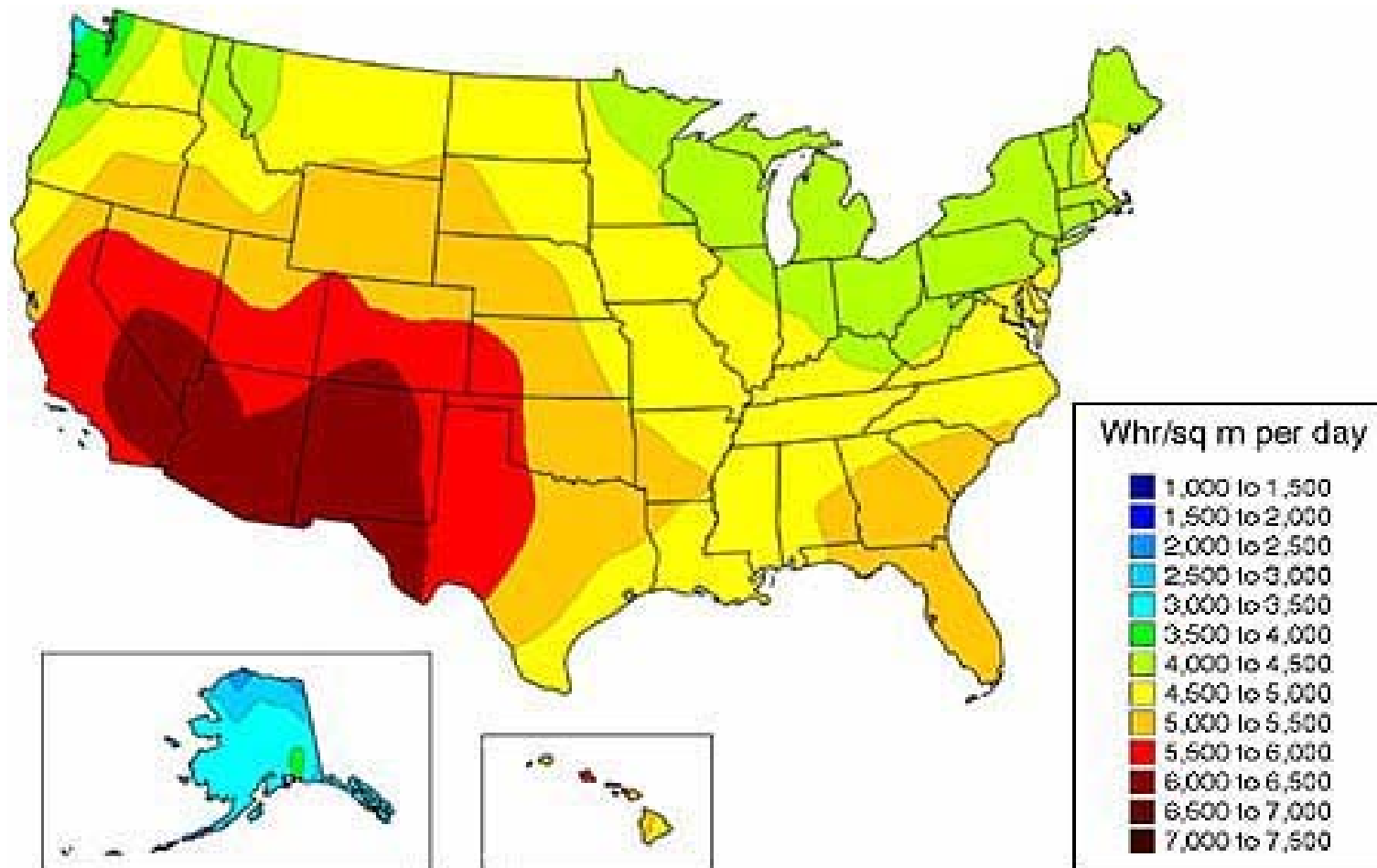
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- **This resource is the single largest source of renewable energy in Indiana**
  - primarily due to the use of wood waste
- **It is the second largest source of renewable electricity generation in the state**
  - landfill gas
  - municipal solid waste



# Solar Energy / Photovoltaics



Solar resource for a flat-plate collector

## Fuel Cells

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- **Currently available fuel cells cost about \$3000/kW**
- **This is roughly twice the cost of a large coal plant and about 10 times the cost of a natural gas-fired combustion turbine**
- **There is a large amount of research being performed to solve some of the problems**
  - **cost**
  - **efficiency**
  - **hydrogen production**
  - **hydrogen storage**

## Hydroelectric Power

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- **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.**