

# Wind Energy and Utility Providers

## Regulatory and Operational Issues

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# Regulatory and Legislative

- PURPA (Public Utilities Regulatory Policies Act of 1978)
  - Intended to promote greater use of renewable energy
  - Purchases of energy from non-utility producers at rates based on the utility's avoided cost
- Energy Policy Act of 2005
  - Utilities must consider adoption of five new standards
  - Net Metering and Interconnection are two of these

# Regulatory and Legislative

## ■ Net Metering

- Energy that is shown to be consumed after deductions are taken for outflows from consumer owned generation facilities
- Generally sized to meet customer needs up to a certain size (30 kW)
- Energy in excess of usage at the end of the month usually results in a credit to be carried over to future bills
- Utilities have limited the overall amount of net metering available to a percentage of their peak demand (.1%)

# Regulatory and Legislative

- Interconnection Standard
  - Institute of Electrical and Electronics Engineers (IEEE) 1547
  - Standardizes interconnections for distributed generation sources
  - Specifies the necessary protection devices (relaying, etc) to protect the system and workers on de-energized systems

# Regulatory and Legislative

- Renewable Portfolio Standard (RPS)
  - State of Michigan House Bills 5548 and 5549
  - Mandates percentages of electrical energy sold at retail that must come from renewable energy sources
    - 4% by the end of 2012 and 10% by the end of 2015
  - Unless extensions are granted by the Public Service Commission due to maximum rate impacts or zoning issues preventing compliance
  - Currently Tie-Barred with eight other bills including the modification of the electric choice law

# Details of RPS Bill

- Definition: What is renewable?
  - Wind Energy
  - Biomass – Defined as crops, wood (wood waste), animal waste, wastewater sludge, aquatic plants, food production waste, municipal solid waste and organic byproducts from biofuel production
  - Solar Energy
  - Kinetic water energy (dam, waves, pumped storage)
  - Geothermal Energy
  - Industrial Thermal Energy
  - Hydrogen Synthesis Gases

# Details of RPS Bill

- Renewable Energy Credits (RECs)
  - Used to fulfill obligation under RPS
  - Usually one credit per megawatt-hour (MWh) of supply
  - Michigan Incentive RECs
    - Solar – Additional 2 RECs per MWh
    - Michigan-made equipment - .1 REC per MWh
    - Systems built by Michigan workers - .1 REC per MWh
    - Equipment used at peak demand time (excludes wind) - .05 REC per MWh

# Regulatory and Legislative

## ■ Net Metering Bill

- Senate Bill 1246 – Still in Energy Policy and Public Utilities Committee
- Calls for a state-wide net metering program for generators powered by renewable fuel or a fuel cell
- Limited to 550 kilowatts
- Capped at 2% of the utility's in-state peak load
- Uniform interconnection requirements
- Payment would be on top incremental cost based on time of day

# Grid Operational Issues with Wind

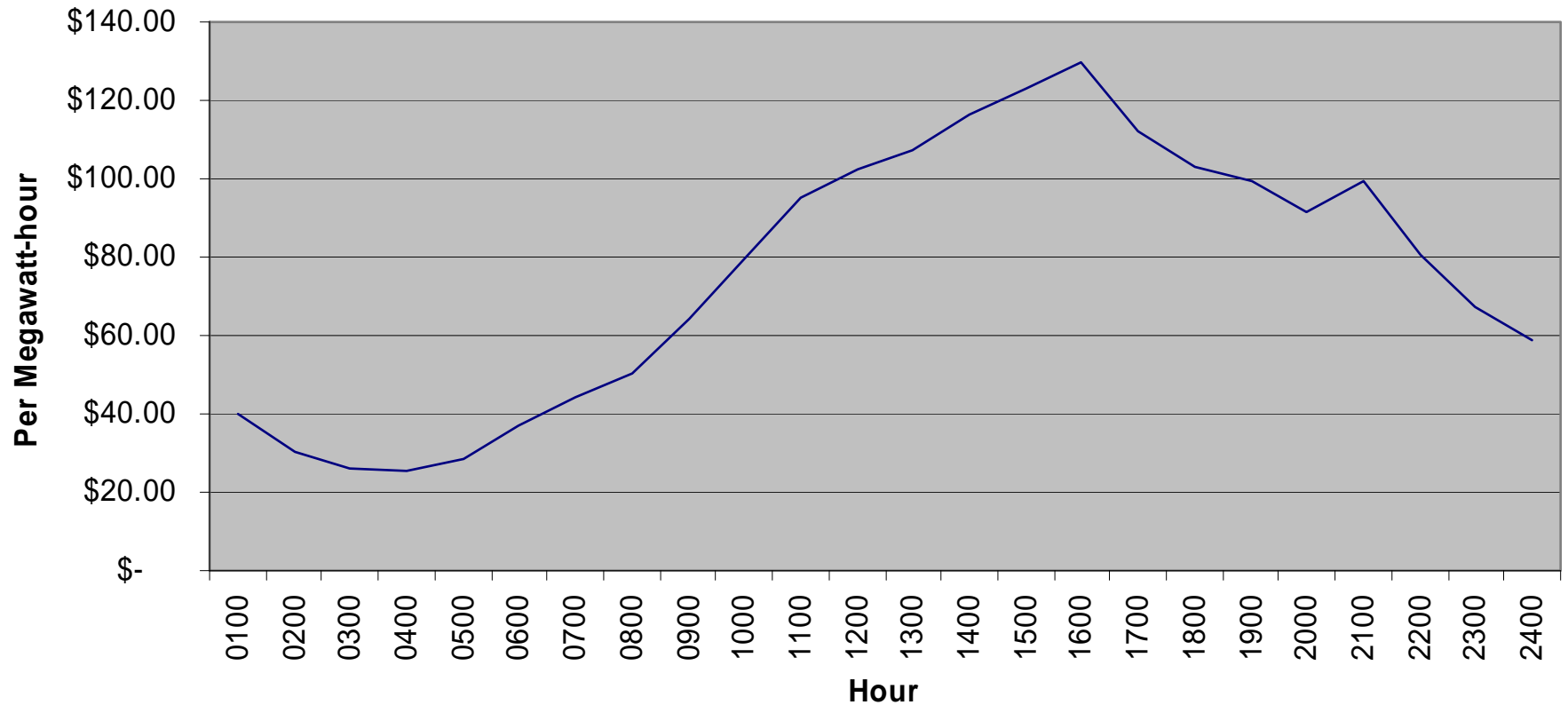
- Frequency control of the electrical grid
  - Controlled to 60 Hertz (+/- .05 Hz)
  - Underfrequency Load Shedding before 59 Hz
  - Contingent Reserves must be able to restore the supply upon loss of generation
- Voltage Flicker
  - Generally a consideration on lightly loaded distribution lines during full generation output or during wind turbine start up due to inrush current

# Power Market Issues with Wind

- Payment Mechanisms
- Avoided Cost
  - This is the cost of generation that a utility avoids when a connected non-utility generator injects power into the system
  - Usually, this a fuel (coal for example) and other variable costs
- Market Price

# Market Price Example

Summer 2007 Typical Power Prices



— August 2007 Weekday Power Prices

# Wind Generation Plans for Holland

## ■ Utility Scale

### ■ Wyandotte Municipal Services Project

- Five 1.5 Megawatt Turbine Development
- Estimated at over \$2,400 per kilowatt installed
- Anticipated 25% Capacity Factor

### ■ Local to Holland

- Receiving bids for a meteorological tower to be placed at Windmill Island for wind data collection

## ■ Small scale

### ■ Demonstration project at the Holland Civic Center

- 3 Swift 1.5 kW facade mounted and 1 Skystream 1.9 kW monopole turbines



Birdseye View Looking Northwest

# Future Plans?

