

Energy Cost Impact of asynchronous supply and demand, electric load curve amplitude, and unproductive capacity utilization

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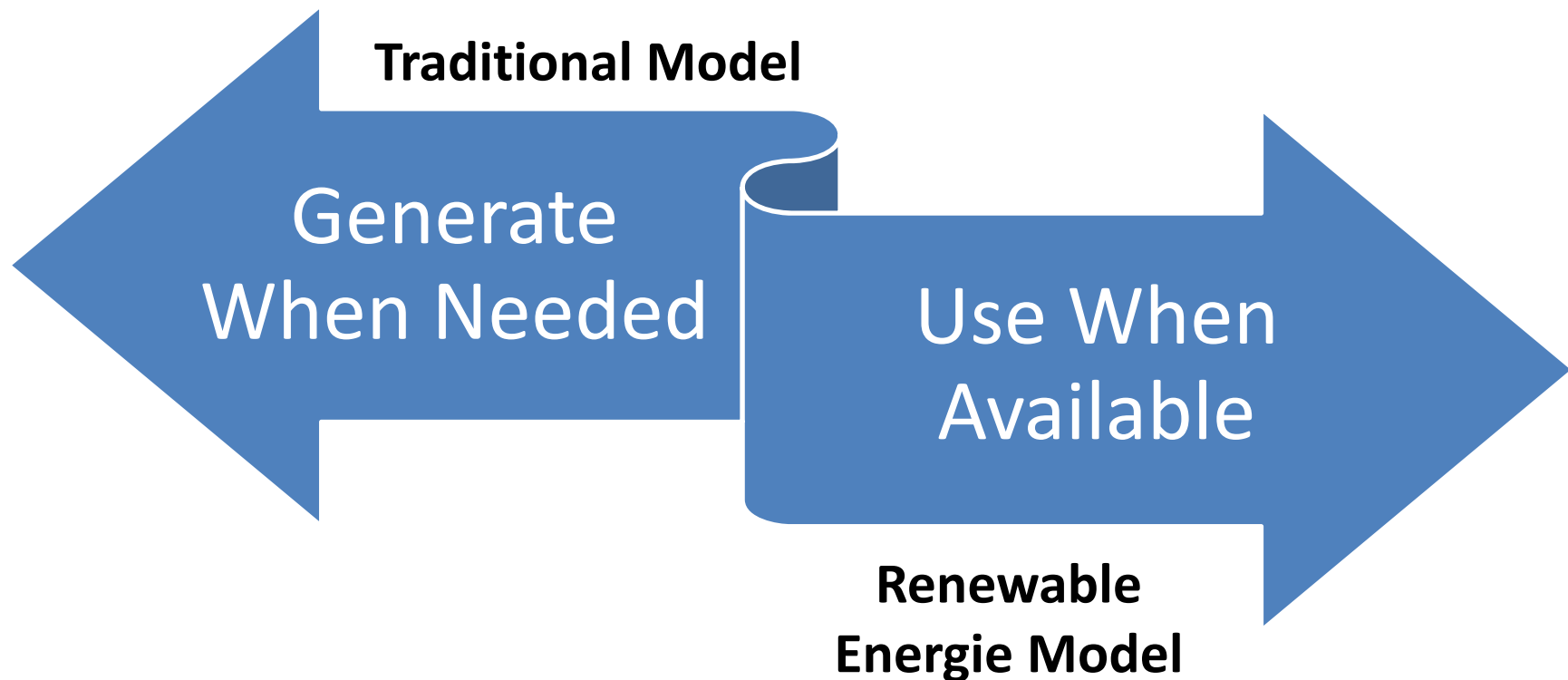
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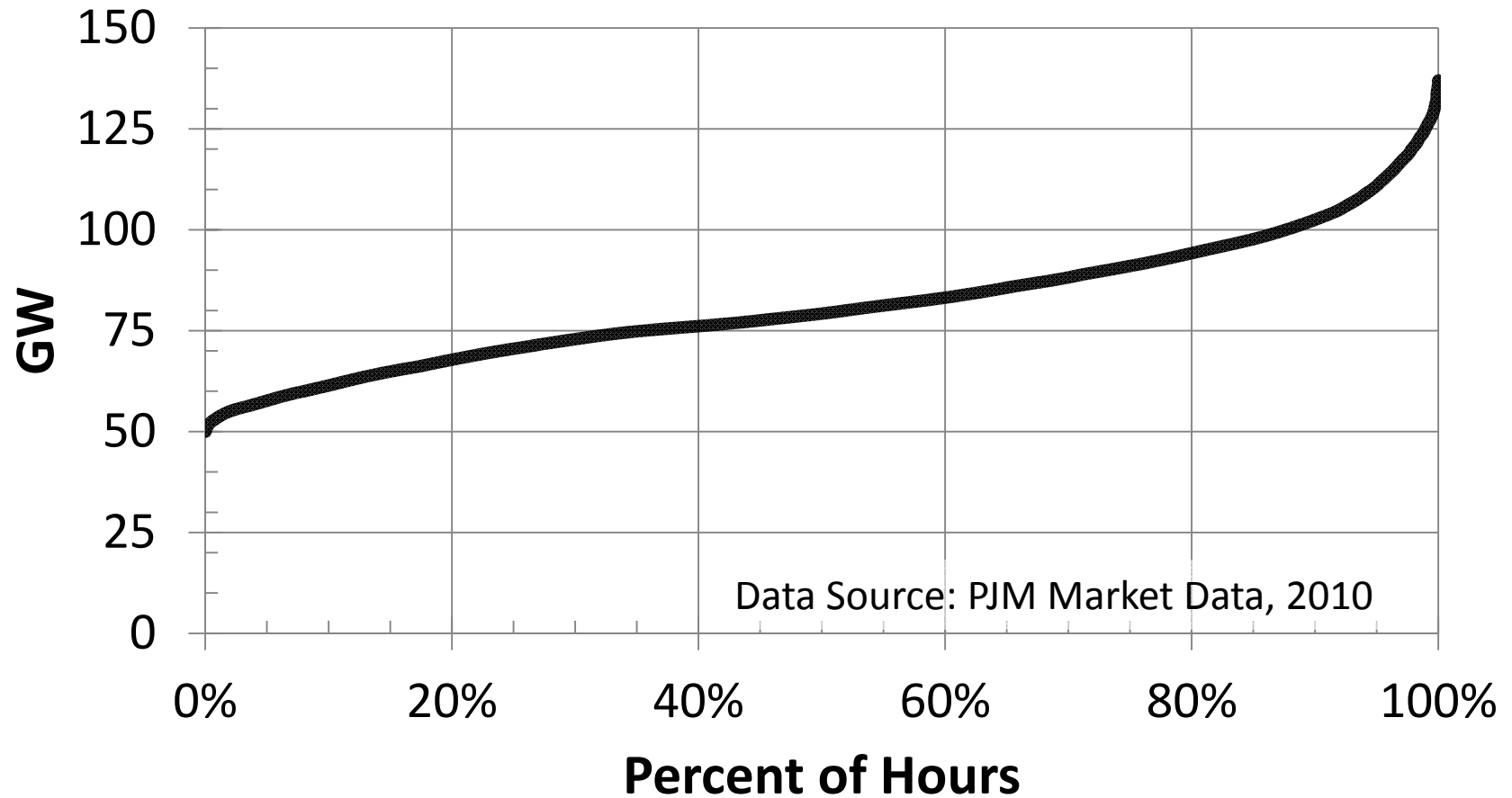
Electricity Generation Costs

- Energy Costs
 - Variable production cost
 - Incurred when electricity is generated
 - Ex. Fuel, Operations & Maintenance
- Capacity Costs
 - Fixed cost
 - Incurred regardless of electricity generation
 - Ex. Investment, cost of capital

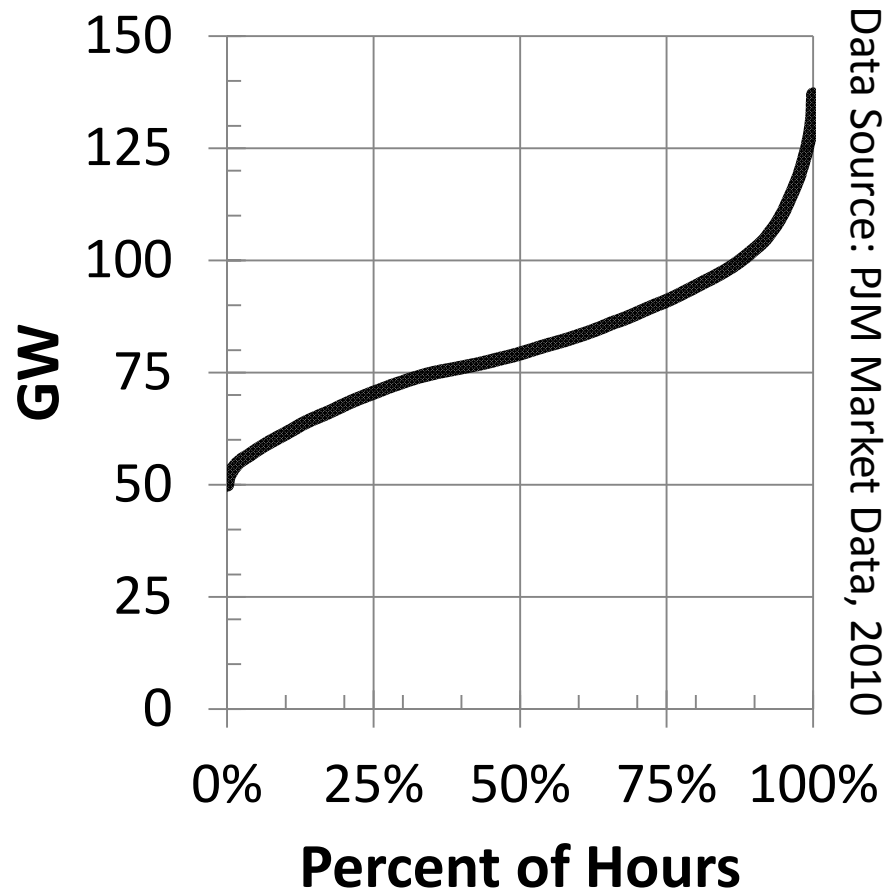
Generation Mix Continuum



Electric Market Load Curve

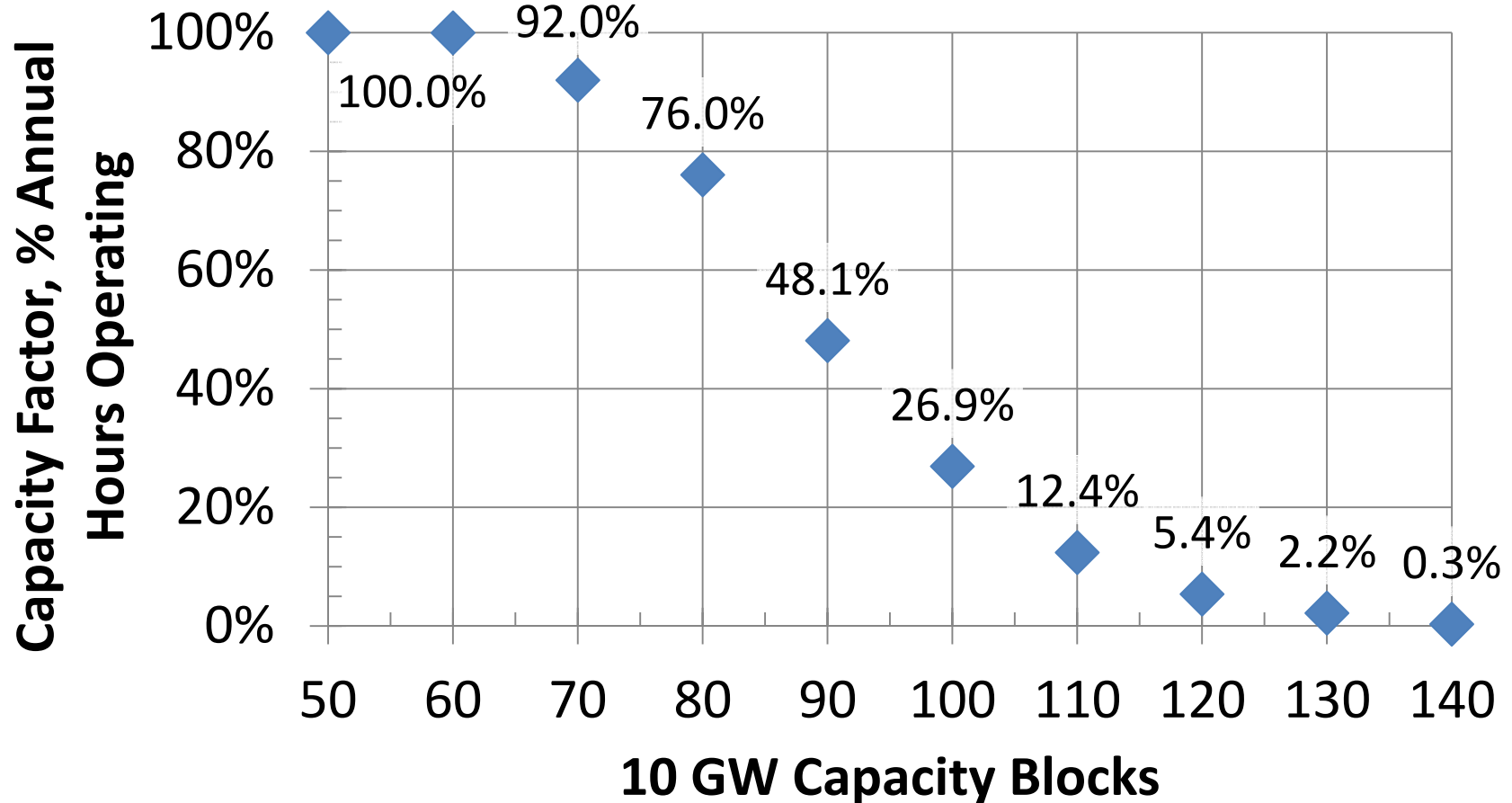


Electric Market Load Curve

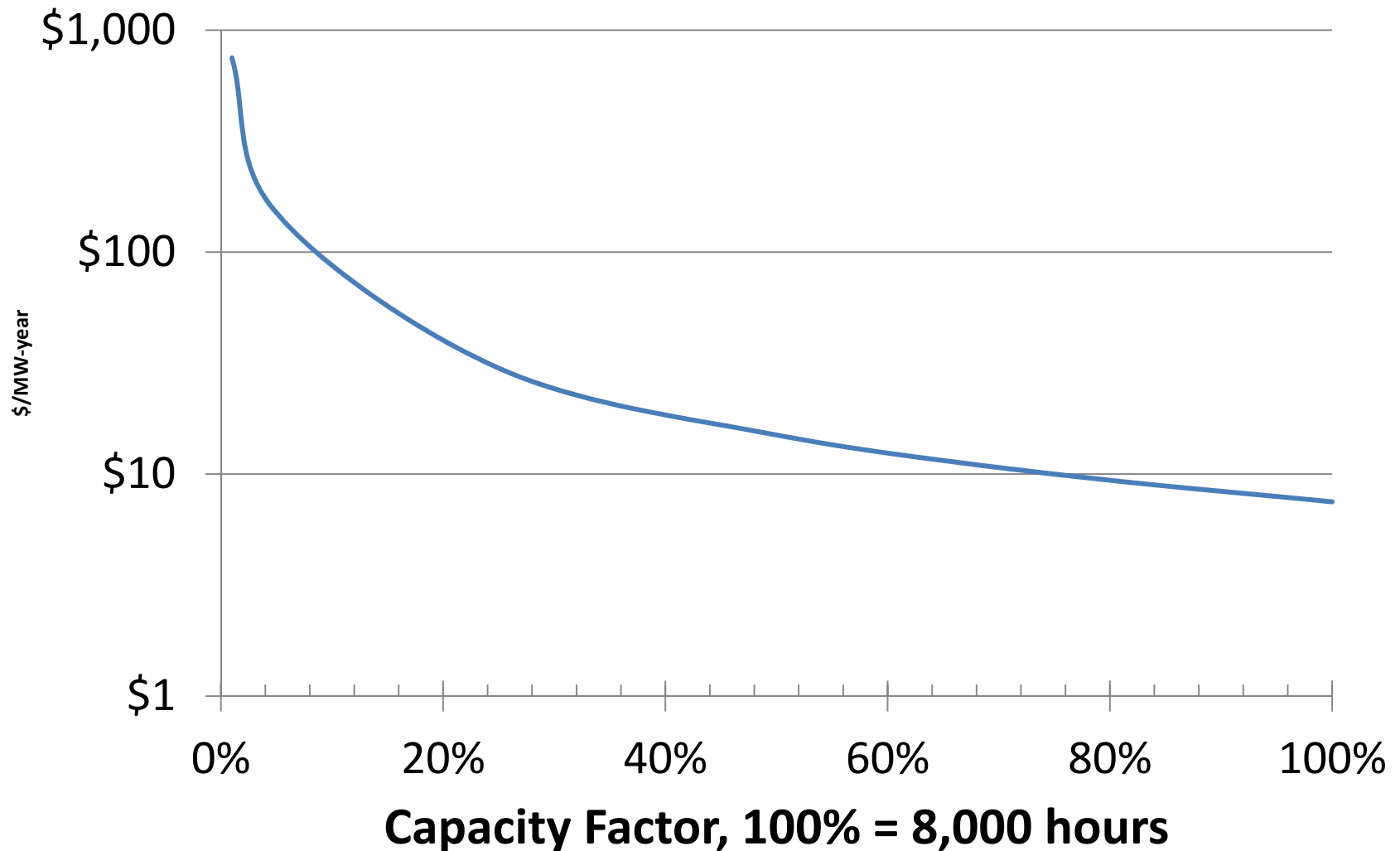


- Amplitude of Load Curve:
 - 87 MW = Max-Min Load
 - Dictates operating hours for each additional block of generation capacity
- Higher amplitude =
 - Greater intermediate and peak generation
 - Capacity cost is greater portion of average price

Simplified Load Curve, % of hours operating by generation block

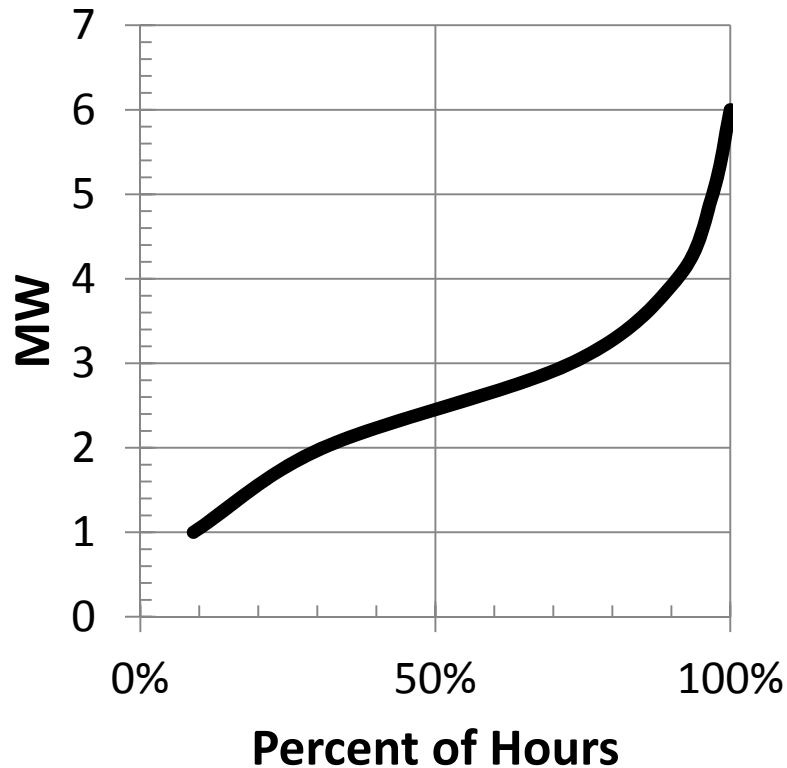


$\$/\text{MW-yr}$ (\log_{10}), capacity cost

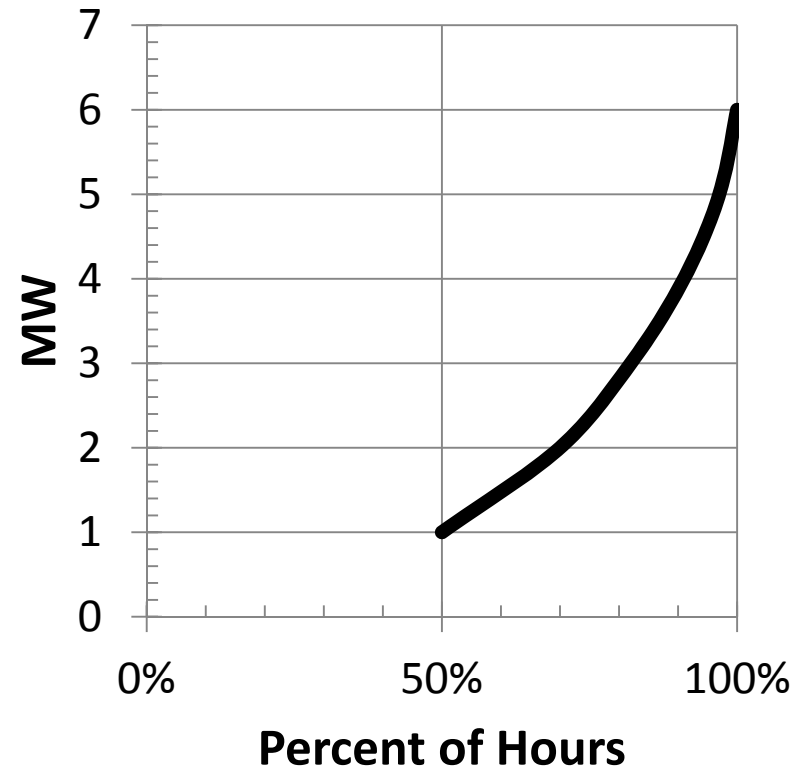


Higher Capacity Utilization = Lower Price, Greater Generation

\$46.08/MWh | 24,638 MWh



\$41.75/MWh | 35,318 MWh



Results of Simple Capacity Cost Model

- Capacity Cost Component
 - Greater capacity utilization
 - Increases electric output by 43.4%
 - Decreases capacity portion of price by 9.4%
 - Peak requirements remain unchanged
 - “Trough” demand is increased
- Many possible derivations and configurations of distributing peak and trough demand

Conclusion

- Excess power or not, increasing capacity utilization of electric generators yields greater output and system-wide price reductions
- Dispatchable demand has a valuable, and long ignored, role in managing electric costs
- Price savings could justify subsidies for dispatched demand
- Possible support for hydrogen generation & benefits of wind-to-transport fuel