Climate Change Policy: Federal Legislation and Regulatory Responses

Commissioner Sherman Elliott

December 10, 2009

Disclaimer/Disclosure

- My comments today are mine alone and do not reflect the positions of the Illinois Commerce Commission on any of the issues discussed today.

- In full disclosure, currently, the Commission is reviewing the IPA's procurement plan as well as other docketed matters dealing with SmartGrid and AMI. In light of ex parte rules I ask that the panel refrain from discussing matters that are addressed in proceedings before the Commission. In the event, there is inadvertent discussion Agency personnel will ensure that any necessary reports of ex parte communications are made a part of record in the appropriate case, if necessary.

Effects of Federal Legislation in PJM

- At CO2 prices of $10, $40, or $60 per short ton, typical residential customers using 750 kilowatt-hours (kWh)/month could see increases in their monthly bills up to approximately $6 ($72 annually), $23 ($276 annually), or $34 ($408 annually) respectively assuming all wholesale cost increases are passed through on a dollar- for-dollar basis.

- Regardless of the higher electricity prices that could result from CO2 prices, the increased market penetration of energy efficiency and some types of demand response can reduce total consumption and customer costs for electricity, and in turn mitigate the wholesale price impacts, and result in additional CO2 emission reductions.

* Source: Potential Effects of Proposed Climate Change Policies on PJM's Energy Market, PJM Whitepaper, 1/2009

Effects of Federal Legislation in PJM

- Reductions in consumption for energy of two percent, five percent, and ten percent in the PJM region can result in mitigating price increases by as much as $4/MWh, $9/MWh, and $17/MWh, respectively depending on the price of natural gas. This corresponds across the PJM region to reductions in total costs for electricity by as much as $3 billion-$4 billion, $6 billion-$11 billion, and $10 billion-$18 billion per year, respectively, depending on the price of natural gas.

- Reductions in consumption for energy of two percent, five percent and ten percent in the PJM region can result in corresponding additional CO2 emissions reductions up to of 14 million, 34 million and 60 million short tons, respectively, in 2013.

- Only at relatively low CO2 prices of $10/ton and a natural gas price of $6.44/ million British Thermal Units (mmBtu) in the study, can the increase in wholesale price and market-wide expenditures be completely offset through reductions in consumption of five percent or greater.

* Source: Potential Effects of Proposed Climate Change Policies on PJM's Energy Market, PJM Whitepaper, 1/2009

What are the Regulatory Challenges?

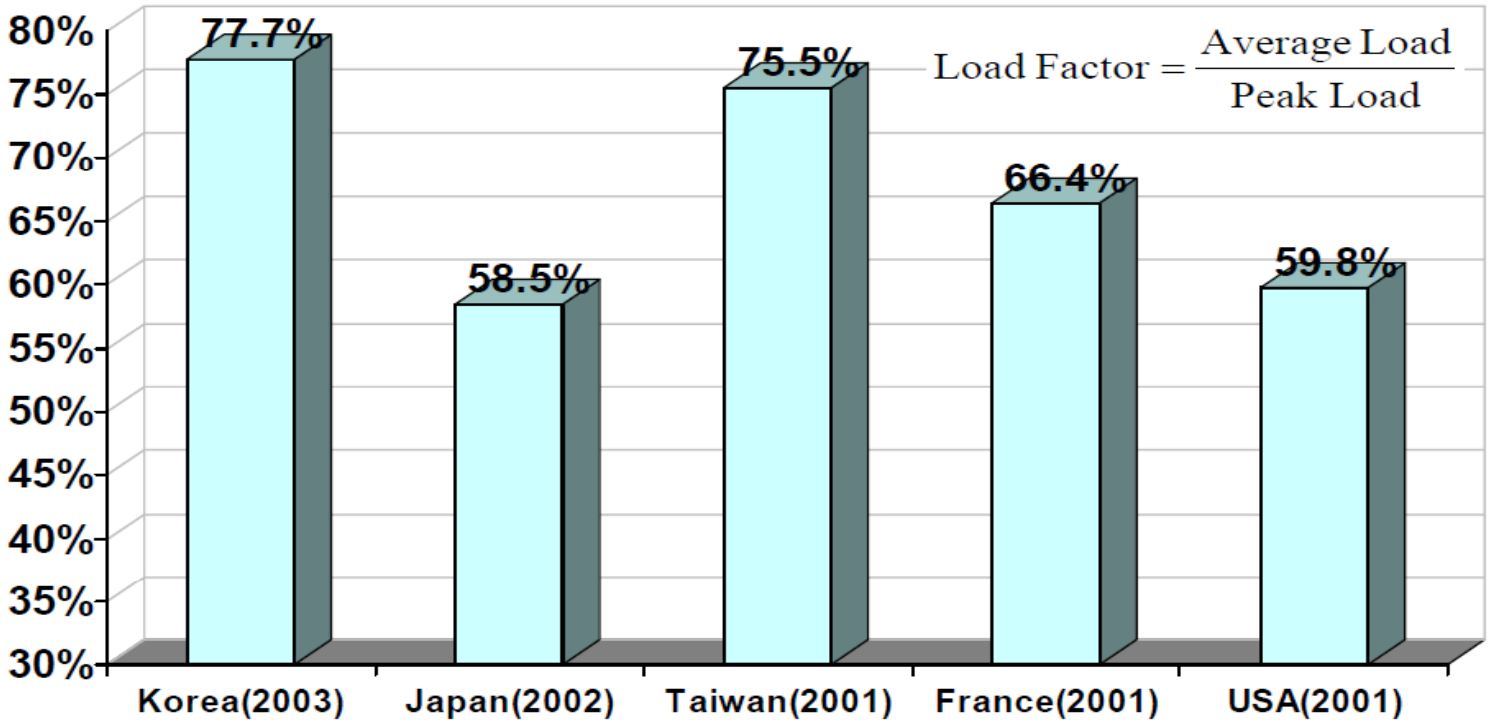
- High (and increasing) cost of electricity
- Price impacts associated with carbon-emitting resources
- Potential for substantial growth in peak demand as PHEVs are introduced to the marketplace
- Demand for increased production of energy from renewable resources and a desire to increase demand response capability.
- Increased investment in a smarter grid.

Should a System Load Factor Approach be Applied?

- Definition: $\frac{Average\ Load}{Peak\ Load}$
- What we know:
  - The U.S. uses electricity inefficiently
  - The U.S. system load factor compares poorly against other developed countries

Load Factor Comparisons

International Comparison of Load Factor



Significant Opportunity to Improve Load Factor in US Power System

Source: KEPCO Annual Report

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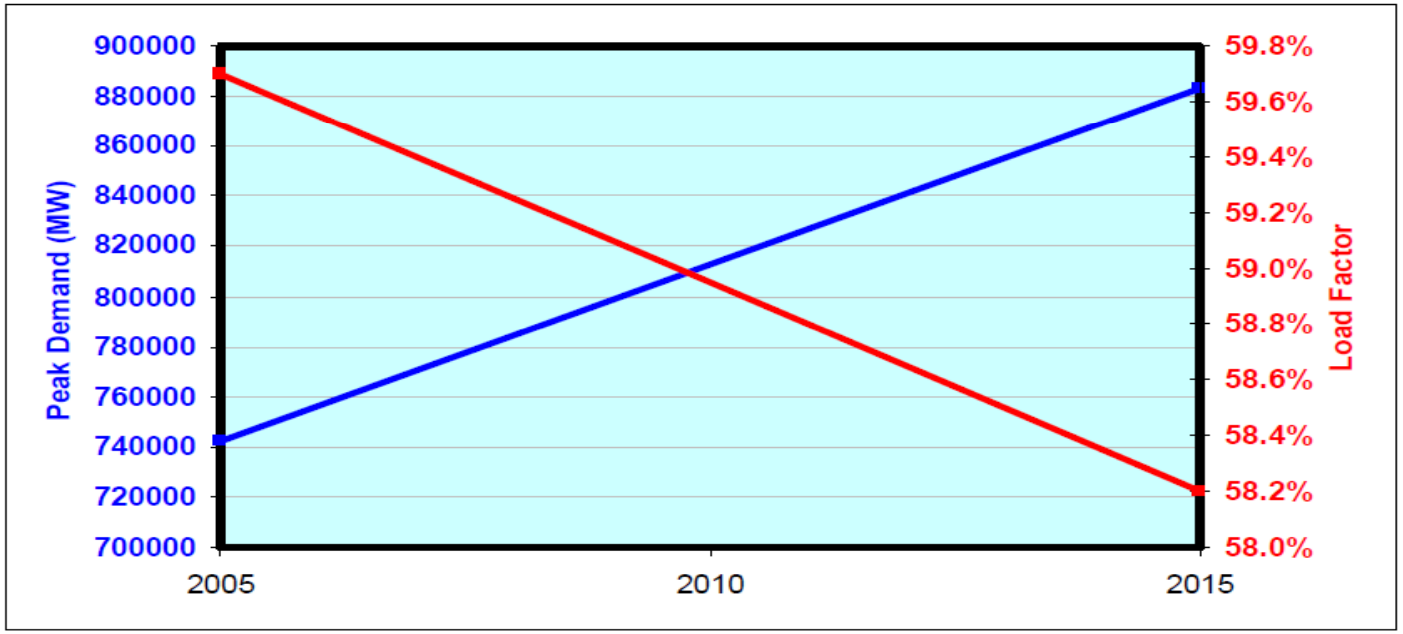
What are the Threshold Questions for Applying a System Load Factor Metric?

- Will a project (either demand or supply side) increase or decrease the system load factor?
  - If it increases the SLF, yes, then we implement the project
  - If not, then we need to figure out how the project can be adjusted to, at the very least, maintain the status quo

NERC Forecast

Growing Demand and Decreasing Load Factor
– Long Term Forecast for US Power System



Peak Demand from 2006 to 2015 is Expected to Grow by 141GW and Load Factor to Decrease from 59.7% to 58.2%; Peak Demand Growth can be Levelized by Improving Load Factor to 69.2% in 10 years

Source: NERC 2006 Long Term Assessment and DOE/EIA AEO 2007

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Value of Improving Load Factor

- Reduction in the need of peaking generation capacity
- Conservative estimate ~$50/kw-year of avoided capacity
- Reduction in power system load losses
- Transmission and distribution capacity release
- Deferments of new or upgraded T&D infrastructure
- Relief of transmission system congestion
- Distribution Value of Improving Load Factor for T&D System is Difficult to Quantify--Ballpark Savings Estimate ~ 10% of Avoided Generation Capacity

Source: EPRI Presentation: **Utility Industry Value Proposition for PHEVs, Tom Reddoch, December 2007**

Potential Grid Impacts from Increasing Wind Energy Production?

- Ramping burdens in wind output power
- Wind's fluctuating output power
- Limited reactive power control of wind power
- Distributed collection of wind power
- Distinctly remote nature of wind power
- Cost of forecast inaccuracy for day-ahead scheduling
- Cost of additional load-following reserves
- Cost of intra-hour load following (energy component)
- Cost of additional regulating reserves (power component)

***Source:** EPRI **Wind Power Integration Technology Assessment and Case Studies, 1004806 ,** Final Report, March 2004

What Are Potential Solutions?

Wind Characteristics and Solution Categories:	Turbine Controls	Fault Tolerance	Reactive Compensation	Forecasting Tools	Energy Storage
Intermittency	N/A	Helps	N/A	Helps	Solves
Ramping burdens	Helps	N/A	N/A	Helps	Solves
Fluctuating output	Helps	Helps	Solves†	N/A	Solves†
Limited reactive power	Solves†	N/A	Solves	N/A	Solves†
Distributed collection	N/A	Helps	Helps	n/a	N/A
Remote locations	Helps	Helps	N/A	N/A	Helps

† Depends on the specific technology.

***Source:** EPRI **Wind Power Integration Technology Assessment and Case Studies, 1004806 ,** Final Report, March 2004

What Are The Potential Solutions?

- Energy storage and power electronic technologies can benefit all areas of the energy value chain: generation, transmission, distribution, and end-use
  - Capacity Utilization
  - Grid stabilization
  - Grid operation support
  - Distribution power quality
  - Load shifting
  - Firming large penetration of intermittent renewable applications

What Negative System Load Factor Effects Might PHEVs Potentially Create?

- The necessity for additional peaking generation capacity, decreasing system load factors
- Higher energy prices
- Reduced reliability

What System Load Factor Effects Might PHEVs Potentially Solve?

- Better utilization of the U.S. electric system
- Fueling of the light duty vehicle fleet through electricity
  - Reduces greenhouse gas
  - Reduces our dependence on foreign oil
- In the U.S. as a whole, 84% of cars, pickup trucks, and sport utility vehicles could be supported by the existing infrastructure
- EPRI reports that 50% of Americans travel less than 26 miles/day
- Behind-the-meter electric load reduction or ancillary electric services
- Synergy of wind production with PHEV/EV charging

* Source: IMPACTS ASSESSMENT OF PLUG-IN HYBRID VEHICLES ON ELECTRIC UTILITIES AND REGIONAL U.S. POWER GRIDS, Authors: Michael Kintner-Meyer, Kevin Schneider, Robert Pratt, Pacific Northwest National Laboratory

The Disconnect Between Wholesale Markets and Retail Prices

- Peak demand is growing and becoming potentially "Toxic"
- In organized markets we are seeing
  - High summer LMPs
  - Increasing number of hours in the year where natural gas is on the margin
- Retail mass market consumers with average fixed rates are unaware of these high summer price signals and pay higher off peak prices than otherwise as a result

The Economics of Inefficiency

- The United States has 3 percent of the world population, and yet, we consume 25 percent of the energy. By contrast, there are 1.6 billion people who don't have access to electricity. Hundreds of millions of people still cook with twigs or dung. The life we enjoy may not be within the reach of the developing world, but it is within sight, and they want what we have.*

* Steven Chu addressing Harvard Graduating Class, June 4, 2009

The Economics of Efficiency

- Consumer Education is critical to create active participants in energy savings:
  - Advanced Metering Infrastructure
  - Dynamic rate designs
  - Other smart grid developments

→LOWER ENERGY BILLS

The Economics of Efficiency

- The transformational benefits of changing consumption patterns (improving system load factor) leads to:
  - The ability to reduce the use of expensive peak-load demand
  - Delaying the need for building new generation facilities
  - Charging PHEV/EVs during low-cost time periods
    - Enables wind or other carbon reduced off-peak energy production
    - Less taxing on the system
- Customers save money!

Assuring Clean, Affordable and Reliable Electricity?

- Educate customers
- Establish an energy efficiency culture (improve the system load factor)
- Incent and reward price-responsive customer behavior
- Make extensive energy efficiency investments
- Invest in technology-enhanced demand response
- Make pricing – from wholesale to retail - fair and transparent
- Assure utility delivery system fixed cost recovery as demand responds to higher prices
- Share the benefits
- Protect the poor, the elderly and the infirm

Questions?