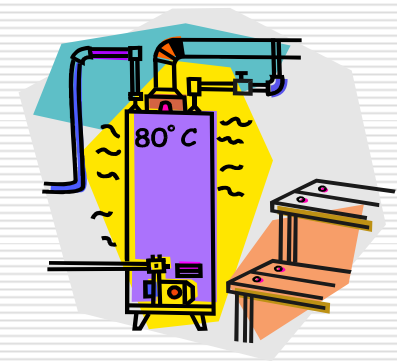
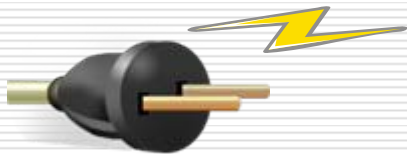


# US energy and environment policies and the electricity market

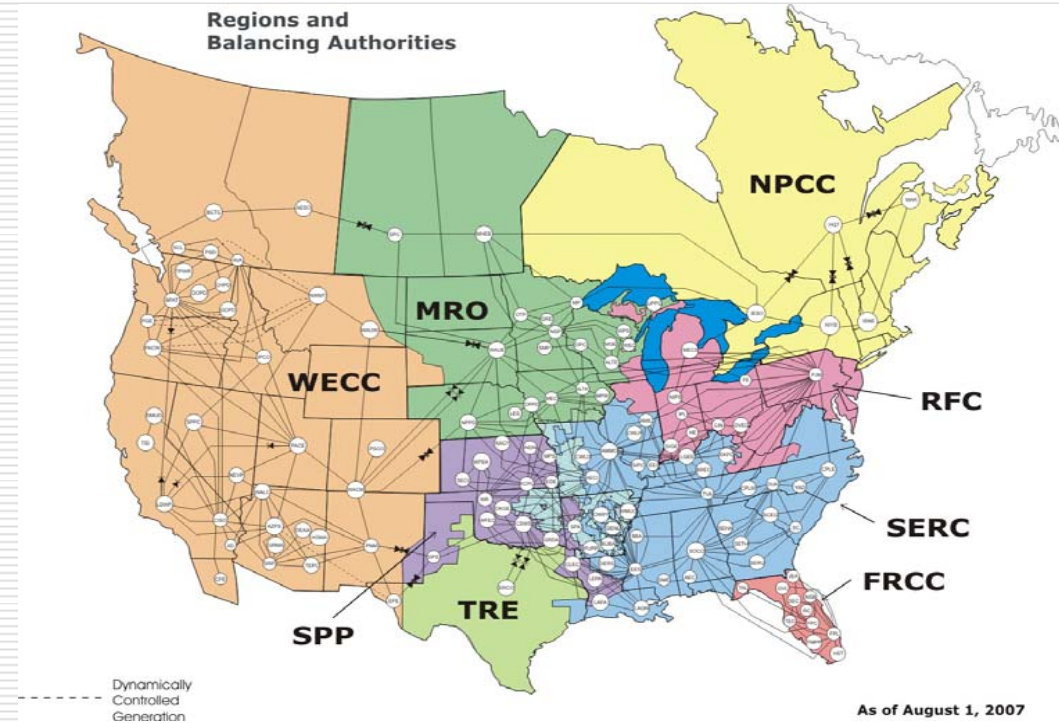
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Jun-ichi Ogasawara, Leader, Electricity Group,  
The Institute of Energy Economics, Japan



## ① Features of Electric Power Industry in US

### NERC Regions and Balancing Authorities



(Source) NERC

There are many types of electric power companies and complex regulations.

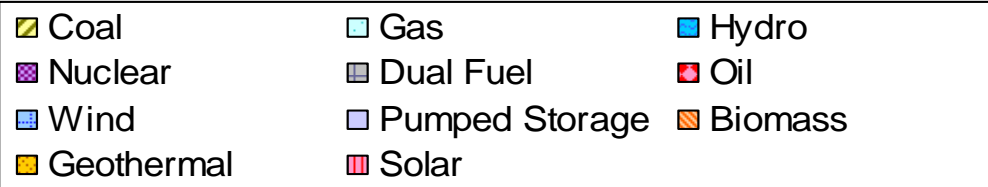
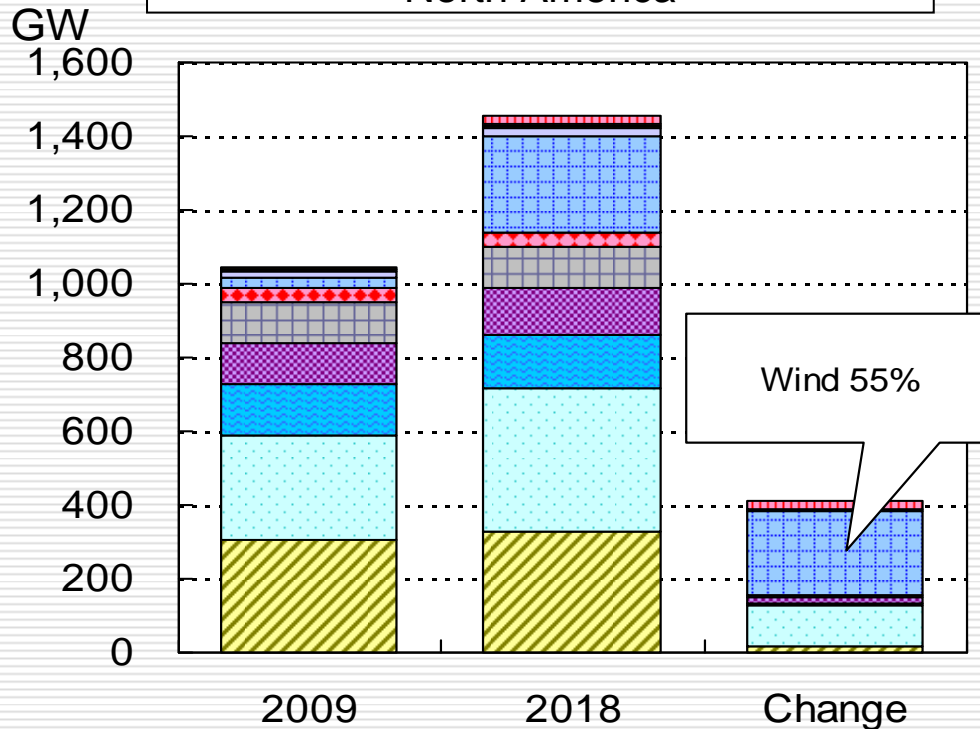
- Regulation Authorities of the electric power industry belongs to state governments. Inter-states transmission facilities and trades, hydro-power station etc are regulated by the federal government.
- There are some types of electric power companies; investor-owned utilities; federal power agencies; rural electric cooperatives; state, municipal and provincial utilities; independent power producers; power marketers. (Electricity Restructuring is jurisdiction of State governments.)
- Retail company: 450, Distribution company; 563, Transmission system operator; 152, Transmission Facilities owner; 311, Generating facilities operator; 48, Generating facilities owner; 812.



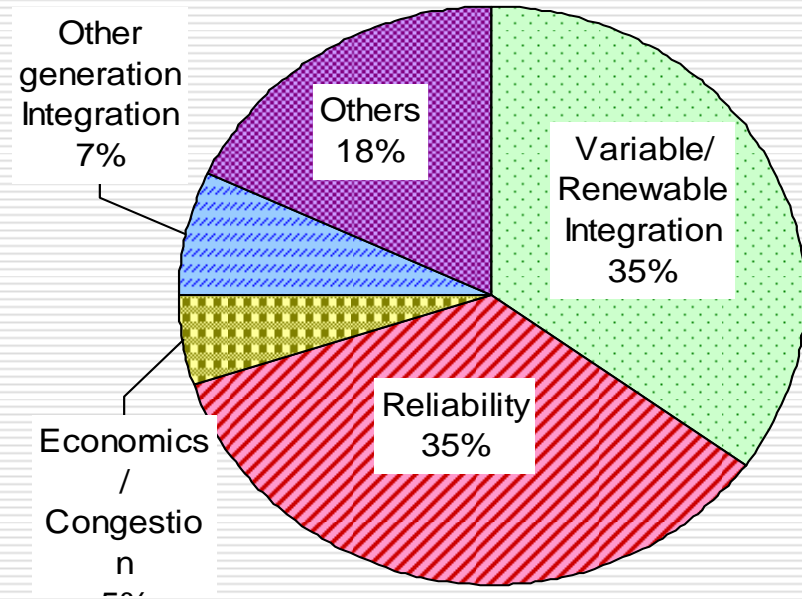
# 1. Electric Power Industry in US

## ③ Projected Generation Investments

Projected Generation Capacities in North America



Relative Transmission Mile Additions >200 kV by Primary Driver



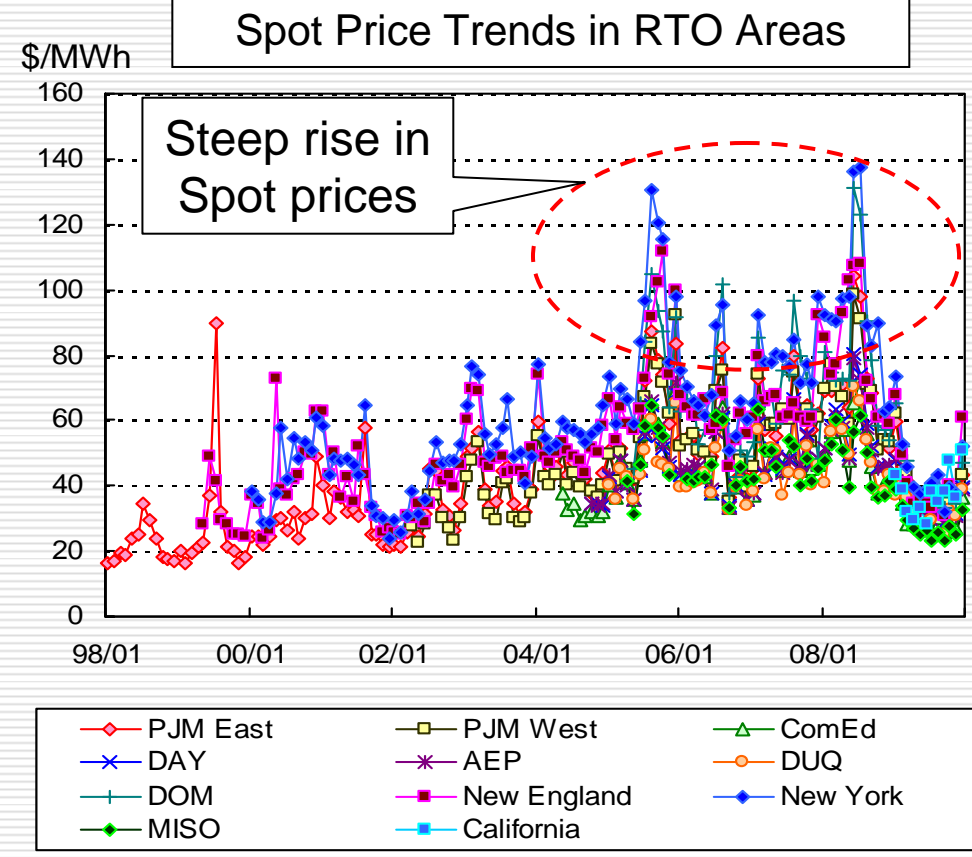
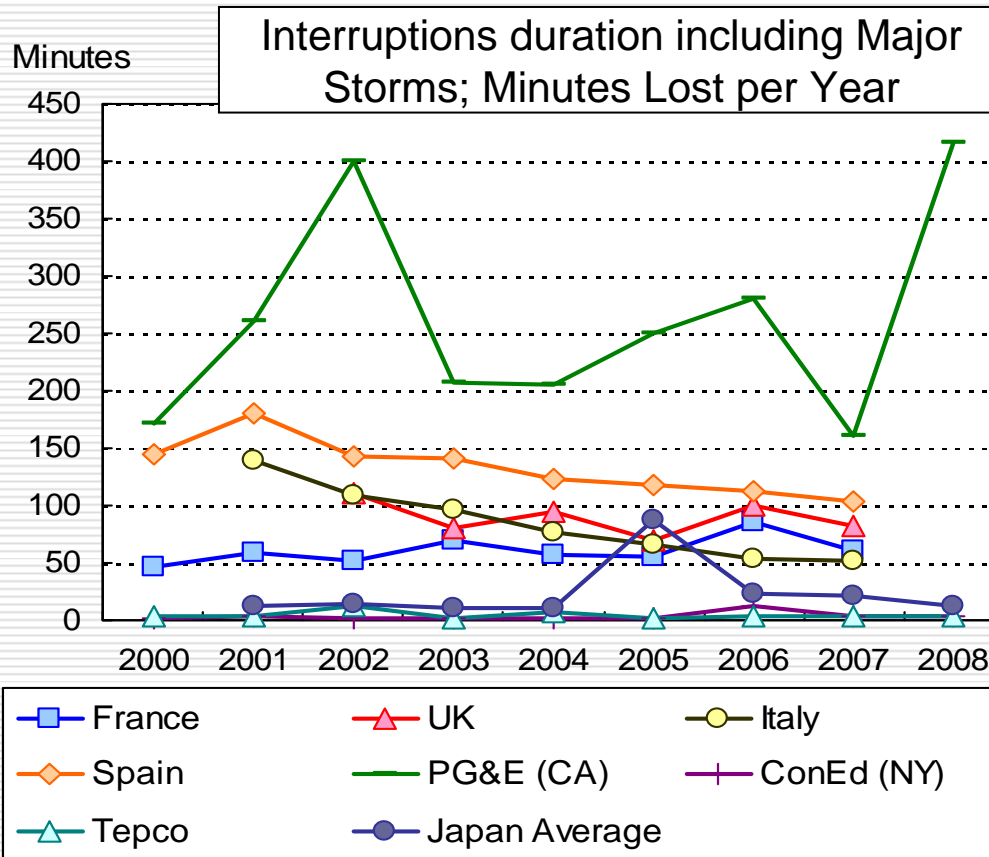
(Source) NERC, "2009 Long-Term Reliability Assessment"

Main projected generation additions will be mainly renewable (wind in particular), therefore US Grid will need transmission system reinforcement.

(Source) NERC, "2009 Long-Term Reliability Assessment"



## ④ Issues of Electric Power Industry in US



(Source) CEER, "4th Benchmarking Report on Quality of Electricity Supply 2008", New York Public Service Commission, "ELECTRIC RELIABILITY PERFORMANCE REPORT", California Public Utilities Commissions "Reliability Annual Reports"

(Source) RTO Web sites

Main issues in US Electric Power Industry; ① Increase of Capacities of Renewable Energy Generation, ② Qualities of Supply, ③ Control of Wholesale prices

### ① Summary

Smart Grid Targets in US; Create More reliable, more flexible, more cost-effective grid.  
 Activities of Smart Grid begun in 2007 (EPA of 2007) and became more active after having shifted to Obama Administration.

**Energy Policy Act of 2005**

Smart Meter, Demand response program

**Energy Independence and Security Act of 2007**

R&D, Demonstration Program, Inter-operability Standards, Smart Grid Investment Grant, etc

**Emergency Economic Stabilization Act of 2008**

Change the depreciation period for smart grid investments (20years→10years)

**American Recovery and Reinvestment Act of 2009**

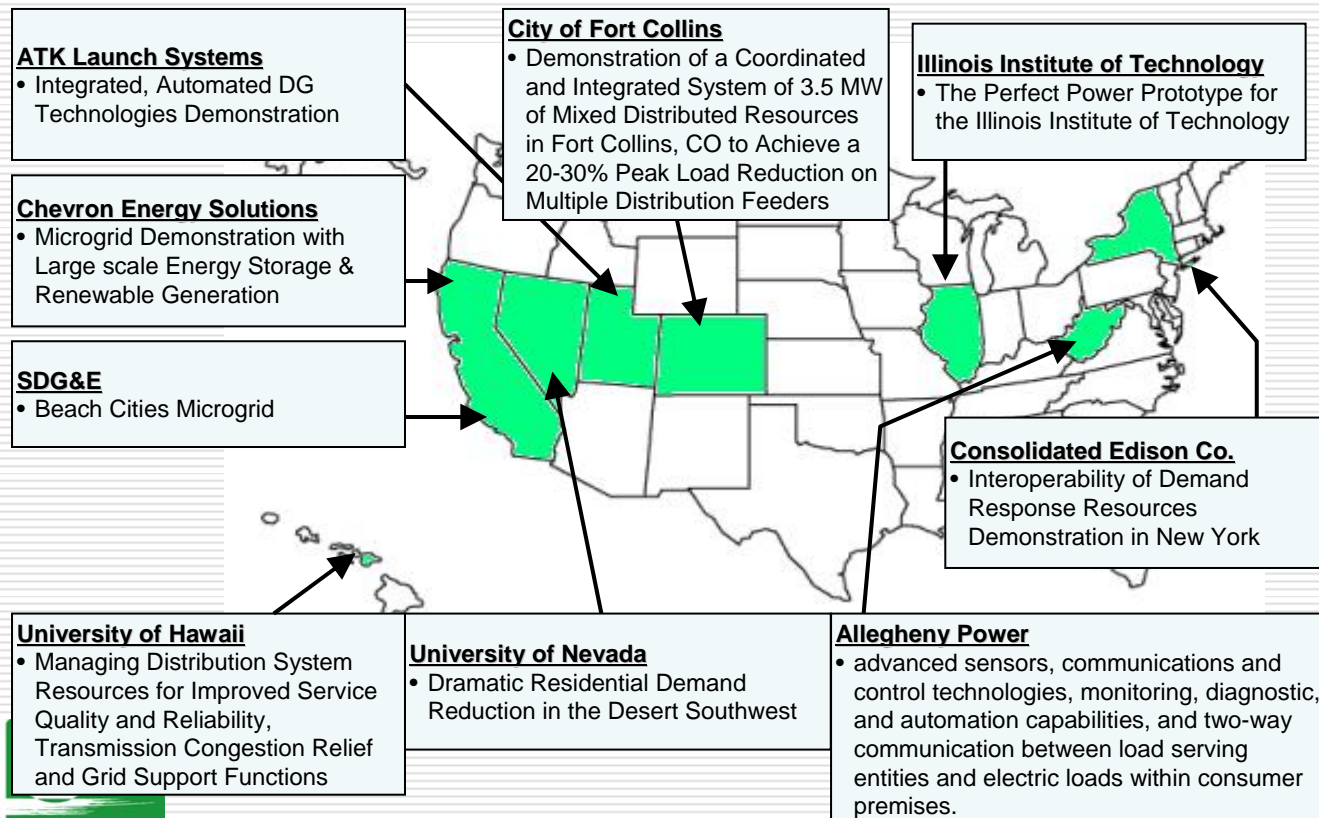
Smart Grid Investment Grant (20%→50%)

	対象	内容
Smart Grid Investment Grant	Electric Utilities and others	Funding a broad range of technologies to spur the nation's transition to a smarter, stronger, more efficient and reliable electric system 【Max 50%; 33億7,500万ドル】
Smart Grid Demonstration Projects	Electric Utilities and others	Demonstration Projects of advanced technologies related to Grid operations 【615 Million dollars】
Interconnection-level Transmissions Analysis & Planning	NSIT and NERC	Promote collaborative long-term analysis and planning for the Eastern, Western and Texas electricity interconnections.【60 Million dollars】
State Electricity Regulators Assistance	State governments	State governments hire or retrain staff and expand state-level capacities to address challenges to the country's energy systems. 【46 Million dollars】
State Government Energy Assurance	State governments	Develop or expand local energy assurance plans that will improve electricity reliability and energy security 【40 Million dollars】

### ② Renewable Energy and Smart Grid

DOE began “Renewable and Distributed Systems Integration Program”, which include EV, Demand Response Program and others’ advanced technologies.

#### Renewable and Distributed Systems Integration Program from 2007

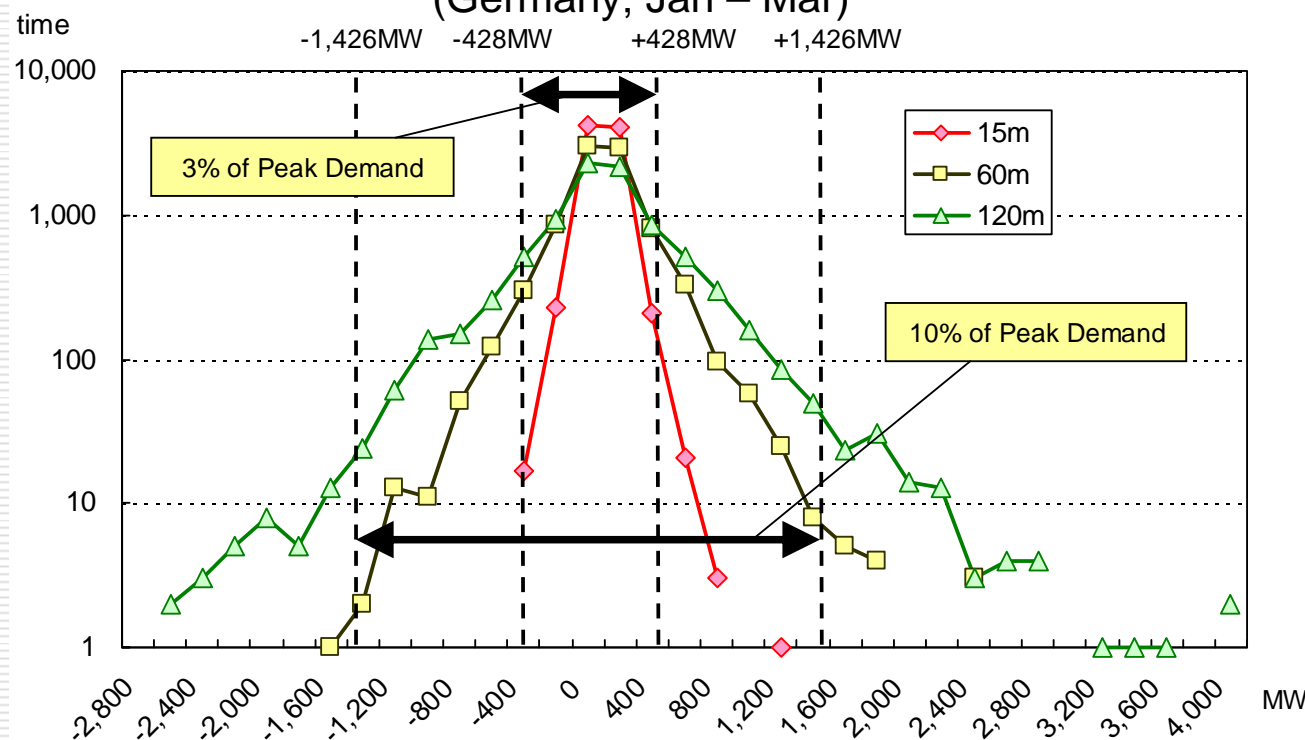


- ❑ Increased use of renewable energy and other clean distributed generation
- ❑ Increase asset use through integration of distributed systems and customer loads to reduce peak load and thus price volatility
- ❑ Enhance reliability, security, and resiliency from microgrid applications
- ❑ Improve system efficiency with on-site, distributed generation and improved economic efficiency through demand-side management
- ❑ Enabling plug-in electric vehicle (PHEV) operations with the grid

### ③ Reliability and Wind generation output

Max wind power output reached to 9,600MW in 2010 Jan – Mar, but Peak Demand in 50 Hertz Transmission (Germany) was 14,260MW in same period. I guess, it was tangible sign of the reliability issue. It seems to be insufficient for reserves for normal conditions in extreme wind condition. One of important issues is the wind resource penetration level.

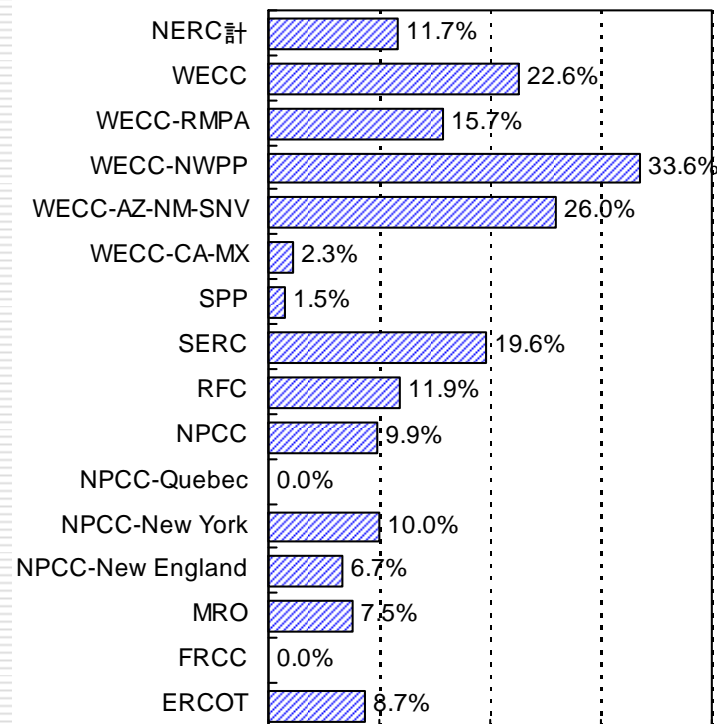
Wind Power Volatilities in 50Hertz Transmission Area  
(Germany; Jan – Mar)



(note) 15m: output change (MW) at 15 min intervals, 60m: output change (MW) at 1 hour intervals, 120m: output change (MW) at 2 hours intervals

(Source) 50 Hertz Transmission Web site, "Grid Data" etc. (<http://www.50hertz-transmission.net/>)

Summer 2010 Wind Resource Penetration Levels (Expected On-Peak capacity / Nameplate Capacity)

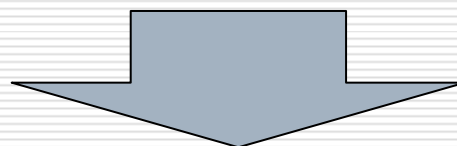


(Source) NERC, "Summer Reliability Assessment"



# Conclusion

- Electric power industry in US is characterized by many companies and complex structures. In additions, some areas have problems of quality of supply.
- Main projected generation additions will be mainly renewable (wind in particular).



- Need to Modernize US electricity grid ; “Smart Grid”
- But there are some problems; Reliability problems in the situation of increasing renewable energy generations, etc. (ex; 50 Hertz Transmission situations in Germany)