

Standardizing Smart: ICTs and the Environmental Promise of Smart Grid

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20 June 2013 ICT for Environmental Regulation: Developing a Research Agenda

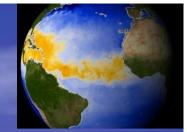


Smart Grid – what is it?

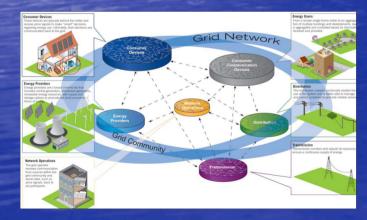
A digitally enabled electrical grid that gathers, distributes, and acts on information about/from all participants to improve efficiency, reliability, economics, sustainability of electricity

services.





A smart grid can



- 1. Run efficiently
- 2. Heal itself
- 3. Motivate participation
- 4. Resist attack
- 5. Save money
- 6. Accommodate more generation & storage options
- 7. Enable more penetration of intermittent sources



EcoGrid EU

- Realization of EU 20-20-20 goals
- Demonstrate power system w > 50 % renewable sources
- Implement ICT systems and innovative market solutions
- Offer TSOs more efficient balancing
- services
- Enhance small consumer and local producers to participate in power market
- Make prototype solution for Europe -"fast track" market-based SGs



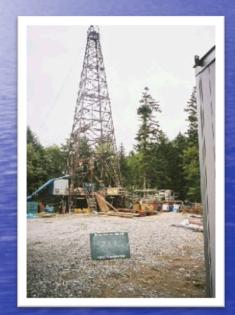
ICT platform

Based on modern information technology

- Commercial meters
- End-user devices/appliances
- Use solutions demonstrated in other R&D projects

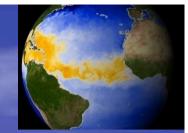


Other Motives for Smart Grid



- Reduce cost
- Increased access
- Improved efficiency
- Reduce electricity theft
- Enhance energy security





ICT Challenges for Smart Grid

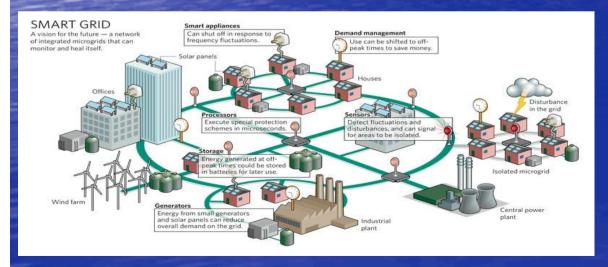
- Cybersecurity & privacy
- Multi-level governance
- Appropriate architectures
- Large scale demonstrations
 - Mix of small/large units and capabilities

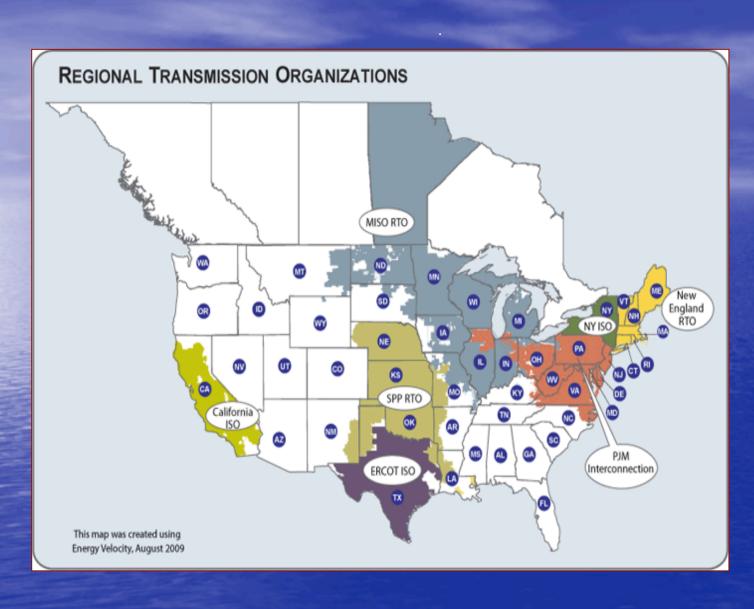


Standards for multilevel governance & cross sector integration



International, national, state, municipality
ICT versus utility business models





U.S. RTO Map



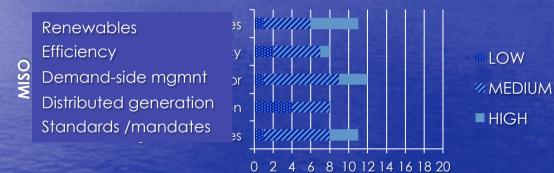
State	Pop (mill)	Electricity Market Status	
Texas	25.2	Restructured	
Illinois	12.8	Restructured	
Minnesota	5.3	Traditionally Regulated	
Massachusetts	6.5	Restructured	
Vermont	0.6	Traditionally Regulated	

Population & Market Status

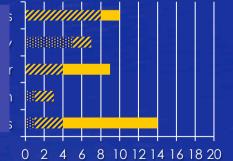
State	Total Generation (TWh)	Per Capita CO ₂ Emissions	Percent Electricity from	Average Electricity Price		
	()	(metric Tons)	Renewables	(¢/Kwh)		
Texas	411.7	25.98	7.04	9.3		
Illinois	201.4	17.98	2.61	9.1		
Minn	53.7	17.57	13.94	8.4		
Mass	42.8	11.18	5.30	14.3		
Vermont	6.6	9.64	27.63	13.2		
US average	82.0	23	12.52	11.9		
Energy Profile						



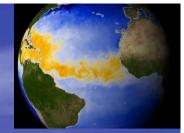
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Renewables Efficiency Demand-side mgmnt Distributed generation Standards /mandates



IOW
MEDIUM
HIGH



What standards can do

Harness environmental benefits of ICTs for Smart Grid
RPSs have been the greatest driving factors of renewable energy in the U.S.



What standards can do

Facilitate technology compatibility
Address cybersecurity concerns
Enable rapid but careful change



New standards for integrating ICTs may optimize opportunities to develop and implement a Smart Grid that leads to improved environmental quality.



