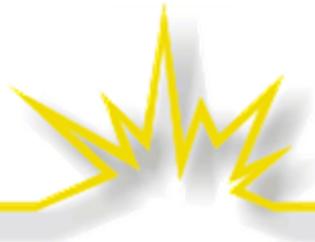


Smart Policies Before Smart Grids: *How State Regulators Can Steer Smart Grid Investments Toward Customer-Side Solutions*

Lisa Schwartz

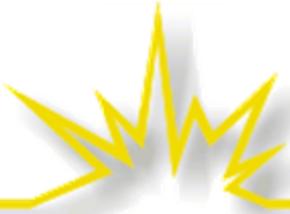
2010 ACEEE Summer Study on Energy Efficiency in Buildings

August 17, 2010



The Regulatory Assistance Project

China ♦ EU ♦ India ♦ United States



About the Regulatory Assistance Project

- RAP is a nonprofit organization providing technical and policy assistance to government officials on energy and environmental issues.
- RAP provides educational assistance to other stakeholders, including consumer and environmental groups, utilities and business associations.
- RAP principals and senior associates all have extensive regulatory experience.
- We are funded by foundations and federal agencies.
- We have worked in nearly every state and many nations throughout the world.



What Is Smart Grid?

- An interconnected system of information and communication technologies that works with other technologies throughout the electricity system that can do good things:
 - Help consumers manage their energy use
 - Increase system reliability through automation
 - Improve integration of clean energy resources
- Distinguishing features of smart grid from standard practice: (1) engaging the customer and (2) integrating supply and demand
 - *Energy efficiency practitioners have a head start*



Example Technologies and Applications

Technologies

- Advanced metering infrastructure
- Smart appliances
- Distribution automation systems
- Networked synchrophasors for transmission system

What They Can Do

- Dynamic pricing and smart charging of EVs
- Auto demand response
- Monitor/control grid in real time with loads
- Better integrate variable renewable energy resources

Congress' Vision for Smart Grid



- Improved grid reliability, security and efficiency
- Timely information for consumers and new opportunities for saving energy and money
- Massive increases in demand response, energy efficiency, energy storage, distributed generation and large-scale renewable resources
- Electrification of the transportation sector



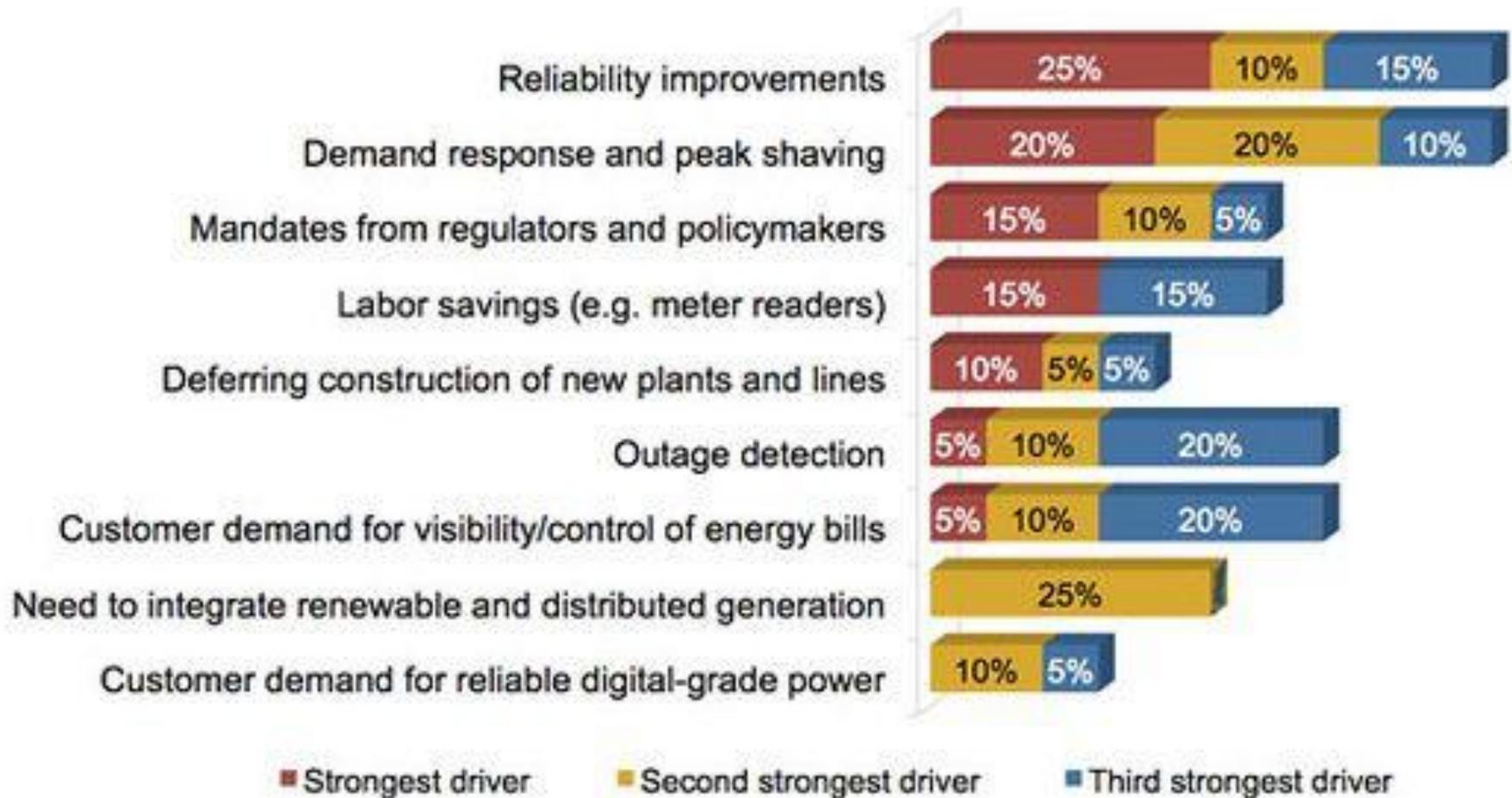
New Federal Funding for Pilots and Deployments

Funding (millions \$)

- Smart Grid Investment Grants - \$3,400
- Smart Grid Regional Demonstrations - \$615
- Standards/Interoperability Framework - \$10
- Some funding for state regulators (\$50) and state planning (\$55) is for SG

Smart Grid Systems and Equipment	Number of Units
Networked Phasor Measurement Units	877
Smart Transformers	205,983
Automated Substations	671
Load Control Devices	176,814
Smart Thermostats	170,218
Smart Meters	18,179,912
In-Home Display Units	1,183,265
Charging Stations	100

Why Do Utilities Want Smart Grid?



Increasing rate base wasn't included in survey but is certainly a driver

Clean Energy and Consumer Benefits Are Not Automatic

- Smart grid can engage many, quickly, but it's only an *enabler*.
- Smart grid will not increase energy efficiency, renewable energy or emissions reductions without smart policies.
- Without the right policies, smart grid may divert attention and funds from clean energy investments that can be made today.
 - Ask which *specific* technologies, programs, policies and rules must be in place to get asserted benefits.



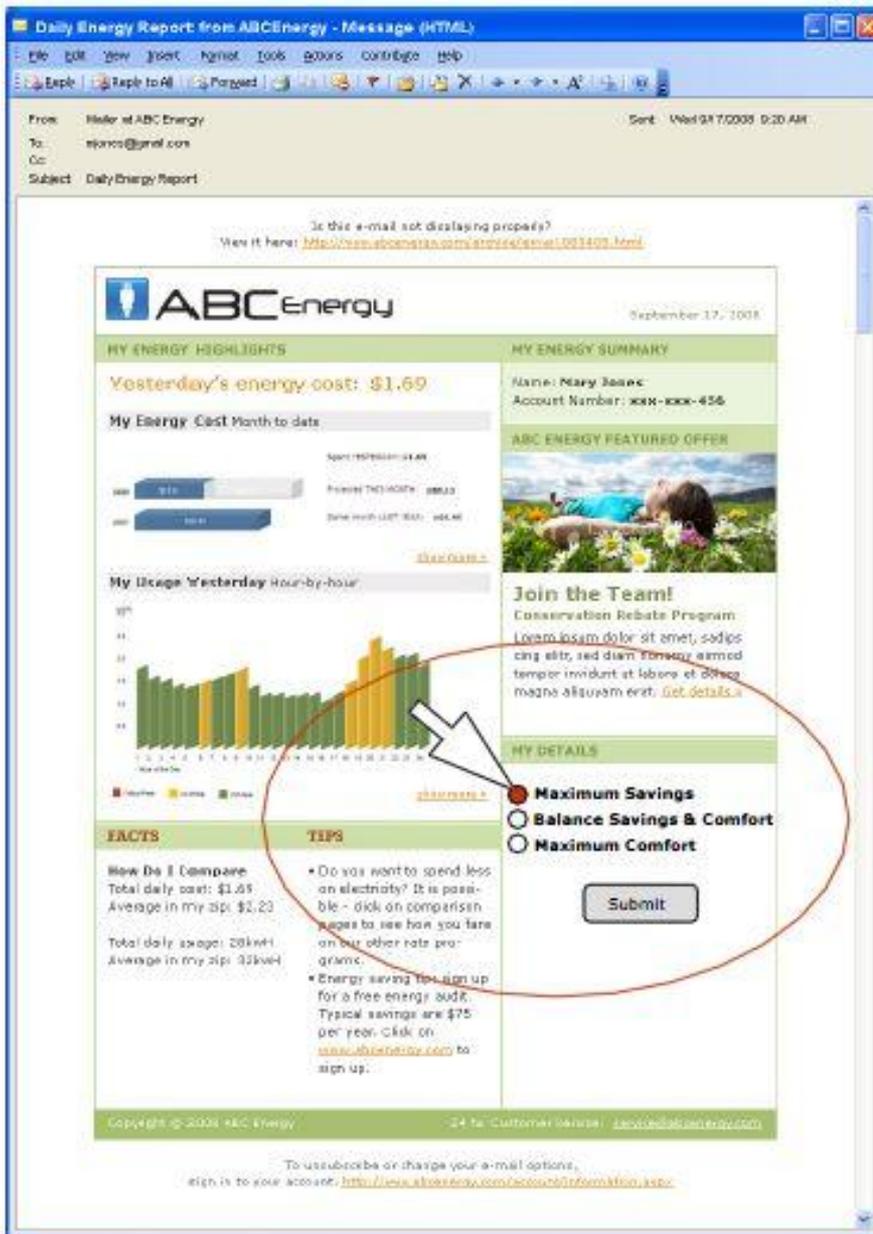


**WHAT DOES SMART GRID
HAVE TO DO WITH CLEAN
CUSTOMER-SIDE SOLUTIONS?
(HIGH-LEVEL VIEW)**

Energy Efficiency and Smart Grid

- Optimize voltage and reactive power on distribution systems
 - Reduced line losses and energy use in homes and businesses
- Continuous building diagnostics
 - Alert owners about problems with energy-consuming equipment



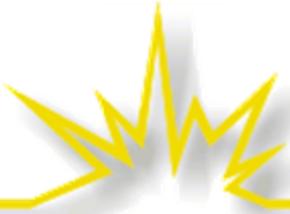


➤ Information-driven behavior changes

- Data from smart meters and smart thermostats
- Customized analysis, comparisons, and recommendations to consumers via Web, in-premise devices, phone, e-mail, snail-mail, etc.

➤ Better evaluation

- Customized baselines
- Remote analysis means more money can be spent on efficiency measures



Demand Response and Smart Grid

Traditional DR

- Primarily utility control
- Focuses on a few end uses
- Limited customer options
- Participation incentives required
- Primary focus on retail markets

Smart Grid DR

- Customer control
- All end uses
- Unlimited options
- Advanced meters enable dynamic pricing for all
- Wholesale and retail markets linked

Source: Levy, Goldman and Sedano

- **Demand response programs may result in some energy savings.**
- **Decrease *and* increase loads to follow variable energy resources**

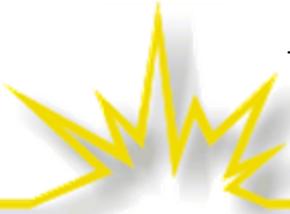
Distributed Resources and Smart Grid

- Dynamically integrate distributed generation and energy storage with other resources – and loads
 - Minimize losses, provide voltage support and improve reliability
- Microgrids – Interconnected network of loads, generation, and energy storage that works connected to or separate from grid
- Plug-in electric vehicles
 - Charge off-peak
 - Provide energy storage and ancillary services





JUST A FEW OF THE SMART POLICIES NEEDED



Examples: Smart Policies to Match Smart Capabilities

Smart Capabilities	Policies Needed to Capture Benefits
Enables interconnected distributed generators to safely operate during utility outages	Support investments in clean distributed resources, simplify and standardize interconnection requirements and procedures, provide net metering, enable excess power sales
Continuous building diagnostics	Invest in efficiency programs for buildings and major energy-consuming equipment
Optimize distribution voltage & reactive power	Remove barriers to utility investments in distribution efficiency and end-use conservation
Increase demand response	Provide supportive rates/incentives, timely usage data and advice for consumers, automated controls through marketplace



How Will States Develop the Necessary Policies?

- Leadership
- Pay attention to what other states are trying and benefit from lessons learned
- Public support – *engage consumers*
- Cooperation among stakeholders
- State regulatory utility commissions have a big role.
 - They decide how utility investments are recouped in customer rates, consistent with the public interest.
 - They can establish rules and guidance for smart grid plans and ratepayer-funded clean energy programs.

Consider Environmental Goals in Energy Regulation

- Smart grid vision of a far smaller environmental footprint requires broadening the energy regulator's mandate to consider environmental goals
 - Are power sector regulations working at cross purposes with carbon reduction and other environmental goals?
 - What are the environmental benefits of smart grid investments compared to other energy investments?



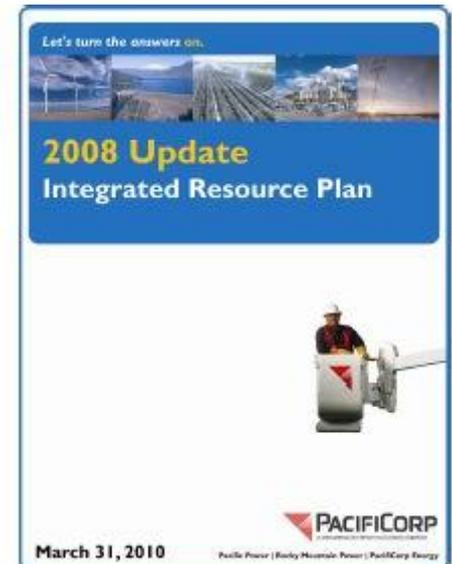


Acquire All Cost-Effective Energy Efficiency

- State investment in energy efficiency below what is easily achievable and cost-effective is at odds with the rationale behind many smart grid investments.
- By and large, energy efficiency is the cheapest resource.
- Ample supplies at cost-effective levels
- Policy options
 - Energy efficiency resource standards with strong targets for cumulative savings (with teeth)
 - Require acquisition of all cost-effective energy efficiency
- Need targeted programs to address market barriers as well as sufficient funding

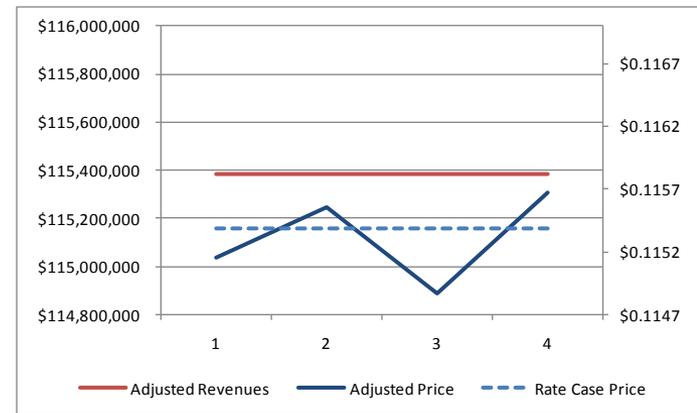
Improve Integrated Resource Planning

- Objective: Resource mix w/best combination of cost, risk and environmental impact
 - Among unknowns for future: loads, fuel prices, technology options and costs, environmental regs
 - Scenarios and sensitivities are crucial
- Long-term view and near-term action plan
- Treatment of energy efficiency is key
- Demand response and distributed generation often get short shrift
- Need strong public involvement, state regulatory oversight
 - Acknowledgment or approval that means something – in a rate case
- Apply same objective and analytical methods when utility acquires resources



Align Utility Incentives

- Energy efficiency and distributed generation reduce sales.
 - Utility has less revenue to cover fixed costs
- Decoupling is a ratemaking mechanism that breaks the link between energy sales (kilowatt-hours) and profits.
 - Prices are periodically adjusted up or down based on actual sales to keep utility revenue at the approved level.
 - Only removes *disincentive*
- Performance-based incentives for shareholders can help ramp up energy efficiency programs
 - 3rd party administration of programs is another option



Ensure Consumer Access to Energy Information

- Specify consumers' access to their energy usage data
 - Near real time vs. day after
 - Historical usage
 - Also retail and wholesale prices

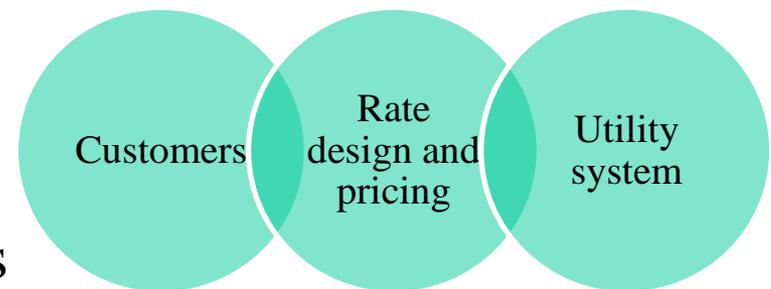


- Spell out rights and consumer protections for sharing data with third parties that can offer customized products and services
- Address data security and privacy issues



Integrate Smart Grid With Rate Design and Demand-Side Programs

- Smart grid allows customers to become more involved in how and when they use energy.
 - They won't respond just because they get shiny new meters.
- Let customers choose a dynamic pricing option that varies according to market prices and system conditions.
 - Rates that reduce utility costs, encourage *long-term* reductions in peak loads and support distributed resources
- Make it easy for customers
 - Controls that respond automatically to prices
- Right-time charging and discharging of electric vehicles



Consider Customer Resources in Distribution System Plans

- “Geo-target” energy efficiency, demand response, and distributed resources to reduce peak loads and defer distribution system upgrades
 - Guidelines for considering cost-effective alternatives
 - Incentives for investments in customer-side resources that can, together, defer costly upgrades





Lisa Schwartz
Senior Associate
541-990-9526

lschwartz@raponline.org

RAP is committed to fostering regulatory policies for the electric industry that encourage economic efficiency, protect environmental quality, assure system reliability and allocate system benefits fairly to all customers.