



# Regulatory Hurdles to Achieving a Smart Grid

**Kirk D. Rasmussen**  
**April 16, 2010**

# A Few Disclaimers

- These are my views, not necessarily those of my firm – Winstead PC.
- These are my views, not necessarily those of my clients. If there is a difference, I definitely agree with my clients, not with what I say today.

# A Dawn of a New Age

- GE “pays” approx. \$6M to run two commercials during Super Bowl XLIII regarding the smart grid and wind energy
- My mother is confused as to what GE wants her to buy



# Smart Grid - Defined

- One definition of the “smart” grid:
  - *“It is the policy of the United States to support the **modernization** of the Nation's electricity transmission and distribution system to maintain a **reliable and secure electricity infrastructure** that can meet **future demand growth** and to achieve each of the following, which together characterize a Smart Grid.”*
  - *Energy Independence and Security Act of 2007*

# Components of a Smart Grid

- Increased use of **digital information and controls** technology to improve reliability, security, and efficiency of the electric grid.
- **Dynamic optimization of grid operations and resources**, with full cyber-security.
- Deployment and integration of **distributed resources and generation**, including renewable resources.
- Development and incorporation of **demand response**, demand-side resources, and **energy-efficiency** resources.
- Deployment of “**smart**” **technologies** (real-time, automated, interactive technologies that optimize the physical operation of appliances and consumer devices) for metering, communications concerning grid operations and status, and distribution automation.

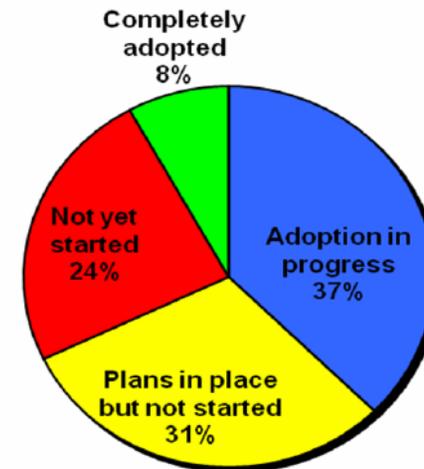
# Components of a Smart Grid, Cont.

- Integration of “**smart**” **appliances** and consumer devices.
- Deployment and integration of advanced **electricity storage** and peak-shaving technologies, including plug-in electric and hybrid electric vehicles, and thermal-storage air conditioning.
- Provision to consumers of **timely information and control** options.
- Development of **standards** for communication and interoperability of appliances and equipment connected to the electric grid, including the infrastructure serving the grid.
- Identification and **lowering of unreasonable or unnecessary barriers** to adoption of smart grid technologies, practices, and services.

# Where Are We Today?

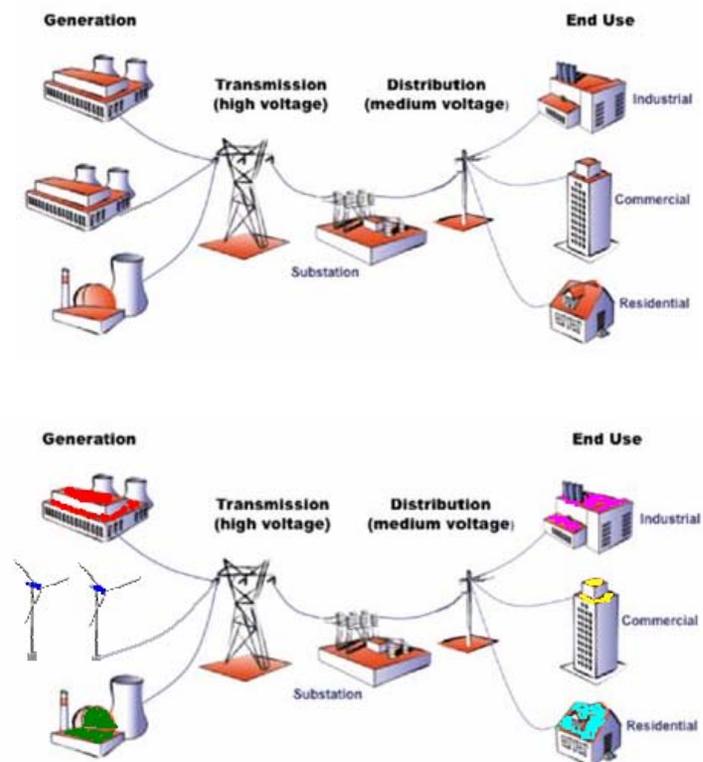
- According to the recent Microsoft *Worldwide Utilities Industry Survey 2010* - Only 8 percent of utilities around the world have completed their smart grid technology implementations while 37 percent have projects underway and more than half haven't yet started.

**Microsoft**  
Microsoft Utilities Industry Group



# Brief Utility Regulation Primer

- Two models (with degrees of variation)
  - Fully regulated vertically integrated utilities
    - Utility self generates or acquires power, transports that power on its transmission (high voltage) and distribution (lower voltage) wires, and sells the power to captive end-use customers
  - Unbundled, competitive market
    - Independent generators sell wholesale power; regulated transmission and distribution utilities transmit power to end use customers; retail electric providers purchase wholesale power and sell retail power to end-use customers



# Utility Regulation Primer, Cont.



- The (primary) types of stakeholders that might be present in U.S. electric markets
  - Regulated utilities (vertically integrated and stand-alone transmission and distribution wires companies) – *earn a regulated rate of return*
  - Merchant generators – *sell in a competitive wholesale market*
  - Retail electric providers – *sell in a competitive retail market*
  - Consumers – *either captive or customer choice*
  - Regulators – *establish or implement the regulatory paradigm*

# The Takeaway Message

- **Success within a regulated utility market depends on more than just designing a better mousetrap and obtaining funding**
- **Interested parties must define an appropriate value proposition that works within the established regulatory framework or seek a modification of the regulatory framework that will allow for the stated value proposition**



# Examples of Regulatory Hurdles to Achieving a Smarter Grid

- **Who is the Regulator?**
- **Risk of Innovation**
- **The Lightning Quick Speed of Regulation**
- **What is it?**
- **Who Keeps the Data?**
- **Who Gets to Pay for It?**

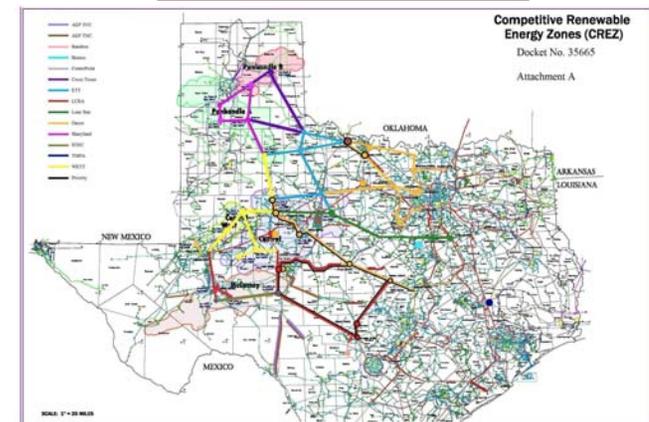
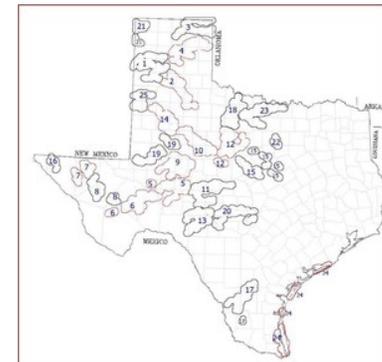
# Who is the Regulator?

- Electric Regulation
  - Federal Energy Regulatory Commission
  - State public utility commission
  - Municipal utility
  - Electric Cooperative
  - Lots of Others
    - FCC, EPA, state environmental agencies, state land offices, etc., etc., etc.

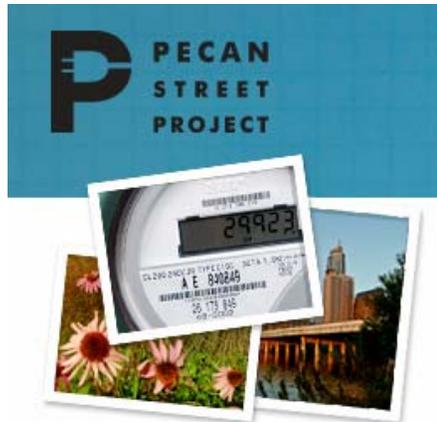
# Who is the Regulator?

## ■ Case Study

- Texas Competitive Renewable Energy Resource Zones (“CREZ”) in Texas
  - In ERCOT - one primary regulator (PUCT) with a settled cost recovery methodology allowed for rapid development of transmission resources
  - Disputed rejection of municipal utilities over jurisdictional issues
  - Question regarding FERC involvement in Texas panhandle facilities



# Who is the Regulator?



- Case Study
  - Austin Energy
    - Single, vertically integrated municipal utility
    - Governed by city council
    - Big enough to capture full benefits, but small enough to manage
    - Able to implement smart grid 1.0 (grid infrastructure) without controversy
    - Decision-making on avoided generation resources
    - Benefit of full implementation pilot project (Pecan Street Project)

# Risk of Innovation

Monday, April 27, 2009 As of 6:50 PM EDT  
THE WALL STREET JOURNAL. BUSINESS

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APRIL 27, 2009, 6:50 P.M. ET

## Smart Meter, Dumb Idea?

*New devices promise to cut energy use by giving consumers more control, but they aren't worth the cost.*

Article | Interactive Graphics | Comments (18)

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By REBECCA SMITH

Not everyone thinks smart meters are such a smart use of money.

Utilities are spending billions of dollars outfitting homes and businesses with smart meters that wirelessly send information about electricity use to utility billing departments. Some consumers control energy use.

- Utilities must demonstrate prudence and reasonableness of investment for earning a return and recovering expenses
  - *“In establishing an electric utility's rates, the regulatory authority shall establish the utility's overall revenues at an amount that will permit the utility a reasonable opportunity to earn a reasonable return on the utility's invested capital **used** and **useful** in providing service to the public in excess of the utility's **reasonable** and **necessary** operating expenses.”*
  - Texas Public Utility Regulatory Act § 36.051

# Risk of Innovation

- Historical utility regulation rewards safe capital investment, not innovation
  - Incentive to build what worked last time
  - No reward for innovation
  - Punishment of mistakes and failure
    - Example – Utility would not purchase from entity less than 30 years old



The screenshot shows a news article from KTVU.com. The header includes the station logo, weather for San Jose (44°), San Francisco (46°), and Oakland (44°), and the date Wednesday, March 10, 2010 at 10:08am. The article title is "Are PG&E's SmartMeters Getting A Failing Grade?". It includes a video player showing a smart meter and text discussing regulatory concerns and customer complaints.

**Are PG&E's SmartMeters Getting A Failing Grade?**

Posted: 7:23 am PST March 9,2010  
Updated: 7:29 am PST March 9,2010

**SAN FRANCISCO** -- Pacific Gas and Electric's new SmartMeters have raised the ire of many customers and now they have captured the attention of state regulators.

The California Public Utilities Commission announced on Monday that it would test the accuracy of the meters after receiving several complaints from PG&E's customers.

The digital SmartMeters send information about a household's gas and electric use to the company through wireless signals.

But since the first smart meters went online in other parts of the state over a year ago, many customers have complained the devices aren't smart at all and in fact -- in some cases -- may be costing them dearly.

Leo and June Margosian are self-described frugal "light-switcher-offers" living in a Fresno townhouse where they don't turn on the air conditioning unless it gets toward 110 degrees.

Their July 2008 electricity bill was \$27.28. Then PG&E installed a "smart meter."

Their bill for July 2009 summer rose to \$102.96.

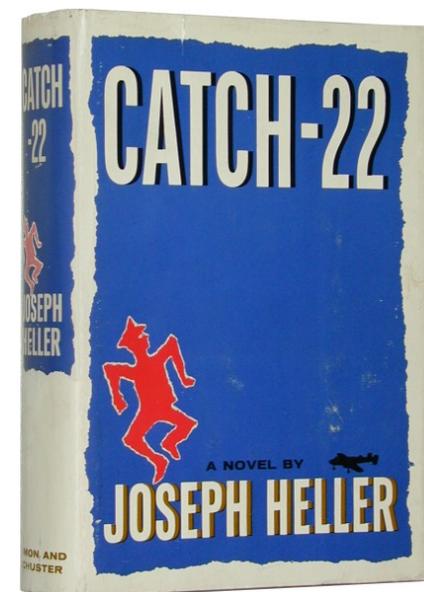
# Risk of Innovation



- Historical (and much current) utility ratemaking based on kWh consumed, not kWh reduced
  - Utility rates based on kWh metered/consumed
  - Utilities recover less if kWh's reduced

# Risk of Innovation

- The utility smart grid innovation dilemma:
  - The program fails, resulting in possible disallowances in cost recovery
  - The program works, reducing demand, which reduces utility revenue



# Risk of Innovation

- Case study
  - Utility desires to “smart up” the grid with the installation of automated meters
  - Utility begins installing a number of automated meters on its system (2004)
  - Regulator initiates a rulemaking and approves a type of advanced smart meter that is different from what utility is installing (2007)



**NBCDFW**  
Locals are *furious* about landscaping on Central Expressway

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FEATURED VIDEO



**ONCOR Fails To Give Notice for Smart Meter Installation**

Ken Kathoff, NBCDFW.com

North Texas electric service provider Oncor promises to notify customers three weeks in advance of meter replacement, but another neighborhood has reported no warning.

# Risk of Innovation

The screenshot shows a news article from WFAA.com. The article is titled "Smart meters rankle some in Houston, too" and is dated March 04, 2010. It is part of a "NewsWatch: Energy" series. The article discusses how the installation of smart meters in Houston has led to unusually high power bills for some customers. A quote from Maria Pineda, who manages an apartment complex, states that tenant electric bills have doubled since smart meters were installed. A line graph shows a significant spike in power bills for one tenant after smart meter installation. The article is by Brad Watson and was posted on March 9, 2010.

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Consumer complaints spark 'smart' meter tests

NewsWatch: Energy  
Blogging the business of energy with Tom Fowler

« Security raised on terrorist threat to oil tankers in Malacca strait | Main | Biofuels boosters seek tax credit to jumpstart production »

March 04, 2010

**Smart meters rankle some in Houston, too**

As we noted this morning, Texas Sen. Troy Fraser is calling for a freeze on the installation of new smart meters because of complaints in his North Texas district that the new devices are leading to unusually high power bills.

It turns out North Texas isn't the only area where some customers have been cringing.

by BRAD WATSON / WFAA  
Posted on March 9, 2010 at 5:38 F

DALLAS — Following hun consumer complaints and from the Texas Public Utili Commission, Oncor is now new "smart" meters in side comparisons in North Tex

Maria Pineda, who manages an apartment complex in Northeast Houston, says tenant electric bills there have doubled since CenterPoint Energy installed smart meters a few months ago.

"Residents are getting \$300 to \$400 bills," she told the Chronicle's Purna Patel. "Most of my tenants are on food

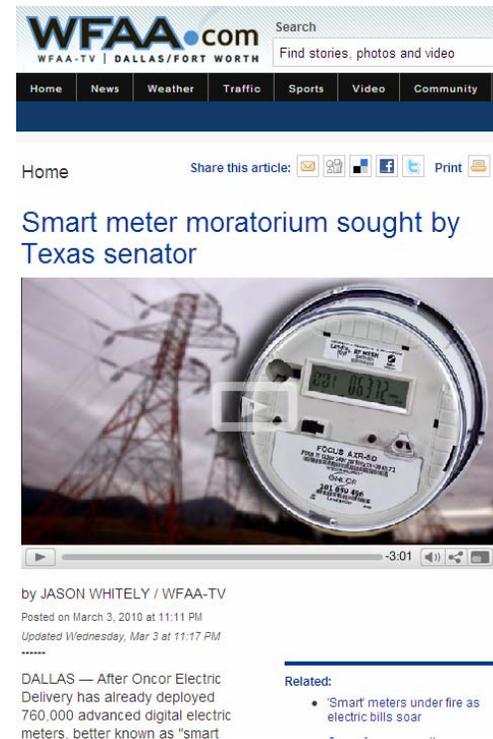
CenterPoint

## ■ Case study, cont.

- In its next rate proceeding, several parties, including commission staff challenge the prudence of utility's investment in the original automated meters (2009)
- The administrative law judges determine that approximately 42% of utility's investment in automated meters should not be recovered (2009)
- A happy ending? The Commission finds that utility acted prudently and allows utility to recover the full costs of its automated meters (2009)

# Risk of Innovation

- Case study, post-script
  - Legislators and consumers challenge cost and accuracy of newly installed smart meters (2010)
  - Utility required to provide free meter tests to requesting consumers
  - Regulator institutes third party meter testing program



The image is a screenshot of a news article from WFAA-TV. The header includes the station's logo, 'WFAA.com', and navigation links for Home, News, Weather, Traffic, Sports, Video, and Community. The article title is 'Smart meter moratorium sought by Texas senator'. Below the title is a video player showing a close-up of a smart meter with a digital display showing '0000000000'. The video player has a progress bar at the bottom. Below the video, the author is listed as 'by JASON WHITELEY / WFAA-TV', with a post date of 'Posted on March 3, 2010 at 11:11 PM' and an update date of 'Updated Wednesday, Mar 3 at 11:17 PM'. A short text snippet follows: 'DALLAS — After Oncor Electric Delivery has already deployed 760,000 advanced digital electric meters, better known as "smart'. To the right of this text is a 'Related:' section with a bullet point: 'Smart meters under fire as electric bills soar'. The video player controls at the bottom show a play button, a progress bar at -3:01, and other standard video controls.

# The “Lightning” Quick Speed of Regulation

- Technology is able to advance much more quickly than regulation
  - Where in the technology stream do you jump in?
    - Getting in too early can lock into technology that will not serve future requirements
    - See “risk of innovation” discussion
  - How much testing before it works?
    - Pilot projects, pilot projects, and more pilot projects
    - You test it first, then I’ll think about it



# What is it?

- Many smart grid facilities have a number of applications across the utility landscape
  - Smart grid technologies can be difficult to assign to one particular market segment
  - Regulator's role is to match costs to specific market segments that either cause the cost to be incurred or benefit from the expenditure
  - Knowing (or defining) how an asset will fit in a fully or partially regulated market landscape is necessary to getting it in place
    - Rate recovery, cost allocation/rate design, etc.
    - Market rules may restrict use of certain technologies by certain market participants

# What is it?

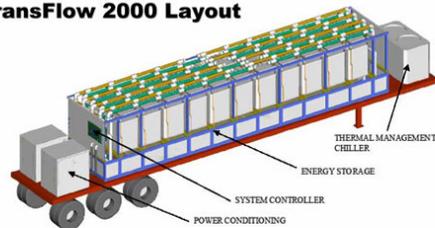


- Case Study
  - Energy storage systems
    - Is it a transmission and distribution utility asset?
    - Is it a generation asset?
    - Is it a customer asset?
    - Who owns the energy that is stored?

## Flow Batteries – Zn / Br

Gaining Utility Consideration for Grid Support Applications

### TransFlow 2000 Layout



0.5 MW / 2 MWh

Design by Premium Power Corporation

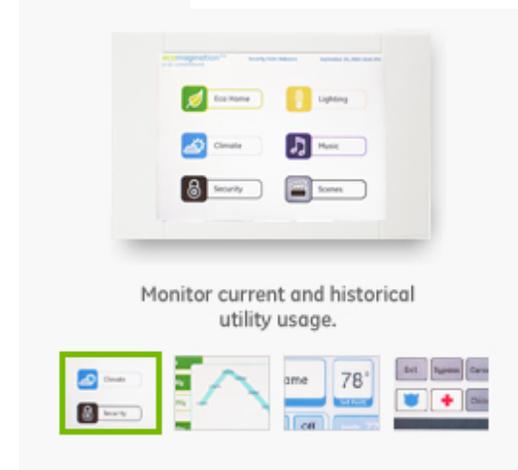
EPR | ELECTRIC POWER RESEARCH INSTITUTE

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# What is it?

- Case Study
  - In-home energy management systems
    - Located on the customer side of the meter
    - Can be provided competitively – GE, Google?
    - Push for utility installation based on cost, wide market penetration and speed of implementation



# Who Keeps the Data?

- Advanced meters and smart grid systems will generate a large volume of information
- A number of entities and individuals will want access to much of the information
- Strong consumer concern over data privacy and security



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washingtonpost.com > Technology > Security Fix

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Privacy and the emerging smart grid: lessons from the Internet

**BIG BROTHER**  
IS WATCHING YOU

My good friend Ann Cavoukian, I co-authored a [new report](#) that identifies potential security breaches that could result in a smart grid infrastructure, one that will be layered on top with the capabilities and when we use electricity. It's a gathering, but Cavoukian says that protection must be made during early design and information about what customers and what devices are involved. An electricity usage

**Security Fix**  
Brian Krebs on Computer Security

About This Blog | Archives | Security Fix Live: Web Chats | E-Mail Brian Krebs

**Experts: Smart grid poses privacy risks**

Technologists already are worried about the [security implications](#) of linking nearly all elements of the U.S. power grid to the public Internet. Now, privacy experts are warning that the so-called "smart grid" efforts could usher in a new class of concerns, as utilities begin collecting more granular data about consumers' daily power consumption.

"The modernization of the grid will increase the level of personal information detail available as well as the instances of collection, use and disclosure of personal information," warns a [report](#) (PDF) jointly released Tuesday by the **Ontario Information and Privacy Commissioner** and the **Future of Privacy Forum (FPF)**, a think tank made up of chief privacy officers, advocates and academics.

# Who Keeps the Data?



- National security concerns
  - Remote access to grid operations
  - NIST February 2010 - Smart Grid Cyber Security Strategy and Requirements
- Utility ability to use data
  - Potential volume of data dwarfs anything utilities have seen to date
  - Many utilities still utilize paper maps of their systems
  - Utilities will need to learn to trust the data
  - Data will expose weaknesses of system

Oracle Utilities Blog

ORACLE

[Renewable Energy in EMEA: The Critical Role of Smart Grids](#) < main

## Accenture Launches Smart Grid Data Management Platform

By caroline.yu on March 18, 2010 9:33 AM

Accenture announced today it has launched the Accenture Intelligent Network Data Enterprise (INDE), a data management platform to help utilities design, deploy and manage smart grids.

INDE's functionality can be enabled by an array of third party technologies. In addition, Accenture plans to offer utilities the option of implementing the INDE solution based on a pre-configured suite of Oracle technologies. The Oracle-based version of INDE will accelerate the design of smart grids and help reduce the costs and risks associated with smart grid implementation.

Stephan Scholl, Senior Vice President and General Manager of Oracle Utilities said, "Oracle and Accenture share a common vision of how the smart grid will enable more efficient energy choices for utilities and their customers. Our combined expertise in delivering mission-critical smart grid applications, security, data management and systems integration can help accelerate utilities toward a more intelligent network now and as future needs arise."

For the full press release, [click here](#).

# Who Gets to Pay for It?

- According to *Electric Light & Power*: “By some estimates, over the next 15 years new capital expenditures will exceed today’s entire U.S. electric industry rate base, and much of this investment will be made by regulated utilities needing to seek approval for recovering costs through a formal rate proceeding.”

# Who Gets to Pay for It?

- Xcel SmartGridCity
  - Original cost estimate in 2008 - \$15.3 million
  - May 2009 - \$27.9 million
  - Today - \$42.1 million
  - CPUC analyst has estimated total cost will exceed \$100 million
  - CPUC increasing regulatory scrutiny and requiring a certificate of convenience and necessity for the project

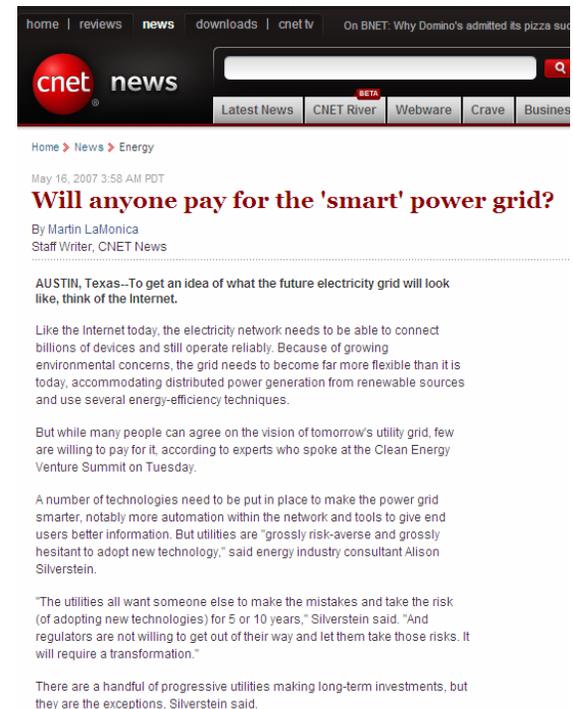


SMARTGRIDCITY™

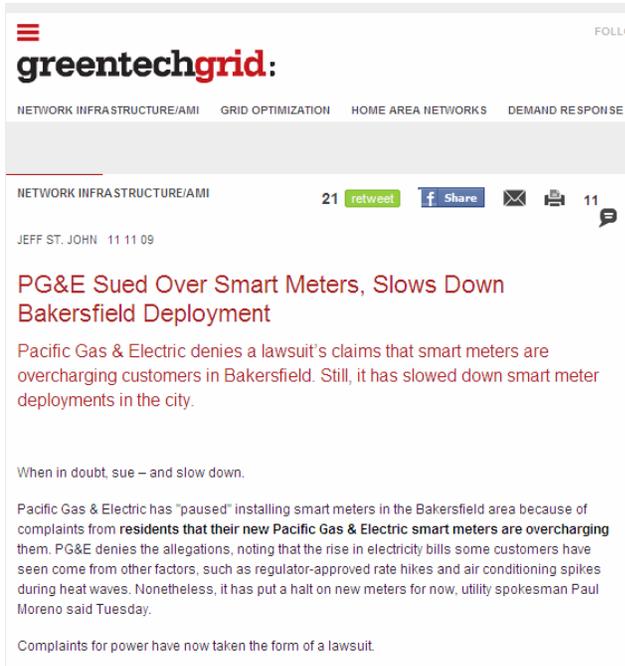


# Who Gets to Pay for It?

- Determining who benefits most and who gets to pay for a particular facility can be difficult
  - Allocation of costs to market participants can be problematic
  - Many smart grid technologies can be difficult to pigeon-hole into one particular market segment
  - Many of the initial benefits of smart grid systems are not visible to consumers



# Who Gets to Pay for It?

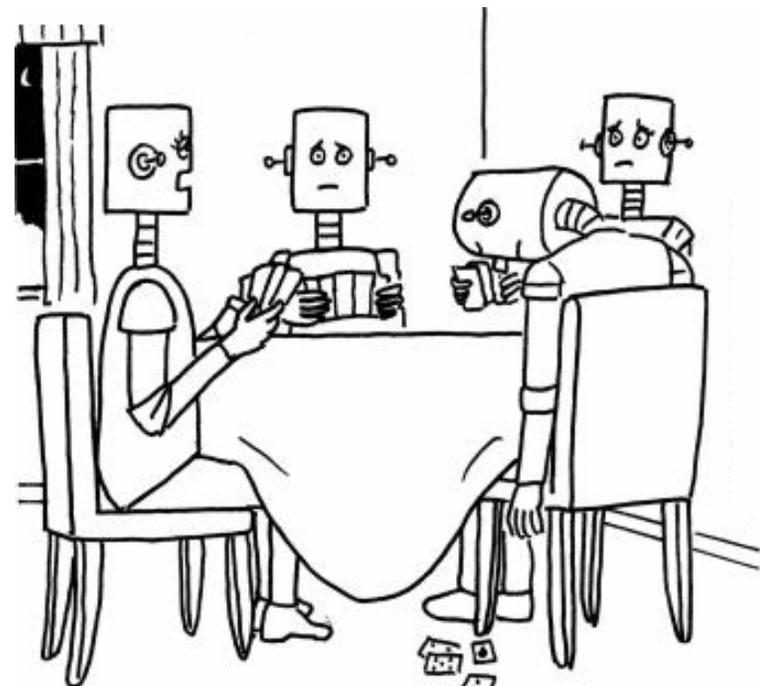


The screenshot shows a tweet from the account 'greentechgrid'. The tweet text reads: 'PG&E Sued Over Smart Meters, Slows Down Bakersfield Deployment'. The body of the tweet states: 'Pacific Gas & Electric denies a lawsuit's claims that smart meters are overcharging customers in Bakersfield. Still, it has slowed down smart meter deployments in the city.' Below this, it says 'When in doubt, sue – and slow down.' and 'Pacific Gas & Electric has "paused" installing smart meters in the Bakersfield area because of complaints from residents that their new Pacific Gas & Electric smart meters are overcharging them. PG&E denies the allegations, noting that the rise in electricity bills some customers have seen come from other factors, such as regulator-approved rate hikes and air conditioning spikes during heat waves. Nonetheless, it has put a halt on new meters for now, utility spokesman Paul Moreno said Tuesday.' The tweet concludes with 'Complaints for power have now taken the form of a lawsuit.'

- “Selling” the cost of smart grid facilities can be difficult
  - Commercial and industrial customers
    - Increased cost
  - Residential customers
    - Lack of perceived value
    - Lack of interest
  - Utility operators
    - Loss of revenue
    - Risk of recovery
  - Regulators
    - Sensitive to rate increases

# Who Gets to Pay for It?

- A Case Study
  - Municipal utility seeks to increase solar resources
  - Bids returned are 5 to 10 times the current wholesale market prices
  - Pressure from regulators to pursue project regardless of financial impact
  - Feed in tariffs well above market price of electricity



"He's not much fun in the evenings -- he's solar powered."

# Solutions?

- Clearly stated value proposition to:
  - Regulators
  - Utilities
  - Consumers
  - Other market participants
- Legislative directives



"We've made your environmental report greener. It now uses 50% less paper."

# Solutions?

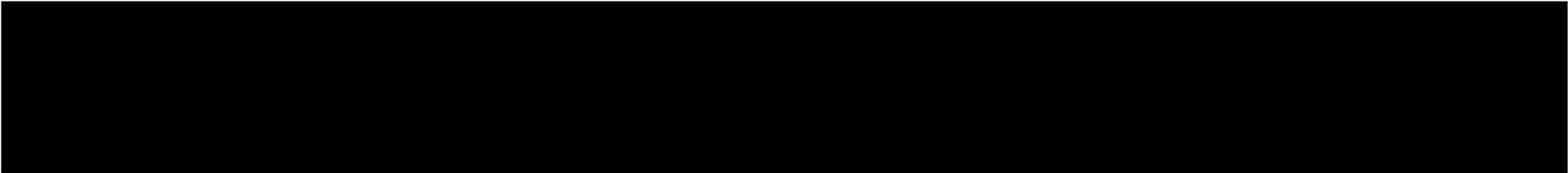


- Reshaping the regulatory paradigm
  - Use of future test years
  - Decoupling utility rates from kWh
  - Time of use rates
  - Preclude subsequent cost disallowances in future rate proceedings for pre-established technology implementations
- Flexible regulators

# The Takeaway Message, Cont.

- Designing a better mousetrap and obtaining funding in a regulated market may be just the beginning of a successful journey





Questions?

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