

# Getting Smarter About the Smart Grid

Timothy Schoechle, PhD  
Senior Research Fellow  
National Institute for Science, Law, and Public Policy  
Washington, DC

Commonwealth Club of California

San Francisco

January 28, 2014

# Opening remarks

- Introduction
- Qualifications
- Theme of presentation
  - An energy revolution in the making
  - “Smart meters” as a symptom of dysfunction

# Brief history/context

- *Power Struggle* by Rudolph & Ridley, 1986
  - Subtitle “The Hundred Year War over Electricity”
- Centralized grid model c. 1892
  - generation, transmission, distribution
- Historic tie to banking industry
  - e.g., Thomas Edison and JP Morgan
  - Big economy-of-scale attracts & depends on big money
  - 4:1 ratio of investment to revenue
- PUC monopoly regulation model
  - Invented by Insull, Chicago Edison, JP Morgan c. 1907
  - Private monopoly rates & cost recovery
  - Guaranteed by government regulators
  - “Corporate socialism” as a business model
- Distinction between investor-owned and community-based (munis, coops, etc) utilities

# Key points of “Getting Smarter...”

- Define “smart grid”
  - Using IT to make the grid reliable, efficient, balanced, renewable
- Promise of the smart grid vs. the smart meter *canard*
  - A decoy
- Public push-back on smart meters
  - cost, safety, privacy
- Conventional utility business model
  - commodity sale and capital cost recovery
- Renewables vs. baseload generation
  - inherently in conflict
- New utility business model
  - service model, let the customers generate the power

# Key points of “Getting Smarter...”

- The smart meter “bait & switch”
  - Risks and diversion of resources [federal push]
- Federal policy failure/capture
  - Captured by industrial interests
  - The “electricity/industrial complex”
- Power to the people
  - Distributed energy and local control
  - Renewable and sustainable energy
- Blueprint for new energy economy
  - Key technologies and policies

# Update: emerging issues

*What's changed since the paper was written/published Nov 2012?*

- Emerging privacy and security risks
- Dramatically improved economics of renewables
- Utility push-back on solar PV and net metering
  - e.g., CA, AZ, CO, ALEC initiatives
- Clash with investors and wholesale independent power producers
  - e.g., NRG, PJM, Solar City, etc.
- Collapsing utility business model based on:
  - Economy of scale *that is declining*
  - PUC regulatory régime *that is loosing legitimacy*

# Update: emerging issues

- Community need for grid resiliency and security
  - Severe weather events
  - Grid reliability problems
- Localization and community rights movement
  - Pushback on corporate control: fracking, GMOs, etc.
  - Dysfunctional and “captured” regulators
- Municipalization, community choice aggregation (CCA), deregulation of generation

# Update: emerging issues

- Germany and the dramatic success of rooftop solar
  - *Energiewende*—revolution away from carbon & nuclear and toward renewable and sustainable energy
- Over 20% solar, over half on individual rooftops
  - Rejected smart meters
    - Ernst & Young study for Germany found “no consumer benefit”
  - Gateway requirement by German data security agency (BSI)
    - German federal requirement for security and privacy protection
    - Consumer control of premises data



# Update: emerging issues

- Community need for grid resiliency and security
  - Vulnerability to severe weather events
  - Vulnerability to financial and management risk
- The case of Boulder, Colorado, municipalization
  - What is new and different in Boulder?
  - The motivation: clean energy
  - The model: service, not commodity sale
    - manage the wires and poles
    - let the customers generate the power, wherever possible

# Update: emerging issues

- Why “opt-out” is not an answer
- Divide and conquer
- Utility strategy to de-fuse & co-opt the opposition

# Technologies and policies that can work

- Distributed community-based solar microgrids
- Localization
  - Avoid “utility-scale” generation and transmission
  - Big wind/solar “farms” not the best approach
- Principle: *generate electricity as close as possible to where it will be used*
  - Microgrids and DER (distributed energy resources)
- Tools for the “prosumer”
  - Utility customer not just a “consumer”
  - Also a producer

# Technologies and policies that can work

- Reliable, fast, and secure wired home networks
  - e.g., wired GigaBit Ethernet (and others)
  - New life into old wires
- *Transactive Energy* technology and policy
  - Automated variable pricing/trading
- Advanced “clean” inverter/chargers
- Premises-based energy management
  - Keeps the data at home
  - User-owned and controlled
  - Fast “demand response” and local grid support

# Technologies and policies that can work

- Clean electricity now available
- DC bus enabled now available
  - DC “nanogrid” low voltage direct current available on premises
  - Rationale for AC power being challenged
  - Back to the future
- Plug-in electric vehicles
  - Back to the future (again)
- Feed-in tariffs, net metering, and “transactive energy”
- Phase out of baseload generation
  - Sunset for coal and nuclear
  - Bottom-up support for grid reliability and resiliency

# Some Key Questions to be Asking

- Has the public been misled about the technical capabilities of smart meters?
- Is your “smart meter” really a surveillance “drone” in your home”?
- What is the futility of smart meter “opt out” programs, and will they just make the situation worse?
- Why is the utility industry so desperately pushing back against rooftop solar and net metering?
- Why does federal energy policy continue to flounder, and do local communities need to take control of their own energy future?
- Is the Public Utility Commission regulatory model irreparably broken/obsolete, and does it need to be retired/sunset?
- Are \$ billions being wasted in the name of the “smart grid”, while the genuine “smart” technical solutions go underfunded?
- How can we create a truly WISE decentralized electricity grid without the privacy, security, reliability, public health, and economic risks of the present approach?

# Discussion

- Questions?
- Comments?
- Discussion?

# Further reading

- *Empires of Light: Edison, Tesla, Westinghouse and the Race to Electrify the World*, Jill Jonnes, 2004
  - Early history of the technology and the industry
- *Power Struggle: The Hundred-Year War over Electricity*, Richard Rudolph & Scott Ridley, 1986
  - Development of the industry from 1900 through 1986, including the business, financial, and political struggles
- *Democratizing the Electricity System: a Vision for the 21<sup>st</sup> Century Grid*, John Farrell, 2011 <http://www.newrules.org>
  - A vision of the future of the grid including distributed renewable generation, microgrids, and localization



# Further reading

- *Reinventing Fire: Bold Business Solutions for the New Energy Era.* by Amory Lovins and Rocky Mountain Institute, 2012
  - Detailed technical analysis and plan for transition to renewable and sustainable energy economy
- *The Third Industrial Revolution: How Lateral Power is Transforming Energy, the Economy, and the World,* by Jeremy Rifkin, 2011
  - Visionary historical framing of today's technological, economic, and social transformation related to the world's energy economy
- *Normal Accidents: Living with High-Risk Technologies,* by Charles Perrow, 1984
  - Inherent risks of reliance on overly complex technological systems (e.g., nuclear power, electric transmission grids, financial trading, etc.)