Item #3

Can we Pilot the Future of Electric Utility Service in Maryland?

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The Coming Transition in Electricity Services

- The broader context: the coming transformation of the U.S. electric sector to a "Utility 2.0" model.
  - General agreement on inevitability of the transition
  - General agreement on what electric utility of the future might look like
  - Little agreement or ongoing work on the process required to make this transition.
- The key challenges utilities confront to offer reliable, affordable services going forward fall into four categories:
  - Technological
  - Environmental
  - Economic
  - Institutional
- Can we design a test of potential answers to these challenges in a pilot project in Maryland?

Challenges to Electric Utilities

Technology – Profound changes are coming

- **Consumers will deploy new technologies**
  - Programmable smart appliances and buildings with two-way communication and remote operation
  - Electric vehicles (and other potential electricity storage)
  - Distributed self-generation (renewable, CHP, and other) and microgrids
  - Real-time system monitors and controls with remote access
  - Highly efficient end-use applications, systems
- **Utilities will deploy new technologies**
  - Remote reading two-way smart meters
  - System sensors and communications
  - Upgraded transformers and substation technologies
  - Microgrid system architecture for better reliability, lower costs
  - Underground distribution and transmission technologies
  - Systems to accept, store, share and analyze massive amounts of digital information
- **Cyber-security needs will drive new software and hardware**
- **New technologies will accept many small and variable sources of energy while maintaining grid-wide power quality and reliability**

Challenges to Electric Utilities

- **Environmental Requirements – old, new, prospective, and meaningful.**
  - [Absorbing long-expected but major costs of criteria pollutant controls]
  - [Finding increasing difficulty in siting central generation, transmission facilities]
  - [Strict new constraints on water use, discharges]
  - [Solving the impasse on nuclear waste disposal]
  - Achieving greater efficiency in electricity generation
  - Moving to non-carbon sources of generation
  - Meeting vegetation management requirements with minimum damage to tree cover
  - Meeting energy-efficiency and renewable energy portfolio standards

Challenges to Electric Utilities

- **<u>Economics</u> – The utility business model must change**
  - Trillions of dollars of new investment capital needed to adapt to new technology, respond to environmental mandates, replace outmoded systems, integrate regionally
  - Uncertain but probable low growth of future demand for power
  - Much cost-effective efficiency in electric consumption yet to be achieved
  - Value of power quality and reliability increases with continued electrification and computerization
  - Consumers will see, want to react to cost of power in current intervals
  - Customers will sell as well as buy power; some will seek self-sufficiency
  - Utilities may be required to operate markets as well as grids
  - 3rd party vendors bring service and technology innovations, aggregate and represent customers
  - Natural gas opportunities for new generation and competition for end-use applications increase
  - Utilities and customers anticipate an eventual policy imposing a price on carbon emissions
- **Utility business models will have to reflect all these factors while seeking to maintain low cost of capital, favorable investment position**.

Challenges to Electric Utilities

- **<u>Institutions</u> – <u>lack</u> of change will increase system stress.**
  - 3,200 retail U.S. electric utilities, with three basic models: investor-owned utilities, municipal utilities, and cooperative utilities (mostly rural)
  - Increasingly regional operations under varying governance:
    - Regional Transmission Operators
    - Independent System Operators
    - Federal power marketing administration areas
    - Bilateral contract regions
    - Texas
  - Lack of effective regional regulation
    - FERC authority in interstate transmission , wholesale markets
    - FERC assertion of regional planning, cost-allocation authority
    - State pre-eminence in retail and distribution authority
    - Judicial and legislative uncertainty on interstate transmission siting and construction
  - Varying competitive market reliance from state to state, service to service
    - Vertically-integrated monopoly utilities
    - Unbundled utilities with retail competition
    - Everything in between
  - Uncertainty, with Congress deadlocked on policy, court reviews slow

What Must Change and What Won't…

What will be different:

- The technological basis for system operation, consumption, pricing, and use.
- Utility business models, regulatory incentives and disincentives.
- Sources, sellers, volumes and end-use value of generated power.
- Utility-customer relationships, including new third-party market participants, as customers shift from passive to active, from buyers-only to some self-supply.
- Degrees of competition in electricity pricing and service options.
- Utility role in achieving social and environmental benefits – climate protection, water use management, low-income support.

What is likely to remain the same:

- Utility responsibility for distribution and transmission wires investment and services.
- Utility responsibility for power reliability and quality.
- Utility responsibility as provider-of-last-resort.
- Utility ownership structures – IOU, Muni, Coop, Federal
- Matching state, local, and federal regulatory jurisdictions and regulatory responsibilities.
- Utility right to recover investment costs and fair return from ratepayers.

Why a Pilot Project?

- The coming transition will be challenging for electric industry, its customers, and its regulators.
- Its complexity and related uncertainties make it impossible to simply plan and execute to a fixed future.
- It is, however, coming one way or the other: either through conscious actions and efforts, or through technology push, competitive forces, consumer do-it-yourself efforts, and governmental mandates.
- A pilot project may allow testing of a transitional process and elements of the new utility in a more acceptable, less disruptive, and less expensive manner, while focusing earlier on demonstrating key benefits such as improved resiliency.
- A pilot project will require significant work to design and significant expense to implement, so it warrants doing carefully.
- It also requires cooperation from all key stakeholders.

Potential Elements for Pilot Project

- **Technology options** – the easiest to design and measure, but potentially expensive to implement.
- **Environmental options** – may include clean energy or non-carbon incentives to promote demand-side efficiency, clean energy options.
- **Economic options** – Difficult to isolate in pilot area, potentially distorted by downside protection policy.
- **Institutional options** – Designation of new competitive markets and services is only viable institutional option to test.