The Grid of the Future:
Enabling & Rewarding Utility Performance,
Service & Value in a Distributed Energy Age

Maryland Grid of the Future Conference
29 January 2016

Karl R. Rábago
Executive Director,
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The Company Store
Drivers of Change

- Natural gas supply & prices
- Declining economics of central station power solutions/model
- Environmental responsibility & imperatives
- Improving economics of distributed energy resources ("DER") – emergence of short-term price elasticity
- Resiliency & the inherent benefits of community-based solutions
- New clarity about FERC role (until …)
Potential Pathways

• “Maintain and harden”
• Incremental changes
• Comprehensive regulatory reform
• Legislative overhaul
Utility Reform: Why now? Challenges to Utility Growth

- Generation capacity prices, costs, value
- T&D investment recovery
- Decreasing relevance of incentives (in selected markets) and increase in efficiency, conservation/load mgmt.
- Controversy around efforts to buttress fixed cost recovery through monopoly rents
- Pressure on public benefit funds

A situation ripe for disruption transformation!
Economics are Compelling, Even When Only Wholesale Costs are Considered!

Figure 7: Unsubsidized Levelized Cost of Energy Comparison—September 2017

- Solar PV — Rooftop Residential
- Solar PV — Rooftop C&I
- Solar PV — Crystalline Utility Scale
- Solar PV — Thin Film Utility Scale
- Solar Thermal with Storage
- Fuel Cell
- Microturbine
- Geothermal
- Biomass Direct
- Wind
- Energy Efficiency
- Battery Storage
- Diesel Generator
- Gas Peaking
- IGCC
- Nuclear
- Coal
- Gas Combined Cycle

Levelized Cost ($/MWh)

Source: Lazard estimates.

Responses to DER

• Prohibition vs. mandates
• Regulation (define as “utility,” or not)
• Extra charges vs. extra incentives
• Eliminate benefits vs. incentives
• New services from utilities vs. others
• Technical, regulatory, economic - internalization vs. bypass
• Utility transformation
Perceptions & Beliefs

- Utilities and IPPs – the forces of change are inevitable; the pace is uncertain. We are all in the same boat. (relative competitive posture)
- Non-solar/DER customers – growing bills, evaluating bypass, environmental concerns. (I’m busy and stressed)
- DER providers – utilities are shifting fixed costs, creating undesirable limits to growth at early market stages. (We are just getting going – give us a chance)
Perceptions & Beliefs (cont.)

- Regulators – seeking a more resilient, decentralized system, bypass increases pressure on non-discretionary customers, failure to deal with issues accelerates the spiral. (Hate being in the middle of 2 good things – don’t force us to decide!)

- Customer groups – rate and bill increases frustrating, lack of confidence in utility planning. (Been there, don’t trust that!)

- Legislators – like regulators, increasingly facing unsavory choices and conflicts. (Generates contributions, but ultimately no-win decisions)
A Sharing Utility for a Sharing Economy: The Platform Utility

“Collaborative Consumption”

• “Collaborative consumption as a phenomenon is a class of economic arrangements in which participants share access to products or services, rather than having individual ownership.”

• Collaborative consumption gives people the benefits of ownership with reduced personal burden and cost and also lower environmental impact—and it’s proving to be a compelling alternative to traditional forms of buying and ownership.
  – E.g. Uber, Airbnb, ZipCar, Yeloha/MySunBuddy (net metering credit sharing company)
A Well-Regulated “Sharing Utility”

• Allows customers to benefit more from utility investments
  – Systematic localized integrated resource planning
  – Transparent price and value information

• Operates against performance standards
  – Short- & long-term prices
  – Environmental responsibility
  – Customer satisfaction
  – Grid reliability & service quality
  – Minimization of revenue requirement

• Expands 3rd party participation
  – Vehicle for innovation
  – Decouple revenue from throughput
  – Leverage private market assets and solutions
The Company Store
The Community Store
On Sale, Tomorrow!

- **Pre-Season Bonus Offer on select Mantis Tillers!**
  - Buy a Mantis Deluxe Tiller or a Mantis Tiller
    - Bonus Free Border Edger, Kickstand, Maintenance Kit & Free Shipping
  - Buy a Mantis XP Tiller
    - Bonus Free Kickstand, No-Spill Gas Can, Maintenance Kit & Free Shipping
  - Enter Key Code 12345 during checkout.
  - Offer valid thru March 31, 2023, cannot be combined with other offers. Excludes electric tiller and unadvertised tiller models.

- **UNADVERTISED SPECIAL**
  - Limited Time Offer
  - The Original Mantis 2-Cycle Tiller that changed the way people garden.
  - Now available for only:
    - $299

- **Certified Organic Seeds - $2.99 Only $1.99!**

Rábago – Maryland GOTF Conf
Some Things New Markets Could Offer to Citizens and Businesses

Figure 8: Energy Management Applications Store

Usage vs. Comparable Community Footprint

- Efficient Neighbors: 63 therms
- All Neighbors: 84 therms
- You: 93 therms

What Some are Already Doing

- Community and shared solar
- Combined heat and power
- District heating and cooling
- Demand response
- Community Choice Aggregation
- Solar Rooftop Leasing
- Community Storage
- V2G – Vehicle to Grid
Your Energy Infrastructure Landscape Will Change Dramatically

Thank you!

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Part 2: Some Details

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5 “Sharing Utility” Principles

1. The full impact of electricity generation, delivery, and use on natural systems must be accounted for.

2. Traditional cost-plus regulation should be largely replaced by value-based pricing of functionally unbundled services, remaining only for those services that continue to meet the definition of natural monopoly.

3. Every new regulated system asset has to prove its economic value to society, relative to alternatives, on a full life-cycle cost accounting basis.

4. Electricity pricing should offer customers a broader array of rate choices and reflect the full, location- and time-sensitive long-run marginal cost (LRMC) of utility service. *Price structure need not mimic cost structure.*

5. Utilities should provide customers with full and fairly-priced access to solar and DER technologies, and services appropriate to their individual circumstances and their consumer (or “prosumer”) preferences.
Challenges & Strategies: Low/Moderate Income

• Community-based initiatives
• Education
• Demonstrations
• Residual monopoly obligations
• Granular grid cost data
• Platform technology deployment & design
Challenges & Strategies: Platform Technologies

*How do we build this platform?*

- Differentiate Smart Grid 1.0 (BAU grid modernization), from Smart Grid 2.0 (enhanced services)
- Metrics and performance criteria for platform development
- Bulletin board of short, mid, long-term marginal distribution capacity costs
- Accountability against the DSIP – Distribution System Implementation Plan (“SLIRP”)
Challenges & Strategies: Animating Markets for DER

Jumpstarting DER Markets:

• Stakeholder collaboratives
• Unbundling “building blocks” of rates to reveal competitive opportunities
• Marketplace portals
• Community Choice Aggregation
• Shared solar “plus”
• Demonstrations that prove something new
Challenges & Strategies: Large Scale Renewables

• Competitive procurement
• Portfolio management with mix of contract lengths
• Contracts with multiple parts, re-openers, synthetic provisions, pre-pays, etc.
Challenges & Strategies: New Revenue Models

• Minimal fixed charges
• Earnings Impact Measures
  – Revenue Loss
  – Performance
• Differential Returns on Equity to align with policy
• Market Based Earnings
What PACE/NESEMC are doing

• Leadership is convening people around a common agenda

• Pace Energy and Climate Center
  – Public interest intervenor
  – Stakeholder participant
  – Convener

• Clean Energy Organizations Coalition

• NESEMC – regional solar businesses
Demonstration Project Options

- Community and shared solar
- Combined heat and power
- District heating and cooling
- Demand response
- Community Choice Aggregation
- Solar Rooftop Leasing
- Community Storage
- V2G – Vehicle to Grid
Conclusion: A Well-Regulated Sharing Utility

• Shifts market surplus downstream to customers
  – Local integrated resource planning
  – Transparent price and value information
• Operates against performance standards
  – Short- & long-term prices
  – Environmental responsibility
  – Customer satisfaction
  – Grid reliability & service quality
  – Minimization of revenue requirement
• Expands 3d party participation
  – Decouple revenue from throughput
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1. Accounting for Impacts

Externalities are real, and markets are distorted and inefficient as a result of not accounting for them

• Pricing carbon
• Incorporating in value assigned to DER
• Flowing (some) carbon charge revenues back through bill reductions and infrastructure development
2. Move from Cost to Value

The Averch-Johnson Effect is a real and logical response to the ratemaking formula, that also applies to public power

- Cost-plus regulation only for monopoly services
- Allow deviation from dominance of averaged class rates – segmentation of customers
- Use market mechanisms to internalize externalities through value-based rates
- Open system platform for distribution services
- The “DSP” serves as conduit for crediting of value and distribution of costs
3. SLIRP, with Improvements

*Translate experience into value, not just rents*

- Systematic Localized IRP – the DSIP
- Extend valuation methods to all DER
- Risk-adjusted discount rates
- Markets to assess value where possible, but with regulatory oversight
- Comprehensive functional unbundling
- Utility becomes load coordinator/manager; could be 3rd party (IDSO)
- DSP participation only in non-competitive market segments
4. Reflecting Cost

*Increasingly, short term elasticity is possible!*

- Unbundling
- Customer segmentation
- Broad access to data
- Two-part rates
- Introduce temporal and locational sensitivities in rates (with gradualism in mind)
5. Access to DER & Services

There will be a residual, natural monopoly – but it should be constantly challenged by innovation

• Utilities should develop DER programs to start, with an eye to competitive markets providing products and services wherever possible

• Utilities transition to non-competitor platform provider as competitive markets emerge