Future Power Markets Forum

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Johns Hopkins Environmental Health & Engineering

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Activating Demand Response and Distributed Energy Resources

Future Power Markets Forum
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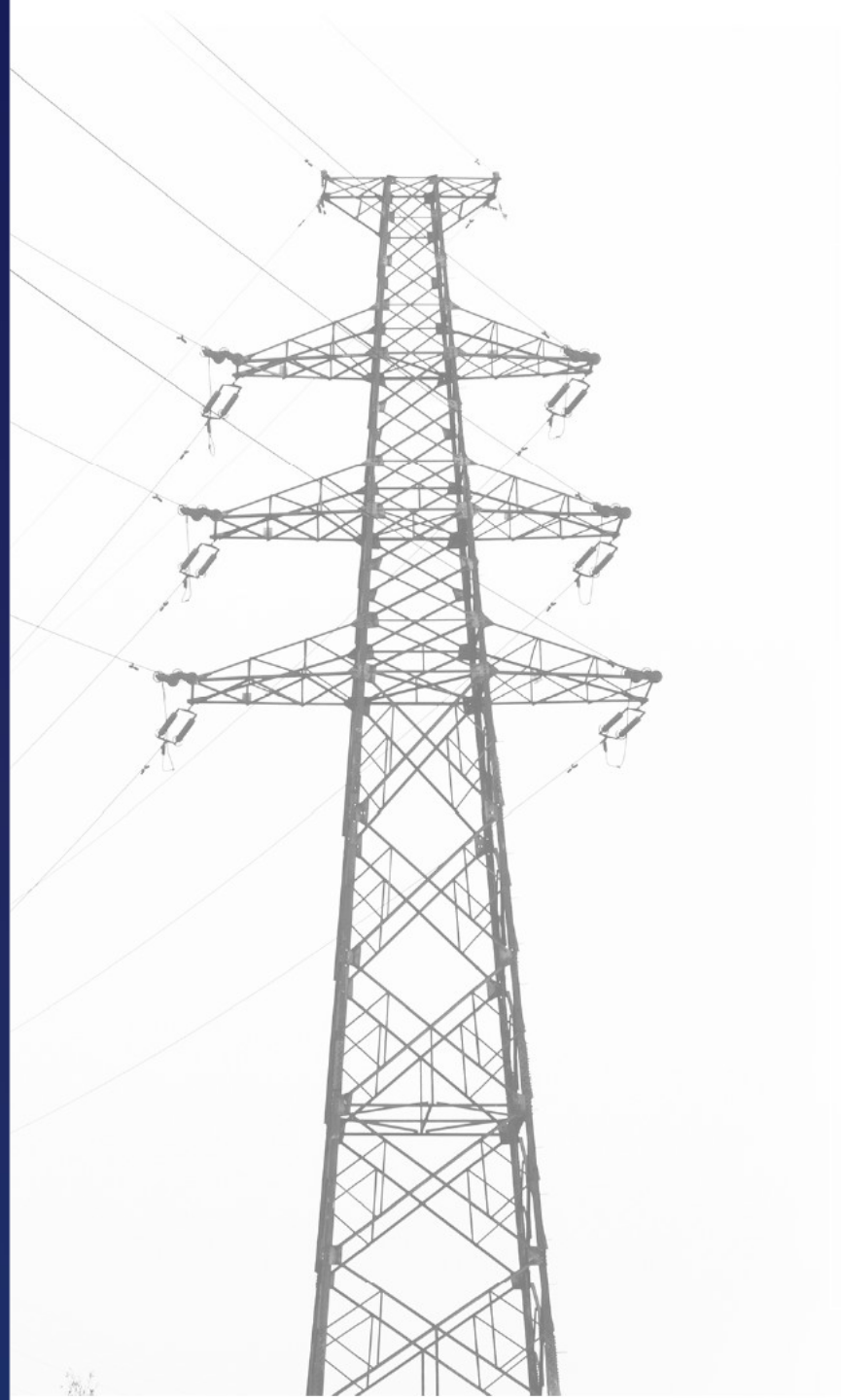

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Advanced Energy Economy

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Activating DR and DERs

Ms. Alison Silverstein

Consultant

Responsive Demand

Alison Silverstein
Alison Silverstein Consulting

Sources

- Customer energy use
- Distributed generation
- Storage devices
- EVs & electrification

Means

- Time-varying rates & other incentives
- Automation, energy management systems, prices to devices
- Customer choices & behavior
- Smart appliances, buildings, C&I systems
- Grid or third-party dispatch
- Voluntary customer action

ROLES

Markets

- Direct in-market resource bids
- Through aggregators shaping portfolios
- Supply discipline
- Price moderation

Reliability

- Resource capacity
- Transmission capacity
- Frequency management
- Distribution system management
- Voltage management
- Load-shaping

More

- Emissions reductions
- Renewables integration
- Customer bill savings
- Risk reduction through increased flexibility and optionality

Activating DR and DERs

Commissioner Sally Talberg

Michigan Public Service Commission

Barriers/Challenges

- Outdated planning, procurement & interconnection models
- Rates (design and marketing)
- Regulatory/legal ambiguities; reactive approach
- Unclear roles and boundaries of utility, RTO, DER providers, and customers
- Data access limitations
- Utility investment incentives (return on capital)
- Operational capabilities

Drivers/Opportunities

- Declining costs
- Customer demand
- Technological innovation
- Environmental benefits

Solution

Holistic approach to maximize benefits of transition to clean, distributed energy resources for Michiganders

Three areas of emphasis:

- Customer engagement
- Integrating emerging technologies
- Optimizing grid investments and performance

MI POWER GRID

Activating DR and DERs

Dr. Ahmad Faruqui

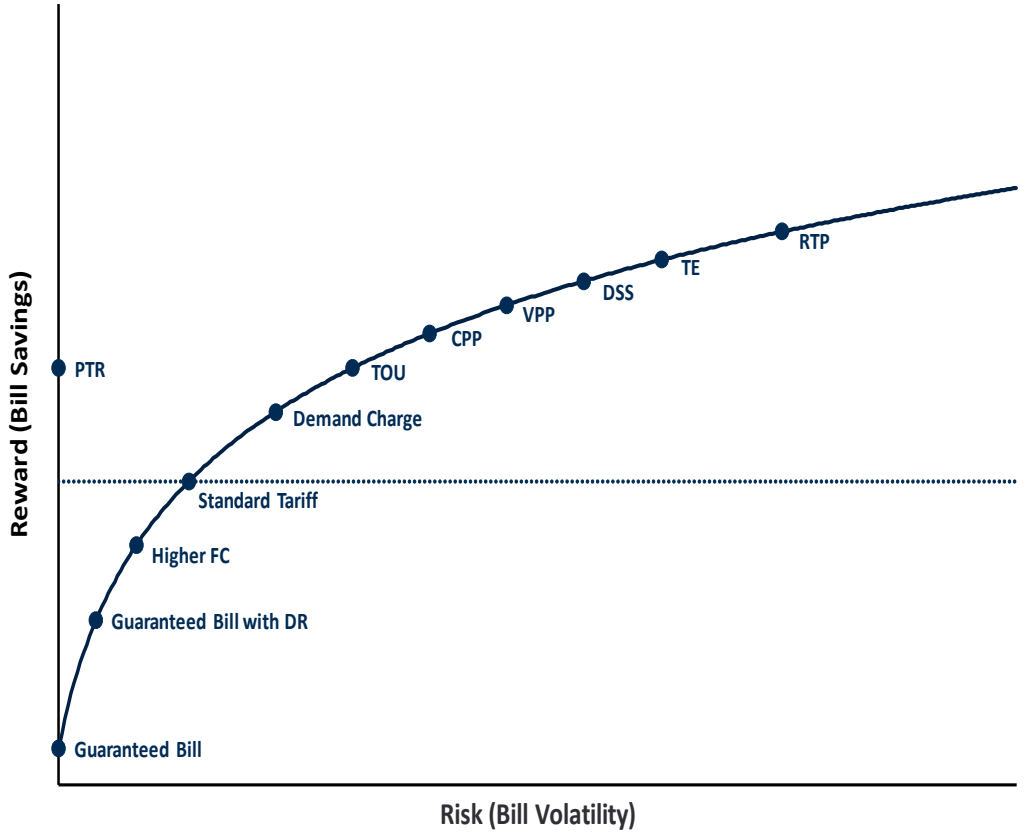
The Brattle Group

A decarbonized grid is going to require real-time demand response

Almost 100 million smart meters are deployed in the US today but only 6 million customers are on time-varying rates

More than 350 tests have shown that customers understand and respond to time-varying rates

The tariffs of tomorrow should offer choices to customers



Activating DR and DERs

Mr. Tanuj Deora

Uplight

DER Grid Value Use Cases

	System Benefits	Consumer Benefits
Virtual Power Plants	• Alternative to Peakers • Scalability / “Right sizing” • Community Goodwill	• Lower System Cost • Incentive Payments
Non-Wires Alternatives	• Replace T&D Investment • Scalability / “Right sizing” • Community Goodwill	• Lower System Cost • Incentive Payments
Localized Grid Services	• Replace Distribution Investment • Scalability / “Right sizing” • Community Goodwill	• Localized Power Quality • Lower System Cost • Incentive Payments
Continuous Demand Mgmt	• Improved Load Factor • Fundamental Shift in Market Price Formation	• Lower Demand Charges • Claims for “100% Clean” (e.g. Google 9/14/20)
Microgrid Management	• Load Shed / DR Asset • Improved Load Factor	• Increased Site/BtM Resilience • Lower Demand Charges

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Specific DER Tech Tie-Ins

	Drivers	Challenges / Limits	Use Cases	Other Considerations
Smart T-Stats	• Customer love the tech • OEM marketing • EE measure • Summer peak coincident	• Dispatch control & architecture • Building shell physics • Override forecasting • Winter peak performance	VPP NWA CDM	• Program coordination • Value prop presentation • Consumer ed, CX, CS • Reg approvals
Controllable Water Heaters	• Selected utilities pushing • Proven “solar sponge”	• Slow stock turnover • Professional retrofit	VPP NWA LGS CDM	• OEM partnerships • Channel partnerships
Solar + Storage	• Consumer cost value proposition • Resilience concerns	• Deployment business model challenges • Utility v. solar industry sentiment / regulatory strategy	VPP NWA LGS CDM MGM	• OEM partnerships • Channel partnerships
EVSE Managed Charging	• Utility interest in promoting EV adoption while managing grid impacts	• Dispatch control & architecture • Consumer acceptance • Override forecasting	NWA LGS CDM	• Role of Auto OEMs • Role of EVSE OEMs • Broader emobility applications
C&I Loads	• Direct business case • Resilience concerns • Sustainability targets (e.g. Google 24/7 clean)	• Facilities vs. HQ conflict • Utility key account teams incentives & capabilities • Utility shareholder incentives	VPP NWA LGS CDM MGM	• Legacy of existing programs

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Barriers to Adoption of DER as Grid Assets

Key Challenges

Dispatch Architecture
Current dispatch control schemes do not map to use cases, value stack, full portfolio; i.e. “prices to devices” is insufficient

Performance Modeling
Limited understanding of how BTM DER will perform, vs. tradition “steel in the ground”

Resource Planning Processes
Siloed for generation, transmission, distribution, & DSM w/different assumptions, timelines, benefit valuation & analytical tools

Utility Incentives
Discussion of new business models gaining traction, but still falling short for consideration of non-traditional solutions

Additional Issues

Cost
DERs a few years off from cost-effectiveness in many utility service territories

Rate Design
TOU has momentum, but customer acceptance & equity concern slow adoption

Consumer Engagement (CX)
Strategic focus tends to lag, in part due to lack of quantitative metrics and targets

Market Access
DER access to wholesale markets rules still in development; may be ultimately moot

Infrastructure Deployment
Full AMI capability & value not understood, accepted & deployed in most jurisdictions

Security
Actual DER security requirements remain opaque but should be manageable

Connect

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