Utility of the Future:
Utility Customers and Regulators Working together to Optimize Tomorrow's Utility

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Regulatory Purposes

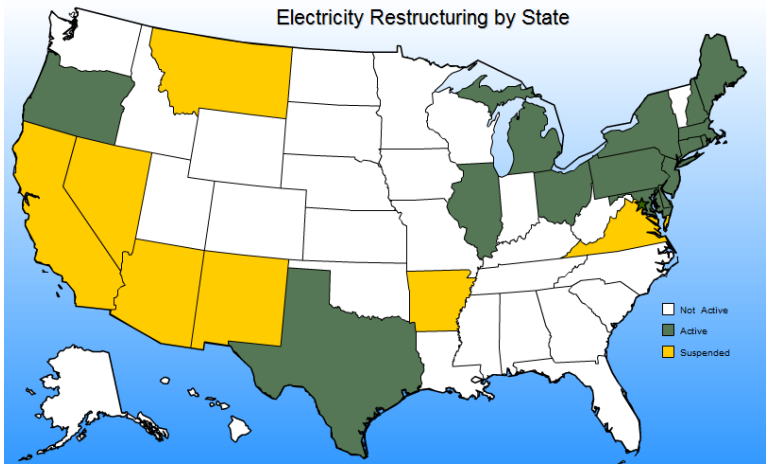
Protect
the
Public Interest

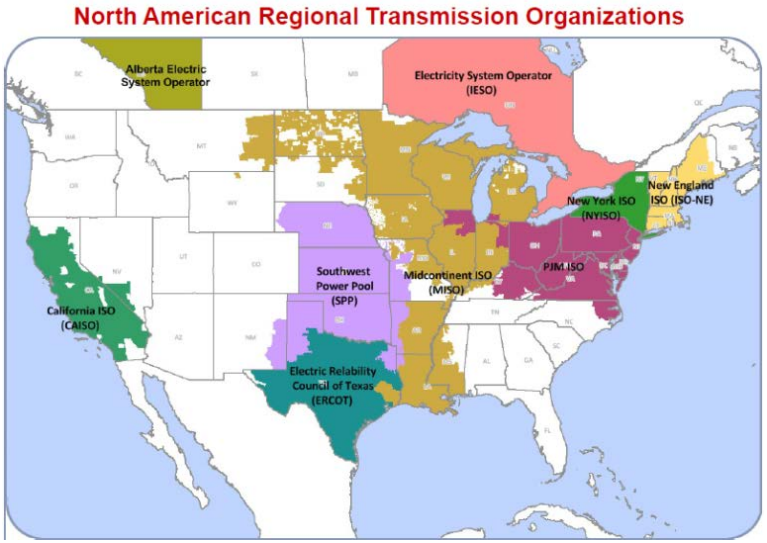
Ensure
Reliable Service
at
Just and
Reasonable
Rates

Allow
the Utilities
a Fair Return
for Providing
a Public Good

Historical View of Electric System and Regulatory Evolution

- Bundled Generation, Transmission, Distribution Under Cost Based Regulation
- 1990's Shift to Competition and Unbundling
  - Open Access Transmission
  - Development of Regional Markets for Bulk Electric System
  - Retail competition in some states
- 2000: California Energy Crisis
- Today: A Mix of Restructured and Traditional, Vertically-Integrated Systems





NOW - Technological Advances and Innovation

Information Technology & Computing Power

More Variable Energy Resources

Increasing Distributed Generation

Environmental Goals and Mandates

Automated Demand Side Management maturing into a true capacity asset and grid resource

REGULATORY APPROACH TO UNLOCK THIS POTENTIAL ON THE DISTRIBUTION GRID

Two philosophical views emerging *again:*

- *Align Regulatory Incentives to have the Utility Enable Innovation*
- *Try to animate markets through competition(NY REV)*

History: Learn from others what has and has not worked

- In the U.S. and Europe, DR is still used as an “emergency not as a “grid” resource.
- DR programs designed to operate for <80 hours/year.
- DR typically called <20 hours/year
- ADSM: A 440+ hour/year resource, two way, verifiable by Grid Operator, real-time
- ADSM: Not one-way, not 80 hours, not seasonal, not emergency only use
- In the U.S., great things have been accomplished:

- But the net result related to the Root Cause Problem of our Industry, the system load duration curve is WORSE? Yes, it is worse now than it was 25 years ago.
- Grid is “peakier”, causing reliability issues, price separation from peak to base load and other economic problems and stability issues for utilities and consumers
- In the US, Utilities not in control of their grid and it is getting worse
- The wrong metrics are being used, it’s not about “sign ups” in a program, it is about whether or not we are solving the problems we set out to solve.

Traditional DSM Models: Regulatory Economic Implications

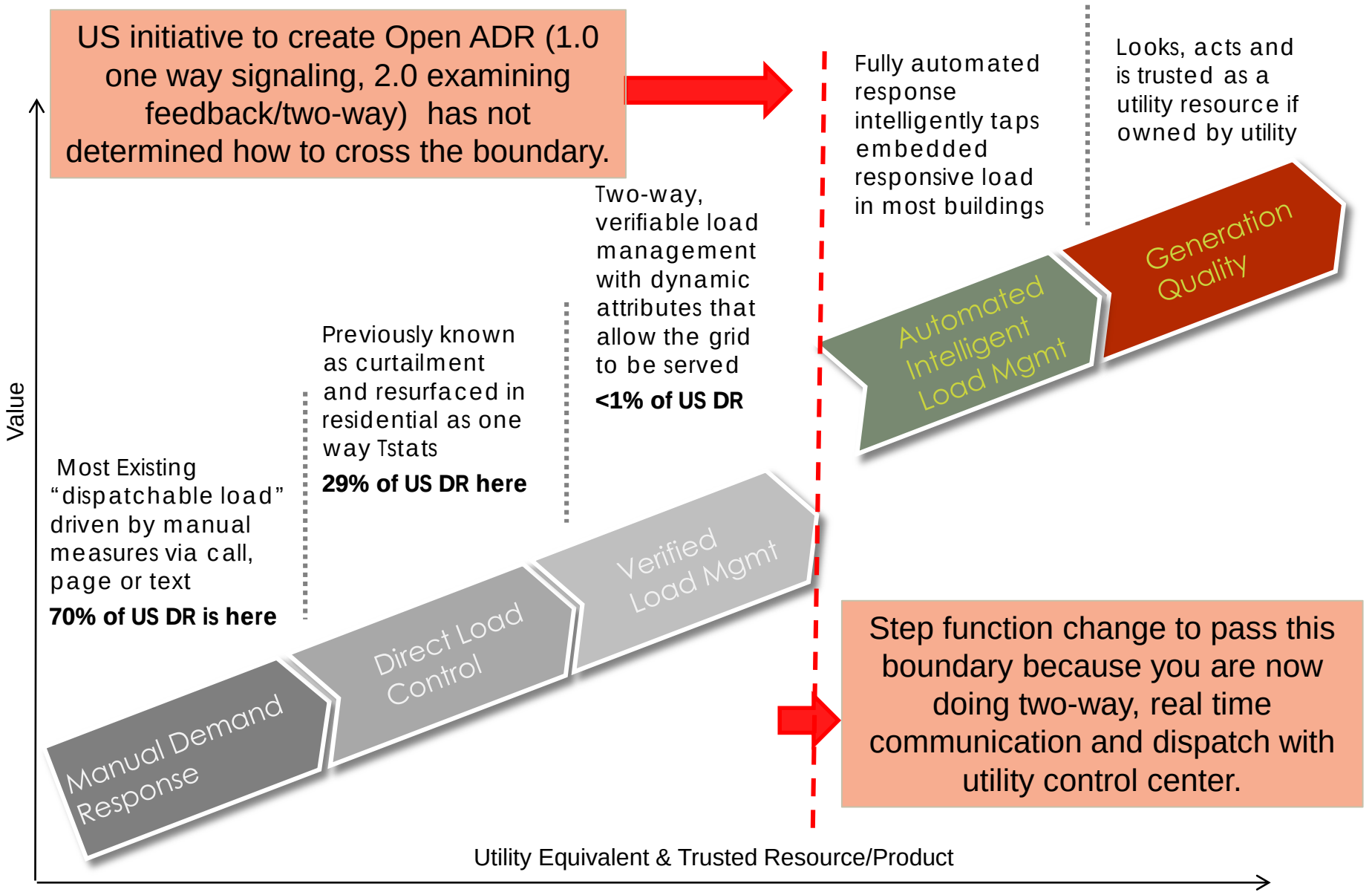
Traditional DSM or DR program structures

- No physical assets
- Programmatic expenses are created
- Execution of DSM events creates kWh reduction, which erodes revenue
- Customer interaction typically owned by vendor, creates conflict with regulator and utility
- Not treated as a 'regulatory equivalent' to other options, such as a peaking power plant

SPLIT INCENTIVES

The typical regulatory-or legislation-mandated DSM program creates new expenses while reducing revenue. No asset is created to be included in rate base. The utility's customer relationships are transferred to a vendor. The utility must manage a programmatic pass-through expense with negative revenue implications and negative customer impacts. Customer complaints to regulators increase.

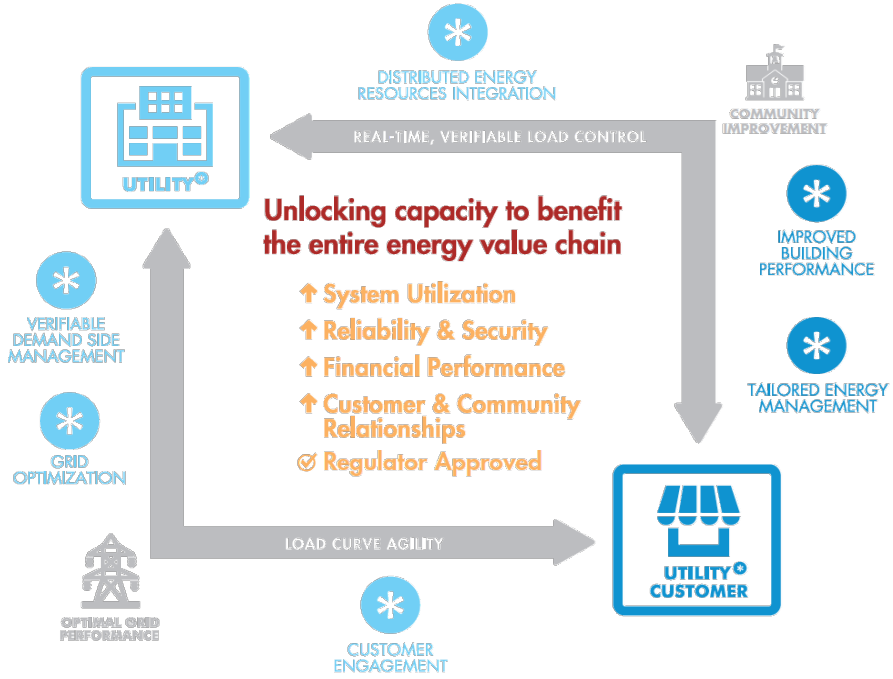
US initiative to create Open ADR (1.0 one way signaling, 2.0 examining feedback/two-way) has not determined how to cross the boundary.



Step function change to pass this boundary because you are now doing two-way, real time communication and dispatch with utility control center.

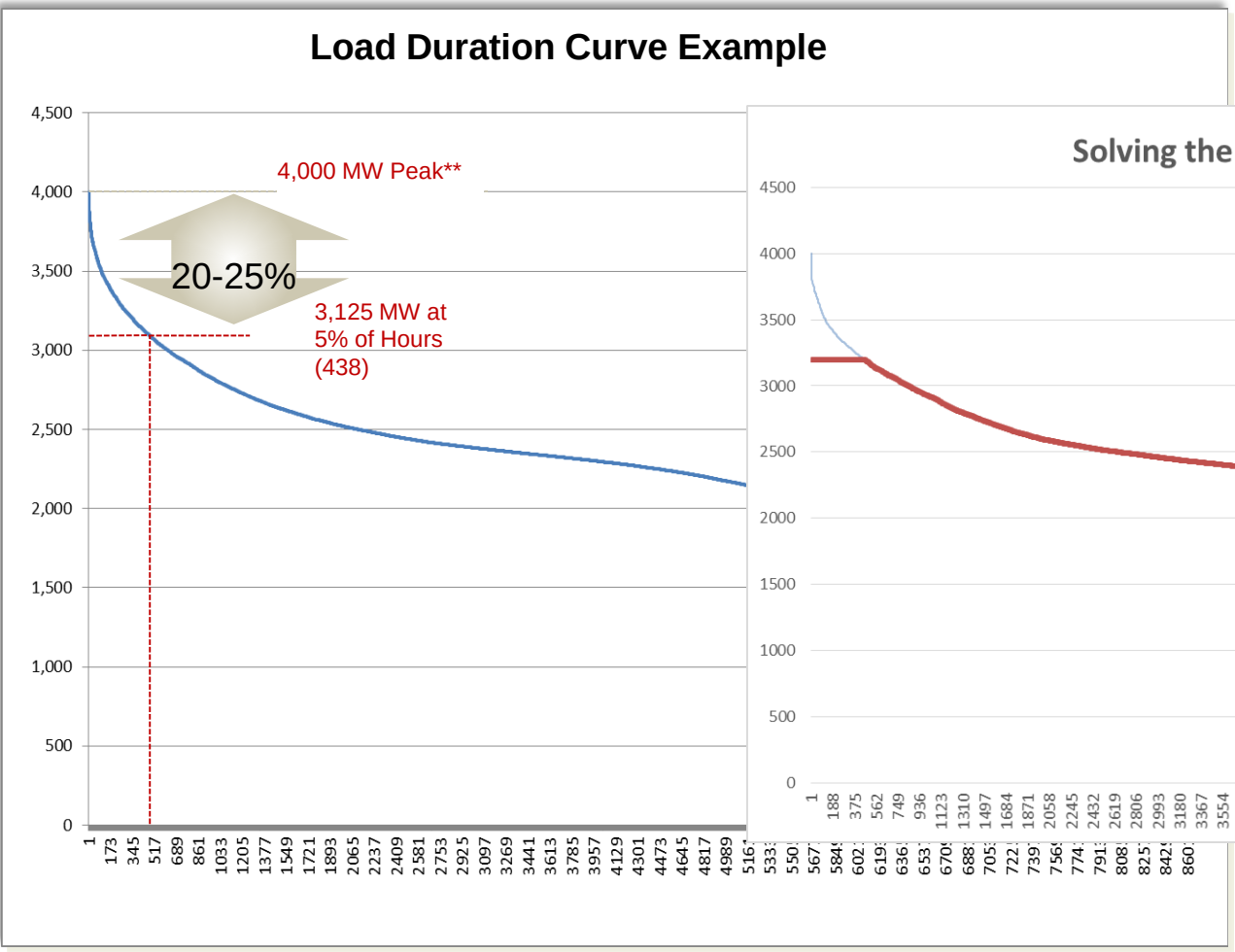
Automated Demand Side Management

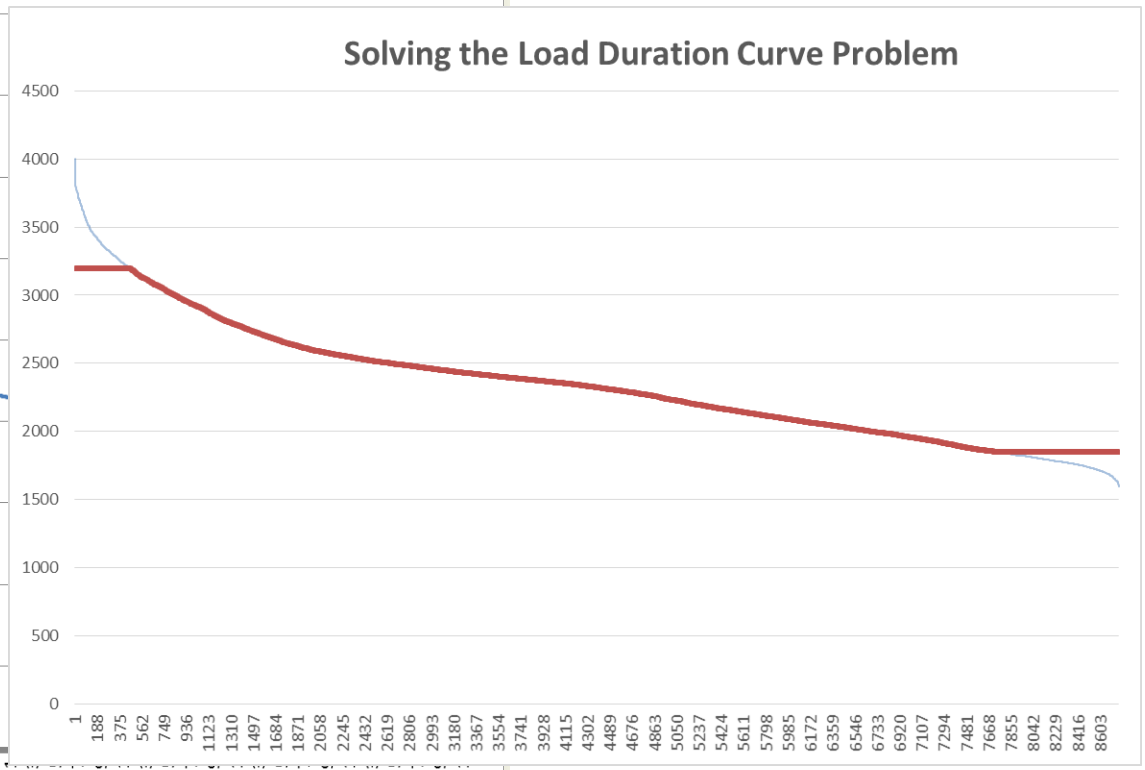
- Automated Demand Side Management incorporating Distributed Energy Resources for the benefit of all stakeholders
  - Demand Side Management can be a 400 hour/year resource
  - It can be two-way and verifiable by Grid Operator in real-time
  - This enables ADSM to address the load duration curve, and smooth out the peaks in the system
  - Regulation can align utility and customer interest to optimize system



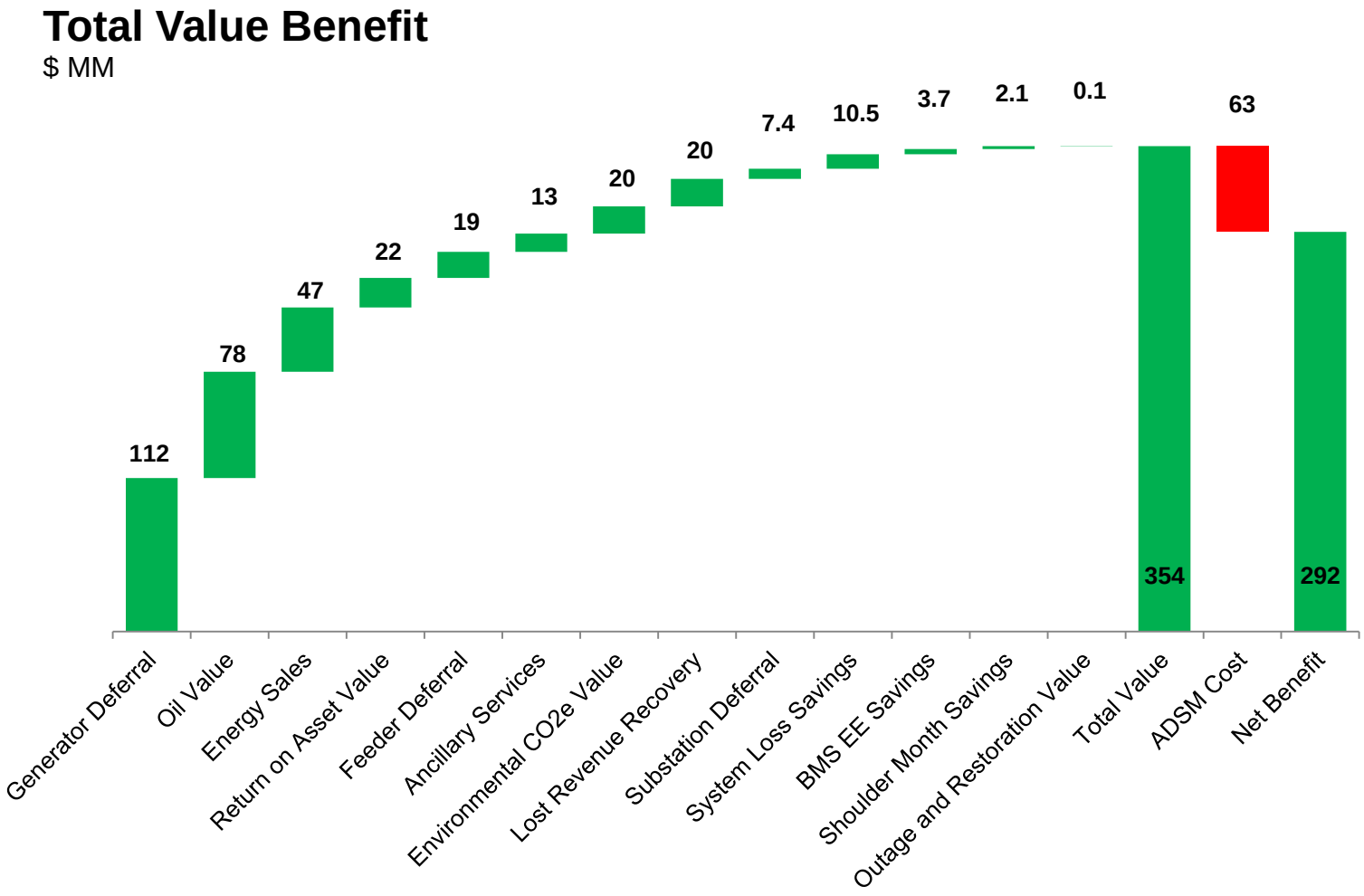
Ensure ADSM designed to attack 400 hours/year of the LDC

Create Automated & Dispatchable DSM with DER's that can be trusted and relied upon up grid operators to effectively manage and optimize their system.





What's the real value of this new resource ADSM with DER?



Asset Based Approach for ADSM with DER Regulatory and Economic Implications

- ADSM provides system optimization and reliability. The ADSM equipment can be recognized as a plant-in-service asset
- Enhances the utility's value to their customer, through incentive or tariff
- Works within existing regulatory framework to simplify program creation and support regulatory goals for electrification of the Power Sector
- Designed to enable a truly equivalent resource for the utility to choose
- Designed to improve the overall GDP of through efficient, effective, reliable and low cost supply of electricity

ASSETS ARE INSTALLED THAT THE UTILITY CAN ADD TO RATE BASE AND EARN ON

Utility relationships with key commercial and industrial customers can be improved. Regulatory framework exists today so can get started quickly and create value for every stakeholder in the energy value chain. True Win-Win-Win model for Utility-Customer-Regulator.

Asset Based Approach for ADSM with DER Recommended Regulatory Framework Outline

Step 1: Allow the asset to be placed into rate base.

Step 2: Define regulatory treatment for the programmatic/recurring cost of the program and customer incentives.

Step 3: Define regulatory treatment for the lost revenue from reduced kWh due to ADSM events and EE effects.
Consider kWh dispatched instead of kWh sold.

Step 4: Define the regulatory treatment/tracking for the environmental benefits associated with the kWh reductions for both EE and ADSM. (White Tags)

Step 5: Define the regulatory treatment of fuel pass through mechanism for aggregation of customer owned distributed generation resources.

USE TRADITIONAL REGULATORY STRUCTURES TO IMPLEMENT

For each of these 5 steps, regulatory recovery mechanism already exist. Nothing new!

Alternative View

- Use Competition to try to *Animate* a market among end-use consumers through third party merchants, like mini RTOs on the distribution grid
- Require distribution utilities to maintain a reliable distribution grid and dispatch distributed energy resources, including demand response, but do not allow them to own the resource

UNCERTAIN

Has potential to unlock innovation, but also will create uncertainty in the market as distribution utilities wait to see whether price differentials and third party marketing result in significant or optimal deployment of technology. DERs will not be planned or coordinated to optimize the system, so it is unlikely that goal can be achieved.

Summary

- Need to align utility, consumer and regulatory goals
- Advanced Demand Side Management with Distributed Energy Resources has matured to be able to be an integral part of Utility Capacity Portfolio
- Opportunity to improve system utilization by as much as 20%!
- Opportunity to use Automated and Dispatchable DSM for ‘Peaking Power’ and to balance intermittent renewables
- Regulatory equivalent treatment for demand side investments allows utilities to embrace these programs and the investments necessary to make them part of their standard planning and operating practices
- This leads to a robust, stable, reliable optimized grid that enables customer participation through demand management and distributed energy resource integration on the grid

THANK YOU!

QUESTIONS?

THANK YOU!

Appendix

Specific Examples of the Five Steps of Regulatory Recovery and their Overall Impacts

Asset Based Approach for DSM
Recommended Regulatory Framework Outline

Partnership approach with regulators to define a successful model for ADSM and DER. Develop a Common Framework for scale implementation.

Step 1: Allow the asset to be placed into rate base.

Step 2: Define regulatory treatment for the programmatic/recurring cost of the program and customer incentives.

Step 3: Define regulatory treatment for the lost revenue from reduced kWh due to DSM events and EE effects.

Step 4: Define the regulatory treatment/tracking for the environmental benefits associated with the kWh reductions for both EE and DSM. (White Tags)

Step 5: Define the regulatory treatment of fuel pass through mechanism for aggregation of customer owned distributed generation resources.

Concept: Use traditional Regulatory structures to implement. For each of these 5 steps, regulatory recovery mechanism already exist. Nothing new!

Example Effects of Implementation

Step 1: Allow the asset to be placed into rate base

RR = RB (ROR) + Exp

RR=Revenue Requirement

RB=Rate Base

ROR=Rate of Return

Exp=Expense

Rate Base Increase	Rate Base Decrease
ADSM Platform	Distribution Feeder Upgrade Deferral/Elimination
	Substation Upgrade Deferral/Elimination
	Peaking Power Plant Deferral/Elimination

Net Effect

Overall capital requirements for the business will be decreased and Rate Base will be slightly lower as the investments on the demand side are less costly than those on the supply side.

Example Effects of Implementation

Step 2: Define regulatory treatment for the programmatic/recurring cost of the program and customer incentives.

RR = RB (ROR) + Exp

Expense Increase	Expense Decrease
Opex for ADSM platform	Opex for Peaking Power Plant
Opex for Customer Incentives	Opex for Peaking Power Plant fuel

Net Effect

Overall expense requirements for the business move from volatile and variable costs of power plant operation and fuel to stable, fixed costs on the demand side that engage and improve relationships with customers. Overall expenses are less.

Example (cont)

Step 3: Define regulatory treatment for the lost revenue from reduced kWh due to DSM events and EE effects.

Method allows all stakeholders to recognize the value of a reduction in kWh equally as valuable as one produced from a generator and sold to a customer. Removes "Dis-incentive" for utility by allowing the reduced kWh from dispatched ADSM events to be recovered instead of being an expense that erodes the utility revenue stream.

dkWh=dispatched generation kWh + dispatched ADSM kWh

dkWh = total dispatched kWh

Utility Avg $/kWh = (RB(ROR) + Exp) / dkWh

As with a power plants produced kWh, ADSM kWh is now recovered fairly across all utility customers.

Net Effect: De minimis effect in total

Example (cont)

Step 4: Define the regulatory treatment/tracking for the environmental benefits associated with the kWh reductions for both EE and DSM. (White Tags)

dkWh tracked and measured. Total dkWh leads to a defined carbon equivalent reduction based on the fuel mix of the region.

Additionally possibility to include positive environmental effects of the deferral and/or elimination of additional fossil fired peaking power plants.

Net Effect

Significant Carbon Equivalent reductions identified to help meet sustainability goals with no incremental expense for the tracking and certification mechanism.

Example (cont)

Step 5: Define the regulatory treatment of fuel pass through mechanism for aggregation of customer owned distributed generation resources.

Engage resources that have been invested in by customers and make them an active and positive part of the grid optimization.

Rate Base Increase	Rate Base Decrease
Synchronous Interconnection Switchgear	Peaking Power Plant Deferral/Elimination

Expense Increase	Expense Decrease
Opex for maintenance share	Opex for Peaking Power Plant
Opex for fuel	Opex for Peaking Power Plant fuel

Net Effect

Overall expense requirements for the business neutral. Significant grid reliability/stability improvement and customer satisfaction through partnership of shared operation/fuel to help manage their expense in exchange for grid support.

ADSM + Akin Gump Model Outcomes

- Lower kWh charge (cost recovery based on dispatch)
- Distribution Company intimately tied to the customer
  - Future opportunities large and potentially available
  - Lower disintermediation possibility
- Distribution total cost is lower and more reliable
  - Outcomes aligned with Regulator's interests
  - Outcomes aligned with Customer's interests
- Total Utility Rate Base slightly lower (ADSM vs. Peaking Power Plant investment and deferral/elimination of upgrades)
  - Cash freed up for alternative investments
- Platform created to help enable and accept a wide variety of current, and future, edge grid technologies
- Mitigate or Mute Peak vs Off Peak Cost/Price by flattening the Load Duration Curve

Summary

- You are now uniquely positioned to leapfrog existing DSM/DER paradigms in markets like the US and Europe.
- Opportunity to utilize Automated and Dispatchable DSM for 'Peaking Power' for total system utilization and reliability and enabling renewables. Improving the performance of the wires business while helping meet state and national goals for sustainability and system optimization.
- Bringing the consumer, the regulator and the utility together creates a powerful partnership to drive the overall performance of your grid
- These initiatives will fail if the utility, consumer and regulatory goals are not aligned. Regulatory equivalent treatment for demand side investments must be achieved for utilities to embrace these programs and the investments necessary to make them part of their standard planning and operating practices.
- KPI's must measure and be correlated to system impact, not programmatic enrollment or programmatic measures.