

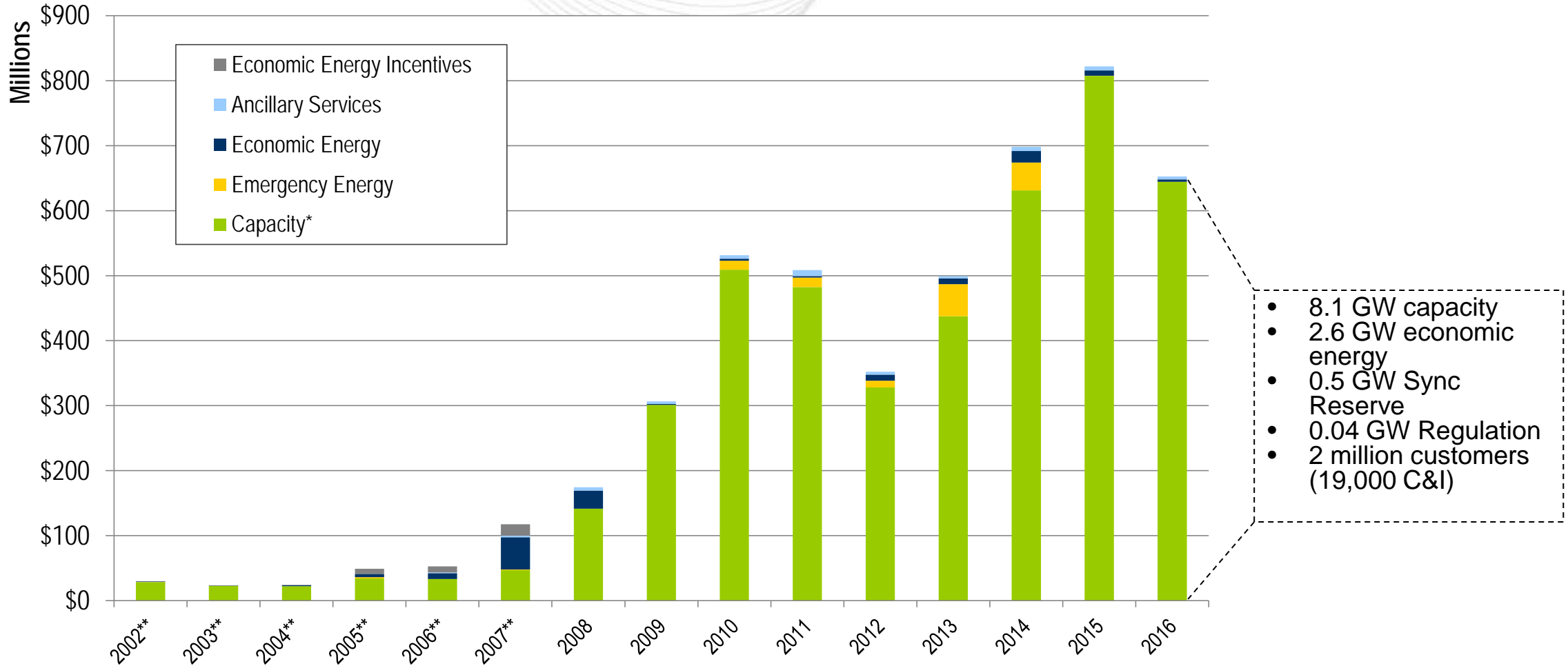


DR Strategy

- 10 years since implementation of
 - RPM
 - CSP model
- DR opportunities expanded to all markets
- Evolution from DR “pilots” to “resources”

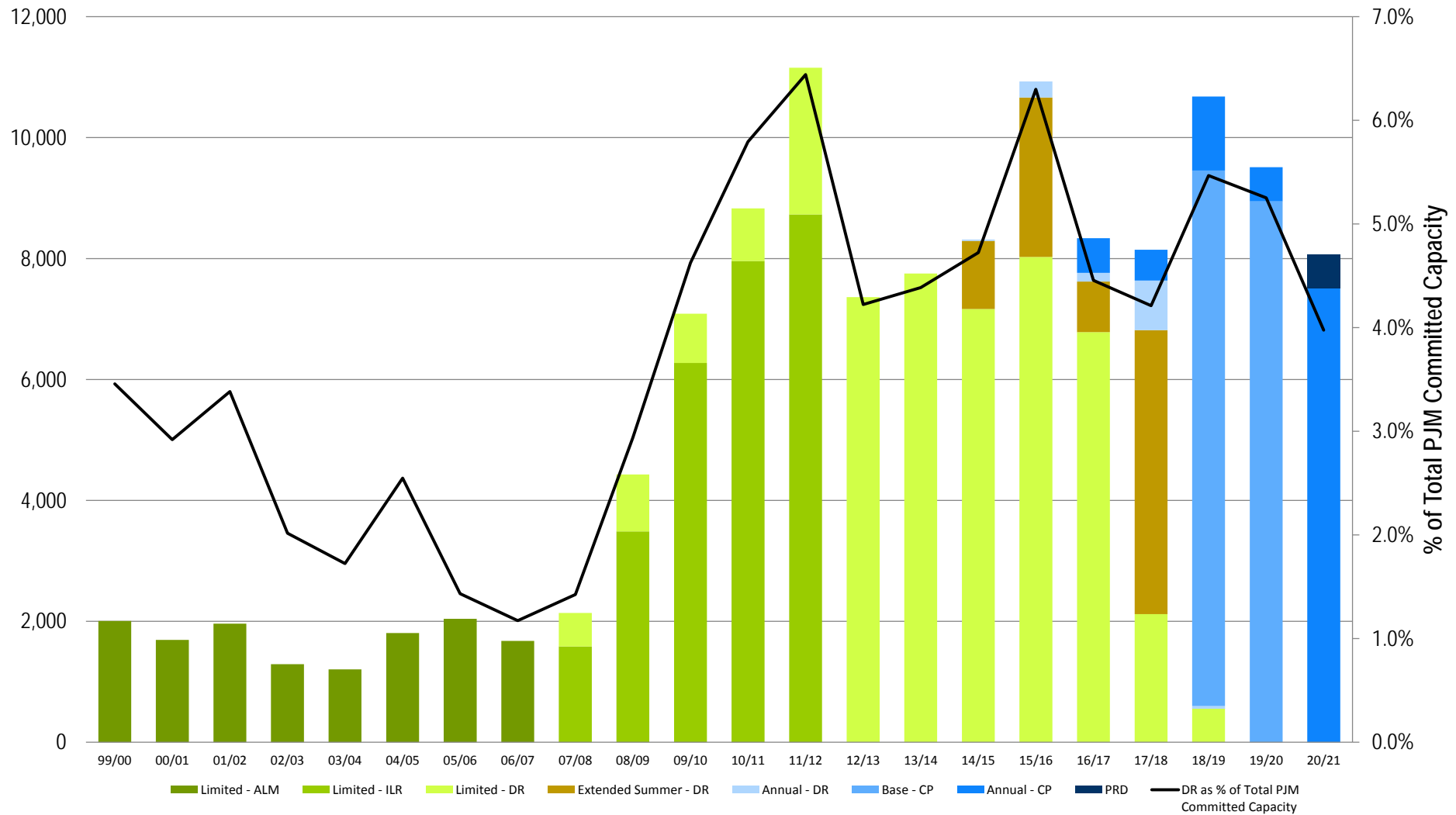
PJM wide effort to review current DR processes





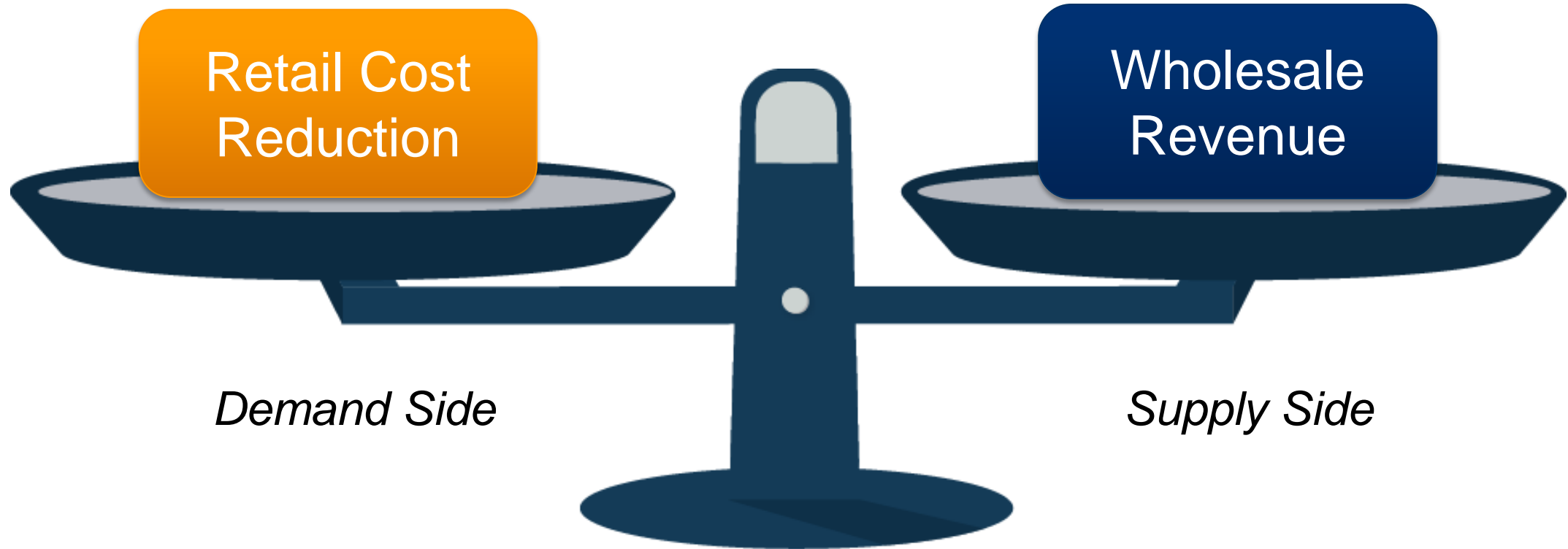
- 8.1 GW capacity
- 2.6 GW economic energy
- 0.5 GW Sync Reserve
- 0.04 GW Regulation
- 2 million customers (19,000 C&I)

DR Capacity Market Participation by Product

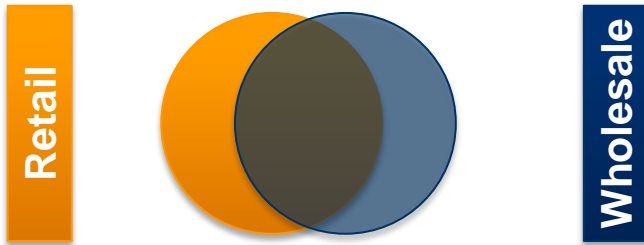


- Ensure DR is a predictable, reliable, and transparent resource to manage the grid,
- Enable price sensitive demand for more efficient market outcomes, and
- Increase alignment of wholesale and retail market incentives through coordination with state retail regulatory authorities.

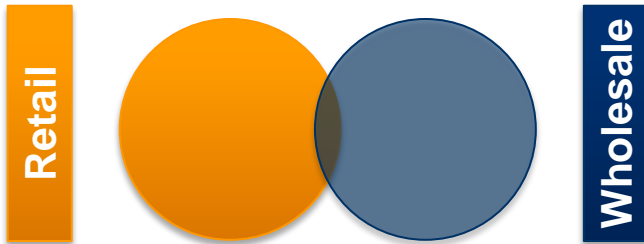
Retail Customer's Opportunity to Manage Electricity Cost by Changing Consumption



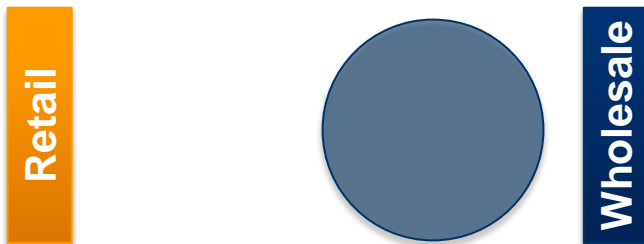
Manage Electricity Cost - Overlap of Retail Market Cost Reduction vs Wholesale Market Revenue Opportunities






Energy (80% of cost) - significant overlap between retail market cost reduction and wholesale market revenue opportunities. Issue with full LMP compensation.



Capacity (16% of cost) - minimal overlap between retail market cost reduction (peak shaving) and wholesale market revenue opportunities. Customer chooses which way to manage cost (no concerns with double counting).



Ancillary Services (4% of cost) - no significant opportunity to reduce retail market cost reduction, need to participate in wholesale market and receive revenue to reduce

Legend	
Gap (Regulatory)	Indicates how difficult it would be from a regulatory standpoint (State and Federal) to implement the future state.
Gap (Stakeholders)	Indicates how much support/opposition there would be from PJM stakeholders to implement the future state. Large gap means more than 1 stakeholder group would oppose.
Gap (Cost)	Indicates how much it would cost PJM stakeholders (PJM, members, people/process/system changes) to implement the future state.
Value (Benefit)	Reflects value future state would bring to all stakeholders (PJM & members). Value represents increased reliability and lower costs and/or risk.
	Large gap between current vs future state (Cost > \$5mm), Value = Not a significant amount of value or difficult to quantify.
	Medium gap between current vs future state (Cost \$1-5mm), Value = Significant value for at least one whole member sector or PJM
	Small gap between current vs future state (Cost < \$1mm), Value = Major perceived value to PJM and most member sectors.
Timeframe	Long term = attribute on the radar 5+ years in the future, Medium term = attributes to consider over the next 3 to 5 years after DR participation in CP is better known, Short term = attributes to consider over next 2 years.

Time Frame	Market	Attribute	Current	Future	Regulatory	Stakeholders	Cost	Value
Short	Capacity	Product	DR, PRD (proposed WLR)	Consistent DR mechanism for wholesale market participation.	●	●	●	●
Short	Capacity	Aggregation	Ability to aggregate by registration and by resources (DR or other permitted types)	Optimize aggregation rules in capacity market to enable seasonal DR customers to fulfill CP commitment	●	●	●	●
Short	Capacity	Capacity Dispatch	Dispatch by variety of parameters through administrative procedures	Develop model that will provide optimal DR dispatch strategy based on current state of system, forecast, and prior use of DR.	●	●	●	●
Short	Capacity	Training	Training not required	Implement mandatory training to ensure all CSPs are ready when DR is dispatched	●	●	●	●

Transition to CP (annual capability through aggregation)

- Maintain DR in wholesale capacity market and transition to capacity performance
 - New CP rules implemented (auction aggregation, aggregation across LDAs, winter M&V comparable to summer M&V)
 - Current DR capacity commitment (17/18 DY) = 8,105 MW (16% are CP/Annual resources).
 - 2020/21 BRA results (first DY with CP only) - 7,820 of DR cleared (96% CP resources). The new auction aggregation process cleared 289 MW of the 1,480 MW offered as summer only DR.
- Develop DR dispatch model to optimize dispatch and release of DR.
- Review DR and PRD rules and consider integrating into one approach.
 - First step underway to review potential CP related changes to PRD
- Continue to increase PJM operational visibility of DR.
- Implement broader energy market changes (5 min settlements, hourly offers, price caps).
- Identify any needed enhancement for Distributed Energy Resources that operate as DR.
- Implement mandatory training to ensure all CSPs are ready when DR is dispatched.

- Customer load reductions (“peak shaving”) on the retail side may not be as effective as participation directly in the wholesale capacity market:
 - Customers need to predict when to curtail to reduce peak load contribution
 - curtail more often to avoid missing one of the peak days.
 - No curtail because did not know it was needed
 - The grid may not need the customer to curtail on the peak day if there are more economic supply resources available
 - The total amount of capacity procured will not significantly change for several years (forecast is stochastic process).
 - When 1 customer’s capacity requirement goes down, the other customers’ capacity requirements may go up, which may lead to cost shifting, and
 - A forecast of demand reductions in the future based on past behavior is not as transparent and reliable as a future commitment to reduce load.

Customers should continue to have opportunity to participate in wholesale capacity market instead of being required to “peak shave” to manage capacity cost

Ensure DR capabilities are aligned with DR commitments

- Ensure DR commitments reflect DR capabilities by developing and implementing:
 - More robust and comprehensive capacity testing requirements.
 - Synchronized Reserve testing with enhanced performance measurement (CBL approach).
- Work with states and other stakeholders on other options to recognize the value of seasonal resource flexibility.
- Refine PJM ability to dispatch DR by quantity and by location.

Long Term Direction: look for opportunities to move DR in the energy market to the demand side

- Look for opportunity to move DR in the energy market to demand side (cost savings) by modifying or eliminating energy compensation.
- Collaborate with Load Serving Entities to support contracts/pricing that fosters demand elasticity.
- Expand participation in Ancillary Services markets where performance is comparable to generation.
- Foster investment and implementation of DR automation
- Look for opportunity to move Energy Efficiency to demand side (cost savings) by eliminating capacity compensation.