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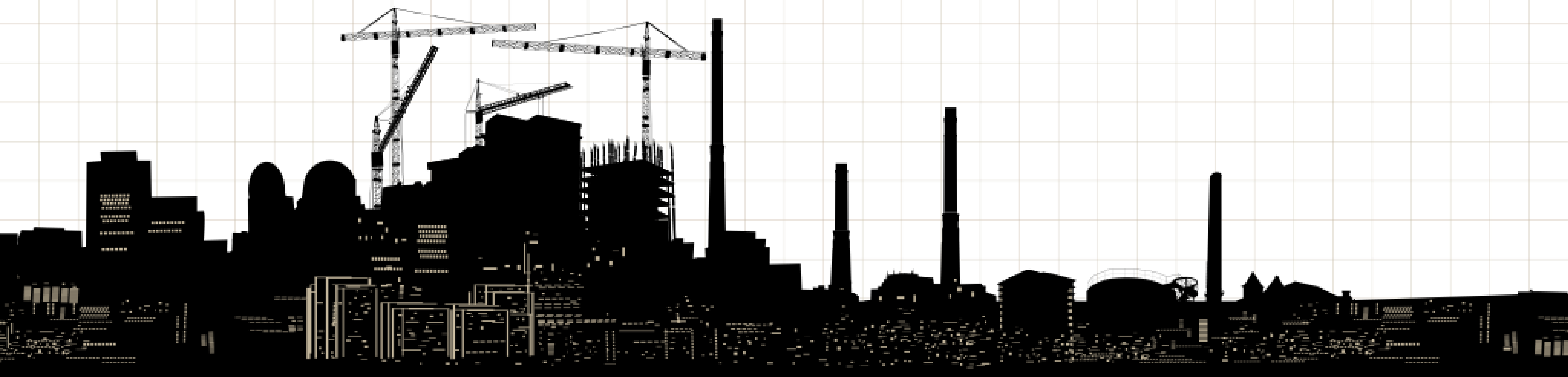
# ELECTRIC POWER IN NEW ENGLAND



# AGENDA

- New England Generation Risk
- The Challenge
- Solutions
  - Demand Response
  - Capacity Tag Management
- Standby Emergency Generator Status
- Demand Response Economics
- Demand Response Enrollment
- Questions

# NEW ENGLAND GENERATION RISK
## (ISO-NE 2010 Economic Study)

## *Capacity Resources Assumed to be at Risk of Retirement*

| | Unit Type | MW Maximum Assumed | In-service Date | Age in 2020 | Unit | Unit Type | MW Maximum Assumed | In-service Date | Age in 2020 |
|---|---|---|---|---|---|---|---|---|---|
| BRAYTON POINT 1 | Coal | 261 | 1-Aug-63 | 57 | MONTVILLE 6 | Oil | 418 | 1-Jul-71 | 49 |
| BRAYTON POINT 2 | Coal | 258 | 1-Jul-64 | 56 | MOUNT TOM 1 | Coal | 159 | 1-Jun-60 | 60 |
| BRAYTON POINT 3 | Coal | 643 | 1-Jul-69 | 51 | MYSTIC 7 GT | Oil | 615 | 1-Jun-75 | 45 |
| BRAYTON POINT 4 | Oil | 458 | 1-Dec-74 | 46 | NEW HAVEN HBR | Oil | 483 | 1-Aug-75 | 45 |
| BRIDGEPORT HBR 2 | Oil | 190 | 1-Aug-61 | 59 | NEWINGTON 1 | Oil | 424 | 1-Jun-74 | 46 |
| BRIDGEPORT HBR 3 | Coal | 401 | 1-Aug-68 | 52 | NORWALK HBR 1 | Oil | 173 | 1-Jan-60 | 60 |
| CANAL 1 | Oil | 597 | 1-Jul-68 | 52 | NORWALK HBR 2 | Oil | 179 | 1-Jan-63 | 57 |
| CANAL 2 | Oil | 599 | 1-Feb-76 | 44 | SCHILLER 4 | Coal | 51 | 1-Apr-52 | 68 |
| MERRIMACK 1 | Coal | 121 | 1-Dec-60 | 60 | SCHILLER 6 | Coal | 51 | 1-Jul-57 | 63 |
| MERRIMACK 2 | Coal | 343 | 30-Apr-68 | 52 | W. SPRINGFIELD 3 | Oil | 111 | 1-Jan-57 | 63 |
| MIDDLETOWN 2 | Oil | 123 | 1-Jan-58 | 62 | YARMOUTH 1 | Oil | 56 | 1-Jan-57 | 63 |
| MIDDLETOWN 3 | Oil | 248 | 1-Jan-64 | 56 | YARMOUTH 2 | Oil | 56 | 1-Jan-58 | 62 |
| MIDDLETOWN 4 | Oil | 415 | 1-Jun-73 | 47 | YARMOUTH 3 | Oil | 122 | 1-Jul-65 | 55 |
| MONTVILLE 5 | Oil | 85 | 1-Jan-54 | 66 | YARMOUTH 4 | Oil | 632 | 1-Dec-78 | 42 |

**TOTAL 8,281 MW**

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# THE CHALLENGE
## *Retirements Alone Result in Capacity Shortfalls*

*Region will be challenged to meet 2020 Installed Capacity Requirements absent replacements, repowering or the addition of new resources*

| | |
|---|---|
| Qualified Capacity Assumed Available in 2020 including EE Forecast | 37,000 MW |
| Representative Installed Capacity Requirement in 2020 (net of HQICC) | 34,600 MW |
| Margin Before Potential Retirement of At-Risk Units | 2,400 MW |
| Amount of At-Risk Generation | 8,300 MW |
| Shortfall After Retirements | - 5,900 MW |

| | |
|---|---|
| Shortfall After Retirements | - 5,900 MW |
| April 2013 Generator Interconnection Queue* | 5,200 MW |
| Shortfall plus queue | -700 MW |

** Generator Interconnection Queue includes nameplate capacity – note almost 40% of April 2013 queue is wind generation*

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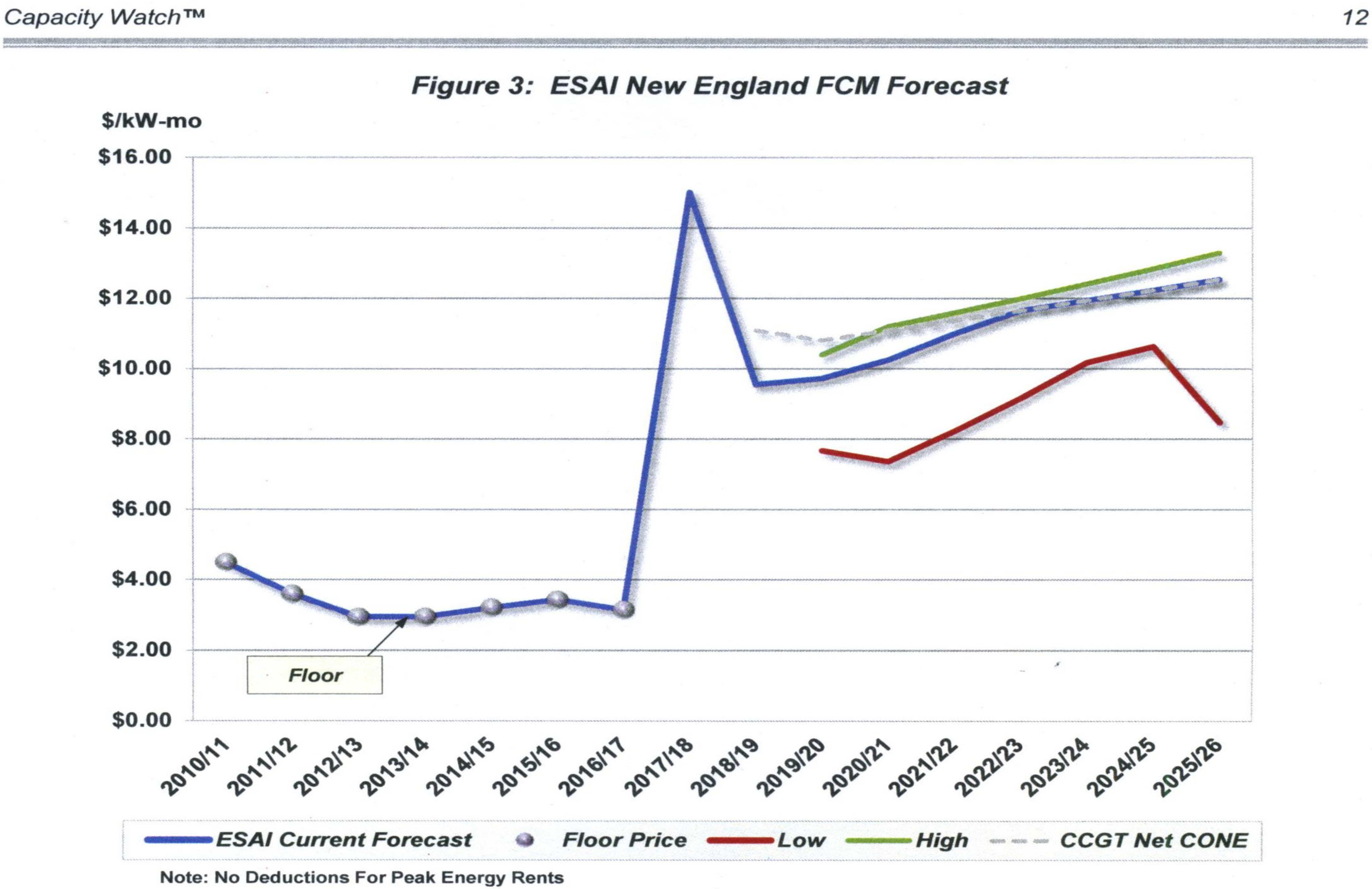
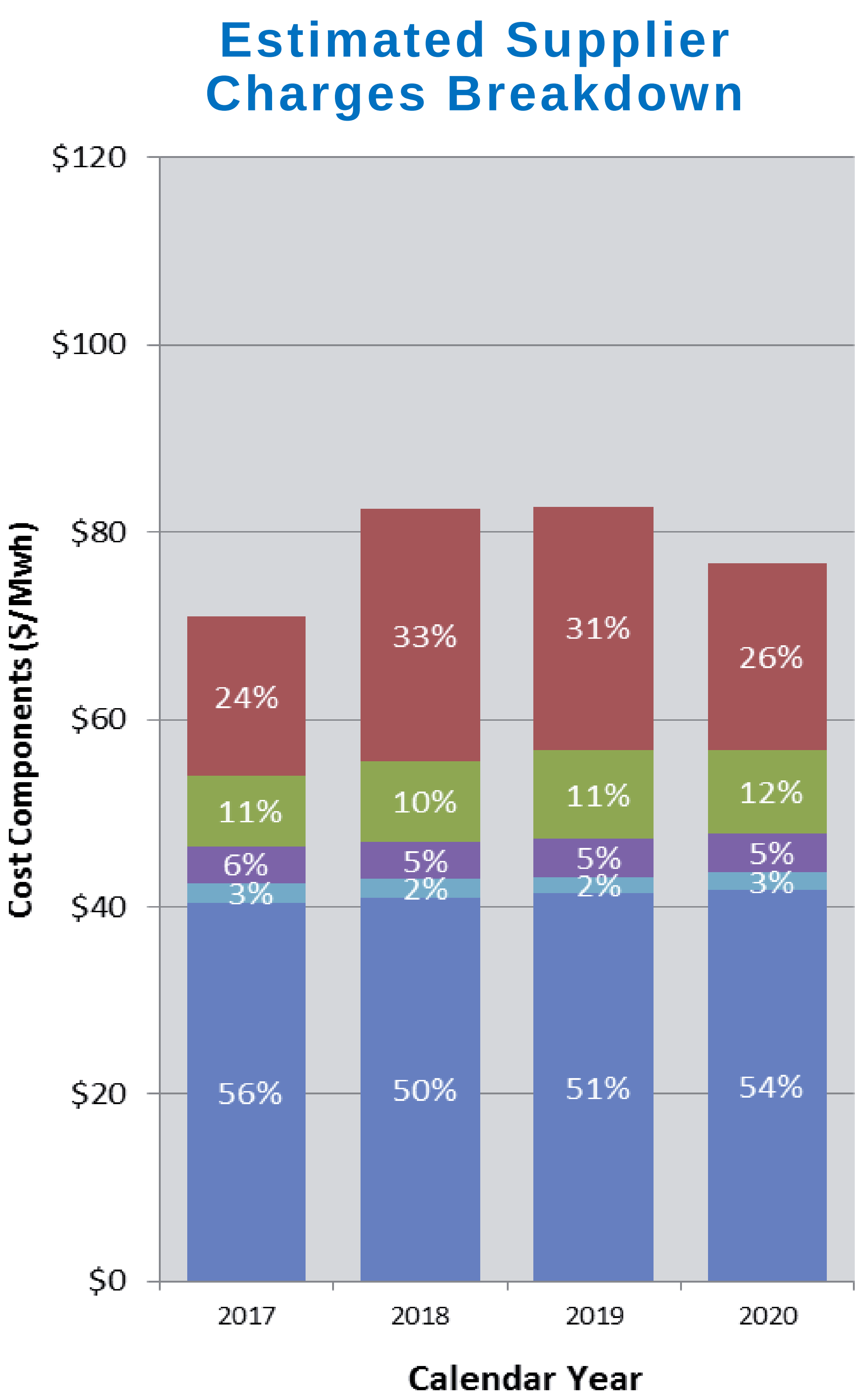
# THE CHALLENGE



# THE CHALLENGE




- **Capacity** – Determined by prices set from independent system operator (ISO)-run auctions and customer capacity tag (peak usage). Designed to provide grid reliability and ensure enough generation available to the region.
- **Renewable Portfolio Standards (RPS)** – Mandates set by individual states for load-serving entities to purchase a certain amount of renewable energy. Determined by state regulated compliance percentages and the financial market for renewable energy certificates (RECs).
- **Ancillaries** – Small administrative charges billed to load-serving entities by the ISO to operate grid safely and reliably.
- **Line Losses** – Included to make up for the energy lost over transmission and distribution (T&D) lines due to heating
- **Energy** – The cost of procuring the actual electrons transmitted through the T&D lines. Largely determined by cost of natural gas for New England.

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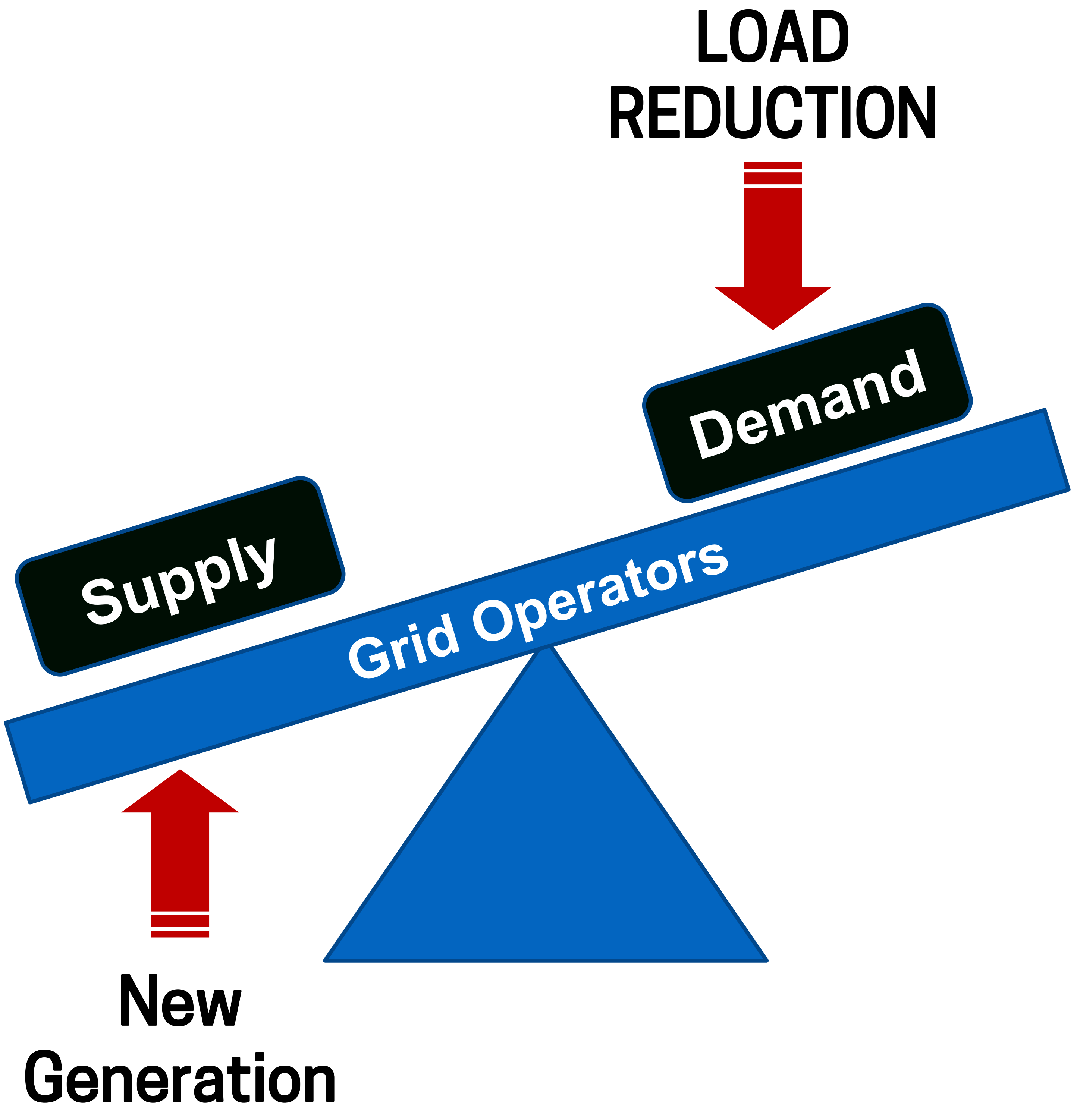
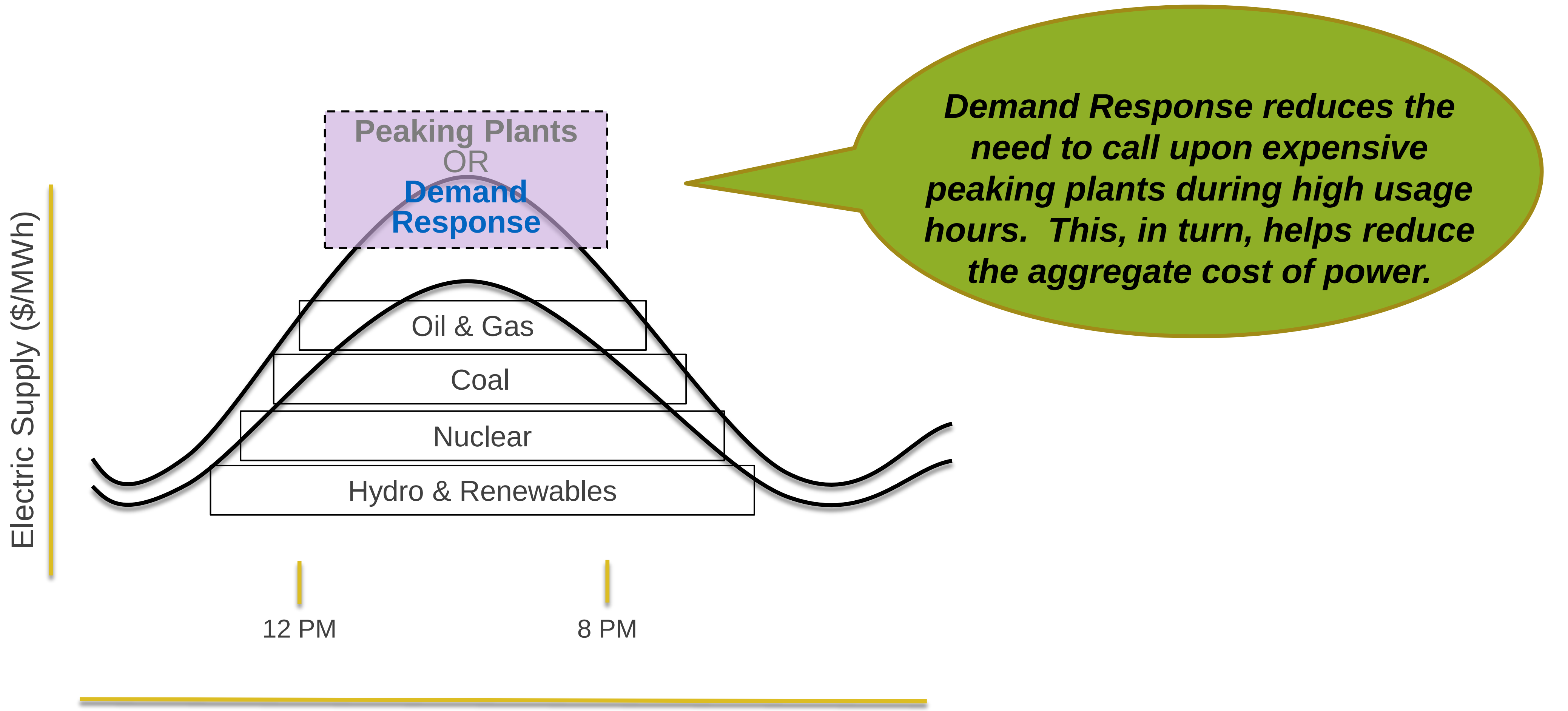
# SOLUTIONS


LOAD
REDUCTION
Demand
Supply
Grid Operators
New
Generation

# DEMAND RESPONSE

**Demand Response** is a collaboration of options providing financial opportunities for electricity users to appropriately manage down total energy spend by incorporating avoided cost or offset strategies.

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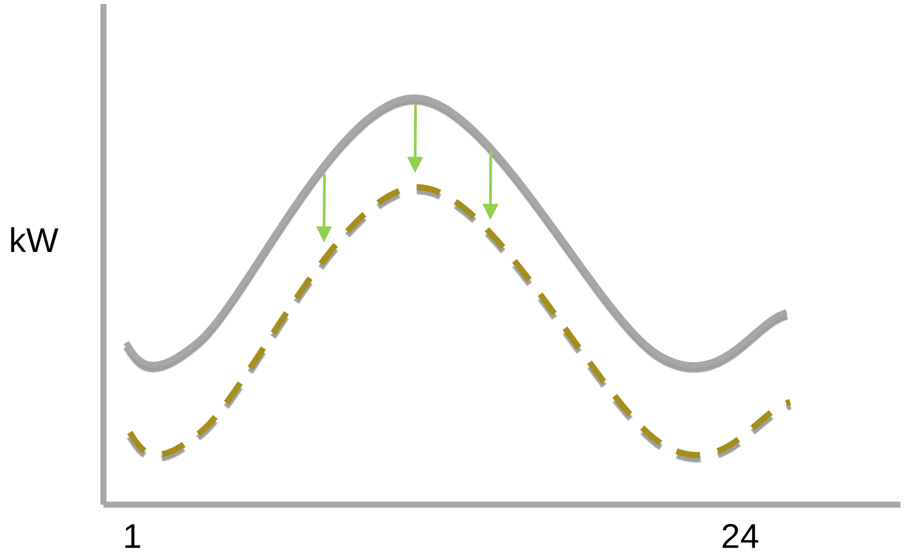
# DEMAND RESPONSE MEASURES

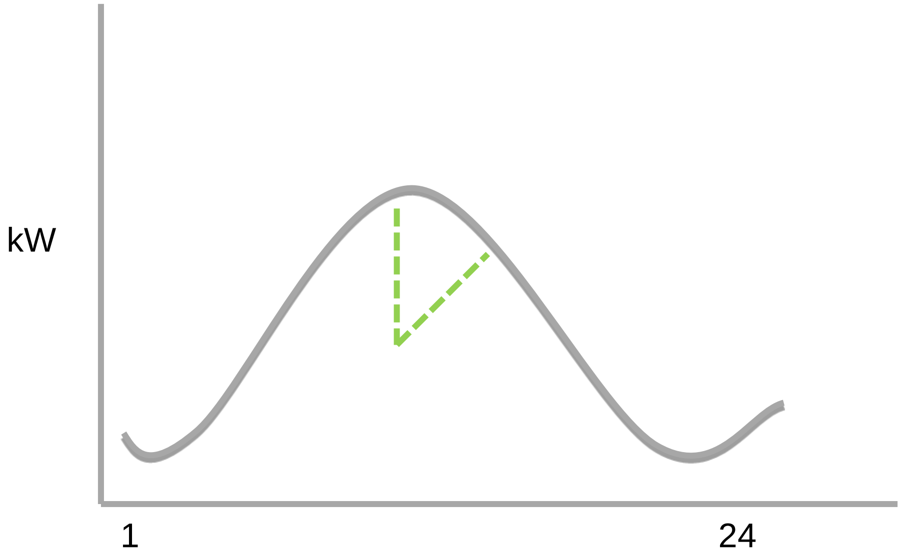
## On-Peak Demand Response

- ✓ Energy Efficiency
- ✓ Fuel Switching
- ✓ Distributed Generation
  - SolarPV
  - Cogeneration
  - Wind Turbines




## Real-Time Demand Response

- ✓ Curtail Load
- ✓ Adjust HVAC Settings
- ✓ Activate Standby Generator
  - Non-emergency
    - ➢ *Federal EPA*
    - ➢ *State DEP*

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# ON PEAK DEMAND RESPONSE

ISO-New England pays electricity consumers for installing load reduction measures that ***permanently*** reduce load across pre-defined On-Peak seasonal hours.

- Participants earn monthly payments for enacting measures that reduce electrical load on the power grid via:
  - Energy Efficiency
  - Fuel Switching
  - Distributed Generation
- On-Peak seasonal hours are 1:00pm to 5:00pm non-holiday week days in June, July and August (Summer Season) and 5:00pm to 7:00pm non-holiday week days in December and January (Winter Season)

## Capacity credit ownership

- Utility financial incentives
- Mass State Green Energy regulations

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# REAL-TIME DEMAND RESPONSE

ISO-New England pays electricity consumers for reducing their electric load when the New England power grid is stressed.

- RTDR is an emergency measure.
- Participants earn monthly payments for ***WILLINGNESS*** to reduce electrical load when called by the ISO-NE.
  - Curtailment: Real-Time Demand Response (RTDR)
  - Standby Tier 4 Generators

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# Summer Event: July 19, 2013

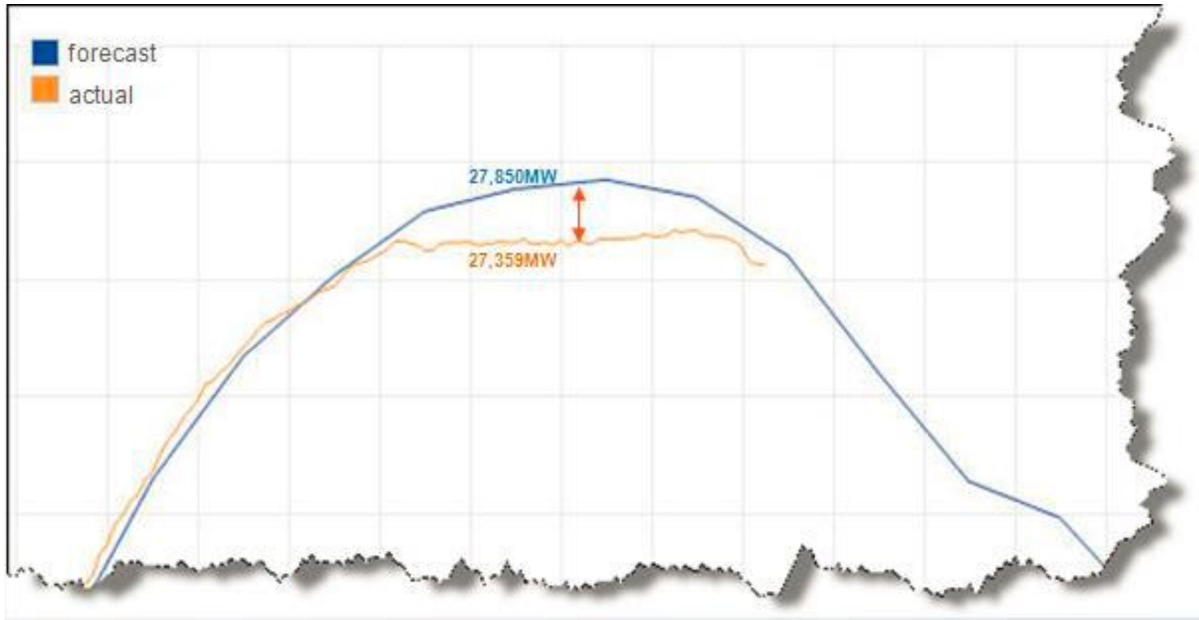
## Summer

- Strain on the grid is generally caused by hot and humid conditions resulting in transmission lines inability to carry the required power.

## There was a grid emergency event on July 19, 2013 for RTDR participants.

## Triggers:

- Forecasted temperature in Hartford and Boston was 99°F and with high humidity
- Sixth consecutive day with temperatures climbing above 90 degrees in New England
- Unplanned Generator Outages




| Duration of the July 19th, 2013 Real Time Event (Local Time) | | MW Dispatched | Percent Avg. Performance |
|---|---|---|---|
| Start Time (after 30 minute ramp) | End Time | | |
| 1:35 PM | 8:35 PM | 193 | **95%** |

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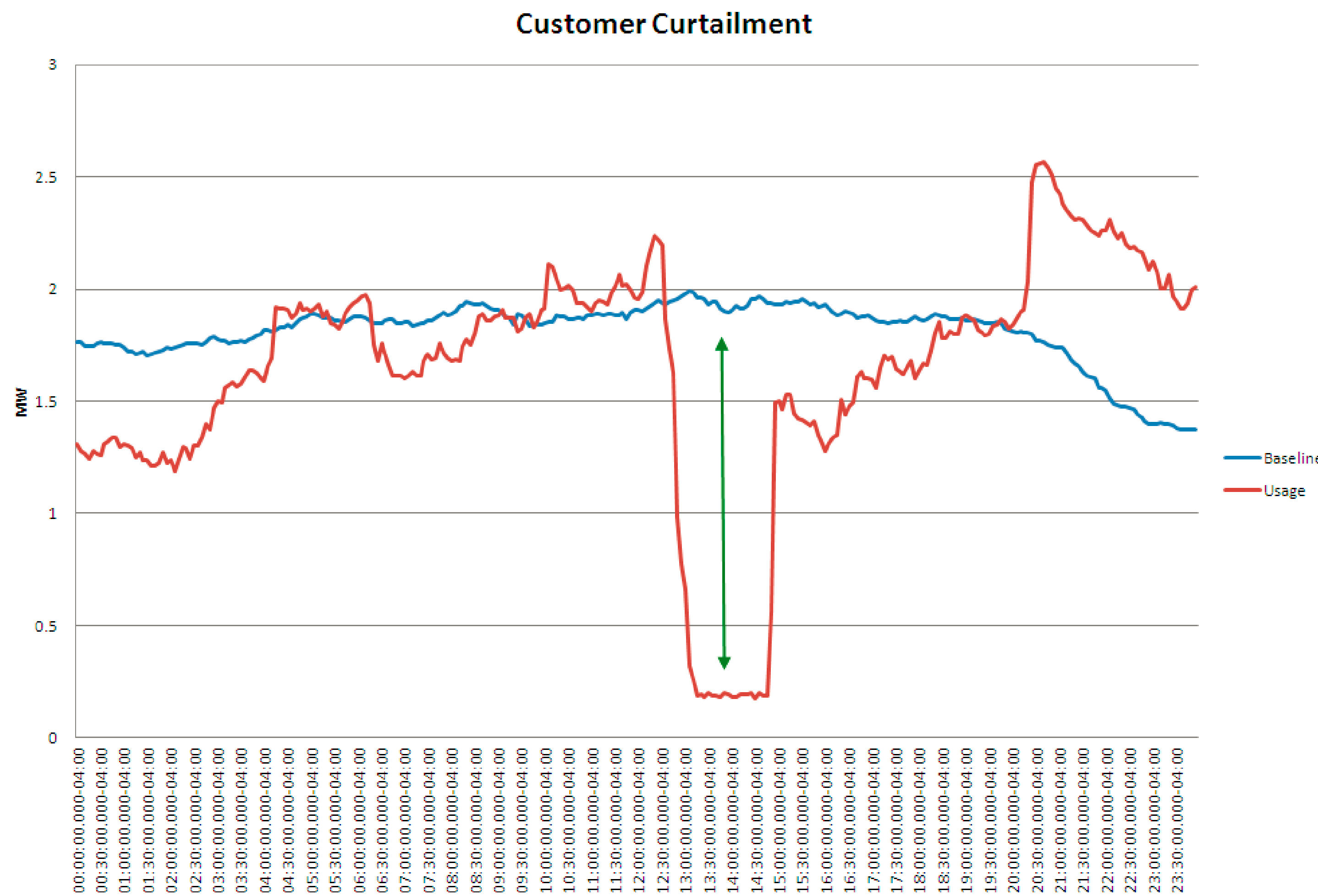
# Performance on Utility Meter

Performance is determined as the average hourly difference between baseline and actual load.

Performance is determined by ISO-NE through use of near real-time load data from installed metering equipment

- Note that failing Performance can lead to reduction of payment

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# REAL-TIME DEMAND RESPONSE

There are 2 Participation Seasons

- Summer Season: April - November
- Winter Season: December - March

In each season, tests ***will*** occur and events ***may*** occur.

- Test: 1 hour minimum
- Actual event: Duration based on need

## ACTUAL EVENT HISTORY

| YEAR | #EVENTS | HOURS |
|---|---|---|
| 2010 | 1 | 2:45 |
| 2011 | 2 | 6:45 |
| 2012 | 0 | 0:00 |
| 2013 | 3 | 13:10 |
| 2014 | 0 | 0:00 |
| 2015 | 0 | 0:00 |
| AVG. | 1.0 | 3:47 |

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# CAPACITY TAG MANAGEMENT

## What are peak demand (capacity) charges?

Every month your business is charged a fee—called a capacity charge or peak charge—based on how much electricity you consumed during the period when electricity demand was at its highest.  Capacity charges can account for up to 30% of your organization's monthly electric bill.

## How are they assessed?

The New England grid operator, ISO-NE, assesses capacity costs based upon each end user's kW or MW consumed during the peak consumption hour of the entire New England system on an annual basis. The basic value of capacity, in $/kW month, is determined by an ISO-NE auction process and these values are known 3 years in advance of any given year.

While capacity costs are determined by the ISO, the charges you see on your electricity bill are determined by your supplier. These charges therefore vary from supplier to supplier.

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# HOW CAN ELECTRICITY USERS LOWER THEIR CAPACITY CHARGES?

If an entity can curtail energy consumption during periods of peak system load, it will lower its capacity value (cap tag) which in turn will potentially reduce power costs.  Since the peak hour can only be confirmed after the summer peak periods are over, any end user consumption reduction made during the peak hour will be recognized with reduced charges on your power bill in the following year.

CPower's  Peak Demand Management service can help make this happen.

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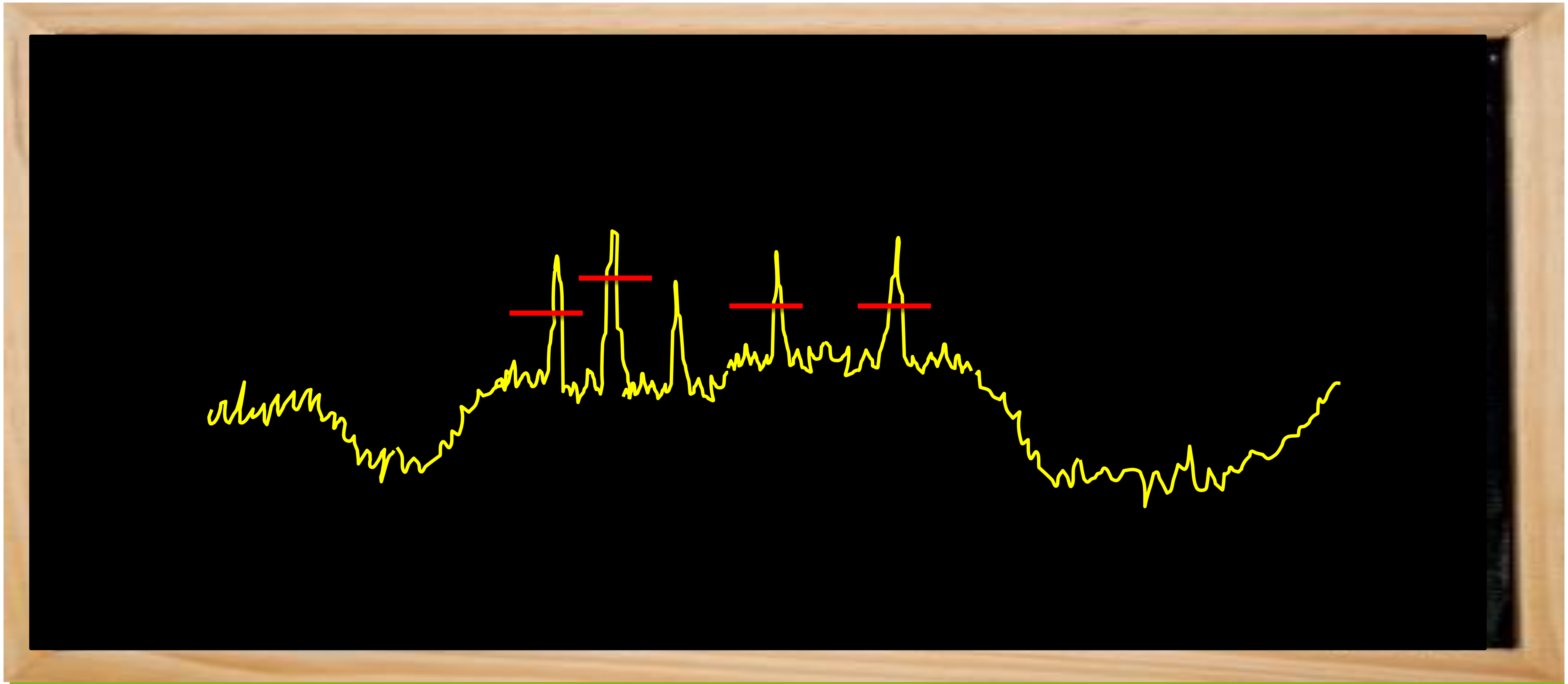
# CAPACITY TAG MANAGEMENT

Cap Tag Management allows electricity consumers to reduce the capacity component built into the $/kWh price their electricity supplier charges.



**Participant Impact:** Aside from the simple avoided cost of NOT using during high priced periods participants also receive an economic incentives for their reduction.

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# ECONOMICS

| | NEMA RTDR and On-Peak | | | | | | ICAP tag Management | |
|---|---|---|---|---|---|---|---|---|
| | Demand Reduction Values | | Price | | Customer Share | | | |
| Forward Capacity Market Year | Summer kW (8 months) | Winter kW (4 months) | $/kW-mth | Gross Revenue | % | Annual $ | Annual $ | Totals |
| June 1, 2016 - May 31, 2017 | - | 400 | $ 7.19 | $ 40,264 | 72% | $ 28,990 | 0 | $ 28,990 |
| June 1, 2017 - May 31, 2018 | 500 | 400 | $ 16.20 | $ 90,720 | 72% | $ 65,318 | 0 | $ 65,318 |
| June 1, 2018 - May 31, 2019 | 500 | 400 | $ 10.31 | $ 57,736 | 72% | $ 41,570 | $ 37,570 | $ 79,140 |
| June 1, 2019 - May 31, 2020 | 500 | 400 | $ 7.59 | $ 42,504 | 72% | $ 30,603 | $ 26,603 | $ 57,206 |
| | | | | | Totals | $ 166,481 | $ 64,173 | $ 230,654 |
| | | | | | Meter Costs | $ (3,500) | 0 | $ (3,500) |
| | | | | | Customer Net Revenue | $ 162,981 | $ 64,173 | $ 227,154 |

| | SEMA RTDR and On-Peak | | | | | | ICAP tag Management | |
|---|---|---|---|---|---|---|---|---|
| | Demand Reduction Values | | Price | | Customer Share | | | |
| Forward Capacity Market Year | Summer kW (8 months) | Winter kW (4 months) | $/kW-mth | Gross Revenue | % | Annual $ | Annual $ | Totals |
| June 1, 2016 - May 31, 2017 | - | 400 | $ 3.40 | $ 19,040 | 72% | $ 13,709 | 0 | $ 13,709 |
| June 1, 2017 - May 31, 2018 | 500 | 400 | $ 7.59 | $ 42,504 | 72% | $ 30,603 | 0 | $ 30,603 |
| June 1, 2018 - May 31, 2019 | 500 | 400 | $ 11.97 | $ 67,032 | 72% | $ 48,263 | $ 44,263 | $ 92,526 |
| June 1, 2019 - May 31, 2020 | 500 | 400 | $ 7.59 | $ 42,504 | 72% | $ 30,603 | $ 26,603 | $ 57,206 |
| | | | | | Totals | $ 123,178 | $ 70,866 | $ 194,044 |
| | | | | | Meter Costs | $ (3,500) | 0 | $ (3,500) |
| | | | | | Customer Net Revenue | $ 119,678 | $ 70,866 | $ 190,544 |

| | WCMA RTDR and On-Peak | | | | | | ICAP tag Management | |
|---|---|---|---|---|---|---|---|---|
| | Demand Reduction Values | | Price | | Customer Share | | | |
| Forward Capacity Market Year | Summer kW (8 months) | Winter kW (4 months) | $/kW-mth | Gross Revenue | % | Annual $ | Annual $ | Totals |
| June 1, 2016 - May 31, 2017 | - | 400 | $ 3.40 | $ 19,040 | 72% | $ 13,709 | 0 | $ 13,709 |
| June 1, 2017 - May 31, 2018 | 500 | 400 | $ 7.59 | $ 42,504 | 72% | $ 30,603 | 0 | $ 30,603 |
| June 1, 2018 - May 31, 2019 | 500 | 400 | $ 10.31 | $ 57,736 | 72% | $ 41,570 | $ 37,570 | $ 79,140 |
| June 1, 2019 - May 31, 2020 | 500 | 400 | $ 7.59 | $ 42,504 | 72% | $ 30,603 | $ 26,603 | $ 57,206 |
| | | | | | Totals | $ 116,484 | $ 64,173 | $ 180,657 |
| | | | | | Meter Costs | $ (3,500) | 0 | $ (3,500) |
| | | | | | Customer Net Revenue | $ 112,984 | $ 64,173 | $ 177,157 |

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# STANDBY EMERGENCY GENERATOR STATUS

## The Issue:

In 2013, the EPA enacted the RICE NESHAP NSPS regulations.  Specific rules pursuant to the regulations allowed for the limited use of stationary standby emergency generators such to participate in the ISO-NE demand response program.

This past summer, following a lengthy dispute, the U.S. Court of Appeals for the District of Columbia Circuit overturned these rules (Delaware Department of Natural Resources and Environmental Control, ET AL., USCA #13-1093).  The implementation date for this order was May 1, 2016.  This allowed standby emergency generators to continue to participate in demand response until May 1, 2016.

## Solutions:

Generators installed after January 1, 2011 must be Tier 4 certified

Some standby emergency generators installed prior to January 1, 2011 may be upgradeable to non-emergency status – allowing them to continue to participate in demand response programs post May 1, 2016 under ISO-NE rules as RTDR assets.  These upgrades could include revisions to existing generator permits and/or the installation of after-market emissions controls on the generator engine and revisions to existing permits.

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# STANDBY EMERGENCY GENERATOR CHECK LIST

| |
|---|
| Generator Type |
| Generator Make |
| Generator Model |
| Gen Fuel Storage Capacity (U.S. Gal.) |
| Generator Fuel Type |
| Generator Vintage (The day, month, and year the generator was built (included on nameplate). |
| Generator Install Date (The day, month, and year the generator was installed) |
| Generator Retrofit Year (If the generator was retrofit for pollution control equipment please include the year of the retrofit) |
| Nameplate Capacity Rating |
| Engine Horsepower |
| Approximate Percent of building load backed up by generator |
| Specify Engine Tier Level if generator newer than January 1, 2011 |
| Generator Serial Number |
| Specify if any after-market controls were installed (DOC, CVS, CPMS, SCR) |

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# REAL-TIME DEMAND RESPONSE ENROLLMENT

## Analyze utility bills

- Determine load reduction potential
    - Obtain copies of the most recent electric bill for the following months
        - ✓ Summer Season: June, July and August
        - ✓ Winter Season: December and January

## Develop plan to achieve committed reduction

- Identify specific equipment to curtail & appropriate BMS programing adjustments
    - HVAC
    - Lighting
- Standby generator activation
    - Identify transfer switches
    - Mitigate load transfer issues
- Commit to a specific kW reduction level

## Assign staff specific demand reduction duties

- Facility review to confirm preparedness for participation

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# ON-PEAK DEMAND RESPONSE ENROLLMENT

Project Description

- System name plate rating AC and DC
- Make, model and number of generation units
  - ✓ Solar
    - ➢ AC Energy Savings (PVWatts or equivalent)
  - ✓ Wind
    - ➢ Performance curves
  - ✓ CHP
    - ➢ Parasitic loads
- The initial Commercial Operation Date

Manufacturers' cut sheets

Single line diagram showing points of connection to the facility electrical system and the location of the utility load meter

Interconnection Agreement signed by the local electric distribution company

Administrative documents

- Utility Bills
- LOA

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# FORWARD CAPACITY AUCTION PRICES

| | | | | RTDR & On-Peak | | |
|---|---|---|---|---|---|---|
| | | | | ICAP Payment | | |
| FCA | Commitment Period | | | $/kW-mth | Gross-Up | Total |
| 7 | 6/1/2016 | to | 5/31/2017 | | | |
| | | | **NEMA** | $ 6.661 | 1.080 | $ 7.194 |
| | | | **Rest of System** | $ 3.150 | 1.080 | $ 3.402 |
| 8 | 6/1/2017 | to | 5/31/2018 | | | |
| | | | **NEMA** | $ 15.000 | 1.080 | $ 16.200 |
| | | | **Rest of System** | $ 7.025 | 1.080 | $ 7.587 |
| 9 | 6/1/2018 | to | 5/31/2019 | | | |
| | | | **SEMA/RI*** | $ 11.080 | 1.080 | $ 11.966 |
| | | | **Rest of System** | $ 9.550 | 1.080 | $ 10.314 |
| **10** | **6/1/2019** | **to** | **5/31/2020** | $ 7.030 | 1.080 | $ 7.592 |

*SEMA/RI zones: $11.08/kW-month (administrative price trigger – zone had closed in auction at $17.73). All other zones: $9.55/kW-mth.

# QUESTIONS

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# Thank You

## Contact Information

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