

# New England Capacity Deficiency

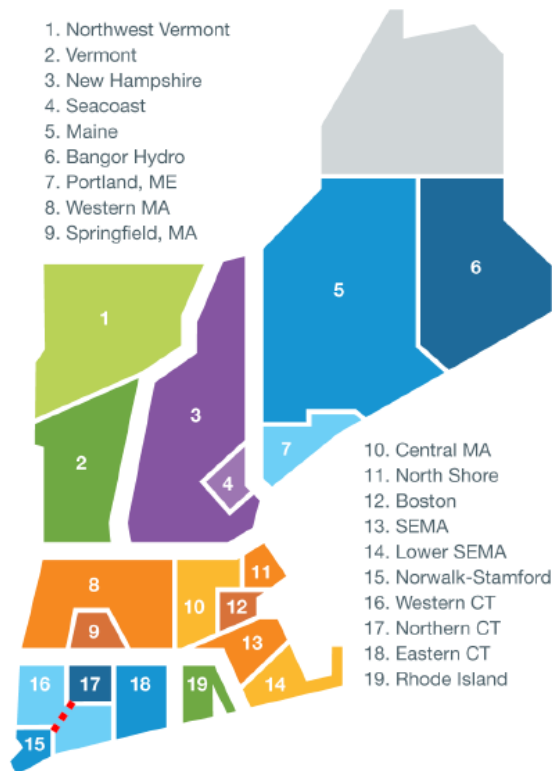
September 3, 2018



VELCO Operating Committee  
October 18, 2018  
Jason Pew

# New England Capacity

## New England Dispatch Zones



## Generation

≈ **30,000** MW of installed capacity

(29k summer, 31k winter)

≈ **1,500** MW summer & 1,000 MW of obligated imports (mostly Canadian hydro)

## Demand Response

≈ **2,700** MW of Demand Response (DR)

Includes passive demand resources

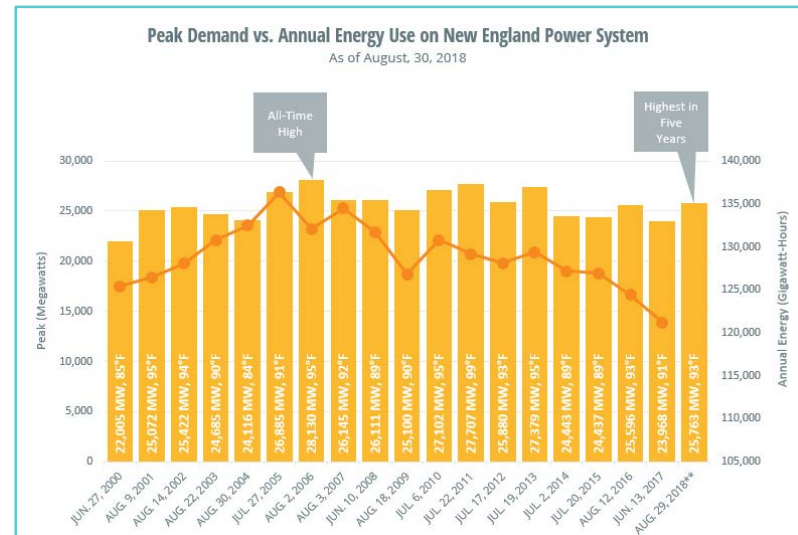
1. Northwest Vermont ≈ 6 MW

2. Vermont ≈ 4 MW

# New England Demand



| WEATHER FORECAST:<br><b>Warmer than average</b>   |   |
|---|---|
| <b>SUMMER PEAK DEMAND FORECAST:</b><br><b>25,729 MW</b><br>(with temperatures of about 90°F)              | <b>EXTREME SUMMER PEAK DEMAND FORECAST:</b><br><b>28,120 MW</b><br>(with an extended heat wave of about 94°F)           |
| <b>LAST SUMMER'S PEAK DEMAND:</b><br><b>23,968 MW</b><br>(June 13, 2017, with temperatures of about 91°F) | <b>ALL-TIME HIGHEST SUMMER PEAK DEMAND:</b><br><b>28,130 MW</b><br>(set on August 2, 2006, after a prolonged heat wave) |



\*The sum of metered generation and metered net interchange, less demand from pumped storage units. Starting with full market integration of demand response on June 1, 2018, this total also includes the grossed up demand response value.

\*\*Annual peak, as of 8/30/18. Values are preliminary and subject to adjustment.

\*\*\*Net energy for load (NEL) is the total amount of grid electricity produced by generators in New England and imported from other regions during the year to satisfy all residential, commercial, and industrial customer demand.

Source: ISO New England, Seasonal Peaks since 1980 Report (8/6/2018), Hourly Real-Time System Demand Report (8/30/18), and Annual Generation and Load Data for ISO NE and the Six New England States Report (8/18/17)

# New England Reserves

Operating Reserve is capacity above what is required to balance real-time system demand.

## Operating Reserves:

### Generation

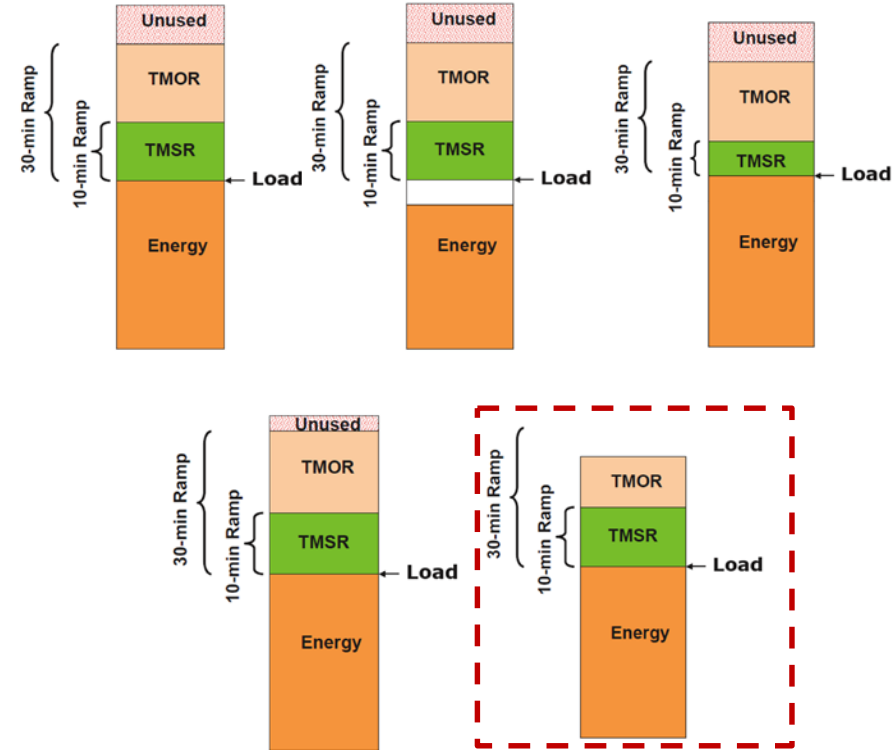
- Ten-Minute Spinning Reserve (TMSR)
- Ten-Minute Non-Spinning Reserve (TMNSR)
- Thirty-Minute Operating Reserve (TMOR)

### Demand

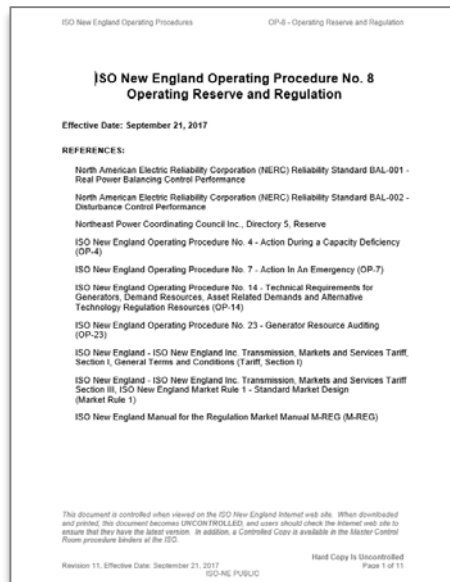
- Dispatchable Asset Related Demand (DARD)
- Demand Response Resource (DRR)

## Enough reserves to cover:

- 100% of the first contingency
- 50% of the second contingency



# Capacity Deficiency



## IV. SHORTAGE OF OPERATING RESERVE

Normally, Operating Reserve will be provided to prescribed levels of Synchronized and Non-synchronized reserve from within the New England RCA/BAA. If available capability is insufficient to provide adequate Operating Reserve, ISO will implement the various Actions of ISO New England Operating Procedure No. 4 - Action During a Capacity Deficiency (OP-4), as appropriate to maintain Operating Reserve Requirements. During shortages of Operating Reserve, Thirty-Minute Reserve shall be re-dispatched to maintain Ten-Minute Reserve at the prescribed value.

If ISO is arranging to purchase available emergency capacity and energy, or energy only, in accordance with OP-4, and a shortage of Ten-Minute Reserve is

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Revision 11, Effective Date: September 21, 2017

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ISO New England Operating Procedures

OP-8 - Operating Reserve and Regulation

# Operating Procedure No. 4

## Action During A Capacity Deficiency

ISO New England Operating Procedures OP-4 - Action During A Capacity Deficiency

### ISO New England Operating Procedure No. 4 - Action During A Capacity Deficiency

Effective Date: June 1, 2018

#### REFERENCES:

NERC Reliability Standard EOP-011 - Emergency Operations  
NERC Reliability Standard COM-002 - Operating Personnel Communications  
Protocols  
NPOC Directory #2 Emergency Operations  
NPOC Directory #5 Reserve  
ISO New England Inc. Transmission, Markets and Services Tariff Section III, ISO  
New England Market Rule 1 - Standard Market Design (Market Rule 1)  
ISO New England Operating Procedure No. 7 - Action in an Emergency (OP-7)  
ISO New England Operating Procedure No. 8 - Operating Reserve and Regulation  
(OP-8)  
ISO New England Operating Procedure No. 9 - Scheduling and Dispatch of External  
Transactions (OP-9)  
ISO New England Operating Procedure No. 14 - Technical Requirements for  
Generators, Demand Response Resources, Asset Related Demands and  
Alternative Technology Regulation Resources (OP-14)  
Master/Local Control Center Procedure No. 2 - Abnormal Conditions Alert  
(MLCC 2)  
Master/Local Control Center Procedure No. 13 - ISO and LCC Communication  
Practices (MLCC 13)  
CROP: 10002 Implement Capacity Remedial Actions

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downloaded and printed, this document becomes UNCONTROLLED, and users should check  
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Normal Actions

Emergency Actions

| Action | Description   | MW Relief Estimate |
|--------|---|--------------------|
| 1      | Implement Power Caution, allow the depletion of 30 minute reserves  | 0 / ≈ 600          |
| 2      | Declare Energy Emergency Alert (EEA) Level 1  | 0                  |
| 3      | Voluntary load curtailment of MP facilities   | 40                 |
| 4      | Implement Power Watch   | 0                  |
| 5      | Schedule MP submitted Emergency Energy Transactions (EETs)  | 0-1,000            |
| 6      | Implement 5% voltage reduction >10m   | 132                |
| 7      | Request resources not subject to CSO to voluntarily provide energy  | 0-1,500            |
| 8      | Implement 5% voltage reduction <10m   | 265                |
| 9      | Transmission customer generation not contractually available to MP<br>Voluntary load curtailment by large industrial / commercial customers | 5<br>≈ 200         |
| 10     | Radio & TV appeals for load curtailment, Power Warning, EEA Level 2   | 200                |
| 11     | Request New England state Governors to reinforce power warning appeals  | 100                |

Total relief range: 1942 - 4042



# Monday, September 3, 2018

1530

Action 1  
Action 2

1600


Action 3  
Action 4  
Action 5

1900

Action 3 - Cancelled  
Action 4 - Cancelled  
Action 5 - Cancelled

2000

Action 1 - Cancelled  
Action 2 - Cancelled

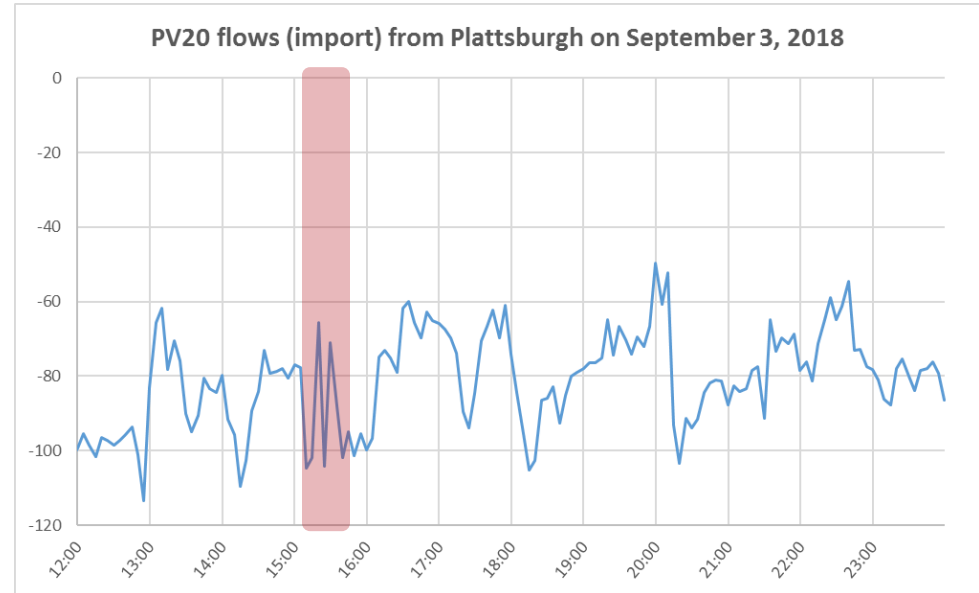
| <div>  <b>OP-4 Notification Log</b> </div>          |              |            |            |                         |            |            |            |            |            |               |            |            |      |                   |      |                              |
|--|--------------|------------|------------|-------------------------|------------|------------|------------|------------|------------|---------------|------------|------------|------|-------------------|------|------------------------------|
| This is Gordon, Mike at VELCO: A capacity deficiency has been declared. We are implementing ISO-NE Operating Procedure #4, Action(s) |              |            |            |                         |            |            |            |            |            |               |            |            |      |                   |      |                              |
| Implement Date: 09/03/2018      Cancellation Date: 09/03/2018  |              |            |            |                         |            |            |            |            |            |               |            |            |      |                   |      |                              |
| ISO-NE Notification (Time)   |              |            |            | VELCO Notification Time |            |            |            |            |            |               |            |            |      |                   |      |                              |
|  |              |            |            | GMP (Colchester)        |            | BED        |            | VEC        |            | Swanton (SVE) |            | Stowe (SE) |      | Lyndonville (LED) |      | Emergency Notification Email |
|  | ACTION       | Impl       | Canc       | Impl                    | Canc       | Impl       | Canc       | Impl       | Canc       | Impl          | Canc       | Impl       | Canc | Impl              | Canc |                              |
| Power Caution  | 1            | 09/03 1530 | 09/03 2000 | 09/03 1540              | 09/03 1948 | 09/03 1540 | 09/03 1948 | 09/03 1541 | 09/03 1947 | 09/03 1541    | 09/03 1947 |            |      |                   |      | 09/03 1544 09/03 1947        |
|  | 2            | 09/03 1530 | 09/03 2000 | 09/03 1540              | 09/03 1948 | 09/03 1540 | 09/03 1948 | 09/03 1541 | 09/03 1947 | 09/03 1541    | 09/03 1947 |            |      |                   |      | 09/03 1544 09/03 1947        |
| Email all VELCO associates   | 3            | 09/03 1600 | 09/03 1857 | 09/03 1601              | 09/03 1854 | 09/03 1602 | 09/03 1855 | 09/03 1602 | 09/03 1856 | 09/03 1606    | 09/03 1855 |            |      |                   |      | 09/03 1609 09/03 1857        |
| Power Watch  | 4            | 09/03 1600 | 09/03 1857 | 09/03 1601              | 09/03 1854 | 09/03 1602 | 09/03 1855 | 09/03 1602 | 09/03 1856 | 09/03 1606    | 09/03 1855 |            |      |                   |      | 09/03 1609 09/03 1857        |
|  | 5            | 09/03 1600 | 09/03 1857 | 09/03 1601              | 09/03 1854 | 09/03 1602 | 09/03 1855 | 09/03 1602 | 09/03 1856 | 09/03 1606    | 09/03 1855 |            |      |                   |      | 09/03 1609 09/03 1857        |
|  | 6            |            |            |                         |            |            |            |            |            |               |            |            |      |                   |      |                              |
| *  | Confirmation |            |            |                         |            |            |            |            |            |               |            |            |      |                   |      |                              |
|  | 7            |            |            |                         |            |            |            |            |            |               |            |            |      |                   |      |                              |
|  | 8            |            |            |                         |            |            |            |            |            |               |            |            |      |                   |      |                              |
| **   | Confirmation |            |            |                         |            |            |            |            |            |               |            |            |      |                   |      |                              |
|  | 9            |            |            |                         |            |            |            |            |            |               |            |            |      |                   |      |                              |
| Power Warning  | 10           |            |            |                         |            |            |            |            |            |               |            |            |      |                   |      |                              |
|  | 11           |            |            |                         |            |            |            |            |            |               |            |            |      |                   |      |                              |

\* Action 6 requires a 5% Voltage Reduction requiring more than 10 minutes to implement. Confirmation is required from the VDUs upon completion.

\*\* Action 8 requires a 5% Voltage Reduction attainable within 10 minutes. Confirmation is required from the VDUs upon completion.

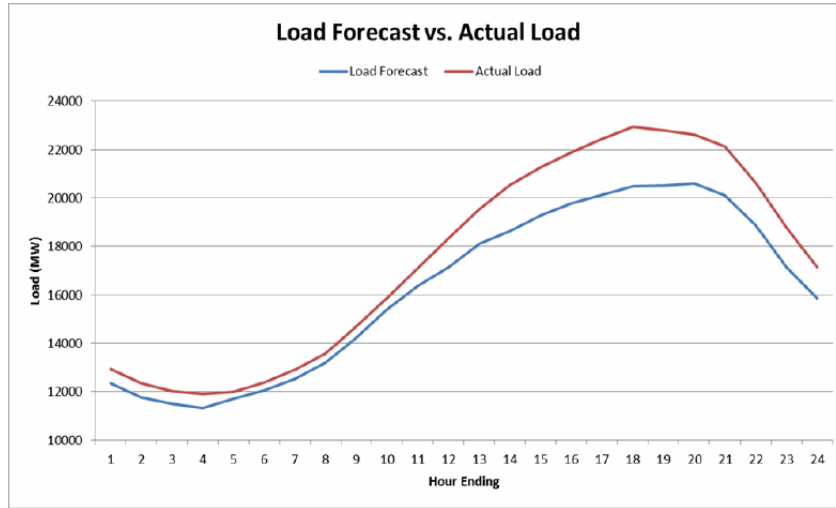
# Monday, September 3, 2018

- Over the course of the day, the system experienced  $\approx 1650$  MW of generation outages/reductions
- Approximately 15:15, the most significant generation loss of  $\approx 1050$  MW occurred
- Between 15:00 and 15:30, the ISO committed  $\approx 600$  MW of capacity resources
- ISO then committed all remaining resources ( $\approx 45$  MW) that could assist in meeting the evening peak





# Monday, September 3, 2018



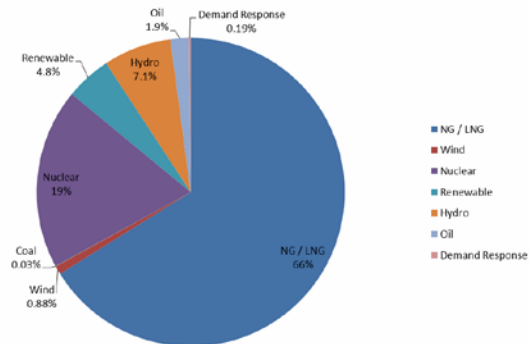
- ISO load forecast was 20,590 MW
  - Actual peak load served was 22,956 MW
  - Considering DR,  $\approx$  23,174 MW
- Temperature was hotter and more humid than forecasted (primary input for load forecasts)

## Top 3 Labor Day Loads

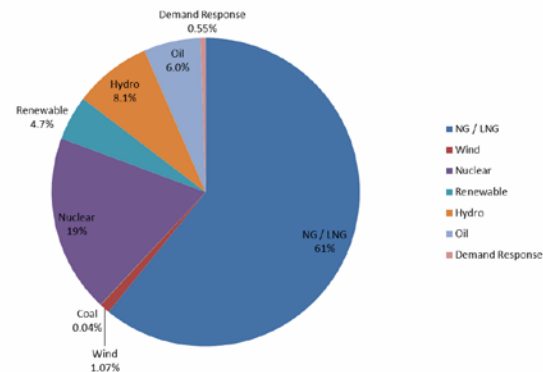
| Year | 2018  | 2014  | 2015  |
|------|-------|-------|-------|
| HE01 | 12944 | 13639 | 12204 |
| HE02 | 12360 | 12958 | 11545 |
| HE03 | 12030 | 12555 | 11122 |
| HE04 | 11895 | 12357 | 10907 |
| HE05 | 11986 | 12325 | 10895 |
| HE06 | 12377 | 12579 | 11143 |
| HE07 | 12888 | 13033 | 11461 |
| HE08 | 13584 | 13783 | 12157 |
| HE09 | 14680 | 15089 | 13270 |
| HE10 | 15859 | 16570 | 14494 |
| HE11 | 17095 | 17890 | 15677 |
| HE12 | 18379 | 18898 | 16759 |
| HE13 | 19583 | 19552 | 17723 |
| HE14 | 20559 | 19928 | 18566 |
| HE15 | 21298 | 20101 | 19350 |
| HE16 | 21980 | 20386 | 19993 |
| HE17 | 22647 | 20787 | 20610 |
| HE18 | 23174 | 21083 | 20923 |
| HE19 | 22971 | 20818 | 20649 |
| HE20 | 22688 | 20771 | 20755 |
| HE21 | 22151 | 20557 | 20373 |
| HE22 | 20655 | 19100 | 18922 |
| HE23 | 18779 | 17231 | 17082 |
| HE24 | 17159 | 15604 | 15494 |
| Peak | 23174 | 21083 | 20923 |

# Fuel Diversity

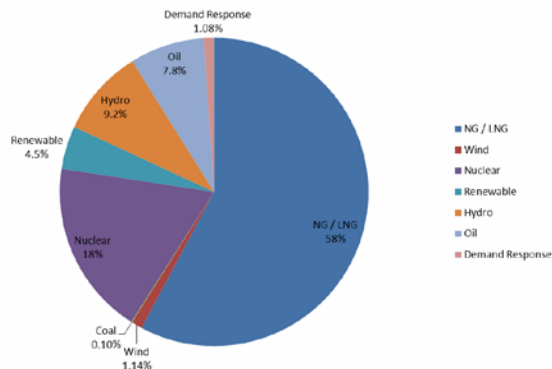
HE 15 Fuel Diversity - September 3, 2018



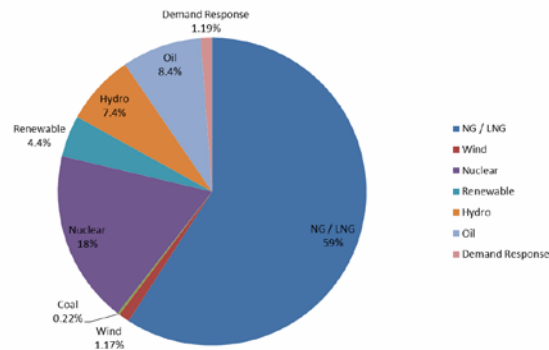
HE 16 Fuel Diversity - September 3, 2018



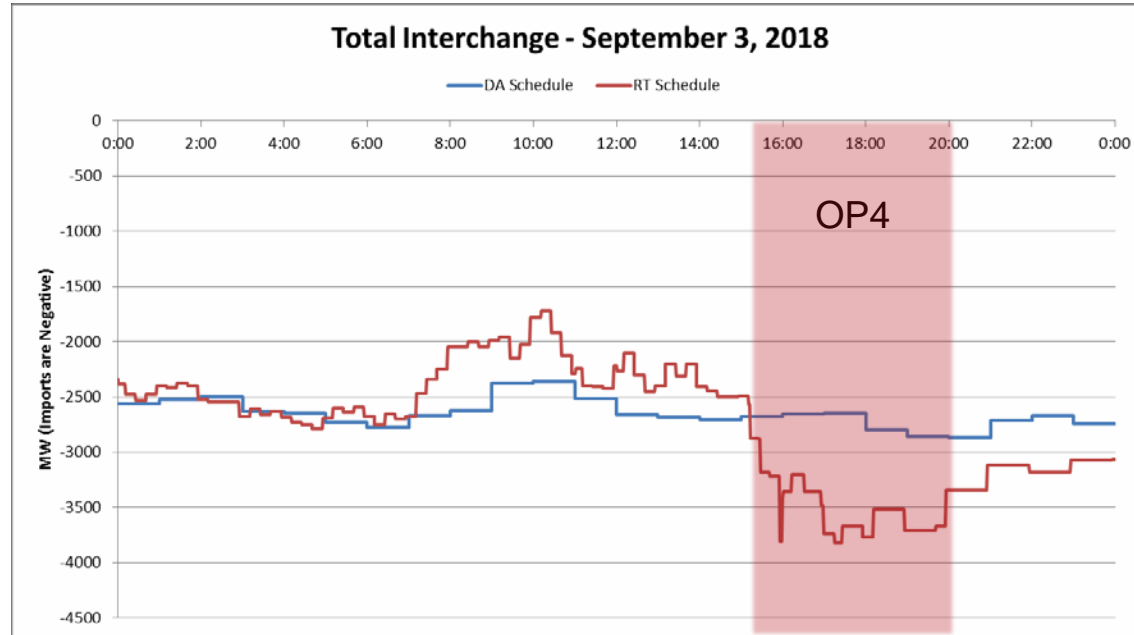
HE 17 Fuel Diversity - September 3, 2018



HE 18 Fuel Diversity - September 3, 2018

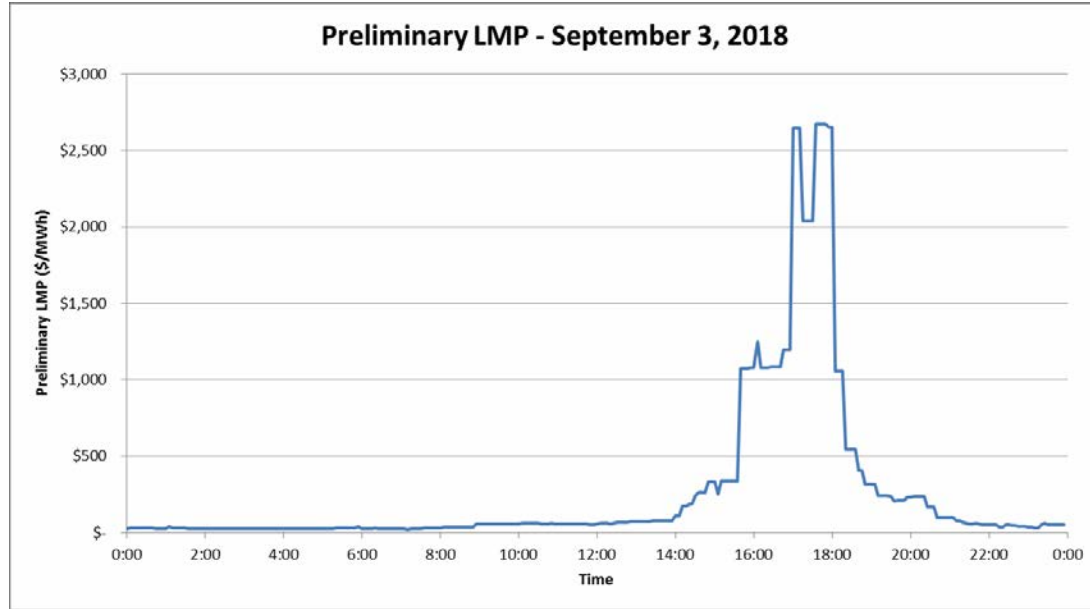


# Interchange



- New Brunswick Power System Operator
  - 16:20-17:14; 150 MW
  - 17:14-18:00; 229 MW
- New York Independent System Operator:
  - 17:00-17:30; 251 MW
  - 17:30-18:00; 100 MW

# LMP



## Day-ahead Hub Hourly LMPs

- \$21.34/MWh to \$60.85/MWh
- Averaged \$38.65/MWh

## RT Hub LMPs

- \$19.79/MWh to \$2,677.05/MWh
- Averaged \$262.61/MWh

# Pay-for-Performance

Under-performing resources  
penalized (\$2,000/MWh)  
***This event  $\approx$  \$37M***



Over-performing resources  
receive \$2,000/MWh  
***This event  $\approx$  \$36.1M***



Performance payment rate is **increasing**  
**to 5,455/MWh** over the next six years

*This event estimated penalties and payments based on preliminary summary performed by ISO-NE*

That was a 10,000 foot view of the event, more information can be found on the ISO-NE website.

