ISO New England Overview of Emergency Procedures and Communications Processes

Pre-Summer Briefing with Emergency Communications Contacts

Note: ***This meeting will be recorded***

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Technical Instructions for Today's WebEx

- Today's meeting is being recorded
- All attendee lines are muted
- If you are experiencing technical issues or have a question you would like to submit, send it via **Chat** to the **host**
- Questions and Answers will be addressed throughout the meeting

TODAY'S KEY MESSAGES

- The ISO regularly briefs state and federal officials and corporate communications contacts at the transmission companies on the ***seasonal outlook*** *(summer and winter)*
- The ***goal*** of this outreach is to exercise our emergency communications plan with external audiences and promote unified messaging during actual system emergencies
- Under **typical weather conditions**, New England is expected to have **sufficient resources** to meet peak consumer demand for electricity this summer
  - Tight supply margins could develop if forecasted peak system conditions associated with above-average hot and humid weather occur
  - If this happens, ISO New England will take steps to manage New England's electricity supply and demand and maintain power system reliability

Upcoming Events

- **May 19, 2022** – **3:45pm today** ISOAlert test scheduled for emergency communications government contacts

- **June 2022** – anticipated publications
  - 2022 Summer Outlook Factsheet
  - Press Release

- **October 12, 2022** – Regional Tabletop Exercise

- **November/December 2022** – Pre-Winter Briefing

Outline of Presentation and Discussion

- ISO Introductions and Background *slides 7 - 16*
- ISO 2022 Summer Outlook *slides 17 - 20*
- Action During a Capacity Deficiency (OP-4) *slides 21 - 28*
- Communications Overview *slides 29 - 44*
- Action in an Emergency (OP-7) *slides 45 - 47*
- Summer 2022 NPCC Reliability Assessment *slide 48 - 59*
- Next Steps and Questions *slides 60 - 61*
- Appendices
  - Background Information on OP-4 *slides 63 - 70*
  - Action in an Emergency (OP-7) *slides 71 - 73*
  - Abnormal Conditions Alert (M/LCC2) *slides 74 - 76*
  - Background Information on OP-21 *slides 77 - 89*

Focus of Today's Briefing: 2022 Summer Outlook and Relevant ISO New England Operating Procedures

Action During a Capacity Deficiency (OP-4)

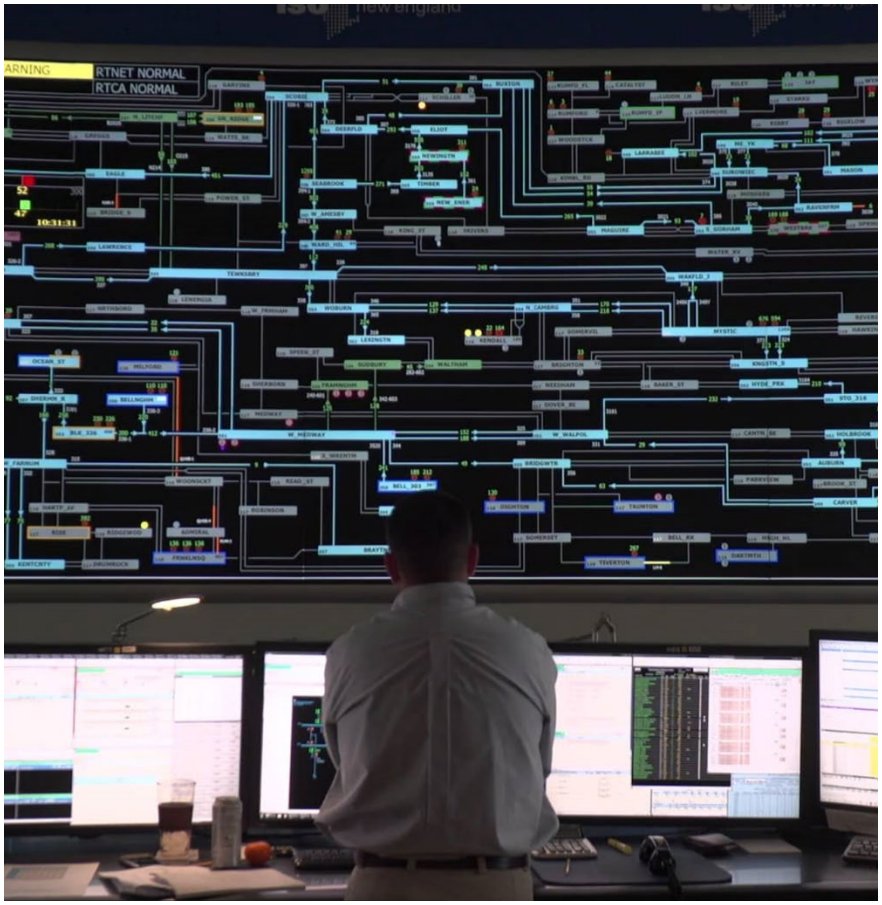
Action in an Emergency (OP-7)

ISO INTRODUCTIONS AND BACKGROUND

One Goal Lies at the Heart of ISO New England's Mission: *Reliability*

ISO New England is:

- **Regulated** by the Federal Energy Regulatory Commission (FERC)
- **Reliability Coordinator** for New England under the North American Electric Reliability Corporation (NERC)
- **Independent** of companies in the marketplace and **neutral** on technology



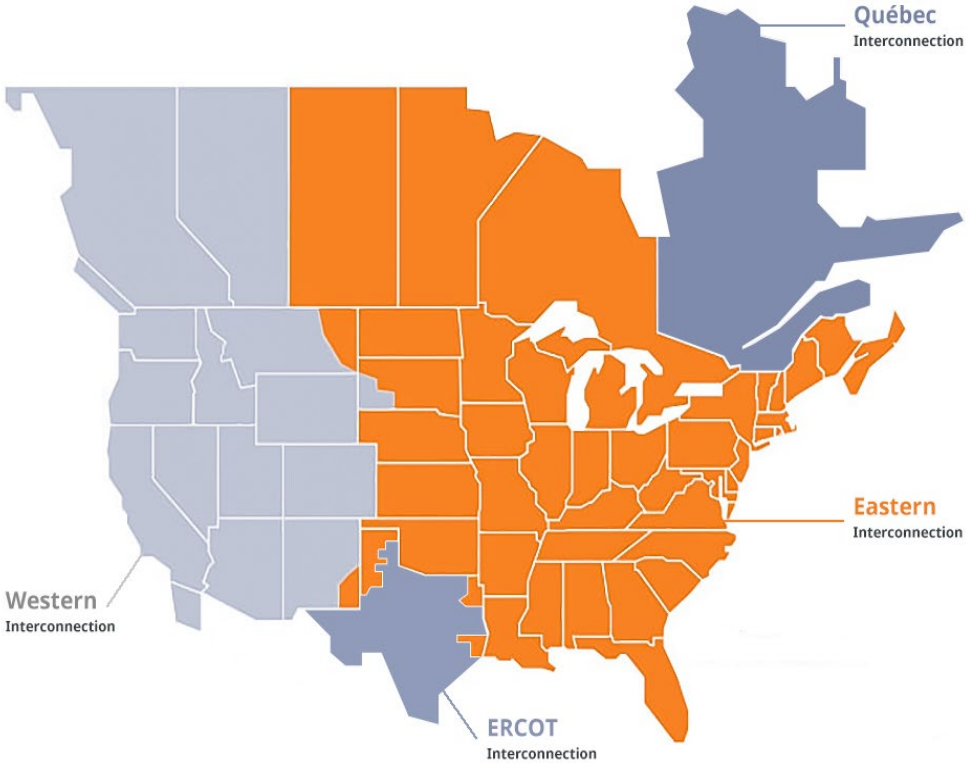
Generation and Demand Resources Are Used to Meet New England's Energy Needs

- **350** dispatchable generators in the region
- **31,500 MW** of generating capacity
- Almost **30,000 MW** of proposed generation in the ISO Queue
  - Mostly wind, solar, and storage proposals
- Roughly **7,000 MW** of generation have retired or will retire in the next few years
- **765 MW** of active demand response and **2,032 MW** of energy efficiency with obligations in the Forward Capacity Market*
  - Demand resources have had further opportunities in the wholesale markets since 2018

* In the Forward Capacity Market, demand-reduction resources are treated as capacity resources.

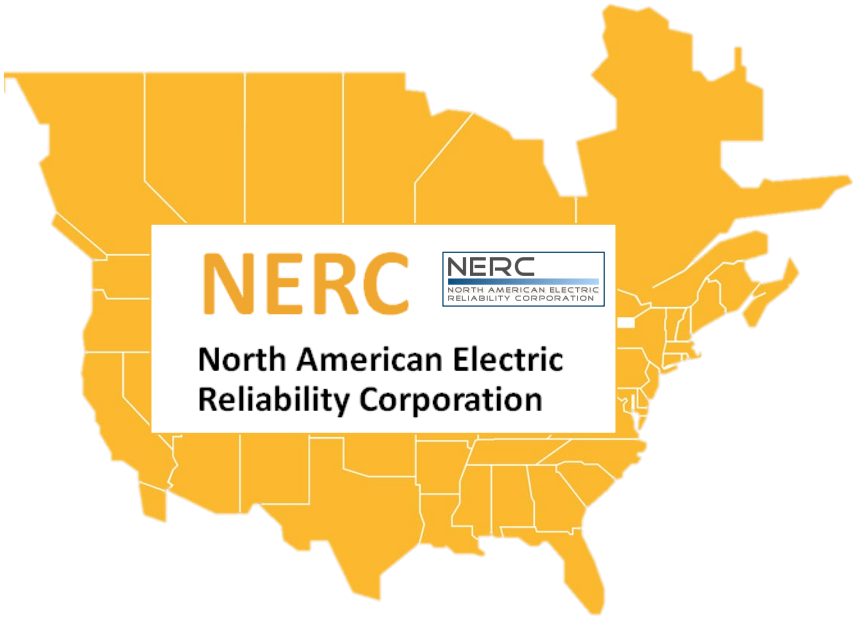
New England's Power Grid Is Part of a Larger Electric Power System

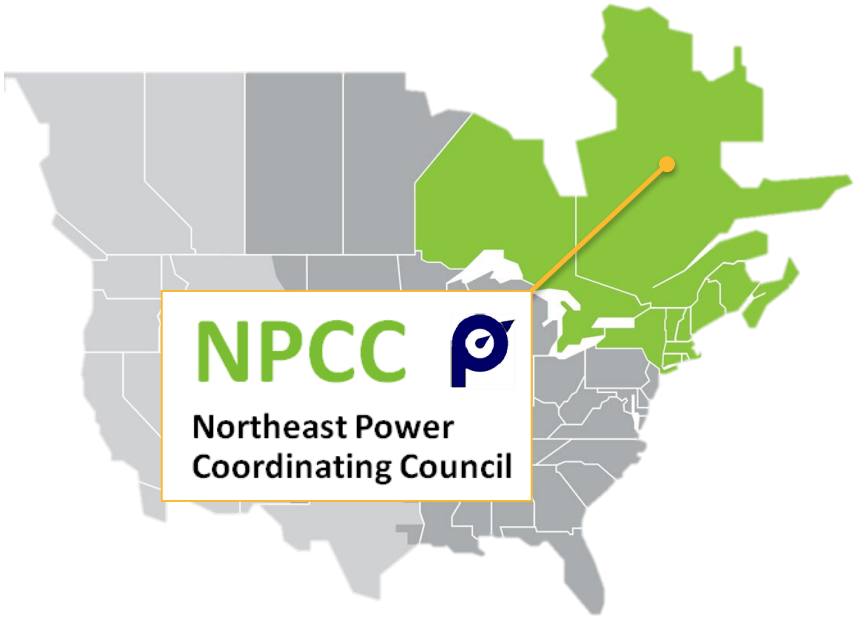
- Part of the **Eastern Interconnection**, one of four large power grids in North America
  - Interconnected through primarily alternating current (AC) transmission
- Tied to **Québec** only through direct current (DC) transmission
- 2003 blackout ushered in wide-area monitoring and **mandatory** reliability standards
- Subject to reliability standards set by **NERC** and **NPCC***



* North American Electric Reliability Corporation (NERC) and Northeast Power Coordinating Council (NPCC)

ISO-NE is Subject to Reliability Standards



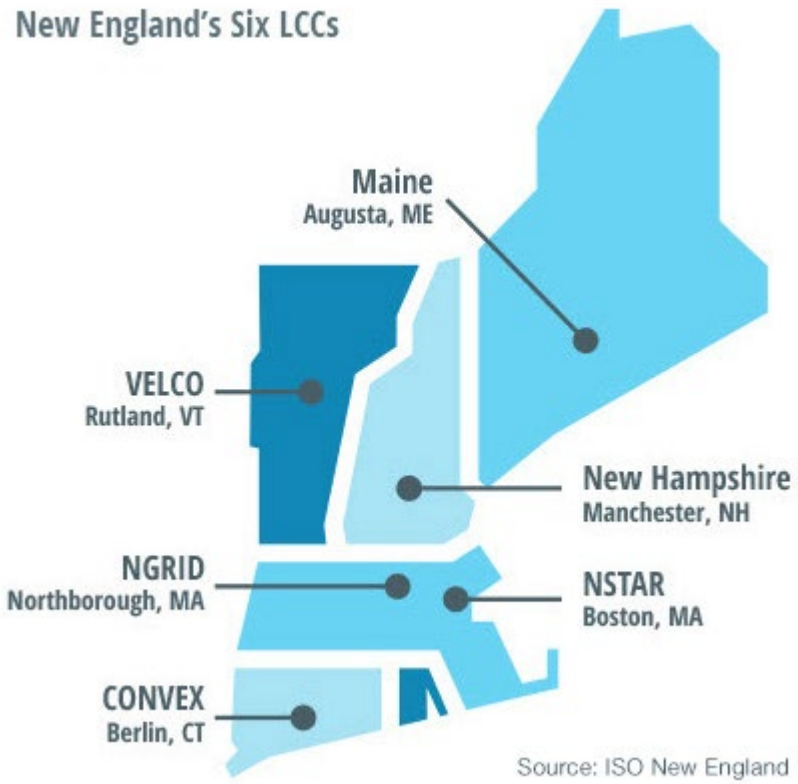


NERC is certified by FERC to be the Electric Reliability Organization, which establishes and enforces reliability standards for the US power system, and it plays a similar role in Canada.

NPCC is one of 8 authorities delegated by NERC to monitor and enforce compliance with reliability standards. It assesses reliability, creates specific regional standards to support reliability principles, and monitors and enforces those standards.

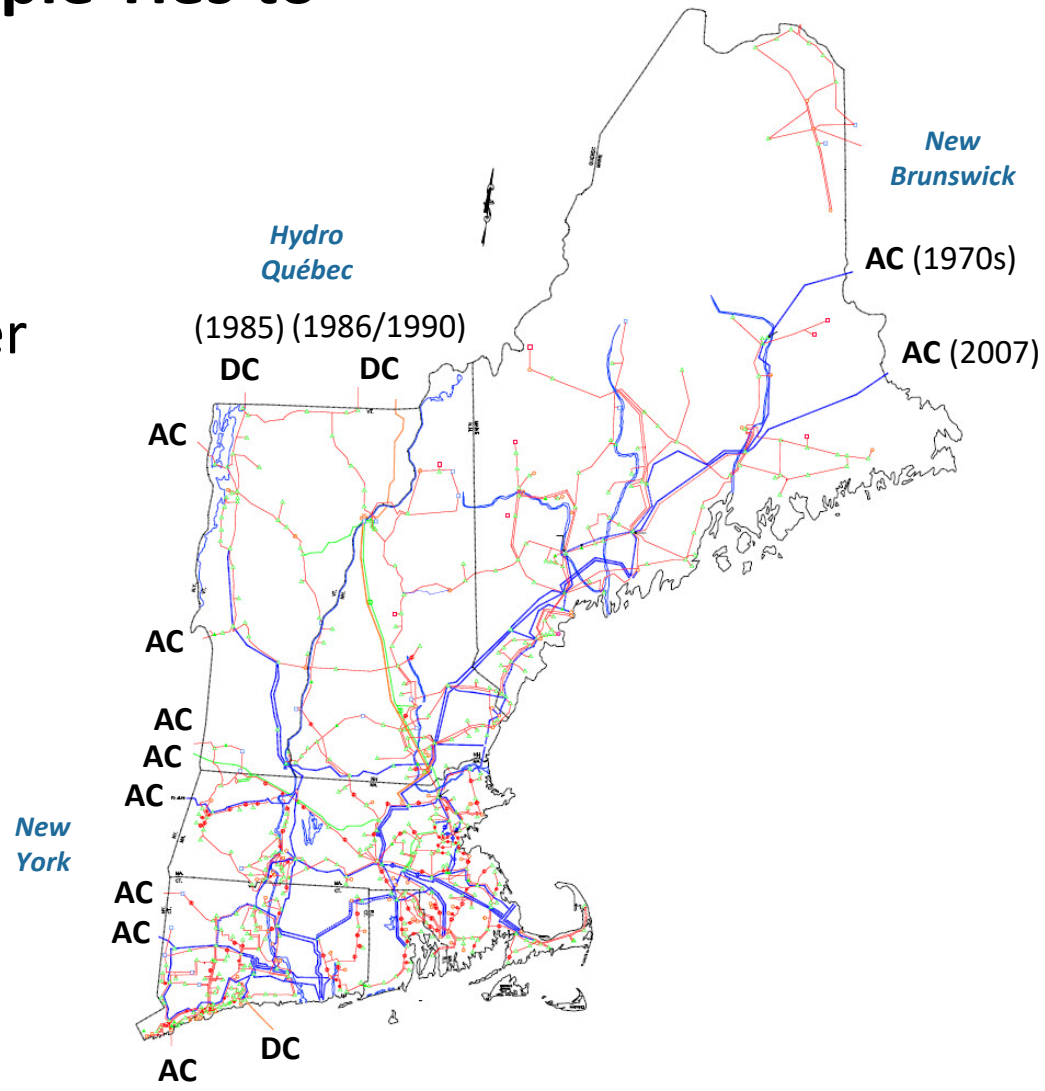
New England Local Control Centers (LLCs)

- From its master control center (MCC), the ISO is responsible for operating all transmission facilities rated 115 kV and above.
- New England also has six local control centers (LCCs), which are run by transmission owners and are responsible for operating transmission facilities rated 69 kV and above, with certain exceptions.



New England Has Multiple Ties to Neighboring Regions

- Transmission system is tied to neighboring power systems in the U.S. and Eastern Canada:
  - New York (8 AC ties, 1 DC tie)
  - Hydro Québec (2 DC ties)
  - New Brunswick (2 AC ties)
- **16%** of the region's energy needs were met by imports in 2021



Note: AC stands for Alternating Current and DC stands for Direct Current

ISO-NE Is a Summer-Peaking System

New England shifted from a winter-peaking system to a **summer-peaking** system in the early 1990s, largely because of the growth of air conditioning and a decline in electric heating

- Peak demand on a normal summer day has typically ranged from 17,500 MW to 22,000 MW
- Summer demand usually peaks on the hottest and **most humid** days and averaged roughly 25,600 MW since 2000
- Region's all-time summer peak demand was **28,130 MW** on **August 2, 2006**

While the region sees its peak during the summer, it could shift back to a **winter-peaking system**

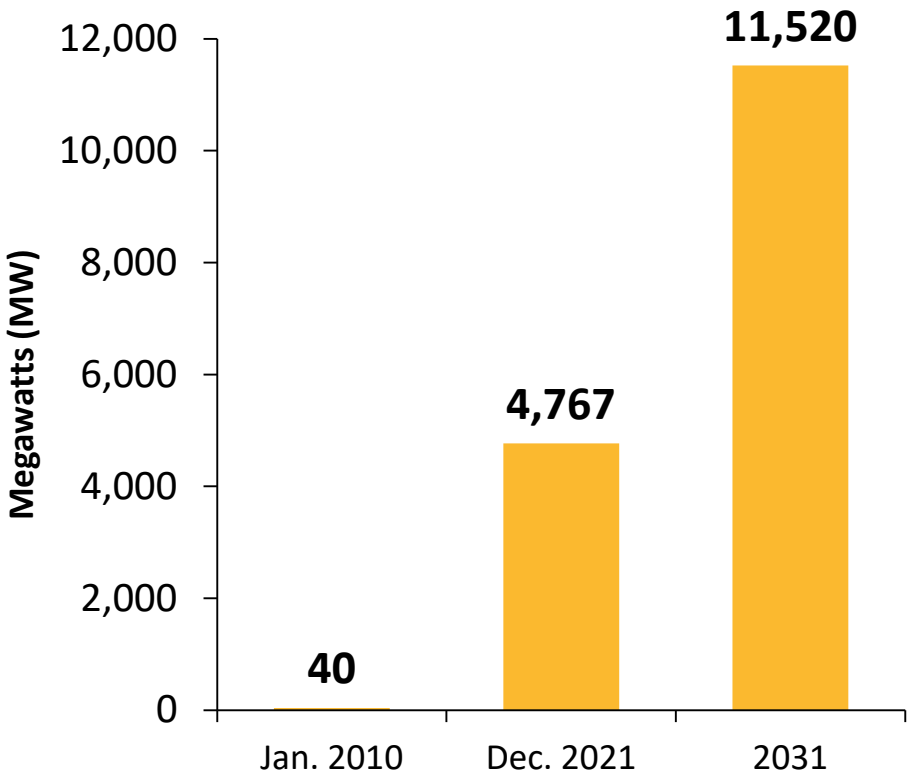
- Region's all-time **winter** peak demand was **22,818 MW** on **January 15, 2004**
- Extended periods of extreme cold weather could pose challenges
- Natural gas pipeline constraints, coupled with global supply chain issues related to deliveries of oil and liquefied natural gas (LNG), are placing New England's power system at heightened risk under certain conditions

ISO New England Forecasts Strong Growth in Solar Photovoltaic (PV) Resources

December 2021 Solar PV Installed Capacity (MW_{ac})

State	Installed Capacity (MW_{ac})	No. of Installations
Connecticut	809	63,735
Massachusetts	2,953	130,040
Maine	125	7,403
New Hampshire	157	12,186
Rhode Island	288	12,641
Vermont	434	17,296
New England	**4,767**	**243,301**

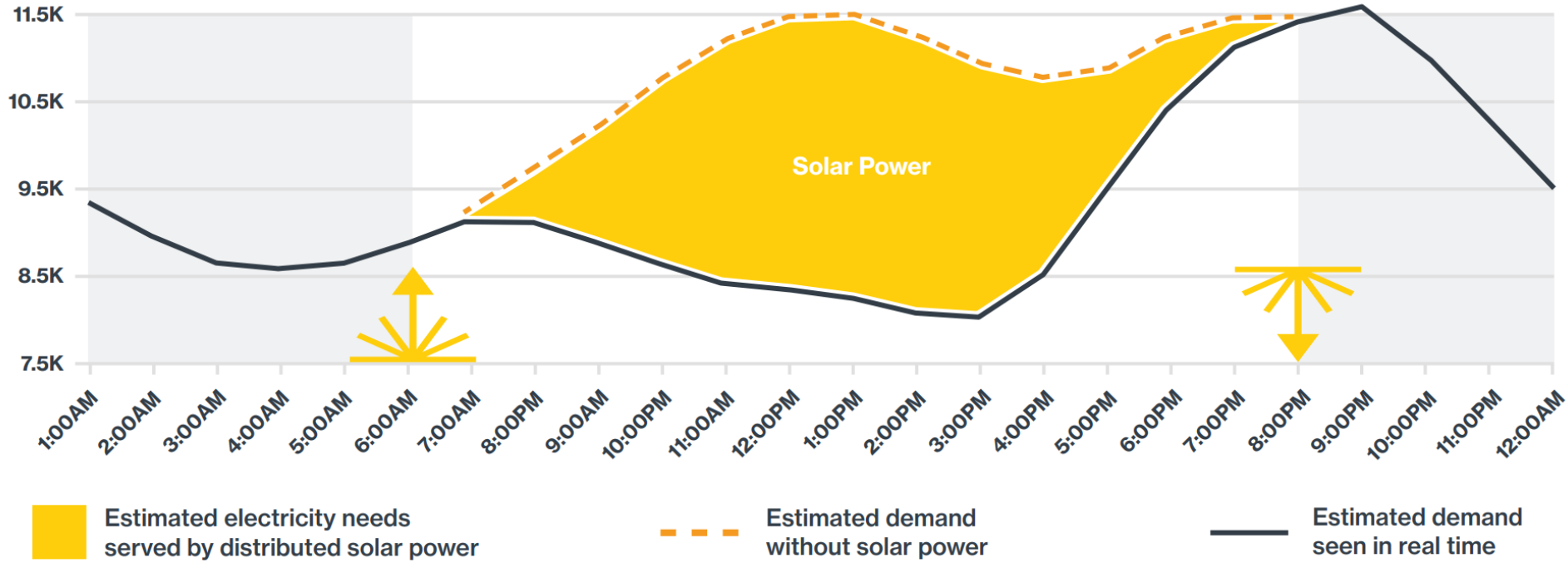
Cumulative Growth in Solar PV through 2031 (MW_{ac})



Note: The bar chart reflects the ISO's projections for nameplate capacity from PV resources participating in the region's wholesale electricity markets, as well as those connected "behind the meter." The forecast does not include forward-looking PV projects > 5 MW in nameplate capacity. Source: ISO New England 2022-2031 Forecast Report of Capacity, Energy, Loads, and Transmission (2022 CELT Report) (May 2022), and December 2021 Distributed Generation Survey Results; MW values are AC nameplate.

Nighttime Electricity Demand on the Region's Electric Grid is Exceeding Daytime Consumption On Sunny Days

Continued development of solar deployment drives down afternoon demand, especially in spring when demand is lower

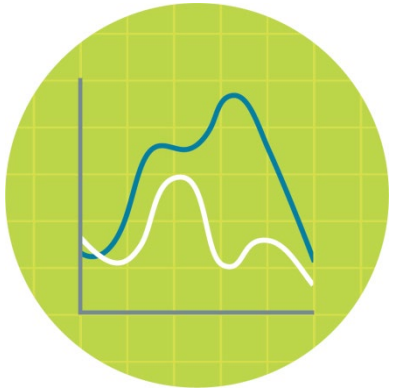


Number of times New England saw daytime electricity demand lows

35x Pre-2022 **27x** January–April 2022

ISO NEW ENGLAND 2022 SUMMER OUTLOOK AND PREPARATIONS

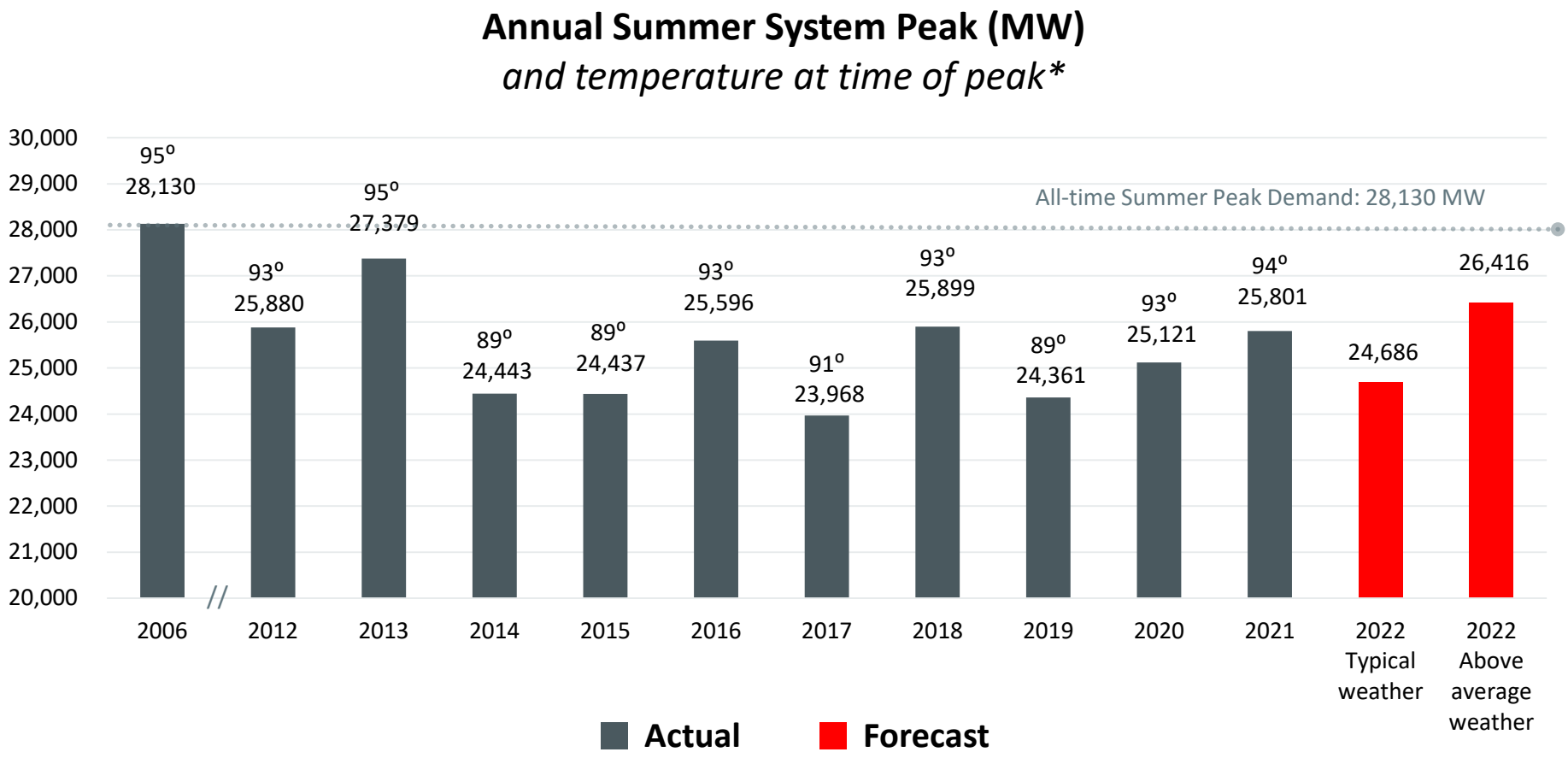
Preparations for Summer Peak Demand



- New England's peak summer demand period runs from **June 1** through **September 30**
- In preparation for the summer, ISO New England will:
  - Forecast New England's demand for electricity and reserves
  - Evaluate the region's summer capacity outlook
  - Exercise the communications plan
- The ISO prepares **short-term forecasts** for the summer and winter seasons, taking into account estimated supplies for all resources; unplanned resource outages; imports from neighboring regions; resource retirements; and delays in commissioning new resources
- The purpose of the communications plan is to provide **timely**, **complete**, and **consistent** updates to key stakeholders on power system conditions

Weather Drives Summer Peak Demand

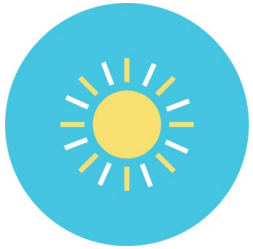
Historical and Projected Peak Demand in New England



*Temperature is dry-bulb temperature in degrees Fahrenheit based on weighted average of eight New England weather stations. Summer 2022 50/50 and 90/10 forecasted peaks include the demand-reducing effects of energy-efficiency measures acquired through the Forward Capacity Market and behind-the-meter solar.

Sources: ISO-NE Seasonal Peaks Since 1980, 2022 CELT Forecast

Summer Outlook Highlights



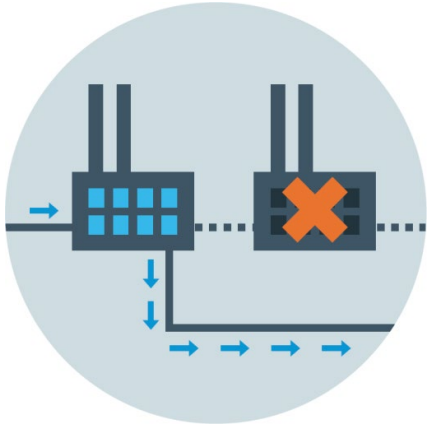
- New England is expected to have adequate resources to meet peak summer demand
  - Peak demand for typical summer weather: **24,686 MW**
  - Peak demand for above-average summer weather: **26,416 MW**
- Both forecasts take into account the demand-reducing effects of energy-efficiency measures (more than **2,100 MW**) acquired through the Forward Capacity Market and behind-the-meter solar (more than **900 MW**)
- New England has more than **31,000 MW** of total capacity available this summer
- ISO plans to issue its summer outlook press release June 1

Summer Outlook Press Release: https://www.iso-ne.com/about/news-media/press-releases/

ACTION DURING A CAPACITY DEFICIENCY

Operating Procedure No. 4 (OP-4)

Reserve Requirements



- ISO New England carries operating reserves to maintain **reliable** power system operations in the event of a contingency on the system*
  - **Ten-Minute Reserve Requirement**
    - ISO maintains Ten-Minute Reserves to recover from the loss of the largest source of supply
      - Normally 1,560 MW to 2,250 MW
  - **Thirty-Minute Reserve Requirement**
    - ISO maintains Thirty-Minute Reserves equivalent to 50% of the second largest source of supply
      - Normally 625 MW
- A contingency is an **unplanned disconnection** of a power system element, such as a transmission facility or a generator

* Governed by Northeast Power Coordinating Council (NPCC) requirements and ISO New England procedures

OP-4 Is Implemented When One or More of the Following Occur

- **Demand + reserves** cannot be met with available resources
- **Contingencies** (1 or more) result in an immediate deficiency in available capacity
- **Transmission** facilities in a subarea are loaded beyond established transfer limits
- **Manual load shedding** (OP-7) is needed, but OP-4 actions could avoid or reduce that need
- **Abnormal voltage** and/or **reactive conditions** in a subarea
- **Assist other NPCC control areas** that are experiencing a capacity deficiency (would reduce our reserves below required margin)
- **Other serious threat** to the bulk power system for which the ISO determines this procedure would mitigate the impact

Key Takeaways: OP-4 Implementation

11 actions can be implemented…

…to cover the **affected area**:

- New England-wide
- State(s)
- LLC(s), or
- A specific area

…in any **order**

…or, **skipped** if emergency actions are needed

Potential Relief Under OP-4

Roughly 1,900 – 4,000 MW of potential relief systemwide from 11 actions

OP-4 Action	Action Description (Page 1 of 3)	Possible Relief (MW)
1	Implement **Power Caution** and advise resources with a capacity supply obligation (CSO) to prepare to provide capacity and notify "Settlement-Only" generators with a CSO to monitor reserve pricing to meet those obligations Begin to allow depletion of 30-minute reserves	0[1] About 600
2	Declare Energy Emergency Alert (EEA) Level 1	0[4]
3	Request voluntary load curtailment of Market Participants' facilities	40[2]
4	Implement **Power Watch**, a notification that additional OP-4 actions may be taken *If conditions warrant, issue a public appeal for voluntary conservation*	0 *0[2]*
5	Schedule Emergency Energy Transactions and arrange to purchase Control-Area-to-Control-Area Emergency Capacity and Energy	Variable 0 – 1,000

Source: OP-4, Action During A Capacity Deficiency, Appendix A

Potential Relief Under OP-4, *continued*

Roughly 1,900 – 4,000 MW of potential relief systemwide from 11 actions

OP-4 Action	Action Description (Page 2 of 3)	Possible Relief (MW)
6	Implement a voltage reduction of 5% of normal operating voltage requiring more than 10 minutes Declare Energy Emergency Alert (EEA) Level 2	Variable 0 – 125[3] 0[4]
7	Request resources without a CSO to provide energy for reliability purposes	Variable 0 – 1,500
8	Implement a voltage reduction of 5% of normal operating voltage requiring 10 minutes or less Declare Energy Emergency Alert (EEA) Level 2 (if not already declared)	Variable 0 – 250[3] 0[4]
9	Request activation of transmission customer generation not contractually available to Market Participants during a capacity deficiency Request voluntary load curtailment by large industrial and commercial customers	5 200[2]

Source: OP-4, Action During A Capacity Deficiency, Appendix A

Potential Relief Under OP-4, *continued*

Roughly 1,900 – 4,000 MW of potential relief systemwide from 11 actions

OP-4 Action	Action Description (Page 3 of 3)	Possible Relief (MW)
10	Implement **Power Warning** and issue urgent public appeal for voluntary conservation	200[2]
	Declare Energy Emergency Alert (EEA) Level 2 (if not already declared)	0[4]
11	Request state governors' support for ISO appeals for conservation	100[2]
	Declare Energy Emergency Alert (EEA) Level 2 (if not already declared)	0[4]
	Total Relief (MW)	1,920 – 4,020

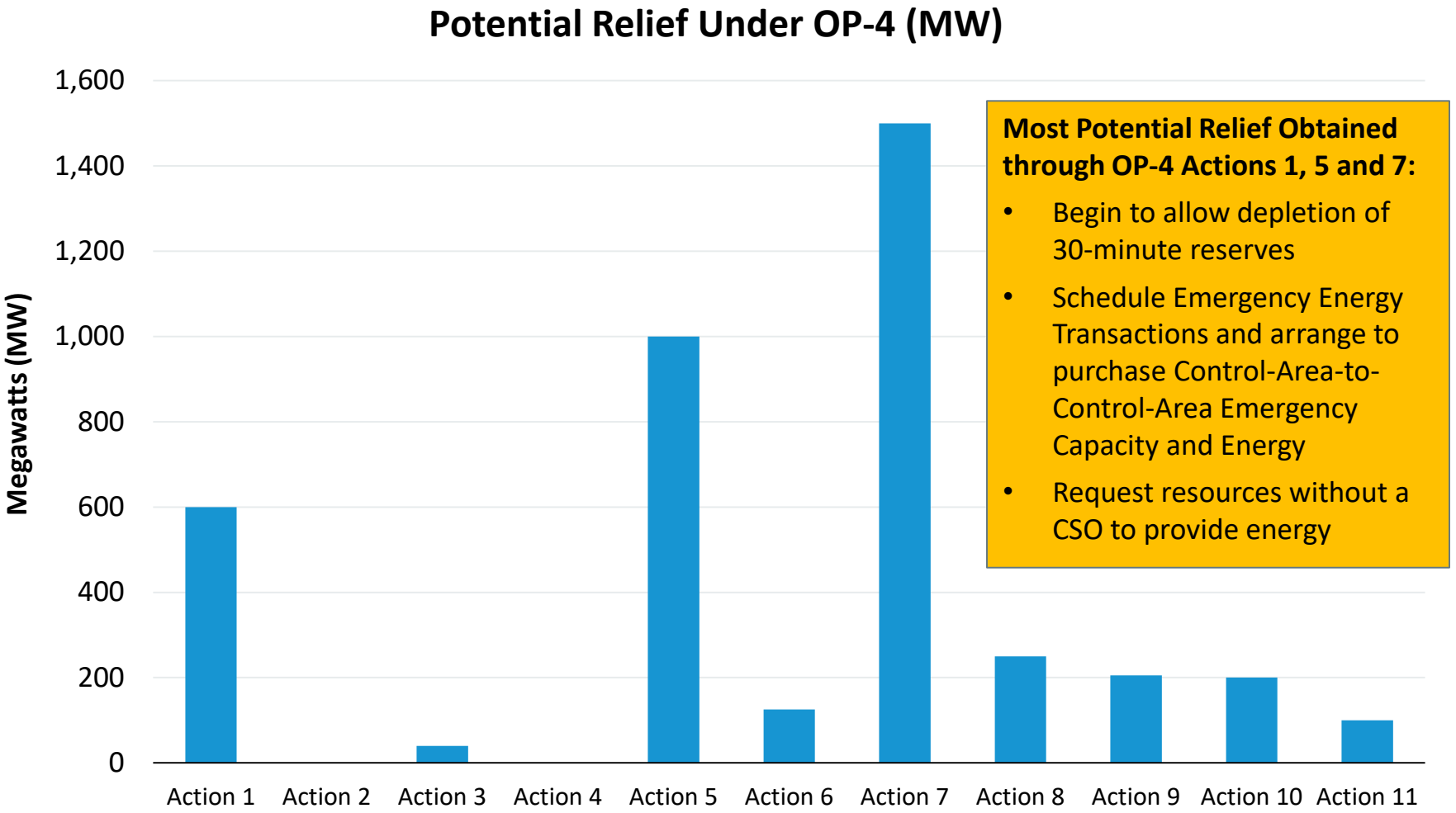
NOTES:

1. Based on Summer Ratings. Assumes 25% of total MW Settlement-Only units <5 MW will be available and respond.
2. The actual load relief obtained is highly dependent on circumstances surrounding the appeals, including timing and the amount of advanced notice that can be given.
3. The MW values are based on a 25,000 MW system load and verified by the most recent voltage reduction test.
4. EEA levels are described in Attachment 1 to NERC Reliability Standard EOP-011 - Emergency Operations (https://www.nerc.com/pa/rrm/ea/Pages/Energy-Emergency-Alerts.aspx) and do not trigger additional communications with OP-4 contacts.

Source: OP-4, Action During A Capacity Deficiency, Appendix A

Potential Relief Under OP-4, *continued*

Roughly 1,900 – 4,000 MW of potential relief systemwide from 11 actions



COMMUNICATIONS OVERVIEW

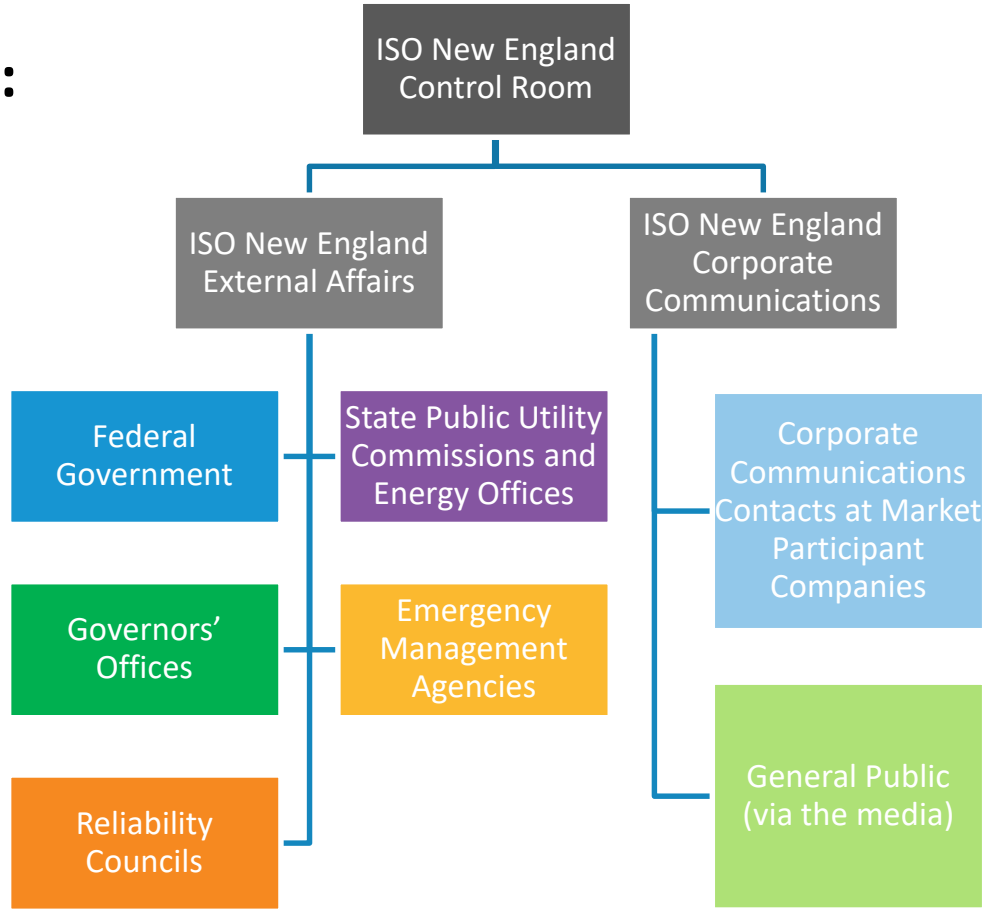
When Are Communications Triggered?

- Several **operating procedures** trigger communications with external stakeholders:
  - Action During a Capacity Deficiency (Operating Procedure No. 4)
  - Action in an Emergency (Operating Procedure No. 7)
  - Cold Weather Condition Operations (SOP-RTMKTS.0050.0007)
  - Actions During an Energy Emergency (Operating Procedure No. 21)
- Other unusual and emergency circumstances in which the ISO communicates with external stakeholders:
  - Conservation appeals not triggered by an operating procedure
  - Emergencies (storms, potential terrorist alerts) that could affect operation and reliability of the region's power grid or wholesale markets
- ISO will use the OP-4 communication process as a **guide** for communicating power system emergencies that are not linked to an operating procedure
- ISO will share system-level information during emergency communications; however, we will not release unit-specific information

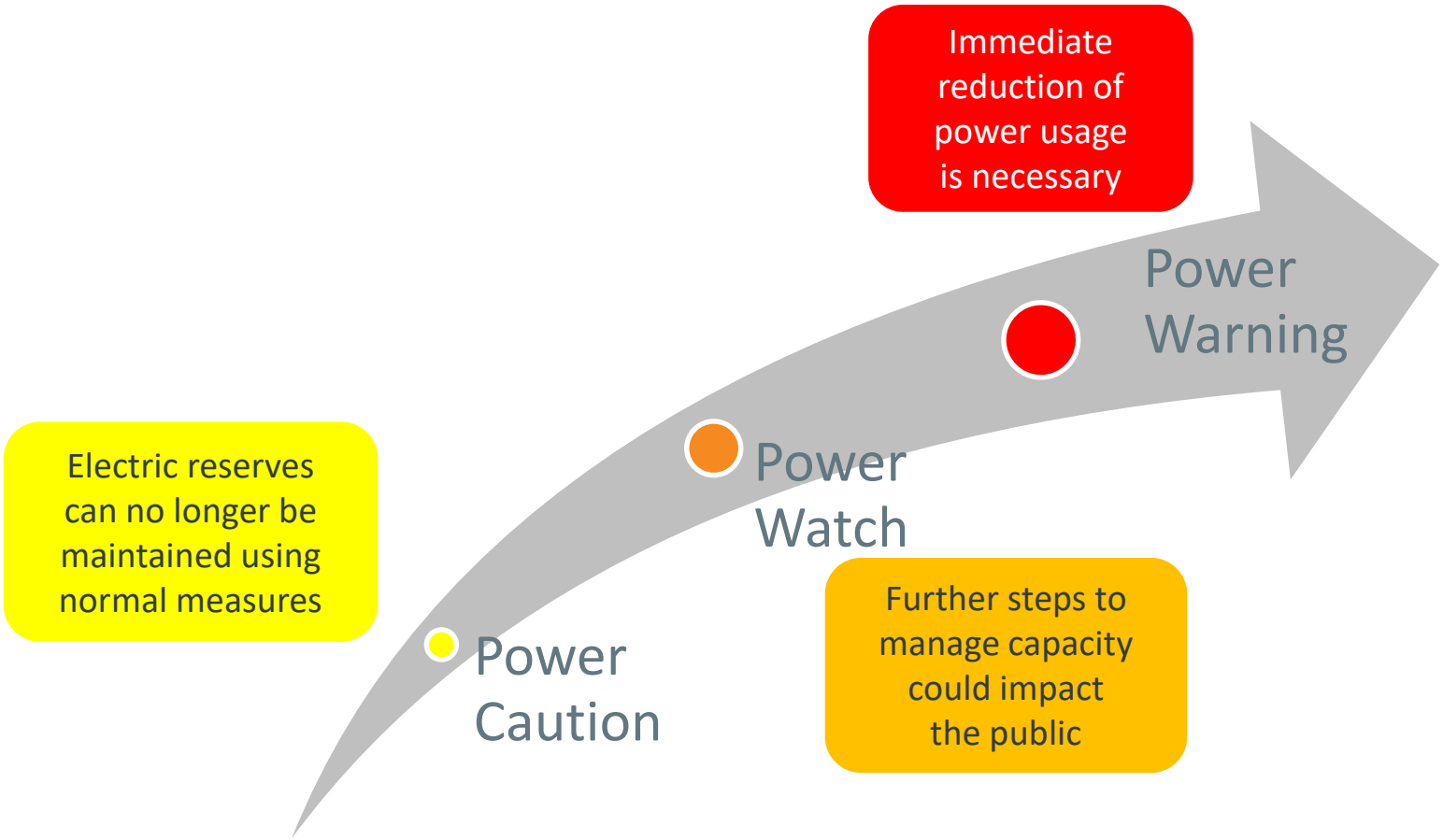
Coordination Is Vital for Accurate and Timely Communications with Stakeholders

Process for Communications:

- Control Room issues notice of a capacity deficiency
- External Affairs (EA) and Corporate Communications (CC) coordinate with the Control Room to verify event details
- EA and CC notify designated OP-4 contacts



OP-4: Three Primary Notifications



OP-4 Communications for a *Power Caution*

Action 1

- CC and EA will:
  - Inform government officials and NEPOOL communications contacts of implementation of OP-4 and "Power Caution" via e-mail notification
  - No public appeal for conservation is necessary

Action	Description
1	Implement **Power Caution** and advise resources with a CSO to prepare to provide capacity Begin to allow depletion of 30-minute reserves

OP-4 Communications for a *Power Watch*

Action 4

- CC and EA will:
  - Inform government officials and NEPOOL communications contacts of OP-4 implementation and "Power Watch" via e-mail notification
  - Update "pre-scripted" public appeal for voluntary electricity conservation and issue it via media advisory *if conditions warrant*
  - Activate conference call "bridgeline" and conduct regular conference call updates *if public appeal is issued*
  - Publicize conservation appeal: ISO-NE home page, Newswire, mobile app, and Twitter

Action	Description
4	Implement **Power Watch**, a notification that additional OP-4 actions may be taken *If conditions warrant, issue a public appeal for voluntary conservation*

OP-4 Communications for a *Power Warning*

Action 10 Power Warning and Radio/TV Appeal

- CC and EA will:
  - Inform government officials and NEPOOL communications contacts of OP-4 implementation and "Power Warning" via e-mail notification
  - Update "pre-scripted" public appeal for voluntary electricity conservation and issue it via media advisory
  - Activate conference call "bridgeline" and conduct regular conference call updates
  - Publicize conservation appeal: ISO-NE home page, Newswire, mobile app, and Twitter

Action	Description
10	Implement **Power Warning** and issue urgent public appeal for voluntary conservation Declare Energy Emergency Alert (EEA) Level 2 (if not already declared)

*Note: EEA levels are described in Attachment 1 to NERC Reliability Standard EOP-011 - Emergency Operations. These alerts do not trigger any additional communications with OP-4 contacts.

OP-4 Communications for a *Governors' Appeal*

Action 11 Governors' Appeal

- CC and EA will:
  - Issue notice as far in advance as possible
  - ISO notifies state contacts to assist with appeal
  - Notify pre-determined governors' staff members
    - Action requested is for the governors to make an urgent public appeal for conservation

Action	Description
11	Request state governors' support for ISO appeals for conservation Declare Energy Emergency Alert (EEA) Level 2 (if not already declared)

*Note: EEA levels are described in Attachment 1 to NERC Reliability Standard EOP-011 - Emergency Operations. These alerts do not trigger any additional communications with OP-4 contacts.

OP-4 External Notifications

- OP-4 Action 1
- Serves as a notice to Market Participants that a capacity deficiency exists
- No public appeal for electricity conservation is made

- OP-4 Action 4
- All internal and external stakeholders are notified
- Public appeal for electricity conservation *if conditions warrant*

- OP-4 Action 10
- All internal and external stakeholders are notified
- **Urgent public appeal** to immediately turn off all unnecessary power use

Governors' Appeal

- OP-4 Action 11
- ISO notifies state government contacts to assist with appeal
- ISO requests Governors' support for Power Warning

What Government OP-4 Contacts Can Expect

- External Affairs will notify Government OP-4 contacts initially via **ISOAlert** if the ISO implements any OP-4 actions
  - **ISOAlert** will trigger an automated email, phone call, and text message to all Government OP-4 contacts (i.e., those designated as primary, secondary, and alternate)*
  - We will make subsequent notifications only if actions 4, 10 or 11 are implemented
- If the ISO implements a Power Watch *with a public appeal* or a Power Warning, **ISOAlert** will prompt the recipient to connect to a conference **bridgeline**
- ISO staff will communicate the **status of the power system** on the bridgeline
- OP-4 contacts will be notified when actions are **cancelled**
- For **localized** events, we will only notify the primary OP-4 contact in the affected area

	Actions	Email	Text Message	Phone Call	Activate Bridgeline
Power Caution	1	●	●	●	
Power Watch	4	●	●	●	If ISO issues a public appeal
Power Warning	10	●	●	●	●
Governors' Appeal	11	●	●	●	

* If ISO-NE External Affairs needs to bypass ISOAlert, we will reach out to primary contacts first; we will only call secondary and alternate contacts if the primary contact is unreachable.

External Affairs (EA) Contacts

Federal Government

- U.S. Department of Energy (DOE)
- U.S. Environmental Protection Agency (EPA Region I)
- Federal Energy Regulatory Authority (FERC)
- Federal Emergency Management Agency (FEMA)

State Public Utility Commissions and Energy Offices

- Connecticut PURA and DEEP
- Maine PUC (Electric and Emergency Staff)
- Massachusetts DPU and DOER
- New Hampshire PUC and DOE
- Rhode Island PUC, DPUC and OER
- Vermont DPS and PUC
- NECPUC (as an FYI)

Governors' Offices

- Connecticut Governor's Office
- Maine Governor's Office
- Massachusetts Governor's Office
- Rhode Island Governor's Office
- Coalition of Northeast Governors

Emergency Management Agencies

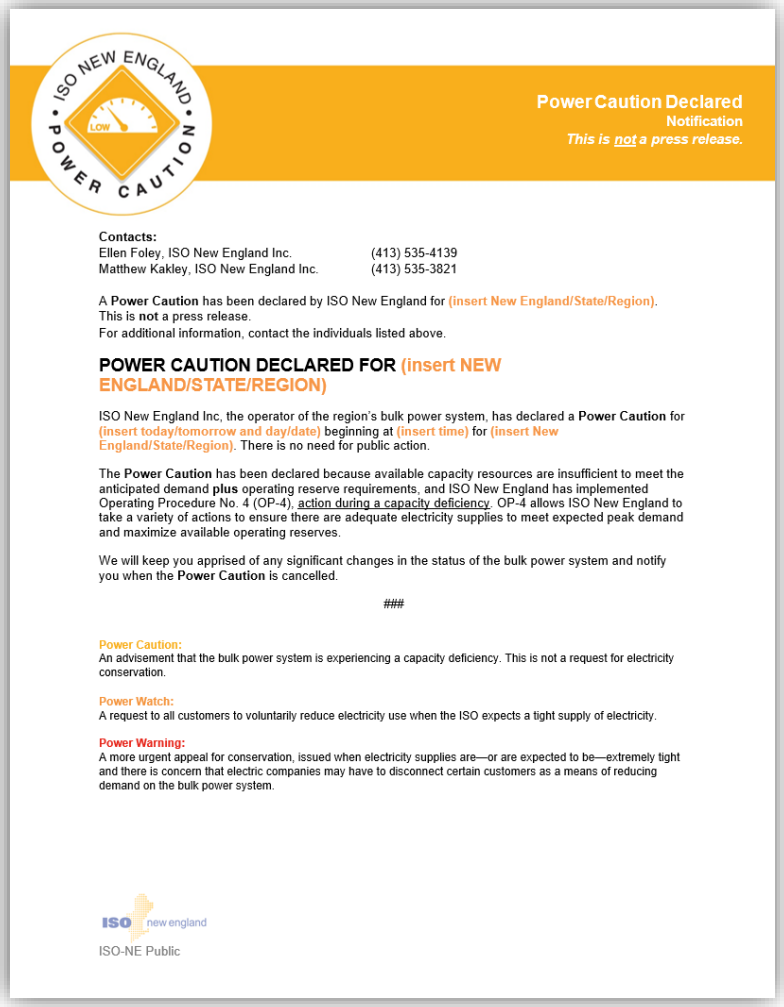
- Connecticut Emergency Management Division
- Maine Emergency Management Agency
- Massachusetts Emergency Management Agency
- New Hampshire Bureau of Emergency Management
- Rhode Island Emergency Management Agency
- Vermont Emergency Management
- Northeast States Emergency Consortium
- City of Boston Dept. of Emergency Management

Reliability Councils

- North American Electric Reliability Corporation (NERC)
- Northeast Power Coordinating Council (NPCC)

Corporate Communications Notifications

- Pre-scripted messages include:
  - *Power Caution, Power Watch, Power Warning, and Controlled Power Outage*
    - New England-wide
    - State- and area-specific
      - e.g., State of Connecticut, Greater Boston area
    - Time-specific
      - e.g., Today, Extended through Tomorrow, Power Watch Lifted



ISO NEW ENGLAND • POWER CAUTION • Low

Power Caution Declared
Notification
This is not a press release.

Contacts:
Ellen Foley, ISO New England Inc. (413) 535-4139
Matthew Kakley, ISO New England Inc. (413) 535-3821

A **Power Caution** has been declared by ISO New England for (insert New England/State/Region).
This is **not** a press release.
For additional information, contact the individuals listed above.

POWER CAUTION DECLARED FOR (insert NEW ENGLAND/STATE/REGION)

ISO New England Inc, the operator of the region's bulk power system, has declared a **Power Caution** for (insert today/tomorrow and day/date) beginning at (insert time) for (insert New England/State/Region). There is no need for public action.

The **Power Caution** has been declared because available capacity resources are insufficient to meet the anticipated demand **plus** operating reserve requirements, and ISO New England has implemented Operating Procedure No. 4 (OP-4), action during a capacity deficiency. OP-4 allows ISO New England to take a variety of actions to ensure there are adequate electricity supplies to meet expected peak demand and maximize available operating reserves.

We will keep you apprised of any significant changes in the status of the bulk power system and notify you when the **Power Caution** is cancelled.

###

Power Caution:
An advisement that the bulk power system is experiencing a capacity deficiency. This is not a request for electricity conservation.

Power Watch:
A request to all customers to voluntarily reduce electricity use when the ISO expects a tight supply of electricity.

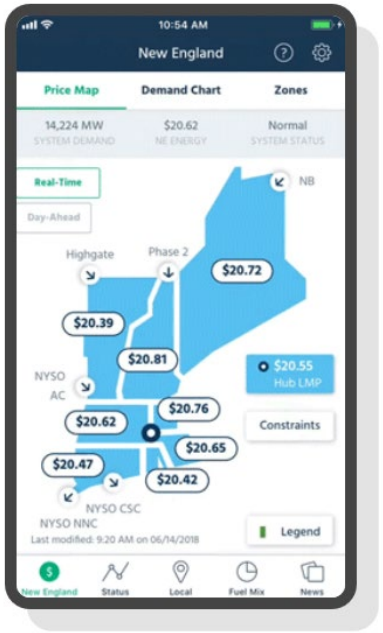
Power Warning:
A more urgent appeal for conservation, issued when electricity supplies are—or are expected to be—extremely tight and there is concern that electric companies may have to disconnect certain customers as a means of reducing demand on the bulk power system.

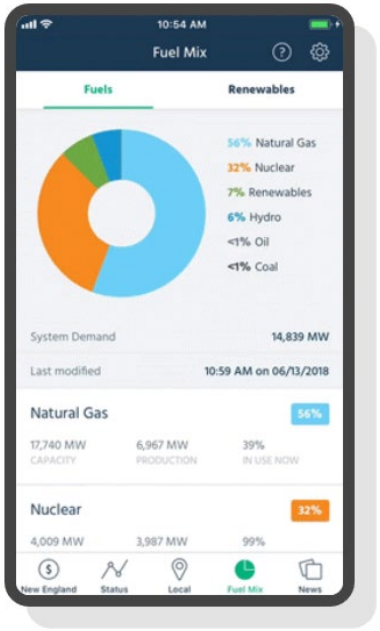
ISO new england

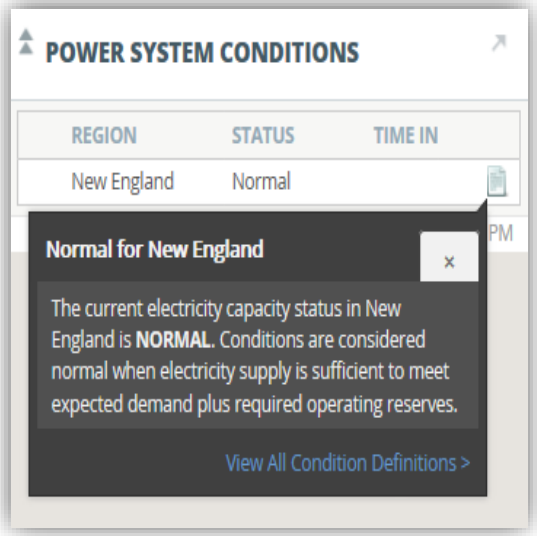
ISO-NE Public

Digital and Social Media Communications Are Used to Provide System Updates

- Log on to **ISO Express**
  - ISO Express provides real-time data and notifications regarding power system conditions
- Follow the ISO on **Twitter**
  - @isonewengland
- Download the **ISO to Go App** for free
  - ISO to Go is a free mobile application that puts real-time wholesale electricity pricing and power grid information in the palm of your hand

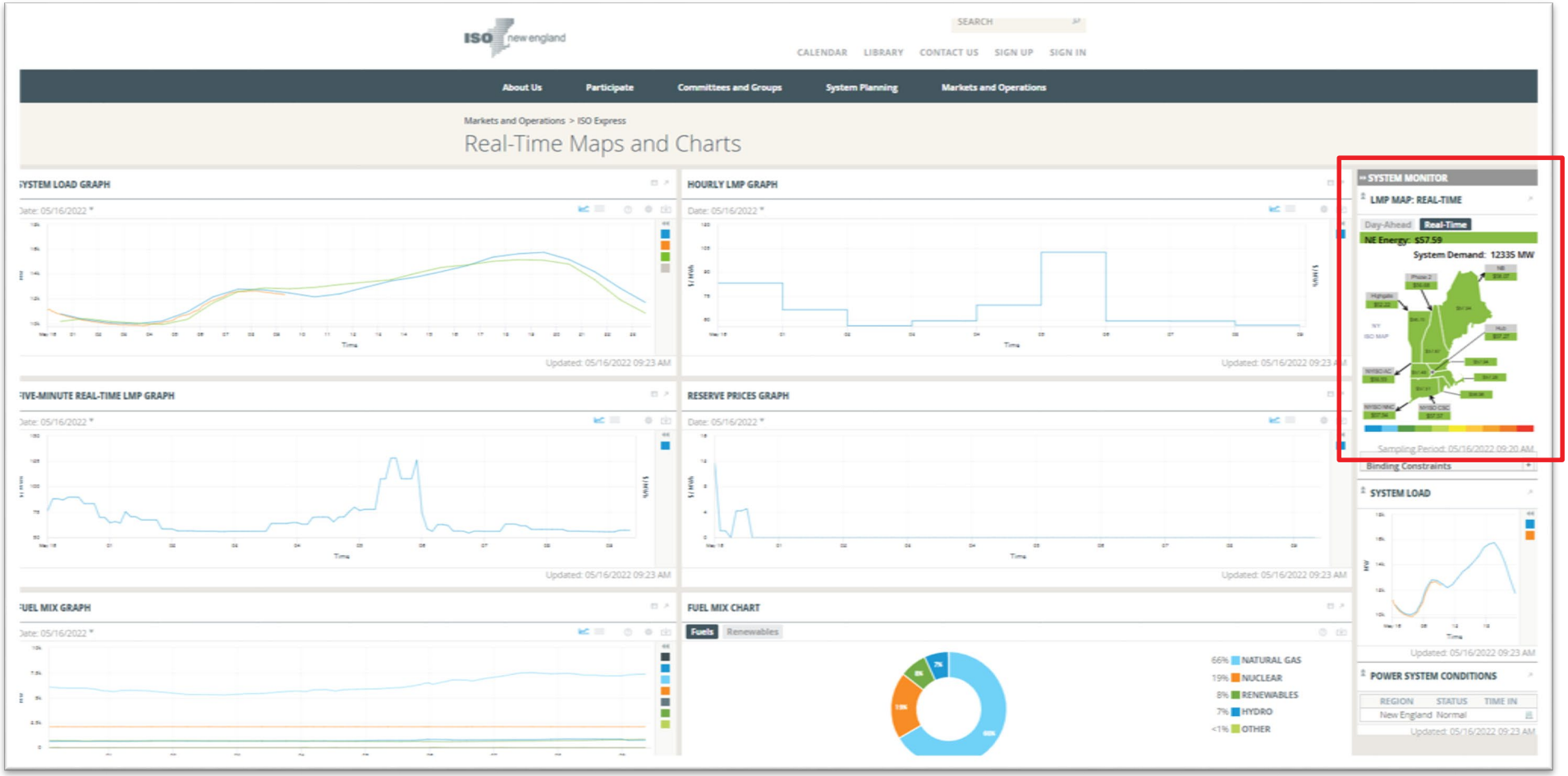






For a Quick Look at Power System Conditions…

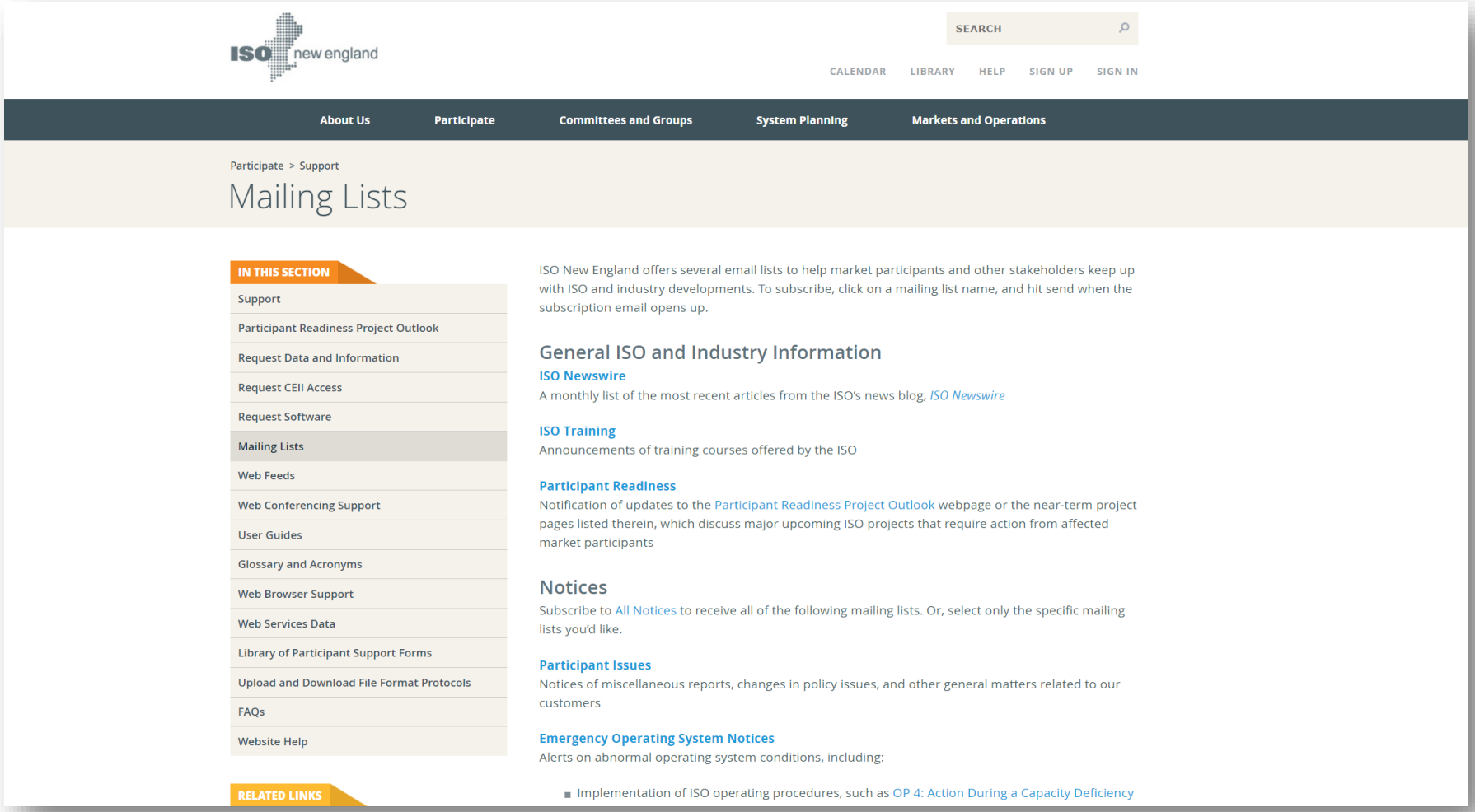
Visit the System Monitor on ISO Express



ISO Express is available at: http://www.iso-ne.com/isoexpress/

Options to Subscribe to ISO New England Email Lists

Subscribe to receive All Notices, Emergency Operating System Notices, and others



Subscribe here: http://www.iso-ne.com/participate/support/mailing-lists

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    - By phone: (413) 535-4138
    - By email: gwarmangold@iso-ne.com

- **NEPOOL Contacts:**
  - Corporate Communications/ Media Relations Department:
    - By phone: (413) 535-4309
    - By email: rjohnson@iso-ne.com

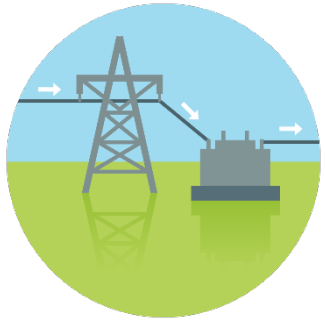
NEPOOL
NEW ENGLAND POWER POOL

ACTION IN AN EMERGENCY

Operating Procedure No. 7 (OP-7)

Link: https://www.iso-ne.com/participate/rules-procedures/operating-procedures

Action in an Emergency (OP-7)



- If OP-4 actions are not adequate to manage a capacity deficiency, the ISO will implement OP-7
  - OP-4 can be skipped to move into OP-7 immediately, if necessary
- OP-7 allows system operators to order the **disconnection** of firm customer load—frequently referred to as manual load shedding, load curtailment, controlled power outages, or rolling blackouts—as a means of maintaining the integrity of the bulk power system
- OP-7, like OP-4, can be called region-wide or locally
- When OP-7 actions are required, transmission and/or distribution companies disconnect customers at the direction of the ISO or the Local Control Centers (LCC)
  - ISO system operators do not have the ability to disconnect customers

Communications During OP-7

Communications follow the general framework for OP-4 events

- Control Room will:
  - Notify LCCs, U.S. DOE, NERC, and NPCC
- CC and EA will:
  - Inform government officials and NEPOOL communications contacts of OP-7 implementation (prior to implementation, if possible)
  - Activate conference call “bridgeline” and conduct regular conference call updates when time permits
  - Issue *Controlled Power Outage* notice and, if necessary, conservation appeal (prior to implementation, if possible)

2022 NPCC Summer Reliability Assessment Summary

ISO New England Annual

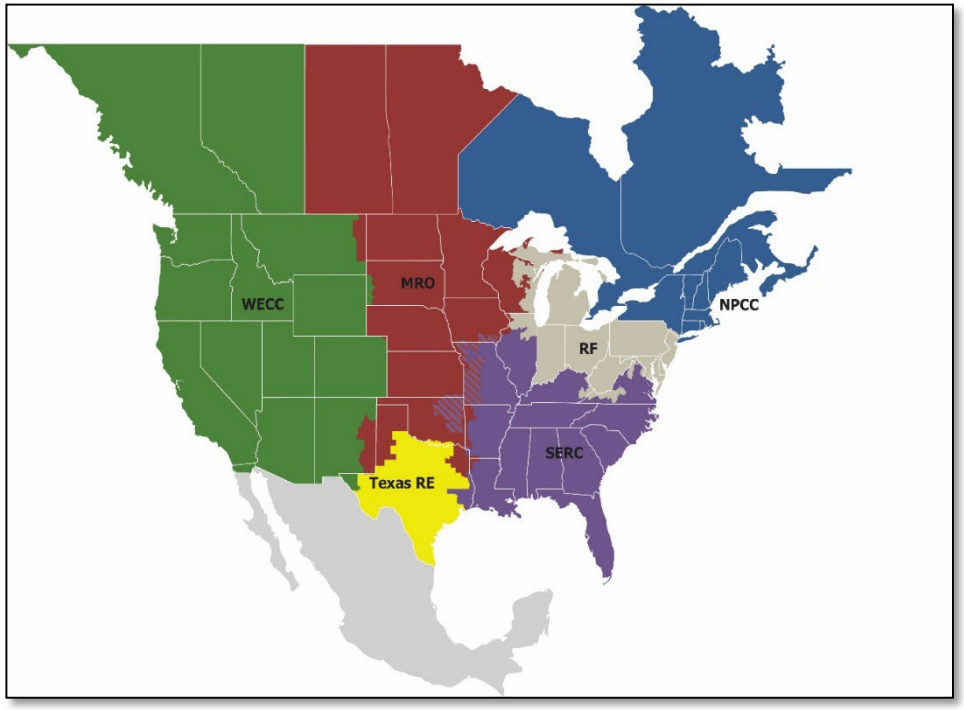
Pre-Summer Communications Training

Thursday, May 19, 2022

Andreas Klaube
Manager, Probabilistic Assessment
Northeast Power Coordinating Council

NPCC, Inc.

Northeast Power Coordinating Council (NPCC)



- One of six NERC Regional Entities throughout the US, Canada and portions of Mexico
- Area (sq. miles): 1.2 million
- Population: 56+ million people
- States (US): 7 Provinces (Canada): 4
- Registered Entities: 239, performing 472 functions
- Share of Eastern Interconnection Load: ~20%
- Share of NPCC Load: 44% US / 56% Canadian
- Share of Total Canadian Load within NPCC: ~65%

Summary of Major Findings – NPCC Region

- The assessment is based on estimates of demand, resource and transmission project's availability reported as of April 22, 2022. NPCC's assessment indicates adequate transmission capability and capacity margins available to meet peak demand and required operating reserve this summer.

- Overall coincident NPCC 2022 summer peak demand is expected to be around 104,600 MW – approximately 500 MW above last summer.

- An installed supply capacity of about 159,400 MW is projected to be in place to meet electricity demand this summer. NPCC's installed capacity has decreased by approximately 1,530 MW from last summer. The largest installed capacity decrease occurs in Ontario and New England.

Summary of Major Findings – NPCC Region

- After accounting for transmission constraints, the region's spare operable capacity (capacity over and above reserve requirements) during the summer period is estimated to be sizable - ranging from approximately 8,200 to 15,000 MW.

- The sizeable estimate of NPCC spare operable capacity will help to counteract any adverse reliability impacts from the unavailability or inoperability of key facilities, such as resulting from equipment and fuel supply interruptions, and deferred generation maintenance.

- Established operating procedures are available to maintain reliability and keep electricity supplies and demand in balance.

COVID-19 Pandemic

- With COVID-19 pandemic restrictions lifting in most regions, many organizations have already begun phased, return to office plans, with some electing to continue splitting the work arrangements between home and office.

- Overall impacts of the COVID-19 pandemic are expected to translate to a small increase to summer peak demands as workplace requirements are blended with home office electricity use. However, ambient weather conditions are the single most important variable impacting the demand forecasts during the summer months.

NPCC Resources – Summer 2022

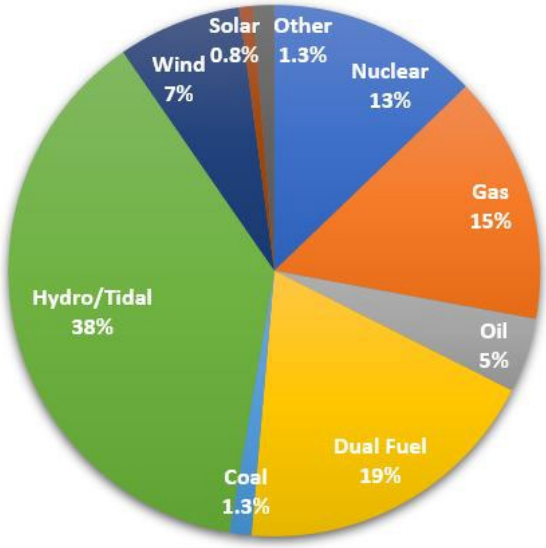
Renewables, BTM and Load Management

Nameplate Wind Capacity	13,732 MW
Nameplate Solar Capacity	3,344 MW
Installed Behind-The-Meter (BTM) PV*	8,461 MW
Demand Response Program Resources	2,773 MW

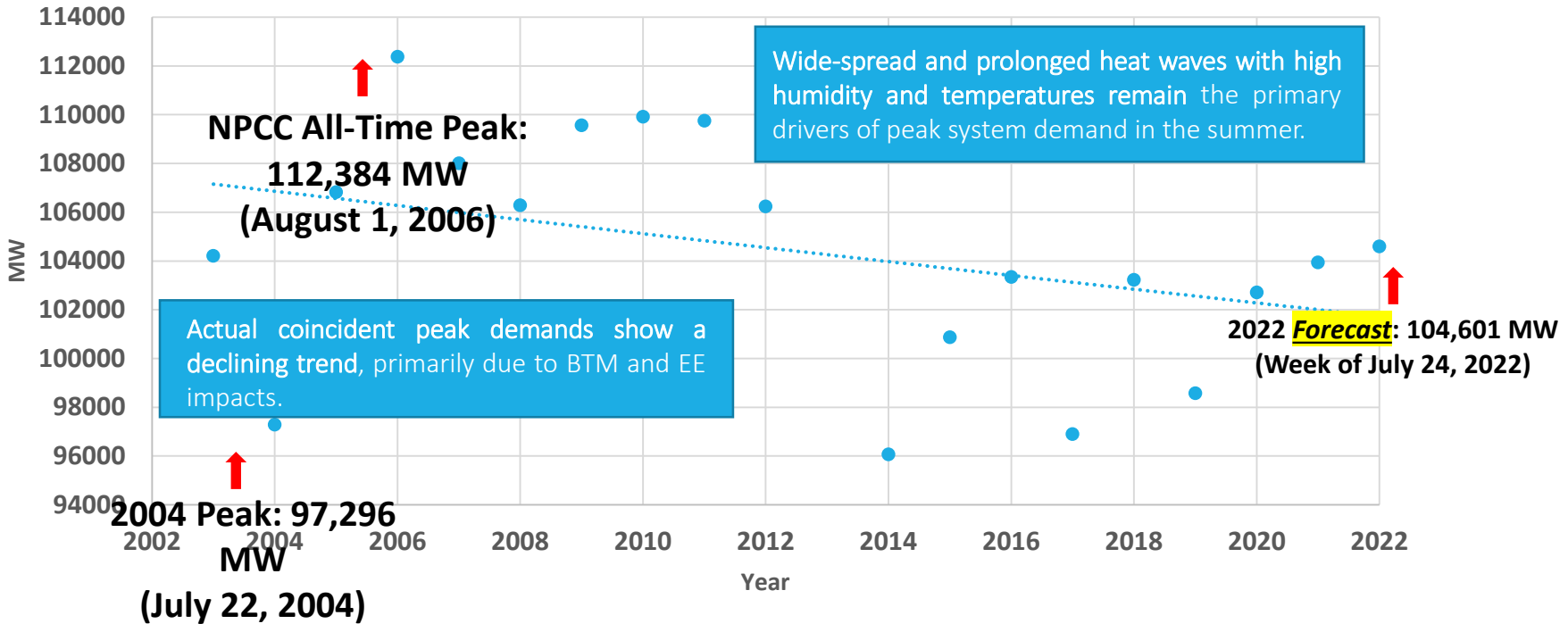
*Estimated BTM Photovoltaics; Impact on Non-coincident Peak load: 2,734 MW

- Forecast Installed Capacity: **159,401 MW** (July 2022)
- Forecast Peak Demand: **104,601 MW** (July 2022)

NPCC Installed Capacity by Fuel Type



Summer NPCC Region
Actual Coincident Peak Demands (MW)



Summary of Major Findings – New England

- New England expects to have sufficient resources to meet its 50/50 summer peak demand forecast of 24,817 MW – 7 MW lower than last summer's forecast.

- Accounting for purchases, sales, required operating reserve, planned and unplanned outages results in a spare operable capacity of approximately 1,705 MW during the peak week.

- With natural gas as the predominant fuel source for power generation in New England, ISO-NE monitors the factors affecting the natural gas fuel deliverability for the area. There is expected to be limited amounts of natural gas pipeline maintenance and construction to occur for select areas and does not forecast major deliverability issues that would affect the installed capacity.

Summary of Major Findings – New York

- The New York Independent System Operator (New York ISO) forecasts installed capacity of 37,431 MW for the 2022 summer peak demand forecast of 31,765 MW, which is 562 MW lower than the corresponding 2021 summer peak demand forecast.

- Resource additions include seven new (~20 MW) solar generation facilities. Considering all changes and other capacity adjustments, the resultant net change for New York generation (from summer 2021 through this upcoming summer) is a decrease of approximately 280 MW.

- Accounting for purchases, sales, required operating reserve, planned and unplanned outages results in a spare operable capacity of approximately 1,900 MW during the peak week.

Summary of Major Findings – Ontario

- Ontario is projected to have an adequate supply of electricity this summer and Ontario's transmission system is expected to be adequate.

- The Ontario 2022 summer peak 50/50 demand forecast is 22,546 MW. The forecast is roughly 50 MW higher than last summer's 50/50 forecast peak demand.

- Considering all changes and capacity adjustments, the resultant net change for Ontario generation from summer 2021 is approximately a 760 MW decrease. This corresponds to a spare operable capacity of approximately 900 MW during the peak week.

- The Phase Angle Regulator connected to the Ontario-New York 230kV circuit L33P is expected to be back in-service by the third quarter of 2022. This will provide greater flexibility to control future intertie flows with New York.

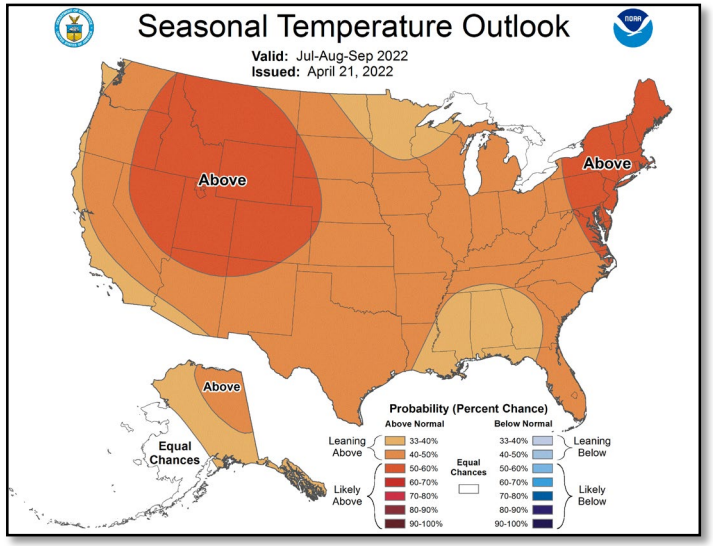
Summary of Major Findings
Quebec and the Canadian Maritimes

- The Québec and Canadian Maritime Provinces are winter peaking and have more than an adequate supply of electricity forecast for the summer period. No transmission reliability or resource adequacy issues have been identified.

- Québec maintenance outages are coordinated with neighboring Area Reliability Coordinators to provide for maximum export capability to summer peaking areas. There have been no major generation or transmission additions since last summer.

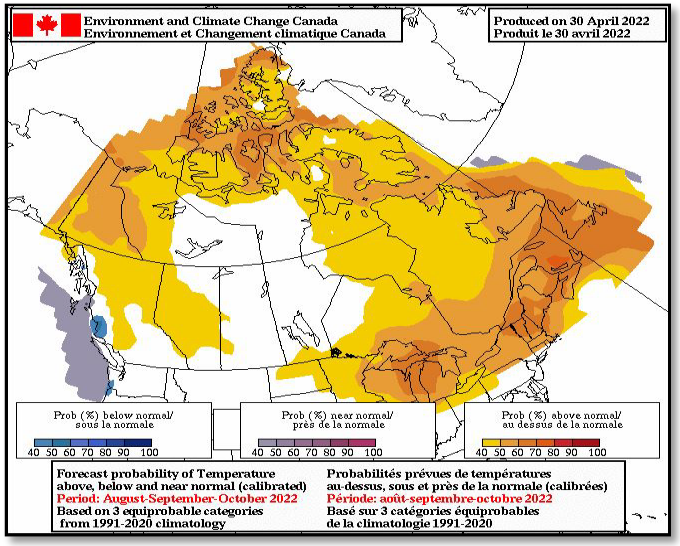
- A 500 MW (475 MW received in Nova Scotia) High Voltage Direct Current undersea cable link (Maritime Link) between Newfoundland and Nova Scotia was installed in late 2017. The associated firm capacity contract is expected to facilitate the eventual retirement of a 153 MW coal-fired unit in Nova Scotia; thus, the overall resource adequacy will be unaffected by these changes.

Summer 2022 Temperature Outlook



NOAA Climate Prediction Center

Link



Environment Canada

Link

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    - By email: gwarmangold@iso-ne.com

- **NEPOOL Contacts:**
  - Corporate Communications/ Media Relations Department:
    - By phone: (413) 535-4309
    - By email: rjohnson@iso-ne.com

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Questions

APPENDIX

BACKGROUND INFORMATION ON OP-4

Link: http://www.iso-ne.com/participate/rules-procedures/operating-procedures

Action 1

- Inform all resources that a capacity deficiency exists
  - Each resource with a Capacity Supply Obligation (CSO) should prepare to provide capability
  - "Settlement-Only" Resources with real-time obligations and CSOs need to monitor the status of reserve pricing and meet their obligations under "Capacity Scarcity Condition" definitions in the Tariff
- Begin to allow depletion of 30-minute operating reserve
- Implement a **Power Caution**
  - Does not involve public appeals for conservation

Action 2

- Declare Energy Emergency Alert (EEA) Level 1
- EEA levels are described in Attachment 1 to NERC Reliability Standard EOP-011 - Emergency Operations:
  - https://www.nerc.com/pa/rrm/ea/Pages/Energy-Emergency-Alerts.aspx

Action 3

- Request voluntary load curtailment of Market Participants' facilities in New England

Action 4

- Implement a **Power Watch**
  - Notification that additional OP-4 actions may be taken
- If conditions warrant, issue a public appeal for voluntary conservation

Action 5

- Implement Actions 5 and above to maintain 10-minute reserves
- Arrange to purchase available emergency capacity and energy, or energy only (if capacity backing is not available), from Market Participants or neighboring regions

*Note: EEA levels are described in Attachment 1 to NERC Reliability Standard EOP-011 - Emergency Operations (https://www.nerc.com/pa/rrm/ea/Pages/Energy-Emergency-Alerts.aspx).

Action 6

- Declare Energy Emergency Alert (EEA) Level 2*
- Implement a voltage reduction of 5% of normal operating voltage requiring more than 10 minutes to implement
  - Local Control Centers (LCCs) implement voltage reduction on distribution and sub-transmission systems
- Alert NYISO that sharing of reserves within Northeast Power Coordinating Council (NPCC) may be required

Action 7

- Request generators and demand response resources not subject to a CSO to voluntarily provide energy for reliability purposes
  - Either on a forecast basis or in real time when ISO anticipates it will be unable to maintain 10-minute reserves

*Note: EEA levels are described in Attachment 1 to NERC Reliability Standard EOP-011 - Emergency Operations (https://www.nerc.com/pa/rrm/ea/Pages/Energy-Emergency-Alerts.aspx).

Action 8

- Implement a voltage reduction of 5% of normal operating voltage that is attainable within 10 minutes
  - LCCs implement voltage reduction on distribution and sub-transmission systems
- Declare Energy Emergency Alert (EEA) Level 2 if not already performed under an earlier action*

Action 9

- Request activation of all customer generation not contractually available to Market Participants
- Request voluntary load curtailment by large industrial and commercial customers
- Request is made through Transmission and Distribution owners

Action 10

- Initiate radio/television appeals for voluntary load curtailment
- Implement a **Power Warning**
  - Public appeals made when an immediate reduction in power usage is necessary to avert overload of the electrical system
  - Public appeals made when other efforts (e.g., emergency purchases, voluntary curtailment, contracted curtailment and voltage reductions) have been unsuccessful in bringing supply and demand back into balance
- Declare Energy Emergency Alert (EEA) Level 2 if not already performed under an earlier action*

Action 11

- Request New England governors to reinforce **Power Warning** appeals initiated in Action 10
- Declare Energy Emergency Alert (EEA) Level 2 if not already performed under an earlier action*

*Note: EEA levels are described in Attachment 1 to NERC Reliability Standard EOP-011 - Emergency Operations (https://www.nerc.com/pa/rrm/ea/Pages/Energy-Emergency-Alerts.aspx).

OP-4 Actions from Beginning of FCM to Present

Action	1	2	3	4	5	6	7	8	9	10	11
Date	Power Caution	Power Caution	Power Caution	Power Watch	Power Caution	Power Caution	Power Caution	Power Caution	Power Caution	Power Warning	Governors' Appeal
6/24/2010	•	•	•	•	•						
7/5/2010	•										
8/9/2010	•										
4/22/2011	•										
7/22/2011	•	•	•		•						
8/16/2011	•	•			•						
12/19/2011	•	•									
1/28/2013	•	•									
7/19/2013	•	•	•		•						
12/14/2013	•	•			•						
9/28/2014	•										
12/4/2014	•										
9/9/2015	•										
8/11/2016	•	•									
9/3/2018	•	•	•	•	•						

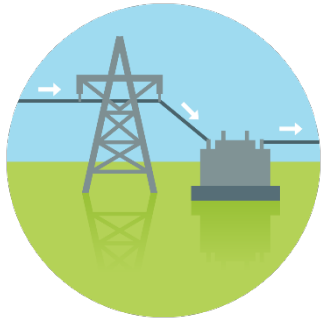
Note: The OP-4 actions above were called New England-wide, except on July 19, 2013 (actions 2, 3, and 5 were called for all zones but Maine) and on August 11, 2016 (action 2 was called for all zones but Maine).

ACTION IN AN EMERGENCY

Operating Procedure No. 7 (OP-7)

Link: http://www.iso-ne.com/participate/rules-procedures/operating-procedures

Action in an Emergency (OP-7)



- If OP-4 actions are not adequate to manage a capacity deficiency, the ISO will implement OP-7
  - OP-4 can be skipped to move into OP-7 immediately, if necessary
- OP-7 allows system operators to order the **disconnection** of firm customer load—frequently referred to as manual load shedding, load curtailment, controlled power outages, or rolling blackouts—as a means of maintaining the integrity of the bulk power system
- OP-7, like OP-4, can be called region-wide or locally
- When OP-7 actions are required, transmission and/or distribution companies disconnect customers at the direction of the ISO or the Local Control Centers (LCC)
  - ISO system operators do not have the ability to disconnect customers

Communications During OP-7

Communications follow the general framework for OP-4 events

- Control Room will:
  - Notify LCCs, U.S. DOE, NERC, and NPCC within the times prescribed by the various agencies
- CC and EA will:
  - Inform government officials and NEPOOL communications contacts of OP-7 implementation (prior to implementation, if possible)
    - Notification by phone and email
  - Activate conference call “bridge-line” and conduct regular conference call updates when time permits
  - Issue *Controlled Power Outage* notice and, if necessary, conservation appeal (prior to implementation, if possible)

ABNORMAL CONDITIONS ALERT

Master/Local Control Center Procedure No. 2 (M/LCC 2)

Link: https://www.iso-ne.com/participate/rules-procedures/master-lcc-procedures

M/LCC 2 – Abnormal Conditions Alert

- What is an abnormal condition on the bulk power system?
  - Forecasted or actual deficiency of operating reserves requiring implementation of OP-4 and/or OP-7
  - Low transmission voltages and/or low reactive reserves
  - Inability to provide first contingency protection when an undesirable post-contingency condition might result (e.g., load shedding)
  - Geomagnetic Disturbance (GMD)
  - Cold Weather Event is declared
  - Operational staffing shortage impacting normal power system operations within New England
  - Any other credible threat to power system reliability and integrity (e.g., terrorism, sabotage, storms)

M/LCC 2 – Abnormal Conditions Alert*, continued*

- The purpose of M/LCC 2:
  - Alerts power system personnel and market participants of abnormal system conditions
  - Outlines steps to be taken, including:
    - Cancellation of maintenance on power system resources
    - Delineates which outages can and cannot be allowed
- M/LCC 2 may be issued systemwide or locally
- M/LCC 2 may be skipped – the ISO may move straight into OP-4 and/or OP-7, if necessary
- Typically, the ISO does not send M/LCC 2 notices to OP-4 contacts

BACKGROUND INFORMATION ON OP-21

Link: http://www.iso-ne.com/participate/rules-procedures/operating-procedures

Background on OP-21

- **Purpose:** OP-21 documents the processes and establishes the associated requirements to:
  - Collect fuel availability and environmental limitation information from each coal, oil, and natural gas-fired generator in the region, and any other resource that the ISO determines to be necessary
  - Forecast and report on expected energy availability over a 21-day look-ahead period
  - Declare Energy Alerts and Energy Emergencies based on forecasted or real-time system conditions
  - Take appropriate action in anticipation of, or during, an Energy Alert or Energy Emergency
  - Communicate with interstate natural gas pipelines, LNG import facilities, local gas distribution companies, generating resources, and all other regional stakeholders regarding matters related to resource fuel availability and environmental limitations

Background on OP-21

- **Applicability:** Energy Emergencies may occur at any time as a result of sustained national or regional shortages in fuel availability or deliverability to New England's generating resources
  - Shortages of fuel may come in many forms, including, but **not** limited to: severe drought, interruption to availability or transportation of natural gas, LNG, oil, or coal
- Because fuel shortages and/or environmental limitations may impact New England's ability to fully meet system load and ten-minute operating reserve requirements for days, weeks, or months at a time, the ISO may need to take action **in advance of** a projected Energy Emergency to manage and preserve fuel supplies within the region
  - Changes to OP-21 are intended to improve **situational awareness** and encourage **proactive measures** to avoid forecasted energy deficiencies

Potential Initiating Conditions for an Energy Emergency Include, *But Are Not Limited to:*

- One or more pipeline Operational Flow Orders (OFOs) have been declared
- Significant reductions in resource capability due to natural gas-related issues
- Weather forecast for an extended period of cold or hot weather
- Fuel delivery to fossil fuel-fired generating resources is, or may be, impaired
- Prolonged drought
- Adverse weather conditions within the Gulf of Mexico, Western Canada, or regional shale gas basins
- Abnormal conditions at regional LNG import, satellite storage, or LNG trucking facilities

- Extremely cold regional, national, or international weather conditions
- Extreme storm conditions offshore in the Maritimes
- Any viable threat to one or more of the pipelines or LDCs supplying the region
- Sustained environmental limitation on some, or several, regional resources
- Any other serious threat to the integrity of the bulk electric system for which the ISO determines that this procedure may mitigate the impact

Forecasting and Reporting Framework Has Been Added to OP-21 to Encourage Proactive Measures

- ISO New England performs Energy Emergency forecasting and reporting using an **hourly 21-day energy assessment** and comparing the results of that assessment with Energy Emergency **forecast alert thresholds** in order to identify and communicate potential reliability issues to regional stakeholders
- Forecasting and reporting framework:
  - Alerts stakeholders to the potential for near-term forecasted energy deficiencies
  - Allows resources in short supply of fuel to take action to replenish fuel supplies
  - Allows resources with potential environmental limitations to purchase additional credits or pursue regulatory relief to mitigate the limitation
  - Allows participants to take action to shorten or reschedule maintenance or repair to transmission facilities or resources throughout the region
  - Informs regulatory and government entities of potential energy deficiencies

Forecasted and Real-Time Energy Emergency Alerts

Forecast Alert Thresholds	Established Real-Time Alert Thresholds
Forecast M/LCC-2 (FMLCC2) • Resources during any hour are forecasted to be less than 200 MW above operating reserve requirements	**M/LCC-2** • Resources are less than 200 MW above operating reserve requirements
Forecast Energy Emergency Alert Level 1 (FEEA1) • Resources during any hour are forecasted to be less than operating reserve requirements and implementation of OP-4 Actions 1 – 5 is being forecasted (deficiency in 30-minute operating reserves)	**Energy Emergency Alert Level 1 (EEA1)** • OP-4 Action 2 implementation
Forecast Energy Emergency Alert Level 2 (FEEA2) • Resources during any hour are forecasted to be less than operating reserve requirements and implementation of OP-4 Actions 6 – 11 is being forecasted (deficiency in 10-minute operating reserves)	**Energy Emergency Alert Level 2 (EEA2)** • OP-4 Actions 6, 8, 10, or 11 implementation
Forecast Energy Emergency Alert Level 3 (FEEA3) • Resources during any hour are forecasted to be insufficient to serve firm load and implementation of load shedding under OP-7 is being forecasted	**Energy Emergency Alert Level 3 (EEA3)** • OP-7 implementation

Energy Alert Declarations and Actions

- An **Energy Alert** is declared when**:**
  - FEEA2 or FEEA3 is forecasted to occur in at least one hour on one or more consecutive days in **days 6 through 21** of the **21-day energy assessment**, or
  - Any other reason for which the ISO Chief Operating Officer, or designee, determines that the actions described below may mitigate the impact of an actual or forecasted energy deficiency
- Once an **Energy Alert** has been declared, the ISO must take the following actions:
  - Alert each Local Control Center (LCC) and surrounding Reliability Coordinator/Balancing Authority of the Energy Alert
  - Alert all market participants of the Energy Alert by posting to the ISO website
  - Alert New England state regulators and officials of the Energy Alert
  - Initiate daily data collection using OP-21 survey forms, and daily Energy Emergency forecasting and reporting

Energy Alert Declarations and Actions, *continued*

- Once an **Energy Alert** has been declared:
  - Each lead market participant must evaluate actual and anticipated fuel supplies and environmental limitations and should consider taking action as necessary to replenish fuel supplies and/or mitigate environmental limitations
  - Each lead market participant and Local Control Center must evaluate scheduled maintenance or repair to transmission facilities or resources in the region that reduces the capability of a facility or resource to supply energy to the region and should consider taking action, if possible, to maximize availability of those facilities or resources

Energy Emergency Declarations

- An **Energy Emergency** is declared when**:**
  - FEEA2 or FEEA3 is forecasted to occur in at least one hour on one or more consecutive days in **days 1 through 5** of the **21-day energy assessment**, or
  - Shedding of firm load under OP-7 is occurring or is anticipated to occur due to an actual energy deficiency resulting from a sustained shortage of fuel availability or deliverability to, or sustained environmental limitations on, some or several of New England's resources, or
  - Any other reason for which the ISO Chief Operating Officer, or designee, determines that the actions described below may mitigate the impact of an actual or forecasted energy deficiency

Energy Emergency Actions

- Once an **Energy Emergency** has been declared, the ISO must take the following actions:
  1. Alert each Local Control Center (LCC) and surrounding Reliability Coordinator/Balancing Authority of the Energy Emergency
  2. Alert all market participants of the Energy Emergency by posting to the ISO website
  3. Alert New England state regulators and officials of the Energy Emergency
  4. Report the Energy Emergency to the U.S. Department of Energy
  5. Initiate daily data collection using OP-21 survey forms, and daily Energy Emergency forecasting and reporting
  6. Request that each dual-fuel generator scheduled to operate voluntarily switch to operation on the fuel source that is not in short supply
  7. Implement specific capacity and load relief measures available through actions of OP-4, **excluding** requesting the New England State Governors to reinforce appeals for voluntary load curtailment (Action 11)

Energy Emergency Actions, *continued*

- If the seven actions described on the previous slide do not result in the necessary relief from the Energy Emergency, or if there is insufficient time for those measures to provide relief, the following actions may be taken:

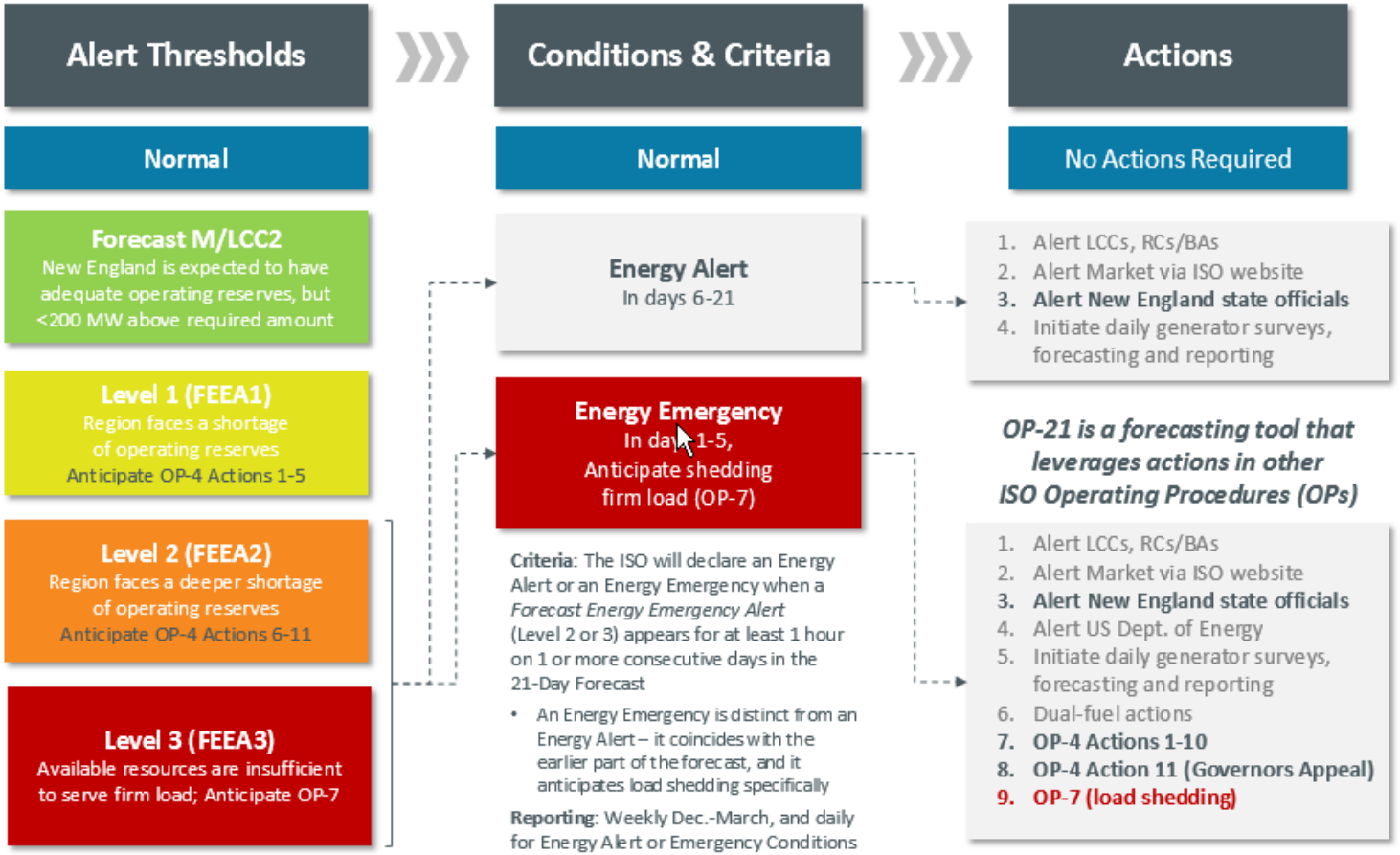
  8. Implement Action 11 of OP-4: Request the New England state governors to reinforce appeals for voluntary electrical load curtailment through Power Warning implementation

  9. Under extreme conditions, the ISO must seek reliability relief through load shedding actions available through implementation of OP-7

Forecasting and Reporting

- During Normal Conditions, ISO New England performs Energy Emergency forecasting and reporting:
  - **Weekly** during winter months (December through March)
  - **Bi-weekly** during non-winter months (April through November)
- During Energy Alert or Energy Emergency conditions, the ISO performs Energy Emergency forecasting and reporting on a **daily** basis, until such time as the conditions no longer exist
- Reports are posted to the **ISO website** and include:
  - A summary, by operating day, detailing whether conditions are expected to be Normal, Forecast M/LCC-2, Forecast Energy Emergency Alert 1, Forecast Energy Emergency Alert 2, or Forecast Energy Emergency Alert 3
  - A determination of whether the threshold for declaring an Energy Alert or Energy Emergency has been met
  - To the extent possible, the reasons why the threshold was met

ISO New England Operating Procedure No. 21 (OP-21): *Operational Surveys, Energy Forecasting & Reporting and Actions During an Energy Emergency*



Discretionary Appeals:
The ISO may issue public appeals for conservation that are not triggered by these operating procedures if it determines that actions by the public to conserve energy could lessen the need for emergency actions.

Note: ISO uses OP-4 actions to manage *capacity* deficiencies and OP-7 actions for *energy* deficiencies.

Information Sources:

- **OP-21**: https://www.iso-ne.com/static-assets/documents/rules_proceds/operating/isone/op21/op21_rto_final.pdf
- **21-Day Forecast**: https://www.iso-ne.com/isoexpress/web/reports/operations/-/tree/21-Day-Energy-Assessment-Forecast-and-Report-Results
- **All ISO Operating Procedures**: https://www.iso-ne.com/participate/rules-procedures
- **FEEA Levels** are based on NERC EOP-011-1: Emergency Operations; https://www.nerc.com/pa/Stand/Reliability%20Standards/EOP-011-1.pdf

ISO New England, January 2022