



ISO New England's 2021 Annual Work Plan

Incorporates feedback from stakeholders

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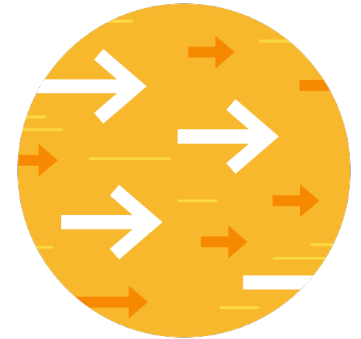
EXECUTIVE VICE PRESIDENT AND CHIEF OPERATING OFFICER



2021 Objectives and Highlights

Innovating for the evolving grid; adjusting to impacts of recent events; advancing operational improvements and managing risks

- Notable initiatives focus on innovation for reliability and the clean-energy transition across markets, planning, operations, and software structures
 - Energy Security Initiative (ESI) key projects
 - New England’s Future Grid Initiative
 - Transmission planning for the clean-energy transition
 - Evaluating impacts of shifting net peak loads
- Additional priorities align with recent events
 - Reviewing lessons learned from the first competitive transmission solicitation process
 - Continuing improvements to operational and long-term planning forecasts, including consideration of COVID-19 impacts and other data-related enhancements
 - Moving the margining and settling of the Financial Transmission Rights market to a clearinghouse
- The foremost business implementation/capital projects improve speed and efficiency, mitigate risks
 - Implementing nGEM day-ahead market clearing software upgrades
 - Enhancing cybersecurity tools to protect against increased intrusion attempts



Unknown Impacts of 2021 Factors

The ISO must remain flexible during this uncertain time while performing well in our day-to-day operations

- **COVID-19 impact on business:**

To date, all of the ISO's reliability, markets, and planning functions have proceeded as usual, and our lines of communication have remained open

- Unknown long-term effect of continued pandemic on new cross-functional and/or complex initiatives



- **FERC actions:** Unknown timing and topics for possible FERC orders or NOPRs; November 2020 election results could also potentially shift regulatory priorities

- **FERC Order No. 2222 on Distributed Energy Resources**, issued September 17, 2020, will need to be assessed for impacts on the overall work plan



NOTABLE INITIATIVES

Innovating for reliability and the clean-energy transition



Develop Additional Components of ESI

Projects relating to the region's energy-security needs continue to be a priority

- FERC's order on the April 2020 ESI filing will provide the foundation for the ISO's next steps
 - Approval of core design of day-ahead ancillary services is key
- Subject to that approval, the ISO is continuing its efforts to prepare and advance the additional components of ESI:
 - Market power mitigation framework
 - Seasonal forward market construct
 - Detailed design and conforming rule changes
- If FERC changes the core design or schedule, the ISO will adjust plans accordingly



Develop Additional Components of ESI, cont'd

Meet anticipated FERC deadlines for designing ESI market power mitigation framework

- The ISO is conducting a **market power assessment (MPA)** to identify the extent to which market power could be exercised with ESI day-ahead ancillary services
 - The MPA is a time-consuming and technical undertaking that involves multiple departments and significant resources
- The ISO will then develop the **mitigation market rules and procedures**, guided by the results of the MPA and input from both the internal and external market monitors and stakeholders
- Significant resources are being allocated to fulfill this schedule
 - Complete initial MPA (late 2020)
 - Assess results and design framework to mitigate market power (2021)
 - Stakeholder process and filing of final MPA and mitigation rules (2021)



Develop Additional Components of ESI, cont'd

Seasonal forward market construct, design details, and conforming changes

- The ISO is targeting late 2021 to have further discussions with stakeholders on its developments for a **seasonal forward market** that complements the ESI day-ahead ancillary services
 - Work is subject to the FERC order; core design of the ancillary markets must first be set to determine design of seasonal forward market
- With the implementation (go-live) of the ESI day-ahead ancillary services planned for June 2024, the ISO is working over the next few years to complete all **design, technical, and implementation/integration details**
 - Multiple conforming-change projects to the market rules in areas such as Net Commitment Period Compensation, financial assurance requirements, and more are likely to be brought through stakeholder process in 2022-2023 before filing with FERC



New England's Future Grid Initiative

Assess the future of the regional power system in light of state energy and environmental laws



- The ISO is engaging with market participants and state entities, including NESCOE, on this high-priority initiative
- Stakeholder meetings in 2020 are exploring this initiative on two tracks that are contemplating a reliable, clean-energy future grid:
 - **Future Grid Reliability Study:** Assess the future state of the power system by: defining scenarios; studying whether the ISO can operate reliably under status-quo mechanisms; considering what products and attributes are missing (via gap analysis); and discussing what market changes could be developed in response
 - The ISO is supporting stakeholder discussions and preparing to assist with requested studies; the ISO is working with stakeholders to shape its scope and order of engagement on this track for 2021
 - **Pathways to the Future Grid:** Regional identification, exploration, and evaluation of potential market frameworks that may help support the evolution of New England's power grid
 - In 2021, ISO resources are dedicated to evaluating market-framework options

Transmission Planning for the Clean-Energy Transition

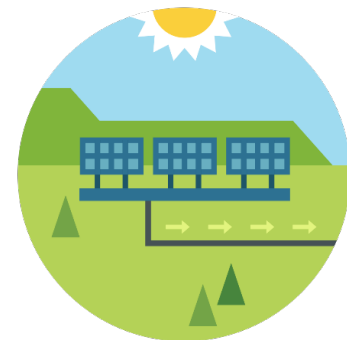
As clean-energy trends continue to accelerate in New England, the ISO must examine transmission study challenges that will arise



- In late 2020 and extending into **2021**, the ISO will consider and discuss with stakeholders proposed refinements to transmission planning assumptions that better reflect long-term trends, such as increased amounts of distributed-energy resources (DERs), renewable resources, and energy storage
 - Different system conditions could drive transmission planning needs
 - Differing load levels, times of day, and times of year will need to be considered based on changing resource-mix characteristics
 - Data collection will need to be expanded, including increased data on load and DERs from distribution owners, to accurately model the system
- Proposed changes in assumptions could be used in future studies such as Needs Assessments and Competitive Solution Process/Solutions Studies
 - Some studies may begin using new assumptions in 2021

Evaluate Impacts of Shifting Peak Loads

The summer daily peak is shifting to later in the day



- The ISO is reviewing the effect of projected behind-the-meter photovoltaics (BTM PV) growth on net peak loads to determine if changes are warranted to how the region's capacity requirements are calculated or how resources' reliability contributions are measured
 - The ISO is analyzing these effects using peak-hour scenarios and BTM PV projections
- In addition, the ISO is performing an initial study of effective load carrying capability (ELCC) to analyze the capacity value of adding renewable generation and energy storage resources
 - ELCC is a dynamic method for measuring resources' contribution to reliably serving load and could play an important role for planning and markets as the resource mix evolves
- Once these analyses are more fully developed, the ISO plans to discuss the findings with stakeholders and consider how the results may be used to update our processes
- These early stages of analyses began in 2020 and will continue through 2021

NOTABLE INITIATIVES

Adjusting to impacts of recent events



Order 1000/Boston 2028 RFP: Lessons Learned

Refining the competitive transmission solicitation process

- Following the conclusion of the Boston 2028 RFP process, the ISO has committed to reviewing lessons learned from its first competitive transmission solicitation process
- While the process functioned as intended with the selection of a least-cost, reliable solution, a lessons-learned exercise will provide the ISO and stakeholders the opportunity to discuss some possible areas for improvement. In Q4 2020, the ISO will:
 - Hold a lessons-learned session with stakeholders
 - Offer one-on-one sessions with Qualified Transmission Project Sponsors that responded to the Boston 2028 RFP where specific questions regarding their proposals or the process can be discussed
- **For 2021**, the ISO is allotting resources to support additional discussions and for assessing any future changes, as needed



Load Forecasting Enhancements

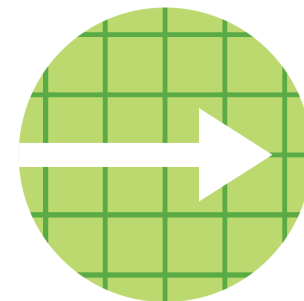
Continuing improvements to operational and long-term planning forecasts

- **Real-time operational forecasts:** In 2019, the ISO implemented enhancements to more accurately forecast the impact of PV installations; in 2020, the ISO began producing a weekly analysis of the estimated impact on region-wide system demand attributable to societal changes in response to COVID-19
 - In 2021, the ISO will continue to share with participants what our operators observe in real-time and make adjustments as necessary as the pandemic evolves
 - The ISO also plans to build on its PV forecast by including more cities and data
- **Long-term planning forecasts:** The ISO will develop the long-term peak-load forecast for CELT 2021, which will reflect expected economic impacts of the pandemic
 - The ISO will use Moody's October 2020 macroeconomic outlook and other economic indicators such as employment numbers
 - Discussions are ongoing with industry experts regarding emerging technologies/trends and methods of incorporating these into the forecast



Submission of FTRs for Clearing

Addressing default risk in the Financial Transmission Rights (FTR) market for the ISO and market participants



- Major defaults in other RTO FTR markets in North America have occurred in recent years, where lack of appropriate margining and inability to liquidate positions resulted in other market participants bearing the cost of the defaults
 - The ability to liquidate positions and set margin is needed to manage default risk in the ISO’s FTR market but requires more robust infrastructure and expertise than we can offer
- Therefore, the ISO is working toward moving the margining and settlement of FTRs to a third-party—potentially Nodal Exchange Clearing—who will calculate the collateral requirements and employ twice-daily margining and settlement for the ISO’s FTR customers
 - The ISO will continue to administer FTR auctions, but upon completion, FTR awards will be novated to location-specific futures contracts on the exchange
 - The ISO will be a counterparty in each of the futures contracts novated; the counterparty default risk from FTR portfolios is isolated from the ISO’s market participants
- The project is targeted to kick off in Q2 2021 and possibly extend into 2022
 - The timeline is dependent on the ISO obtaining financing for the margin requirements as the counterparty, FERC discussions, the stakeholder process, and finalization of rules

NOTABLE INITIATIVES

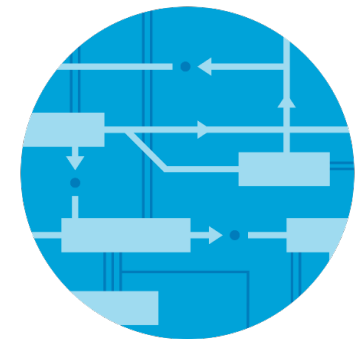
Advancing operational improvements and managing risks



nGEM Day-Ahead Market Clearing Engine Implementation

This is one project within the broader nGEM Program

- GE Solutions is modernizing its market application suite in a program called Next Generation Markets (nGEM), co-funded by GE, ISO-NE, MISO, PJM
 - The ISO's Market Management System (MMS) is based on the GE suite
 - This effort spans 2020-2027 and is broken into three phases
 - The ISO plans to describe this program in more detail at an upcoming PC meeting
- As part of this nGEM Phase 1 program, GE is developing a new market clearing engine (MCE) and implementation of the day-ahead version of this MCE will be a major focus in 2021 and 2022
 - In this timeframe, the ISO will be working on the complex processes for customizing and implementing the nGEM DA MCE software and infrastructure into the ISO's unique MMS
 - The DA MCE replaces the legacy MCE, and benefits include improved performance, flexibility, functionality, and scalability
 - This improved DA MCE is a pre-requisite for the ESI market implementation
 - The DA MCE is expected to be in-service Q1 2023



Enhance Cybersecurity Tools

While a key focus for the ISO over past five years, continued security enhancements are needed to mitigate rise in intrusion attempts by state actors

- **Identity & Access Management (IAM)** replaces the ISO's access rights application that records approval of users to thousands of ISO assets (e.g., applications, badged physical access, etc.)
 - IAM is the foundation of the ISO's cybersecurity program: improves the functionality and security associated with logical and physical access management, and maintains compliance of these functions with NERC Critical Infrastructure Protection standards
 - Implementation is major undertaking, affecting dozens of business processes and every member of workforce
- **Security Information and Event Management (SIEM)** collects and correlates logs from hundreds of servers, network devices, and the applications running on them
 - New system allows in-depth analysis of logs for monitoring and alerting on security events
- **Ongoing refinements to phishing attack tests** will be developed to enhance phishing-risk metrics for the company and update employee training, awareness, and testing measures appropriately
- These projects will be completed in 2021

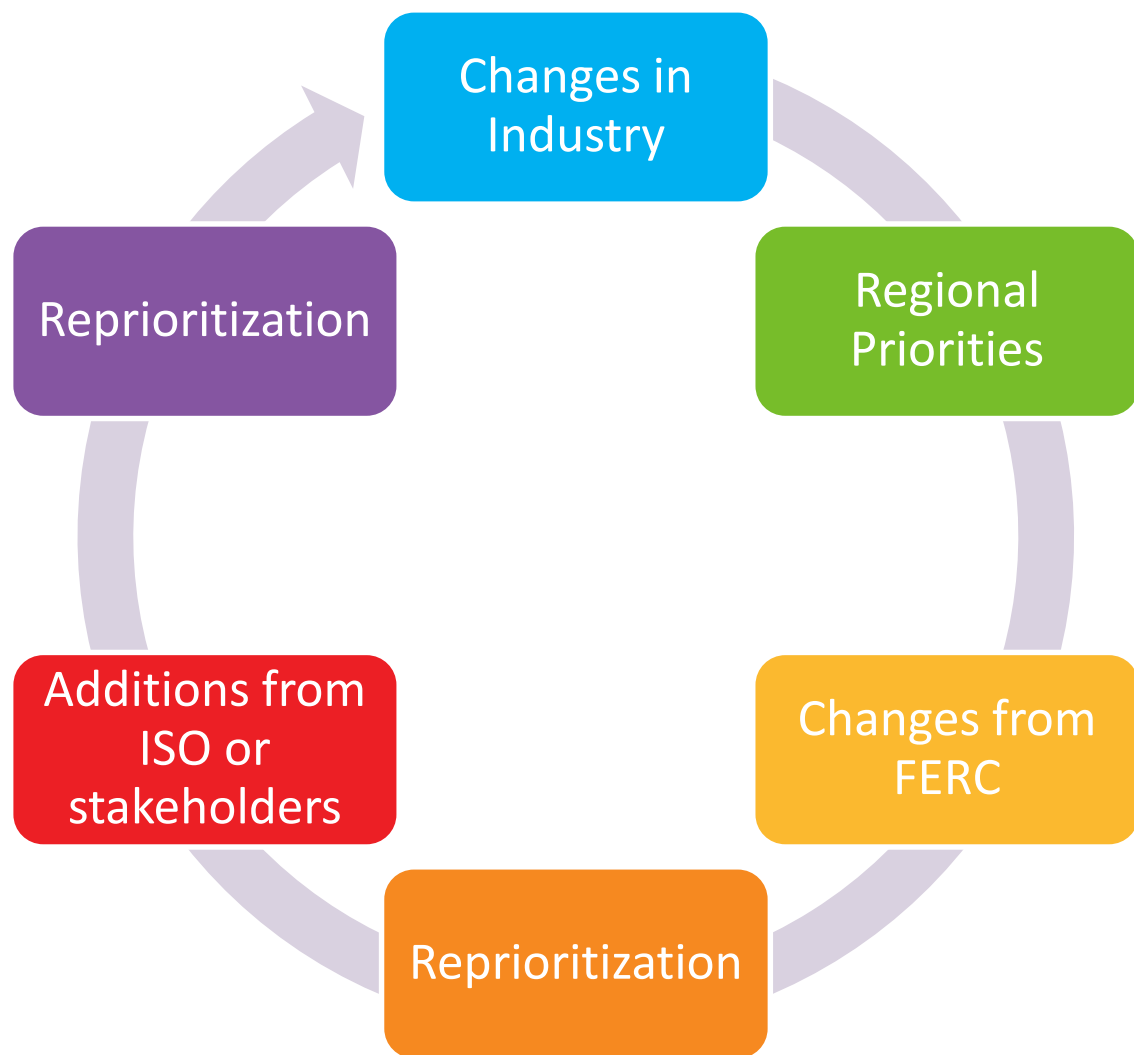


WORK PLAN PRIORITIZATION

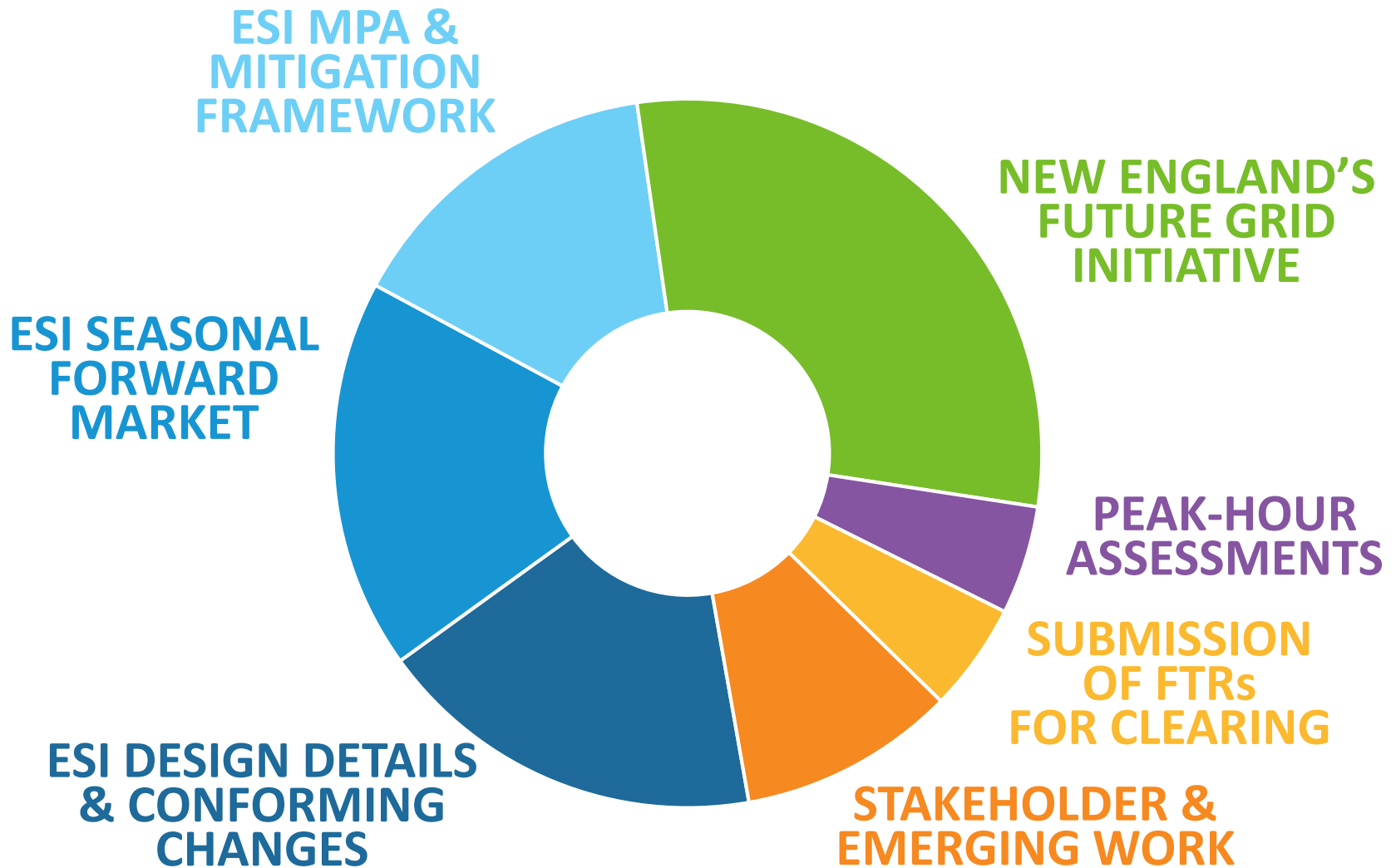


Prioritization Process

- The ISO adjusts its priorities as needed to best maintain reliable operations, robustly plan for a changing grid, and ensure competitive wholesale markets
- Planned projects are impacted as scopes shift or new projects emerge



Markets-Related Priorities Include:

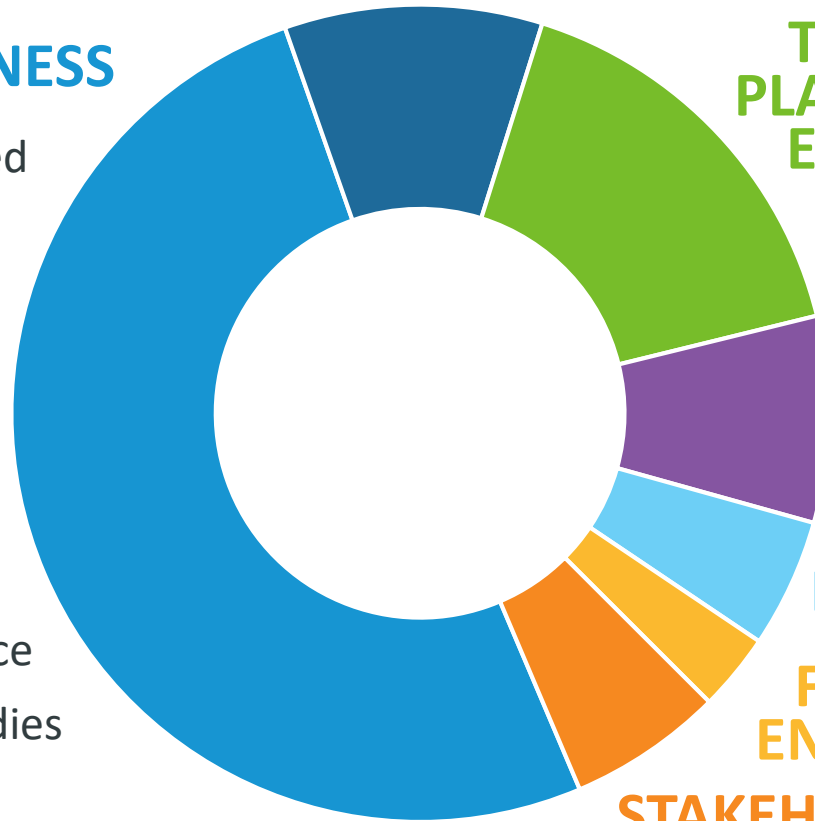


Planning/Operations Priorities Include:

2021 REGIONAL SYSTEM PLAN

CONTINUING BUSINESS

- Generation/Distributed Generation (DG) Interconnection and Transmission Planning
- Administer FCA #15 and FCM-related modeling
- NERC/FERC Compliance
- Annual Economic Studies



TRANSMISSION
PLANNING FOR THE
EVOLVING GRID

PEAK-HOUR
ASSESSMENTS

ORDER 1000
LESSONS LEARNED

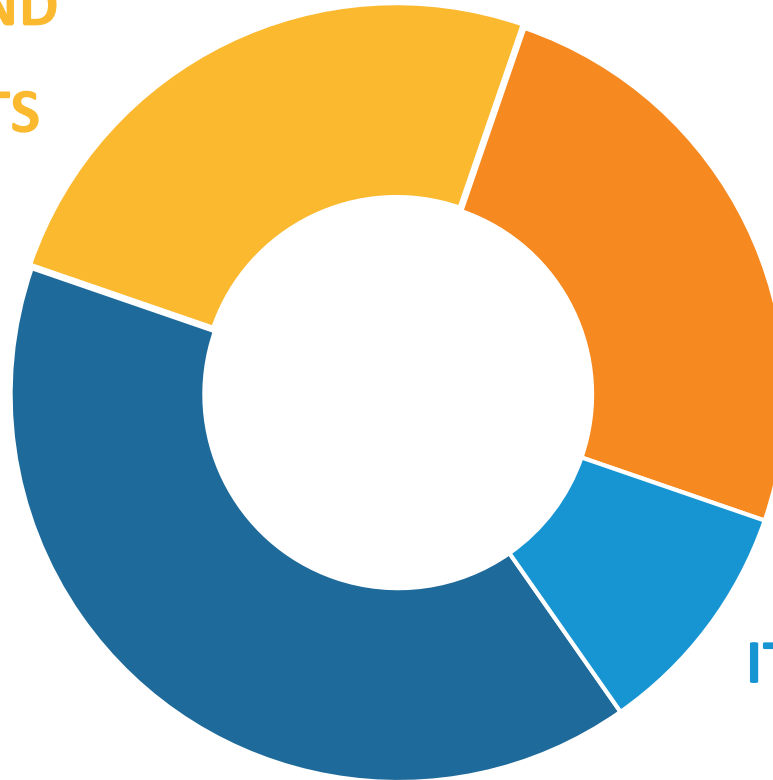
FORECASTING
ENHANCEMENTS

STAKEHOLDER &
EMERGING WORK

Capital Project Priorities Include:

APPLICATION AND DATABASE ENHANCEMENTS

- FCTS
- IMM Data Analysis
- Scheduling
- PMU
- Historian
- Market Simulator



CYBERSECURITY

- IAM
- SIEM
- Phishing tool
- Critical Infrastructure Protection (CIP) Version 5 audit by NPCC (occurs every 3 years)

IT INFRASTRUCTURE ENHANCEMENTS

- Control Room Wallboard
- Storage and Network Devices

nGEM DAY-AHEAD MARKET CLEARING ENGINE IMPLEMENTATION

Q1 2021

Q2 2021

Q3 2021

Q4 2021



Markets Related

• Energy-Security Improvements

• New England's Future Grid Initiative

• Submission of FTRs for Clearing

• Peak-Hour Assessments

• Transmission Planning for the Evolving Grid



Operations/Planning

• Order 1000 Lessons Learned

• 2021 Regional System Plan

• Peak-Hour Assessments

• Forecasting Enhancements

• Continuing Business



Capital Project Priorities

• nGEM Day-Ahead Market Clearing Engine Implementation

• Cybersecurity Projects

• Application and Database Enhancements

• IT Infrastructure Enhancements