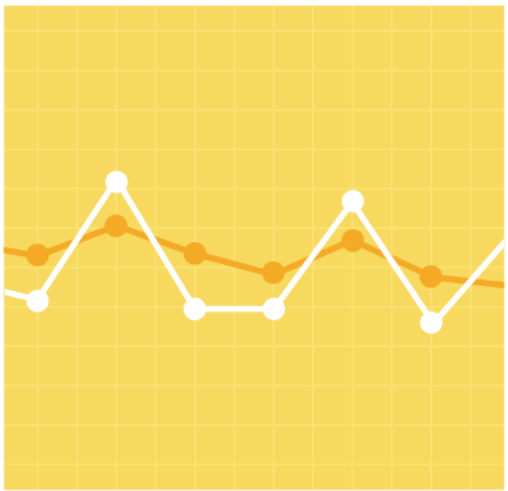
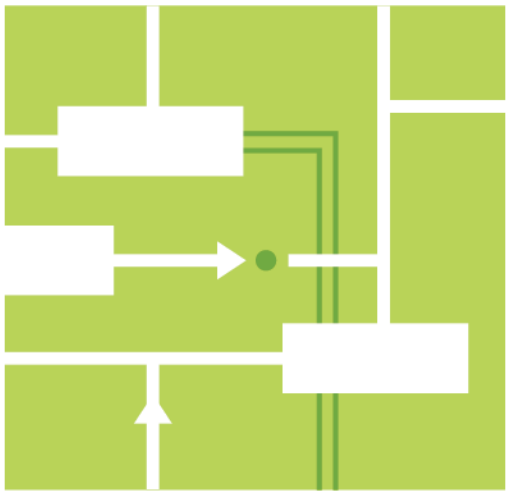
ISO New England Transmission Equipment Outage Coordination 2022

System Operations

MARCH 10, 2023





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Section 1
Introduction and Executive Summary

ISO New England Inc. (ISO), created in 1997, is the not-for-profit Regional Transmission Organization (RTO) with broad authority for the reliable day-to-day operation of the region's Bulk Electric System (BES), regional system planning, and the independent and effective management of New England's competitive wholesale electricity markets.

Regular maintenance of existing transmission facilities and the construction of new facilities are essential for assuring that the transmission system can meet the demands of customer load while maintaining system reliability at the lowest cost and minimizing overall impacts under expected and contingent conditions. To accomplish this, equipment must be taken out of service, which has an impact on the normal configuration and operation of the transmission system. While the New England participating transmission owners (PTOs) and local control centers (LCCs) initially coordinate transmission equipment outages, the ISO further identifies, refines, and repositions the outages using its expanded situational awareness of all outage requests, which includes all defined Resource outages, and forecasted system conditions.[1] In addition to maintaining system reliability and minimizing costs to New England consumers, outage coordination provides timely and accurate information for other participants in the ISO's wholesale markets, minimizes conditions that would impede the ability of Resources to participate in the markets, and facilitates outage scheduling with adjacent areas and transmission owners.

Outages are coordinated either through a long-term process, which is preferred, or through a short-term process. For the long-term process, equipment-outage requests are submitted to the ISO from 24 months to 21 days before the start date for the requested outage. The short-term process evaluates equipment-outage requests received from 20 days in advance to the day before the outage is scheduled to begin. All equipment-outage requests submitted through the long-term process are reevaluated during the short-term process as well.

The ISO coordinates transmission and Resource outages in accordance with several governing documents. It follows the Transmission Operating Agreements (TOAs), which define the ISO's authority to direct the operation of transmission facilities in the region.[2] It also complies with the rules and requirements established in the ISO's *Market Rule 1*, which sets forth the scheduling, other procedures, and certain general provisions applicable to the operation of the New England markets within the New England Balancing Authority Area.[3] The ISO also operates in accordance with other governing documents, including Federal Energy Regulatory Commission (FERC) Order No. 2000, regional and

[1] The LCCs are located throughout New England and include Connecticut Valley Electric Exchange (CONVEX), National Grid LCC (NGRID), Central Maine Power Company (CMP), New Hampshire Electric System Control Center, Vermont Electric Company (VELCO) Control Center, and NSTAR. The LCCs are separate from the ISO New England Master Control Center (MCC) and perform certain functions in accordance with the ISO tariff, the TOAs (see Appendix A), and other operating procedures. Information on the resource-outage process is available at the ISO's "Outage Coordination Requirements" webpage (2023), https://www.iso-ne.com/markets-operations/markets/forward-capacity-market/fcm-participation-guide/outage-coordination-requirements.

[2] The TOAs are available at the ISO webpage https://www.iso-ne.com/participate/governing-agreements/transmission-operating-agreements/.

[3] *Market Rule 1* is Section III of the *ISO New England Inc. Transmission, Markets, and Services Tariff* (ISO tariff). The rule is available at http://www.iso-ne.com/participate/rules-procedures/tariff/market-rule-1, and the tariff is available at https://www.iso-ne.com/participate/rules-procedures/tariff. For compliance with North American Electric Reliability Corporation (NERC) reliability standards, a *balancing authority area* is the bulk electric power system (BEPS) within metered boundaries under a balancing authority and a Reliability Coordinator (RC).

national reliability standards, and ISO operating documents.[4] Appendix A contains more information about the TOAs.

This report documents the ISO's compliance with provisions of the TOAs that require the ISO annually assess its coordination of transmission equipment outages. For example, Section 3.08(c) of the ISO's TOA with the New England PTOs states that the ISO must prepare and issue annual public reports on the scheduling and coordination of transmission outages.[5] This TOA section also states that the ISO's annual outage-coordination report must accomplish the following:

- Assess the accuracy of the ISO's estimation of congestion cost impacts and the inputs used in such estimation
- Assess any long-term impacts of the ISO's rescheduling of transmission-outage requests
- Provide information to the New England PTOs that will allow them to identify opportunities for improving outage coordination, reducing congestion costs, or increasing operational flexibility

The report outlines the overall purpose and process of outage coordination and highlights the collaborative efforts between the ISO, the LCCs, and other entities in 2022. The report also describes the Transmission Outage Coordination Working Group (TOCWG) responsible for overseeing the region's outage coordination, outage coordination governing documents, and the applied improvements and objectives the ISO and the TOCWG have achieved through the years. The 2022 metrics, year-end results and the goals for 2023 are described as well. Key terms are defined in the body of the report as needed.

1.1 Key 2022 Results

The ISO measures several outage coordination metrics to assess outage scheduling and coordination and provide feedback for improvement. Key results for 2022 were as follows:

- With the PTOs and LCCs submitting 87.1% of all transmission outage requests in New England in 2022 via the long-term process, the ISO exceeded its 80% target for the Long-Term Planning Metric goal. This was a 1% yearly decrease from the 2021 results.
- With 63.5% of the total requests for outages that could have an impact on economic dispatch and system reliability submitted more than 90 days before the planned outage start date, the PTOs and LCCs exceeded the 60% target for the 90-Day Metric goal. This was a 8.0% increase from the 2021 results.
- One goal was to have at least 85% of all transmission equipment outages be planned outages with their requests submitted more than five days before the outage start date. For 2022, only 84.4% of all transmission-outage requests were planned. Although this missed the metric goal for 2022, this was an increase of 1.9% from the 2021 results indicating a positive trend year over year.

[4] In FERC Order No. 2000, Section III.D.4, *Short-Term Reliability (Characteristic 4)* (1999), https://www.ferc.gov/legal/maj-ord-reg/land-docs/RM99-2A.pdf, FERC concluded that the RTO must have the authority to approve and disapprove all requests for scheduled outages of transmission facilities to ensure that the outages are accommodated within established reliability standards.

[5] The Section 3.08(c) references in this document refer to the TOA the ISO entered into with the New England participating transmission owners, which is posted at https://www.iso-ne.com/static-assets/documents/regulatory/toa/v1_er07_1289_000_toa_composite.pdf. Comparable provisions are contained in the other TOAs the ISO has entered into with other transmission owners in New England.

- For planned transmission equipment outages, the ISO received 68.8% of the cancellation notifications before 10:00 a.m. the day before an outage was scheduled to begin (i.e., before the Day-Ahead Energy Market closed for bids and offers), meeting its minimal 65% target for this metric.

Overall, during 2022, the ISO outage-coordination groups processed and managed 4,647 transmission equipment outages submitted by transmission owners within the ISO's footprint which was a 4.4% increase from 2021. Roughly, 82.7% of these outages were planned and 17.3% were unplanned requests. Compared with 2021, the ISO coordinated 1.7% more submissions for planned outages in 2022 (and 1.7% less unplanned requests). In whole, the ISO processed 7,415 applications for planned and unplanned outages, which includes outage submissions by neighboring transmission owners and informational applications as well. The 2022 total for all outage requests was 9.1% higher than the total outages New England processed in 2021. The ISO repositioned 19 outages of major transmission elements (MTEs), as defined by ISO Operating Procedure No. 3 (OP 3), *Transmission Outage Scheduling*, resulting in roughly $6.8 million dollars of congestion savings throughout the year.[6] As a result of the coordinated efforts to reschedule planned work, New England recognized the fourth lowest year of uplift costs and the lowest year by percent of Energy Market Value since Standard Market Design.

1.2 Long-Term Outage-Coordination Trends

Cooperatively, the ISO and the TOCWG have accomplished the following through the years:

- Increased the percentage of all New England transmission equipment outages submitted into the long-term process (at least 21 days in advance) from 10.3% in 2005 to 77.7% in 2022
- Increased the percentage of MTE equipment outages submitted at least 90 days in advance from 24.4% in 2009 to 67.2% in 2022
- Increased the percentage of all transmission equipment outages submitted more than 90 days in advance from 23% in 2010 to 35.7% in 2022
- Repositioned a total of 187 transmission-outage requests that saved an estimated $249 million in congestions costs since 2005

The ISO and PTOs anticipate sustained activity in scheduling requests for transmission equipment outages to accommodate the integration of new facilities currently under construction or in the planning stages and to support the scheduled maintenance of existing transmission system equipment.

1.3 2023 Goals

Continued cooperation among the ISO, PTOs, LCCs, and adjacent Reliability Coordinators is expected to benefit system operations and the New England markets. The outage-coordination goals for 2023 reinforce the goals for 2022 and are as follows:

- Increase the 2022 target of having a minimum of 80% of the total transmission-outage requests submitted via the long-term process, to a new goal of 82%.

[6] ISO Operating Procedure No. 3, *Transmission Outage Scheduling* (January 13, 2022), http://www.iso-ne.com/static-assets/documents/rules_proceds/operating/isone/op3/op3_rto_final.pdf.

- Increase the 2022 target of having at least 60% of total outage requests for equipment identified to have an impact, defined above for the 90-Day Metric, submitted more than 90 days before the planned outage start date, to a new goal of 62%.
- Maintain the 2022 target of having at least 85% of all outages be planned outages submitted more than five days before the outage start date.
- Maintain the 2022 goal of at least 65% of MTE outages cancelled before 10:00 a.m. the day before the scheduled outage.

The improvements and achievements made throughout the years to the outage coordination process have directly contributed to the safe and reliable operation of New England's Bulk Electric System as well as ensure the efficiency of the wholesale electricity markets. The ISO will continue to coordinate with the LCCs and PTOs to reposition transmission equipment and Resource outages as necessary to ensure the continued reliable operation of the New England transmission system and to minimize economic impact.

Section 2
Outage-Coordination Purpose and Process

Regular maintenance of existing transmission facilities and the construction of new facilities are essential for assuring that the transmission system can meet the demands of customer load while maintaining system reliability at the lowest cost and minimizing overall impacts under expected and contingent conditions. To accomplish this, equipment must be taken out of service, which has an impact on the normal configuration and operation of the transmission system. The participating transmission owners (PTOs) and local control centers (LCCs) are required to initially coordinate outages within their purview. With its wide-area view and expanded situational awareness of all outage requests and forecasted system conditions, ISO New England (ISO) further identifies, refines, repositions, and coordinates transmission equipment outages with Resource outages to achieve the following objectives:

- Maintain overall system reliability
- Minimize congestion and thereby reduce overall costs to New England consumers
- Provide timely and accurate analysis for the monthly Forward Capacity Market (FCM) and information for the Financial Transmission Rights (FTR) market.[7]
- Minimize conditions that would impede the ability of Resources to participate in the wholesale electricity markets
- Coordinate outage scheduling with PTOs and adjacent RCs
- Minimize Energy Security impacts to the region when scheduling transmission outages

This section provides an overview of the types of outages and the outage coordination purpose and process and summarizes the efforts of the working groups overseeing these tasks.

2.1 Types of Outages

The ISO carefully reviews and coordinates requests for various types of planned transmission and Resource outages. ISO Operating Procedure No. 3 (OP 3), *Transmission Outage Scheduling*, classifies outages as follows:

- A *planned outage* as taking equipment out of service to conduct routine maintenance or to accommodate new construction, and the request for the outage is submitted within the planned timeframes in accordance with OP 3.[8] These requests must be submitted more than five days in advance of the outage start date.

[7] An FTR is a financial instrument—equal to the amount of electric energy flowing in one direction between two specific locations on the regional power system—that a market participant can buy to help hedge against the economic impacts associated with transmission congestion and to arbitrage differences between expected and actual day-ahead congestion caused by constraints on the transmission system. The FTR holder might incur an obligation to pay a charge or the right to receive revenues. The FTR auction is the periodic auction of FTRs conducted by the ISO in accordance with Section III.7 of *Market Rule 1*. For more information, see *Market Rule 1* at http://www.iso-ne.com/regulatory/tariff/sect_3/index.html and the ISO's webpage on FTRs at https://www.iso-ne.com/markets-operations/settlements/understand-bill.

[8] ISO Operating Procedure No. 3, *Transmission Outage Scheduling* (January 13, 2022), http://www.iso-ne.com/static-assets/documents/rules_proceds/operating/isone/op3/op3_rto_final.pdf. OP 3 also defines several other types of outages.

- An *unplanned outage* occurs when equipment is forced out of service because a problem was discovered and the request for the outage did not meet the minimum notification requirements of the planned outage identified in OP 3. Two types of unplanned outages are as follows:
    - An *emergency outage* is the obvious failure of a piece of transmission equipment that comes out of service on its own or requires immediate operator intervention to remove it from service.
    - A *forced outage* is the discovery of a problem that needs to be repaired as soon as any combination of crews, equipment, or corrective dispatch actions can be put in place to allow the work to be performed. By definition, a forced outage cannot be scheduled.
- An *opportunity outage* is when unanticipated changes on the power system allow transmission work to take place that otherwise would have required outage scheduling at a less opportune time.
- A *cancelled outage* is an outage requested but ultimately not taken.

2.2 Overview of the Outage-Coordination Process

The planning of transmission equipment outages is carefully coordinated to ensure that load will be reliably served if the most-limiting Resource or transmission facility contingency (i.e., N-1 criteria) were to occur while the maintenance, construction, or both are in progress. In defined areas of New England, because of the potential impact on the interconnection and to meet North American Electric Reliability Corporation (NERC) standards, coordinating transmission equipment outages requires assurance that electricity loads can be continuously served during the maintenance and construction activities while the system suffers the most-limiting first and second contingencies (N-1-1 criteria).[9]

Advanced planning of transmission equipment outages allows the ISO to conduct studies and project system conditions, as well as potential congestion costs under a given set of assumptions. The publishing of accurate information about transmission outages facilitates PTO and LCC understanding of current outage planning practices and areas for improvement and assists market participants in effectively hedging potential congestion costs. The first step is for the PTOs to identify work to be performed (e.g., either routine preventative maintenance or outages needed to accommodate new construction projects). Each PTO then establishes a desired outage schedule in coordination within its own company project timeline and with due consideration for the reliability of its local area. The PTOs then convey their desired transmission equipment outage requests to their LCCs who evaluate the initial impacts of the requests on intra-area reliability. In addition, an evaluation occurs to identify impacts to the Resource fleet during this process. Coordination amongst all parties is vital to ensure collaborative outages are scheduled which accomodate both transmission and Resource work to the fullest extent possible. This initial planning by each of the PTOs, in coordination with their respective LCCs, results in an outage plan designed to maintain reliability during the outage.

PTOs submit to the ISO the LCC-approved outage requests for a final reliability study and congestion analysis. Working with the LCCs, PTOs, and Resource owners, the ISO assembles the submitted equipment-outage requests for transmission and Resource facilities and gathers and analyzes the data. The studies ensure that regional and inter-area reliability is maintained, as well as identify and work toward minimizing congestion cost and impacts to Resources during the outage. When the reliability studies identify an undesirable or unacceptable condition that could have a negative impact on system

[9] More information on NERC standards is available at https://www.nerc.com/pa/Stand/Pages/default.aspx (2023; accessed February 2, 2023).

reliability or cause excessive congestion, the ISO and the LCCs work with the select PTOs and Resource owners to review and potentially reposition a requested outage to a more suitable period. The aim is to minimize the impacts to the extent possible and avoid scheduling equipment outages during periods of high load and conflicts with Resources and other requests for transmission equipment outages.

The ISO evaluates planned transmission equipment outages through either the long-term or the short-term process, depending on when the outage request is submitted. A transmission-outage request submitted as part of the long-term process is given a higher priority than one submitted as part of the short-term process. Additionally, transmission equipment outage requests in the long-term process may also be considered in the FTR auction assumptions. Because of the urgency of forced and emergency transmission outage requests, they receive a higher scheduling priority than those for planned equipment outages. The duration of an outage can vary from a few minutes to several weeks or months, and it can be continuous or noncontinuous.

2.2.1 Long-Term Coordination of Transmission Equipment Outages

In accordance with OP 3, to be considered as part of the long-term process, an equipment-outage request can be submitted to the ISO from 24 months to 21 days in advance of the requested outage start date. Note that the LCCs may require earlier submittal.

The long-term process is the preferred option because it allows sufficient time for the ISO to conduct the mandatory reliability studies as well as a congestion analysis and provides information for stakeholders. Essentially, through the long-term process, the ISO has more opportunity to arrange the outage to meet the PTO's desired scheduling timeframe while minimizing the reliability and economic impacts to the system. The ISO publishes on its website long-term transmission equipment outage information from 21 days to 24 months in advance, updated on a daily basis, in conformance with the *ISO New England Information Policy*.[10]

Work prioritization is designed into the long-term outage coordination process to encourage the submittal of requests for equipment outage at least 90 days in advance. If a submitted outage request meeting the 90-day criteria is for a major transmission element (MTE) (as defined by OP 3), and it receives an interim approval, the outage may also be given an economic approval to provide a higher level of priority to maintain its original schedule.[11]

Some equipment outages routinely create significant congestion regardless of when they are scheduled. These types of outages could benefit by following the advanced approval process, which along with timely notification, allows market participants to account for the effects of the congestion and take appropriate steps to employ applicable hedging. Outages that do not receive this economic approval are

[10] The *ISO New England Information Policy* provides the rules and procedures the ISO follows to disclose information collected and created while administering New England's wholesale electricity markets and operating the region's transmission grid. It is posted at https://www.iso-ne.com/static-assets/documents/regulatory/tariff/attach_d/attachment_d.pdf (September 11, 2022).

[11] As defined in OP 3, a *major transmission element* is a subset of a "Category A" or "Category B" transmission facility that affect Resources and has one or more of the following characteristics: 1) is identified as an Northeast Power Coordinating Council (NPCC) "critical facility for notification," 2) is recognized within a defined external interface, 3) is recognized within a defined internal interface, 4) places restrictions on the operation of a Resource, or 5) can be referenced in a ISO transmission operating guide, and that may have a significant impact on the reliable or economic operation of the New England transmission system and thus may have greater exposure than other transmission facilities to being cancelled or denied because of economic impacts.

considered at risk of creating congestion and may be subject to repositioning or cancellation through the short-term economic evaluation process.

2.2.2 Short-Term Coordination of Transmission Equipment Outages

The ISO short-term process evaluates equipment outage requests received from 20 days in advance to the day before the outage is scheduled to begin, respecting current implemented outages and forecasted system conditions. The ISO conducts system studies of these equipment outages and renders approval or denial for planned outages up to the day before the outage is to begin. The approved daily transmission equipment outage data, including actual equipment detail, associated power-flow cases, and hourly interface limits, are input into the models and tools for the Day-Ahead Energy Market as well as real-time control room operations. The ISO control room manages outage requests received in real time. The ISO publishes on its website, in 15-minute intervals, a comprehensive listing of information on transmission equipment outages, from 21 days in advance up to and including sustained outages in real time, in conformance with the *ISO New England Information Policy*. The ISO short-term group creates the next-day report detailing transmission and Resource outages for communication to adjacent Reliability Coordinators (RCs).

The short-term economic evaluation process forecasts the effects that equipment outages have on the Day-Ahead Energy Market. The ISO conducts an economic evaluation of all outages three to four days before the outages are scheduled to take place. Outages that create significant congestion and have not been given an economic approval through the long-term process will be more likely to be considered for repositioning or possible cancellation than those that have been given an economic approval through the long-term process. This consideration is conducted in consultation with the appropriate LCC and PTO to support better understanding and assessment of additional factors.

At any time, up to and including the actual scheduled outage time, the ISO, LCCs, and PTOs each have the independent authority to deny or cancel an equipment outage that could have an impact on their jurisdictional area. Additionally, at any time during the actual outage and within safety parameters, the equipment can be recalled to address unforeseen system reliability needs.

2.3 Transmission Outage Coordination Working Group

Formed in 2005, the Transmission Outage Coordination Working Group (TOCWG) is made up of PTOs and ISO staff. The TOCWG meets at least six times per year to discuss and review the trends, performance, and challenges of the outage-coordination process. The group reviews the actual outage-coordination performance since the last meeting. Per the TOCWG charter (see Appendix B), the group also monitors, identifies, and discusses issues to determine actions to correct and further improve transmission equipment outage coordination, scheduling, and communication. At the last TOCWG meeting of the year, the group reviews and proposes new goals for the metric measuring transmission outage coordination for the coming year, which continues to challenge all participants to improve outage coordination and, ultimately, performance.

The TOCWG adhered to a number of accepted principles in 2022:

- Comprehensive coordination of transmission equipment outages in accordance with OP 3, which encompasses the outage-coordination processes
- Continued focus on ensuring all contributors to the process (project management, engineering, field, and operation personnel) are aware of the benefits of broad coordination and further

improving the planning and scheduling of Resource and transmission equipment outages with an emphasis on minimizing reliability and economic impacts

- Encouragement of notifying New England stakeholders in advance of planned transmission outages by encouraging that more and higher quality outage requests are submitted into the long-term process when possible
- Promotion of operational efficiency of the entire New England transmission system through monthly metrics that help increase the awareness of outage-coordination performance
- Emphasis on MTE outage planning through a metric measuring the percentage of MTE outage requests submitted to the ISO at least 90 days before the planned outage date, as defined in OP 3

2.4 Transmission Owner Working Group

The Transmission Owner Working Group (TOWG), formed in 2007, comprised LCCs and ISO outage-coordination representatives. The purpose of the group was to discuss Resource and transmission outages, provide improvements to the outage-coordination process through procedure updates, and to coordinate improvements to the ISO outage-scheduling software. In early 2020, the TOWG combined with the TOCWG to increase efficiency for both groups. The reporting structure for the TOCWG remains as it was in the past. Additionally, as a result of the merge, the TOCWG group now also reports to the master and local control center (M/LCC) managers in accordance with Master/Local Control Procedure No. 12 (M/LCC 12), *Identification and Coordination of ISO and LCC Transmission Operator (TOP) Responsibilities.*[12] Appendix C which previously summarized the scope of the TOWG was retired as a result.

2.5 North American Outage Coordination Working Group

The ISO continues its membership in the North American Outage Coordination Working Group (NAOCWG) and encourages PTO participation from its TOCWG representatives. The NAOCWG is composed of a broad representation of North American bulk transmission system operators and outage coordinators, which includes Independent System Operators, transmission owners and operators, Regional Transmission Organizations, and other entities active or interested in the reliable operation and outage coordination of the bulk transmission system. The NAOCWG was established in 2007; it is supported by individual participants and has no direct affiliation with any recognized group. The ISO participated at the most recent NAOCWG conference which was hosted virtually by Southwest Power Pool (SPP) in September 2022.

[12] ISO New England, M/LCC 12, *Identification and Coordination of ISO and LCC TOP Responsibilities*, procedure (May 2, 2022), https://www.iso-ne.com/static-assets/documents/rules_proceds/operating/mast_satllte/mlcc12.pdf.

Section 3
TOCWG Goals and Metric Results for 2022

In 2022, the ISO provided detailed performance metrics to the PTOs on a monthly and annual basis, which were communicated with the TOCWG. This section highlights the findings and data-collection efforts, summarizing the TOCWG's goals for 2022 and the results. Tracking and communicating these performance metrics are ongoing (see Section 5, 2023 Action Plans).

3.1 Long-Term Planning Goal and Result for 2022

The long-term scheduling of transmission outages improves forecasted system topology that assists in anticipating economic and reliability impacts to the electric power system. A clearer expectation of system topology ultimately results in more accurate analyses and better coordination. This "long-term planning" metric measures transmission outages with one of the following characteristics:

- Equipment identified as MTE
- An outage period of at least 24 hours
- A recall time of at least 12 hours
- Requiring a Resource to be on line or available

This type of scheduling reinforces long-term coordination with the PTOs and LCCs and improves the ISO's ability to coordinate all requests for planned transmission equipment outages that could have an impact on economic dispatch and system reliability. The ISO's target for 2022 was for the PTOs and LCCs to submit a minimum of 80% of all transmission-outage requests via the long-term process.

The result for this goal was that 87.1% of the New England transmission equipment outages were submitted into the long-term process in 2022. This performance demonstrates the successful submittal of outages into the long-term process that could have an impact and continued improvement, indicating more efficient scheduling of transmission outages. The year end result of this metric realized a reduced outcome of 0.9% from the 2021 results. Figure 3-1 shows the percentages of the total requests for transmission equipment outages scheduled in 2022 using the long-term process.

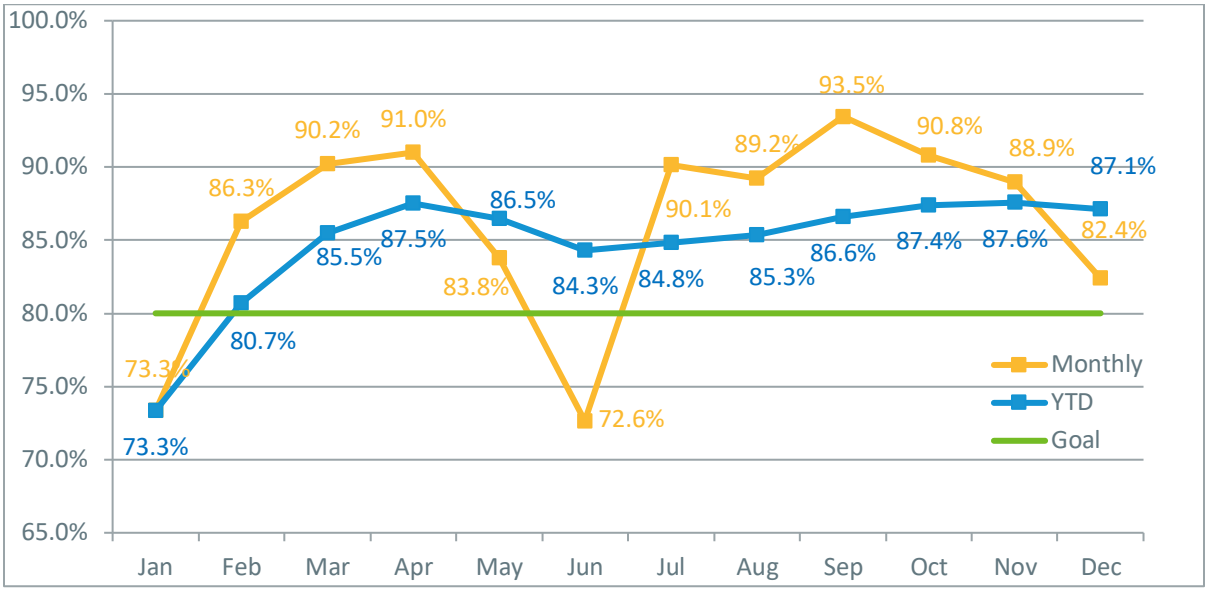

Figure 3-1: Percentages of total transmission equipment outage requests scheduled using the long-term process in 2022.

Note: The green line represents the 80% target for this metric.

3.2 90-Day Metric Goal and Result for 2022

To improve long-term coordination, the scheduling of projects and transmission equipment maintenance that could have an impact on economic dispatch and reliability continually challenges PTOs to plan and manage outage schedules further into the future. This "90-day metric" measures transmission outages with one of the following characteristics:

- A recall time of at least 30 minutes for equipment identified as an MTE
- An outage period of at least 120 hours
- A recall time of at least 48 hours for a non-MTE element
- Containing an element identified to be critical as part of the ISO's transmission system restoration plan in the event of a system blackout[13]
- Requiring a Resource to be restricted

Periodically, Resource and transmission outages may need to be repositioned because of the priority held by unplanned outages, schedule conflicts, or anticipated adverse impacts. Submitting transmission outages in advance, however, makes outage management more efficient. The 90-Day Metric goal is to improve the planning and coordination of the transmission equipment outages identified to potentially have an impact on economic dispatch or reliability. The ISO's target was to maintain the percentage of total requests submitted more than 90 days before the planned outage date to a minimum of 60%.

The result for this goal was that, in 2022, 63.5% of all the requests for outages that could have an impact were submitted to the ISO more than 90 days before the planned outage date. Transmission owners

[13] For more information on system restoration, see the ISO's *New England System Restoration Plan*, Master/Local Control Center Procedure No. 18 (M/LCC 18) (March 3, 2022), http://www.iso-ne.com/static-assets/documents/rules_proceds/operating/mast_satllte/mlcc18.pdf.

continue to work with the ISO to prioritize transmission project schedules and coordinate the timely submittal of requests for outages that could have an impact. The year end result of this metric realized a remarkable improvement of 8.0% from the 2021 results. This can be attributed to better outage planning in 2022. Figure 3-2 shows the percentages of the total transmission equipment outage requests scheduled in 2022 more than 90 days before the planned outage date.

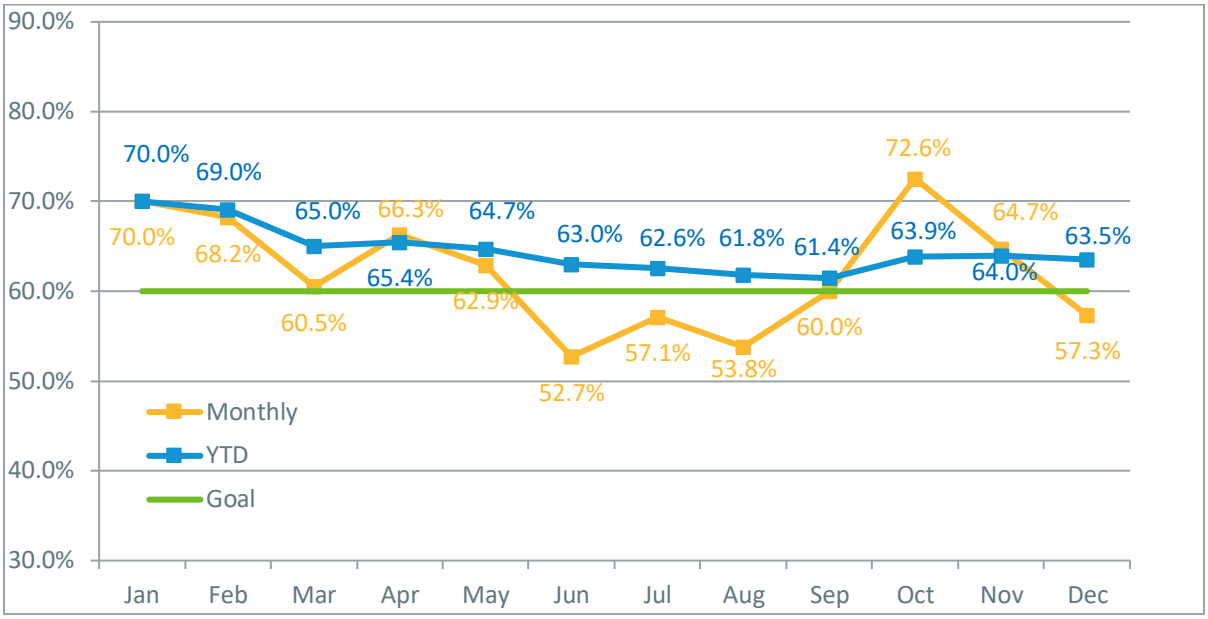

Figure 3-2: Percentages of the total transmission equipment outage requests scheduled more than 90 days before the planned outage date in 2022.

Note: The green line represents the 60% target for this metric.

3.3 Planned-Outage Goal and Result for 2022

The timely scheduling of planned transmission outages helps effectively analyze the impacts of transmission equipment outages, improve the coordination and analysis of other planned transmission and Resource outages, communicate the impact of such outages to the day-ahead market, and disseminate timely information to market participants on outages that could have an impact on economic dispatch or reliability. This "planned-outage" goal is to improve the coordination of all transmission outages, with a target goal of having at least 85% of all outages be planned outages through transmission equipment outage requests submitted at least five days before the outage start date.

For 2022, 84.4% of all transmission-outage requests were coordinated as planned outages. The year end result of this metric realized an improvement of 1.9% from the 2021 results. Figure 3-3 shows the percentages of the total transmission equipment outages coordinated as planned outages in 2022—monthly and year to date. This planned-outage metric outcome is variable and based on the number of outage submissions requested throughout the year. Compared with 2021, 44 less unplanned outages occurred in 2022. This was a 5.2% decrease from the unplanned outage submissions that the ISO encountered in 2021.

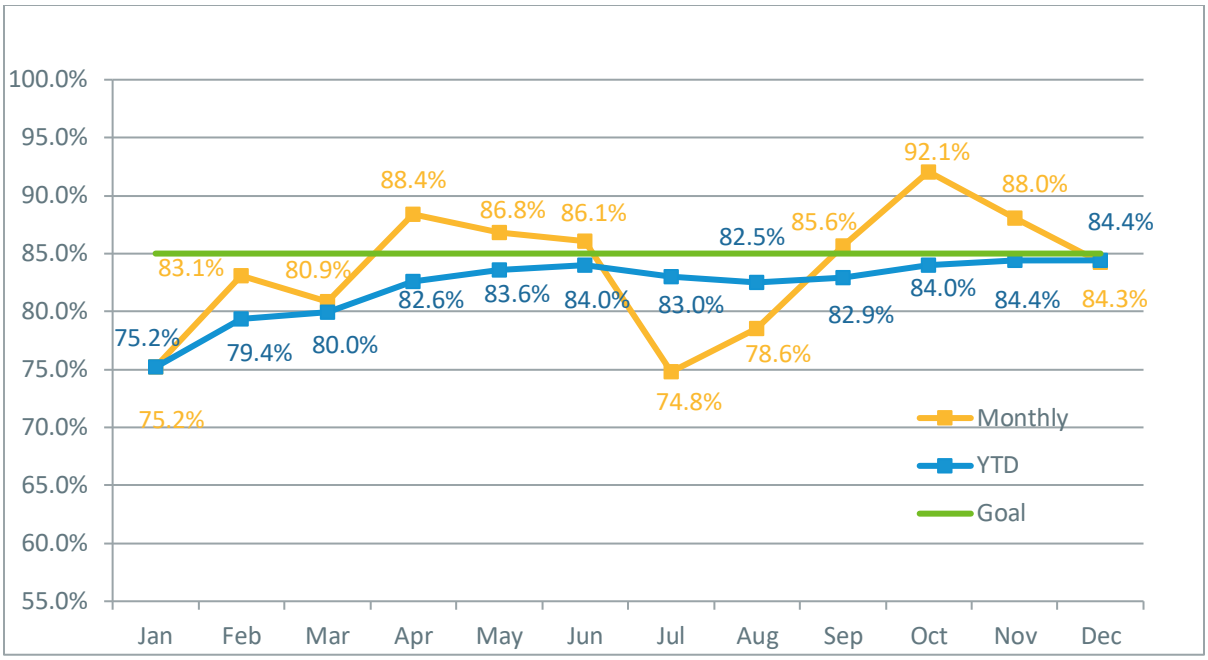

Figure 3-3: Percentages of the total planned transmission equipment outages coordinated in 2022.

Note: The green line represents the 85% target for this metric.

3.4 Outage-Cancellation Goal and Result for 2022

The energy markets operate more efficiently and effectively when the Day-Ahead Energy Market receives accurate information on transmission system topology and capability. Timely notifications of outage cancellations to the ISO before running the day-ahead market, especially those received before 10:00 a.m., allow the ISO to factor the anticipated status of the facilities into the forecasts of transmission interface limits and to align these limits with the expected conditions for the next operating day. Notifications of outage cancellations to the ISO after running the Day-Ahead Energy Market could result in adjustments to Resource commitment and overall production costs. This "outage-cancellation" goal is to improve timely notifications to the ISO of cancelling transmission equipment outages and increasing the percentage of outages cancelled before 10:00 a.m. the day before the scheduled outage. The target for 2022 was for the ISO to receive at least 65% of the cancellation notifications before 10:00 a.m. the day before a scheduled outage start date for the planned transmission equipment outages submitted.

For 2022, 68.8% of the cancellations for transmission equipment outages occurred before the Day-Ahead Energy Market's 10:00 a.m. closure for bids and offers. The ISO, PTOs, and LCCs continue to evaluate best business practices and use the outage data to gauge performance. They also educate groups involved in planning, scheduling, and physically working on transmission equipment about the importance of notifying the ISO about outage cancellations and the impact these cancellations can have on the wholesale power markets. The year end result of this metric realized an improvement of 0.8% from the 2021 results. Section 4 further discusses outage cancellations and improved metrics. Figure 3-4 shows the percentages of cancelled outages cancelled before the 10 a.m. goal.

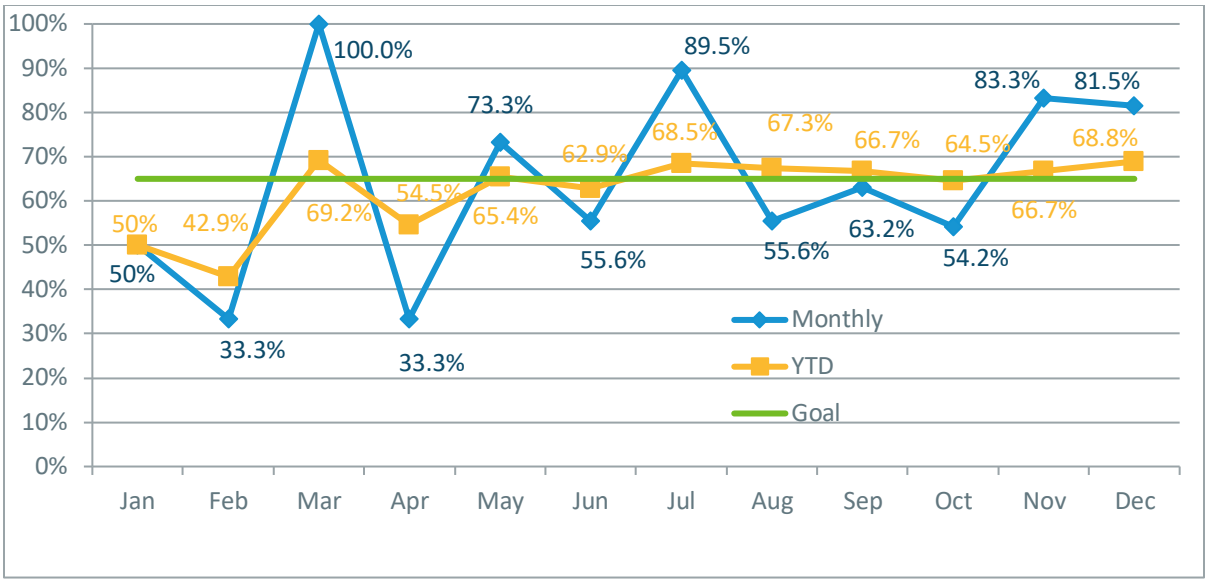

Figure 3-4: Percentage of cancelled outages in 2022 cancelled before the 10 a.m. goal.

Note: The green line represents the 65% target for this metric.

3.5 Additional Goals and Achievements

In 2022, the ISO studied and ultimately approved or disapproved 100% of all transmission-outage requests 48 hours before the planned start date for the outage, which is 24 hours more than the time requirement identified in OP 3.[14] This goal was established to encourage sending the results back to the PTOs or LCCs expeditiously, which helps them improve planning and offer assurance that the outage will occur. In accordance with OP3, 100% of all outages were processed 24 hours before their start date.

The ISO also incorporates three long-term metric goals internally, as follows, to ensure that outage requests are evaluated in a timely manner:

- For all MTE outages submitted at least 90 days before the planned start, the ISO must approve, deny, or cancel the outage at least 45 days before the outage start month. The ISO met its goal of 95% for this metric in 2022, with an actual result of 100%.
- For all MTE outages submitted less than 90 days before their planned start, the ISO must approve, deny, or cancel the outage within 21 days after the outage request had been submitted. The ISO met its goal of 85% for this metric in 2022, with an actual result of 100%.
- For all outages that take equipment out of service where the requests are submitted more than 21 days before the planned start, the ISO must approve, deny, or cancel the outage at least 14 days before the planned start date of the outage. The ISO met its goal of 85% for this metric in 2022, with an actual result of 100%.

Overall, during 2022, the ISO processed and managed 4,647 transmission equipment outages submitted by transmission owners within the ISO's footprint. This equates to an increase of 4.4% year over year. Roughly, 82.7% of these outages were requests for planned outages, and 17.3% were for unplanned

[14] OP 3, Section VI, A 1, directs ISO New England to approve or disapprove transmission-outage requests at least 24 hours before 00:01 a.m. of the day the work is to begin.

outages. Compared with 2021, the ISO coordinated 1.7% more submissions for planned outages in 2022 (and 1.7% less unplanned requests). In whole, the ISO processed and managed 7,415 applications for planned and unplanned outages, which includes outage submissions by neighboring transmission owners and informational applications as well. The 2022 total for all outage requests is 9.1% higher than the total outages the ISO processed in 2021. The ISO and PTOs anticipate sustained activity in scheduling transmission equipment outages to accommodate the integration of new facilities currently under construction or in the planning stages and to support the scheduled maintenance of existing transmission system equipment.

In 2022, the ISO reviewed its Operating Procedure No. 3 processes and continued to allow the use of opportunity outages when reliability permits. This enables transmission owners to perform work when forecasted operating conditions are favorable and would eliminate the potential for congestion. To illustrate, in 2010, approximately 22 transmission outages were submitted as opportunity outages. In 2022, the number of opportunity outages increased to 55 sumbissions. The increase in opportunity outage requests submitted in the short-term outage planning process has helped avoid economic impacts to the transmission system, and it affords transmission owners the opportunity to perform work under favorable operating conditions with reduced notification requirements.

Beginning in late 2020, and carrying on throughout the entirety of 2022, the ISO in conjunction with the LCCs began specifically tracking duplicate outages for system-wide equipment. By doing this, the TOCWG was able to combine proposed outages of the same equipment in order to minimize the total instances of outages on the New England system.

The winter months were challenging for the region due to energy security concerns. The LCCs worked hand-in-hand with the ISO to ensure reliability was maintained throughout the cold season without incident. These efforts included but were not limited to shortening planned transmission work, implementing system-wide load caps or ceilings to prevent transmission work from occurring, and denying planned outages to maintain continuity of the system at all times. This was a highly coordinated effort amongst all parties involved and will likely be a challenge that the region will have to face moving forward. The TOCWG will continue to analyze and digest the transmission outage data from the 2022/2023 winter to better plan for future winter seasons.

In conjunction with the LCCs the ISO had been working to incorporate many new outage scheduling software enhancements that would aid in the outage coordination process on multiple levels. This had been an ongoing effort since early 2020, and implementation of these enhancements occurred in December 2022. These changes will allow for a more robust and comprehensive outage analysis summary within the scheduling software. These changes also corrected some of the outage scheduling software shortcomings that had been identified in the past.

The improvements and achievements made throughout the years have directly contributed to the safe and reliable operation of the bulk electric power system, while minimizing market uplift costs. The greater number of outages submitted in the long-term process facilitated communications between the ISO, LCCs, and PTOs earlier in the process, creating sufficient time for all parties to assess reliability and promoting market efficiency.

Section 4
Outage-Coordination Impacts and Trends

In addition to the efforts of the TOCWG, the ISO and PTOs frequently review transmission equipment outage metrics to help bring about more effective outage scheduling and coordination and provide feedback to their organizations, including TOCWG members. During 2022, the ISO worked with the PTOs to review and benchmark outage-coordination practices and detailed transmission equipment outage data. The data established a baseline set of metrics that allows the ISO to assess and further enhance the overall effectiveness of the process to coordinate transmission equipment outages with the PTOs and LCCs, as required by Section 3.08(c) of the TOA. The results of the ISO's analysis are assessed on the basis of three criteria:

- Assess the accuracy of the ISO's estimation of the cost impacts of congestion and the inputs used in such estimation
- Assess any long-term impacts of the ISO's rescheduling of transmission maintenance outages
- Provide information to the New England PTOs that will allow them to identify opportunities for improving outage coordination, reducing congestion costs, or increasing operational flexibility

This section provides data on the impacts that transmission equipment outages can have on congestion and discusses how the ISO has met its obligations under Section 3.08(c) of the TOA. It also summarizes statistics on requests for transmission equipment outages from 2022 and the rescheduling of outages.

4.1 Impacts of Outages on Congestion

Since 2008, the ISO has been evaluating the economics of scheduled transmission equipment outages from two years in advance up to a few days before an outage start date. The purpose is to review the economic impact of equipment outages as study variables stabilize (i.e., improved load forecast, recent topology changes, anticipated Resource dispatch, and other factors). If planned transmission outages were not analyzed and coordinated through the long-term economic-evaluation process but were found to have a significant economic impact as part of the short-term economic-evaluation process, sufficient time is typically still available to consider other options for reducing congestion costs so long as ample lead time is given. The ISO cooperates with the appropriate RC, LCC's, and PTO to consider such options, which could include the repositioning or cancellation of the outage.

The ISO repositioned 19 transmission equipment outages to reduce congestion in 2022. The result of modifying these outages was roughly $6.8 million dollars of congestion savings throughout the year. This was a coordinated effort with the LCCs and PTOs and can be directly attributed to the ongoing coordination and communication of transmission outages amongst all parties.

The overall improved communications between the ISO and LCCs before the LCCs submit outages, has minimized the need to reposition many outages that would have created reliability issues or excessive congestion as originally submitted in past years. These discussions allow for identifying problems earlier so that the requested Bulk Electric System (BES) work can be repositioned before the LCCs submit outage requests to the ISO.

Over the past 20 years, the ISO's continuous study and analysis of the BES has helped maintain reliability and guide cooperative regional investments to address weak spots and bottlenecks within the system.

After years of strong investment, New England now has a more reliable and flexible power system, which has led to less congestion and thus lower costs.

4.2 Impacts on the System from Rescheduling Outages

The assessments the ISO conducted in 2022 indicated that its efforts to coordinate and reposition transmission equipment outages were warranted and reduced the forecasted congestion and reliability costs as noted above.[15] The repositioning of some outages did affect the original schedule to complete the work and required the PTOs to modify their schedule or work methods to minimize the impacts to the schedule. The LCCs and the ISO spent significant effort and time in 2022 to minimize the impacts to the PTO work schedules due to the rescheduling of outages. As a result of the coordinated efforts to reschedule some planned work, New England once again recognized one of the lowest years of uplift costs at the conclusion of 2022 totaling roughly $53 million. These coordinated efforts also negated an estimated 90MW of load at risk for potential post-contingent load shed. By effectively repositioning multiple transmission jobs throughout the year, the ISO and LCCs continued to maintain system reliability and energy security to the highest degree, while minimizing economic impacts to Resources.

4.3 Transmission Equipment Outage-Request Statistics

As in previous years, the TOCWG analyzed monthly outage-coordination data to identify trends and define benchmarks of outage-coordination practices across New England. Such data includes the following:

- Summaries of equipment-outage types and amendment to causes of emergency and forced outages
- The frequency of various planned, unplanned, and cancelled equipment outages
- Other relevant statistical information on equipment outages

The identified metrics are measured and monitored for improvements, including the lead time for submitting outage requests to the ISO for prompt coordination with affected Resources and adjacent Reliability Coordinators.

4.3.1 Positive Statistical Trends

Cooperatively, the ISO and the TOCWG have accomplished the following:

- Increased the percentage of New England transmission equipment outages submitted into the long-term process from 10.3% in 2005 to 77.7% in 2022 (This is a 3.7% increase year over year)
- Increased the percentage of MTE equipment outages submitted at least 90 days in advance from 24.4% in 2009 to 67.2% in 2022 (This is a 7.6% increase year over year)

[15] Reliability costs arise when, depending on system conditions, the ISO needs to make supplemental commitments of resources to supply local second-contingency reserves. A resource committed for this type of local second-contingency coverage is described as a local second-contingency-protection resource (LSCPR). These supplemental commitments are of resources that do not receive sufficient revenues through the market-pricing mechanisms to remain profitable but are needed to maintain the reliability of the system. Second-contingency commitments are a function of local reserve requirements and the availability of fast-start units (i.e., those that can start up and be at full load in less than 30 minutes) to meet these requirements. Limited transmission capacity into an area reduces the amount of reserves that resources outside the area can supply, and this lack of supply increases local reserve requirements. For more information on reliability cost provisions, see the ISO's *Annual Markets Report* at http://www.iso-ne.com/markets/mkt_anlys_rpts/annl_mkt_rpts/index.html.

- Increased the percentage of all transmission equipment outages submitted more than 90 days in advance from 23% in 2010 to 35.7% in 2022 (This is a 4.8% increase year over year)
- Repositioned a total of 187 transmission-outage requests that had an estimated $249 million in congestions savings since 2005

These long-term metrics highlight the PTOs' focus on submitting outage requests with longer lead times and indicate process improvements. They also indicate the awareness and continuous efforts of the PTOs, LCCs, and the ISO to improve outage-coordination practices. The ISO and PTOs remain committed to improving and implementing outage-scheduling tools and processes for coordinating transmission equipment outages more efficiently.

4.3.2 Outage-Request Summary Statistics

Table 4-1 and Table 4-2 provide summary statistics pertaining to New England PTOs and their submitted transmission equipment outage requests for outages with a start date during 2022. Data for 2019 through 2021 are also provided for comparison. Of all transmission equipment outage requests the ISO processed in 2022, 82.7% were scheduled and taken as planned outages and 17.3% were taken as unplanned outages, which is an increase of approximately 1.7% from the 2021 planned outages. The remainder of the table shows equipment-outage requests ultimately cancelled or had profiles that were cancelled—17.0% in 2022, which is a 3.8% decrease, or positive trend compared to 2021. The primary driver for the decrease was due to increased proactive scheduling by the LCCs. Extraneous outages represent 72.0% in comparison to planned outages in 2022.[16] Of the profiled requests for transmission equipment outages cancelled, 57.6% were cancelled before the close of the Day-Ahead Energy Market.[17] There was a 1.7% decrease in the number of forced and emergency outages that were submitted to the ISO in 2022. Overall there were less outage cancellations in 2022 compared to 2021. However, it should be noted that many LCC's experienced supply chain issues throughout the year as was the case in 2021. This did create numerous challenges to completing scheduled work as originally planned.

Table 4-1
Requests for Transmission Equipment Outages in New England that Began in 2019, 2020, 2021, and 2022 (totals and percentage change)

Type of Request (excluding Extraneous)	2022			2021		2020		2019	
	Total	%	% Change over previous year	Total	%	Total	%	Total	%
Submitted for long-term process (≥21 days in advance)	2,985	77.7%	3.7%	2,666	74.0%	2,668	77.8%	2,411	76.0%
Submitted for short-term process (<21 days in advance)	857	22.3%	-3.7%	937	26.0%	761	22.2%	761	24.0%
Total number of requests submitted	3,842		6.2%	3,603		3,429		3,172	

[16] An *extraneous outage request* is a transmission-outage request submitted by an adjacent Reliability Coordinator or the request is for an informational outage.

[17] A *profile* is a subset of an outage request. If the planned start and planned end dates are the same day, the outage request is continuous and has one profile. If an outage request has multiple planned start and planned end dates (e.g., return evenings, return weekends, or return evenings and weekends), each planned start and planned end-date pair defines a profile.

	2022			2021		2020		2019	
Planned	3,842	82.7%	1.7%	3,603	80.9%	3,429	81.0%	3,172	79.6%
Unplanned	805	17.3%	-1.7%	849	19.1%	802	19.0%	814	20.4%
Subset of unplanned									
Emergency (immediately)	378	47.0%	2.7%	376	44.3%	411	51.2%	376	46.2%
Forced (ASAP)	427	53.0%	-2.7%	473	55.7%	391	48.8%	438	53.8%
	2022			**2021**		**2020**		**2019**	
Cancelled outages	653	17.0%	-3.8%	751	20.8%	928	27.1%	498	15.7%
	2022			**2021**		**2020**		**2019**	
Extraneous outage requests	2,768	72.0%	6.9%	2,346	65.1%	1,360	39.7%	1,248	39.3%

Table 4-2
Transmission Owner Requests for Transmission Equipment Outages in New England that Began in 2019, 2020, 2021, and 2022 (totals and percentage change)

Type of Request	2022			2021		2020		2019	
Cancelled before day-ahead market closes	525	57.6%	-0.7%	565	58.2%	705	63.6%	536	62.2%
Cancelled after day-ahead market closes	387	42.4%	0.7%	405	41.8%	403	36.4%	326	37.8%
	2022			**2021**		**2020**		**2019**	
MTE outages submitted; Percentage based on total number of requests submitted	348	8.7%	1.5%	265	7.2%	321	8.7%	308	9.3%
MTE submitted >90 days in advance	234	67.2%	7.6%	158	59.6%	183	57.0%	217	70.5%
MTE submitted <90 days in advance	114	32.8%	-7.6%	107	40.4%	138	43.0%	91	29.5%
All planned outages submitted >90 days in advance	1,432	35.7%	4.8%	1,138	30.8%	1,248	33.8%	1,479	44.4%

4.3.3 Planned Transmission Equipment Outages Compared with Monthly Peak Demand

Figure 4-1 depicts transmission equipment outages planned to start in each month in 2022 compared with the monthly peak demand. The TOCWG continues to analyze the data to identify trends, develop plans to improve transmission equipment outage scheduling, and improve the process to coordinate and schedule long-term transmission equipment outages. Over the past few years the LCC's and ISO have coordinated to allow more equipment outages to begin during the summer period. Past outage planning methodologies have been revisted and altered to allow greater flexibility in the scheduling of transmission work while still maintaining reliability of the system. These changes have induced many

positive impacts which include but are not limited to: enhanced LCC ability to complete maintainenance activitities throughouth the year, reduced risk of overlapping outages due to scheduling constraints with other transmission and/or generation work, and minimization of congestion impacts by avoiding problematic overlapping outages.

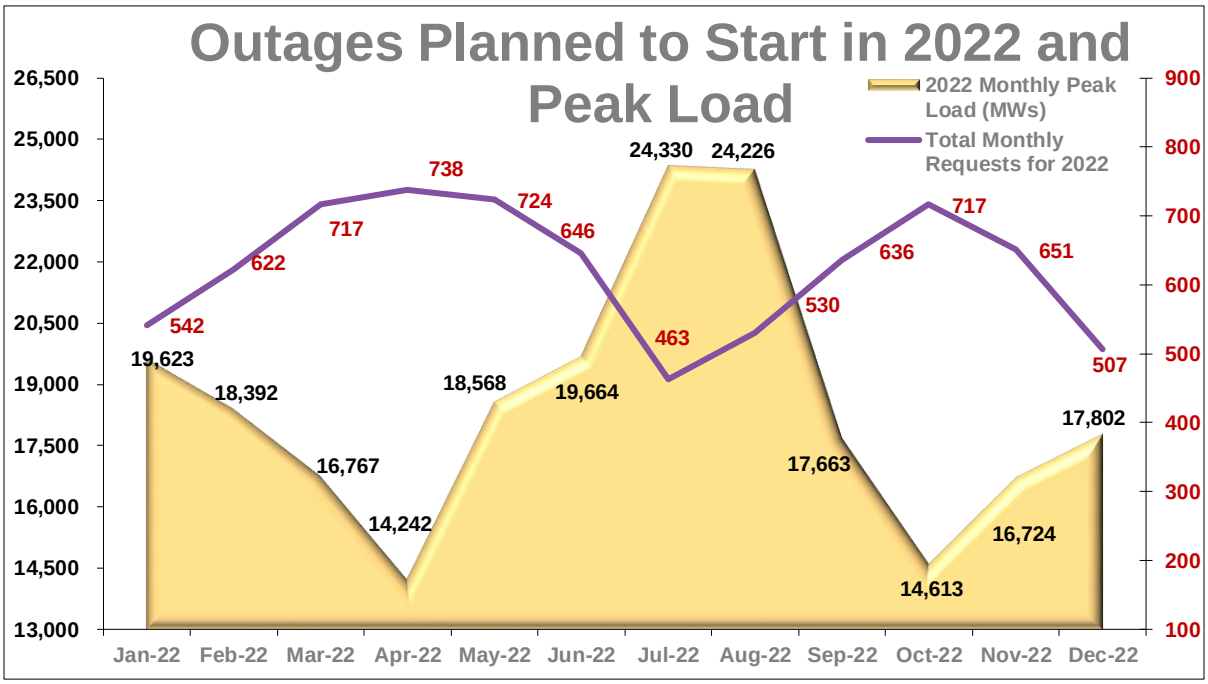

Figure 4-1: Transmission equipment outages planned to start in each month in 2022 compared with monthly peak demand (MW and totals).

4.3.4 Causes for Unplanned Transmission Equipment Outages

Figure 4-2 illustrates and compares the causes for the various types of unplanned transmission equipment outages in 2022 (emergency and forced). The relatively high percentages for the system and equipment category shows that unforeseen transmission equipment problems and unplanned system related work were the leading drivers of both emergency and forced outages in 2022.

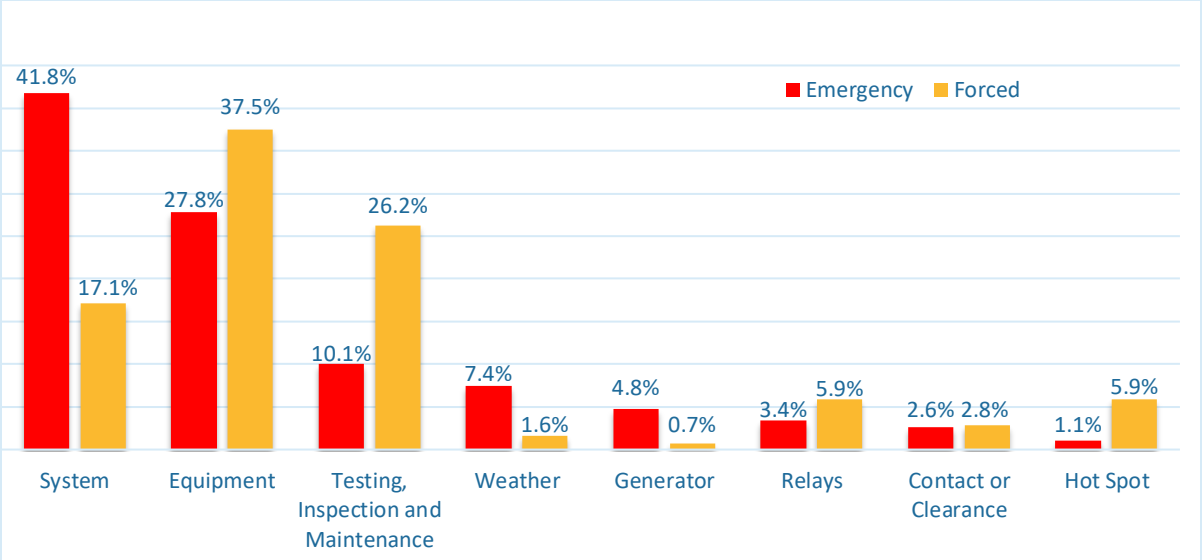

Figure 4-2: Reasons for unplanned (emergency and forced) transmission equipment outages in 2022.

4.3.5 Reasons for Cancelled Outage Requests

Figure 4-3 illustrates the top reasons for cancelled outage requests in 2022. Despite the best planning practices in use to schedule transmission equipment outages well in advance, a certain degree of variation is always present, and the cancellation of outages is an unavoidable part of the coordination process. In 2022, 653 outage applications were cancelled due to various reasons, as depicted in the table below. Divergence between forecasted and actual operating conditions sometimes necessitates the cancellation of planned transmission work. Weather, load variability, project schedules, workforce changes, and many other factors all have a direct impact on the schedule and the ultimate equipment outage. Supply chain issues are still driving planned transmission work cancellations and work delays in 2022, although it was to a lesser degree than what the New England region had experienced in 2021.

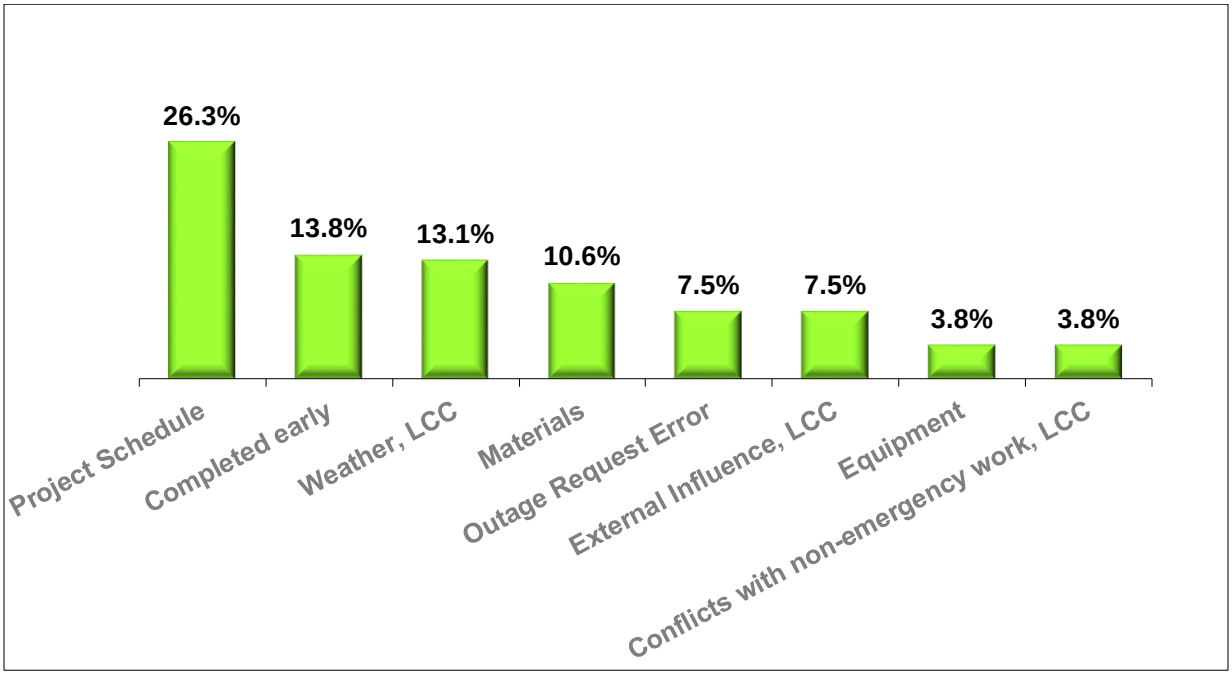

Figure 4-3: Reasons for cancelled transmission equipment outages in 2022.

During 2022, the TOCWG evaluated the outage-coordination process for reporting transmission-outage cancellations and examined the cancellations to determine more precisely why they occurred. The reasons for the outage cancellations are summarized below:

- **Weather, LCC:** outages submitted through the outage-coordination process that had been cancelled due to forecast weather conditions or if crews had been reprioritized to address weather-related transmission outages, as mentioned above
- **Project Schedule:** outages submitted through the outage-coordination process but were subsequently cancelled due to specific project needs and schedule changes
- **Completed Early:** outages finished before the expected end date, allowing unnecessary work days to be cancelled as a result
- **Outage Request Error:** outages cancelled due to duplicate outage submittals, unnecessary work submission, or other administrative errors identified on the outage application itself
- **Materials:** outages cancelled as a result of an unforeseen lack of material and/or parts needed to complete the scheduled work
- **External Influence, LCC:** outages cancelled as a result of an unforeseen circumstances that were outside the control of the LCC
- **Equipment:** outages cancelled as a result of an unforeseen equipment or part related problem that was outside the control of the LCC
- **Conflicts with Non-Emergency Work, LCC:** outages submitted through the outage-coordination process but cancelled predominantly due to outage prioritization with transmission projects or postponement when more favorable system conditions were forecasted

The process to coordinate transmission equipment outages and the metrics that track performance continue to identify areas of continued success and areas that may require improvement. The noteworthy progress made with the judicious scheduling of transmission-outage requests in 2022 can be attributed to the increased use of historical and forward-looking metrics, as well as better-defined metrics as listed above. These metrics have improved the quality of outage submissions and the timeliness of submissions, which supports planning processes for all entities involved.

The historical results, represented as lag indicators, helped identify past outage coordination behaviors that appear cyclical in nature, and the forward-looking metrics, represented as lead indicators, helped identify opportunities for additional coordination and scheduling improvements. The lead and lag indicators helped improve submittal behaviors for long-term outages and expand awareness of the long-term outage coordination process by those coordinating the work, PTOs, LCCs, Resource owners, and the ISO. The better defined metrics increase outage scheduling flexibility throughout the outage coordination process, and they have expanded expectations for the PTO and LCCs. An evaluation of the metrics and indicators used to measure performance indicates the continued need for and promotes further improvements in the outage coordination process. Specific metrics incrementally improved are as follows:

- The quantity of 90-day metric outages submitted to the ISO per the stipulations defined within Section 3.2 increased to 63.5%, an 8.0% improvement from 2021.
- The quantity of MTE applications submitted greater than 90 days in advance increased to 67.2%, a 7.6% improvement from 2021.
- The quantity of cancelled applications in 2022 decreased to 17.0%, a 3.8% improvement from 2021.

Recognizing these improvements, the TOCWG identified room for further progress in the following activities:

- The percentage of outages that were cancelled before the day-ahead market closed in 2022 was only 57.6%. This was a decrease of roughly 1% from the 2021 results. More importantly is the fact that this is has been a decling trend over the previous three years. Transmission outage cancellations can have significant market impact if not cancelled prior to the day-ahead closing. Some of these delays can be contributed to supply chain issues, as was the case in 2021. Part supply shortages and delivery delays have affected many of the LCC's throughout the year, and as a result this led to many work scope changes and job cancellations. The TOCWG will continue to track the outage cancellation timing in 2023 while emphasizing the importance of cancelling jobs prior to the day-ahead market closure.
- Development and implementation of improvements to the relay submittal process.
- Implementation of cross-training between the ISO and the LCCs to holistically increase knowledge and communication amongst the outage coordination teams.

Section 5
2023 Action Plans

The frequent review of the statistics regarding outage coordination helps maintain awareness of anomalies, performance, and desired behaviors. Likewise, the prompt review of behaviors observed throughout the process helps recognize additional areas for improvement. The ISO will use its stated goals, provided to the PTOs and LCCs, to cooperatively develop action plans to improve transmission-outage planning, coordination, and communications and reduce the number of unplanned transmission equipment outages by the end of 2023.

Continued cooperative efforts by the ISO, PTOs, LCCs, and adjacent Reliability Coordinators are expected to benefit system operations and the New England markets. Through the outage-coordination process, the ISO will continue to reposition transmission equipment and Resource outages as necessary to ensure the continued reliable operation of the New England transmission system and to minimize economic impact.

The following sections provide the ISO's outage-coordination goals for 2023.

5.1 90-Day Metric Goal for 2023

Early notification of transmission outages provides greater transparency to all entities and has a positive impact on the ISO's markets because all affected parties can identify any resulting reliability and financial impacts sooner. The ISO, LCCs, and PTOs are mindful that outages associated with the significant transmission construction, maintenance, and related work expected to continue must be planned and coordinated well in advance whenever possible. Periodically, repositioning Resource and transmission outages may be necessary because of the priority held by unplanned outages, schedule conflicts, or anticipated adverse impacts; however, submitting transmission outages in advance is more efficient.

Because out-of-service MTE facilities typically have a greater impact on operations than other equipment, resulting in differences in commitments and congestion, the early notification of MTE outages allows for improved coordination and advanced publishing of outage intentions and provides greater benefit to all entities involved. Through outage coordination, relevant factors such as forecasted system load, Resource dispatch, and transmission topology may become apparent, resulting in favorable opportunities for submitting transmission outages in the short term. Proposed metrics in 2023 will provide incentives for transmission owners to schedule transmission maintenance activities when favorable conditions exist.

To continue to build on the benefits of long-term coordination for projects and transmission equipment maintenance determined to have impacts, PTOs must face the challenge of planning, scheduling, and managing outage schedules further ahead of when the outages must take place. Thus, the timely submittal of planned transmission-outage requests continues to be a prime objective. This "90-day metric" goal will measure transmission outages identified as containing one of the following:

- An MTE element
- An outage period of at least 120 hours
- An outage recall time of at least 48 hours
- An element identified as part of the ISO system restoration plan
- Requiring a Resource to be restricted

This goal is to reinforce the planning and coordination of the transmission equipment outages identified to have an impact. The ISO's goal is to increase the 2022 target of having at least 60% of total outage requests for equipment identified to have an impact (as defined above for the 90-Day Metric) submitted more than 90 days before the planned outage start date, to a new goal of 62% for 2023.

5.2 Long-Term Planning Goal for 2023

The long-term scheduling of transmission outages affords ample time to review the potential impacts of transmission equipment outages, improves forecasted system topology that can help anticipate economic and reliability impacts to the electric power system, and allows for the timely dissemination of outage information to market participants. A clearer expectation of system topology ultimately results in better coordination with other planned transmission and Resource outages. Thus, the timely submittal of planned transmission-outage requests continues to be a prime objective. This "long-term planning" goal will measure transmission outages identified as containing one of the following:

- An outage period of at least 24 hours
- A recall time of at least 12 hours
- An outage that requires a Resource to be on line or available

This goal is to reinforce the importance of long-term coordination and therefore improve the ISO's ability to coordinate all planned transmission equipment outage requests by working with the PTOs and LCCs. The ISO will increase the 2022 target of having a minimum of 80% of the total transmission-outage requests submitted via the long-term process, to a new goal of 82% for 2023.

5.3 Planned-Outage Goal for 2023

Scheduling planned transmission outages in a timely manner provides the opportunity to effectively analyze the impacts of transmission equipment outages, coordinate with other planned transmission and Resource outages, communicate the impact of such outages to the day-ahead market, and disseminate timely outage information to market participants. This "planned-outage" goal is to improve the coordination of all planned transmission outages. The ISO will maintain the 2022 target of having at least 85% of all outages be planned outages since this metric was missed last year.

5.4 Outage-Cancellation Goal for 2023

Providing the Day-Ahead Energy Market with accurate and timely information on transmission system topology and capability helps the energy markets operate efficiently and effectively. When the ISO receives cancellation notices before 10:00 a.m. on the day before the scheduled outage, it has more accurate information about transmission system topology and can align its analysis with the expected conditions for the next operating day for calculating the Day-Ahead Energy Market transmission limit. Notifications to the ISO of outage cancellations after running the Day-Ahead Energy Market could result in adjustments to Resource commitment and overall production costs.

This "outage-cancellation" goal is to improve timely notifications to the ISO for cancelling MTE outages and increase the percentage of outages cancelled before 10:00 a.m. the day before the scheduled outage. The ISO will maintain last year's target so that the annual average of total cancellations submitted before 10:00 a.m. the day before a scheduled outage will be at least 65% in 2023. Because the 2022 goal results yielded a result of 68.8% for the cancellation metric which is in close alignment with the target, this metric will not be changed for 2023.

Appendix A
ISO's Transmission Operating Agreements

The ISO operates the New England transmission system pursuant to, among other things, various Transmission Operating Agreements with transmission owners in New England. The ISO is a party to the following TOAs:

- The Transmission Operating Agreement that governs the transmission facilities owned by New England participating transmission owners (PTOs).[18]

- The high-voltage direct-current (HVDC) Transmission Operating Agreement (HVDC TOA) that governs the 450 kV Phase I/II HVDC transmission facilities (HVDC-TF). These facilities, owned by certain New England asset owners, interconnect New England with Québec. Certain holders of long-term rights offer transmission service over the HVDC-TF (Schedule 20A service providers), whose rates are recovered under the Schedule 20A of the ISO's *Open Access Transmission Tariff* (OATT), which is part of the ISO New England Inc.[19]

- The MEPCO Transmission Operating Agreement (MEPCO TOA), which governs the 345 kV transmission facilities that interconnect with New Brunswick. MEPCO owns these facilities and offers transmission service over them pursuant to Schedule 20B of the ISO OATT.[20]

Also, Section II.47.7(c) of the ISO OATT indicates that a merchant transmission facility (MTF), such as the Cross-Sound Cable, is subject to the ISO's operational control, scheduling, and maintenance coordination. FERC approved this provision via a letter order dated October 26, 2005, in Docket No. ER06-69-000. Section II.47.7(c), along with Schedule 18 of the ISO OATT, set forth the full measure of the ISO's oversight authority regarding MTFs.

[18] ISO New England, et al., 106 FERC ¶ 61,280, (2004), accepted by Federal Energy Regulatory Commission (FERC) by letter order dated March 28, 2005, in Docket No. ER05-527-000. Note that on December 1, 2008, the classification of the MEPCO 345 kV transmission facilities under the ISO OATT changed from "other transmission facilities" to "pool transmission facilities," pursuant to a settlement agreement approved by FERC on September 29, 2008; see *ISO New England Inc.*, 124 FERC ¶ 61,297, Docket No. ER07-1289, *et al*. (2008) (Settlement Agreement). In accordance with the Settlement Agreement, the MEPCO 345 kV transmission facilities are currently governed by the Transmission Operating Agreement.

[19] *Transmission, Markets, and Services Tariff*. ISO New England, et al., 111 FERC ¶ 61,244, (2005), accepted by FERC by letter order dated May 25, 2005, in Docket No. ER05-754-000.

[20] ISO New England, et al., 111 FERC ¶ 61,277 (2005), accepted by FERC by letter order dated May 27, 2005, in Docket No. ER05-730-000. The MEPCO TOA was terminated on December 1, 2008, as a result of the Settlement Agreement providing for the treatment of the MEPCO 345 kV transmission facilities as pool transmission facilities (see previous footnote).

Appendix B
ISO New England Transmission Outage Coordination Working Group Charter

This appendix provides an overview of the Transmission Outage Coordination Working Group (TOCWG).

Purpose

- Review and introduce improvements to the transmission outage coordination process
- Discuss improvements to existing processes and information flows, including the improvement and replacement of current tools, as needed
- Assess the compilation, content, and statistical presentation (definitions, content, format, and the like) of certain data associated with transmission outages
- Identify the effectiveness of the data and data presentations in bringing about meaningful communication to improve the transmission outage coordination process
- Evaluate the data to gain a better understanding and awareness of trends and the overall impacts associated with maintaining and improving the performance of the New England transmission grid

Deliverables

- Develop and monitor proposed changes to the rules and governing documentation for coordinating transmission outages
- Develop and enhance monthly outage-coordination reports
- Develop and enhance yearly outage-coordination plans

Structure

Membership

- ISO New England to appoint a chair
- New England transmission owners to appoint representatives
- Working group to appoint a vice chair and secretary

Meeting Frequency

- Bimonthly or as required

Meeting Conduct

- Generally informal; however, minutes will be taken and approved by the TOCWG

Reporting

- Reports to the transmission owners
- Reports to the ISO New England Executive Committee
- Reports to the Master and Local Control Center Heads (M/LCC Heads)

Influence

- Advisory