

# Discussion of the Draft 2016 Work Plan

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# Objective and Highlights

- The primary objective is to provide the highlights of the 2016 ISO work plan and seek stakeholder input
- Most of 2015 involved an ‘implementation year’ with several of the market and planning activities moving into implementation stage, most notably the hourly offers project, updated treatment of Elective Transmission Upgrades, and Forward Capacity Auction 9
- A considerable number of projects continue to be scheduled for implementation. For example:
  - 2015: Coordinated Transaction Scheduling (CTS) and Generator Control Application (GCA)
  - 2016: Forward Capacity Auctions 10 & 11, Do Not Exceed Dispatch, Fast Start Pricing, and Cyber Security Related Projects
- Looking forward, 2016 will also comprise market and planning based activities that required significant stakeholder involvement, as well as efforts continuing to improve upon our existing methods and practices

## Objective and Highlights, cont.

- With respect to market design activities, the ISO's primary emphasis in 2016 are on topics related to Price Formation and the Forward Capacity Market
  - Full integration of Demand Resources or developing alternative approaches to demand response remains uncertain, creating some risk around the scope of work and the timing of the work
- New FERC or regional initiatives could all influence the timing of the various activities in the 2016 work plan
- The current work plan is intended to address necessary improvements, while attempting to maximize resource efficiency and accounting for software and vendor constraints
  - However, the plan can be adjusted to account for new and emerging priorities
  - Such work plan adjustments will involve trade-offs
- Slides 4-6 offer a Gantt chart view of the 2016 work plan

# Planning/Operations Related Activities

2015	2016				2017	
Q4	Q1	Q2	Q3	Q4	Q1	Q2
<b>Planning/Operations Activities</b>						
Order 1000 Implementation (Slide 8)						
Transmission Planning Studies/Support State Siting (Slides 9-12)						
Transmission Cost Allocation (Slide 13)						
Annual Economic Studies (Slides 14-15)						
Eastern Interconnection Planning Collaborative (Slide 16)						
Interregional Planning (Slide 17)						
Data Collection and Finalization of 2016 EE Forecasts				Data Collection and Finalization of 2017 EE Forecasts (Slide 18)		
	DG Forecast		(Slide 19)		DG Forecast	
	Stakeholder and Regulatory Review of ICR/LSR (Slide 20)					
FCA 11 Zones: Expected Topology	Regional Transfer Limits/ID Potential Zones		FCA 11: Zonal Requirements (Slide 21)			
	FCA 10/ ARA 3 CCP7	ARA 1: CCP9	ARA 2: CCP8	(Slide 22)	FCA 11/ARA 3 CCP8	ARA 1: CCP 10
FCA 11 CONE Adjustment		(Slide 23)		FCA 12 CONE Recalculation		
Gen. Interconnection Process Improvements (Slide 24)						
Generator Interconnection Studies (Slide 25)						
	RSP 16			(Slide 26)	RSP 17	
2015/16 Winter Program		(Slide 27)		2016/17 Winter Program		
	VAR CC Rate Review (Slide 28)					
NERC/FERC Compliance/Cyber Security (Slides 29-33)						
Operating Procedures Updates (Slide 34)						

# Markets Related Activities

2015	2016				2017	
Q4	Q1	Q2	Q3	Q4	Q1	Q2
<b>FCM Related Work</b>						
Resource Retirement (Slide 36)	Treatment of Resource Retained for Reliability (Slide 37)					
Zonal Demand Curves (Slide 38)	Reconfiguration Auctions & CSO Bilaterals (Slide 39)					
FCM Qualification / Other Modifications (Slide 40)						
Scoping Discussion on FCA Format (Slide 41)						
<b>Price Formation Related Work</b>						
DARD Pump Parameters (Slide 43)	Extend Storage Model (Slide 44)					
Resource Dispatch Requirements* (Slide 45)						
Subhourly Real-Time Settlement* (Slide 46)						
TMSR and Local TMOR RCPF Evaluation (Slide 47)						
Day-Ahead Reserve Market (Slide 48)						
					Other Price Formation Assessments (Slide 49)	
<b>Other Design Work</b>						
FRM Modifications (Slide 51)						
Submission of FTRs for Clearing (Slide 52)		Conforming FTR/LTTR Changes				
Demand Resource Related Work* (Slide 53)						
Resource Perf. Evaluation (Slide 54)						
* Required for PFP						
Planned Stakeholder Discussion	Market Design Project					
	Market Assessment					

# Capital Projects

2015	2016				2017	
Q4	Q1	Q2	Q3	Q4	Q1	Q2
<b>Capital Projects</b>						
Generation Control Application (Slide 56)						
Coordinated Transation Scheduling (Slide 57)						
FCA 10 (Slide 58)						
Do Not Exceed Dispatch (Slide 59)						
Cyber Security Related (Slide 60)						
	Divisional Accounting (Slide 61)					
	Submission of FTRs for Clearing (Slide 62)					
	DARD Pump Parameters (Slide 63)					
	Fast Start Pricing (Slide 64)					
	FCA 11 (Slide 65)					
	Sub-Hourly Real-Time Settlement (Slide 66)					
	Various Application Enhancements (Slides 67-70)					
	Issues Resolution Project (Slide 71)					

# PLANNING/OPERATIONS ACTIVITIES



# FERC Order 1000

- FERC Order 1000 compliance filings are complete. Awaiting any final compliance obligations for both the regional and interregional compliance orders
  - No major changes anticipated at this time
- Implementation efforts are underway
  - Given the amount of change in the planning process from Order 1000, these efforts will continue into 2016 as we gain experience and identify necessary process improvements





# Transmission Planning Studies

- Updated Needs Assessments will be conducted in 2016, as needed, in accordance with the Planning Process
  - Updated regional load forecast, Energy-Efficiency (EE) forecast and Solar PV forecast
  - Resource mix will be adjusted for the results of the first 10 Forward Capacity Market Auctions
    - New Resources
    - Non-Price Retirements and de-list bids
    - Other resource changes

# Transmission Planning Studies, cont.

- Several studies are underway
  - SEMA/RI area Needs Assessment, including impact of Brayton Point retirement
  - Updated Bulk Power System (BPS) classification testing and regional transfer limit analysis, including the impact of the Greater Boston upgrades
  - System assessment to demonstrate compliance with NERC TPL-001-4 Standard
- Studies requiring identification of system needs to be addressed through competitive solicitation process are underway and will be presented to stakeholders by Q4 2015
  - Maine
  - New Hampshire
  - SEMA/RI
  - Eastern Connecticut

# Transmission Planning Studies, cont.

- Continue implementation of approach discussed with PAC mid-2015 for review of transmission planning assumptions and methods
  - Discussion of concepts for and testing of probabilistic transmission planning assumptions – Q1 2016
  - Review of available probabilistic-based transmission assessments – Q1 2016
  - Review of available probabilistic-based transmission assessment tools – Q2 2016
  - Review of required data (resource availability and load modeling) – Q2 2016; As part of this activity, evaluate the inputs and correlations with historical data as it relates to long-term load forecast
  - Base case analysis discussions/improvements associated with transmission planning studies will be independent from the ongoing assessment of probabilistic planning tools/assessments
- Support state siting proceedings for major transmission projects, as necessary (e.g., Greater Boston Reliability Project (MA))

# Transmission Planning Studies, cont.

- Update ISO Planning Process Guide based on the FERC Order 1000 ruling
  - Sections being published as updated; most recent update July 2015
    - Included enrollment process to become a transmission provider and the process to become a Qualified Transmission Project Sponsor
- The Planning Technical Guide remains valid post FERC Order 1000 implementation; will be updated as needed
  - Last updated in December 2014



# Transmission Cost Allocation (TCA)

Transmission Owner	Project	Pool Transmission Facilities (PTF) Cost Estimate	Target Date
VELCO	PV-20 Cable Replacement	~53M	Potential 2016 TCA Submittal
VELCO	Vermont Solutions CT River Valley	~134M	Potential 2016 TCA Submittal
Eversource/NGRID	Advanced Boston Projects	~60M	Potential 2016 TCA Submittal
Eversource/NGRID	NEEWS (Interstate Reliability Project)	~536M	Submitted in 2015; TCA expected to be completed Q2 2016
Eversource	New Hampshire Solutions	~352M	Partially submitted in 2015 expected TCA completion Q2 2016; remainder expected to be submitted in 2016
Eversource	SWCT (Southwest Connecticut)	~430M	Potential 2016 TCA Submittal
Eversource	GHCC (Greater Hartford and Central Connecticut Area)	~357M	Potential 2016 TCA Submittal

# 2015 Attachment K Economic Studies

- Conducting three 2015 economic studies of wind integration scenarios
  - Keene Road Area; Offshore wind expansion; Strategic Transmission Analysis results
- Draft results presented to PAC by late 2015 or early 2016
  - Final reports completed after consultation with the PAC
- Studies will compare performance of future system with additional representative future system improvements
  - Will not include detailed transmission planning analysis, including system impact study results
- Results may be used to inform region on need for future infrastructure changes:
  - Example: Market Efficiency Transmission Upgrades in the Keene Road area and other areas of ME

## 2016 Attachment K Economic Studies

- Reflecting NEPOOL's priorities, ISO and regional stakeholders will consider requirements for an economic study in 2016 to review potential impacts of emerging public policy on performance of the power system and markets in New England
- Study scope definition efforts, which NEPOOL and the states will need to help shape with the ISO, will need to be largely completed before the end of Q1 2016
- 2016 Economic Study requests to be submitted by April 1, 2016

# Eastern Interconnection Planning Collaborative (EIPC)

- 2016 EIPC activities
  - Model Roll-up and Evaluation (contingency analysis and/or transfer analysis) for summer and winter 2025 will be completed in 2015
  - Engage stakeholders to seek input on potential scenarios of interest for analysis on the 2025 cases
  - Options for developing Production Costing models have been discussed and final approach scheduled to be completed in Q3/Q4 2015; Development of Production Costing models and discussion of potential study scenarios
  - Discussions are on-going regarding the degree to which EIPC could support the NERC Model Building Process
  - DOE Annual Transmission Data Report



# Interregional Planning

- There are a number of forums and activities related to interregional planning efforts beyond EIPC
  - North American Electric Reliability Corporation (NERC)
  - Northeast Power Coordinating Council (NPCC)
  - Inter-Area Planning Stakeholder Committee (IPSAC)
  - Department of Energy (DOE) Congestion Study Support
  - Northeast Gas Association (NGA)
- ISO, NYISO, and PJM will be working on implementation of the interregional planning portion of Order 1000 in 2016. These efforts are likely to continue through 2017 as we gain more experience with the new process

# State Sponsored Energy-Efficiency Programs

- The Regional Energy-Efficiency Initiative (REEI) efforts have highlighted the New England states' activities and investments in energy efficiency
  - Data is being gathered to support the development of the 2016 EE forecast, expected to be completed in Spring 2016
  - ISO will continue working with the Energy-Efficiency Forecast Working Group to review and refine the EE forecast process
  - Data gathering to support development of the 2017 EE forecast to begin in Q3 2016

# Distributed Generation (DG) Forecast

- By May 1, issue the DG forecast with DG Forecast Working Group input and use of Solar PV production data
  - Initiate improvements to the data collection process
  - ISO will continue monitoring the growth of non-PV DG, but does not see a need for an initiative similar to the PV forecast at this time
- ISO continues to review how forecast should influence various ISO planning studies and will seek input from stakeholders on any changes to planning processes
- PV forecast will be used for calculating ICR and Qualification studies, starting with FCA #10 and earlier commitment period ARAs/Bi-laterals
- Technical issues have been identified regarding the interconnection and operability of solar photovoltaic and other distributed resources that will require changes to IEEE and state interconnection standards
  - The ISO will participate in processes that revise the standards
- ISO Operations will be exploring the integration of irradiance data into the ISO weather forecast that feeds into the load forecast to better anticipate the level of solar generation in real-time

# 2020/2021 Installed Capacity and Local Sourcing Requirements for FCA #11

- Prepare inputs to Installed Capacity Requirement calculations
  - PSPC review of ISO recommendation of Installed Capacity Requirement (ICR) values – June 2016
  - Reliability Committee (RC) review/vote – August 2016
  - Participants Committee review/vote – October 2016
  - File with FERC – November 2016
  - Forward Capacity Auction #11 conducted – February 2017

# Modeling Capacity Zones

- Based on stakeholder feedback to improve the Capacity Zone modeling process, the ISO will initiate an earlier stakeholder dialogue for FCA 11
  - ISO will present an overview of the expected power system topology for the 2020/2021 Capacity Commitment Period (FCA #11) in November 2015
    - Will include review of existing zones, discussion of relevant constraints, and factors that could “trigger” the use of these zones in FCA 11
  - ISO will review the existing capacity deliverability standard (Overlapping Impact Test) in December 2015
- Regional transfer limits will be updated in Q1 2016
- Any changes or updates to Capacity Zones for FCA #11 will be identified in Q1/Q2 2016
- Zonal requirements for FCA #11 will be determined in Q2/Q3 2016
- Following the discussion on zonal requirements for FCA 11, the ISO expects to continue dialogue with stakeholders on the potential persistence of zones for FCA 12 and beyond

# FCM Auction Key Dates

- Commitment Period #7 (2016-2017)
  - ARA #3 – March 2016
- Commitment Period #8 (2017-2018)
  - ARA #2 – August 2016
- Commitment Period #9 (2018-2019)
  - ARA #1 – June 2016
- Commitment Period #10 (2019-2020)
  - Conduct Auction – February 2016
  - Results Filing – February 2016
- Commitment Period #11 (2020-2021)
  - Show of Interest Window – February 16 – March 1, 2016 \*
  - FCA FERC Informational Filing – November 2016
  - Conduct Auction – February 2017

\* May change with Retirement Reforms Project to April 4/7/2016 - 4/22/2016

# CONE Update

- For FCA #11, the ISO will complete an assessment to adjust CONE and Net CONE
  - This assessment will be finished by the SOI window opening in Feb 2016
- For FCA #12, the ISO will initiate a recalculation of CONE and Net CONE (as required per tariff)
  - This assessment will start in Q4 2016 and be finished by the SOI window in 2017

# Generator Interconnection Improvements

- The ISO is working with stakeholders to improve the interconnection process
  - Q3 2015 – Q1 2016
- Goal is to reduce time to complete system impact studies for new inverter-based generators and address the Interconnection Queue backlog
  - Particularly for generators in weak areas of the system, such as northern and western Maine
- Also seek to address curtailment and performance issues in system operations for inverter-based generators and to meet modeling and performance requirements being introduced by new NERC standards
- Based on discussions with NEPOOL, the ISO will make a presentation on generator interconnection issues in December 2015, along with Overlapping Impact Test presentation on capacity deliverability standard (see slide 21)



# New Generation Update as of August 1, 2015

- In total, 93 generation projects are currently being tracked by the ISO totaling approximately 11,300 MW
  - 7 in scoping stage
  - 17 in feasibility study
  - 26 in system impact study/optional interconnection study
  - 0 in facilities study
  - 14 negotiating interconnection agreements (IAs)
  - 25 with interconnection agreements
  - 4 distribution interconnections

Note: Additionally, there are 8 ETUs in the SIS phase of the interconnection process.

# Regional System Plan (RSP) – 2016

- Based on stakeholder feedback, the ISO is planning to change the RSP cycle to a biennial rather than an annual process
  - Data contained in the RSP will continue to be available to stakeholders consistent with current data release schedules (annually, quarterly, etc.)
- The ISO will plan to review related OATT changes with Transmission Committee (TC) and file at FERC: Q4 2015/Q1 2016

# Winter Reliability Programs

- 2015/16, 2016/17, and 2017/18 winter reliability program services
  - Compensation for unused oil inventory and unused liquefied natural gas (“LNG”) contract volume;
  - Pending outcome of FERC order on jump ball, 2016-18 winter period may also include compensation for other stored fuels and/or DR;
  - Proposed rate for compensation posted each July 15
- ISO will provide monthly updates on the program at the NEPOOL Participants Committee meetings

# VAR Capacity Cost Rate Review

- Evaluate the current Base Capacity Cost Rate specified in OATT Schedule 2 for VAR compensation to determine whether it is still appropriate or whether it should be changed
  - This evaluation will plan to include a discussion on any implications associated with emerging NERC CIP standards
- Stakeholder process likely by Q2 2016
  - Implementation would be targeted for 2017

# NERC/FERC Compliance; Cyber Security

- Ensure compliance with new and existing NERC and FERC orders
  - Maintain compliance monitoring with required self-certifications
  - Work with NERC on its new Reliability Assurance Initiative
  - Increase focus on internal controls
  - Continued interaction with Participants on matters relating to NPCC's administration and auditing of NERC Standards
- Improving ISO programs for managing system models to support enhanced NERC modeling and planning requirements
- Enhance existing tools, processes and controls to provide better protection against current and emerging cyber security threats
- See also slide 59 on Capital Projects

# NERC Standards: Generator Dynamics Data

- To address different Planning, Modeling, and Relay Protection standards, there are several efforts to enhance the submission and acquisition of system data
- A new Dynamics Data Management System (DDMS) is being implemented to house generator and transmission dynamics data and to automate the equipment owner certification process
  - There is also a need to expand on the software to track protective relaying, short circuit and under-frequency load shedding information



# NERC Standards: Operational and Planning Studies

- ISO is continuing to address different Planning, Modeling, and Relay Protection and Critical Infrastructure Protection standards
  - Study of long-term system needs using new contingencies and criteria
  - Verify that the Transmission Owners identified facilities for physical protection consistent with the risk assessment study methodology that they designed
  - Assess new dynamic operating characteristic information provided by generation owners
  - Study impact of Geo-Magnetic Disturbances

# NERC Standards: Comparison of Steady State and Dynamic Events to Simulations

- Requires ISO to compare simulations to actual system events in 2017.
  - Will require migration of system topology information from Energy Management (EMS) Systems into PSS/E Model (PSS/E is a format widely used in planning studies)





# NERC Grid Security Exercise

- NERC will be conducting its third exercise (GridEx III) on cyber and physical security in November 2015
- The exercise brings together NERC, the industry, and government agencies, as well as participants from Canada and Mexico.
  - Exercise the readiness of the electricity industry to respond to a security incident
  - Review existing command, control, and communication plans and tools
  - Identify potential improvements in cyber and physical security plans, programs, and responder skills
- ISO will share relevant results with stakeholders following issuance of NERC report in Q2 2016

# Operating Procedures Update

- Review and update Guides due to transmission and generation changes
  - Interstate; Generation Retirements; Addition of Renewable Generators in Northern Maine
- ISO will replace off-line voltage calculator tool with real-time calculator integrated within the EMS in 2016
- ISO is evaluating Phasor Measuring Units (PMUs) application to improve power system efficiency
- Based on information gathered from fuel surveys and pipelines, ISO continues to run capacity analysis scenarios and update operating plans
- Review of Schedule 16 (Blackstart) rate in 2016

# MARKET DESIGN

*FCM Related*



# FCM: Resource Retirement Reforms

- The ISO is proposing changes to the rules related to resource retirements, including modifications to the non-priced retirement and permanent delist bid structure, as well as the timing for submitting information available to the market
- The stakeholder process is underway with a FERC filing targeted for end of 2015
  - Implementation is targeted for FCA11

# FCM: Treatment of Resources Retained for Reliability

- The ISO is also evaluating modifications treatment of resources retained for reliability
- Stakeholder process will not begin until after the Resource Retirement Reforms project is completed
  - Implementation would be targeted for no earlier than FCA12

# FCM: Zonal Demand Curves

- The ISO is developing a revised zonal demand curve design for FCA11, including conforming changes to the FCA pricing rules
- The stakeholder process is expected to begin in Q4 2015 with a FERC filing targeted for Q2 2016
  - Implementation targeted for FCA11



# FCM: Reconfiguration Auctions & CSO Bilaterals under Zonal Demand Curves

- Reconfiguration auction (RA) and CSO Bilateral rules will be developed once the changes related to associated with Zonal Demand Curves have been completed
- The stakeholder process is expected begin in Q1 2017 with a FERC filing targeted for mid-2017
  - Implementation targeted for early 2018 to coincide with the first annual RA for CCP11 (starting June-2020)

# FCM: Qualification Modifications and Clarifications

- The ISO is developing changes to aspects of the FCA and reconfiguration auction qualification processes
- The review includes minor qualification improvements for resources, expanding participation in reconfiguration and bilateral requirements, reducing resource size requirements, and miscellaneous qualification-related clarifications.
- The stakeholder process is expected to begin by Q4 2015 with a FERC filing targeted for Q1 2016
  - Implementation targeted for 2016



# FCM: Auction Format Evaluation

- As requested by NEPOOL, the ISO is planning to evaluate the FCA's descending clock auction format and alternatives
  - Evaluation will include the impacts to the format, timing, and review of de-list bids and supply offers
- An initial scoping discussion is expected to be scheduled in Q4 2015 to understand stakeholder concerns with current construct and desired objectives
  - Next steps will be determined based on this problem statement/scoping discussion

# MARKET DESIGN

*Price Formation Related*



# Price Formation: DARD Pump Parameters

- The ISO is proposing to add intertemporal parameters for DARD pumps to improve the commitment and operation for normally off-peak pumping load
- The stakeholder process is underway with a FERC filing targeted by the end of 2015
  - Implementation targeted for Q4 2016

# Extend Storage Model

- The ISO is evaluating extending the pump storage model to new storage technologies
  - This project is dependent upon the DARD Pump Intertemporal changes project
- The stakeholder process is targeted to start later in 2017
  - Implementation will depend upon the scope of the proposal

# Price Formation: Resource Dispatch Requirements

- The ISO is proposing to require all non-settlement only generation resources to be on electronic dispatch
  - Similar to the exclusion under the Do Not Exceed Dispatch changes, resources that would otherwise meet the settlement only generation resource definition, but participate directly in the markets, would be excluded
- The stakeholder process is expected to begin in Q3-Q4 2015 with a FERC filing targeted for mid-2016
  - Implementation will depend upon the scope of the proposal

# Price Formation: Sub-hourly Real-Time Settlement

- The ISO is developing sub-hourly settlement for the real-time markets for generation and Dispatchable Asset Related Demand and External Transactions
  - The real-time markets (energy, reserves, and regulation) are all settled hourly, but resources are dispatched sub-hourly
  - The hourly settlement approach, especially for resources that are able to respond quickly, can result in hourly compensation inconsistent with the resource's performance on a 5-minute basis
- The stakeholder process is underway with a FERC filing targeted for Q1 2016
  - Implementation targeted for Q1-Q2 2017

# Price Formation: TMSR and Local TMOR RCPF Evaluation

- In light of recent adjustments to the system Thirty Minute Operative Reserve, the ISO is evaluating the RCPF levels for local reserves
- ISO is also assessing if the current TMSR RCPF remains adequate to obtain needed re-dispatch capability during scarcity
- Assuming changes are required, the stakeholder process is expected to begin by Q2 2016
  - Implementation will depend upon the scope of the proposal

# Price Formation: Day-Ahead Reserve Market

- The ISO is evaluating design changes to the day-ahead market to procure and price operating reserves in co-optimized day-ahead energy and reserves markets.
  - Allowing suppliers to submit financially binding offers for reserves on a day-ahead basis, in addition to submitting their offers for energy, will improve price formation by enabling transparent market prices to signal the costs suppliers must incur to provide reliable operating reserves.
- The stakeholder process is expected to begin in Q4 2016 with a discussion of the issues and conceptual design
  - Implementation will be evaluated as part of developing the proposal, but is expected to not be earlier than Q1 2019



# Price Formation: Other Assessments

- Multi-Hour System Ramp Pricing
  - The ISO is planning to assess the potential development of a new system ramping product to convey, through transparent prices, the costs incurred when the system must be re-dispatched in advance of a sustained load ramp
  - This work will not start the stakeholder process until after the Day-Ahead Reserve Market proposal has been completed
- External Real-Time Node Reoffer and Clearing
  - The ISO plans to evaluate allowing more flexibility for external transactions to offer or re-offer priced transactions in real-time at non-CTS locations

# MARKET DESIGN

## *Other Design Work*



# Forward Reserve Market Modifications

- The ISO is developing revisions to the FRM price cap, the rules that net the FCA price from the FRA price, and further modifications to the FRM threshold price heat rate
- The stakeholder process is underway with a FERC filing targeted for the beginning of 2016
  - Implementation targeted for the Summer 2016 FRM delivery period
- The ISO intends to discuss its future plans with regards to the overall Forward Reserve Market during Q2/Q3 2016
  - ISO recognizes the importance of off-line reserve capability to operations. As noted by the EMM, however, the ISO does need to analyze the purpose and efficiency of the Forward Reserve Market against the backdrop of an enhanced market structure

# Submission of FTRs for Clearing

- The objective of this project is to replace the ISO's financial assurance requirements for holding FTRs with clearing of equivalent futures contracts by a third party
  - A third party is better positioned to handle valuation (margin) on an ongoing basis
  - Default risk is shifted from ISO-NE's market participants to third party clearing organization
  - This will allow for the implementation of Long Term FTRs
  - Facilitate secondary market trading
- The stakeholder process will resume in Q1 2016 with a FERC filing targeted for April/May 2016
  - Implementation targeted for Q4 2016 (for the 2017 FTR period)
- Conforming changes will begin when Submission of FTRs for Clearing is completed

# Demand Response Related Work

- If the Supreme Court overturns EPSA v. FERC, the ISO will move forward to complete the design and implement the demand response full integration approach including:
  - Propose all remaining conforming changes to the Tariff
  - Apply any subsequent market changes (e.g., Energy Market Offer Flexibility, Subhourly Settlement, Fast Start Pricing) to demand response resources as appropriate
- Discussion on the remaining demand response full integration work will not begin until the Supreme Court decision is issued
- The ISO also continues to evaluate and develop contingency plan options to address the possibility of the Supreme Court upholding the EPSA decision

# Resource Performance Evaluation

- The ISO continues to evaluate generator performance during source loss contingencies and plans to bring any identified market rule changes to stakeholders in Q4-2016
  - In 2012, the ISO increased the amount of real-time Ten Minute Reserve (TMR) required by 25%
    - Reflected fleet-wide 20% average non-performance when dispatched to recover from NERC and NPCC reportable source loss contingencies
  - The ISO also put into place offline reserve auditing provisions and more robust ISO-initiated parameter auditing rules
- Assuming changes are required, the stakeholder process is targeted to start by Q4 2016
  - Implementation will depend upon the scope of the proposal

# CAPITAL PROJECTS



# Generation Control Application (GCA)

- This project will expand on previous functionality and provide the following
  - An enhanced version of the optimization engine for the commitment and shutdown of fast-start units
  - Dispatch slow-moving units to relieve expected future reserve or transmission constraints
  - Automatic detection/prediction for minimum generation conditions
  - Development of next hour interchange predictor for the New York North interface
  - This project is a pre-requisite to the Coordinated Transaction Scheduling project
- This project is scheduled to be implemented in November 2015





# Coordinated Transaction Scheduling

- This project will improve the economic efficiency of interchange scheduling between NYISO and ISO New England by implementing software changes to enable the two ISOs to coordinate selection of the most economic transactions
- Participants will be able to submit interface bids with 15 minute granularity, and the ISOs will move to 15 minute scheduling
- This project is scheduled to be implemented in December 2015



# Forward Capacity Auction 10

- This project will implement all rules associated with FCA 10, once FERC approved, including zonal demand curves, mitigation, elective transmission upgrades, and inclusion of demand curves in reconfiguration auctions
- This project is scheduled to be implemented in Q1 2016



# Do Not Exceed Dispatch

- This project will design and implement functionality that will incorporate wind and hydro resources into Real-Time dispatch
- Other project goals include improvements to short-term wind power forecast; publishing of medium-term and long-term forecasts and improving real-time wind dashboard displays for operators
- This project is currently scheduled to be implemented in Q2 2016



# Major Cyber Security Related Initiatives

- 24x7 Security Operations Center: This project will build upon existing tools and provide the capability for 24x7 monitoring of the security of ISO network
- Implementation of an IT Asset Management System, including necessary process automation to improve inventory and monitoring of hardware and software assets
- CIP Version 5 Transition
  - CIP Version 5 standards go into effect on April 1, 2016 (Q2 2016)



# Divisional Accounting

- This is a multi-phase project through that will implement changes to various ISO New England systems to allow participants to create and maintain subaccounts and associate their resources and transactions to these subaccounts.
- These changes will increase market efficiency for participants by allowing them to evaluate their portfolio by business unit, division, or generating facility.
- The final phase of this project is scheduled to be implemented in Q4 2016



# Submission of FTRs for Clearing

- This project will design and implement software that is capable of administering third-party clearing, subject to timely regulatory approvals
- This project is scheduled to be implemented in Q4 2016



# DARD Pump Parameters

- This project will allow Dispatchable Asset Related Demands (DARDs) with pumps to model inter-temporal parameters (maximum demand dispatch duration, maximum dispatch frequency and minimum down time)
- This project is currently scheduled for implementation in Q4 2016



# Fast Start Pricing

- This project will improve price formation by enabling fast-start resources to set price more efficiently, thereby reflecting the cost of fast-start deployments through transparent market price signals.
- Price formation improvements associated with this project will also improve performance incentives for all resources during tight system conditions when reliability risk is heightened.
- This project is currently scheduled for implementation in Q4 2016 - Q1 2017





# Forward Capacity Auction 11

- This project will implement all FERC approved rules associated with FCA 11
  - Notable enhancements for FCA 11 include zonal demand curves and resource retirement related reforms
- This project is scheduled to be implemented in Q1 2017



# Sub-hourly Real-Time Settlements

- This project will modify the settlements infrastructure and rules to settle the market at a more granular five-minute price instead of an hourly basis and will improve performance incentives for resources
- This project is scheduled to be implemented in Q1-Q2 2017



# Various Application Enhancements, cont.

- Asset Registration Automation
  - The purpose of this project is to improve the asset registration process by providing a digital format for submittal of asset registration forms; The current asset registration process relies on participant submittal of scanned, emailed, or faxed asset registration forms or spreadsheets
  - The benefit will be a secure digital method for customer retrieval and submittal of asset data, in addition to requested asset data changes and transfers
  - This project is scheduled for implementation in Q3 2016
- Asset Characteristics Database and User Interface Enhancements
  - The Asset Characteristics Database User Interface Re-design project will provide participants and ISO-NE Market Monitoring staff enhanced functionality to track generator characteristics for reference level calculations
  - This project is scheduled for implementation in Q3 2016

## Various Application Enhancements, cont.

- Upgrade External Transaction Scheduling Application Platform
  - Upgrade the current external transaction scheduling platform that is used by the ISO system operations department to support functionality related to external transactions
  - This project is scheduled for implementation in Q4 2016
- Operations Document Management (ODMS) System
  - This project will upgrade the ODMS system that allows system operations to manage the editing and review and finalization of transmission operating guides, operating procedures and master local control center procedures
  - This project is scheduled for implementation in Q4 2016



## Various Application Enhancements, cont.

- Simplification of Energy Management System (EMS) Custom Applications
  - This project involves working with Alstom to simplify/eliminate certain custom software applications such that maintenance of the EMS and future upgrades are easier
  - This project is scheduled for implementation in Q4 2017



# Various Application Enhancements

- Oracle 12c Upgrade
  - This project will incorporate a phased approach to ensure all relevant ISO systems and applications are upgraded from Oracle version 11g to Oracle version 12c
  - Oracle upgrade versions are largely dictated by the vendor support timelines for previous versions
  - This project is scheduled for implementation in Q2/Q3 2016
- Quarterly Releases: Various Smaller Hardware Upgrades / Software Enhancements
  - These upgrades are intended to address various smaller software enhancements to enterprise applications, market and reliability based applications, and data bridges that connect these applications
  - These enhancements are expected to be bundled into two quarterly releases (Q2 2016 and Q4 2016)

# 2016 Issues Resolution Project

- Reduce Backlog in Issues Management
  - The 2016 Issue Resolution Project is intended to continue to improve the resolution pace of issues
  - This will increase operational efficiency and accuracy, provide for minor enhancements, and reduce risk
  - This could include both software and hardware infrastructure enhancements
  - This will be implemented as multiple projects and they are scheduled for completion by the end of 2016

# ACTIVITY DRIVERS





# Planning/Operations Activity Drivers

Activity	Driver	Reliability Impact	Market Efficiency Impact
Implement FERC Order 1000	FERC Compliance	Medium	N/A
Transmission Planning Studies	NERC / NPCC / Tariff Compliance	High	Medium
Transmission Cost Allocation	Tariff Compliance	Low	N/A
2016 Economic Studies	Tariff Compliance; Order 890	Low	N/A
EIPC	DOE Initiative	Low	N/A
Interregional Planning	NERC / NPCC / Tariff Compliance	Medium	Low
2016/ 2017 EE Forecast	Public Policy	Medium	Medium
DG forecast	Public Policy	Medium	Medium
2020/21 ICR and LSR	NERC / NPCC / Tariff Compliance	High	Medium

# Planning/Operations Activity Drivers, cont.

Activity	Driver	Reliability Impact	Market Efficiency Impact
Modeling Capacity Zones	FERC Order	High	High
FCA 10 / FCA 11; Annual Reconfig Auctions	Tariff Compliance	High	High
CONE Updates	Tariff Compliance	Medium	Medium
Generator Interconnection Process	ISO; Market Participants	Medium	Medium
Generator Interconnection Studies	Tariff Compliance	Medium	Medium
2015-2018 Winter Program	ISO Initiative	High	Medium
VAR CC Rate Review	FERC Order	Medium	N/A
NERC/FERC/NPCC Compliance; Cyber Security	NERC / FERC / NPCC Compliance	High	N/A
Operating Procedures	ISO Operations	High	N/A

# Market Design Projects: Activity Drivers

Activity	Driver	Reliability Impact	Market Efficiency Impact
FCM: Resource Retirement Reforms	Market Monitors, ISO Initiative	Medium	High
FCM: Zonal Demand Curves	ISO Initiative, FERC Proceeding, Market Participants	Medium	High
FCM: Qualification Clarifications and Other Modifications	ISO Initiative	Low	Medium



# Market Design Projects: Activity Drivers

Activity	Driver	Reliability Impact	Market Efficiency Impact
Price Formation: DARD Pump Parameters	Market Participants, ISO	Medium	Medium
Price Formation: Sub-Hourly Real-Time Settlement	Market Participants, ISO Initiative	Medium	Medium
Forward Reserve Market Modifications	Market Monitors, ISO Initiative	Low	Medium



# Capital Project Activity Drivers

Activity	Driver	Reliability Impact	Market Efficiency Impact	Estimated 2015 Implementation Cost*
Generator Control Application	ISO Initiative	High	High	\$3.7M
Coordinated Transaction Scheduling	Market Monitors; FERC	High	High	\$3.1M

\* Estimated 2015 implementation costs; Several Projects are not chartered and budgets will be finalized as projects are chartered

# Capital Project Activity Drivers, cont.

Activity	Driver	Reliability Impact	Market Efficiency Impact	Estimated 2016 Implementation Cost*
FCA 10 Implementation	ISO Initiative	High	High	\$0.6M
Do Not Exceed Dispatch	Market Participants, ISO	Medium	Medium	\$2.3M
Cyber Security	NERC; ISO Initiative	Medium	Medium	\$0.75M
Divisional Accounting	Market Participants; ISO Initiative	Low	Medium	\$0.5M
Submission of FTRs for Clearing	ISO Initiative	Low	Medium	\$1.8M
DARD Pump Parameters	Market Participants, ISO	Medium	Medium	\$1.0M

\* Estimated 2016 implementation costs; Several Projects are not chartered and budgets will be finalized as projects are chartered

## Capital Project Activity Drivers, cont.

Activity	Driver	Reliability Impact	Market Efficiency Impact	Estimated 2016 Implementation Cost*
Issue Resolution 2016	ISO Initiative	Medium	Medium	\$1.5M
Various Application/Database Enhancements	ISO Initiative	Medium	Medium	\$3.0M

\* Estimated 2016 implementation costs; Several Projects are not chartered and budgets will be finalized as projects are chartered

# Capital Project Activity Drivers, cont.

Activity	Driver	Reliability Impact	Market Efficiency Impact	Estimated 2016/17 Implementation Cost*
Fast Start Pricing	FERC Proceeding; ISO Initiative	Medium	High	\$2.5M
FCA 11 Implementation	FERC Proceeding; ISO Initiative	High	High	\$3.0M
Sub-Hourly Real-Time Settlement	Market Participants, ISO Initiative	Medium	Medium	\$2.5M

\* Estimated 2016/17 implementation costs; These Projects are not chartered and budgets will be finalized as projects are chartered





# Capital Projects

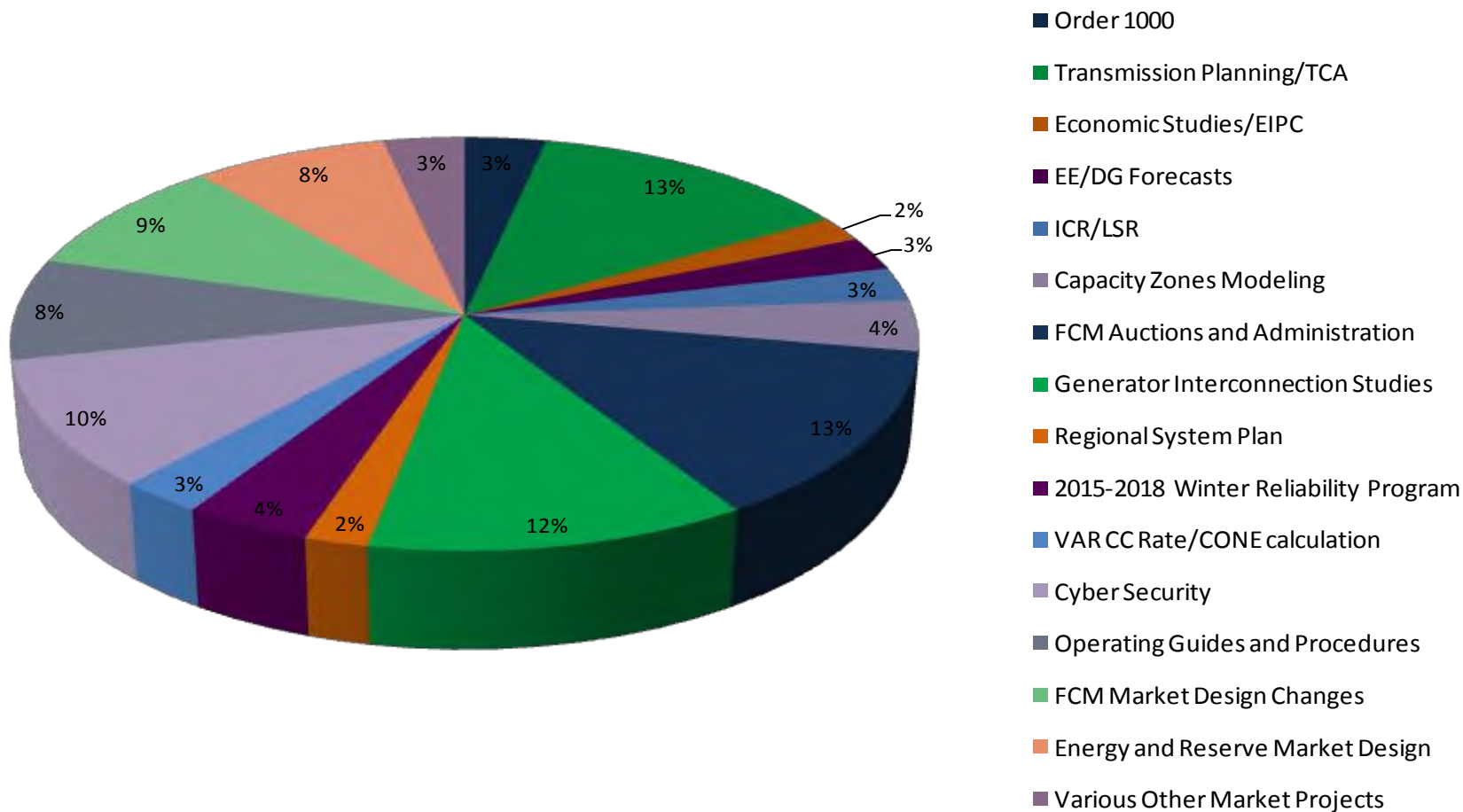
- The ISO discusses changes and updates to its capital budget each quarter (with stakeholders) and files a quarterly capital projects report with the FERC
  - The quarterly report captures any changes in the cost of a project
  - The quarterly report also notes projects that are completed and new projects that are chartered
  - The most accurate quarterly costs are reflected in these quarterly reports
  - Please note that the resource estimates and costs contained in this presentation are only approximations, likely to change through the course of the year based on actual scope and other emerging priorities

# Resource Allocation Estimates

- For the activities identified in the work plan, the estimated ISO resource allocation is as follows:
  - For the capital projects identified in the work plan, the ISO expects an approximate allocation of 100 resources
  - For the non-capital activities identified in the work plan, the ISO expects an approximate allocation of 155 resources
- Slides 83 and 84 illustrate the relative resource allocation across activities contained in the work plan
  - These resources are only estimates and actual allocation of resources across all activities changes frequently based on scope, schedule and emerging priorities
  - Costs associated with generator interconnection studies are mostly reimbursed by the study owner

# Estimated Resource Allocation to Operating Activities

## 2016 Estimated Resource Allocation (FTE's Equivalent)



# Estimated Resource Allocation to Capital Projects

## 2016 Estimated Resource Allocation (FTE's Equivalent)

