

Overview of Forward Capacity Market (FCM)

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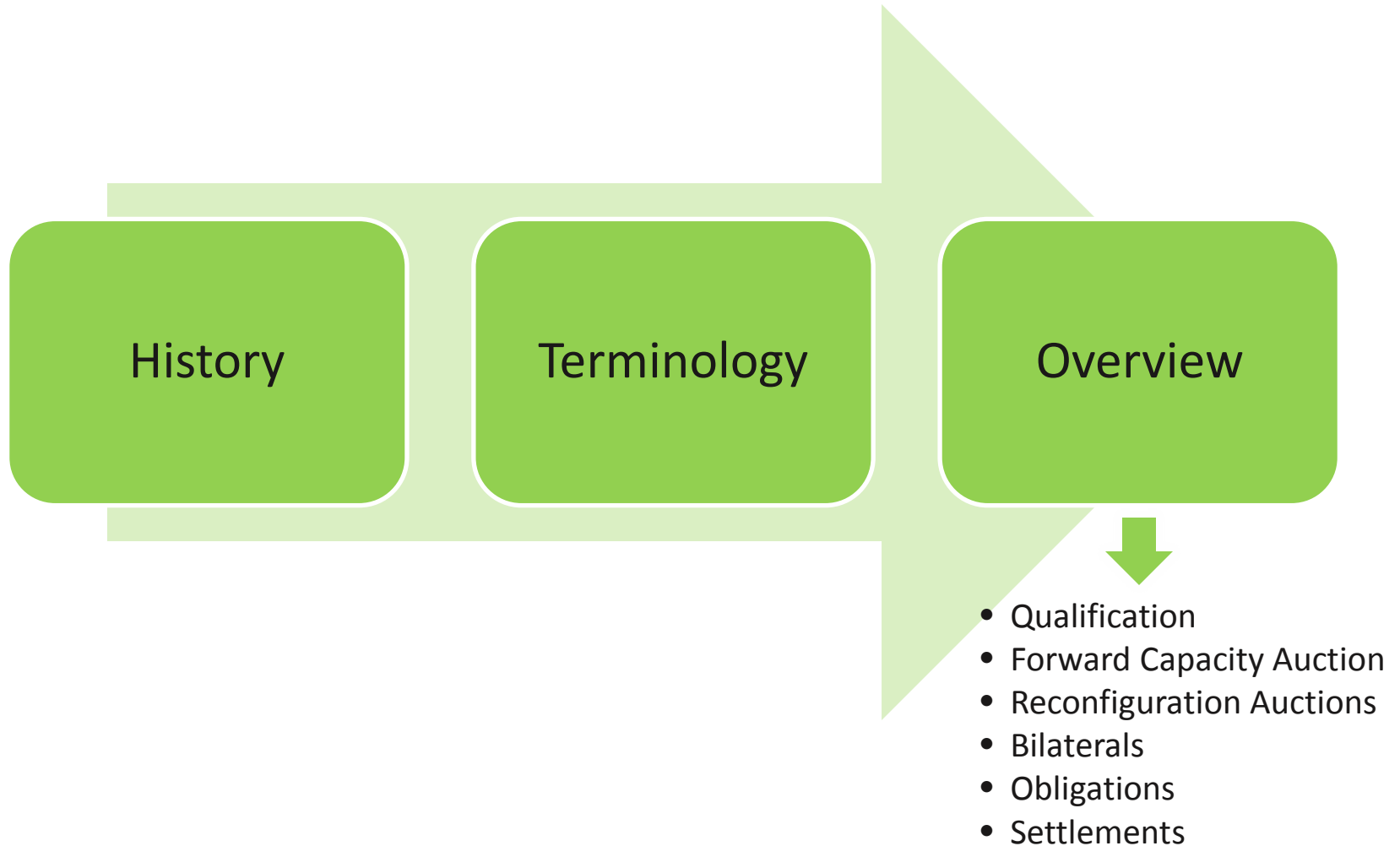
Business Architecture & Technology Department

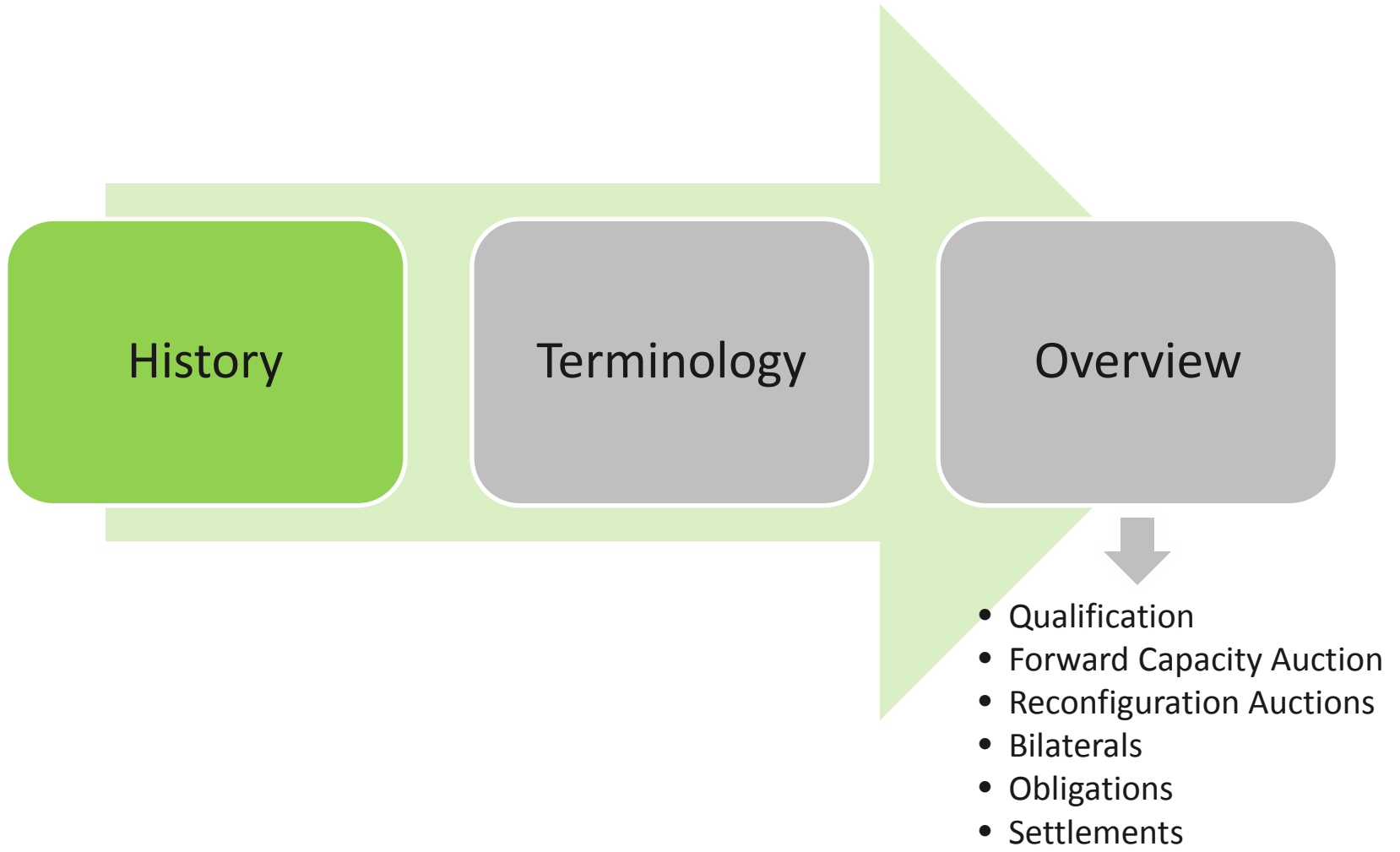
Important Information

- It is important that you read the rules and understand them.
- The rules are still changing! Filings to implement changes identified in the Forward Capacity Working Group are in various stages
- **Need to follow continuing changes to the rules**

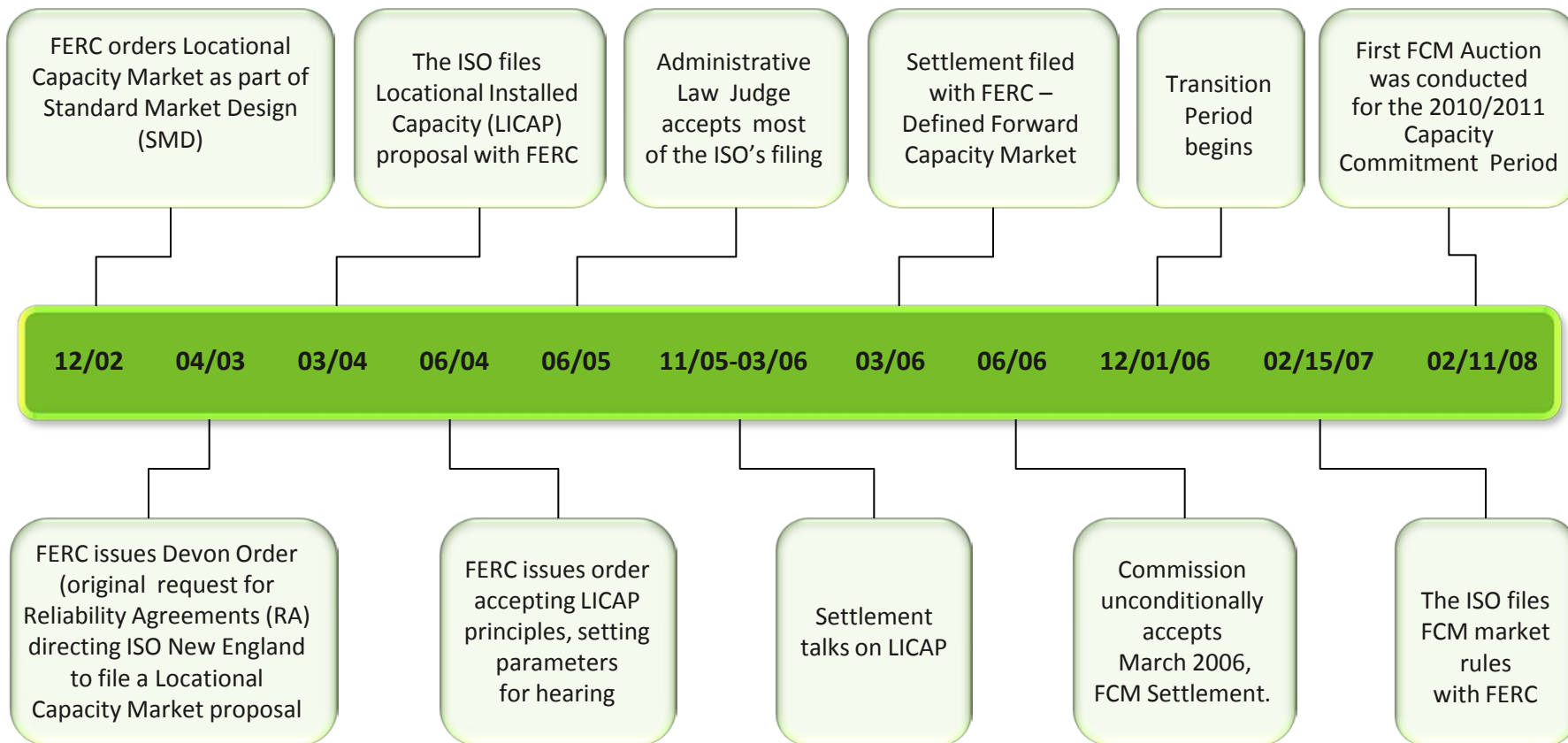


Topics Covered in this Module

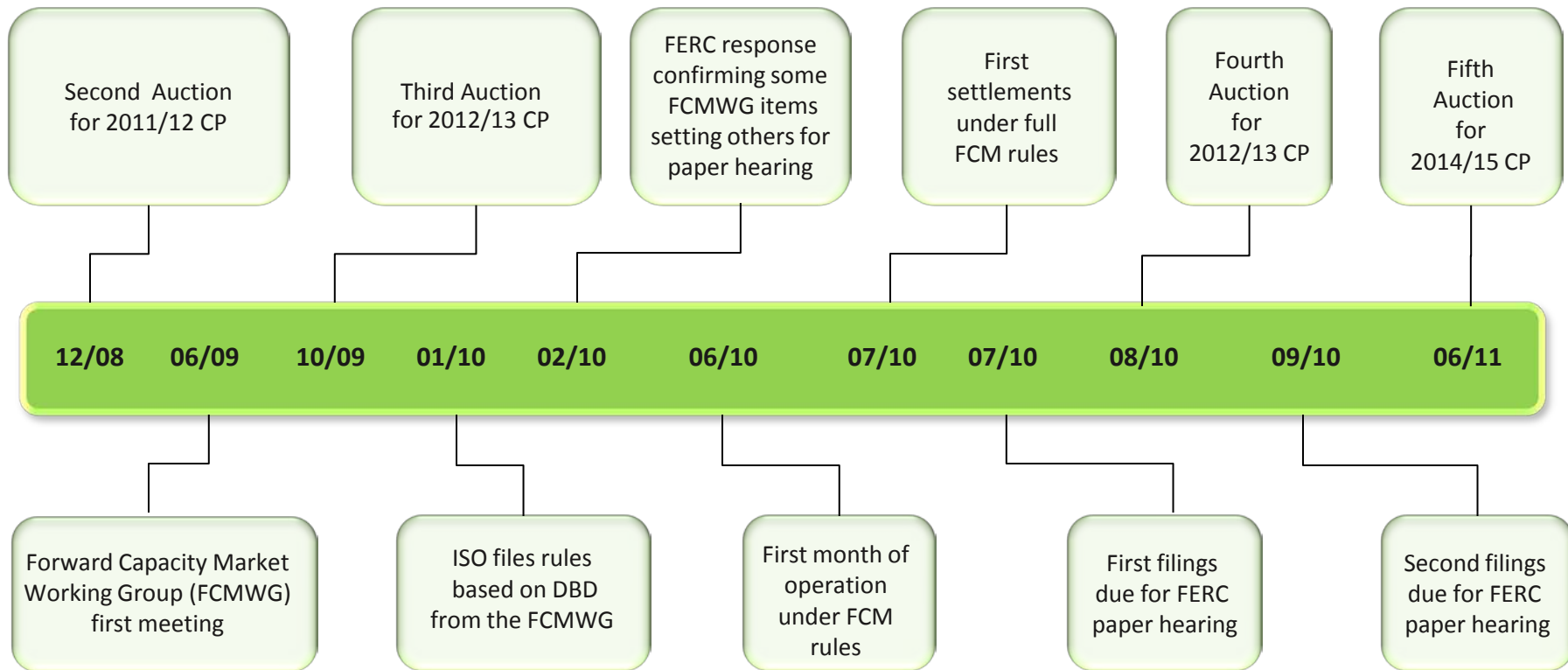




History of FCM

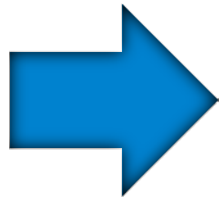


History of FCM (cont.)

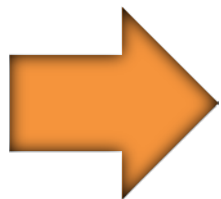


A Forward Capacity Auction is...

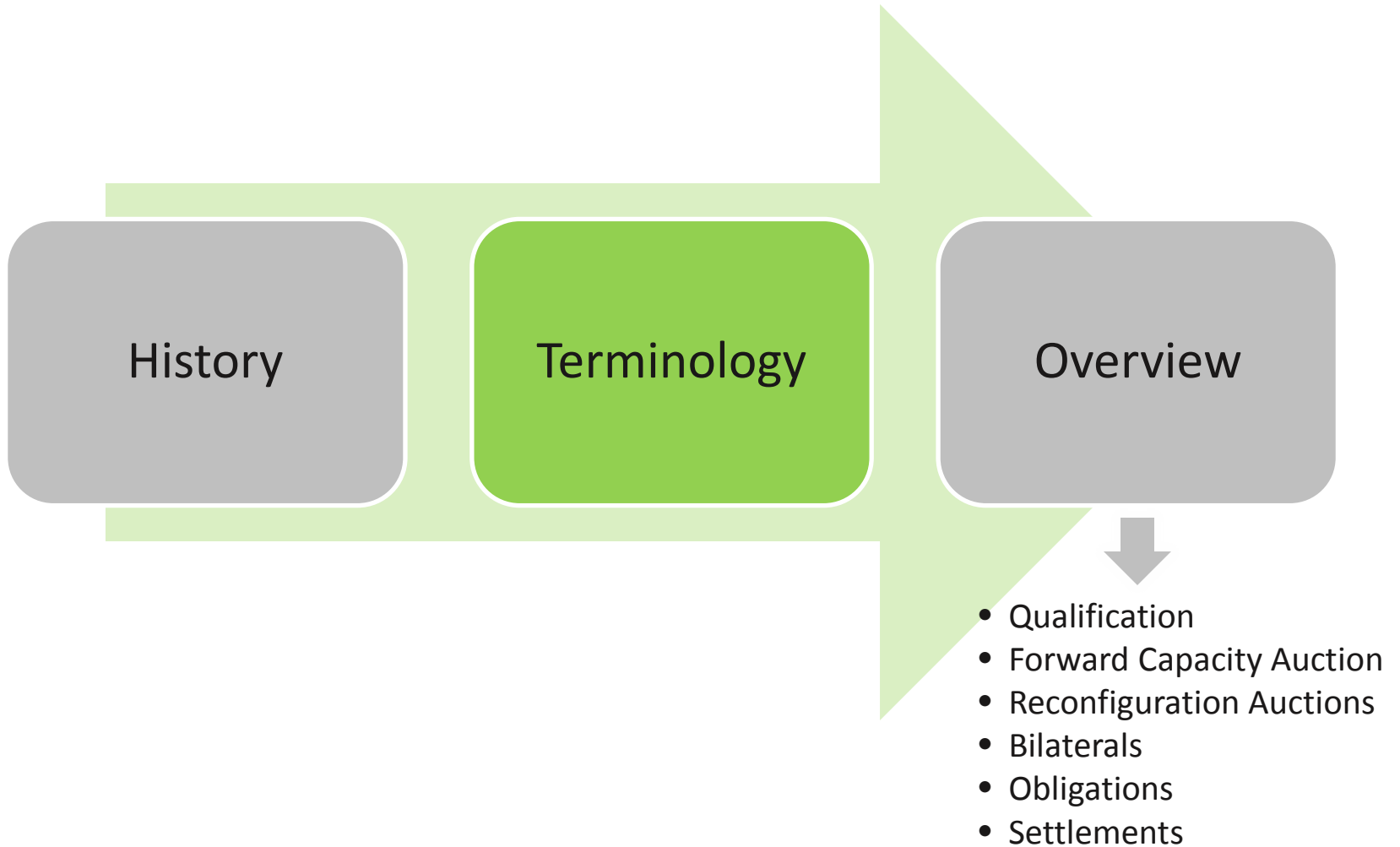
a forward procurement, auction-based locational capacity market.



Intended to send appropriate price signals to attract new investment, including demand resources and maintain existing resources where and when they are needed, thus ensuring the reliability of the New England electricity grid.

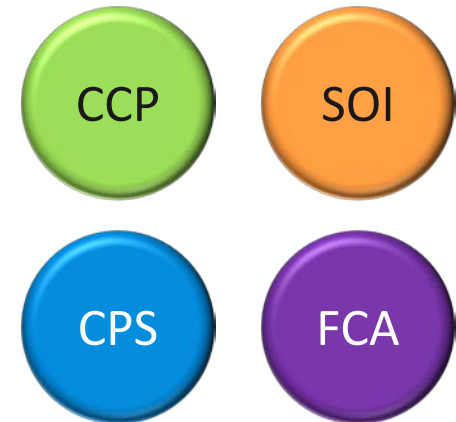


Allows new capacity (capacity planned to build but not commercial) to set the market clearing price, while accounting for locational capacity requirements, thereby providing a market-based measure of the cost of new entry.



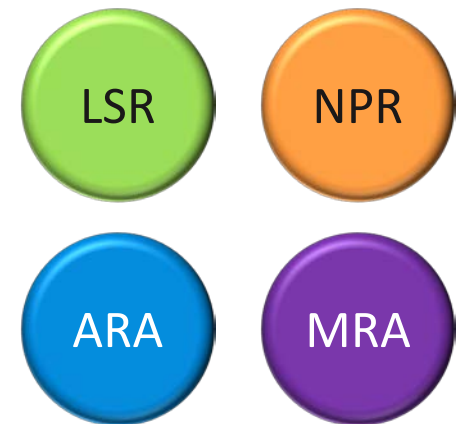
Terminology Additions

- The Forward Capacity Market has created many new terms (abbreviations) not previously used in the ISO including:
 - Resources
 - Capacity Commitment Period (CCP)
 - Show of Interest (SOI)
 - Proposals
 - Qualification
 - New Capacity Qualification (New Cap Qual)
 - Existing Capacity Qualification (ExCap Qual)
 - Critical Path Schedule (CPS)
 - Forward Capacity Auction (FCA)
 - Composite Offers



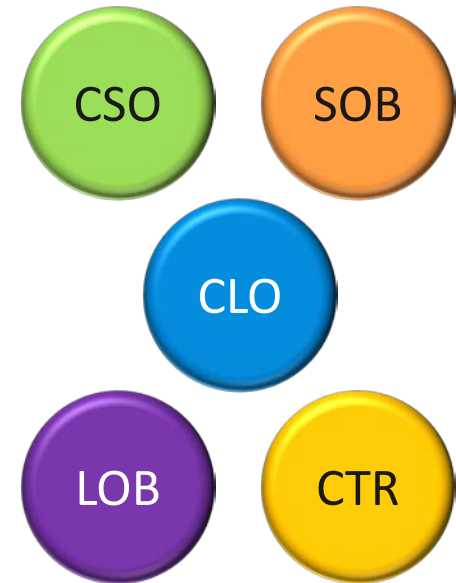
Terminology Additions (cont.)

- Permanent Delist Bids
- Static Delist Bids
- Dynamic Delist Bids
- Conditional Qualified Capacity
- Local Sourcing Requirements (LSR)
- Non-Price Retirement (NPR)
- Annual Reconfiguration Auctions (ARA)
- Monthly Reconfiguration Auctions (MRA)
- Significant Decrease
- Restoration Plans
- Non-Commercial Capacity



Terminology Additions (cont.)

- Capacity Supply Obligation (CSO)
 - Capacity Load Obligation (CLO)
 - Capacity Supply Obligation Bilateral (SOB)
 - Capacity Load Obligation Bilateral (LOB)
 - Capacity Transfer Right (CTR)
 - Shortage Event
 - Supplemental Availability Bilateral (SAB)
 - Supplemental Availability Designation (SAD)
- We will introduce all these terms to you and describe how they are used.



Basic Terms Used Throughout FCM

FCA	The Forward Capacity Auction is the time where the majority of the Capacity Requirements are procured from Supply
Qualified	Amount of capacity that a resource is allowed to use to participate in the Forward Capacity Market
Offer	Amount of capacity that a Resource owner offers to sell into an auction
Bid (De-list)	Amount of capacity that wants to reduce or not receive an Obligation through an auction
Net Installed Capacity Requirement (NICR)	Net Installed Capacity Requirement – Quantity of Supply Procured for a Commitment Period
Capacity Supply Obligation	MW of Capacity Obligation taken on by a Supply Resource during all of or a portion of a specific Capacity Commitment Period
Capacity Commitment Period (CCP)	A year period (from June 1 to May 31 of the next year) that defines a period for which annual auctions/bilaterals will apply.

Objectives of a Forward Capacity Market

Procure enough capacity to meet New England's forecasted Demand approximately three years in advance

Provide compensation for the capacity cost of a an existing Generation, Import or Demand Resource

Attract New Resources to constrained regions through an additional source of income

Implement a penalize-for-non-performance approach for not providing capacity during a shortage event

FCM – Design Parameters

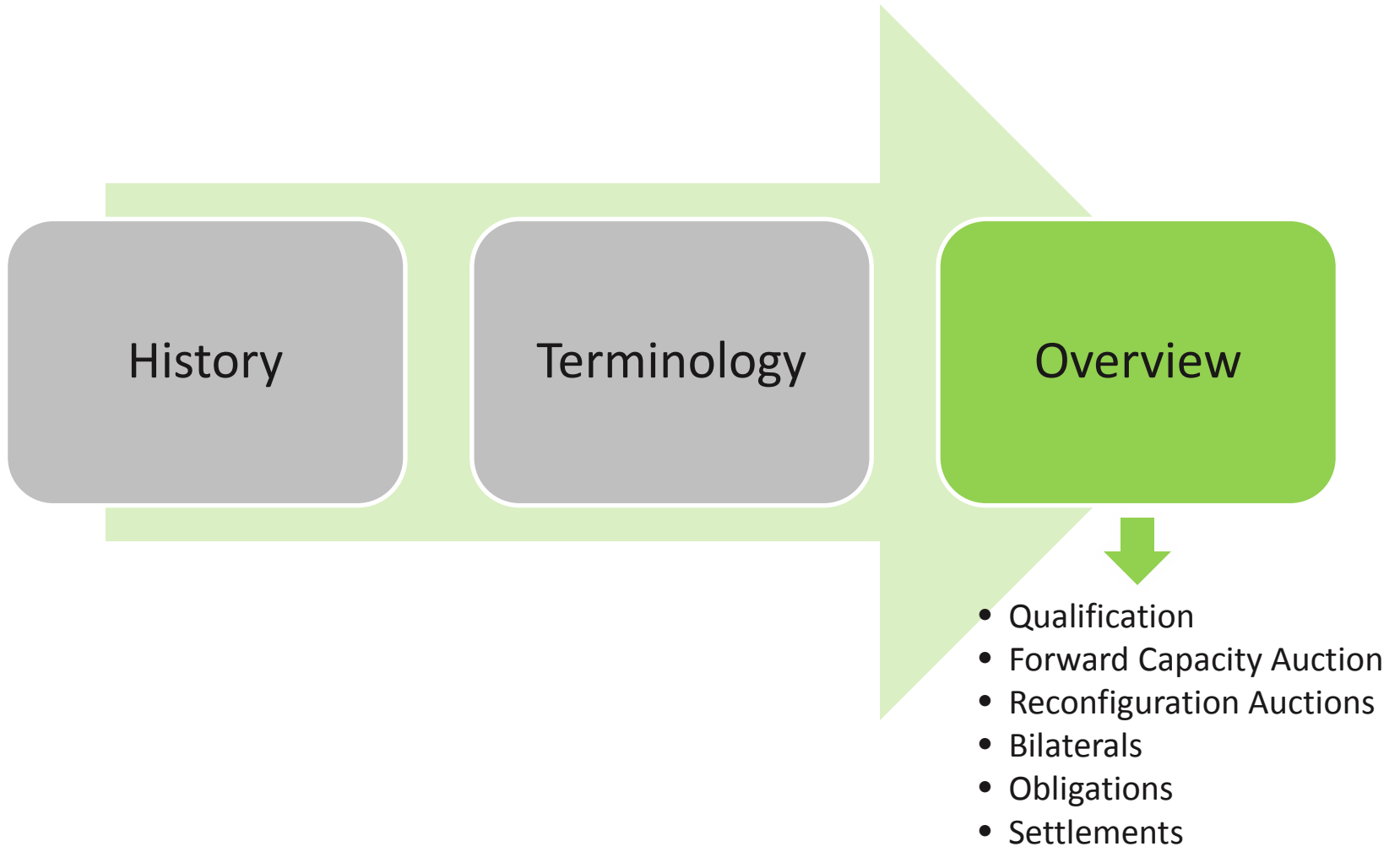
Allow new proposed capacity projects to compete in the market and set price

Include new categories of resources beyond traditional supply resources

- Demand Resources including energy efficiency
- Intermittent Generation (e.g., Wind, Hydro, Solar)

Market objective is to buy enough capacity to meet New England's Net Installed Capacity Requirement (NICR)

Implement a shortage hour availability metric for performance to determine if capacity is delivered



Resource Qualification for the Forward Capacity Market (FCM)

Resource Qualification

Resource Qualification can be divided into categories:



Section Outline

Qualification
Overview and
Timeline

FCM and the
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Process for New
Generation

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in the
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Eligible Resources

- Supply Resources
 - Traditional Generation (oil, coal, natural gas, etc.)
 - Intermittent Generation (wind, solar, etc.)
 - Renewable Generation
 - Imports
- Demand Resources
 - Demand Side Management
 - Energy Efficiency
 - Load Management
 - Distributed Generation



What is New Resource Qualification?

- Potential New Capacity Resources must submit, no later than the relevant qualification deadlines, documentation indicating it's ability to operate at a specific MW value for the relevant Capacity Commitment Period
 - ISO-NE will evaluate this information to confirm that the Resources will be able to provide capacity for the Capacity Commitment Period
- Qualification criteria are different for each Resource Type
- New Resources will be qualified for a specific MW value for a specific Capacity Commitment Period

Qualification Process Overview

Two major information submittals are required for qualification of New Capacity Resources

1

Show of Interest (SOI) form

- Contains sufficient information to perform preliminary analysis of the effect of the proposal on the New England system
- Will include attachments as necessary (such as site control)

Note: A valid Interconnection Request for Capacity Network Resource (CNR) Interconnection Service is now required before submitting an SOI form

2

New Capacity Qualification Package

- Contains sufficient information to assess the viability of the project
- Critical Path Schedule (CPS)
- Will include attachments as necessary

Key Steps in the Qualification Process for New Resources



1. SOI form
2. Project Sponsor submits Qualification Process Cost Reimbursement deposit
3. ISO performs Initial Interconnection Analysis
4. Project Sponsor submits Qualification Packages
5. ISO Reviews Qualification Package
6. Project Sponsor becomes an ISO Market Participant
7. ISO sends Qualification Determination to the Project Sponsor
8. Project Sponsor submits Financial Assurance

Section Outline

Qualification
Overview and
Timeline

**FCM and the
Interconnection
Process for New
Generation**

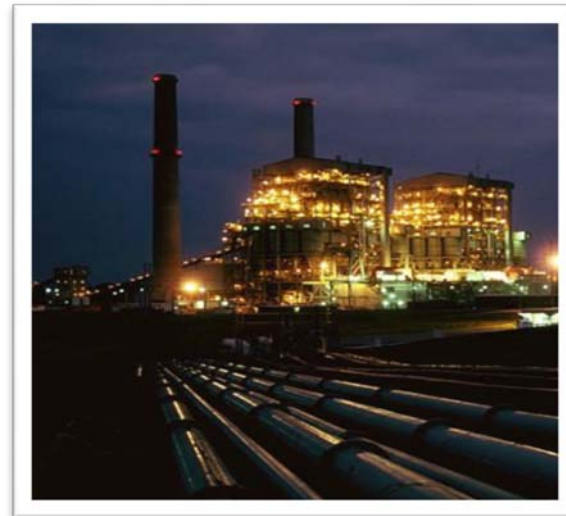
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What Qualifies as a New Generation Capacity?

- Resources that have never been “listed” as a Capacity Resource (counted as capacity) in the New England capacity markets
 - New power plants/projects



What Qualifies as a New Generation Capacity?

(cont.)

- Certain modifications to Existing Generating Capacity Resources
 - Up-rate (> 20% or > 40MW)
 - Entire Resource is treated as New
 - Re-power (>\$200/kW invested)
 - Entire Resource is treated as New
 - Environmental Compliance (>\$100/kW invested)
 - Entire Resource is treated as New
 - Incremental Output (> 2% of Seasonal Claimed Capability)
 - Only the increment is treated as New
 - Re-establishment of Capacity De-rated for > 3 Years
 - Capacity being re-established is treated as New

Intermittent Resources

- Intermittent Power Resources and Intermittent Settlement Only Resources are defined as wind, solar, run of river hydro and other renewable resources that do not have control over their net power output
- Intermittent Resources are not qualified at their nameplate capability
- Intermittent Resources are qualified based on the median measured energy production during defined “reliability hours” in the summer and winter seasons

New Intermittent Resources

- Intermittent New Generating Capacity Resources
 - Must submit, in the New Capacity Qualification Package, information regarding the expected output of the Intermittent Resource
 - For example, measured wind speeds/solar energy
 - Equipment physical characteristics
 - Forecasted energy output

Interconnection Process in New England

- The Large Generator Interconnection Procedures (LGIP) and Large Generator Interconnection Agreement (LGIA) apply to requests to interconnect Large Generating Facilities or to materially change the capacity of an existing generating unit interconnected to the Administered Transmission System
- LGIA/LGIP – Schedule 22 of the Tariff
- SGIA/SGIP (< 20MW) – Schedule 23 of the Tariff
- These requirements are not bypassed by participation in the FCM market

Capacity Interconnections

- Capacity Network Resource (CNR) Interconnection Service is available for Interconnection Customers that wish to provide capacity to New England at their established CNR Capability
 - CNR Interconnection Service must meet the Capacity Capability Interconnection Standard

Note: A valid Interconnection Request for CNR Interconnection Service is now required before submitting an SOI form

Capacity Network Resource Capability

- Defines the Capacity Network Resource interconnection service rights that must be maintained for the generator
- Defines whether an Interconnection Request is required for a proposed increase in Capacity Network Resource Capability in accordance with the LGIP/SGIP
- Defines whether an initial interconnection analysis is required under FCM qualification for a proposed increase in output from an Existing Generating Capacity Resource

Capacity Network Resource Capability (cont.)

- For Existing Generating Capacity Resources was identified using historical documented capability
- For New Generating Capacity Resource is obtained by completing all of the associated interconnection milestones, including obtaining a Capacity Supply Obligation in the FCM
- Is captured in the Interconnection Agreement for New Generating Capacity Resources
- Has been recorded in the in the annual Forecast report of Capacity, Energy, Loads and Transmission (the “CELT”) and is maintained in the Forward Capacity Tracking System (FCTS)

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What's Included in a Show of Interest (SOI) Submittal?

- ✓ Project Sponsor's contact information
- ✓ Status of the project under the Large/Small Generator Interconnection Procedures
- ✓ Project Name and Type
- ✓ Capacity (Max & EcoMin in MW) of the proposed New Capacity
- ✓ Project's expected commercial operation date and desired FCM Capacity Commitment Period
- ✓ Site Control
- ✓ Project address or location, and if relevant, Asset ID number
- ✓ General description of the project's equipment type and configuration (identify if re-powering, environmental, etc.)
- ✓ Simple location plan and simple line diagram of the plant and facilities
- ✓ Other specific project data as set forth in the New Capacity SOI form

New Capacity Qualification Package

- Package has several sections
 - Critical Path Schedule (CPS)
 - Elections
 - Additional Requirements
 - Modifications to Existing Resources
 - Intermittent Information
 - Import Information
- Most Project Sponsors will have to complete more than one of the above sections
- Completed submittals should include attachments, if applicable

*CONE = the Cost of New Entry

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ISO Qualification Process Overview

1. Receive and review application materials
 - Show of Interest form
 - New Capacity Qualification Package
2. Meet with Project Sponsors
3. Conduct the qualification reviews
 - Described on the following slides
4. Consult with Project Sponsors on any findings or questions
5. Consult with Transmission Owners on any findings or questions
6. Issue Qualification Determination Notifications (QDN's)

What is Initial Interconnection Analysis?

- A Deliverability Standard that is a part of the FCM Qualification
 - Assess the ability to interconnect by the start of the Capacity Commitment Period
 - Thermal Power Flow Analysis
 - Short Circuit Analysis
- Uses LGIP result whenever available
- For the FCM, if qualification is restricted due to Initial Interconnection Analysis, the threshold is
 - Where the upgrade(s) cannot be completed in time for the Commitment period
 - Where upgrades can be completed in time, the generator will be qualified and the generator will be responsible for the upgrades

Conditional Qualified Capacity Resources

- An option for Generating Capacity Resources
- A lower-queued resource (Conditional Resource) with the same overlapping impacts as a higher-queued resource (Primary Resource) may “conditionally qualify” for the FCA along with the Primary Resource
 - Both resources can offer their capacity in FCA
 - The Conditional and Primary resources are mutually exclusive
 - If the Primary Resource does not post FA, then the Conditional Resource would no longer be Conditional and could proceed (as if it were Primary)
 - If the Primary Resource withdraws from the FCA, then the Conditional Resource may clear

Intermittent Resource Review

- Intermittent Resource information reviewed to verify the following (for example for a wind resource):
 - That the raw wind speed data provided is reasonable and suitable for the purposes of estimating wind turbine electrical output at the given location
 - That the equipment characteristics (e.g., mechanical efficiency) are reasonable for the purposes of estimating wind turbine electrical output
 - That the calculations of wind turbine electrical output are conducted in an appropriate manner
 - That the overall calculation of effective capacity is reasonable

Import Capacity Resources

- Existing and New Import Capacity Resources are contemplated by the Market Rule
 - Existing Import Capacity Resources – “multi-year” commitment
 - New Import Capacity Resources – “single-year” commitment
- Options for backing an Import Resource
 - Single external generating resource (commercial or non-commercial)
 - Multiple external generating resources (commercial or non-commercial)
 - Control-Area backed
- Intermittent treatment does not apply to Import Capacity Resources

New Import Capacity Resources

- New Import Capacity Resources have the same two primary submittal requirements with the same deadlines and as described above for New generating Capacity Resources
 - Show of Interest Form
 - New Capacity Qualification Package
 - Documentation of ownership or direct-control over the external resource
 - Documentation of the capacity capability for commercial external resources
- OR**
- Critical Path Schedule for non-commercial resources
 - Control Area documentation (if applicable)

Critical Path Schedule Review

- CPS reviewed to perform the following:
 - Evaluation of whether a project's CPS contains all required milestones or not
 - Evaluation of whether CPS milestones meet required definitional requirements or not
 - Evaluation of whether proposed milestone sequences and / or durations create obvious schedule inconsistencies or not
 - Evaluation of whether milestone durations are flawed or not

What is the Consultation Process?

- The ISO will share its Initial Interconnection Analysis findings with affected Transmission Owners (TO), offering the TO(s) an opportunity to comment on the findings
- If ISO-NE determines that there are any negative findings, either in Initial Interconnection Analysis or in Critical Path Schedule review, then
 - ISO-NE will provide written documentation of its determination to the Project Sponsor a number of weeks before the end of the qualification review period
 - The Project Sponsor will have an opportunity to respond to ISO-NE's determination and attempt to cure the evaluation failure

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New Resource Qualification Determination

- On approximately 127 days before the FCA, the ISO will send notification of qualification to Project Sponsors
- Positive Determinations will contain
 - Summer & Winter Qualified MWs
 - Determination of Market Monitoring for Offers below $0.75 \times \text{CONE}$ (*will be a separate notification from the technical notification*)
 - Description of how the Resource must address Overlapping Interconnection Impacts
 - List of transmission upgrades, if applicable
- Negative Qualification Determinations will contain
 - Description(s) of why the Resource was not accepted

Section Outline

What is a Demand Resource?

New Demand Resource Participation

Passive Demand Resources

Active Demand Resources

New Demand Resource Qualification Process

Demand Resource Concept

- Demand Resource(DR) in FCM: Installed measures (i.e., products, equipment, systems, services, practices and/or strategies) that result in additional and verifiable reductions in end-use demand on the electricity in the New England Control Area
- These verifiable reductions serve to reduce the peak demand in the system and maintain operating reserves, avoiding the dispatch of additional generation
- Demand Resources displace load permanently, over pre-defined hours or in real-time when dispatched by the ISO
- Minimum size of 100 kW

Eligible Resources

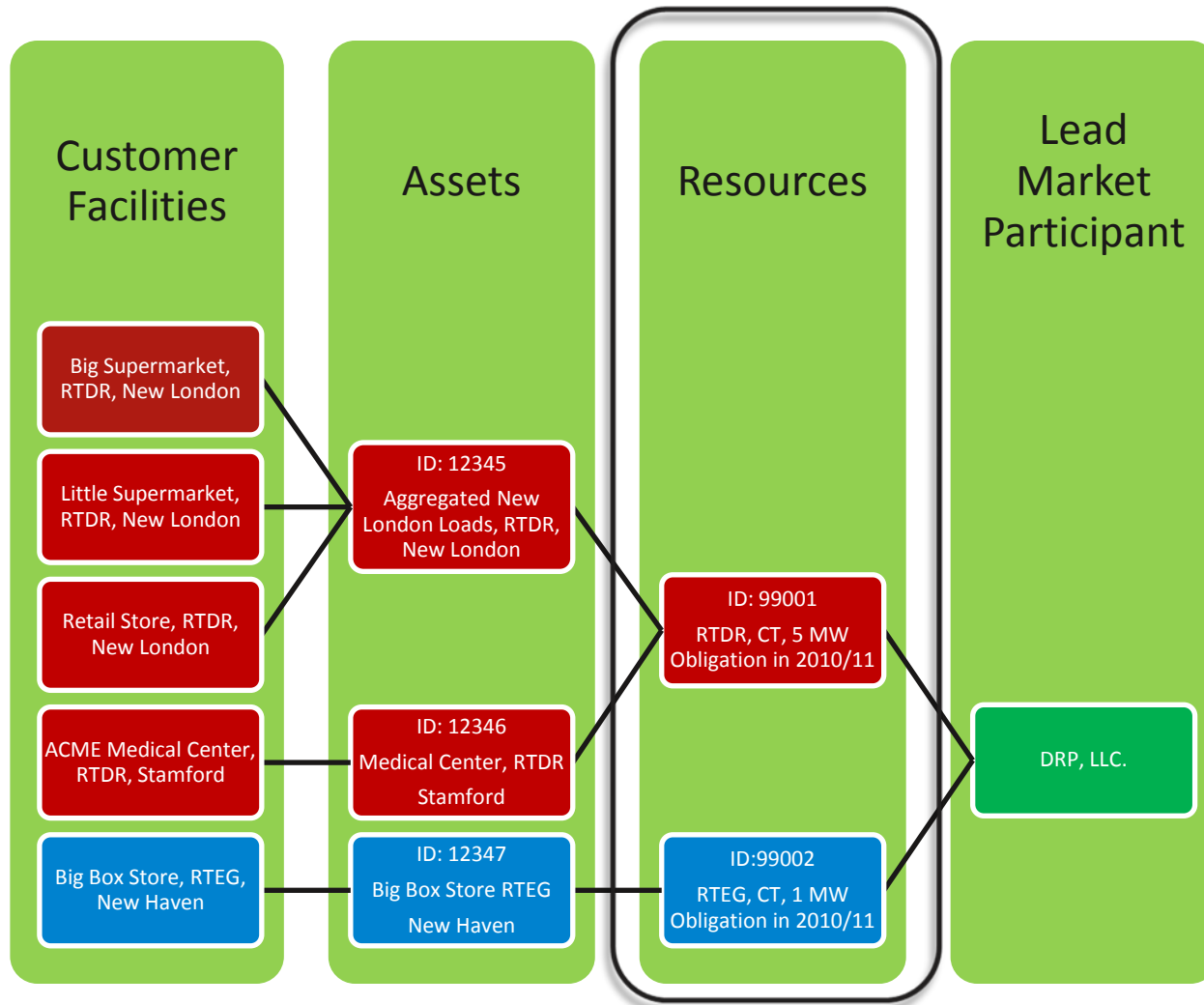
- Supply Resources
 - Traditional Generation (oil, coal, natural gas, etc.)
 - Intermittent Generation (wind, solar, etc.)
 - Renewable Generation
- Demand Resources
 - Energy Efficiency
 - Load Management
 - Distributed Generation



How Do Customers Participate?

- Reduce Electricity Consumption
 - Alter production schedule in a manufacturing process (Active or Passive)
 - Turn off discretionary lighting, motors, etc. (Active or Passive)
 - Raise HVAC temperatures (Active or Passive)
 - Use Lighting Controls (i.e., Dimming) (Active or Passive)
 - Use an Energy Management System (Active or Passive)
- Start Emergency Generator/Distributed Generation
 - Transfer load from the Grid to an Emergency Generator

Customer Facilities, Asset, Resource and Lead Participant Relationships



Section Outline

What is a Demand Resource?

New Demand Resource Participation

Passive Demand Resources

Active Demand Resources

New Demand Resource Qualification Process

Forward Capacity Market Participation

1

Qualification Period

Determine which Resource projects can be submitted into the auction

2

Planning/Construction Period

Gives Project Sponsors sufficient time to install/construct new Resources to fulfill capacity obligations

3

Commitment Period

The period that Project Sponsors are obligated to deliver capacity

Demand Resource Categories

- The Market Rules define Demand Resources by the way in which they reduce load, not by technology
- Installed Measures that result in verifiable reductions in end-use consumption of electricity in the New England Control Area
- Passive Demand Resources (Passive DR)
 - Reduce energy demand (MW) during peak hours
 - Are non-dispatchable
- Active Demand Resources (Active DR)
 - Are designed to reduce peak loads (MW)
 - Can reduce load based on real-time system conditions or ISO instructions

Section Outline

What is a Demand Resource?

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New Demand Resource Qualification Process

On-Peak Demand Resources

- On-Peak Demand Resources measure their load reduction during the following hours
 - Summer On-Peak Hours: 1 p.m. to 5 p.m. Non-Holiday Week Days in June, July and August
 - Winter On-Peak Hours: 5 p.m. to 7 p.m. Non-Holiday Week Days in December and January
- Designed for non-dispatchable measures that are not weather sensitive and reduce load across pre-defined hours (e.g., lighting, motors, etc.)



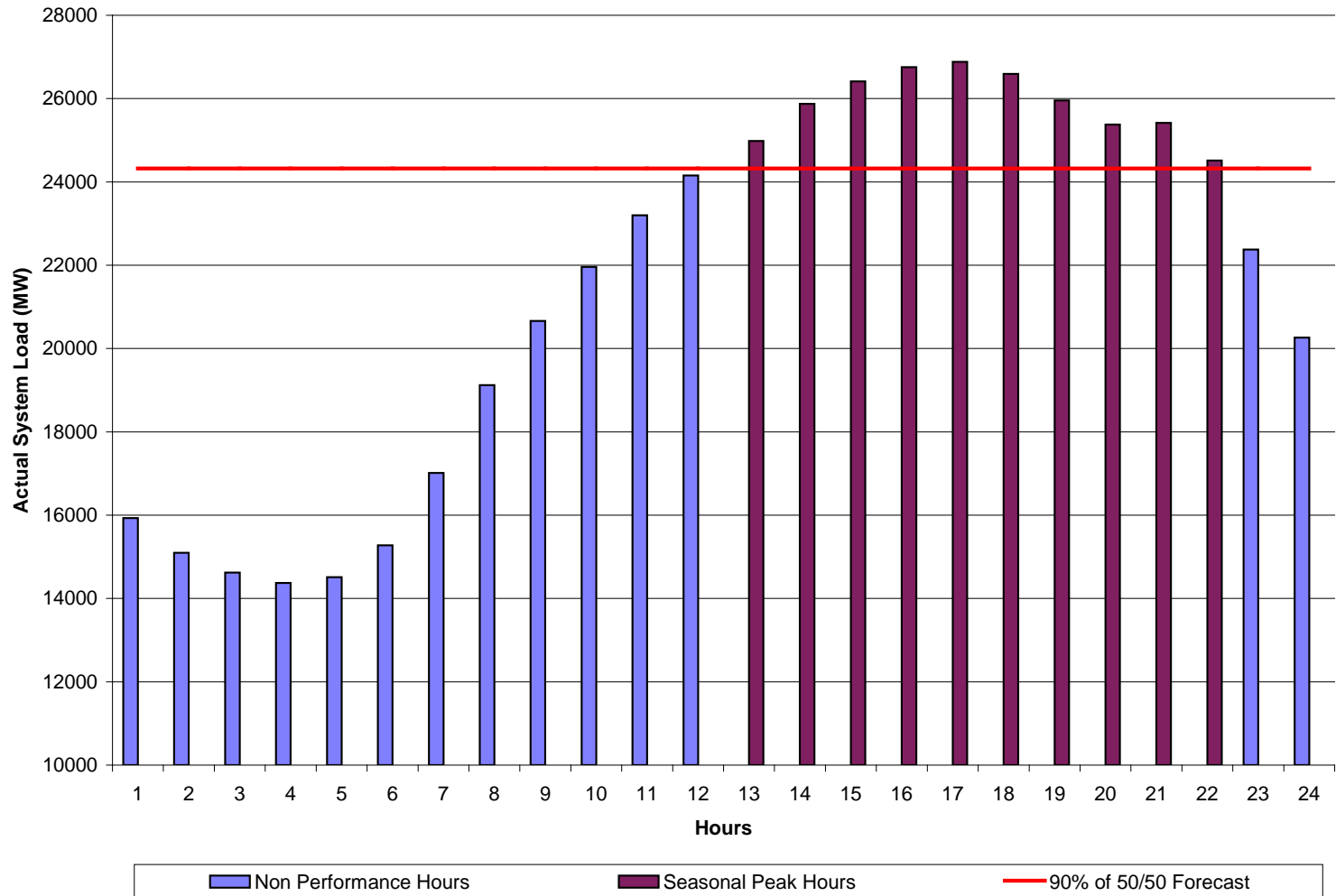
Seasonal Peak Demand Resources

- Seasonal Peak Demand Resources must reduce load during Non-Holiday Week Days when the **Real-Time System Hourly Load** is equal to or greater than **90%** of the most recent “50/50” System Peak Load Forecast for the applicable Summer or Winter Season
- Designed for non-dispatchable, weather-sensitive measures such as energy efficient HVAC measures



Seasonal Peak

(Weekday During Peak Load Conditions)



Section Outline

What is a Demand Resource?

New Demand Resource Participation

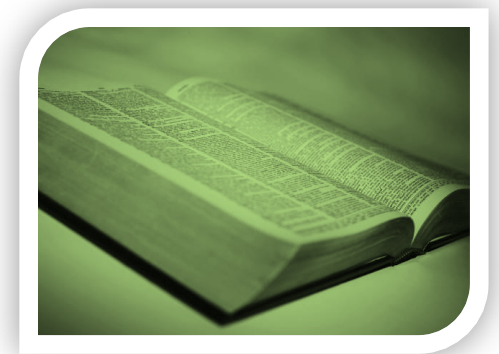
Passive Demand Resources

Active Demand Resources

New Demand Resource Qualification Process

Real-Time Demand Response Resources

- Real-Time Demand Response Resource is a type of Demand Resource that is comprised of installed measures (e.g., products, equipment, systems, services, practices and/or strategies) on end-use customer facilities
 - Demand Resources may be dispatched on a Dispatch Zone, Load Zone, or system-wide basis
 - The ISO may issue Dispatch Instructions that reduce or increase the amount dispatched in each hour

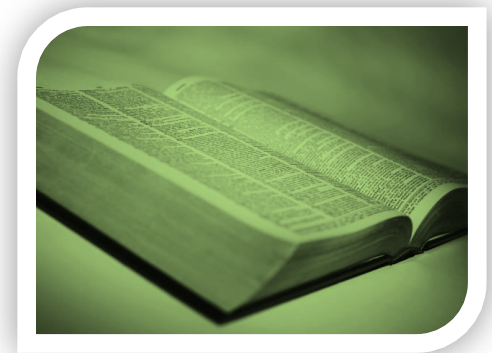


Real-Time Demand Response Dispatch

- Real-Time Demand Response Resources will receive Dispatch Instructions from the ISO
 - They must curtail electrical usage within 30 minutes of receiving a Dispatch Instruction; and
 - Continue curtailing usage until receiving a Dispatch Instruction to restore electrical usage
- Real-Time Demand Response Resources will be activated when:
 - Demand Resource Forecast Peak Hours - The ISO forecasts Operating Procedure No. 4 (OP-4) Action 2 or higher the day before the Operating Day (10:00 PM Day prior to dispatch day)
 - Real-Time Demand Resource Dispatch Hours - The ISO implements OP-4 Action 2 or higher during the Operating Day

Real-Time Emergency Generation Resources

- Distributed Generation whose Federal, State and/or Local air quality permit(s) limit the operation of these generators to hours when the ISO dispatches Real-Time Emergency Generation Resources
 - Generation Resources may be dispatched on a Dispatch Zone, Load Zone, or system-wide basis
 - The ISO may issue Dispatch Instructions that reduce or increase the amount dispatched in each hour
- Limited to 600MW



Real-Time Emergency Generation Dispatch

- Real-Time Emergency Generation (RTEG) Resources will receive Dispatch Instructions from the ISO
 - They must curtail electrical usage within 30 minutes of receiving a Dispatch Instruction; and
 - Continue curtailing usage until receiving a Dispatch Instruction to restore electrical usage
- RTEG will be activated during
 - Hours 7 a.m. and 7 p.m. Monday through Friday, non-Demand Response Holidays when deficient in Thirty-Minute Operating Reserve and when the ISO implements voltage reductions of five percent of normal operating voltage that require more than 10 minutes to implement

Section Outline

What is a Demand Resource?

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Active Demand Resources

New Demand Resource Qualification Process

Qualification Process Overview

Two major information submittals are required for qualification of New Demand Resources

1

Show of Interest (SOI) form

- Contains necessary information to perform preliminary analysis of the main project characteristics
- Informs the ISO of the intended level of participation in the auction and the scope of the project

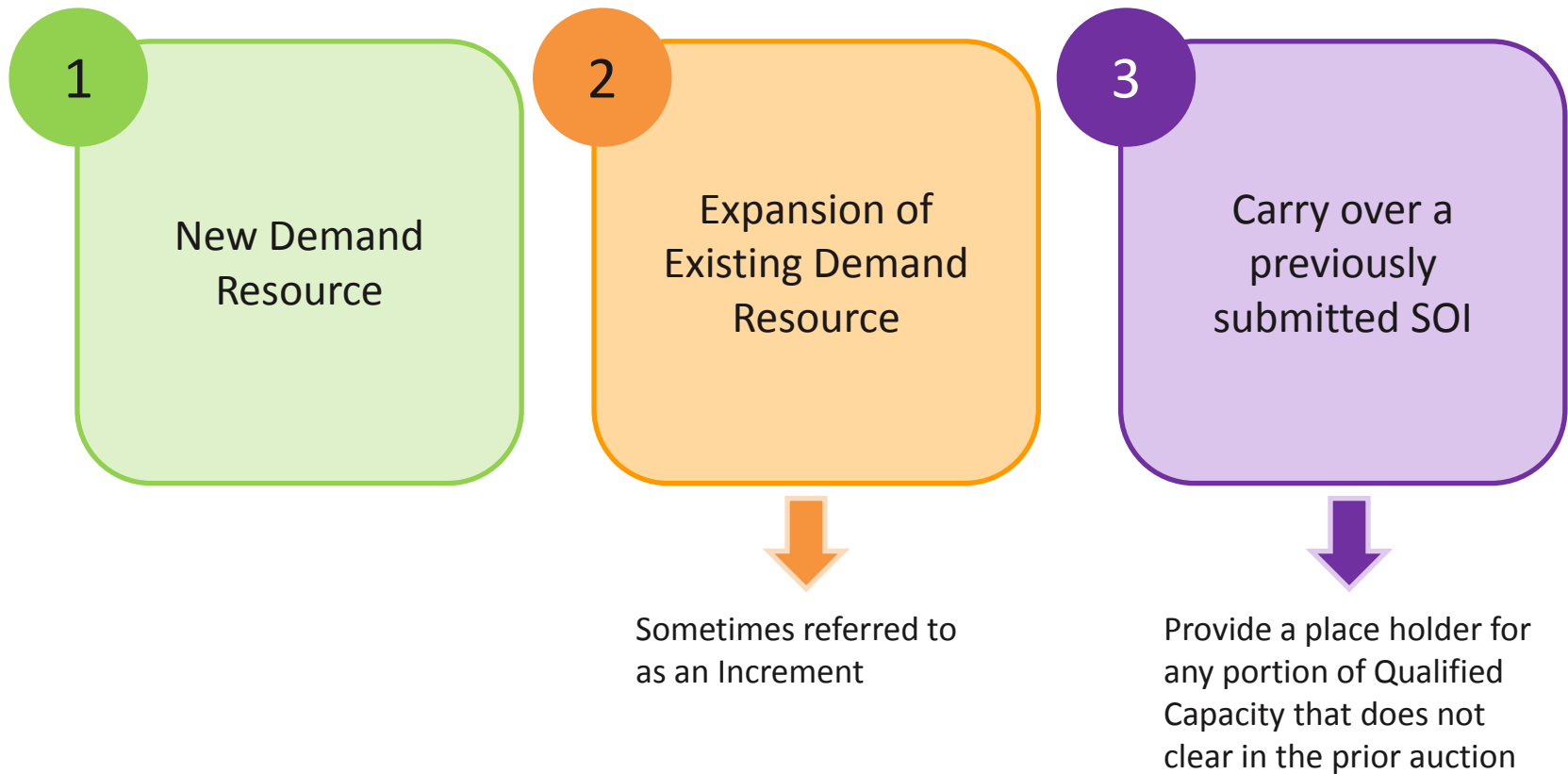
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New Capacity Qualification Package

- Contains:
 - Sufficient information to assess the viability of the project
 - Critical Path Schedule (CPS)
 - Relevant attachments as necessary

Demand Resource SOI Options

There are three (3) Demand Resource SOI Options



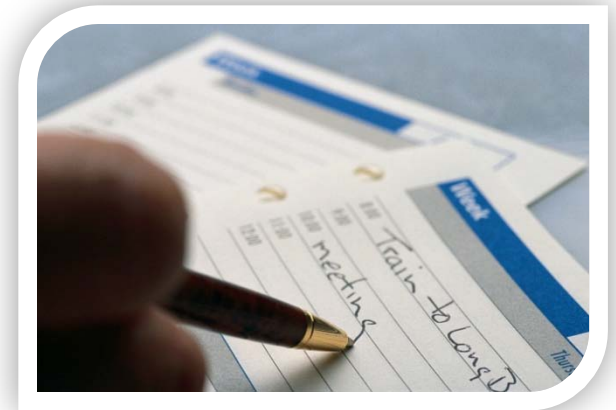
Qualification Package Components

1. Project Description
2. Source of Funding
3. Customer Acquisition Plan
 - Critical Path Schedule
4. Measurement and Verification Plan
5. Operable Capacity Analysis Compliance
6. Offers below $0.75 \times \text{CONE}$
7. Elections
 - a. Distributed Generation
 - b. Single Facility greater than 5 MW
 - c. Capacity Commitment Period Election
 - d. Rationing Election
8. Supporting M&V Documents

Detailed description of each component can be found in Appendix A

Critical Path Schedule (CPS) – Simple

- Summer and Winter Capacity delivery schedule (MW) as of milestone dates during the Planning Period
- Commercial Operation date must be no later than May 31 of applicable Commitment Period
- Ramp up projects are required to have non-zero values for all Milestone dates or may be subject to withdrawal from CPS monitoring

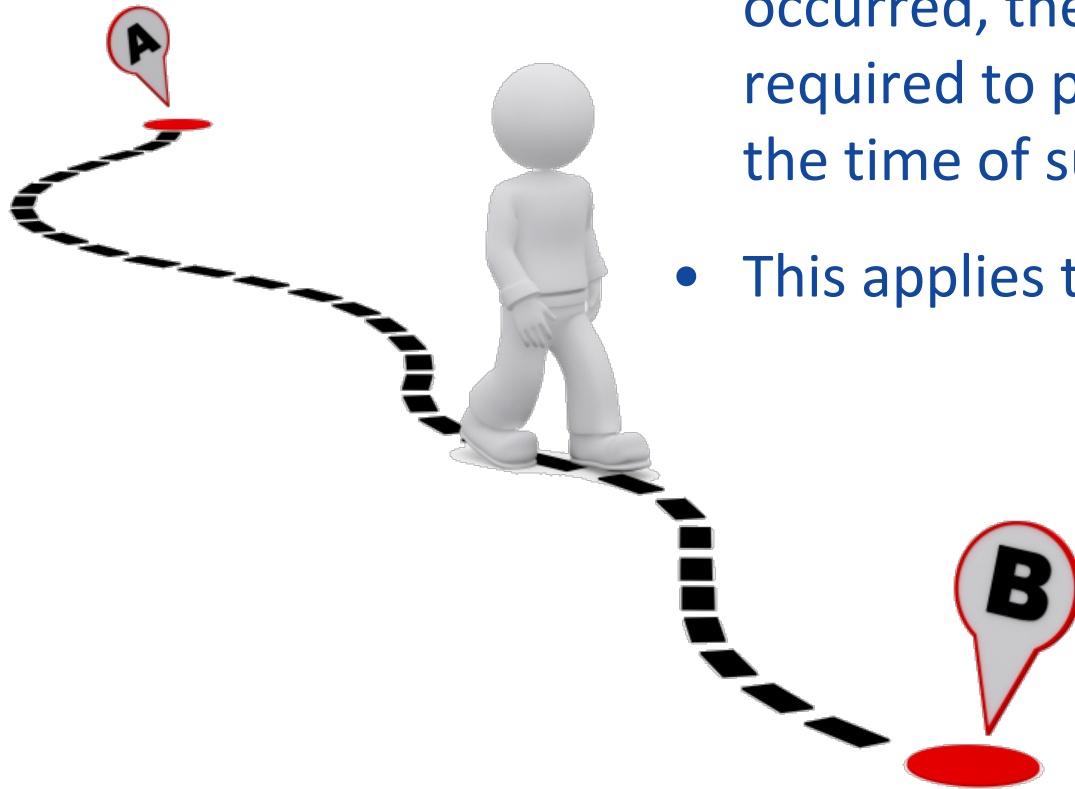


Critical Path Schedule – Complex

- Required for:
 - Distributed Generation projects
 - Projects including a single facility > 5 MW
- Critical Path Schedule must include, at a minimum, the dates on which the following milestones have or are expected to occur
 - Major Permits Received
 - Project Financing Closing
 - Interconnection Request (if applicable)
 - Major Equipment Ordered
 - Major Equipment Delivered
 - Major Equipment Testing Completed
 - Substantial Project Construction Completed
 - Commissioning Completed
 - Commercial Operation Achieved



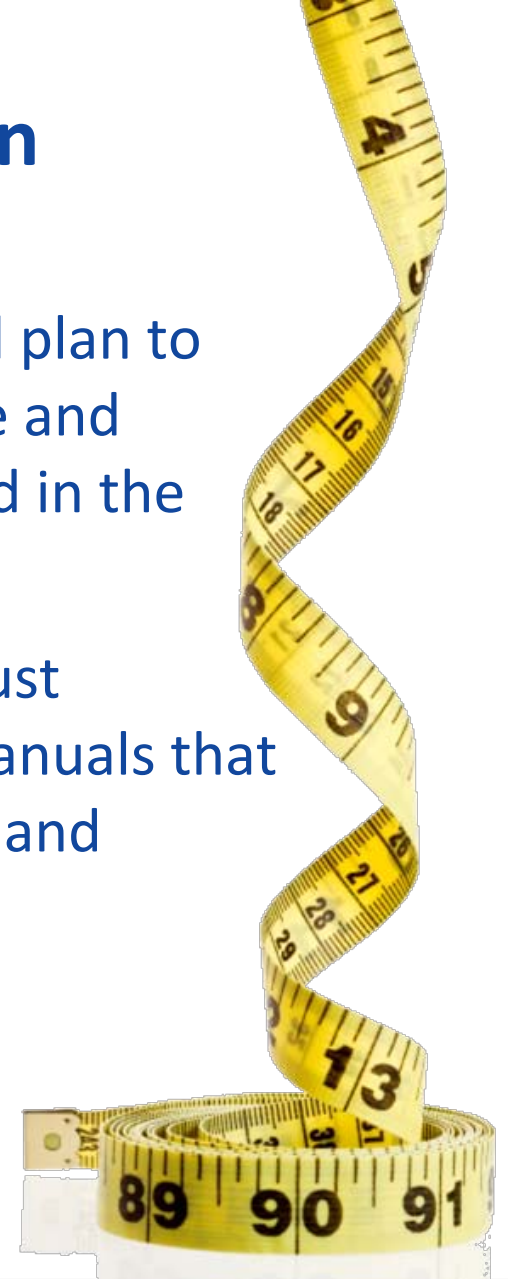
Critical Path Schedule Completed Milestones



- For Milestones that have already occurred, the Project Sponsor will be required to provide documentation at the time of submission
- This applies to both Full and Simple CPS

Measurement and Verification Plan

- The Project Sponsor must provide a detailed plan to collect, verify, report and store performance and audit data for each type of measure included in the project description
- The methods described in this document must comply with the Market Rule and the ISO manuals that contain the requirements for Measurement and Verification (M&V) of Demand Resources
- M&V requirements may differ by Demand Resource Type



Qualification Package Consistency

- The Project Sponsor's New Resource Capacity Qualification Package must be consistent with the SOI form
- No material changes are allowed. Including, but not limited to the following changes
 - Demand Resource Type
 - Project Sponsor [Note: we allow a change in the Project Sponsor if the ISO finds that the new Project Sponsor has similar or better qualifications and experience]
 - Load Zone /Dispatch Zone
 - Demand Reduction Value by more than $\pm 30\%$
 - Measure Type
 - Interconnection Status of a DG project

New Resource Requirements – General

Can New Resources Withdraw from Qualification?

- A Project Sponsor may withdraw from the qualification process at any time prior to three (3) business days before the submission of the financial assurance deposit by providing written notification of such withdrawal to the ISO
- Any withdrawal shall be irrevocable

Withdraw or Proceed to the FCA

- Resources that do not withdraw must submit Financial Assurance for their full Qualified MW amount
- After posting the Financial Assurance, the resource must offer its full summer Qualified Capacity at the FCA Starting Price in the first round of the auction
- Resources are not obligated for the Commitment Period until they clear in the FCA

New Resource Qualification Deposit

- Fees are a cost reimbursement deposit
- Project Sponsors will be charged ISO-NE's actual cost of reviewing their Show of Interest form, Qualification Package and monitoring their project during the planning/construction phase
- Cost reimbursement will be “trued-up” annually
 - Refund issued if ISO-NE's actual cost is less than the deposit after all activity is complete
 - Invoice issued if ISO-NE's actual cost is greater than the deposit until all activity is complete

Existing Capacity Qualification Process

Section Outline



What is an Existing Resource?

- Any resource that has “listed” capacity in the New England Capacity Markets
- Any resource that has not been previously “listed” as capacity but has received a Capacity Supply Obligation (in full or part) for the prior Capacity Commitment Periods through the relevant FCA’s
 - Once a resource clears as a New Capacity Resource in an FCA, it is treated as an Existing Capacity Resource in subsequent Auctions

Types of Existing Resources

Generators

- Non-Intermittent
- Intermittent

Imports

Demand Resources

Section Outline

Definition of an Existing Resource

General Timeline, Process, and Market Rule Qualification Calculations

Participant Actions

Existing Capacity Resource Participation in Forward Capacity Market – Step 1

1. Calculate how much Qualified Capacity MW each resource has.
 - These calculations vary between resource types
 - During this calculation Process, ISO-NE determines the amount of Qualified Capacity that a resource has during the summer and winter

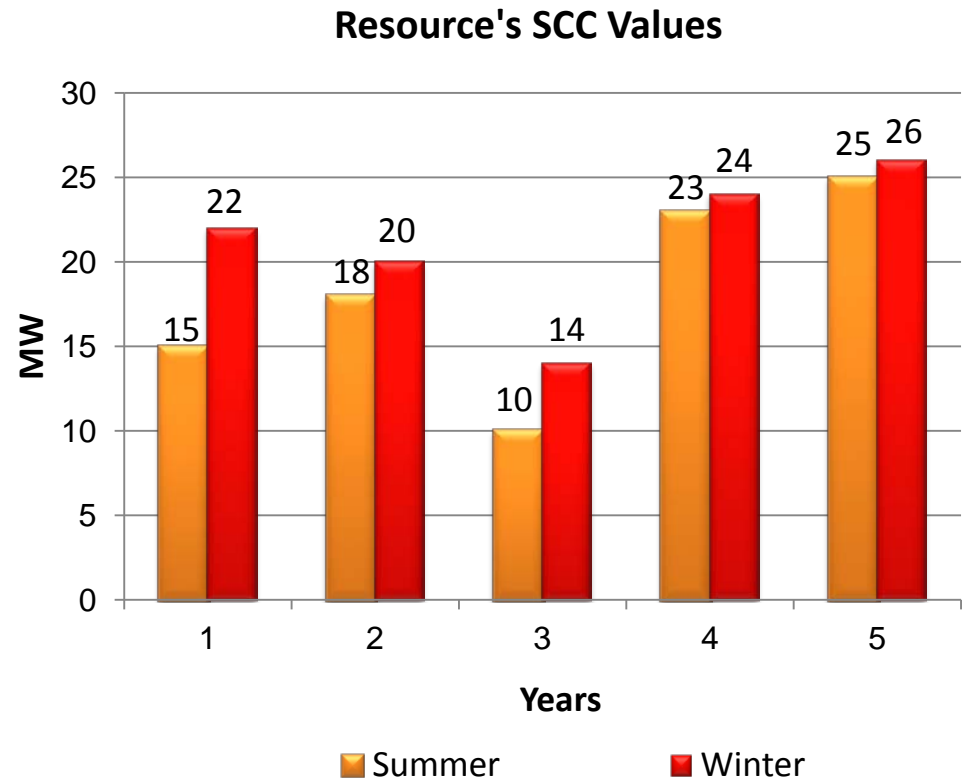
What is my Qualified MW if I am an Existing Capacity Generating Resource?

- Summer and winter Qualified Capacity will be calculated as the median of the most recent five summer and winter claimed capability ratings, with only positive, non-zero ratings included in the calculation
- Summer Qualified Capacity based on capacity rating as of the 5th business day in October
- Winter Qualified Capacity based on capacity rating as of the 5th business day in June

What is my Qualified MW if I am an Existing Capacity Generating Resource? (cont.)

Example 1:

Year	Summer MW	Winter MW
5	25	26
4	23	24
3	10	14
2	18	20
1	15	22



Definition of Median:

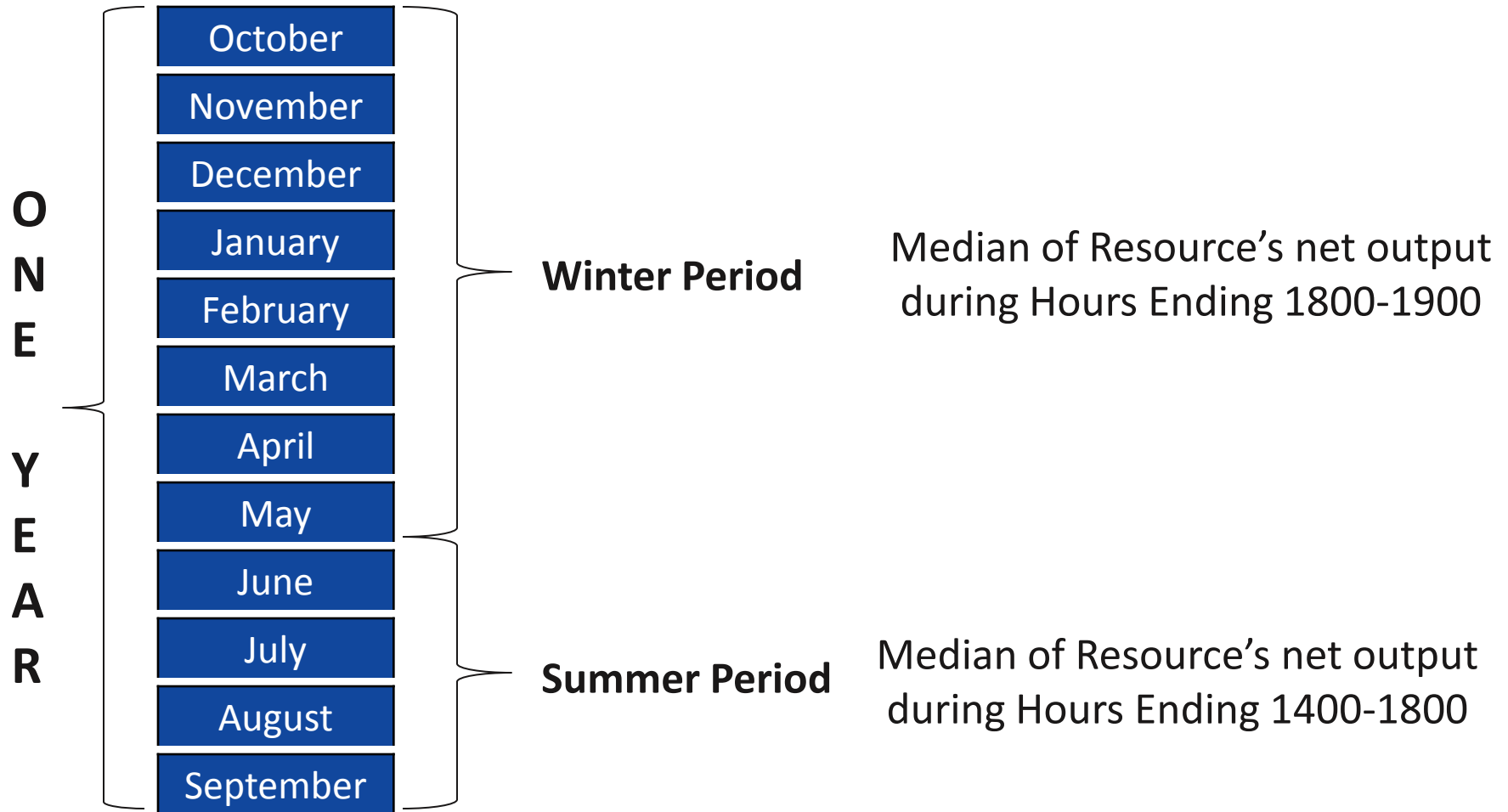
Middle value of an ordered set of values

What is an Intermittent Resource?

- Wind
- Solar
- Run of river hydro
- Other renewable resources that do not have control over their net power output



Calculating the Yearly Output of an Intermittent Resource



After June 1, 2010, Summer and Winter Reliability Hours will also include hours in which the ISO has declared a system-wide Shortage Event (if a Resource was in an import-constrained Capacity Zone, Summer Reliability Hours will also include all Shortage Events in that Capacity Zone).

What is my Qualified MW if I am an Existing Intermittent Resource?

- Average of the medians of the net output during the Summer and Winter Period for the most recent five periods
- Example:

Summer Period	Median Hourly Output (MW)
5	46
4	24
3	10
2	15
1	30
Summer Qualified MW (Average)	25

Winter Period	Median Hourly Output (MW)
5	25.00
4	20.00
3	12.00
2	8.00
1	0.00
Winter Qualified MW (Average)	13.00

Existing Import Capacity Resources

- Any Import Capacity Resource classified as a Grandfathered Import pursuant to MR Section III.13.1.3.3(c)
- Any Import Capacity Resource that has entered into multi-year capacity contract to sell capacity into New England for a period that includes the relevant Capacity Commitment Period and cleared in the prior FCA

What is my Qualified MW if I am an Existing Demand Resource

- The Qualified Capacity values are calculated based on the Summer Audit Value as of the 5th Business Day in October



I Have Not Reached Commercial Operation Yet...What is my Qualified MW?

- Resources that were classified New in a prior Forward Capacity Auction and received an obligation, will be classified as Existing Capacity Resources in subsequent FCAs
- Existing Resource Qualified Capacity will be based on capacity that cleared the FCA in which the resource was New
 - Note: Any portion of a resource that does not clear will be considered New, provided that a Show of Interest (SOI) form has been submitted, and all the requirements for New Resource Qualification are being met/have been met
- Non-Commercial Capacity is Subject to CPS Monitoring

Existing Capacity Resource Participation in Forward Capacity Market – Step 2

2. Market Information Server (MIS) report is posted out to all Existing Resource Participants

- This report informs the participant of the Qualified Capacity (MW) for each of their existing resources
- This report will also indicate if a resource has a Low Winter or Significant Decrease in Capacity Flag
- This report provides an opportunity to review calculation
 - Begins the Challenge Window

What is the Challenge Window?

- A set amount of time (five (5) business days) that the Participant can “challenge” the calculation of Qualified Capacity MW for their Existing Resources.
- Challenge Window Activities:
 - All resources have the ability to challenge their Qualified Capacity
 - Demand Resources can change their Resource Type
 - Demand Resources can submit an updated M&V plan
 - All Real-Time Demand Response and Real-Time Emergency Generation Demand Resources must submit an updated M&V plan that complies with the most recent DR Operable Capacity Analysis
 - Import Resources can submit their required documentation

Existing Capacity Resource Participation in Forward Capacity Market – Step 3

3. Five (5) business days after the Challenge Window closes, the ISO sends out a final MIS Report with the final qualified MW amount
 - This value is what will be entered into the relevant Capacity Commitment Period Forward Capacity Auction

Section Outline



How Do I Know What My Final Qualified Capacity Is?

- All this information is accessible in FCTS during certain periods of time.
- This information is also available in the Federal Energy Regulatory Commission(FERC)Informational Filing.
 - Made 90 days before the FCA
 - Contains all of the qualification information that will be submitted into the Forward Capacity Auction for the applicable Capacity Commitment Period.
 - Where can this be found?
 - [FERC Web site](#)
 - ISO Web site: [Markets > Other Markets Data > Forward Capacity Market > Filings and Orders](#)

Objectives of a Forward Capacity Market

Procure enough capacity to meet New England's forecasted Demand approximately three years in advance

Provide compensation for the capacity cost of a an existing Generation, Import or Demand Resource

Attract New Resources to constrained regions through an additional source of income

Implement a penalize-for-non-performance approach for not providing capacity during a shortage event

FCM – Design Parameters

Allow new proposed capacity projects to compete in the market and set price

Include new categories of resources beyond traditional supply resources

- Demand Resources including energy efficiency
- Intermittent Generation (e.g., Wind, Hydro, Solar)

Market objective is to buy enough capacity to meet New England's Net Installed Capacity Requirement (NICR)

Implement a shortage hour availability metric for performance to determine if capacity is delivered

Key Components of the Forward Capacity Market (FCM)

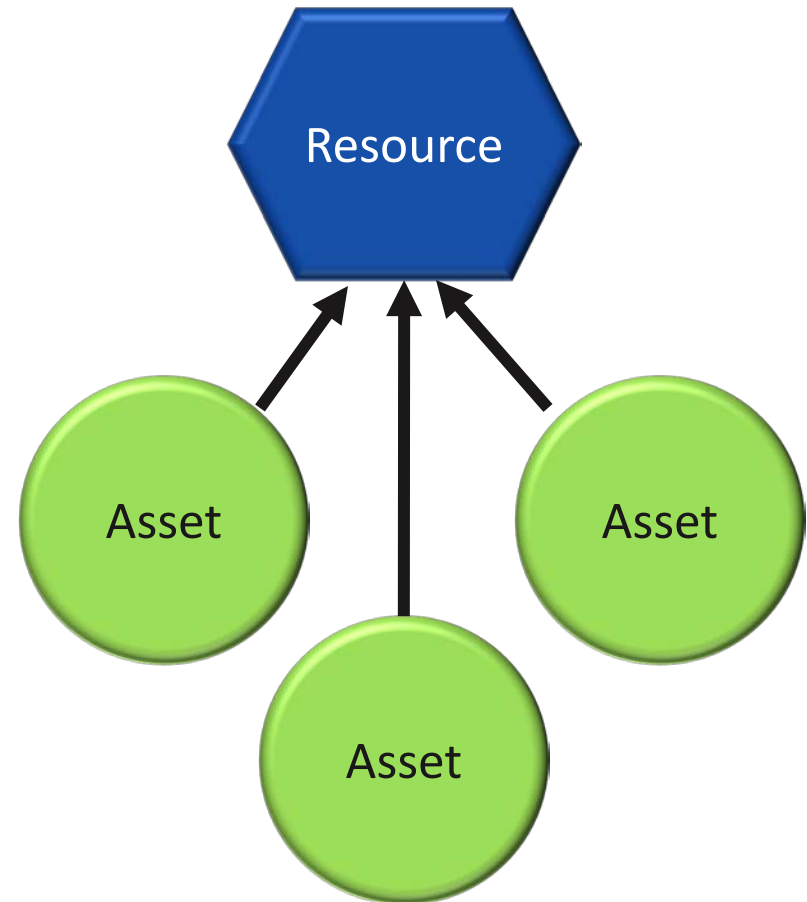




Resources vs. Assets

Assets Mapping to Resources

- One to many Assets map to each Resource
- Generator Assets participate in the Energy/Reserve/Regulation Markets
- Demand Assets are measured for Load Reductions
- Resources are the entities that Participate in the FCM
- Demand Resource Assets must map to Resources in the same location (Load Zone/Dispatch Zone)
- Generator Assets must map to Resource at the same station



Prior to Conducting the Auction



Capacity Zones are designated before the FCA

- Based on transfer limits expected to bind in the auction
- Import constrained zones
- Export constrained zones
- Rest of Pool

FCA begins with a single system-wide price

- Price separation only occurs if and when a transfer limit binds

Capacity Zone remains after the FCA only if price separation occurs

- Capacity Zones remain the same for the Reconfiguration Auctions



Forward Capacity Auction

Resources provide capacity and receive payment during Capacity Commitment Period, three years after auction

Outcome of the auction sets the initial CSO for Resources

Payments reduced by the following:

- Penalties for reduced real-time availability during most needed hours (Shortage Hours)
- Peak Energy Rents (PER) (revenues above a strike price)

Forward Capacity Auction

Bids & Offers

Bids

- Existing Resources have potential to set price **only** by submitting a De-list bid
 - All other Existing Resources are price takers

Offers

- New Capacity Offers – Quantity it wishes to offer into the market
- Selects Commitment Period of 1-5 years
 - Whole-year commitment
 - Auction price indexed for inflation after first year

Forward Capacity Auction

Imports & Exports

Imports

- Annual Commitment
- Existing Import Capacity
- New Import Capacity

Exports

- Annual Commitment
- Multi – Year Exports
 - Administrative Export De-list
- Treated as a de-list bid

Installed Capacity Requirement

- **ICR – Installed Capacity Requirement**

The ISO shall determine the Installed Capacity Requirement such that the probability of disconnecting non-interruptible customers due to resource deficiency, on the average, will be no more than once in ten years. Compliance with this resource adequacy planning criterion shall be evaluated probabilistically, such that the Loss of Load Expectation (“LOLE”) of disconnecting non-interruptible customers due to resource deficiencies shall be no more than 0.1 day each year. The forecast Installed Capacity Requirement shall meet this resource adequacy planning criterion each Capability Year.

MR III.12.1

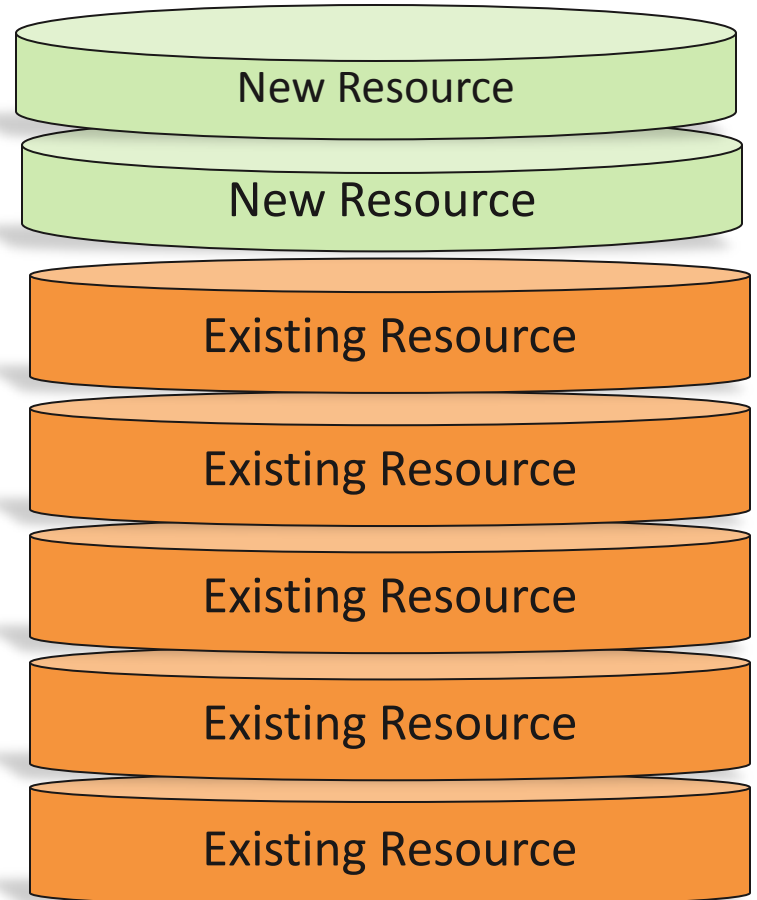
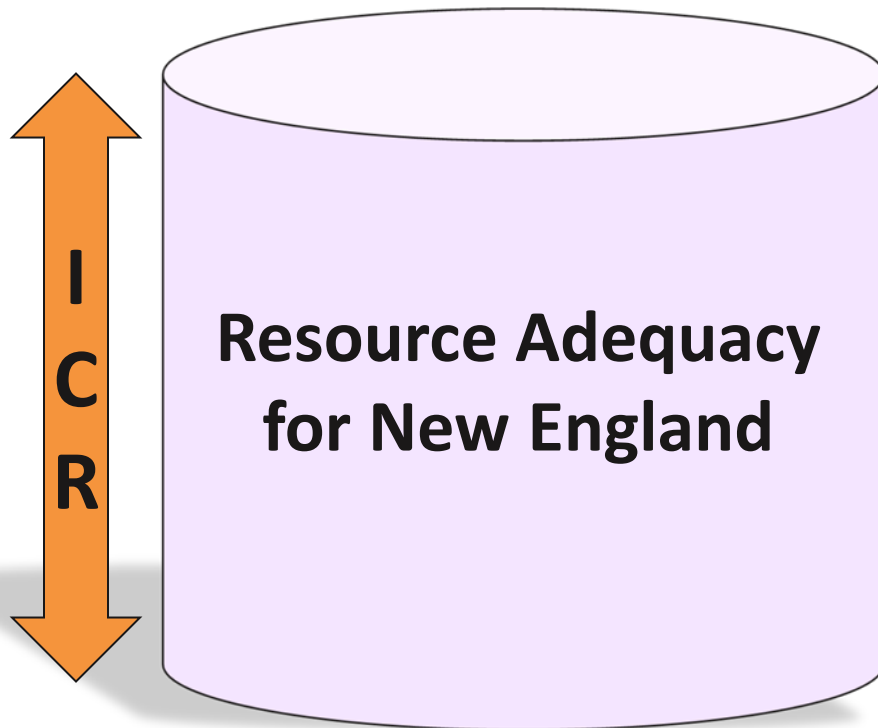
Installed Capacity Requirement (cont.)

- Net Installed Capacity Requirement (NICR)
 - $NICR = ICR - HQICC$
 - $HQICC = \text{Hydro-Quebec Interconnection Credit}$
 - The tie benefits from the Quebec Control Area over the HQ Phase I/II HVDC-TF calculated in accordance with Section III.12.9.1 shall be allocated to the Interconnection Rights Holders or their designees in proportion to their respective percentage shares of the HQ Phase I and the HQ Phase II facilities, in accordance with Section I of the Transmission, Markets and Services Tariff (MR III.12.9.2)
- FCA purchases the NICR
 - Customers with HQICC credits will use those credits to meet that portion of the ICR

How Does the Forward Capacity Auction Work?

During the Auction
Existing Resources can "Bid" into the
bucket

During the Auction
New Resources must "Offer" into the bucket



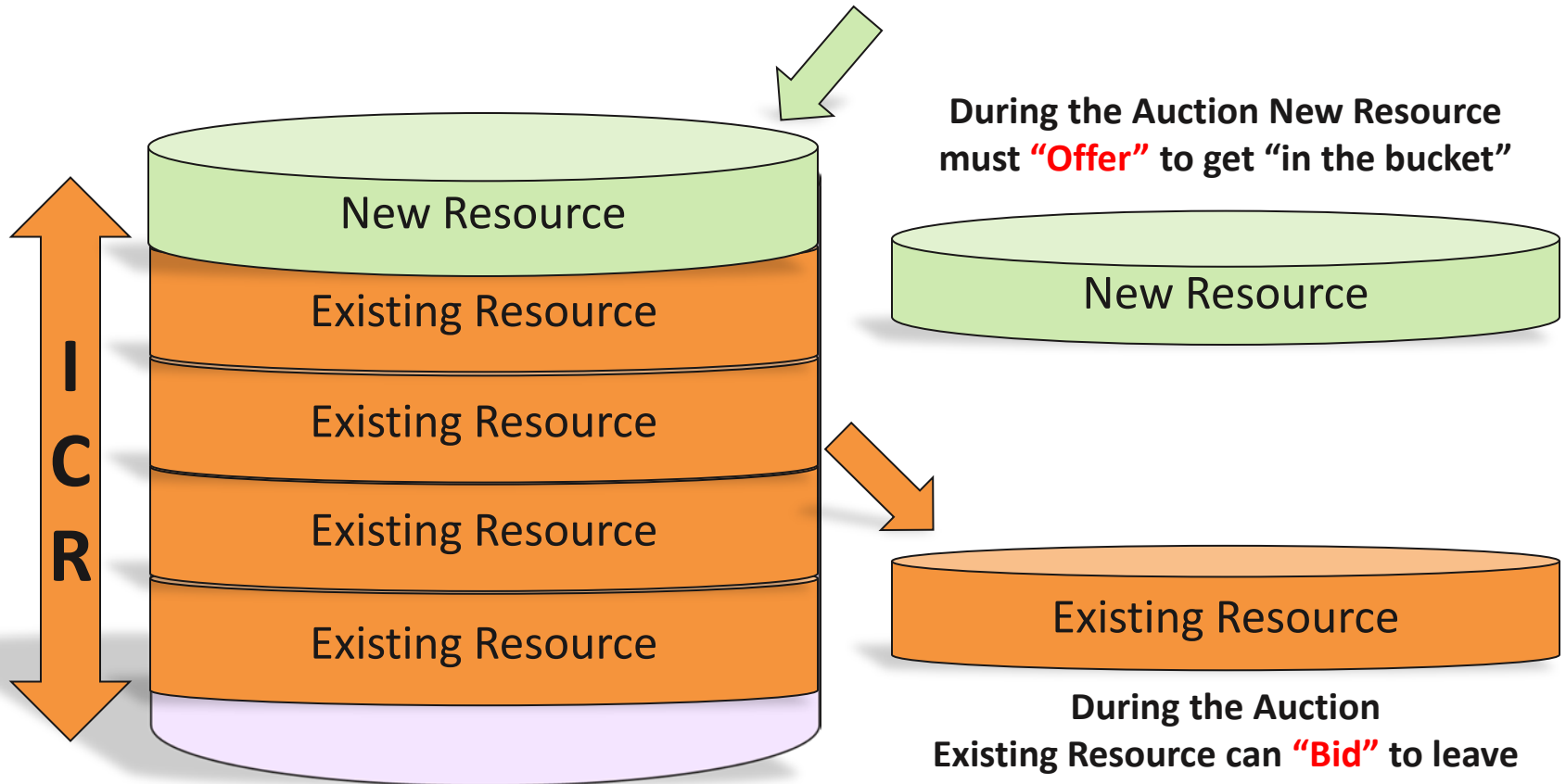
The Auction finishes when the bucket is full (not overflowing)

How Does the Forward Capacity Auction Work?

During Qualification
Existing Resources are put "in the bucket"

During Qualification
New Resources are created

During the Auction New Resource
must "Offer" to get "in the bucket"



During the Auction
Existing Resource can "Bid" to leave

The Auction finishes when the bucket is full (not overflowing)

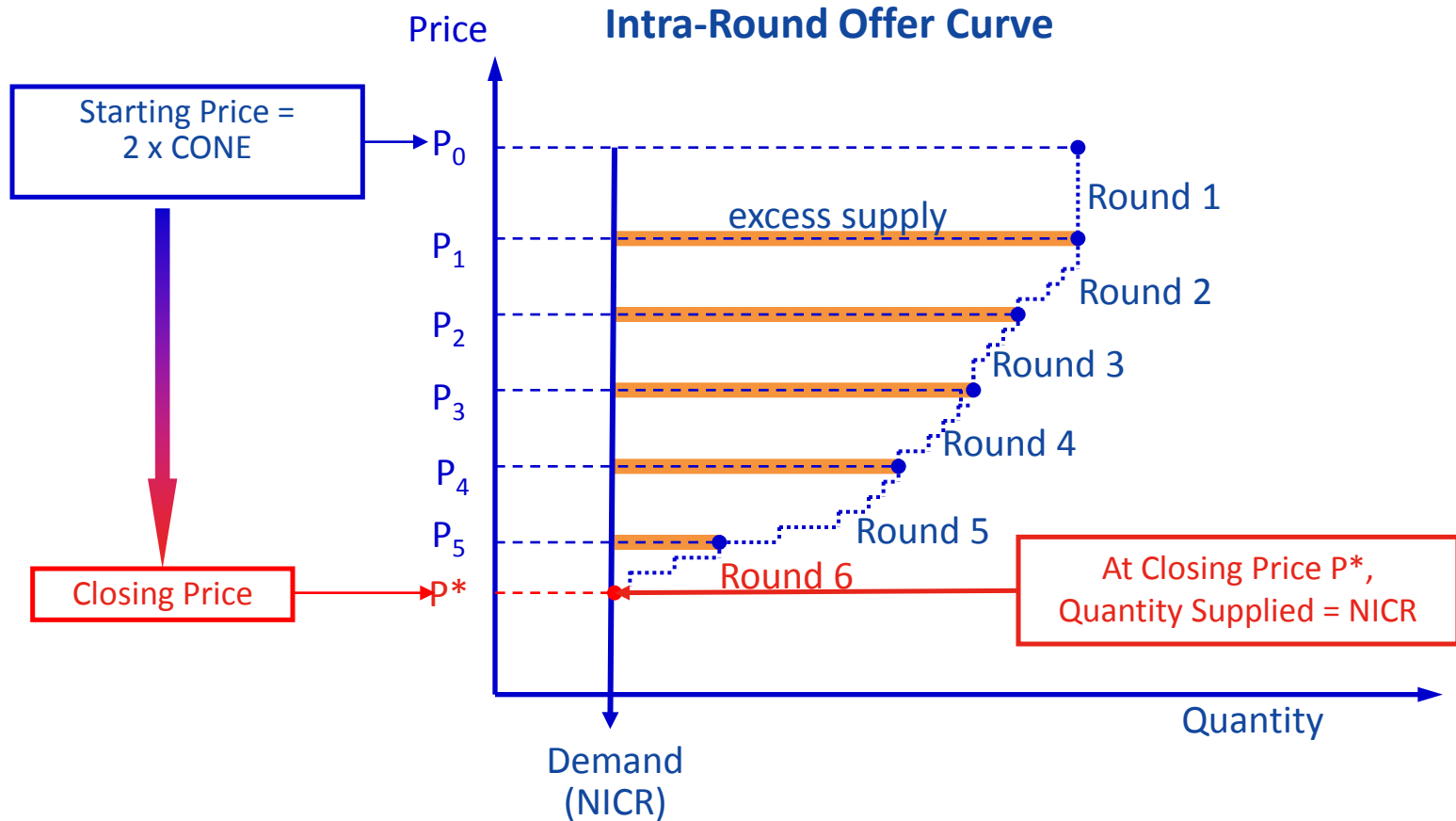
Simple Concepts

- Existing Resource MWs
(Resources that cleared in any previous FCA)
 - Auction – Take no action – they will clear
 - Auction – De-list (many forms) – they will not clear
- New Resource MWs (Resources or MW of a Resource that have not cleared in any previous FCA)
 - Auction – Offer at prices below the FCA clearing price – they will clear
 - Auction – Offer at prices above the FCA clearing price – they will not clear
- SIMPLE RULE
 - NEW MUST OFFER
 - EXISTING CAN BID

Simplified Basic Concept of the Descending Clock Auction

- At a high price you will find more than enough Resources to meet the Capacity Requirements of the System and local Capacity Zones
- During the process, the prices will drop
- As prices drop, some Resources will remove themselves from the auction based upon the Revenue they believe they need from the Capacity Market to make their Resource profitable
- Prices continue to drop until the point at which lowering the price further would cause the Supply to no longer meet the Capacity Requirements

Descending Clock Auction Mechanics



Descending Clock Auction: Basic Example

Assumptions: (CONE = \$5)

Installed Capacity Requirement (ICR)	30,000 MW
Existing Capability	29,000 MW
New Resources needed to meet ICR	1,000 MW
Participating New Capacity	4,000 MW

Round	Start of Round Price (\$/kW-MO)	End of Round Price (\$/kW-MO)	End-of-Round Resource Offers (MW)	Excess Capacity (MW)
1	\$10.00	\$ 8.00	33,000	3,000
2	\$ 7.99	\$ 6.00	32,500	2,500
3	\$ 5.99	\$ 5.00	32,000	2,000
4	\$ 4.99	\$ 4.00	31,000	1,000
5	\$ 3.99	\$ 3.50	30,750	750
6	\$ 3.49	\$ 3.00	29,800	-200
FINAL		\$ 3.10	30,000	0

Meeting the Capacity Supply Obligations

What does an “Obligation” mean?

During the CCP, Resource must meet the CSO or face penalties

Generally penalties will not expose Resources to net losses over the CCP

- No guarantees

Measurement of available and when it is measured is different per Resource type:

- Generator
- Import
- Demand Resource
- Real-Time Emergency Generator
- Intermittent Generator

Meeting the obligation means being available

Forward Capacity Reconfiguration Auctions

To be held on an annual and monthly basis for each Capacity Commitment Period.

Reconfiguration Auctions, which occur after the FCA, enable trading of CSO between Supply Resources

- Take on more Obligations (Offer)
- Try to shed Obligations (Bid)

Rebalancing total CSO to new forecasts of Net Installed Capacity Requirement (NICR) as time gets closer to CCP

- Can sell of excess in the last annual (ARA3)
- Can purchase to make up shortfalls in any annual auction

Forward Capacity Supply Obligation Bilaterals

- Bilaterals which are allowed before or after Reconfiguration Auctions, enable trading of CSO between Supply Resources
 - Transferring Resource shed Obligations
 - Acquiring Resource takes on Obligations
- Allows prices to be submitted with these transactions to facilitate basic financial arrangements, if desired.

FCM Settlements – Supply Credits

Every action that creates or changes the CSO of a Resource effectively creates a new “line item” in the settlement of Resources

Resources get paid (or charged) after the CCP month based on the net of all of the activities (FCA, Reconfiguration Auctions, Bilaterals, Penalties)

All Resource payments (or charges) get credited to the Lead Participant of the Resource

Generators can get relief from penalties during Shortage Events via a Supplemental Bilaterals

