Wholesale Markets Are Evolving to Support New England's Clean Energy Transition: Potential Pathways and Implications for Resource Adequacy

Future Power Markets Forum: A Project of the Columbia University SIPA Center on Global Energy Policy and the Johns Hopkins University Whiting School of Engineering

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We Are Supporting the Clean Energy Transition in Partnership with the New England States and Regional Stakeholders

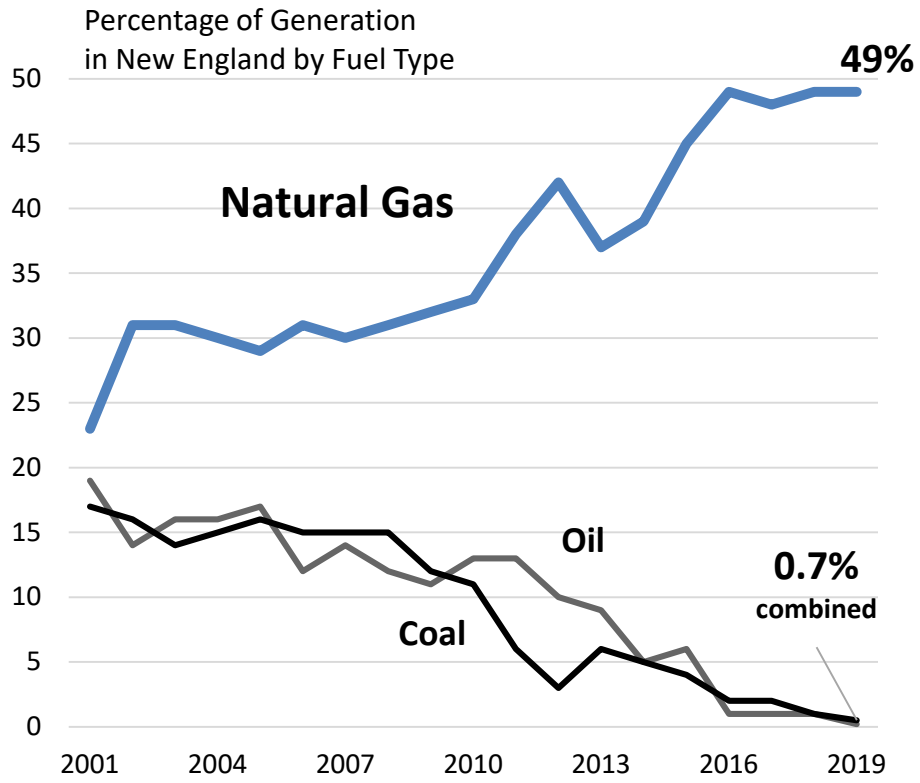
- New England is **navigating** the **clean energy transition** and currently **evaluating** the implications of various **pathways** for the region's wholesale electricity markets
- The primary challenge is that **federal and state** energy and environmental **objectives are not aligned**
  - Efficiency and resource neutrality are prioritized in the wholesale electricity markets while state legislatures are requiring clean energy and decarbonization

Setting the Stage

A look at some key trends, policy drivers, and development activity in the region

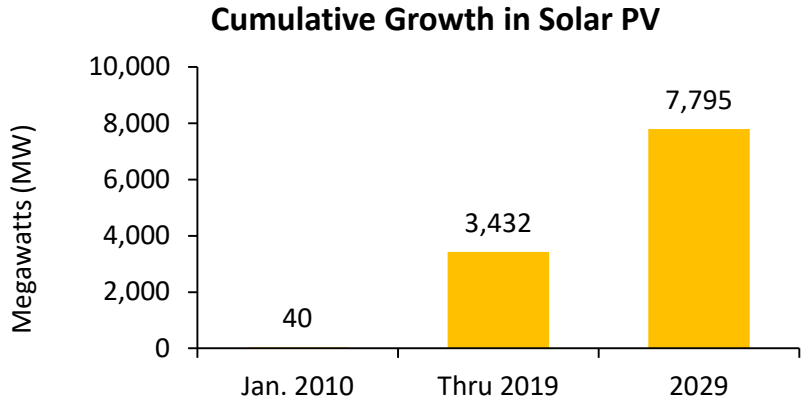
New England's Energy Mix Is Changing Dramatically

Gas has displaced oil and coal for electric generation …



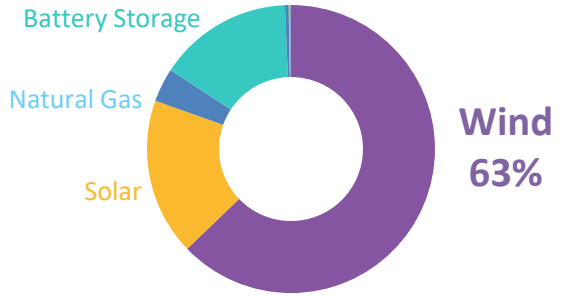
***Source**: ISO-NE Net Energy and Peak Load by Source Electric generation within New England; excludes imports and behind-the-meter (BTM) resources, such as BTM solar.*

… as *solar* grows rapidly …



***Source**: Final 2020 PV Forecast; MW values are AC nameplate*

… and *wind* dominates the queue



***Source**: ISO-NE Generator Interconnection Queue (January 2021)*

State Policymakers Have Aggressive Goals to Reduce GHG Emissions and Increase Renewable and Clean Energy

	Renewable Portfolio/Energy Standard in 2040	Mandatory Greenhouse Gas (GHG) Reductions by 2050	Other Long-term Renewable Energy, Clean Energy, and Zero-Carbon Goals
VT	75.0%	80%	**90% of total energy from renewables by 2050** (Comprehensive Energy Plan)
ME	50.0%	80%	**RPS**: **100% renewable energy by 2050** (statute)
MA	45.0%	80%	**Clean energy standard**: **80% by 2050** (regulation)
CT	40.0%	80%	**100% zero-carbon electric supply by 2040** (Governor Lamont Administration goal)
RI	36.5%	80%	**100% renewable energy by 2030** (Governor Raimondo Administration goal)
NH	15.7%	-	

Notes: Renewable Portfolio Standard percentages include Class I or new renewable energy. Vermont adopted a Renewable Energy Standard. The renewable resources eligible to meet these standards vary by state. MA, RI, ME, and VT seek GHG reductions from 1990 baseline; CT from 2001.

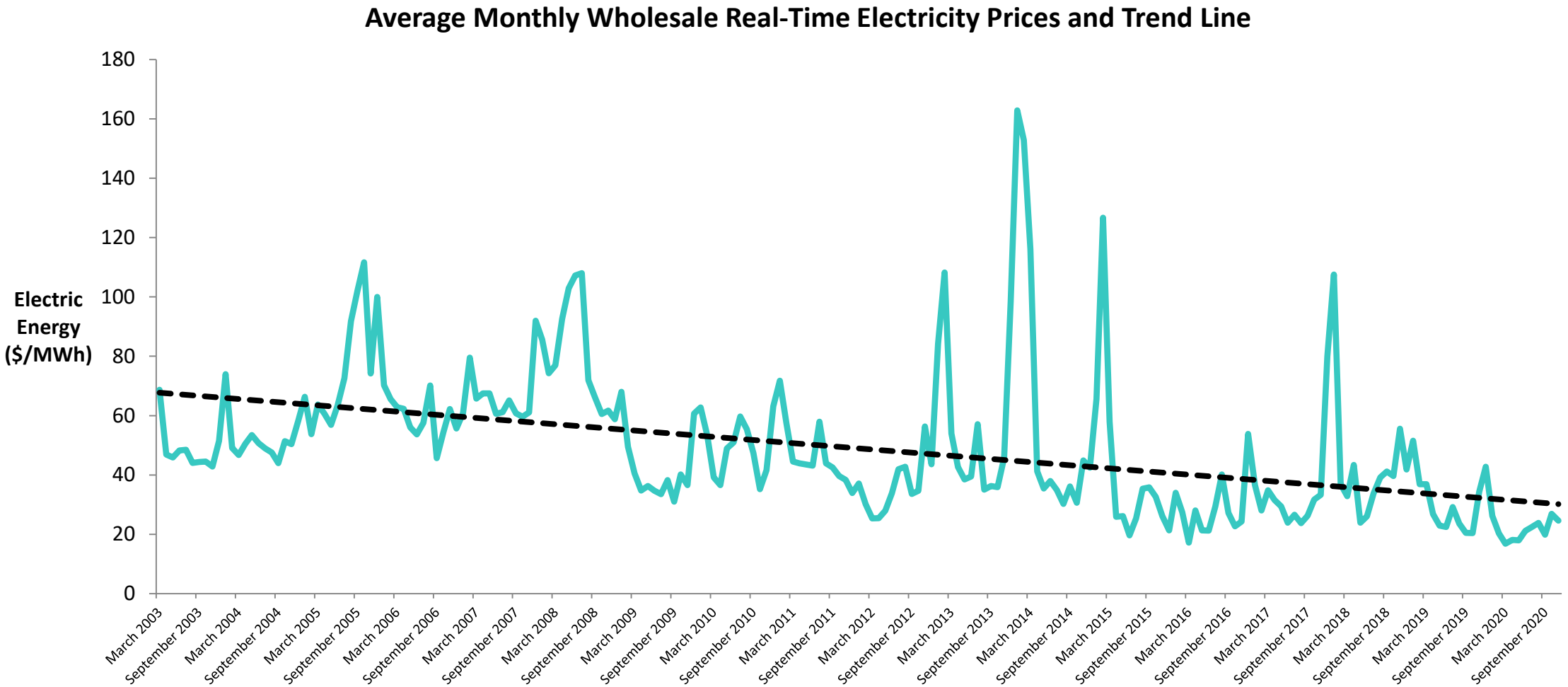
Developers Are Proposing Large-Scale Transmission Projects to Deliver Clean Energy to Load Centers

- Developers are proposing roughly **nine** elective transmission upgrades (ETUs) to help deliver about **3,400 MW** of clean energy to New England load centers
- Wind projects make up roughly **63%** of new resource proposals in the ISO Queue
  - Most are offshore wind proposals in southern New England, but some are onshore wind proposals in northern New England and **would require transmission** to deliver the energy to load centers

Source: ISO Interconnection Queue (January 2021)

Wholesale Electricity Prices Have Been Declining

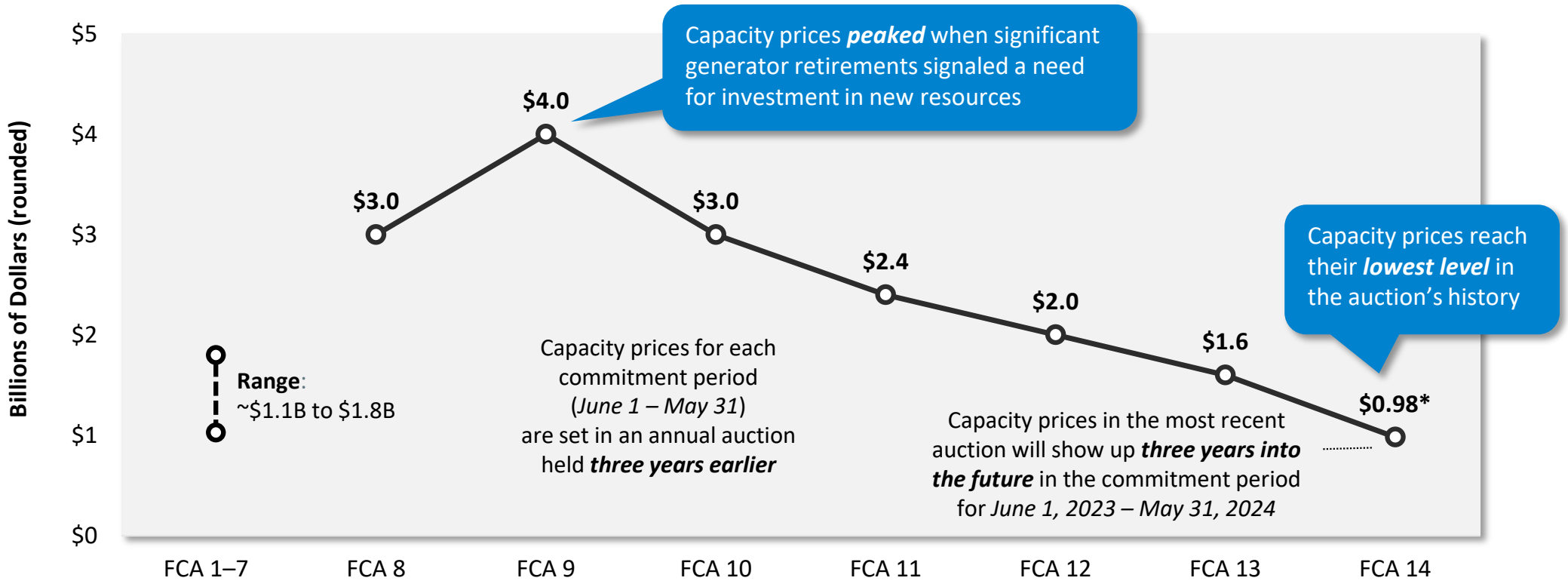
Volatility persists in extreme cold winter periods



Capacity Market Prices Have Been Declining

Costs reflect changing supply conditions

Total Capacity Market Costs



*Preliminary estimate

Striking a Balance Between Two Objectives

The reliability, efficiency, and resource-neutrality valued in FERC-jurisdictional wholesale markets and *the clean energy and decarbonization objectives valued by the New England States*

Wholesale Electricity Markets Have Achieved What They Were Designed to Do

- Competition has driven **efficiencies and innovation**
  - The resource mix has shifted to more efficient generation technologies
  - Average annual wholesale energy prices have declined steadily for many years (except during extreme cold weather), and hit record lows in the past few years
  - Capacity prices have declined steadily and hit a record low in the 2020 auction
- The **risk of bad resource investment decisions** has shifted away from ratepayers
- In addition, **significant environmental benefits** have been achieved in the form of substantially lower generator emissions

States Are Now Advocating to Extend the Markets Beyond the Original Objectives, i.e., to also fully Decarbonize the Power System

- In 2020, the New England States adopted a **Vision** for a **Clean Energy Future**:
  - In addition to goals related to transmission planning and governance, their Vision seeks to align regional competitive markets with their decarbonization goals
- The FERC-jurisdictional wholesale markets, however, were designed to value efficiency, resource-neutrality, and procure required reliability services at least cost
  - The capacity market design seeks to ensure that prices reflect the true cost of providing the required reliability service
  - Ensuring proper price formation requires accounting for out-of-market revenues via the minimum offer price rule (MOPR); however this may lead to other inefficiencies (e.g., excess supply)
  - The States and other stakeholders would like to end the mitigation of renewables' out-of-market revenues as a means of eliminating the concern over excess supply

Resolving the Conflict While Achieving Resource Adequacy Is the Thorniest Market-Design Issue Facing New England

- Ending mitigation of out-of-market revenues via the MOPR would suppress prices and potentially jeopardize cost recovery for the resources that are needed to operate the grid reliably today, and into the future
- The ISO supports "*net* carbon pricing" in the wholesale market
  - Including a mechanism to direct the incremental market revenues from carbon-emitting resources back to wholesale load
- Absent meaningful carbon pricing, the region will not be able to easily address both the *reliability* and *decarbonization* objectives within the wholesale market structure
- ***Are there alternative solutions to achieving both reliability and decarbonization through a wholesale market?***

Navigating the Clean Energy Transition

What is the evolutionary path for New England's wholesale market design, given the New England States' preferences and federal/state regulatory constraints?

ISO New England's Vision

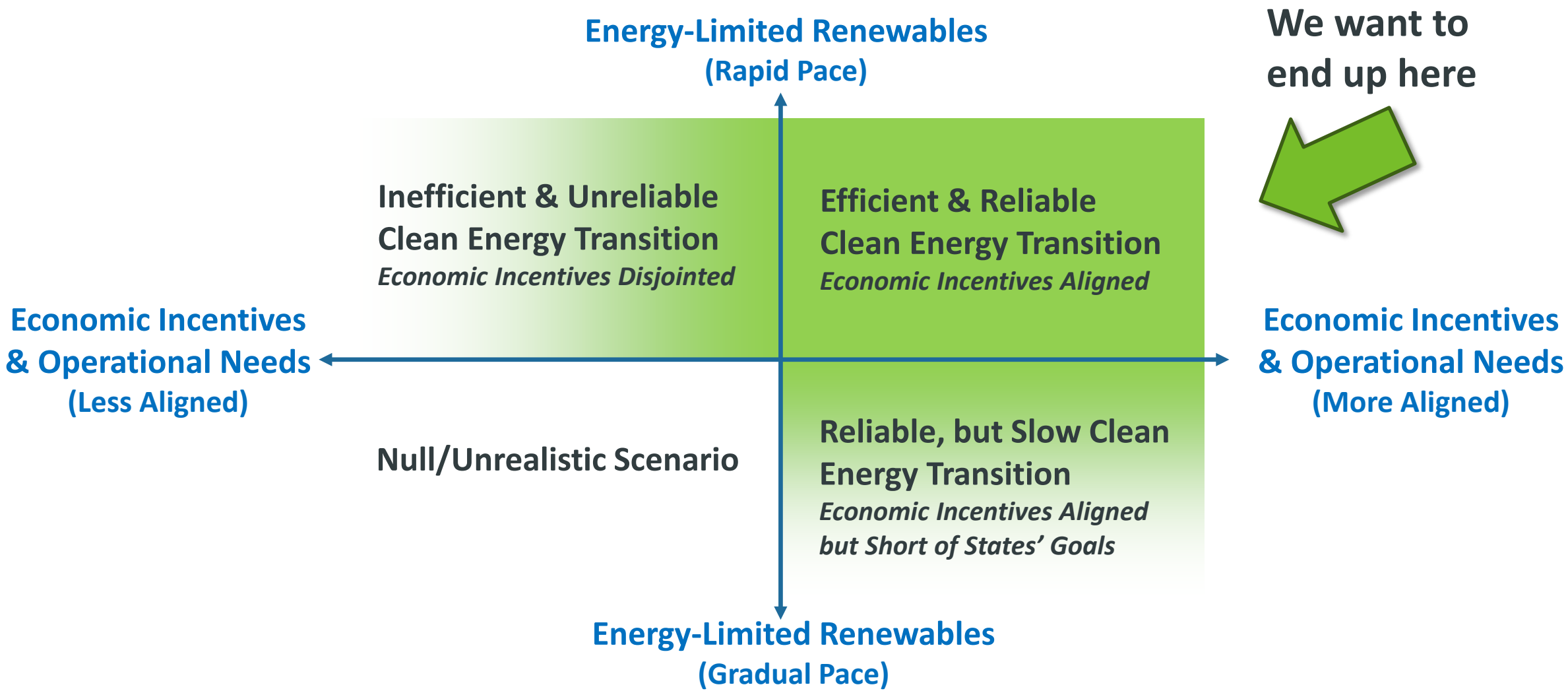
The ISO's Vision for the future represents our long-term intent and guides the formulation of our Strategic Goals

Vision Statement:

To harness the power of competition and advanced technologies to reliably plan and operate the grid as the region transitions to clean energy

How does the ISO think about the future trajectory of the wholesale electricity markets?

Renewables Are Expected to Grow, but the Success of the Transition Will Depend on How the Region Manages Two Critical Uncertainties



The Clean Energy Transition Will Depend on Two Types of Resources

- **Variable, renewable energy resources** will eventually become the new "baseload" resources and produce most of the electrical energy
- **Balancing resources** will be necessary to "fill in" the energy gaps, which may last from seconds to weeks. Balancing resources in New England are merchant facilities (non-utility, non-state-sponsored) and wholly dependent on wholesale market prices

This "hybrid" compensation structure has introduced market design tensions and raised the question of how to maintain "Resource Adequacy," and, more precisely, "Energy Adequacy" in a renewable-intensive power system

Ancillary Services Will Expand to Support the Clean Energy Transition

Challenges: Energy security constraints, emission restrictions and rapid growth in energy-limited, and/or inverter-based resources create new contingency scenarios and greater operational uncertainty

Principles: The ISO is committed to market-based solutions, guided by its core market design principles

Priorities: Ensure that the ISO has adequate tools for managing operational uncertainty, including requiring that all products necessary to maintain reliability are priced

- Specify services and quantities in accordance with dynamic needs and risks
- Sound price formation in the markets; services should cover most, but not all, risks, and prices should result from bids that reflect the marginal cost of providing the service (as opposed to assuming that “unloaded nameplate capacity” has the energy to back the call)

Resource Adequacy Models Generally Fall into One of Three Categories

1. **Traditional, Regulated Utility Model**

   Regulated utility develops Integrated Resource Plan and state regulators authorize cost recovery; consumers bear risks of cost overruns and poor resource selection decisions (Central planning approach and precursor to electric industry restructuring in the late 1990s)

2. **Combined Model**

   A different form of IRP, combined with regional energy markets. States oversee and approve cost recovery for electric distribution company (EDC) and/or load serving entity (LSE) resource portfolios. Some merchant resources participate under a combination of market revenues and out-of-market contracts. Resource adequacy is essentially under state control. Environmental policy objectives are achieved state by state

3. **Market-Based Mechanism**

   An explicit regional (or statewide) mechanism for valuing resource adequacy. Use either forward auctions to establish a clearing price for capacity or establish a high scarcity price in the energy market. Capacity auctions seek a target reserve margin and the 'Energy-Only' market accepts a variable reserve margin. Carbon reduction objective is achieved by including a price on carbon in fuel costs/production cost

What Are the Cost Recovery and Risk Implications of Existing Models?

	1 **Trad., Reg. Utility Model** (Customers Bear Most Risk)	2 **Combined Model** (Customers Bear Most Risk)	3 **Market-Based Mechanism** (Suppliers Bear Most Risk)	
	Regulated Utilities ensure RA and optimize energy production via economic dispatch	**Utilities/LSEs ensure RA and fuel infr.; Energy Market optimizes energy production**	**Energy, Capacity, Ancillary Mkts ensure reliability**	**Energy and Ancillary Mkts, RA through very high spot price**
ISO/RTO, or Region	WECC (except CA) and SERC regions	California, MISO, SPP	ISO-NE, PJM, NYISO	ERCOT
Reserve Margin Requirement?	Yes (Utility IRP, State regulated)	Yes (Utility/LSE IRP enabled, State regulated; CAISO utilizes cost of service reliability contracts to cover gaps)	Yes (FERC regulated)	No, variable (State sets the scarcity price)
Capital Cost Recovery?	Traditional Cost-of-Service Rate Recovery	State approved cost recovery, net of Energy Market	Energy and Capacity Markets	Energy Market
			3a	3b

Which Resource Adequacy Model Would Most Efficiently and Reliably Support the Clean Energy Transition in New England?

1. **States Take Responsibility for Resource Adequacy and Accept Investment Risk:** Implement centralized, regional, integrated resource planning (IRP) through some form of multi-state compact and a regional planning/procurement agency to select/finance the resource mix

2. States direct Electric Distribution Companies to assure Resource Adequacy through contracts with all required resources (i.e., a version of the California model)

3a. **Achieve Resource Adequacy through a Market Construct:** Maintain the capacity market and consider options for pricing the environmental objective through the wholesale electricity markets

3b. Eliminate the capacity market and rely on Energy and Ancillary Services (EAS) only, relying on the States to achieve the environmental objective by some other means

- Responsibility for resource adequacy could be shifted to load-serving entities (LSEs)
- Who decides the appropriate scarcity price (FERC or States)?
- Reserve Margin is highly variable and derived from the scarcity price and market expectations

Regional Stakeholders Have Been Exploring Potential Solutions

- NEPOOL stakeholders have identified several potential Pathways for addressing resource adequacy in combination with clean energy procurement
  (*See* Dr. Frank Felder's Jan. 2021 report)
  - Key questions/design tradeoffs remain unaddressed
  - There does not seem to be much support for the risk/volatility of the Texas/ERCOT model
  - There is strong support for evaluating whether the states' clean energy objectives can be attained through the wholesale market
  - Consequently, the ISO board has directed management to evaluate both net carbon pricing and a forward clean energy market
- Our working assumption is that regional resource adequacy will continue to be addressed through a regional market as the New England States have not asserted an interest in assuming this responsibility
- Any future Pathway must clearly define responsibility for resource adequacy

How Will New England Balance Competing Objectives?

- It is unclear how FERC wants to balance the attainment of resource adequacy and the environmental objective in the Northeast markets
  - The states cannot be forced to take responsibility for resource adequacy (e.g., the MISO/SPP/CAISO models), or to make the state regulatory changes required to make the Texas/ERCOT model work
- At this point in time, it seems that the region seeks an evolutionary path that better accommodates and supports state decarbonization objectives

What Pathway will the region choose?

*We look forward to working with the New England States and stakeholders to choose a preferred **Pathway** to the region's Clean Energy Future*

Photo provided by Trace Meek