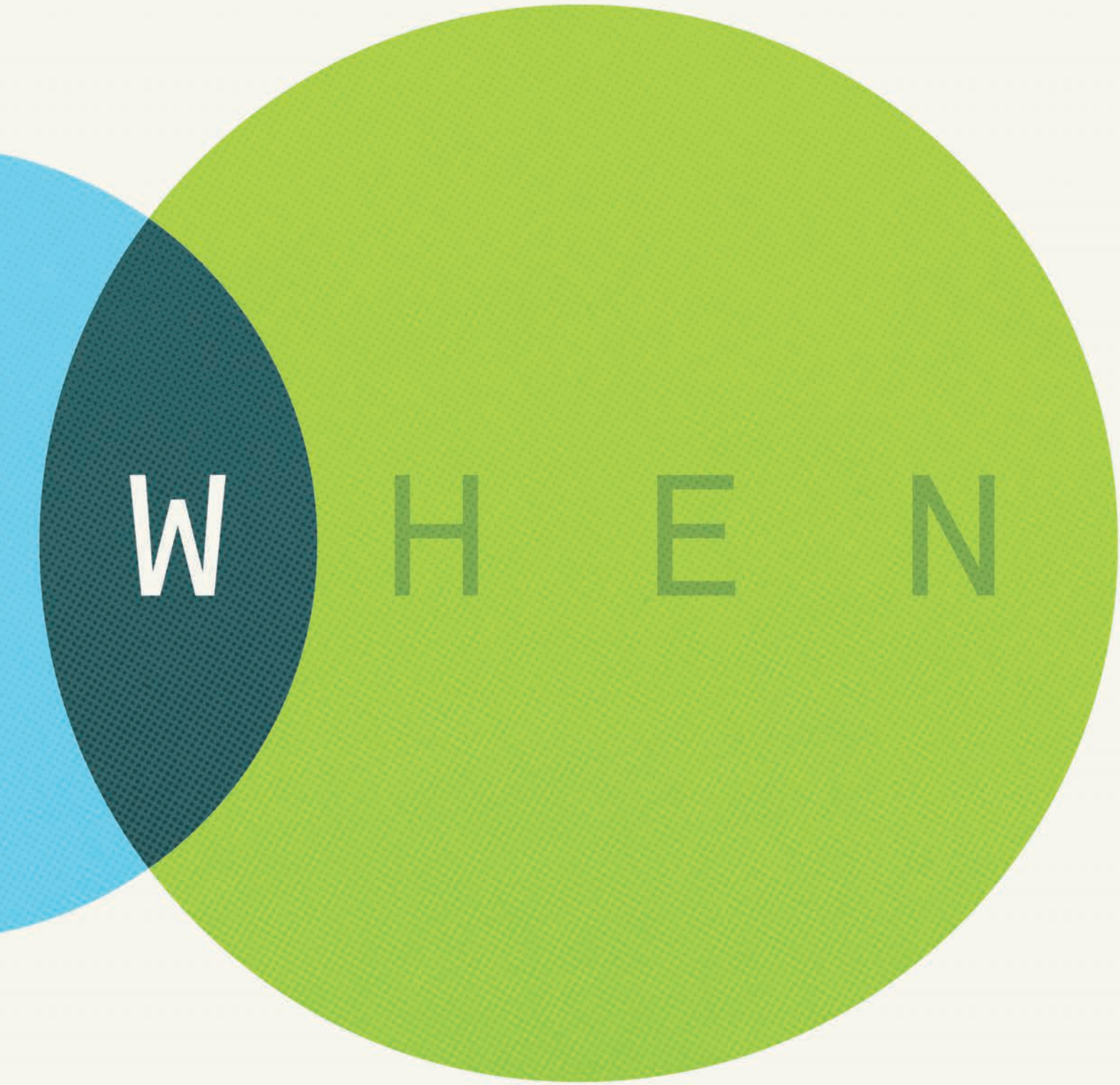
The Power of Change

ISO new england

2021 Regional Electricity Outlook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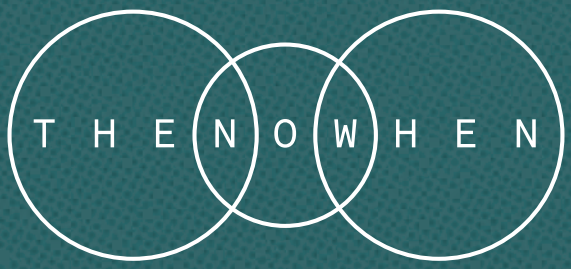

New England's electricity industry is always moving forward. The 2021 *Regional Electricity Outlook* (REO) follows a "Then – Now – When" chronology, presenting an overview of this momentum, which began in the mid-1990s when industry and policymakers sought to restructure the region's wholesale electricity sector and created ISO New England. A unique partnership emerged, propelling change and moving the industry from THEN to NOW. WHEN we reach our clean energy future, it will be the tangible result of this collaboration and commitment among the ISO and its stakeholders in achieving a clean, reliable, and cost-effective power system for New England.

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OUR MISSION

Through collaboration and innovation, ISO New England plans the transmission system, administers the region's wholesale markets, and operates the power system to ensure reliable and competitively priced wholesale electricity.

ABOUT THIS REPORT

ISO New England's unique role gives it an objective, bird's-eye view of trends that could affect the region's power system. The *Regional Electricity Outlook* is one of the many ways the ISO keeps stakeholders informed about the current state of the grid, issues affecting its future, and ISO initiatives to ensure a modern, reliable power system for New England. Please also see our Annual Work Plan at www.iso-ne.com/work-plan for information on the ISO's major projects for the year to improve our services and performance.

FROM THE BOARD CHAIR AND CEO

Kathleen Abernathy
Board Chair

Gordon van Welie
President and
Chief Executive Officer

The Power of Change

This past year starkly reminded us that we don't always know what the future will hold. Yet being nimble and ready to respond to unanticipated obstacles is an inherent responsibility of managing a reliable power system. Natural disasters, energy supply shortages, cyberattacks, and yes, pandemics, are the types of threats that can trigger unprecedented challenges. That's why ISO New England regularly tests its business continuity plans and works with its stakeholders to continuously improve market designs and system planning. But little did we know just how much we would be tested when the Coronavirus (COVID-19) pandemic upended all our lives.

When the severity of COVID-19 became evident in March 2020, we moved the majority of ISO staff to a remote work environment. The ISO's IT experts immediately stepped up to the challenge by assisting our employees as they established home "offices." Those employees who were required to remain onsite, including control room operators, and staff from IT, Facilities, and Finance, went above and beyond to keep the ISO's business operational and the region's electricity flowing.

Ingrained in the ISO New England workforce culture is the importance of a reliable power system. This took on added importance during COVID when our digital connections—the online classroom, telehealth appointment, and family 'Zoom' meeting—became vital links to coworkers, friends and family. As the lock down and social distancing mandates continue into 2021, every employee remains focused on successfully implementing our pandemic response plan for the health and security of the region.

The actions by our dedicated staff have enabled us to fulfill our obligations and meet the electricity needs of the region, while continuing the important work of planning for the future. But we realize we were not alone in meeting these challenges: COVID-19 affected every workplace, every industry, and every home in the region. And it took a collective effort to navigate through a year defined by uncertainty.

Our industry collaborations with the New England Power Pool (NEPOOL), state public utility commissioners and staff, and representatives of the New England States Committee on Electricity (NESCOE) continued through this new virtual realm. Meeting remotely didn't deter progress and discussions of how the region will transition to a clean energy future. Ongoing cooperation built on our strong history of partnership will help us find the right path forward in this era of profound change. Collaboration will be even more essential as we implement a shared vision for the regional power system.

As recent events in California, Texas, and parts of the South and Midwest demonstrate, climate change will continue to challenge all of us and result in extreme weather that will threaten power system reliability. These events have also shown that our historical assumptions about resource performance and energy adequacy are no longer sufficient to ensure system reliability—so we need to plan and prepare. It is vital that we work together as a region to maintain a sound energy foundation throughout the clean energy transition. We will need robust wholesale markets, regulatory standards, and energy supply infrastructure to meet the future climate change challenges.

This year's *Regional Electricity Outlook* (REO), with its Then/Now/When outline, lays the groundwork for us to appreciate the region's progress over the course of the past three decades, so we can better understand the path ahead. Getting to our clean energy future won't be easy, but our changing climate won't wait; the time is now to set the region on the right course and ensure that as our economy is decarbonized, it is supported by a reliable, cost-effective, and clean energy grid.

ISO New England is proud of the strong foundation that has been built from THEN to NOW. We're committed to partnering with the New England states and stakeholders, as well as delivering the expertise to solve the pressing challenges facing the region. We also fully recognize that WHEN the region achieves its clean energy goals, it will be the result of leveraging and maximizing the strengths of a region, and responding to the power of change.

Kathleen Abernathy
Board Chair

Gordon van Welie
President and Chief Executive Officer

"Getting to our clean energy future won't be easy, but our changing climate won't wait; **the time is now** to set the region on the right course and ensure that as our economy is decarbonized, it is supported by a reliable, cost-effective, and clean energy grid."

OUR TIMELINE

The past is prologue, as the saying goes. Our timeline travels through major ISO and industry highlights from the past 30 years, bringing us to today's vantage point of looking forward—and working toward—the region's clean energy future.

1990s

A Decade of Policy Changes

1992-1996

Electricity industry is restructured through federal legislation (1992), federal rulemaking (1995-96), and state-level legislation; these policy changes open the industry, its resources and infrastructure, to more competition

1997

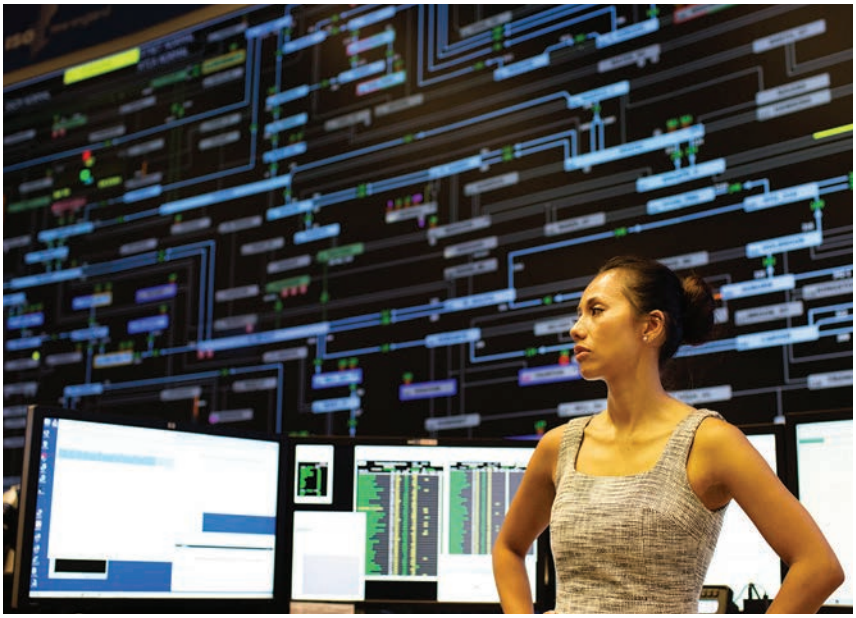
ISO New England is created by industry and state officials to run the region's power grid and establish wholesale markets. The structure is regulated by the Federal Energy Regulatory Commission (FERC)

1999:

New England's first competitive marketplace for wholesale power is launched

By the End of the Decade:

Industry restructuring is underway and a regional wholesale electricity market has been established



2000s

Building the Foundation for Market Competition and Power Grid Reliability

2001:

ISO issues the first comprehensive transmission system planning report for New England, *2001 Regional Transmission Expansion Plan*

Demand response program is launched to offer additional load management flexibility

2003:

First major *responsive market design* introduces locational pricing to eight New England grid zones

2008:

Forward capacity market is launched to ensure supply keeps pace with demand and includes energy efficiency and demand response for the first time

By the End of the Decade:

- **Increased competition:** 60 generating projects, mostly quick-start, lower emission natural gas, were interconnected to the regional system, increasing capacity by 10,800 MW
- **Enhanced reliability and efficiency:** Seven major 345 kilovolt (kV) transmission upgrades; overall, 341 projects were completed, representing $4.3 billion in infrastructure investment
- CO_2, NO_x, and SO_2 decrease regionally

2010s

The ISO Prepares for a Reliable Clean Energy Integration

2010:

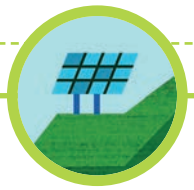
Wind: ISO completes the first major study of New England's wind resources

2012:

Energy efficiency (EE): The first multi-state, long-term EE forecast is finalized and introduced into forecasting and capacity market

2013:

A bitter winter cold snap reveals the region's fuel delivery and energy security challenges; a winter reliability program was established for 2014–2018 to keep our power grid reliable during periods of fuel insecurity

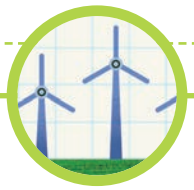


2014:

Solar: The first, multi-state, behind-the-meter (BTM) solar forecast is developed

2015:

Wind: Improved study process to ease grid interconnection for wind resources



Responsive Market Design enhancements: New rules introduced so that **renewable** resources can participate in capacity and energy markets

2017:

Designed to signal the best locations for future **renewable** investments, a marginal reliability impact-based system and zonal demand curves were introduced into capacity market; Real-time, fast-start pricing is improved for **balancing resources** that can ramp up and down quickly when solar resources go off and on

2018:

Full integration of demand resources into all markets, an efficient **balancing resource**

2019:

Renewable resources: the first substitution auction is conducted to ease the entry of clean, state-sponsored resources and the exit of older, less efficient generating resources

Energy storage: energy storage can more easily participate in multiple wholesale markets, showcasing their charging and discharging abilities

By the End of the Decade:

- Emissions continue to trend downward: NO_x down >78%, SO_2 down >99%, CO_2 down 42%
- Sizeable amounts of clean energy resources added to the regional mix: **EE:** 2,900 MW; **Solar:** 3,500 MW (mostly distributed); **Wind:** 1,400 MW, including the nation's first off-shore installation
- 804 transmission projects totaling a $10.9 billion reliability investment are completed, facilitating retirement of older fossil fuel resources and preparing for the delivery of additional **clean energy**
- 6,000 MW of **off-shore wind potential:** studies reveal this amount can interconnect to the current power system configuration without additional grid upgrades
- Several New England states conduct RFPs and award long-term contracts for **clean and renewable resources**; proposals for renewable resources now outpace natural gas generation

2020s

The Clean Energy Foundation: Integrating Federal and State Policies

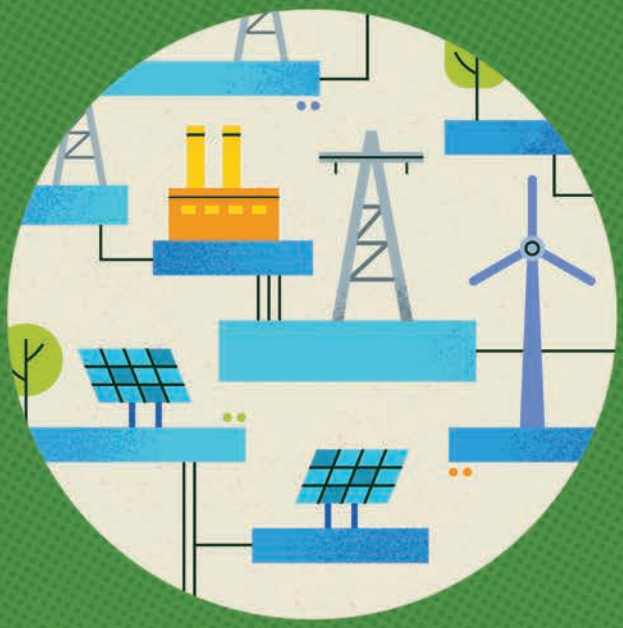
2020:

ISO includes **electric vehicles** and **electric heat pumps** in our 10-year planning forecast

ISO, NESCOE (New England States Committee on Electricity), and NEPOOL (New England Power Pool) embark on the *Future of the Grid* Initiative

Responsive market design: ISO proposes an innovative enhancement to the ancillary services markets to ensure energy security; FERC rejected these enhancements in late 2020; ISO and regional stakeholders considering next steps

ISO finalizes its 'Vision Statement' and set of strategic goals, capping a 14-month effort



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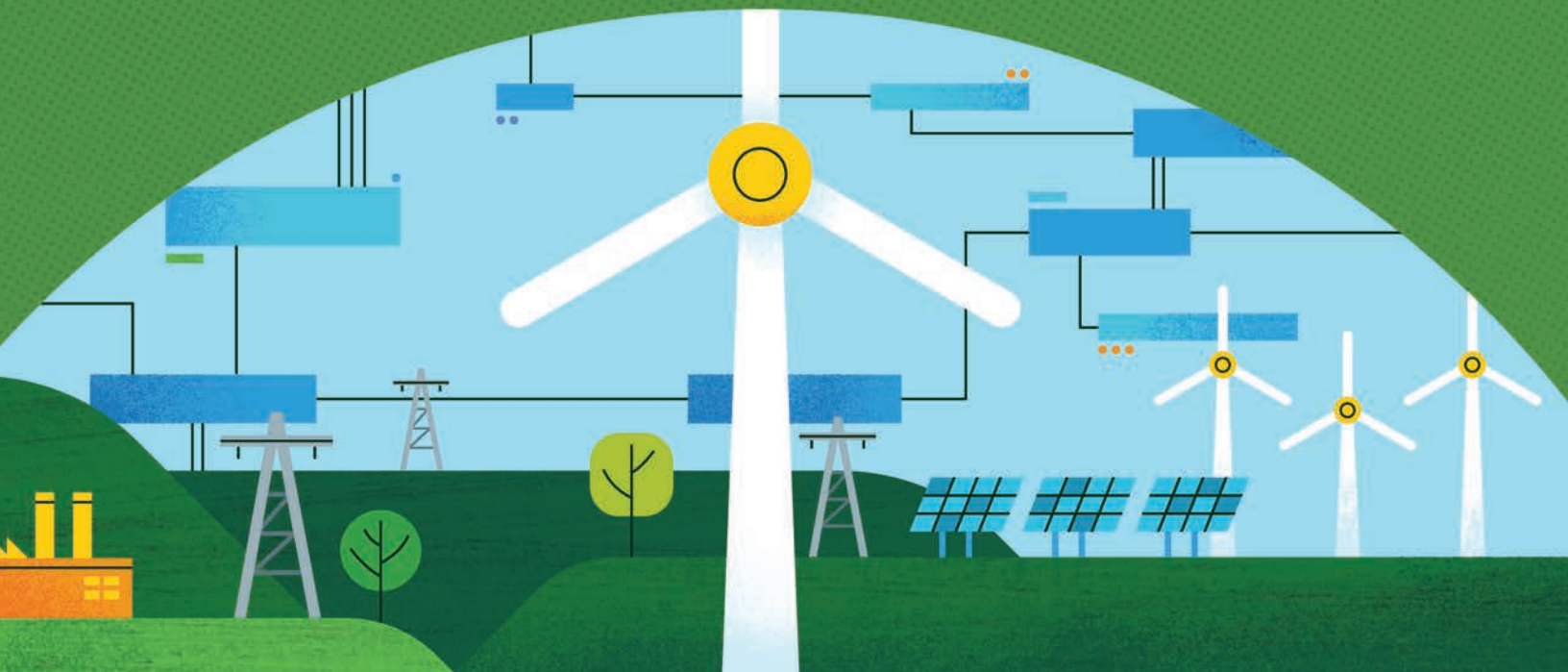
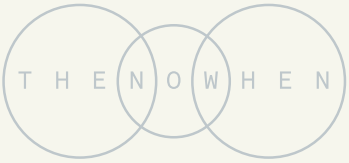




Progress in New England's electricity industry has been on a continuous path since the 1990s, set by clear policy objectives that pursued twin goals of wholesale competition and system reliability. These changes spurred unprecedented investment in electric power infrastructure across the region. Now, more recent policy initiatives have propelled the development of clean energy resources.

PROGRESS

Throughout the 1990s, industry progress came in the form of policy changes enacted through the passage of federal and state legislation, rulemaking, and regulation. The sum of these policies changed the focus of the industry, moving it away from the investor-owned utility (IOU) paradigm, which was funded through a regulated rate-of-return, to one that introduced competition through wholesale markets. To facilitate this changeover, five of the six New England states passed legislation requiring utilities to divest their generation assets. At the federal level, the Federal Energy Regulatory Commission (FERC) called for the creation of independent system operators to facilitate wholesale purchase and sales.

ISO New England was created by a coalition of industry and state policymakers with three primary goals: to operate the regional grid in a reliable and unbiased manner, to conduct power system planning, and to launch fair and open wholesale markets based on setting the lowest cost for producing electricity.

Progress Takes Shape Through New Generation and Transmission Infrastructure

As the industry moved into the 2000s, New England's wholesale markets were established, spurring an unprecedented $16 billion investment in new power generation for the region. Virtually all of this was powered by natural gas that, at the time, was easier to site on the state level because its emissions profile was cleaner than other fossil fuels.

Policy Decisions Create the ISO:

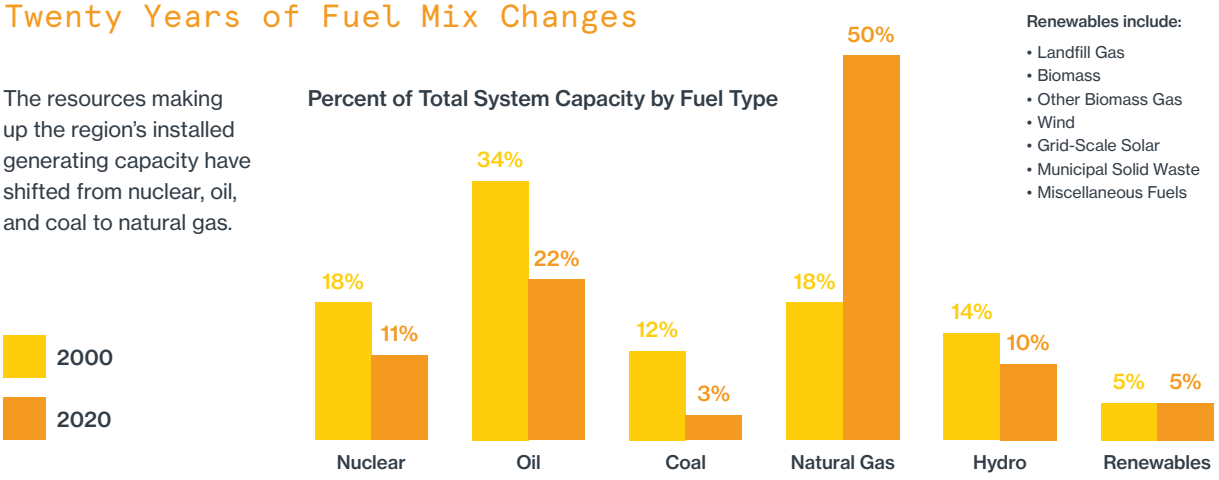
Working with the New England Conference of Public Utilities Commissioners (NECPUC), the New England Power Pool (NEPOOL) filed with the Federal Energy Regulatory Commission (FERC) to create ISO New England. On July 1, 1997, the ISO was created.

These new generating resources came onto the system at the right time because by the mid-2000s, consumer demand for electricity was growing up to 1.5% annually. Not only were these power plants instrumental in meeting the region's all-time demand peak in August 2006, additional consumer benefits from this new generation included:

- Moving the investment risk off the shoulders of consumers because generation was no longer funded through a regulated rate-of-return
- Declining power plant emissions

Twenty Years of Fuel Mix Changes

The resources making up the region's installed generating capacity have shifted from nuclear, oil, and coal to natural gas.



Source: *2020 CELT (Capacity, Energy, Loads and Transmission) Report*, Summer Seasonal Claimed Capability (SCC) Capacity

Regional Emissions Decrease Over Two Decades

New England Generator Air Emissions - 2001 vs. 2019

42% ↓ **Carbon Dioxide (CO_2)** major driver of climate change

78% ↓ **Nitrogen Oxide (NO_X)** adds to smog

99% ↓ **Sulfur Dioxide (SO_2)** with NO_X, leads to acid rain

Source: Appendix Table 4, ISO New England System Annual Generator Emissions Report, 2001 to 2019 (kilotons)

In 2000, FERC granted ISO New England the authority for power system planning—with the goal of developing a guide for transmission infrastructure investment needed to keep the region's grid reliable and efficient. In the two decades since, through its open and public planning process, the ISO has developed a blueprint document called the *Regional System Plan* (RSP). Over the course of 20 years, the ISO's RSP has driven necessary upgrades of New England's grid, which total 800+ transmission projects across New England, including several 345 kilovolt (kV) high voltage lines.

While this investment has been made to maintain power system reliability, recent ISO New England studies indicate there is roughly 6,000 MW of headroom for the interconnection of offshore wind before additional transmission infrastructure will be needed.

Region's Grid is Flexible—and Ready

The region's power grid infrastructure has facilitated generation retirements, laying a reliable foundation for the delivery of clean energy because of the 20-year, $11 billion investment spanning all six New England states.

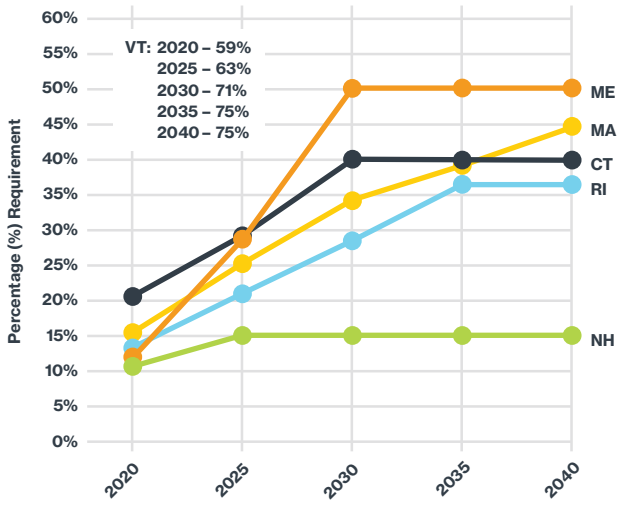
ISO's Job: Preparing for the Changing Resource Mix

Moving beyond the goal of ensuring reliability at the lowest cost, state-level policies and legislation have driven the focus and growth in renewable resources. These clean energy targets range in megawatt amounts and resource types, depending on individual state requirements.

As the New England states have increased requirements for Renewable Portfolio Standards (RPSs) and emission limits to reduce greenhouse gases (GHG), they established additional incentives and contracts for renewable resource development to meet these goals. This has resulted in the development of rooftop behind-the-meter (BTM) solar, off-shore wind, batteries, and energy efficiency.

State Plans to Increase Renewable Portfolio Standards

Class I or New Renewable Energy Resource (%)

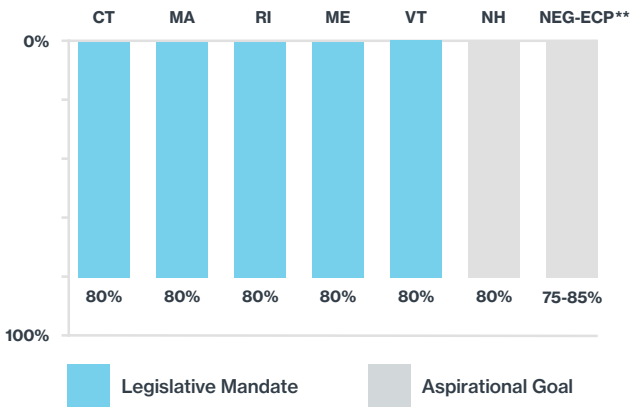


All six New England states have renewable energy standards

Electricity suppliers are required to provide customers with increasing percentages of renewable energy to meet state requirements. Vermont's standard recognizes new and existing renewable energy and is unique in classifying large-scale hydropower as renewable.

New England States Move to Reduce Greenhouse Gas Emissions

Percent Reduction in Greenhouse Gas (GHG) Emissions Economy Wide by 2050*



For more than a decade, ISO New England has recognized the growing importance of renewable resources and began preparing for increasing amounts of clean energy in the region's resource mix. Since the ISO's groundbreaking 2010 wind study, which confirmed areas in New England rich in onshore and offshore wind potential—and how a robust transmission system will be needed to be needed to bring this clean energy to market—the ISO has focused on getting the grid ready for this transition.

During the past 10 years, the ISO's goal has been to reduce or eliminate barriers that inhibit participation on both the grid- and wholesale-level. Listed are some of the many examples of how clean energy has been integrated into our regional power system and marketplace:

- **Wind** resources now participate in all wholesale markets because of the ISO's advanced wind forecast
- **Energy efficiency** is counted in the capacity market, which has led to lower amounts of energy required to meet consumer needs and grid reliability requirements
- By developing a behind-the-meter **solar** forecast, the ISO can better predict when solar will produce electricity; this helps the ISO accurately forecast the region's daily energy needs
- Introduced an "energy-neutral" grid dispatch so energy-storage technologies, such as **batteries** and **flywheels**, can support reliability through ancillary services markets
- **Wind** resources can compete in the energy market and set prices if they also participate in the capacity market

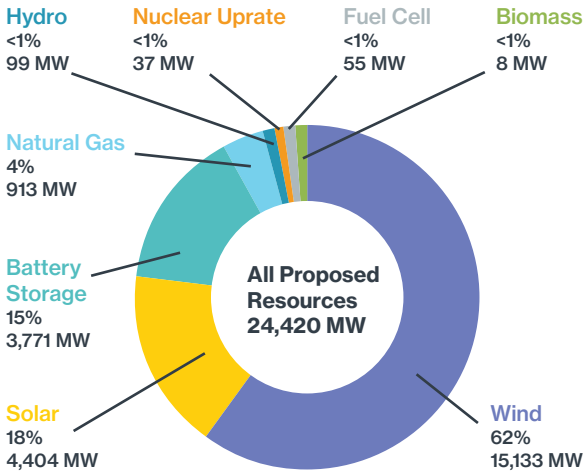
*The New England states are promoting GHG reductions on a state-by-state basis, and at the regional level, through a combination of legislative mandates (e.g., CT, MA, RI, ME, and VT) and aspirational, non-binding goals (e.g., NH and the New England Governors and Eastern Canadian Premiers).

** MA, RI, NH, ME, and VT use a 1990 baseline year for emissions reductions. CT and the NEG-ECP use a 2001 baseline.

The changeover is happening—and is most evident in the ISO's interconnection queue, which tracks proposals for new energy resources. In the past few years, proposals to build clean energy resources such as wind, solar, and battery storage, have eclipsed proposals to build natural gas generation.

Shifting patterns in energy use are also altering how the ISO operates the power system. Because of the significant growth in distributed energy resources such as BTM solar and energy efficiency, as well as the development of renewable resources connected to the high-voltage regional system, electricity usage has shifted—and is shifting—daily demand curves. As the so-called "duck curve" demonstrates, the ISO is adapting both grid operations and transmission planning during the clean energy transition.

Clean Energy Leads Proposed New Resources



Note: Some natural gas proposals include dual-fuel units (with oil backup). Some natural gas, wind and solar proposals include battery storage.

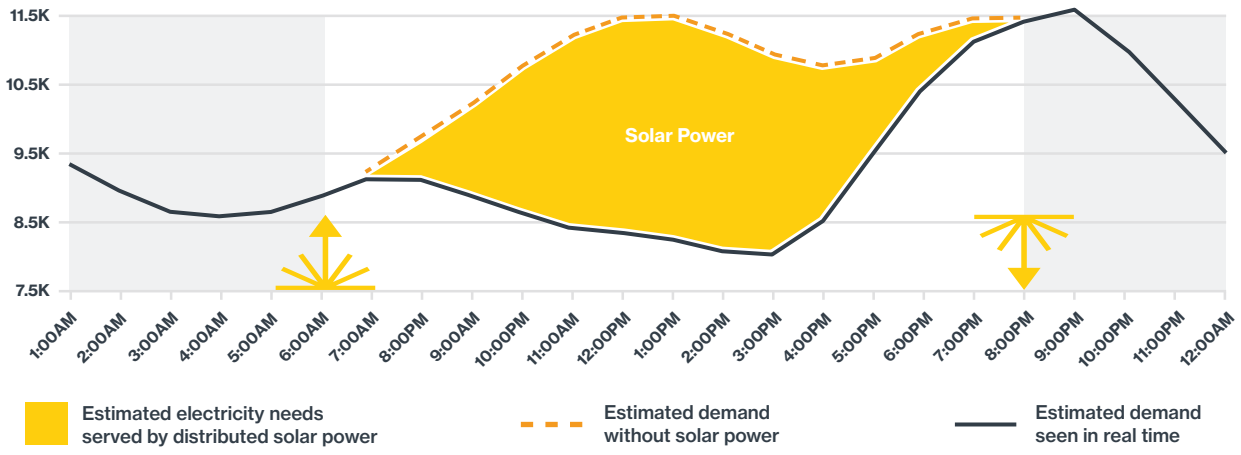
Source: ISO Generator Interconnection Queue (February 2021) FERC and Non-FERC Jurisdictional Proposals; Nameplate Capacity Ratings

How energy resources get compensated in the region depends on whether the resource has a state-sponsored contract or earns its revenues in the wholesale market. But how does a state-sponsored resource interconnected at the grid level participate on equal footing with other, unsponsored resources in the wholesale market? This is the challenge facing the industry—with discussion underway in the region.

More on ISO New England's *Responsive Market Design* and how the ISO, NEPOOL and the New England state policymakers are working on this challenge in the section, "The Power of Competitive Pricing."

Historic Dip in Midday Demand with Record-High Solar Output

May 2, 2020: In Hour Ending 13, behind-the-meter solar reduced grid demand by more than 3,200 MW



WHEN

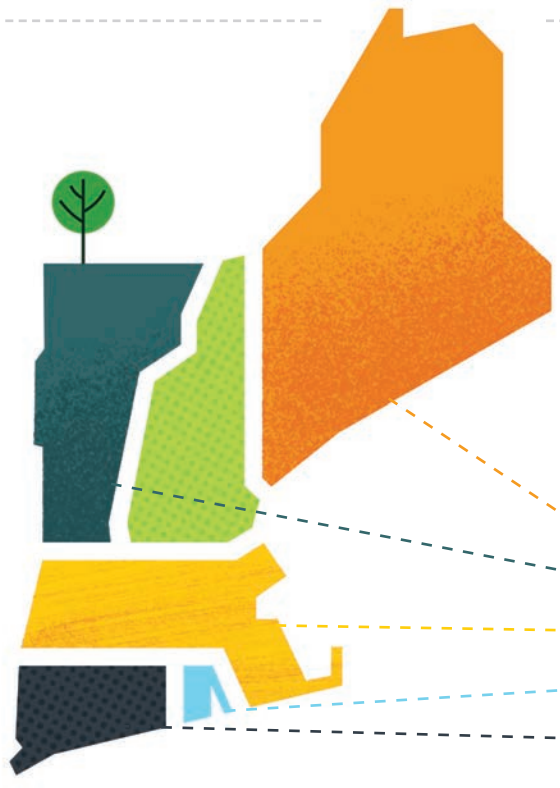
For Our Clean Energy Future, what Power System Infrastructure Will the Region Need?

As we move into the next decade of industry restructuring, state policymakers are looking to meet decarbonization targets by electrifying other areas of our economy with high emission profiles: the transportation and building and heating sectors. The states have set targets to lower emissions, with the goal of progressively trading out old infrastructure and products with new ones—that will eventually lead to decarbonizing our economy and increasing electricity demand.

As the states' goals in this area become more clearly defined, ISO New England will have to answer the question of how to keep our regional grid reliable as we transition to a clean energy grid. Therefore, the ISO's job in the coming decades will be to ensure the power system can transform the resources it currently uses and also adapt the transmission system and wholesale markets as consumer demand grows from the decarbonization of other sectors.

ISO's Expertise Informs Stakeholders

In addition to our Regional System Plan (RSP), the ISO oversees numerous studies on behalf of our regional stakeholders. Through the "Economic Study" process, the ISO accepts applications for hypothetical studies that explore alternative looks at the power system using assumptions submitted by stakeholders. Our Planning Advisory Committee (PAC) runs this annual, public process that includes input on scope of work, assumptions, and results review. Past studies continue to be used and inform New England's industry stakeholders and state policymakers.



States Target Increases in Renewable and Clean Energy and Deep Reductions in CO_2 Emissions

≥80% by 2050: Five states mandate greenhouse gas reductions economy wide: MA, CT, ME, RI, and VT (mostly below 1990 levels).

ME	100% by 2050 Carbon-Neutral by 2045	ME renewable energy requirement ME emissions goal
VT	90% by 2050	VT renewable energy requirement
MA	80% by 2050 Net-Zero by 2050	MA statewide GHG emissions limit MA clean energy standard
RI	100% by 2030	RI renewable energy goal
CT	100% by 2040	CT zero-carbon electricity goal

As we prepare for the next era of the power system and markets, we are currently working with NEPOOL and the states on a future look called the **Future Grid Reliability Study**. The study will look at the implications of a substantially changed grid, one where the majority of the resource mix is clean, intermittent resources. Specifically, the goal for this study is to encompass both engineering and economic analyses based on scenarios that include load-related assumptions, resources, infrastructure, and costs.

Using stakeholder and state assumptions about the future resource mix, this assessment of the region's power system will provide information on what the regional system will need to run reliably. A second phase of the study will assess if the current market structure will be sufficient to attract and retain the resources needed to keep the grid reliable under the range of future scenarios. The ISO will initiate this study in 2021.

A second study, requested by the states, will look at scenarios from 2030 to 2050. This study will serve as a resource for the states as they evaluate additional policy decisions on decarbonization. In addition to these stakeholder and state-requested studies, the ISO launched an effort in 2020 to refine its transmission planning assumptions to better reflect the long-term trends required for the clean energy transition such as interconnecting large amounts of distributed energy resources, battery storage, and changes in demand characteristics.

Other market-focused studies are being identified and developed in collaboration with NEPOOL and the states. See more information on market-related studies in the section "The Power of Competitive Pricing."

While New England has made significant progress toward a clean energy future, challenges remain to ensure a reliable system. The ISO will continue to support this transition through analyses and innovation to ensure we have the necessary operational, transmission, and market tools to support the future system.

Investing in Innovation

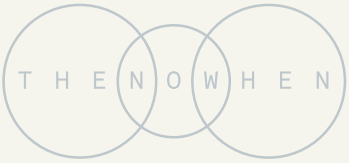
There have been several points that have changed the direction of our industry. The transition to clean energy resources because of climate change is the current turning point. All along, the ISO has been investing in change and innovation – so that our employees have the right operational and administrative tools they need to run the region's grid reliably, understand the changes in the resource mix, and prepare and operate the power system and markets today and tomorrow.

Our Business Architecture & Technology (BAT) staff have been leading the ISO's research and development efforts across our broad set of responsibilities. Among the many ways ISO New England has innovated, here are a just a few:

- **Introduced** the industry's first nodal market, including losses and congestion
- **Implemented** best practices to enable fast-start energy resources to set energy prices
- **Pioneered** cloud computing for power system control and planning applications in the ISO environment
- **Developed** the mathematical framework to optimize power flow between New England and New York called coordinated transaction scheduling, known as the most efficient in the industry
- **Developed** the computer applications to integrate demand resources into all markets, and
- **Developed** a tool for the control room to monitor natural gas supplies, which is critical for energy adequacy.

Pricing wholesale electricity has gone through many changes—and challenges—since industry restructuring started in the 1990s.

The Power of



For ISO New England, *responsive market design* has been the guiding principle to ensuring that New England's wholesale markets yield the benefits of efficiency and competition for the region.

Although the average electricity consumer may not be that familiar with the wholesale side of the business, New England's competitive wholesale markets are now more than 20 years old. Federal and state policymakers sought to introduce competition by restructuring the electric industry in the 1990s after decades of lagging investment in transmission and new technologies, as well as some poor investments in costly power plants that received guaranteed revenues from ratepayers.

New England's competitive wholesale markets have achieved the goals that led to their creation. By supporting competition, these markets have brought real benefits to New England's consumers by ensuring power system reliability with an adequate resource base, providing wholesale power prices that accurately reflect the cost of producing power, and shifting investment risk from ratepayers to investors.

COMPETITIVE PRICING

The 1-2-3's on New England's Wholesale Competition

1 **Competition** drives private investment in energy resources and technologies that are most efficient and provide savings. This savings has led to lower costs.

2 New England's markets are designed to select the **lowest-priced** offers. Power plant owners price their products and services competitively, closely reflecting fuel and operating costs. The higher the fuel and operating costs, the less likely the plant will operate and earn revenue.

3 New England's **competitive pricing** reveals not only cost inputs, but also constraints when prices are higher in one area than another. Higher prices signal possible problems with fuel supplies, transmission bottlenecks, or inefficient power plants that are no longer economic (or competitive).

The ISO launched the region's first competitive electricity market in 1999 and refined that design in March 2003 with the energy market largely in place today. The energy market sets a price for wholesale electricity in eight locations throughout the six New England states, with boundaries based on the high-voltage transmission system. New England's energy resources are paid two ways: by selling their product in a day-ahead market, with a locked-in price, or during the day of production, with a price that tracks the ups and downs of real-time supply and demand.

The region's current forward capacity market design was approved in 2006, with the first auction held in 2008. The market acts as an insurance policy to secure commitments to build new resources three years in advance. Resources are paid three years later, during the annual capacity commitment period.

New England's Wholesale Markets

Energy Market
Electric Energy

Ancillary Markets
Short-Term
Reliability Services

Forward Capacity Markets
Long-Term
Reliability Services

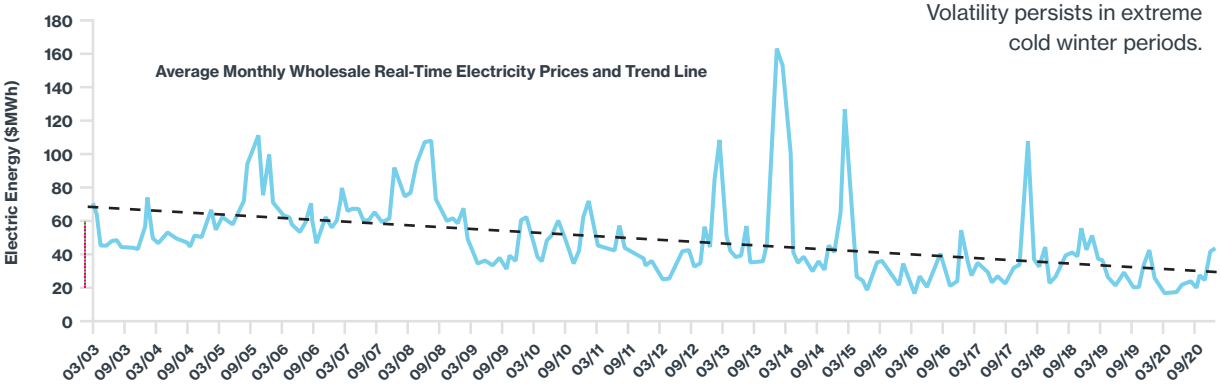
Responsive Market Design

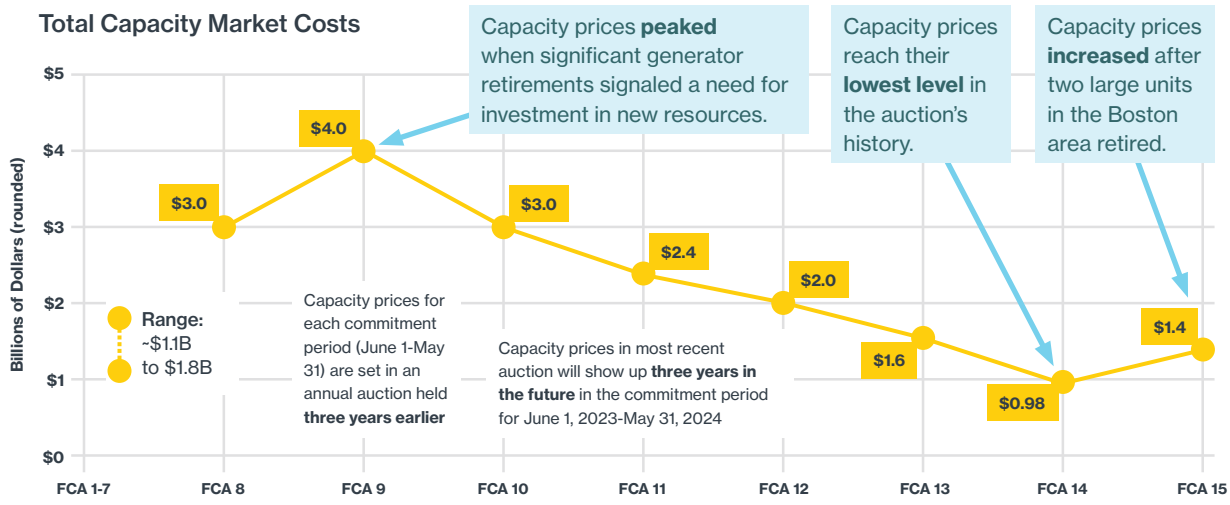
Since the initial market structures were introduced, ISO New England has amended various market designs, responding to changes in resource mix, technology developments, FERC directives, reliability concerns or public policy goals that can affect the efficiency and competitiveness of the region's markets. Revising markets is a highly collaborative process among market participants, state utility regulators, and other stakeholders. Over the years, market enhancements have been made to all of the wholesale market products and services to keep the markets efficient and the pricing competitive.

Competitive Market Pricing Has Led to Lower Costs

Wholesale Electricity Prices Have Been Declining

Volatility persists in extreme cold winter periods.





Twice a year, ISO New England publishes the *Wholesale Markets Project Plan*, a report that charts the progress of market enhancements identified and completed, including the status of stakeholder engagement, design stages, when the updates were filed with FERC for approval, and inception date. Among the numerous changes made, some of the most significant include:

- FCM "pay-for-performance" incentives were introduced in 2018. The PFP rules provide enhanced incentives for resource owners to ensure their resources are ready and able to meet their obligations to provide energy and reserves or reduce demand during times of stress on the regional power system. Resources that don't perform forfeit a portion of their capacity payment.
- Price responsive demand (PRD) integrates all active demand resources into the full range of wholesale electricity markets: the energy market, the reserves market, and the capacity market. PRD was implemented in June 2018.

- Since the 1970s, New England has benefited from pumped-storage hydropower. But since April 2019, the ISO markets offer a flexible framework for the unique attributes of batteries and other emerging storage technologies. This framework recognizes their ability to transition continuously and rapidly between a charging state and a discharging state—and provides a means for their simultaneous participation in the energy, reserves, and regulation markets.

One noteworthy market proposal that hasn't been implemented is a market change designed to help with energy security in the region. Energy adequacy, or the ability for resources to produce electricity when needed, has been a growing concern in New England, originally because of natural gas pipeline constraints, especially during winter, and now as we move into the clean energy era because of the intermittent nature of wind and solar power.

Over the past several years, the ISO has implemented operational tools to manage these challenges; however, the market prices were not fully reflecting the system needs. In 2020, the ISO filed market changes to make certain the market pricing supports the reliability needs of the grid despite uncertain fuel supplies or weather conditions. FERC rejected this market design in late 2020. Energy adequacy remains a concern in New England and the ISO will be evaluating next steps during 2021.

Keeping Markets Aligned with Changing Resources

Today's wholesale market structure is based on selecting the lowest cost resources to reliably serve the region's demand for electricity. This design financially rewards efficient resources and prices less efficient ones out of the market. However, it doesn't explicitly price the primary environmental policy goal in the region, which is to rapidly reduce carbon emissions, first from the grid and then from the rest of the economy. To achieve efficient decarbonization it is important to present the incentive to decarbonize equally to all resources.

Limiting—and eventually removing—carbon from the electricity industry has been a goal of policymakers for more than a decade as renewable portfolio standards and greenhouse gas (GHG) emissions limits have steadily increased. However, these incentive structures have not been sufficient to drive decarbonization at the rate needed to meet long-term goals. To reach these goals, several New England states have established public policies that direct electric companies to enter into ratepayer-funded, long-term contracts for large-scale, carbon-free energy that would cover most, if not all, of the resource's costs.

ISO New England supports the region's clean energy transition in partnership with the New England states and our regional stakeholders. The ISO has been working within its federally approved role and responsibility to adapt both its operations and markets so the grid stays reliable and prices competitive as our energy mix transitions from higher-emitting to lower-emitting resources, and eventually, to non-emitting resources.

The primary challenge facing the industry today is that federal and state energy and environmental objectives are not currently aligned. Navigating the integration of clean resources reliably and efficiently, in a way that maintains price competitiveness, is the current issue at hand. State contracts are established outside of the wholesale electricity market and, as such, have resulted in bifurcated development and payment for the region's electricity resources. This payment disconnect is at odds with the initial goal for industry restructuring set in the 1990s that pursued competitive pricing.

While ISO New England must comply with federal requirements, we have been exploring ways to better harmonize state and federal policies and plan for the future grid. ISO New England does not choose which resources participate in the markets. The mix of resources in the region is a function of which ones are price competitive, as well as which ones meet various state requirements. However, the New England states have requested that the ISO and the New England Power Pool (NEPOOL) consider designs that will accelerate the clean energy transition.

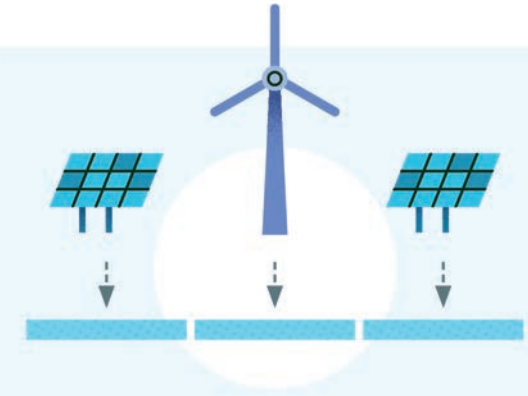
Market Disconnect

How energy resources get compensated in New England depends on whether the resource has a state-sponsored contract, such as wind energy, or if it earns its revenues by participating solely in the wholesale market. But what if a state-sponsored resource wants to participate in the wholesale market? Over the years, the ISO has adapted its markets so renewable resources can enter the wholesale market, but not suppressed the prices for those other resources who don't have a contract.

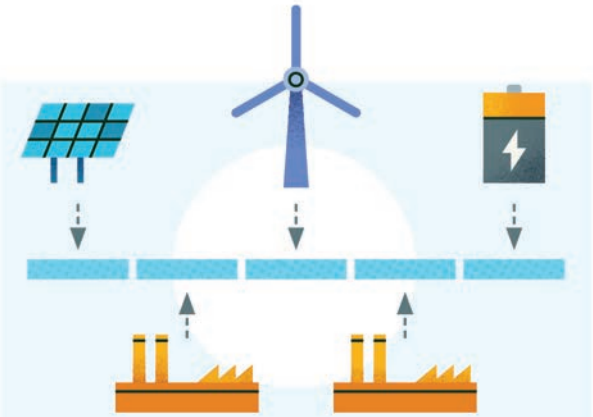
To align wholesale pricing with state-sponsored contracts, market changes have been made in an effort to preserve competitive pricing for *all* resources. One change required a minimum price (the Minimum Offer Price Rule, or MOPR) for entering the forward capacity market. Because renewable resources with a state-sponsored contract or incentive can enter a lower bid to participate, the MOPR was developed to prevent price suppression. However, the long-term efficacy of this design is at issue not only in New England, but also in the other northeast ISO/RTOs. Another change established a substitution auction to swap out less efficient capacity resources for cleaner ones.

The premise of the MOPR and substitution auction work only if clean energy resources and retiring fossil resources actually swap out capacity obligations, but the incentive to engage in these trades depends on the expectation that these mechanisms will be in place for the long term. It is already clear, however, that these market mechanisms are not sustainable for the long term because some federal and state policymakers are calling for the MOPR removal. So, very little activity has resulted between the older fossil fuel resources and the clean energy resources with a state contract.

From the ISO's vantage point, the removal of the MOPR will create additional risks and potentially jeopardize cost recovery for the balancing resources needed to ensure reliability. If the MOPR is discontinued, the search for a new market-based pricing solution will be necessary—and the ISO looks forward to working with our stakeholders and the FERC on this complex issue.



Variable, renewable energy resources will eventually become the new "baseload" resource and produce most of the electrical energy. Most renewable resources receive a contract from the states to help meet state clean energy requirements. State contracts will be paid by ratepayers through regulated rates.



Balancing resources will be necessary to "fill in" the energy gaps, which may last from seconds to weeks, and occur when renewable resources are not available or are not producing at full capacity. Balancing resources in New England are merchant facilities (non-utility, non-state-sponsored) and dependent on the wholesale market for revenues.

WHEN

ISO's Job: Design Markets for a Clean *and* Competitive Resource Mix

More is being asked of the region's power system and wholesale markets as we move into the 2020s and beyond. Efficiency and resource neutrality are required in the current wholesale electricity markets while state legislatures are requiring clean energy and industry decarbonization. Moreover, the states want to decarbonize other industry sectors (as outlined in the section, "The Power of Progress"), which will create additional need for clean resources and a broader use of the region's transmission system.

ISO New England is working with the states and NEPOOL to conduct several studies of the future system to help inform the region's next steps. In the area of wholesale market design, two studies will follow NEPOOL's exploration of market design concepts through its *Pathways to the Future Grid* report.

The first is an interesting design concept called the Forward Clean Energy Market (FCEM) and a variation called the Integrated Clean Capacity Market (ICCM). Both seek to drive investment in clean energy in tandem with the existing wholesale markets.

The ISO has also begun to evaluate net-carbon pricing. Net-carbon pricing could offer an efficient mechanism for allowing for the removal of the MOPR since it presents the carbon reduction incentive to all resources, and allows cleaner, more efficient balancing resources the opportunity to garner additional revenues in the energy market, instead of depending on capacity market revenues.

There is much work to be done, but in recognition of the significant interest in both carbon pricing and the FCEM and ICCM, the ISO Board has directed management to evaluate these design concepts through the NEPOOL stakeholder process. In addition to this work, the ISO will also be working with stakeholders to fulfill FERC Order No. 2222 to enable broader participation of distributed energy resources in wholesale markets.

The ISO Supports Carbon Pricing

The ISO supports a version of carbon pricing, called "net-carbon pricing," which would rebate a substantial portion of the cost of carbon pricing to wholesale buyers, thereby addressing the concerns over the price impact of this mechanism. Net-carbon pricing could also reduce or eliminate the need for state contracts with clean resources. However, robust carbon pricing requires support from policymakers and, thus far, the ISO has not been able to garner support.

2030–2040–2050: Studying Future Possibilities

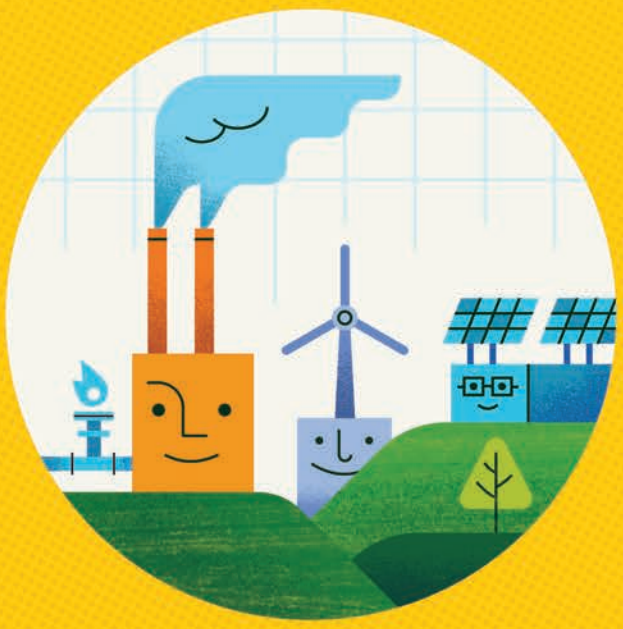
The ISO and regional stakeholders have been exploring potential reliability and market issues that may arise in the coming years as the electric industry experiences significant change driven by state energy and environmental policies to incentivize economy-wide decarbonization. Current studies track two paths: **future grid reliability** and **future wholesale market design possibilities**.

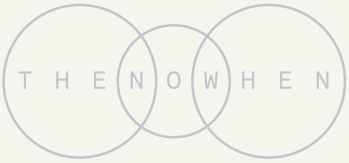
The goal is to have a series of studies to help the ISO, the industry, and policymakers make sound decisions as we proceed through the coming decades and transition to our clean energy economy. The time frame of the studies, based on state renewable and net zero carbon goals, span from 2030, 2040 and 2050. Most studies are expected to be completed by 2022.

The ISO recognizes and respects the imperative of the New England states to drive the clean energy transition. This transition will require a responsive market design that produces prices that reflect the decarbonization goals of the states as well as maintains the balancing resources the region will need for a reliable electricity system.

We believe that the regional wholesale market has an important role to play in facilitating this transition, and we are committed to working with our stakeholders, the New England states, and the FERC to find solutions that achieve both power system reliability and decarbonization.

The Power of





PEOPLE

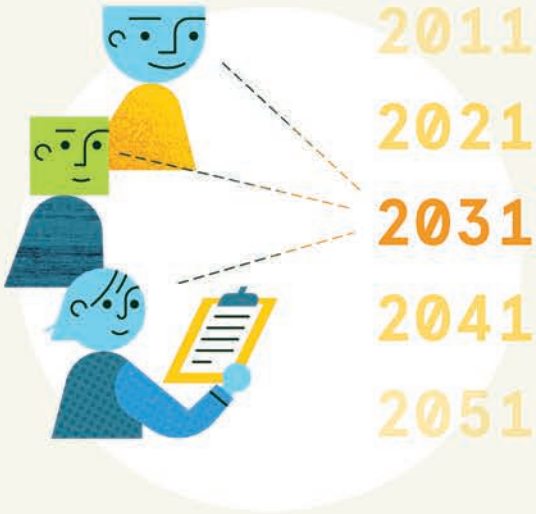
For ISO New England staff, the NEPOOL members, government regulators and policymakers—the common thread has been a sense of purpose in evolving and advancing the regional power system and wholesale markets.

In late 2019, the ISO embarked on a review of our strategic planning process. As a regional transmission organization, ISO New England's role and responsibilities are regulated by the federal government through the Federal Energy Regulatory Commission (FERC). These responsibilities fall into three separate, but interdependent categories. The goal of this 14-month exercise was to review and, if necessary, update the ISO's vision, mission, and values within our approved set of responsibilities.

THE ISO'S RESPONSIBILITIES

OPERATING THE POWER SYSTEM

From our control room in Holyoke, Massachusetts, we dispatch energy resources connected to the power grid totaling 32,000 megawatts of capacity on a minute-to-minute basis based on market price. New England's power grid spans 9,000 miles that crisscross the six NE states, which enables the interstate commerce of electricity purchase and sales.



POWER SYSTEM PLANNING

The ISO prepares engineering assessments looking 10 years into the future and ad hoc economic studies at the request of stakeholders. Our Regional System Plans serve as a blueprint to keep the grid reliable.

ADMINISTERING WHOLESALE ELECTRICITY MARKETS

Managing New England's wholesale electricity markets is a multi-faceted endeavor because it involves development of market designs, real-time market operations, and daily settlements, covering multi-billion dollar annual transactions. New England's wholesale markets have a demonstrated track record of driving efficiencies and innovation.

What emerged after numerous discussions by ISO Senior Management and Board of Directors is an updated strategic plan that better reflects our changing work environment. This includes a refreshed mission, vision, and core values, with a set of strategic goals that will provide guidance and direction as both the ISO and the region move into the next phase of the evolution of the region's electricity industry.

The ISO's 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.

The ISO's Strategic Goals

1: **Progress and Innovation**
2: **Responsive Market Design**
3: **Operational Excellence**
4: **Stakeholder Engagement**
5: **Attract, Develop and Retain Talent**

To learn more about our strategic goals on progress and innovation and responsive market design, please go to the "Power of Progress" and "Power of Competitive Pricing" sections.

Focusing on the Fundamentals— through Excellence, Engagement, and Recruitment

Using our five strategic goals as a guide, the ISO staff works every day operating the region's power grid reliably, efficiently managing the wholesale markets, and studying what the grid needs to keep our regional system reliable and flexible. Our strategic goals, objectives, and initiatives form the foundation for our annual work plans and represent the framework from which the ISO operates.

EXCELLENCE

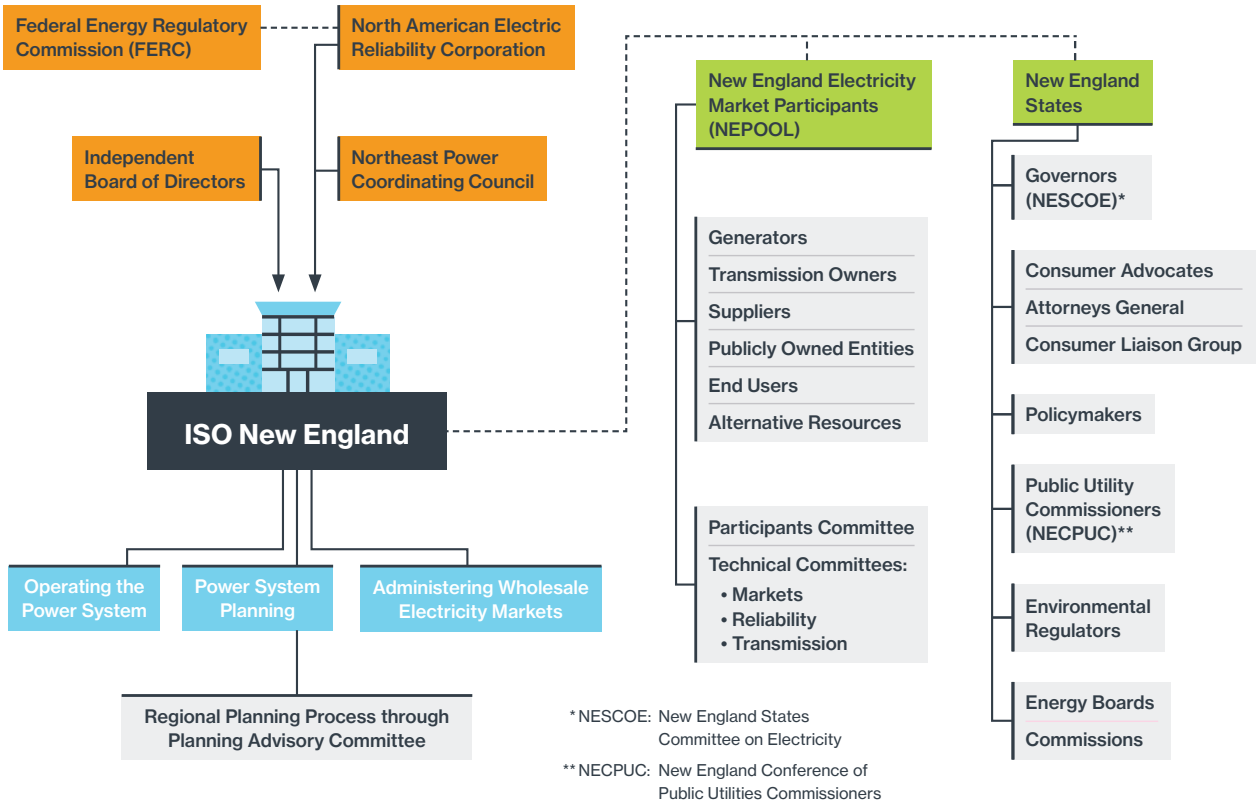
The pursuit of operational excellence is deeply rooted at ISO New England. Across the organization, we are continuously seeking ways to improve how the ISO operates by exploring new ideas and developing better processes, with a focus on efficiency and effectiveness, business-driven results, and continuity of operations.

ENGAGEMENT

ISO New England could not do its job without close collaboration with stakeholders—and relationships with our external partners involve almost every department within the ISO. Our stakeholders are diverse and range from for-profit, publicly traded utilities to small non-profit start-ups; federal regulators and New England's congressional delegation; state-level utility commissions, attorneys general, legislators and consumer advocates, and national and regional power system reliability organizations.

New England's Industry Structure

Like New England's power grid, its industry is also interconnected



ISO New England staff across the board works with our industry and government stakeholders to communicate both high level objectives as well as the nuances of the ISO's responsibilities. In 2020, despite the COVID-19 pandemic that moved the ISO and most stakeholders to a remote work environment, we worked closely with our stakeholders on routine, day-to-day business issues and operations, as well as embarking on a stakeholder-wide discussion of future grid initiatives.

RECRUITMENT

ISO New England employees are the engine of the organization and our most valued resource. Working at the ISO offers both intellectual challenges and the opportunity to work at a unique intersection of the industry, where ideas first introduced through technological advances or policy decisions go from design concept to implementation. By leveraging skills, experience, and industry knowledge, the ISO employee is accustomed to identifying complex problems and developing workable solutions.

As an organization, we are committed to teamwork and believe that sharing ideas within our business units and with our stakeholders leads to the best possible outcomes. *We know how to get the job done*—and keeping the power system reliable and the wholesale electricity markets running efficiently and impartially—speaks volumes to our diligence and determination.

To nurture our employees so they feel empowered to be the best they can be, the ISO promotes a positive work culture. We value diversity, equity, and inclusion, which we cultivate internally and with all stakeholder interactions. At the ISO, with diversity comes strength—and the ability to develop the very best for the future of the region's power grid and wholesale markets.

In 2020, ISO Participant Support resolved 9,557 cases & issues.

Annual market participant survey results returned a 96% satisfaction level for 2020.

There were 80+ NEPOOL Stakeholder meetings

We held virtual classroom or web-conference trainings for over 495 stakeholders and made over 87 e-learning modules and 160 presentations available on the ISO website for stakeholders.

As the ISO and stakeholders determine what the region's clean energy future will look like and how we will get there, the ISO is already preparing for this transition in terms of staffing needs. By evaluating our needs to meet today's challenges, we are also identifying what type of expertise and qualifications will be needed to plan, develop, and operate a power system and marketplace made up of renewable and clean energy resources.

Our staff comprises a number of diverse professions with expertise in IT and computer science, electrical engineering, energy law, economics, program management, and human resources, just to name a few. The ISO's work is complicated, demanding, and ever-changing, and so too are our staffing needs. To succeed at the ISO, staff have to be highly skilled, committed and adaptable professionals.

As the region makes the changeover to clean energy, it will be the ISO employees who will be in the best position to understand how to make that happen, so that power grid reliability is sustained and wholesale pricing continues to be competitive. We are ready for—and already working on—that challenge.

Q: Who will be an essential part of designing and running New England's grid of the future?

A: ISO New England employees.

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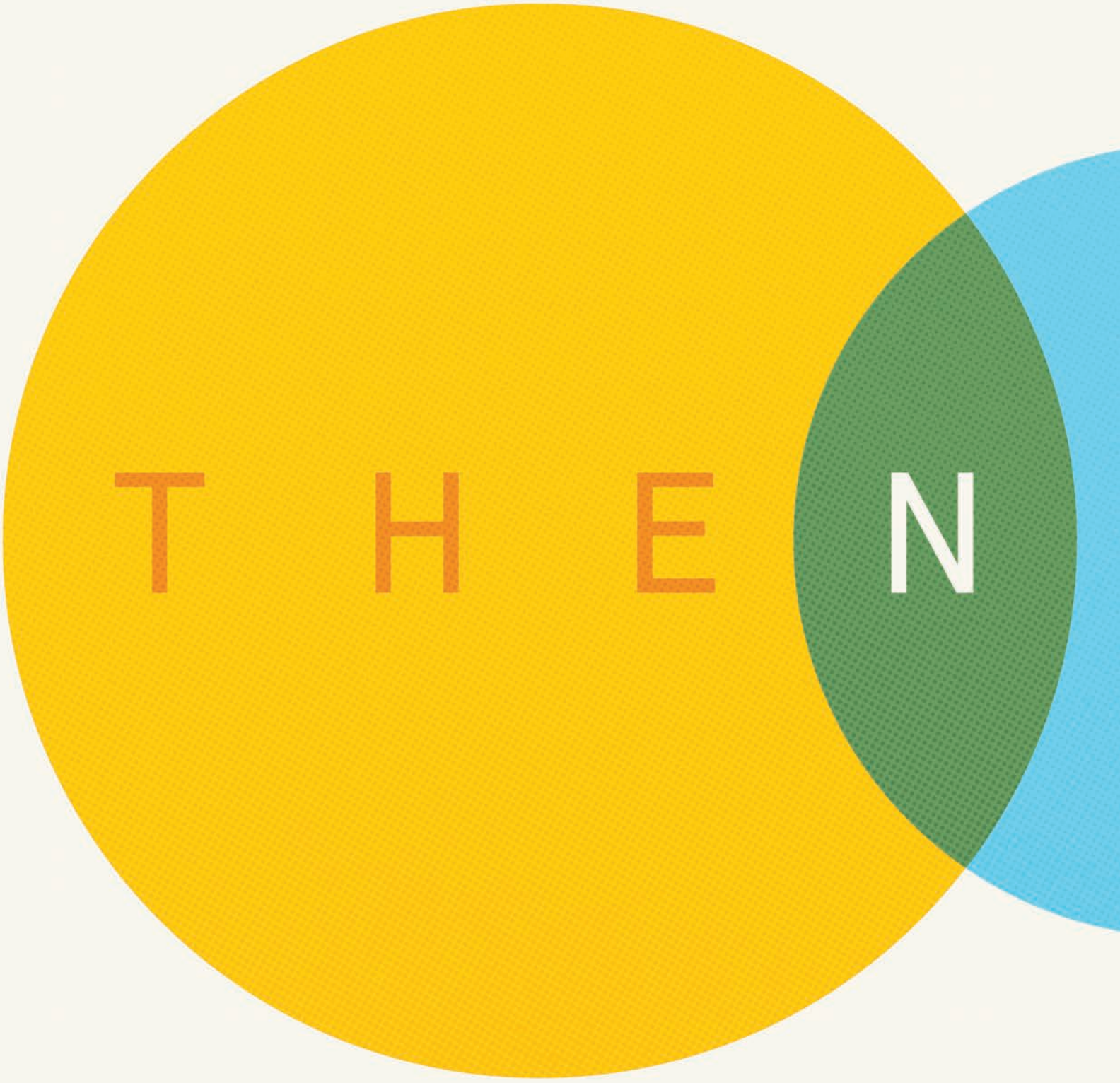
THEN