ISO new england

What Is the Future of the Power Market Design?

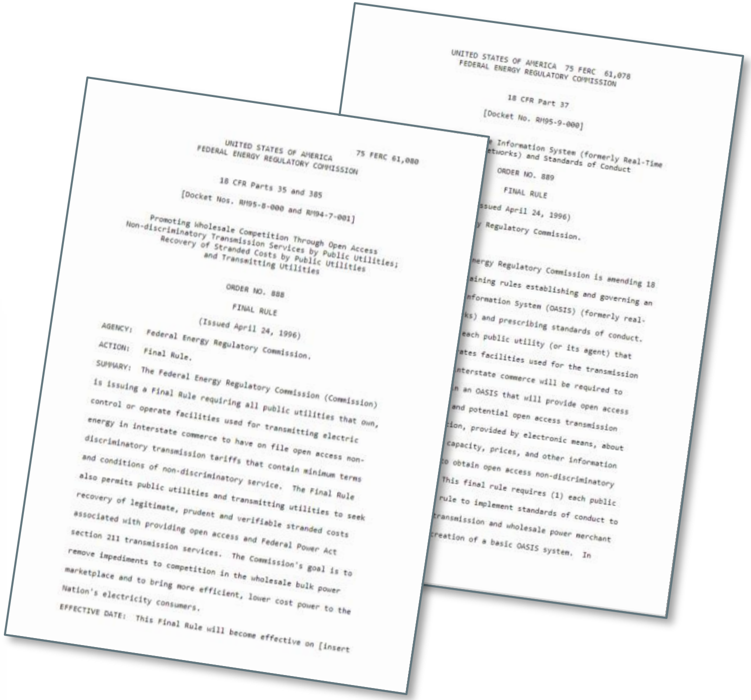
Have the assumptions behind competitive markets held true, and where do we go from here?

Gordon van Welie

PRESIDENT & CEO

Revisiting the Assumptions/Expectations Underpinning the Move to Competitive Markets (in New England, and more Broadly)

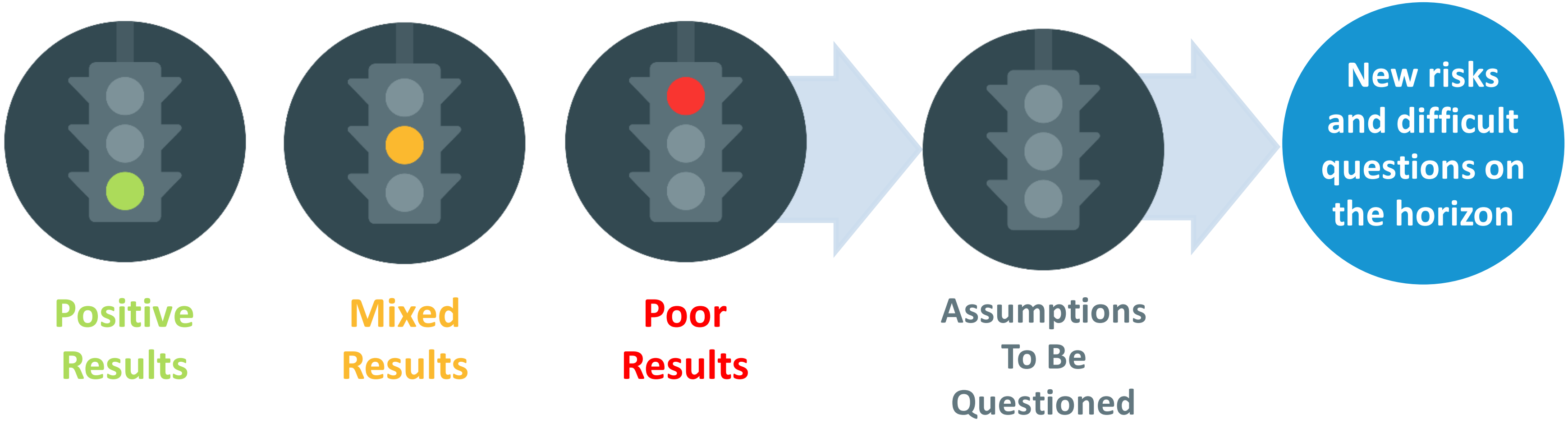
25 Years after FERC Orders 888 and 889 and the ensuing state restructuring laws



Results Raise Questions About Assumptions/Expectations

Results fall into three broad categories (New England/Northeast focus, but also applicable to other markets):

Looking Ahead



Positive Results

Wholesale Competition (Energy Markets)

- Wholesale energy markets are highly competitive
- LMP-based security-constrained unit commitment and economic dispatch are fundamental to reliable and efficient system operations (aligning prices with system reliability)
- LMPs indicate transmission constraints

Supply-Side Response & Innovation

- Higher-efficiency generators displace low efficiency generators, leading to production efficiencies and emission reductions
  - From 2011 - 2020, native system emissions decreased: NO_X by 52%; SO_2 by 97%; and CO_2 by 34%
- New technologies, including renewables and batteries enter the market
- Consumers are shielded from poor investment decisions

Transmission Planning for Reliability

- ISO/RTO transmission planning processes have resulted in significant investments in transmission to address reliability, particularly when jurisdiction/ governance, cost recovery, and cost allocation have been clearly defined
- Projects have largely used existing rights-of-way, alleviating some siting obstacles

Mixed Results

Retail Competition

- Got off to a promising start in New England, but has since receded
- Large end-users have chosen competitive supply options, but most residential customers remain on default service

Demand Response

- Penetration of active demand response is limited
  - Performance risk limits participation in the capacity market
  - States do not embrace dynamic retail pricing, therefore little price responsive demand
  - Smart meter investments are limited in many regions

Resource Adequacy (Capacity)

- Capacity compensation mechanisms needed due to regulatory planning standards and energy market price caps
- Forward Capacity Market is complicated and difficult to administer, requiring continual improvements
- Very difficult to prospectively coordinate resource exit and entry (calling into question the efficacy of FCM)

Mixed Results, *cont.*

Carbon Emissions	Transmission Planning for Public Policy (Integrating Renewables)	Incorporating All Reliability Needs into Market Design

Carbon Emissions

- Competition has driven reductions in energy-sector carbon emissions, but carbon is not directly priced in the market
- RGGI prices are too low to drive the clean energy transition
- "Above market" incentives and Power Purchase Agreements (PPAs) create price and operational distortions and require other fixes
- Some states seek other alternatives, e.g. a Forward Clean Energy Market

Transmission Planning for Public Policy (Integrating Renewables)

- States disagree with Public Policy component of FERC Order 1000, and instead utilize a PPA model for driving investment in transmission
- New FERC NOPR re-examines governance and cost allocation. States have yet to agree on cost allocation
- Significant siting challenges in recent years

Incorporating All Reliability Needs into Market Design

- Consumers, states, and FERC do not always support new market designs to solve prospective problems, particularly when they are innovative or unfamiliar, or when reliability benefits cannot be precisely determined
- A current regional focus is energy adequacy, but incenting very rapid energy production/ curtailment ("flexibility") is the next challenge

Poor Results

Energy Adequacy

- "Resource Adequacy" (capacity) does not ensure "Energy Adequacy" (also calling into question legacy reliability standards)

Utilization of Long Term Hedging

- State mandated retail pricing provide short-term price hedging for end customers, but there is little/no hedging of long term supply risks
  - Long term contracting for variable renewable energy to meet decarbonization goals, but not for reliability services
  - Little/no long term contracting for gas-fired electricity/gas supplies, however gas likely to remain the primary balancing energy input until alternative long duration energy storage technologies are commercial

Key Electric and Gas Interdependencies

- Pipeline developers require, and LNG providers prefer, long term contracts
- Generators unwilling to enter into long term contracts due to cost recovery risk
- Limited dual fuel (oil) resulted from incentives and programs in the past to encourage that capability
- Gas pipelines resist change to their business model
- Gas and electric system remain sub-optimally coordinated
- Siting of new gas infrastructure is (almost) impossible in the Northeast region

Do These Assumptions/Expectations Still Hold True?

Supply Side Frictions Would be Manageable

- Supply would respond promptly to shortages and higher prices
- Infrastructure siting would be manageable
- Exit and entry would be reasonably well coordinated by the markets
- Fuel supply infrastructure would keep up with changing energy supply mix and electricity demand, including changing operational dynamics

Consumers (or Their Proxies), Would Enter Into Long-Term Supply Contracts, or Reduce Demand, to Avoid/Manage Shortages

- Wholesale electricity markets would facilitate healthy long term bilateral contracting
- Restructured states would encourage long term contracting, and price responsive demand, through dynamic retail pricing
- Customers that made forward arrangements would be less vulnerable to load shedding in shortage conditions (i.e. the free rider problem would be minimal)
- With contracting, society would be tolerant of spot price volatility and scarcity conditions (expectation that these events would be short duration)

Public Policy

- Federal and state policies would be aligned, or at least not in conflict (e.g. MOPR)
- Policy incentives outside of the market would be limited in scale and scope
- Externalities (e.g. carbon, NOx, SOx emissions) would be appropriately priced
- Legacy reliability standards would be adequate

New Risks and Difficult Questions on the Horizon

- Energy and ancillary services prices will become increasingly volatile
- Significant, **long-duration** balancing **energy sources** will be needed
- The **coordination of resource (and energy) adequacy** has become more tenuous; barriers to entry (infrastructure siting) are growing
- How to manage the **interdependent** nature of the wholesale electric and gas **system** when the regulatory models are so different?
- Who should make the decision on **how much reliability** is desirable?

Four Pillars of Supporting a Successful Energy Transition

New England is on a path to achieve a clean-energy future over the next several decades. Calling upon the results of several key studies, as well as 25 years' experience planning the region's power system, the ISO has identified four pillars critical to supporting the region's clean energy transition

1

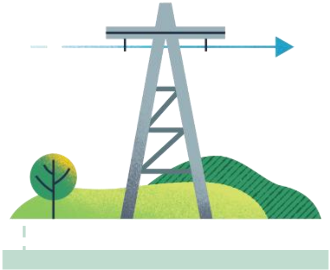
Significant amounts of clean energy to power the economy with a greener grid

2

Balancing resources that keep electricity supply and demand in equilibrium

3

Energy adequacy - a dependable energy supply chain and/or a robust energy reserve to manage through extended periods of severe weather or energy supply constraints



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Robust transmission to integrate renewable resources and move clean electricity to consumers across New England

Conclusions

- The **pace of change** is challenging for wholesale market designers, and transmission and distribution operators. This will drive innovation…
  - Market design must strive to adhere to economic principles but accommodate regulatory/policy imperatives and constraints (including prioritizing reliability)
- The electric and gas **systems are highly interdependent**; however, this is not recognized in the regulatory oversight of these two systems
  - Coordination of the clean energy transition between these two systems is sub-optimal, placing added stress on operations and reliability for both systems
- Significant **innovation and investment** will be needed to ensure a successful clean energy transition
  - We cannot lose sight of the need to ensure that all four pillars are equally robust

Final Thoughts

- The 25-year mark is a timely opportunity to review the original assumptions underlying the wholesale electricity markets framework
  - The underlying energy and ancillary services market design is sound and has provided demonstrable benefits for consumers
  - There are frictions for the continuing development and retention of the energy resources and infrastructure needed to provide **resource** and **energy adequacy** and ensure a reliable clean energy transition
  - These frictions were not considered 25 years ago, but need to be addressed, or accommodated in the market design, for the clean energy transition to be successful