Harmonizing Environmental Policies with Competitive Markets

Using Wholesale Power Markets to Meet State and Customer Demand for a Cleaner Electricity Grid More Cost Effectively

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Discussion Paper

July 2018

THE Brattle GROUP

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In recent years we have seen a growing divergence between states' policies to support certain resources and the design of regional wholesale power markets. States and customers increasingly demand clean energy, while system operators have become increasingly concerned about the collateral effects of policy-supported resources on wholesale market outcomes.

The Federal Energy Regulatory Commission's (FERC's) recent decisions regarding policy resources in PJM's and ISO-NE's capacity markets create a critical fork in the road for both environmental and market advocates.[1] The Orders attempt to resolve the growing disconnect by "protecting" capacity markets from the price-suppressive effects of state-supported resources. The FERC Order on PJM proposes to allow states to withdraw policy-supported resources and corresponding load from capacity market participation. This presents states with one path to re-regulate their electricity supply and lose the benefits of markets, or another to reevaluate their policy goals in order to preserve the wholesale market.

We see a third and better path forward that uses wholesale markets to achieve states' environmental goals. Since state policymakers and customers increasingly value the environmental attributes of their wholesale electricity supplies, system operators should embrace serving the demand for a cleaner supply mix as a central part of their mandate. The system operators can work with policymakers to craft markets that will serve the large and growing demand for clean energy. Meanwhile, states should embrace the opportunity to use competitive wholesale markets to identify lower-cost and more innovative clean-energy solutions. As the fleet transforms toward an ever cleaner energy mix, well-designed market mechanisms can help guide investments toward a fleet that will provide reliability, flexibility, and clean-energy attributes at the least cost.

[1] See FERC Order rejecting both options offered under PJM's jump ball filing, Docket Nos. EL16-49-000; ER18-1314-000 and -001; EL18-178-000.

Conflicting Views: States See "Market Failures" While System Operators See "Subsidies" that Undermine Wholesale Power Markets

State policymakers point to a number of reasons that they want to influence the supply mix, but meeting clean-energy objectives is becoming the dominant reason for transforming the fleet. Many states across the U.S. aim to reduce carbon emissions produced from the electricity sector. Twenty-two states have carbon emissions reduction mandates or goals, and 29 states have renewable portfolio standards (RPS).[2] In New England and New York, all seven states have legal mandates or goals to achieve economy-wide carbon reductions in the range of 80% by 2050.[3] Even greater emissions reductions may be needed from the electricity sector if other economic sectors decarbonize through electrification. In PJM's market, the states' goals are more varied, ranging from some states with only modest environmental policies, to states such as Illinois, Maryland, and New Jersey with 60% to 80% carbon reduction goals by 2050.[4] In addition to states, many customers, public power entities, municipalities, and utilities are pursuing clean-energy goals for a variety of environmental and economic reasons. For example, the Renewable Energy Buyers Alliance, representing more than 60 major companies across the U.S., has set a goal of procuring 60,000 MW of new renewable generation by 2025.[5]

Achieving these state and customer goals will require policy interventions to influence the resource mix. Absent adequate reflection of these policies through regional emissions trading or wholesale market designs, the wholesale markets will produce electricity from the lowest-cost sources of supply, including from fossil fuel plants that produce carbon emissions and other

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2 See Kuramochi *et al.*, States, cities and businesses leading the way: a first look at decentralized climate commitments in the US, New Climate Institute, September 2017, and Galen Barbose, U.S. Renewables Portfolio Standards 2017 Annual Status Report, Lawrence Berkeley National Laboratory, July 2017.

3 See ISO-NE, "The New England states have an ongoing framework for reducing greenhouse gas emissions," March 2017; and "Governor Cuomo, Joined by Vice President gore, announces New actions to Reduce Greenhouse Gas Emissions and lead Nation on Climate Change."

4 See Kuramochi *et al.*, States, cities and businesses leading the way: a first look at decentralized climate commitments in the US, New Climate Institute, September 2017, and North Carolina Clean Energy Technology Center, "Database of State Incentives for Renewables & Efficiency".

5 See J. Pfeifenberger *et al.*, "The Role of RTO/ISO Markets in Facilitating Renewable Generation," December 8, 2016 and World Resources Institute, "RELEASE: Renewable Energy Buyers Alliance Forms to Power the Corporate Movement to Renewable Energy," May 12, 2016.

pollutants. Under current market conditions, the dominant form of market-based entry is from natural gas-fired plants. For example, PJM and ISO-NE's markets have attracted 22,000 MW and 2,750 MW of gas plants, respectively, over the past five years.[6] These are the results even with Regional Greenhouse Gas Initiative (RGGI) that caps the emissions from power plants located in nine northeastern states. Further, wholesale market conditions are often unfavorable for non-emitting resources, including existing nuclear and hydroelectric plants that provide clean-energy attributes without compensation and, consequently, are facing an increased risk of retirement. For example, more than 7,000 MW of nuclear plants failed to clear in the most recent PJM capacity auction.[7] For states that want to decarbonize, these trends are viewed as a "market failure" that needs to be addressed if they are to achieve their policy objectives.[8]

Thus, many states are pursuing policies to support the development and retention of non-emitting resources, through various means such as: RPS; large-scale clean-energy contract procurements from offshore wind, Canadian hydro, and other renewables; mandates to support specific technologies such as offshore wind, storage, or solar; and direct payments such as the zero-emissions credit (ZEC) programs to retain existing nuclear plants. These policies are growing rapidly with the states' increasingly ambitious environmental goals. Over time, we expect that they will largely displace market-based entry of conventional resources. The mix and design of these state-sponsored programs are often selected in consideration of many other policy objectives, including their potential impact on customer rates, local industrial development, local employment, and voters' preferences. But in most cases, a significant and often dominant purpose is to help decarbonize the electricity system.

The system operators and private investors in PJM and New England view these state activities with concern. They warn that states' policy choices to support specific plants or technologies are distorting wholesale power markets by introducing excess supply, displacing market-based investments, imposing regulatory risks on private investors, and suppressing prices in energy and capacity markets. Suppressed prices can have the unintended effect of amplifying the financial distress of existing nuclear and hydro resources, which may invite even more subsidies. Merchant generation investors are frustrated by state policies that award high payments to a subset of clean resources but that do not invite participation from the full set of market participants that could identify lower-cost solutions to meet the states' clean-energy goals. Given the outlook of further growth in states' clean-energy policies, the concern is that the level of state intervention could become so extensive that all investment and retirement decisions would be made through state

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6 Figures for PJM reflect the 2016/17-2020/21 timeframe, New England numbers span 2017/18 to 2021/22. See PJM 2021/22 RPM Base Residual Auction Results and ISO-NE, 2021/22 Forward Capacity Auction Obligations, March 1, 2018.

7 Statement from PJM Vice President Stu Bressler to reporters on May 23, 2018.

8 The fact that markets on their own do not mitigate the environmental externality costs of carbon emissions and other pollutants is one of the classic examples of "market failures" used in many economic textbooks. For example, see Joseph Stiglitz, *Economics of the Public Sector*, 1988.

policy initiatives rather than by private investors responding to market-based signals. This would lead to inefficient resource investment and retirement decisions, reduced competition, less market-driven innovation, and ultimately, higher-cost outcomes for consumers.

To date, the system operators' proposed solutions have been to raise capacity market prices to the estimated higher level that might prevail in the absence of state-supported resources. This is the basic idea behind New England's recently-adopted two-stage capacity auction and both proposals offered under PJM's capacity repricing filing that was just rejected by the FERC.[9] These repricing approaches aim to reconcile state policies and capacity markets, but we do not view them as sustainable long-term solutions. As the quantity of resources needed to achieve states' clean-energy policies increases, it will become progressively more challenging to "adjust" the capacity markets as if those resources did not exist. Attempting to do so creates a fundamental mismatch between the economics of the actual fleet and market prices, as FERC noted in its rejection Order. The size of the pricing mismatch will grow with the increasing share of state-supported resources. Capacity repricing will also negate an important pricing signal that would otherwise prevail: with states and customers demanding large amounts of non-emitting resources, fewer carbon-emitting resources are needed and their economic value is lower.

In other words, the state's policy actions and system operators' capacity repricing responses are working at cross purposes, which will increase system-wide costs by making both wholesale markets and state-supported procurements less efficient. Attempts at maintaining these opposing forces will result in some combination of problems, including paying for more resources than needed for resource adequacy; maintaining economic incentives for carbon-emitting generators in contradiction to the goals and customer preferences; and/or failing to identify the most cost-effective ways to transform to a cleaner fleet. Together, these outcomes will impose inefficiencies and costs on customers that exceed what would be needed to meet capacity and environmental requirements in a more integrated, co-optimized, and competitive market environment.

In the FERC's rejection of PJM's proposals, the Commission discussed many of these challenges and proposed a different approach to balancing the needs of the states and the regional markets.[10] The order requires PJM to create an expanded minimum offer price rule (MOPR) that would allow policy-supported resources to participate in the capacity market, but only if they offer at higher prices reflecting their costs without "subsidies."[11] This mechanism will exclude some of the state-

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[9] Though the basic concept and purpose is the same among all of these capacity repricing proposals, the mechanics, economic impacts, and implications for state policy differ greatly. See FERC Order on ISO-NE Competitive Auctions with Sponsored Policy Resources Tariff Filing, issued March 9, 2018; and PJM filing to FERC, Capacity Repricing or Alternative MOPR-Ex Proposal: Tariff Revisions to Address Impacts of State Public Policies on the PJM Capacity Market, filed April 9, 2018.

[10] See FERC Order rejecting both options offered under PJM's jump ball filing, Docket Nos. EL16-49-000; ER18-1314-000 and -001; EL18-178-000.

[11] Note that the term "subsidy" implies payments that necessarily are economically inefficient. That would not be the case if the payments received reflect the competitively-priced value of states' and customers'

supported or state-mandated clean-energy resources from the capacity market, which will increase capacity prices and the quantity of supply beyond that needed to meet resource adequacy requirements. States that wish to avoid this MOPR treatment would have an opportunity to use an expanded Fixed Resource Requirement (FRR) option to partially opt out of the market, withdrawing both supply and demand from future capacity auctions.[12] In effect, the FERC has indirectly acknowledged the states' concern that the existing markets may conflict with states' policy goals, and has suggested a solution for piecemeal withdrawal from the capacity market. While doing so may be less expensive to the affected states than accepting MOPR, this option will still produce higher costs than a more integrated solution. It would reduce the role of wholesale power markets and their relevance to guiding resource investments and retirement decisions.

Taking a step back, the divergence in views stems from a fundamental mismatch between what environmentally-oriented customers and policymakers want and what the wholesale markets are currently designed to achieve. The wholesale markets were designed to maintain reliability at competitive prices. That purpose is fulfilled by using technology-neutral, competitive processes to procure and co-optimize a set of energy, ancillary service, and resource adequacy products. For the most part, this market design does not differentiate resources based on environmental attributes or carbon emissions. Since the current wholesale power markets were never developed to address clean-energy or carbon-related policy objectives and "internalize" these objectives into market prices, it should be no surprise that the competitive forces can drive operational, investment, and retirement decisions that do not support states' emissions reduction goals.[13] But markets can do more than they have historically been asked to do; they can help environmentally-oriented states and customers pursue their objectives more cost effectively if we design them for that purpose.

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clean-energy preferences. Unfortunately, in the absence of competitive clean-energy markets that are integrated and co-optimized with existing wholesale power markets, the payments currently available may significantly exceed the competitively-priced value of clean-energy preferences, leading to higher clean-energy procurement costs and inefficient market distortions.

[12] The FERC would still allow all resources to participate in the wholesale energy and ancillary services markets.

[13] Though several states have introduced carbon pricing through the cap-and-trade markets with RGGI or the Western Climate Initiative (WCI), the carbon prices associated with these initiative would need to be significantly higher to fulfill the states' carbon and clean-energy goals.

How States Can Meet Their Clean-Energy Policies More Cost Effectively and More Compatibly With Wholesale Power Markets

Most of the states in the Northeastern U.S. have adopted electricity industry restructuring to capture the benefits of competitive power markets. They rely on market-based generation investment and operating decisions to serve customers at competitive prices. But as states pursue an increasing variety and scope of energy policies, some of these initiatives are becoming increasingly dissonant with the wholesale power markets. These dissonances manifest in a variety of ways such as negative pricing caused by wind resources that locate in already-saturated market areas, clean-energy contracts that do not adequately manage transmission constraints, and the procurement of higher-cost clean-energy resources when more competitive, lower-cost options are available. A more harmonized approach is possible.

The starting point for states to better align their policies with the wholesale markets is to focus on a well-defined set of environmental policy objectives. The more explicitly states' objectives can be expressed as a quantified requirement for carbon reductions or clean-energy delivery, the more effectively those needs can be integrated into wholesale power markets. Well-defined, quantifiable objectives can be readily translated into products and services that can be purchased competitively through resource-neutral regional market designs. Further, providing clear, consistent policies with a stable long-term outlook provides the marketplace with a level of consistency that minimizes regulatory risk and maintains investors' confidence.

Many states' clean-energy policies have been pursued alongside a wide range of other policy objectives, many of which are challenging to integrate into regional wholesale markets. For example, some policies aim to retain jobs in a specific location or financially support specific emerging industries. While well-designed markets do create jobs and reward innovation, these opportunities may not arise in the specific location or industrial sector preferred by state policymakers. These types of objectives are difficult to integrate into the wholesale power markets. Other objectives that are challenging to align with wholesale markets would include those that are not based on clearly quantified requirements, would change significantly over time, or that are already remunerated through wholesale markets.

When states' and customers' environmental goals are expressed as well-defined targets, market-based mechanisms can be designed to achieve those goals most cost effectively. As we have

expressed in recent comments at a FERC technical conference, the most promising opportunities to use markets to meet states' and customers' environmental goals are:[14]

- **Carbon Pricing or Cap-and-Trade.** The textbook, market-based way to reduce carbon and other environmental pollutants is to impose a cost for producing them. This creates private incentives to avoid environmental externalities, inducing the competitive markets to achieve reductions. California (with WCI) and the Northeastern states (with RGGI) currently use cap-and-trade markets to internalize carbon-related costs, though the prices are not high enough to support the states' full range of clean-energy objectives. Higher carbon prices would make the markets work even harder to reduce carbon emissions. As another variation, in New York, we are supporting the NYISO to design and evaluate a state-sponsored, ISO-administered, carbon charge mechanism to internalize the state's goals within the ISO's generation commitment and dispatch.[15] Both cap-and-trade and ISO carbon pricing are highly compatible with existing wholesale power markets. The carbon price immediately alters generation commitment and dispatch in favor of lower-emitting plants consistent with state policy goals and, over time, attracts and retains a lower-emitting fleet. However, as efficient as carbon pricing can be as a solution, there are a number of barriers that have prevented widespread adoption. The challenges are greatest in large regional markets where some states and customers place great value on emissions reductions and others do not, requiring difficult seams management. It is also unclear, as shown by the European carbon pricing experience, whether short-term carbon price signals are the most effective approach to supporting clean-energy investment decisions, given regulatory risks surrounding the carbon price.
- **Competitive and "Dynamic" Clean-Energy Markets.** Another approach would be to implement competitive regional markets for clean-energy attributes. To do so, the regional wholesale market operators could administer technology-neutral, competitive auctions for unbundled clean-energy attributes. The product would be the clean-energy attribute of non-emitting generation, similar to the renewable energy credit (REC) systems that many states employ, but based on a best-practice market design. States, large customers, competitive retail suppliers, and public power entities could all rely on the voluntary clean-energy market to procure their clean-energy needs from the most cost-competitive non-emitting resources in the region. For example, in New England, we have supported a group of stakeholders in developing a resource-neutral forward clean-energy market designed to

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[14] Comments of Dr. Samuel Newell to the Federal Energy Regulatory Commission Regarding State Policies and Wholesale Markets Operated by ISO New England Inc., New York Independent System Operator, Inc., and PJM Interconnection, L.L.C, May 1–2, 2017.

See also: Sam Newell, Johannes Pfeifenberger, Judy Chang, Kathleen Spees, "How wholesale power markets and state environmental policies can work together", *Utility Dive*, July 10, 2017.

[15] Samuel A. Newell, Roger Lueken, Jürgen Weiss, Kathleen Spees, Pearl Donohoo-Vallett, and Tony Lee. Pricing Carbon into NYISO's Wholesale Energy Market to Support New York's Decarbonization Goals, August 10, 2017.

enable states to meet their clean-energy goals.[16] The forward clean-energy market would attract and retain clean-energy resources to meet states' clean-energy requirements, similar to how forward capacity markets meet resource adequacy requirements. Beyond utilizing a capacity market-type construct to attract investments, this "dynamic" clean-energy market would maximize the carbon abatement value of every megawatt hour (MWh) of clean energy procured by paying clean-energy resources in proportion to the marginal carbon displacement they actually achieve when feeding power into the grid. Given that many clean-energy technologies (such as hydro, nuclear, wind, and solar) are at present mature or very close to it, this approach is highly compatible with existing wholesale markets, even in regions where states have very divergent clean-energy policies. A shortcoming is that by focusing on only clean energy, this approach does not incentivize switching dispatch from higher-emitting toward lower-emitting fossil plants as a carbon pricing mechanism would.

The states' track records of using the most competitive and economically-efficient solutions to meet their clean-energy policies are mixed at best. Some states use carbon pricing or REC markets to meet some of their environmental goals, but the use of these mechanisms has so far been too limited and too fragmented to incentivize the most cost-effective combination of economic dispatch, retirements, and new investments. Most of the employed mechanisms limit competition to a narrow subset of resource types or in-state locations, or they direct incentives solely toward preferred technologies or specific plants. Other mechanisms rely on administrative determinations of appropriate incentive levels for specific resources or resource types, rather than using competitive forces to determine the minimum level of financial support necessary to achieve state goals. Picking and choosing technologies or individual plants may achieve the specified outcome such as supporting new technologies or industries, but may do so at a high cost per ton of carbon avoided. Further, such approaches can erode the role of wholesale power markets in attracting and retaining the most cost-effective resources.

Going forward, states have many opportunities to enhance the mechanisms used to achieve their clean-energy policies that will reduce customer costs and better align with the regional power markets. The more states can rely on well-defined environmental goals and resource-neutral solutions, the more easily these efforts can be integrated with wholesale markets. Given the rapid acceleration of clean-energy initiatives and customer preferences, states should be proactive in working together and with regional system operators to establish more market-based approaches to support their long-term policy goals. Otherwise they will continue to be disappointed by market outcomes that appear to work at cross purposes to their policy objectives, by inducing additional investments in long-lived fossil plants and allowing the retirement of existing non-emitting resources that could be retained at low cost. As states' and customers' demand for clean energy

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[16] Prepared by Kathleen Spees, Judy Chang, David Luke Oates, and Tony Lee of The Brattle Group and Coalition Partners (Conservation Law Foundation, Brookfield Renewable, NextEra Energy Resources, National Grid, and Robert Stoddard), "A Dynamic Clean Energy Market in New England," November 2017.

continues to grow, it will become ever more important to achieve those goals in the most cost-effective manner through improved wholesale power market designs.

How Wholesale Power Markets Can Be Enhanced to Meet State and Customer Demand for a Cleaner Electricity Grid

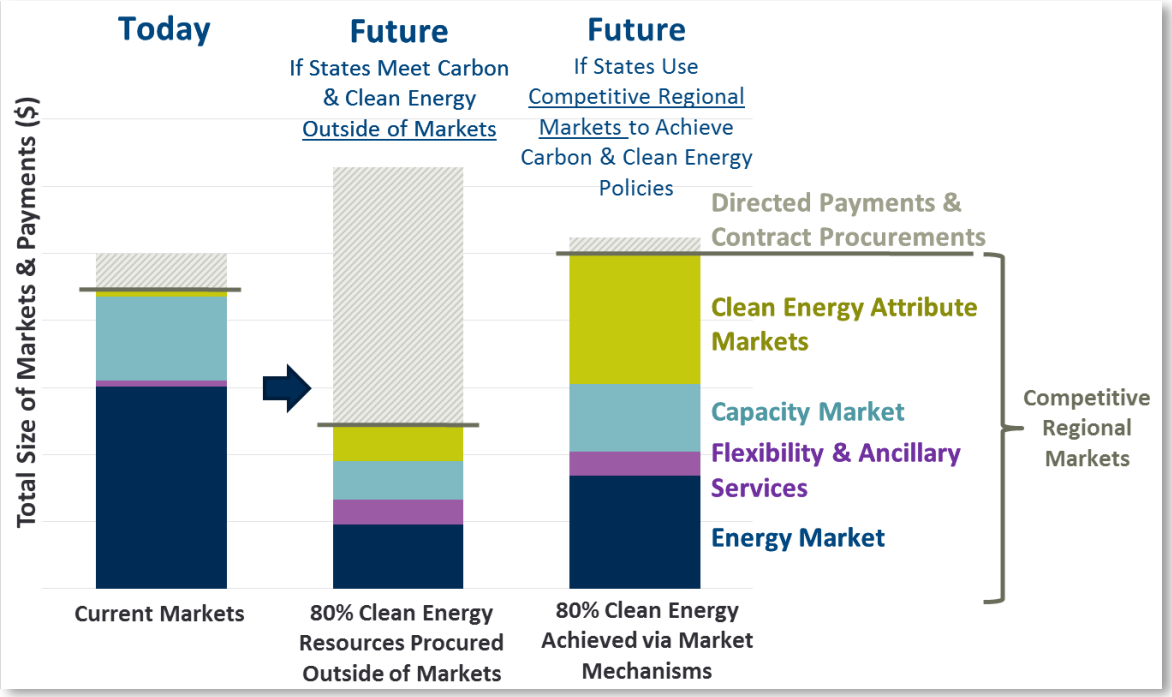
If we continue down our current path, the electricity system will become increasingly dominated by policy-driven and regulated investments if states are to achieve their environmental goals. As illustrated by the first two bars in the figure below, this will result in a declining role for regional power markets and the associated benefits they can provide. However, we are optimistic that there is another, more attractive path forward to meet the demand for clean energy more cost effectively through regional mechanisms that support market-based (rather than state-procured and ratepayer-funded) investments. As shown in the third bar of the figure below, this path will retain a larger role for regional wholesale power markets to address traditional system needs for energy, ancillary services, and capacity. This path would also require the introduction or expansion of clean-energy attribute and carbon markets that reflect states' policy objectives. Carbon pricing or cap-and-trade will influence wholesale market outcomes indirectly through the energy price; clean attribute markets could ultimately become a large portion of the wholesale power markets, given the high investment cost and low variable cost of most clean-energy resources. The expanded carbon and clean-energy attribute markets could be operated by system operators, groups of states, or individual states, but should maximize competitive forces across the regional supply mix to meet the procurement needs most cost effectively.

Pursuing the market-oriented path will require market operators to embrace states' and end-use customers' increasing demand for a cleaner electricity system. Then states and system operators can enhance the wholesale power markets to do what these markets do best: bring together supply and demand in a more competitive fashion that stimulates and rewards innovation. In other industries, customers' shift toward demanding "green" products is increasingly met by competitive suppliers offering more environmentally-conscious options. The electricity sector should be no different. If customers and their representatives demand clean energy, then the role of the regional wholesale power markets should be to deliver that clean energy in a reliable and more cost-effective manner.[17] While many states do not yet appear to focus on the most competitive, cost-

[17] Competitive retailers also engage in procuring clean-energy resources on behalf of customers by procuring and developing individual clean-energy products, but there is no transparent, liquid, centralized clean-energy market that can be used by small customers to avoid transaction costs or used by large customers to evaluate competitive retailers' rate offerings for clean electricity.

effective clean-energy solutions available, these considerations will gain in importance as the scale of clean-energy requirements expands. As the experience in some markets like Ontario has shown, the customer costs and risks of administratively-specified, resource-specific procurements through long-term contracts can be quite high compared to procurements through technology-neutral wholesale market designs.

Future With and Without Regional Carbon and Clean-Energy Markets



Source: The Brattle Group

To maintain their relevance in a future where states and customers demand an increasingly higher share of clean-energy resources, the system operators will need to work with states to develop and implement more attractive, market-based solutions to deliver clean energy. States that work together with the regional market operators to express their goals in a resource-neutral and market-based fashion will be able to achieve more ambitious outcomes at a lower cost to ratepayers. Once these markets demonstrate that they can deliver clean energy at lower costs, states and customers will find it more attractive to participate in them.

The regional market operators should aim to be highly accommodating toward states that are willing to use market-based approaches to meet their clean-energy goals. As to the current capacity market repricing discussions, resources attracted and revenues generated through technology-neutral, competitive mechanisms should be deemed to be "*in-market*" for the purposes of MOPR and capacity repricing. The resources procured through a clean-energy market would enter through competitive merchant investments, and so would not be subject to any capacity market repricing rules. Regional market proponents will likely see value in these market-based clean-energy solutions because all clean-energy technologies, both existing and new resources, would be eligible to compete on a level playing field. Integrating and co-optimizing these clean-

energy markets with the existing capacity, energy, and ancillary services markets will result in better investment and retirement decisions and a lower-cost resource mix to serve reliability and clean-energy needs.

The regional clean-energy markets would enable large customers, retail suppliers, public power entities, and integrated utilities to participate on a voluntary basis. This option may be particularly attractive for entities without the scale, specialized expertise, or risk tolerance to engage in bilateral long-term contracts with renewable power projects. Creating new market-based opportunities for large commercial and industrial customers, such as the members of the Renewable Energy Buyers Alliance, would help them to satisfy their environmental goals more cost effectively.

The design of these carbon and clean-energy markets will need to differ across regions because they will have to acknowledge the differences in the regions' state policies and institutional arrangements. Expanded carbon pricing could be an effective solution in places where that is politically feasible. Careful carbon pricing for power imports and exports can be used to mitigate "leakage" concerns between states with different carbon policies.[18] As an alternative, a centralized "dynamic" clean-energy forward market, like the proposal we developed for New England, may be more acceptable and more supportive of investment decisions in some regions. In any case, these options allow individual states and customers to pursue their clean-energy preferences without imposing additional costs on other states and non-participants.

Charting a constructive path forward will require that states and system operators acknowledge the concerns on each side of this debate. States have a legitimate interest in pursuing environmental policies and enabling customer demand for a cleaner electricity system. System operators have a legitimate interest in preserving the role of markets to deliver economic efficiency and competitive outcomes to the public. Both sets of concerns can be addressed through the creation of well-designed carbon and clean-energy markets that states and customers can utilize to meet their demand for a cleaner electricity mix more cost effectively. The expanded wholesale power market design will put states, customers, and system operators in the best position to harness the full benefits of competitive markets to identify innovative solutions for a reliable, low-cost, and cleaner grid.

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[18] Section V.C. of Brattle's 2017 New York Carbon Pricing report discusses approaches to address emissions leakage across markets. When carbon prices vary within a market, advanced dispatch approaches can be used to mitigate leakage. For example, see Judy Chang, Johannes P. Pfeifenberger, Kai Van Horn, Onur Aydin, and Mariko Geronimo Aydin, Modeling the 1-Step and 2-Step Dispatch Approaches to Account for GHG Emissions from EIM Transfers to Serve CAISO Load, November 17, 2017.

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