# Driving Environmental Outcomes Through Utility Reform

## Lessons from New York REV

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# Acronyms and abbreviations

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| **AMI** | Advanced metering infrastructure |
| **BCA** | Benefit Cost Analysis |
| **BQDM** | Brooklyn-Queens Demand Management (a/k/a "the Neighborhood Program") |
| **CARB** | California Air Resources Board |
| **CES** | Clean Energy Standard |
| **CHP** | Combined heat and power |
| **DER** | Distributed energy resource |
| **DG** | Distributed generation |
| **DPS** | Department of Public Service |
| **DSIP** | Distributed System Implementation Plan |
| **DSP** | Distributed system platform provider |
| **EAM** | Earnings Adjustment Mechanism |
| **FERC** | Federal Energy Regulation Commission |
| **IOU** | Investor-owned utility |
| **ISO** | Independent System Operator |
| **LMP** | Locational Marginal Price |
| **NEM** | Net energy metering |
| **NWA** | Non-wires alternative |
| **NYDEC** | New York Department of Environmental Conservation |
| **NYISO** | New York Independent System Operator |
| **NYPSC** | New York Public Service Commission |
| **PSR** | Platform Service Revenue |
| **REC** | Renewable Energy Credit |
| **REV** | Reforming the Energy Vision |
| **RGGI** | Regional Greenhouse Gas Initiative |
| **RPS** | Renewable Portfolio Standards |
| **RTO** | Regional Transmission Organization |

# Executive summary

The economics that have driven America's electric utilities have changed. For a century, utilities' ability to make profit has depended on their investment in infrastructure, and their revenue has been tied to charging customers based on how much energy they use.

Yesteryear's approach conflicts with today's public interests—energy efficiency, less local air pollution, and decarbonizing our economy. It also conflicts with the technological advancements of the last several decades, which now allow energy to flow more freely through copper wires, much as data flows through the airwaves. Customers can now generate, store and even sell their own electricity. They are beginning to "see" their usage and make real-time decisions to change it.

None of this technological change reduces our need for affordable and reliable energy. Rather, in a warming world, that need has only increased. Major storms like Superstorm Sandy and Hurricanes Irene, Harvey, and Irma are painful reminders of how dependent our lives and economy are on electricity.

Around the United States, cities, counties, states and industry are investing billions of dollars into grid modernization efforts to improve resiliency and future-proof the grid from a mounting wave of disruptive technologies. Together, America's grid upgrade projects will be the largest infrastructure investment in history.

These efforts have the potential to generate incredible environmental and public health benefits, from reductions in local air pollution to massive reductions in greenhouse gas ("GHG") emissions. None of these benefits are, however, guaranteed by a modern grid. They must be part of the plan, right along with resiliency and affordability.

The state of New York launched Reforming the Energy Vision ("REV") to spark a transition of the state's electric system to "achieve optimal system efficiencies, secure universal, affordable service, and enable the development of a resilient, climate-friendly energy system."[1]

This whitepaper examines the approach taken by the New York Public Service Commission ("NYPSC") and sheds light on the elements that must be included for electric utility modernization efforts to yield maximum environmental benefits.

*1. Building a smart platform.*

A clean grid requires a fundamental improvement in the "intelligence" of the infrastructure, including a smart platform that allows customers to become an active part of the energy network and enables utilities and market participants to efficiently deploy a portfolio of generation. This requires the electricity system to evolve beyond poles and wires into a "distributed system platform"—a transactional platform that will function atop the distribution system.

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[1] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting Regulatory Policy Framework and Implementation Plan (February 26, 2015) at 3.

*2. Aligning utility earnings with environmental outcomes.*

REV is built around an electricity system that is heading toward decarbonization. A low- or no-carbon future is not debated; it is treated as essential. This, of course, creates a significant challenge to utilities that have not only relied on resources that burn fossil fuels, but have generated money mostly by selling more energy. Decarbonizing the energy system will require that environmental outcomes be valued and, therefore, desired by energy providers. If utilities have no incentive to foster the emergence of a cleaner grid, they will not do so. Utility earnings opportunities should arise from GHG emissions reductions, or at least from specific levers that utilities can use to influence GHG emissions reductions.

*3. Engaging customers: transforming electricity buyers into market participants.*

Technology and new types of generation energy will surely play major roles in the modern grid. But actively engaged customers will be significant new players. In a future where grid flexibility is valued, customers who can generate energy or significantly alter demand will become as essential as power plants. For this reason, customers will require access to timely, detailed information about consumption, market signals that reward them for certain consumption decisions, and privacy and data ownership policies that allow them to securely share their energy data with any solution providers they choose. Moreover, to ensure a just transition, it will be essential to include low-income and vulnerable consumers in an effort to transform traditionally passive residential customers into full market participants.

The transformation of the U.S. electric industry now underway offers a unique and remarkable environmental opportunity. The imperative to achieve favorable environmental outcomes must remain in focus if that opportunity is to be fully realized.

# 1. Introduction

At a time when the federal government's commitment to environmental values is weak, the tools that can help state governments achieve favorable environmental outcomes are of paramount importance. Utility business practices—including practices that are not on their face related to pollution and other environmental impacts—have an important role to play. Given their ubiquity in the electric industry space, utility companies can help ensure that environmental goals are achieved in the most affordable manner available. This whitepaper considers the transformation of electric utility regulation that has been spearheaded by Governor Cuomo and the NYPSC and the opportunity that that approach presents to drive desirable environmental outcomes in other jurisdictions.

The familiar approach to regulating electric utilities emerged more than a century ago, at the dawn of the electric industry. Under the "regulatory compact," monopoly utilities would in effect give up some control over their ability to make their own business decisions, and, in return for submitting to government supervision of their rates and terms of service, they would have the opportunity to earn a fair rate of return on the capital they invested in their systems. In this context, the utilities' ability to make money in the long term depends on their investment in infrastructure, and to this day, to the extent that customers pay for service on a per-kilowatt-hour basis, utilities also have an economic interest in spending as much capital and selling as much energy as possible. Today, these utility economic interests are misaligned with the public interest because they undermine efforts to encourage utilities to support energy efficiency and optimal system performance. The familiar ratemaking process has also ensured that the best way for utilities to profit is to use mature technologies to build and operate utility-owned systems that can meet any amount of demand at any time and to grow those systems steadily over time, which means electric utilities have little reason to support widespread, rapid deployment of newer technologies and practices that either reduce demand or give customers the opportunity to manage their own demand. As a result, it is not surprising that most customers have no awareness of the temporal variability in the cost of service and have no opportunity to manage the timing of their electricity purchases to minimize costs.

Throughout the United States and around the world, the "traditional" model is now under stress. Multiple customer- and policy-driven developments have undermined the profit opportunity for utilities, the fairness of outcomes for customers, and even the underlying assumptions about how ratemaking works. Furthermore, modern computing and telecommunications technologies and systems controls, especially when paired with energy storage, can make customers of all classes less likely to continue to behave as passive, inelastic price-takers—throwing the traditional approaches to serving costly peak demand, and even the basic arithmetic of ratemaking, into question.

The REV proceeding and its related initiatives are New York's effort to re-examine utility regulations and the resulting business model. New York took this ambitious step for largely local reasons: an electric reliability crisis in the wake of multiple massive outages associated with a series of unusual weather events, combined with fiscal concerns related to the aging of New York's electric system. After Hurricane Irene and Superstorm Sandy, New York's policymakers identified a need to "transition the grid to a flexible system that can respond to future technologies, support clean energy integration and minimize outages during major storms and events."[2] But without fundamental changes to how utilities were regulated, that transition could not get off the ground. Governor Cuomo and the NYPSC saw an opportunity for the transition to this futuristic system to be leveraged to create new value for customers, save customers money, and also decarbonize, all while supporting a financially robust utility.

At the heart of the REV vision is the "distributed system platform," a transactional platform that will function in effect as an overlay to the distribution system. The technological enhancements that will make this transactional platform possible can also be expected to support the greater grid flexibility that is essential to a high-intermittent-renewables future. At the same time, utility compensation mechanisms and innovative pricing tools arising out of REV and related proceedings will provide support for increasing energy efficiency and improving load shapes; allow for increased reliance on distributed energy resources ("DERs") while ensuring that the

[2] NYS 2100 Commission at 15, 80-109.

environmental value of distributed renewable resources is optimized and well compensated; and encourage beneficial electrification. The REV insight that the electric system is evolving into a "platform," and that its most efficient future would be one that builds on that reality, is of central importance when it comes to the goal of economy-wide decarbonization. It aligns with the emerging consensus that the electric system in its entirety will provide a platform for decarbonizing not just electricity, but all other energy uses ranging from transportation to building heating to industrial applications.

Historically, the main environmental challenges presented by the electric system have been to minimize or mitigate the harmful impacts of producing and delivering electricity, including disproportionate impacts on particular populations. But the challenge of decarbonizing is far more ambitious and affirmative than simply managing risk; *the electric system will be called upon to drive down GHG emissions economy-wide.* This can be accomplished most efficiently with the active engagement of companies in the electric sector and related sectors, and their customers. Similarly, as a low-carbon platform for the future takes shape, the challenge of protecting vulnerable populations will be transformed. In addition to guarding against disparate impacts, building a modern, clean system presents a new, affirmative challenge: providing for a just transition, ensuring that disadvantaged populations have a full share in the upside opportunity that a clean energy future presents.

Many facets of the REV transformation can be expected to contribute to favorable environmental outcomes.

**1. Building a smart platform.** Running the system substantially on intermittent renewables means that as far as possible, future demand needs to be capable of following supply, inverting the traditional paradigm. Thus, in addition to needing to grow a cleaner generation fleet, the electric sector needs to become more flexible, developing new capabilities to gauge and respond to changing conditions. The platform that serves as the foundation for a fast-moving DER marketplace can and should incorporate the visibility and flexibility needed to efficiently deploy a portfolio of intermittent generation. At the same time, to minimize the cost of these new capabilities, care should be taken not to continue to invest in massive excess capacity that allows resources to be deployed in a wasteful, inefficient manner. This entails, among other things:

- **a.** Accurate benefit-cost analysis that accounts for environmental impacts in a robust manner
- **b.** Non-wires alternatives
- **c.** Leveraging the many values of energy efficiency and other distributed resources
- **d.** Increasing visibility into system planning, allowing the marketplace to participate by proposing innovative solutions

**2. Aligning utility earnings with environmental outcomes.** New York regulators have assigned to the distribution utilities the important role of distribution system platform provider. In this role, the utilities have an opportunity to shape the future marketplace, and the NYPSC intends that they be able to profit directly from that role, by selling value-added services to some customers and earning "platform service revenues" for their role in facilitating the distributed marketplace. Since the platform is still in its infancy, utilities are not yet in a position to profit from platform-service revenues. Therefore, this whitepaper focuses on two other earnings opportunities that can contribute to favorable environmental outcomes: Non-Wires Alternatives Compensation and Earnings Adjustment Mechanisms, which are discussed in Sections 3.2.1 and 3.2.2 respectively.

**3. Engaging customers: Transforming passive electricity buyers into market participants.** In a future where flexibility is valued and many customers are deploying their own distributed energy resources, customers will need access to timely, detailed information about their consumption as well as market signals that reward them for consumption decisions with favorable cost and environmental ramifications. This whitepaper therefore focuses on advanced metering, consumption tariffs and price signals, and DER price signals. It also explores efforts to ensure a just transition by including low-income and vulnerable consumers in the effort to transform traditionally passive residential customers into full market participants.

The significant negative environmental effects of today's electric sector relate largely to electricity supply, yet electric generators are generally not owned or operated by distribution utilities in New York and other restructured states. Emissions sources other than electric generation are also, naturally, not owned by electric distribution utilities. The most efficient approaches to achieving New York's environmental goals would involve internalizing the externalities associated with carbon dioxide and other GHG emissions on an economy-wide basis. Although New York has begun a program to dramatically increase reliance on renewable generation, the path to economy-wide decarbonization remains unclear.

Whatever the precise pathway to economy-wide decarbonization, giving distribution utilities a direct stake in a low-carbon future would be a transformative step, and one that has not yet been taken in any REV order. The environmental imperative to use the electric system as a platform for decarbonizing other sectors of the economy aligns well with REV's vision of electric distribution utilities as transactional platforms. However, although REV has gone some distance toward aligning utility earnings and business practices with emerging market realities and policy imperatives, more could be done to encourage the electric utilities to embrace their role as a decarbonization platform.

To that end, the NYPSC and other state regulators considering REV-type reforms should consider opportunities to tie utility earnings opportunities to carbon dioxide emissions reductions, or at least to more specific levers for GHG emissions reductions. For example, utilities could have earnings opportunities associated with their customers' increased reliance on renewable generation or deployment of environmentally beneficial electrification. Thinking even more broadly, electric utilities could have earnings opportunities based on their customers' total GHG footprint, including their total GHG footprint associated with applications that are not currently powered by electricity.

# 2. Context

## 2.1 The traditional utility business model

The traditional business model of investor-owned utilities ("IOUs") is by no means the only way to provide "public utility" services. Rather, that model is "a manifestation of public utility," which is based on an approach to regulating electric utilities that emerged more than a century ago, at the dawn of the electric industry.[3] Utility companies (which were originally vertically integrated, including generation, transmission, and distribution functions) were recognized as having a natural monopoly, and so were subjected to "economic regulation," whereby a government regulator would have authority over all their business plans and business practice, including the prices they charged for their services.[4] Under the "regulatory compact," monopoly utilities would in effect give up some control over their own business decisions, and, in return for submitting to government supervision of their rates and terms of service, they would have the opportunity to earn a fair rate of return on the capital they invested in their systems.[5] Generally, customers of monopoly utilities have been assumed to be inelastic price-takers, and the utility has been responsible for ensuring that the system was adequate to serve them. Prices for the services provided by the regulated utility company—also known as "rates"—have been developed by working backward from the fair rate of return to which the utility was entitled. Based on invested capital (rate base), a particular rate of return, and expected operating costs, regulators and regulated companies identify a "revenue" requirement," which is the amount of money the utility needs to be paid in order to cover its costs and earn that rate of return. Typically, responsibility for paying the utility its revenue requirement is allocated among its customers. Since demand has been generally assumed to be inelastic with respect to changes in price, the "ratemaking" process for the most part assumes a particular amount of total energy consumption system-wide. The revenue requirement is usually converted into per-kilowatt-hour prices for service for most customer types by allocating the revenue requirement among customer "classes" based on the respective consumption patterns of each such class.

Under this traditional approach, the utilities' ability to make money in the long term depends on their investment in infrastructure and on their sales. The history of the electric system has largely been a history of rising demand, as energy consumption fueled the country's industrialization and growth. Today, economic maturity and energy efficiency have tempered the growth of overall demand, but peak demand continues to rise, fueling an ongoing justification for continuing to invest in new capacity. Because building additional capacity enlarges the rate base (the invested capital with respect to which utilities are entitled to have an opportunity to earn returns), this business model inevitably gives utilities an interest in energy use (or at least peak demand) increasing over the long term.

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[3] See Frankfurter, F. (1930) at 85.

[4] For most of the 20th century, electric utilities were generally vertically integrated, i.e., they included generation, transmission, and distribution functions. In the 1990s, generation came to be seen as not necessarily a natural monopoly, and to that end many states, including New York, required their utilities to divest of their generation assets so that generation could become a competitive business; this transformation of industry structure is generally known as "restructuring" or "deregulation."

[5] See McDermott, K. (2012). But *see also* Hempling, S. (2015).

Meanwhile, because utilities earn revenue on a per-kilowatt-hour basis, utilities regulated in this traditional manner also have a short-term interest in selling as much energy as possible. An incentive to maximize energy sales may have made sense historically, when electrification was transforming the American economy, and it may still make some sense for vertically integrated utilities, which are at least partly in the business of generating and selling electricity. However, in the case of restructured utilities whose business model is limited to electric distribution, it makes little sense and is poorly aligned with the public interest, since it naturally undermines efforts to encourage utilities to support energy efficiency, as utilities are effectively penalized for selling less power than anticipated. Like many states, New York has neutralized this short-term disincentive to save electricity through "revenue decoupling." Revenue decoupling protects utilities against revenue "shortfalls" when less electricity is sold than expected. However, this approach does not eliminate the utilities' upside interest in selling *more* energy than expected during a given rate term, and does not address the utilities' long-term interest in increasing their rate base by enlarging their systems.

Generally, regulators require electric utilities to provide service that is safe and adequate at rates that are just and reasonable and not unduly discriminatory.[6] The familiar ratemaking process has ensured that the best way for utilities to profit would be to use mature technologies to build and operate utility-owned systems that can meet any amount of demand at any time and to grow those systems steadily over time. This business model relies on passive customers whose demand for electricity is easily predicted (and preferably growing over time) and fairly uniform, and whose activities are generally limited to buying however much electricity they think they need at any given time at whatever the price happens to be. Often, customers are not aware of how much power they are buying at the time they are using it, the source of the generation they are in effect purchasing, and even the price they will ultimately pay, nor are they cognizant of the variation in the cost of the energy service that may occur over the course of a given billing period, as they are ultimately charged on a weighted-average basis.[7]

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[6] See, e.g., N.Y. Public Service Law § 65(1) (Consol. 2017) ("Every gas corporation, every electric corporation and every municipality shall furnish and provide such service, instrumentalities and facilities as shall be safe and adequate and in all respects just and reasonable. All charges made or demanded by any such gas corporation, electric corporation or municipality for gas, electricity or any service rendered or to be rendered, shall be just and reasonable and not more than allowed by law or by order of the commission") and 65(3) ("No gas corporation, electric corporation or municipality shall make or grant any undue or unreasonable preference or advantage to any person, corporation or locality, or to any particular description of service in any respect whatsoever, or subject any particular person, corporation or locality or any particular description of service to any undue or unreasonable prejudice or disadvantage in any respect whatsoever."). The Federal Power Act imposes similar requirements on the pricing of federally-jurisdictional services. 16 U.S.C. § 824d(a) (2012) ("All rates and charges made, demanded, or received by any public utility for or in connection with the transmission or sale of electric energy subject to the jurisdiction of the Commission, and all rules and regulations affecting or pertaining to such rates or charges shall be just and reasonable, and any such rate or charge that is not just and reasonable is hereby declared to be unlawful.") and 16 U.S.C. § 824d(b) (2012) ("No public utility shall, with respect to any transmission or sale subject to the jurisdiction of the Commission, (1) make or grant any undue preference or advantage to any person or subject any person to any undue prejudice or disadvantage, or (2) maintain any unreasonable difference in rates, charges, service, facilities, or in any other respect, either as between localities or as between classes of service.").

[7] Though the cost of distribution service is fixed in rates, the cost of the commodity will vary, potentially dramatically, depending on which power plants are run during a billing period. The same basic dynamic applies in restructured states, where generation is purchased in wholesale markets, and in vertically integrated markets, where the differential costs to customers of various generators that may all be owned by the regulated utility are passed through to customers in the form of fuel surcharges. See, e.g., Biewald, B. et al. (2004).

Throughout the United States and around the world, this “traditional” model is now under stress. Multiple customer- and policy-driven developments have undermined the profit opportunity for utilities, the equitability of outcomes, and even the underlying assumptions of how ratemaking works. These developments can put the interests of the utility and its customers into opposition with one another and even threaten the economic sustainability of the grid. For example, energy efficiency makes good economic sense for customers and has positive environmental externalities, but it can reduce revenues during a rate plan as well as reducing the need for future capital investment (and thus a utility’s future profit opportunity). Similarly, customers who install distributed generation for their own purposes may create positive or negative externalities, but either way they may reduce their per-kilowatt-hour intake of energy and thus decrease the utility’s revenues; at some scale, this could make it necessary to charge non-distributed generation customers more, a process that could lead to some subset of customers avoiding paying their share of the cost of the system or even defecting from the grid, and other customers facing much higher costs for service. Furthermore, modern computing and communications technology and system controls, especially when paired with energy storage, can make customers of all classes less likely to continue to behave as passive, inelastic price-takers, throwing the traditional approaches to serving costly peak demand, and even the basic arithmetic of ratemaking, into question.

## 2.2 New York regulatory landscape

The North American electric system, which connects power sources and hundreds of millions of power users over a vast area, has been dubbed the “world’s largest machine.”[8] Power generation, whether utility-owned or not, generally occurs on a large scale (often located near the fuel or other natural resource needed for the generation); electricity is “transmitted” from the site where it is generated to the general vicinity of where it will be used, often traveling long distances at high voltage; and, after voltage is stepped down to a lower level, electricity is “distributed” to customers. New York is a restructured state, meaning that generation is no longer part of the monopoly utility business and the utilities have been required to divest of most of their generation. New York’s utility regulator, the NYPSC, forms part of the Department of Public Service (“DPS”); the Staff of that Department (“Staff”) supports the NYPSC’s regulatory work on routine matters as well as extraordinary efforts such as rethinking the basic framework of utility regulation, the REV proceeding. The NYPSC comprehensively regulates six investor-owned electric utilities. Consolidated Edison (“Con Edison”), the utility serving New York City and the neighboring county of Westchester, serves over a third of all load in the state.[9] New York City and Westchester comprise part of the “downstate” region, the southeastern corner of the state where most New Yorkers reside. Demand is largely concentrated in the downstate region, with New York City, Long Island, and the Lower Hudson Valley accounting for two-thirds of all load, while half of generation capacity is located elsewhere.[10]

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[8] Rueb, Emily S. (2017).
[9] See DiSavino, Scott (2013) (discussing Con Edison and statewide peak demand on a record-setting day).
[10] See NYISO (2015) at 6, 25-26.

New York has its own single-state Independent System Operator/Regional Transmission Organization ("ISO/RTO"), the New York Independent System Operator ("NYISO"). ISO/RTOs are regional entities formed at the encouragement of the federal utility regulator, the Federal Energy Regulatory Commission ("FERC"). These entities are responsible for managing the transmission system and wholesale electric markets. Although some ISO/RTOs incorporate all or portions of multiple states, NYISO is unique in that its footprint includes the entire state of New York and no portions of other states.[11] In general, electric generators in New York participate in NYISO's wholesale markets and are not covered by the Commission's economic regulation of utility companies. In addition, New York has retail choice, meaning that end-use buyers of electricity may elect to purchase their electric commodity service from an entity other than their distribution utility—although the distribution utilities remain providers of last resort, procuring the commodity on behalf of any customers that have not made other arrangements.

New York's environmental regulator is the state Department of Environmental Conservation, but when it comes to the carbon dioxide impact of the electric sector, New York has long sought to manage that impact through means other than traditional environmental regulation. Instead of command and control regulation, New York, together with other northeastern states, has harnessed the competitive marketplace for electric generation to achieve emissions reductions. New York is a founding participant in the Regional Greenhouse Gas Initiative ("RGGI"), a multi-state carbon dioxide cap-and-trade program.[12] For almost a decade, RGGI has spearheaded much-needed carbon dioxide limits in the face of federal inaction. Since 2009, RGGI has employed a cap-and-trade system to reduce electric sector carbon emissions. The system requires certain electric generators (those with a capacity of 25MW or greater) to hold allowances for each ton of carbon dioxide pollution they emit,[13] with prevailing clearing prices for the allowances usually falling at or below $5/ton.[14] This price point is far below the actual damage caused by carbon emissions, which a federal Interagency Working Group on the Social Cost of Carbon has estimated to be closer to $40/ton.[15]

To date, the RGGI states have achieved electric sector carbon dioxide reductions in line with the participating states' goals, but it is not clear that RGGI's electric sector carbon cap has been the major driver of this achievement. A 2015 econometric analysis found that within the RGGI region, the presence of the RGGI program was the largest factor in emissions reductions since 2009, accounting for about half of the decline in emissions during that period. The economic recession in 2008, the displacement of coal-fired plants by cheap natural gas, and state renewable portfolio standards ("RPS") were also significant factors. However, the analysis also found that the announcement of the RGGI program had a much more significant effect on emissions than the carbon price during the program's operation, suggesting that electricity

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[11] See Federal Energy Regulatory Commission, "Electric Power Markets: New York ISO." The California Independent System Operator (CAISO), the other RTO that is named for a single state, does not cover all of California and does include a portion of Nevada; see California ISO, "ISO at a Glance."
[12] See New York Department of Environmental Conservation, "Regional Greenhouse Gas Initiative".
[13] Regional Greenhouse Gas Initiative, "About the Regional Greenhouse Gas Initiative (RGGI)".
[14] Regional Greenhouse Gas Initiative, Auction Results.
[15] See generally Howard, P. (2014).

generators made early switches to lower-carbon generation in response to the announcement.[16] Although the allowance clearing prices and other market evidence suggest that the obligation to buy allowances has not been a direct driver of reduced emissions, RGGI has been credited with some significant benefits to participating states—benefits far in excess of costs—thanks to certain states using allowance proceeds to fund further reductions in fossil fuel generation through efficiency and other strategies.[17] The relative importance of these investments to emissions reductions, as opposed to the carbon price itself (which has remained low during the entire period of RGGI's operation), remains unclear.[18] The impact of different aspects of the RGGI program is particularly unclear in New York, where a significant amount of RGGI auction proceeds—nearly 30% since 2009—has been diverted to the general budget, reducing the availability of funding for low-carbon investments.[19] To yield far greater carbon reductions in the future, RGGI will likely need to cut the number of allowances much more rapidly in future years, which will likely result in higher clearing prices.[20]

## 2.3 The impetus for REV

REV and its related initiatives are New York's effort to re-examine utility regulation and the resulting utility business model. Although certain developments that place pressure on the utility business model are nearly universal and have driven other re-examination efforts elsewhere, the immediate impetus for New York's uniquely ambitious effort was a local concern: an electric reliability crisis in the wake of multiple massive outages associated with a series of unusual weather events, combined with fiscal concerns related to the aging of New York's electric system.

Portions of New York's electric system are a century old, and anticipated obsolescence alone will drive a need for tens of billions of dollars of investment in the coming years.[21] The capital costs associated with these investments will flow through to customers as part of their delivery charges, although they will receive no discernible new benefit from mere system component replacements. At the same time, increasingly peaky energy usage patterns suggest that New York may be spending billions of dollars building system components that will only be in use during a few peak-time hours per year *indefinitely*, making upgrades far costlier to customers than earlier generations of upgrades were.[22]

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[16] Murray, B. C. and Maniloff, P. T. (2015) at 581-589.
[17] See, e.g., Hibbard P. et al. (2015).
[18] Murray, B. C and Maniloff, P. T. (2015), at 588-589.
[19] Wentz, J. (2016).
[20] If in the future the cost of allowances become a major business consideration, another risk may present itself—the RGGI program may be vulnerable to leakage, whereby generation migrates from covered resources that are obligated to hold allowances (generators of at least 25MW within the RGGI region) to non-covered resources (generators that are below the minimum size threshold, or outside the region). See, e.g., Ramseur, J. L. (2017) at 14. New York's policy of encouraging a distributed electric system (discussed below) may be on a collision course with this carbon pricing scheme, as it may unintentionally offer opportunities to escape the effect of the cap and the cap itself may act as an incentive to develop polluting resources smaller than 25MW.
[21] See N.Y. Public Service Commission (hereinafter "NYPSC"), Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, DPS Staff Report and Proposal (April 25, 2014) at 6, 56.
[22] See, *e.g.*, U.S. Energy Information Agency (2014); Roberts, D. (2015).

On top of this, beginning in 2010, a series of widespread outages associated with freak storms ranging from hurricanes to snowstorms (including an unprecedented October snowstorm that brought down branches still covered with leaves) focused New York State government attention on the future of the electric system. Of the ten worst weather-related outages ever to hit Con Edison, five occurred between 2010 and 2012.[23] Superstorm Sandy represented the culmination of a long series of unusual storm events.

Sandy was dubbed a "superstorm" because although it was one of the most destructive natural disasters ever to hit New York, it no longer had hurricane-strength winds by the time it reached New York. However, the incredibly destructive storm surge sent an unmistakable, frightening message about what higher temperatures and rising sea levels could mean for the state. On the evening of October 29, 2012, shortly after peak high tide, the storm surge peaked in Manhattan at 14 feet above Mean Lower Low Water at the Battery (the southern tip of Manhattan), far higher than the previously record of 10 feet, which had stood since Hurricane Donna in 1960.[24] It filled tunnels, including car tunnels, as well as large portions of the subway system and lower levels of buildings with salt water. The salt water also inundated electric system infrastructure, damaging equipment and substations, leaving Manhattan below 39th Street without power, effectively dividing Manhattan into two cities, dark and light.[25] In the end, more than a million Con Edison customers, and more than two million customers throughout New York State, were left without power.[26]

A year before Sandy, New York was hit by Hurricane Irene. Like Sandy, Irene was primarily a flooding event rather than a wind event; however, whereas Sandy's most devastating effects came from rising seas along the coast in the downstate region, Hurricane Irene mostly caused upstate riverine flooding. Nearly 1 million customers lost power statewide.[27]

Hurricane Irene and Superstorm Sandy changed the climate conversation in New York. Following the one-two punch inflicted by these two storms, Governor Andrew Cuomo launched several commissions to examine New York's preparedness for a changing climate. One of these commissions, the NYS 2100 Commission,[28] issued a report that included a cutting-edge vision of how the electric system needed to change to support resiliency and rapid decarbonization. It put forward a concept for the future energy system that was visionary, specifically calling for new rate structures and incentives to encourage distributed generation, and the implementation of system improvements to provide flexibility. It called for immediate investment to "transition the

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[23] Marritz, I. (2013).
[24] City of New York (2013).
[25] Carpenter, D., Donn, J. and Fahey, J. (2012); Tharoor, I. (2012).
[26] Consolidated Edison Company of New York, Inc. (2012); Office of Electricity Delivery and Energy Reliability, U.S. Dept. of Energy (2013) at 7.
[27] Office of Electricity Delivery and Energy Reliability, U.S. Dept. of Energy (2013).
[28] The NYS 2100 Commission was created by the Governor of New York in November 2012, in the wake of Hurricane Irene and Superstorm Sandy, to "examine and evaluate key vulnerabilities in the State's critical infrastructure systems, and to recommend actions that should be taken to strengthen and improve the resilience of those systems." EDF President Fred Krupp was a member of the Commission. See NYS 2100 Commission at 10.

grid to a flexible system that can respond to future technologies, support clean energy integration, and minimize outages during major storms and events."[29]

However, realizing this vision would require forging a path through the existing regulatory and business landscape. In January 2013, the same month that the *NYS 2100 Report* was issued, Con Edison initiated a rate case calling for major capital projects in response to Superstorm Sandy, which had occurred in late October. Although the rate plan included $1 billion for the restoration and hardening of system elements that had been affected by Superstorm Sandy or that were expected to be at risk in future storms, the rate case was in most respects quite traditional. It included no major proposals that would improve system flexibility, rate structures, load management, or renewables integration. Certain parties, including EDF, argued in that rate case for a sea change in electric pricing and load management, to facilitate resiliency as well as decarbonization. But without fundamental changes to how the utility was regulated, proposals for changes that went to the heart of how Con Edison actually conducts its business and makes money could not gain traction.

Fortunately, the groundwork for more fundamental changes was being laid outside that case. In mid-2013, Governor Cuomo appointed Audrey Zibelman as the new head of the NYPSC. Zibelman was president and chief executive officer of Viridity Energy Inc., a pioneering smart power company she had founded after more than 25 years of electric utility industry leadership experience in both the public and private sectors. At the very end of 2013,[30] as part of an effort to rethink funding for energy efficiency and renewable energy, the NYPSC issued an Order making several observations that presaged what would later come to be known as REV. In that Order, the NYPSC described its intentions in language that continues to shed useful light on the ultimate purpose of the REV effort. The NYPSC highlighted the centrality of "distributed clean energy resources" (generally, "clean energy" resources that would be located at end-use customer sites) in the future system, the need for the regulatory regime and market design to promote the success of those resources, and the impossibility of making subsidy programs devoted to developing those types of resources perform optimally when the regulatory paradigm and market design work against their purposes. To that end, the NYPSC cautioned that it was time to stop treating such resources as "peripheral elements of the electric system" and recognize they needed to become a "core source of value to electric customers." [31] Specifically, the NYPSC observed that "[e]ven the best designed clean energy programs will not succeed in their essential purposes if the regulatory regime and market design within which they operate inhibit rather than promote their success. As one of our owned esteemed regulators, the late Alfred Kahn observed, 'all regulation is incentive regulation.'"[32]

The NYPSC concluded that it could not solve these problems by making changes only to the system benefit programs themselves. Instead, it would undertake a "comprehensive

[29] NYS 2100 Commission at 15, 80-109.
[30] NYPSC Case 07-M-0548, *Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard*, Order Approving EEPS Program Changes (December 26, 2013).
[31] Ibid at 2.
[32] Ibid at 20.

consideration of how our regulatory paradigm and the retail and wholesale market designs either effectuate or impede progress of our policy objectives…."[33]

A few months later, in April 2014, the NYPSC commenced the REV proceeding, in which it questioned the fundamental mechanics of the utilities' business model and the regulation and ratemaking that shape it. In its Order instituting REV, the NYPSC explained why the traditional business model was strained almost to the point of fiscal disaster. Notably, the reasons had little to do with the environmental imperatives related to climate change. Rather, the NYPSC was focused primarily on the tidal wave of costs that will arise in the not too distant future, as aging infrastructure reaches obsolescence and will simply need replacing (at great cost and with no noticeable new value to customers). At the same time, peak demand increases—which do not reflect underlying growth—have been driving a need for capacity additions. Under a business-as-usual approach, these capacity additions would prove exceptionally expensive on a per-kWh basis because they would only be needed to serve a very small number of hours each year. The NYPSC had previously registered its disappointment at the failure of energy efficiency and clean DERs to scale up independently, despite their clear economic merits.[34] At the same time, in parts of the country where non-emitting distributing generation (i.e., rooftop PV) was achieving higher levels of penetration, clean DERs were starting to be viewed as the enemy to the utilities' financial health, and some utilities and regulators were seeking to slow or stop their proliferation.

In response to these challenges, the NYPSC envisioned a more "animated" marketplace, characterized by far more active engagement by non-utility businesses and customers, including customers who were inclined to install their own energy resources at their premises, as a possible solution to the traditional business model's seemingly inexorable drive toward a bigger and bigger system that merely delivers more and more of the same services. As envisioned by the NYPSC, in this new marketplace, customers would have far greater opportunities to procure their own resources; utilities would embrace those resources for the value they offered to the utility's system without requiring substantial utility investment; ratepayers would save money because their distribution utilities could meet system needs with less investment in "rate base," i.e., capital infrastructure; and distribution utilities would have new opportunities to provide value and earn profits by facilitating third party transactions. Since that time, the NYPSC has issued various orders and guidance documents, outlining the vision,[35] the regulatory and ratemaking framework,[36] the criteria for future investments,[37] and the planning and operation of the grid/platform,[38] among other things. Each of the orders gives rise to considerable

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[33] Ibid at 21.
[34] See NYPSC Case 07-M-0548, *Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard*, Order Approving EEPS Program Changes (December 26, 2013) at 21.
[35] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting Regulatory Policy Framework and Implementation Plan (February 26, 2015).
[36] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting a Ratemaking and Utility Revenue Model Policy Framework (May 19, 2016).
[37] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Establishing the Benefit Cost Analysis Framework (January 21, 2016).
[38] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting Distributed System Implementation Plan Guidance (April 20, 2016).

follow-on activity, and much of the implementation of the changes called for in the orders occurs through the rate plans of individual utility companies. That implementation continues apace.

### 2.4 REV and potential environmental outcomes

The vision of a cleaner, more resilient and distributed system is foundational to REV. The NYPSC determined that a distribution system platform would play a central role, facilitating transactions involving utilities, non-utility commercial actors, and customers of all types in a manner that maximizes the efficiency of resource use and aligns market outcomes with public policy objectives.

Decentralization of resources, and a platform for using that decentralization to improve efficiency of the system as a whole, have been salient traits of the REV vision from the start. Improved environmental outcomes have also been central to the vision—as described above, the Order that presaged REV was focused on energy efficiency and renewable generation programs, and one of the stated goals of the REV proceeding is the "reduction of carbon emissions."[39]

That said, a distributed electric system is not necessarily a clean system. In theory, the DERs whose deployment is optimized by the platform could be high emitters, such as diesel-fueled generators. However, the REV vision has taken shape during a period in which New York State has been developing a robust vision for decarbonization,[40] and REV and its related proceedings have become increasingly supportive of that vision as it has taken shape. At this point, it is evident that the electric system has an essential role to play in achieving New York State's environmental goals, and the REV reforms have been evolving to reflect that reality.

## 3. REV reforms and environmental goals

The REV proceeding is not first and foremost an environmental proceeding. Nonetheless, it has the potential to change the rules of the game in a manner that provides new opportunities to push the marketplace in the direction of decarbonization. In REV, the NYPSC has embraced a vision of a cleaner, more distributed system, and is accordingly deploying new mechanisms that both allow utilities to profit from building and operating such a system and encourage customers to become real market participants.

At the heart of the REV vision is the "distributed system platform," a transactional platform that will function in effect as an overlay to the distribution system. The technological enhancements

[39] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, DPS Staff Report and Proposal (April 25, 2014) at 2.
[40] N.Y. State Energy Planning Board (2015); NYPSC Case 15-E-0302, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, Order Adopting A Clean Energy Standard (August 1, 2016); N.Y.C. Mayor's Office of Sustainability (2016).

that will make this transactional platform possible can also be expected to support the greater grid flexibility that is essential to a high-intermittent-renewables future. At the same time, utility compensation mechanisms and innovative pricing tools arising out of REV and related proceedings can provide support for increasing energy efficiency and improving load shapes, allowing for increased reliance on DERs while ensuring that the environmental value of distributed renewable resources is optimized and well compensated, and encourage beneficial electrification.

The REV insight that the most efficient future of the electric system involves thinking of it and operating it as a platform for multidirectional transactions is of central importance when it comes to the goal of economy-wide decarbonization. This is because of the emerging consensus that the electric system in its entirety will provide a platform for decarbonizing not just electricity, but other energy uses, ranging from transportation to building heating to industrial applications. What this means is that New York's utility regulators on the one hand, and environmentalists everywhere on the other, have converged on the idea that the electric grid itself is a system that can be leveraged to do much more than simply deliver electricity from large generators to users of all sizes to meet their current and future electric demand. Rather than simply be a way to furnish light and power to customers—the original functions of the electric grid—tomorrow's grid will be expected to deliver new business opportunities and new policy outcomes to a wide range of stakeholders, including the utilities themselves, and other market actors such as customers, innovative solution providers, policymakers, and even society as a whole.

Over the course of the past decade, various efforts have been made to envision what actual decarbonization would entail—and they have reached remarkably similar conclusions. For example, the European Climate Foundation, in its Roadmap 2050 effort, envisions an 80% reduction in GHG emissions by 2050. In California, a goal of 40% GHG emissions reduction by 2030 has the force of law,[41] and the California Air Resources Board ("CARB") has been developing a roadmap for achieving it. New York State has no formal roadmap, but it does have economy-wide GHG emissions reduction goals that match California's, and its State Energy Plan and implementation efforts to date likewise converge on the same set of solutions as the formal roadmaps developed in Europe and California. New York City, home to almost a third of New York State's electric demand, has made its own commitment to reduce GHG emissions 80% by 2050,[42] and in late 2016 published a roadmap to achieving that goal.[43]

*The consensus vision, common to all these efforts, is that a clean electric grid—something that does not yet exist—is the essential element of decarbonization.*[44] A wide range of energy uses that today usually involve combustion of fossil fuels at the location where the energy

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[41] Megerian, C. and Dillion, L. (2016).
[42] See N.Y.C. Local Law No. 66 of 2014.
[43] N.Y.C. Mayor's Office of Sustainability (2016).
[44] A similar view has recently been embraced by leading consultancies and electric industry analysts, including the Brattle Group, Energy Power Research Institute ("EPRI"), Edison Electric Institute ("EEI"), and Regulatory Assistance Project ("RAP"). See Weiss, J., Hledik, R., Hagerty, M., Gorman, W. (2017); Dennis, K., Colburn, K., Lazar, J. (2016) at 52-58; Blanford, G., (2017); Gould, B. (2017); Bade, G. (2017).

is consumed—energy uses ranging from transportation to building heating to industrial applications—can be electrified and provided using grid-based power, and that that grid-based power can be decarbonized as far as necessary using a combination of non-emitting generation and storage.[45]

Imbuing the electric grid with this kind of importance is a significant departure from how environmental ramifications of the electric system have been evaluated and managed in the past. Historically, the main environmental challenges presented by the electric system have been to minimize or mitigate the harmful impacts of producing and delivering electricity, including disproportionate impacts on particular populations.[46] Most electric generation in the United States has been combustion-based, with attendant risks for human health and the environment. As of 2015, 68% of total electric generation came from fossil fuels and combustion of biomass or waste products.[47] After combustion, byproducts of combustion remain in the ground, pollute water, and become airborne. Combustion of these materials can emit carbon monoxide (CO), sulfur dioxide ($SO_2$), nitrogen oxides ($NO_x$), particulate matter (PM) and heavy metals such as mercury, all of which can harm human health, in addition to carbon dioxide.[48]

By contrast, when the focus shifts to the urgent task of decarbonizing, the challenge is far more ambitious than simply managing risk; *the electric system will be called upon to drive down GHG emissions economy-wide*. Far from merely needing to mitigate its present environmental footprint, the electric system is going to be called into service as an affirmative agent of change—not only to minimize its own GHG emissions, but also to provide a platform for minimizing GHG emissions currently associated with other sectors. This can be accomplished most efficiently with the active engagement of companies in the electric sector and related sectors, and their customers. Indeed, since a wide range of parties can arrive at optimal equilibria by balancing supply and demand in a market construct, a transactional platform that enables parties to buy and sell services in near real time will be essential to finding the most efficient opportunities to balance increasing supply and demand, particularly if supply becomes more intermittent over time.

Similarly, as a low carbon energy system takes shape, the challenge of protecting vulnerable populations will be transformed. While the need to guard against disparate negative impacts will continue,[49] building a new, clean grid presents a new kind of challenge: the affirmative challenge of a just transition, ensuring that vulnerable and disadvantaged populations continue to receive the benefits of universal electric service and have a full share in the upside opportunity that a clean energy future presents.

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[45] See, e.g., N.Y.C. Mayor's Office of Sustainability (2016); Gould, B. (2017). See also Weiss, J., Hledik, R., Hagerty, M., Gorman, W (2017).
[46] See, e.g., Case, C.P. III and Schoenbrod, D. (1973) at 963-965 and 996-1001; Harrington, W., Heinzerling, L., and Morgenstern, R.D. (2009).
[47] U.S. Energy Information Administration (2016).
[48] Ibid.
[49] Indeed, this risk may grow even more challenging as the system becomes more distributed, since more resources may be located in close proximity to the customers they serve.

## 3.1 Building a smart platform

Since distribution utilities have been provisionally granted the role of distributed system platform provider, it is reasonable for now to think of the electric distribution grid and the transactional platform that will shape how the grid is operated and used in the future together. In their capacity as owner and operator of the distribution system itself, the electric utilities will be charged with taking the environmental consequences of their decisions—including the impact of resulting carbon dioxide emissions—into account. They will also be charged with avoiding investing in capacity that causes resources to be deployed in an inefficient manner. To that end, they are beginning to have opportunities to profit from avoiding investment in excess capacity, and increasingly, they will be expected to communicate potential opportunities for third parties to help meet future system needs by providing DERs, and will have opportunities to earn returns by doing so.

In addition, electric utilities will be increasingly expected to give customers and other electric system users more information about the value of changes in energy usage that they themselves could pursue, such as energy efficiency. Opportunities to provide this value to system users may arise from their role as the distribution grid owner and operator, or from their role as platform provider.

Critically, as electric utilities continue to develop their systems—both the distribution grid and the emerging platform—they will need to provide the requisite flexibility needed both for efficient transactions by retail-level market participants and for the incorporation of high levels of intermittent renewables. Running the system substantially on intermittent renewables means that as far as possible, future demand needs to be capable of following supply, inverting the traditional paradigm of supply being built and deployed to *meet* demand. This means that demand will need to become increasingly flexible. Thus, in addition to growing a new, cleaner generation fleet, the electric sector will need to develop new flexibility—new capabilities to gauge and respond to changing conditions. In effect, to function as a smart platform, the electric system must develop a new “nervous system”. This will require storage, sensing, and intelligence capabilities throughout the system, high-resolution data collection and management, and planning and operational practices that support flexible modes of operation.[50] The platform that serves as the foundation for a fast-moving distributed energy resource marketplace should by its nature be well suited to providing the visibility and flexibility needed to operate a portfolio of intermittent generation resources.

### 3.1.1 Accurate BCA that accounts for environmental impacts in a robust manner

Today and for the foreseeable future, utility companies will continue to own, maintain, and reinforce infrastructure to provide their customers with the safe, adequate and reliable service that their customers and regulators expect. That “service” will grow ever more complicated as customers engage with the electric marketplace in increasingly sophisticated ways. Utility

[50] See generally Centolella, P. (2015); Robu, V. (2017); U.S. Department of Energy (2003).

infrastructure is often expensive and long-lived, and to ensure that it is environmentally optimal, utility assessments of benefits and costs must consider the environmental consequences of their investment decisions.

A key REV reform has helped ensure that utilities will not fail to identify the most cost-beneficial approaches to meeting grid needs by overlooking environmental impacts. Specifically, the NYPSC's Order Establishing the Benefit Cost Analysis ("BCA") Framework[51] has required utilities to consider the full marginal damage costs associated with carbon dioxide pollution when performing benefit-cost analyses.[52] This will allow utilities to avoid courses of action that look deceptively "cost-beneficial" because externalities that will be imposed on all of society are being ignored—a tremendous leap forward in decision-making about a platform that is "affected with a public interest."

### 3.1.2 Non-wires alternatives

In contrast with the traditional approach to planning and operating a utility system, a utility operating its system as a smart platform will not start with the assumption that all new customer needs are to be met by adding infrastructure that is owned and operated by the utility company. Utility companies will learn to rely on non-wires alternatives ("NWAs") that they in some cases will not own in order to meet system needs. Planning for and fostering NWAs supports decarbonization in at least two ways. First, it can help contain system costs, freeing up money that would otherwise be spent on endless upsizing, to be used for carbon-beneficial purposes. Second, many technologies that can substitute for system enlargement are also directly supportive of decarbonization, whether because they decrease the need for electricity entirely (as in the case of energy efficiency) or because they increase the system's ability to handle high levels of penetration of intermittent resources such as rooftop PV.

The REV reforms anticipate that significant funds will need to be spent modernizing the system—and seek to avoid overspending on unnecessary capacity upgrades at the same time. Thus, the push for DERs to take the place of grid upgrades began even before the REV proceeding had been formally launched, and baking this practice into utilities' general way of doing business remains a major focus of REV. This initiative first emerged as a major focus at the inception of the Brooklyn-Queens Demand Management ("BQDM") program in the Con Edison service territory, more recently re-named the "Neighborhood Program".

The BQDM program illustrates nicely how NWAs can foster desirable environmental results. The BQDM program was brought into being when, during Con Edison's 2013 rate case, the

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[51] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Establishing the Benefit Cost Analysis Framework (January 21, 2016).

[52] To provide a value for these full marginal damage costs, the NYPSC drew on the work of the federal Interagency Cost of Carbon, which provided a range of possible values that vary depending on the discount rate applied and escalate over time; the NYPSC opted for the middle-of-the-road 3% discount rate, yielding a starting carbon value of $39 per ton. See NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Establishing the Benefit Cost Analysis Framework (January 21, 2016), at 36, Appendix C, and Attachment B.

utility determined that due to unexpected load growth in an area along the Brooklyn/Queens border, substation upgrades would be needed at a cost of $1.2 billion. Substation upgrades in New York City can be exceptionally expensive due to the exigencies of Con Edison's underground, networked system.[53] At the time, it was believed that the overloaded substation at issue would be the first of many similar situations likely to emerge in Brooklyn and Queens, thanks to demographic changes in those areas of the city. As part of the settlement in that rate case, the utility agreed to pursue nontraditional alternatives in an effort to defer the substation.[54] To date, energy efficiency at a massive scale has driven BQDM's success—making the program a win for the utility (which has been granted an opportunity to realize earnings by deferring the need for the substation, as discussed below), the community (where customers are enjoying the benefits of efficiency, including lower bills, and avoiding the disruption of a major infrastructure improvement as well as the local emissions that would have come with a combustion-based solution), ratepayers at large (who have for now avoided adding $1.2 billion of capital improvements to rate base and still enjoy savings even after the utility realizes earnings), and also society at large, as everyone benefits from the reduced reliance on conventional fossil-fueled electric service.

Going forward, the NYPSC seeks to make the practice of harnessing the value of distributed energy resources of all types to meet system needs increasingly routine. In this regard, the Distributed System Implementation Plan ("DSIP") has been a key REV innovation. The DSIP is intended to serve the dual purposes of planning for the development of a distributed system and signaling to market participants where DER opportunities actually are. DERs can take many years to develop at a targeted location, and if system needs are not known to anyone other than the utility until they must be addressed immediately, market actors have no reasonable opportunity to develop solutions that could meet those needs at lower cost to ratepayers (potentially in a manner that provides greater value to the people and companies in the relevant location or society as a whole, as described above). By signaling to market participants where the system needs are, the DSIP is intended to provide a signal to the marketplace that will direct non-utility investigation and investment to the most valuable locations on the grid.

### 3.1.3 Accessing the many values of energy efficiency

As it turns out, energy efficiency has emerged as an early favorite in the BQDM program: efficiency achievements are occurring at an unprecedented scale, involving enormous numbers of individual business owners, building owners, and apartment occupants. According to the most recent quarterly report, from Q3 2017, Con Edison expected to achieve 32 MW of load relief commitments "through installation of efficiency measures at over 6,400 small businesses,

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[53] The undergrounding and network structure contribute to the system's extraordinarily high reliability, but at a cost.
[54] The efforts that came to be known as the "Brooklyn/Queens Demand Management" or "BQDM" initiative were originally described with reference to the neighborhood where the relevant substations were located: Brownsville, Brooklyn. See NYPSC Case 13-E-0030, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service*, Order Approving Electric, Gas And Steam Rate Plans in Accord with Joint Proposal Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service (February 21, 2014).

1,560 multi-family buildings, and 12,768 1-4 family residences."[55] Other resources that are providing part of the solution or are expected to do so in the future include fuel cells, combined heat and power ("CHP"), smart thermostats, microgrids, solar photovoltaic panels, and battery storage, among others. Significantly, energy efficiency is a carbon-free resource, and many other resources that are expected to play a role in the BQDM program in the coming years are also low-carbon or carbon-free.

In BQDM, energy efficiency has been the least-cost way to meet system needs, but those same energy efficiency investments that are meeting system needs in the BQDM area are also saving customers money and reducing carbon emissions. Energy efficiency is among the least expensive ways to achieve carbon reductions on a per-ton basis, and there are many energy efficiency opportunities that are currently cost-effective even without considering the value of the avoided carbon dioxide emissions.[56] Nonetheless, many of these highly cost-effective investments are not made. The failure of consumers to make cost-effective investments in energy efficiency is often referred to as "the energy efficiency gap."

Some approaches to reducing this energy efficiency gap involve addressing barriers that are thought to prevent market actors from pursuing cost-effective energy efficiency opportunities. For example, to the extent that high upfront costs to achieve future savings constitute a barrier, policymakers attempt to address this by providing financing or subsidies. Other policy tools aim to address market participants' lack of information about energy savings opportunities by providing energy consumers and other market actors (including buyers and renters of buildings and space in buildings) with better visibility into energy consumption and increased confidence in projected energy savings. Tools that help address this market dysfunction include benchmarking; point-of-sale disclosures; more granular and timely metering of electricity consumption; and instruments that leverage any combination of data types to develop customized and reliable energy efficiency solutions for customers.

Finally, it is essential to note that because the cost-effectiveness of saving energy depends on the cost of energy itself, and because energy efficiency measures have widely varied GHG impacts depending on which generation resources they avoid, internalizing the cost of carbon would help improve the deployment of energy efficiency. Reflecting the cost of carbon in electricity prices would make all energy efficiency look more cost-effective, but assuming that in the future electricity prices will be time-variant and that carbon pricing will produce higher prices during the dirtier hours of the day, such pricing would provide additional economic incentives for energy efficiency to be deployed in the times, places, and ways that enable the highest carbon avoidance. Getting the underlying price of energy right would be a powerful market improvement that would be expected to bring energy efficiency deployment closer to economically-efficient levels.

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[55] Consolidated Edison Company of New York, Inc. (2017). "BQDM Quarterly Expenditures & Program Report Q3-2017."
[56] See, e.g., Molina, M. (2014).

### 3.1.4 Activating the marketplace: visibility into system planning and providing for operational flexibility

As discussed above, by engaging non-utility parties in system planning, the DSIPs will in effect harness market forces to enlarge the solution set available for addressing grid constraints and reduce ratepayer costs to address those constraints. At the same time, however, the DSIPs are intended to pave the way for the new nervous system that the future electric system will need in order to optimize the deployment of a wide variety of activities and resources at multiple scales in real time. As the NYPSC observed in its DSIP Implementation Plan Guidance:

> "A distributed, smarter, more resilient network that contains sufficient local supply resources, whether in isolation or as part of a microgrid, will be a critical component of assuring efficient, reliable power both on 'blue sky days' and following major climatic events. The DSIP links the multiple systems that compose the power network so that information and communications can flow in multiple directions and promote efficient and better solutions for customers and system owners and all the while assuring a reliable electric system."[57]

In time, the expectation is that the information, visibility, and flexibility that characterize the emerging distribution system and transactional platform, combined with price signals that communicate the particularized system needs at particular locations, will ultimately make it possible for customers and market actors to use their own funds to develop resources that can reliably meet electric system needs while simultaneously adding flexibility, low- or non-emitting generation, and other capabilities needed for economy-wide decarbonization.

## 3.2 Aligning utility earnings with environmental outcomes

At its core, REV is concerned with how electric utilities do business. In the context of the traditional business model, DERs and the active consumers who deploy them are nothing but bad news for utility companies. From the perspective of a traditional utility, DERs can compromise the reliability of the system as a whole and/or give rise to new integration costs; cut into energy sales, which are the basis of utilities' revenues even in states such as New York where utilities do not sell electricity; cause and increase inequities among customers; and diminish future profit-making opportunities for the utility company if the need for traditional infrastructure improvements decreases. While regulators seek to unleash the power of markets to generate greater value for customers at lower costs, those with an interest in creating the new retail marketplace face significant resistance and headwinds when the future of that marketplace is necessarily detrimental to the future of the utility company. Consequently, one of the central strategies of REV is to help the new marketplace along by ensuring that the distribution

[57] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting Distributed System Implementation Plan Guidance (April 20, 2016) at 9.

companies, which provide an essential service and are uniquely positioned to make or break the market, see opportunities—not just threats—in a flourishing retail-level marketplace.

The REV "Track One Order"[58] creates an important new role in the electric system—the distribution system platform provider – and assigns that role to the distribution utilities. In this new role, the utilities have an opportunity to shape the future marketplace, and the NYPSC intends that they be able to profit directly from that role, selling value-added services to some customers and earning "platform service revenues" ("PSRs") for their role in facilitating the distributed marketplace. At the time of this writing, the platform is in its infancy, and with no platform yet in place, utilities are not yet in a position to profit through PSRs. Therefore, this whitepaper will focus on certain new earnings opportunities that the utilities enjoy even in these early days of the REV transformation: NWA compensation and Earnings Adjustment Mechanisms ("EAMs").

### 3.2.1 NWA compensation

Based on the success of the BQDM program (see above at p. 22-24) and utilities' proposals of how to generalize learnings from them, the NYPSC has begun to develop an NWA compensation approach, which allows New York utilities to profit from *avoiding* certain infrastructure upgrades—a fundamental paradigm shift.[59] Under this framework, utilities have an earnings opportunity where, after having identified an infrastructure "need," they succeed in deferring or avoiding the capital improvement that would traditionally have been the default approach, relying instead on DERs and potentially less costly capital improvements that contribute to addressing the need but do not by themselves address it in full. The NWA mechanism that has been adopted for particular utilities allows utilities to earn returns based on the difference in the present values of the net benefits and costs of the non-wires alternatives deployed and the net benefits and costs of the capital improvement avoided. This approach was originally required in the BQDM context in order to save ratepayer funds, but it has yielded significant environmental benefits because it has provided an opportunity and a reason to deploy energy efficiency on a massive scale. The success of this program paints a useful picture of why it is worthwhile to give utilities an interest in pursuing or fostering NWA programs.

To incentivize deployment of NWA in lieu of traditional investments, the emerging NWA approach makes it possible for the utilities to keep earnings associated with avoided capital

[58] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting Regulatory Policy Framework and Implementation Plan (February 26, 2015).

[59] Although the mechanism is developed separately for each utility, the Commission seems to be converging on a mechanism permitting utilities to retain 30% of net benefits, and for ratepayers to keep the other 70%. See, *e.g.*, NYPSC Case 15-E-0229, *Petition of Consolidated Edison Company of New York, Inc. for Implementation of Projects and Programs That Support Reforming the Energy Vision*, Order Approving Shareholder Incentives (January 25, 2017); NYPSC Case 14-E-0318, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Central Hudson Gas & Electric Corporation for Electric Service*, Order Implementing with Modification the Proposal for Cost Recovery and Incentive Mechanism for Non-Wire Alternative Project (July 15, 2016).

investment if they can demonstrate that the NWA approach was used instead.[60] Traditionally, in a multi-year rate plan, if the utility spends less than it anticipated on capital improvements, it would have to return the associated earnings and unspent capital budget to ratepayers in the next rate case. This "clawback" mechanism reflects the principle that utilities should not earn returns on uninvested capital. The NYPSC, in the REV "Track Two Order," which adopted changes in how utilities would be regulated in order to realize the vision for the future marketplace, modified this claw-back mechanism to allow the utilities to retain earnings on unspent capital until the next rate case if they can demonstrate that a capital expenditure was avoided or reduced due to a NWA approach being pursued.[61] At the next rate case, the NWA expenses would be incorporated into base rates, and the earnings associated with the avoided capital project would be removed.[62] This approach makes room for NWAs while providing default protection against NWA projects that are not cost-effective, because only if the NWA expenses are lower than the earnings associated with the traditional capital project would it be in the utility's interest to pursue the NWA.

### 3.2.2 Earnings adjustment mechanisms

EAMs are opportunities for utilities to realize earnings improvements by achieving outcomes that align with public policy objectives. As noted above, utilities have strong incentives to resist a future in which customers do anything other than continue to consume ever increasing amounts of power, which means that they are naturally disinclined toward a revolution in how customers manage their own energy use and engage with the electric grid. Because this revolution is expected to make decarbonization more feasible and affordable, environmentalists as well as policymakers interested in economic efficiency have a shared interest in offsetting this natural disinclination. By giving utilities a financial interest in the upside potential of marketplace developments to which they would otherwise be indifferent or hostile, EAMs can encourage monopoly utility companies to better optimize their own system utilization and to use their ubiquitous market presence to nudge market participants in the direction of decarbonization. In practice, this would mean building and operating an electric system in a manner that promotes efficient asset utilization, while incentivizing customers and other market actors to (a) use energy more efficiently; (b) undertake beneficial electrification of fuel-based energy applications; and (c) deploy and/or rely more heavily on low-emitting or non-emitting generation, whether on-site or elsewhere.

Under the Track Two Order, initial EAMs were to be developed for numerous outcomes, several of which are directly relevant to decarbonization: system efficiency (including both

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[60] While the emerging NWA approach was informed by the experience with the BQDM program, BQDM compensation was distinct from the NWA compensation described here. See NYPSC Case 14-E-0302, *Petition for Extension of Time to Implement Brooklyn/Queens Demand Management Program*, Order Extending Brooklyn/Queens Demand Management Program (July 13, 2017).
[61] See NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting a Ratemaking and Utility Revenue Model Policy Framework (May 19, 2016) at 98-101.
[62] Ibid at 98-100.

peak reduction and load factor improvement),[63] energy efficiency,[64] improvements in distributed generation interconnection,[65] and reducing the cost of achieving the Clean Energy Standard goal (as further discussed below at pp. 32-33).[66] Although these EAMs do not align perfectly with the transformative changes needed, they can begin to nudge the utilities/distributed system platform providers ("DSPs") in the right direction. Additional EAMs will likely be established in the future to promote additional policy goals.

*Efficient use of energy*

Getting to economy-wide decarbonization by any pathway will require a large amount of non-emitting electric capacity. The total amount needed will be smaller if the overall need for energy is not larger than necessary. Fortunately, energy efficiency, which can circumvent the need for some amount of generation capacity as well as complementary resources, is desirable to consumers and is also one of the most cost-effective ways of avoiding capacity upgrades through rising peaks. Historically, however, there has been no way to tie utilities' economic interests to very high energy efficiency achievement in the marketplace. Indeed, near term interest in maximizing kWh sales in the short term, and long term interest in expanding their systems, give utilities a vested interest in *low* energy efficiency achievement. Revenue decoupling neutralizes the disincentive for reductions in electricity use that utilities would otherwise face during a rate term, but it does not address the long-term bias in favor of increasing electricity use, nor does it provide an affirmative incentive in favor of energy efficiency.

The Track Two Order recognized that customers' use of energy needs to be considerably more efficient and specifies that a utility's earnings opportunity should be tied to "electric usage intensity across the utility's service territory."[67] The NYPSC explained the breadth of its vision—which goes far beyond enlarging traditional utility programs—as follows:

> "A metric tied to system-wide usage intensity will encourage utilities to facilitate [Community Choice Aggregators], [energy suppliers], and DER providers in bundling energy efficiency with other value-added services to reduce customers' total bills. It will also encourage utilities to collaborate with NYSERDA, local governments, and [Community Choice Aggregators] toward achieving mutual local and statewide objectives."[68]

In the 2016 Con Edison rate case, an energy intensity EAM was adopted. The targets for the utility to actually realize additional earnings as a result of improved energy intensity are intended to require many times more energy efficiency than could be achieved through the

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[63] See NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting a Ratemaking and Utility Revenue Model Policy Framework (May 19, 2016) at 73-76.
[64] Ibid at 79-83.
[65] Ibid at 83-87.
[66] Ibid at 90.
[67] Ibid at 82.
[68] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting a Ratemaking and Utility Revenue Model Policy Framework (May 19, 2016) at 82.

Company's energy efficiency programs alone.[69] The EAM provides Con Edison with a financial stake in territory-wide electricity consumption reductions rather than simply the success of its own energy efficiency programs. As such, it helps build utility support for a robust marketplace for energy efficiency. This EAM supports the emergence of a future market in which utility energy efficiency programs and market-based energy efficiency each play a role.

*Environmentally beneficial electrification*

Environmentally beneficial electrification—the conversion of end uses that have been powered by fossil fuels to electricity in order to reduce GHG emissions[70]—is a common attribute of all economy-wide carbon reduction plans.[71] Electrification in the pursuit of decarbonization creates new challenges. For example, new electric loads may, depending on their load shape, require increased electric capacity, intensifying the challenge of decarbonizing electric generation. At the same time, some new electric applications may be well-suited to increasing the flexibility of the system—for example, today's electric hot water heaters offer an opportunity to ratchet consumption up and down based on availability of inexpensive or clean generation or a system need to manage rapid changes in electric supply availability, rather than based on the timing in which the hot water will be used—and may therefore be advantageous for the larger decarbonization effort.

Although New York State has no explicit roadmap for electrification, its State Energy Plan includes electrification of *transportation* (personal vehicles[72] as well as buses and trains[73]) and certain building uses (e.g., development of ground- and air-source heat pumps[74]). New York City, which already has the benefit of a substantial electrified transportation network (mostly mass transit), models various levels of new vehicle electrification as well as electrification of certain building systems.[75] Furthermore, the EAMs that have been directed by the NYPSC and developed in the rate case context are beginning to nudge utilities in the direction of supporting environmentally beneficial electrification. The DER utilization metric that was established in the Con Edison rate case is intended to encourage the Company to work with DER providers to expand the use of DERs in its service territory both for the purposes of reducing customer reliance on grid-supplied electricity and for beneficial electrification. The increase in annual electricity consumption from EV charging, thermal storage, battery storage, and heat pumps is

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[69] See NYPSC Case 16-E-0060, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service*, Reply Comments of Acadia Center, Association for Energy Affordability, Inc., Environmental Defense Fund, Natural Resources Defense Council, Pace Energy and Climate Center (November 14, 2016).

[70] See, *e.g.*, Dennis, K., Colburn, K., and Lazar, J. (2016).

[71] The European 2050 roadmap policy document anticipates that reductions in energy usage as a result of efficiency and increases in electricity usage as a result of electrification of transport, buildings, and industry will roughly cancel one another out. See European Climate Foundation (2010) at 12-13. Similarly, in California, the proposed scoping document for 2030 contemplates electrification of transportation and industrial applications. See California Air Resources Board (2017) at 84, 92-105.

[72] See N.Y. State Energy Planning Board (2015) at 105.

[73] Ibid at 101.

[74] Ibid at 75.

[75] See N.Y.C. Mayor's Office of Sustainability (2016).

recognized as beneficial electrification in the EAM definition, and the Company will be rewarded for achieving its combined DER utilization and beneficial electrification target.[76]

While the DER utilization EAM is intended to recognize and reward beneficial electrification, the System Efficiency EAM (or load factor EAM), which has not yet been developed, would be expected to incentivize beneficial electrification in a way that would increase system efficiency rather than imposing additional costs on the system by increasing load during peak times. As discussed above (at pp. 14-18), a central problem with the electric system that animates the entire REV proceeding is the remarkable inefficiency of the whole machine—a phenomenon that is growing worse as usage gets peakier. Staff originally proposed that utilities have an earnings opportunity for improving system efficiency by reducing peaks, but the NYPSC went further in its Track Two Order, ordering that the system efficiency earnings opportunity be tied not just to peak reduction but also to "customer load factor," i.e., the relationship between peak and average use by customers. The NYPSC hinted that it foresaw a future in which it was appropriate to reverse a longstanding policy against encouraging increased use of electricity as a result of the deployment of large amounts of intermittent renewable resources in New York:

> "In 1977, at a time when fossil fuels including coal and oil dominated electric generation and thermal efficiency of electric generation was very low, the [NYPSC] adopted a policy that banned the promotion of any increased use of electricity. As the Clean Energy Standard is implemented, a scenario in which the off-peak power supply consists entirely of non-emitting generation, at very low marginal costs, is foreseeable."[77]

The NYPSC's observation aligns closely with recent research findings. For example, in a 2015 article in *The Electricity Journal*, Keith Dennis describes an evolution from a 1970s view that uses such as building heat should *not* be electrified because the emissions intensity of those applications was higher if they were provided by electricity than based on on-site combustion, to a more current view that as the electric system becomes cleaner, electrification of all applications becomes increasingly desirable.[78] In this context, a previously sensible policy of *avoiding* electrification should begin to give way to a policy supportive of electrification as the electric generation mix becomes cleaner.

The fact that the NYPSC included this observation in its description of its "load factor" EAM concept suggests that the proposed "load factor" EAM is intended to be supportive of environmentally beneficial electrification. In the Con Edison rate case, the parties were generally supportive of a load factor EAM but agreed that additional analysis was needed during the first year of the 3-year rate plan to meaningfully develop a load factor EAM that is consistent with the state's environmental goals. While it is certainly possible that an improvement in the

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[76] See generally NYPSC Case 16-E-0060, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service*, 2017 Outcome-Based EAM Collaborative Report (Aug. 23, 2017).

[77] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting a Ratemaking and Utility Revenue Model Policy Framework at 74 (May 19, 2016).

[78] See Dennis, K. (2015).

load factor of Con Edison's poor load factor customers can result in reductions in carbon dioxide emissions if various conditions are met,[79] there can also be situations in which improving a customer load factor increases emissions associated with that customer's energy use.

One unsolved challenge inherent in developing a customer load factor EAM is how to ensure that customer load factor is not "improved" by non-beneficial electrification, i.e., an increase in average electric consumption where the electric consumption increases air pollution, for the sole purpose of reducing the differential between the peak electric demand and the average demand. Conversely, customer load factor can worsen (decrease) with greater penetration of energy efficiency if the energy efficiency measures reduce average load more than they reduce peak load, even while such energy efficiency measures have environmental benefits and help achieve the state's environmental goals. As a result of these and other challenges, the stakeholder Collaborative that was established as part of the settlement of the Con Edison's 2016 rate case to develop outcome-based EAM metrics, targets, and EAM levels, and make recommendations to the NYPSC, did not succeed in reaching agreement on a load factor EAM for the second year of the rate plan, and has recommended further analysis regarding appropriateness of this EAM.

As the Collaborative parties have further refined their thinking about EAMs, several parties have expressed interest in developing an outcome-based GHG emissions reduction metric, which supports the State's GHG-related environmental goals. Collaborative party discussions are currently underway to help develop a metric to capture GHG emissions reductions achieved in the Con Edison's service territory from measures of all types, including, without limitation, energy efficiency, load shifting, distributed energy resources such as solar PV and batteries, beneficial electrification of end uses, and behavioral changes, for consideration in rate year 3 by the NYPSC. These discussions present a critical opportunity to give a utility company a direct financial interest in economy-wide GHG emissions reductions.

An electric utility GHG metric could be based on what one might think of as a "deemed GHG savings" approach, something akin to the deemed energy savings approach that is used extensively in the energy efficiency field to estimate energy savings using a set of predetermined savings values for efficiency measures. A GHG metric based on this approach would estimate GHG emissions reductions associated with a targeted set of activities using a set of pre-determined emissions factors. This approach would be comparatively simple to implement, but it would have numerous drawbacks and, on balance, would fall short of tying a utility earnings opportunity to a true market outcome relating directly to a REV goal (reduction of GHG emissions), as it would relate more to the success of activities identified before the fact. First, a deemed savings approach would not measure actual GHG emissions reduction values, which could deviate materially from the "deemed" values. Additionally, such an approach would fail to provide the utility with any incentive for ensuring that short-term actions are taken in a manner that is consistent with optimal long-term GHG performance. A deemed GHG savings approach would also miss GHG emissions reduction opportunities beyond the targeted set of activities,

[79] Specifically, load factor improvement can result in decreased emissions if the customer reduces its usage during peak periods when the generating resources are more polluting or if the customer adds new, environmentally beneficial load during off-peak periods.

and would not account for interactive effects among activities, whether favorable or unfavorable with respect to emissions outcomes; for example, it might fail to anticipate what a utility might do to encourage the availability of cleaner generation and how demand-side measures might interact with the available generation to shape overall emissions outcomes. It would also fail to account for market effects (indirect effects that result from the activities that the utility is tracking) as well as any activities that are not necessarily known to the utility. For all these reasons, a deemed savings approach would in effect pre-determine the utility's actions, and so fail to provide a significant incentive for innovation.

An alternative approach, which we would call "measured GHG savings," would be to adopt a metric to assess actual, holistic, economy-wide GHG outcomes in the utility service territory and reward the utility for the achievement of GHG emissions reductions above and beyond the historic trend. While a measured GHG savings metric would be more challenging to implement as the impact of exogenous factors like weather and the state of the economy would have to be isolated—and as the proper time horizon might be longer than a typical rate case settlement plan—a metric of this type could overcome the various limitations associated with the deemed GHG savings approach. As an example, evaluating annual GHG emissions per capita in the utility service territory would be a simple and powerful approach. Compared to the deemed GHG savings approach, a metric of this type would be much simpler for the utility and its regulator to calculate because it would have fewer elements that would have to be calculated solely for purposes of computing the metric; however, it would constitute a far more significant departure from conventional performance-based regulation, and would require thoughtful consideration of how utility practices can contribute to large-scale market outcomes. Therefore, if a regulator expects ultimately to draw a direct connection between utility compensation and real-world environmental outcomes, it should begin developing this type of metric sooner rather than later, to build the necessary experience and data to tie future electric compensation to the emissions associated with nearly the entirety of the energy sector, thus providing an environmentally appropriate incentive applicable to the full spectrum of activities that an electric platform provider can influence.

*Embracing renewables: interconnection and the Clean Energy Standard*

The Track Two Order called for the establishment of two EAMs that would be directly relevant to the increased penetration of renewable generation: one pertaining to interconnection of distributed generation, and one pertaining to reducing the cost of achieving the goals of the Clean Energy Standard (the "CES").

The Interconnection EAM deals with distributed generation, including (without limitation) solar PV. Despite continuing controversy about its precise execution, this will provide utilities with an opportunity to increase their earnings based on timely interconnection of customers' distributed generation and customer satisfaction with the interconnection process.

The CES is the result of a NYPSC proceeding that was launched at the direction of Governor Cuomo, for the dual purposes of purpose of ensuring, first, that the State's goal of 50% renewables by 2030 is met, and second, that the State doesn't lose its nuclear plants prematurely, causing potential backsliding on the State's carbon dioxide reduction goals in the meantime. A CES EAM would, if promulgated, be relevant to the adoption of large-scale renewable generation. Developing an EAM that directly touches on the CES is less straightforward than one that touches on distributed renewables. When the REV Track Two Order was promulgated, the CES Order had not been issued, and certain proposals under consideration would have allowed the monopoly distribution utilities to play a direct role in achieving the renewable energy standard goals, either by owning large-scale generation or by entering into power purchase agreements with renewable generation owners. However, the CES Order as ultimately adopted blocked both these pathways for utility involvement in the adoption of large-scale renewables.[80]

At this time, the outlook for a CES EAM is hazy. It is unclear how one would establish that utilities have reduced the cost of achieving renewables goals. Because less demand for grid–based electricity means less renewable generation needs to be acquired, one option would be to reward utility/DSPs for making the CES more affordable by supporting greater energy efficiency and other behind-the-meter load reductions, such as rooftop PV. However, focusing on these particular utility actions would give an excessively narrow sense of what utilities can do to assist in increasing the utilization of renewable energy, because there is much more they can do than simply reduce the total amount of large-scale renewable generation that needs to be procured. For example, they could facilitate the adoption of well-designed time-variant pricing, which can make renewable generation less likely to be curtailed and thus more affordable. Moreover, EAMs focused solely on energy efficiency and/or rooftop PV as avenues for making the CES more achievable would duplicate EAMs that have already been promulgated. As will be explained further in the conclusion to this whitepaper, it would be extremely valuable for the distribution utilities to be given a more robust stake in the environmental transformation of the electric system, including without limitation the deployment of renewable generation at all scales.

## 3.3 Engaging consumers: transforming passive electricity buyers into market participants

States that have restructured their electric industries fall into two basic categories. In some states, a competitive "wholesale" market has been created for generators to compete against one another to provide service at the lowest price, but the "customers" in that market are all utility companies, while retail customers are kept a step away from the competitive market as they automatically receive their electric commodity bundled with the delivery service from their distribution utility. Other states, in addition to creating a competitive "wholesale market," have also implemented "retail choice," whereby individual retail customers, although they continue to be served by a single set of wires owned by a distribution utility with a monopoly franchise, select among electric commodity sellers.[81]

[80] NYPSC Case 15-E-0302, Proceeding to Implement a Large-Scale Renewable Program and a Clean Energy Standard, Order Adopting A Clean Energy Standard (hereinafter, "CES Order") (August 1, 2016) at 101.
[81] Boyd, W. (2014) at 1631.

New York State has embraced retail choice as well as wholesale competition. The REV reforms will build on the existing retail marketplace by making it possible for retail customers to procure or provide a wide range of possible energy-related services other than the electric commodity in a competitive, market-based manner. For this to occur, however, the utilities/DSPs need to provide customers with basic machinery that provides the basis for market-based decisions: sufficient visibility into what they are purchasing and price signals that enable distinctions among various offerings.

Customers' electricity-related decisions are on the verge of becoming more complicated due to the proliferation of DERs. These DERs include distributed generation as well as a range of other resource types. Generation located at customer premises is increasingly popular with customers of various classes. For example, commercial customers increasingly deploy on-site generation to ensure higher levels of reliability, while residential customers increasingly install rooftop PV for various reasons and may own back-up generation for reliability (especially in the increasingly storm-ravaged northeastern U.S.). Although concerns about grid defection are substantial in some regions where distributed generation adoption is high, distributed generation, if properly deployed, can be a vital part of a smart system, both by reducing the need for unnecessary spending of ratepayer funds on certain system upgrades (as discussed above in connection with non-wires alternatives), and by providing various services, including flexibility, to the system as a whole.

Depending on its type and how it is deployed, distributed generation can yield significant environmental benefits directly. If it is non-emitting, it can comprise part of a future system with a very low carbon footprint. If it does emit pollution, but at comparatively low rate, it can still contribute to reductions in present emissions, although its long-term desirability may be uncertain.

Storage, whether located at customer premises or combined with utility infrastructure, can also enhance flexibility while at the same time improving environmental performance. When storage is taking in energy, it functions as demand, and when it is releasing energy, it is a form of supply. Depending on how it is deployed, it can mitigate intermittency, allowing the use of energy from the sun and wind even when the sun isn't shining and the wind isn't blowing.

Customer-located distributed generation and storage will contribute most to the smart system when they are paired with complementary measures that optimize a customer's energy performance in real time. For example, where a building has on-site generation and storage, smart thermostats and appliance- or building-level controls can be deployed to allow a customer to moderate its use of grid power—and/or its contribution of services to the grid—with some precision, to respond to system constraints (on a given circuit or affecting a large portion of the system) and/or environmental constraints. An electric system in which efficiency, distributed generation, storage, and complementary measures are optimized would minimize the size of the generation portfolio needed to serve demand and allow managing inevitable intermittency at the lowest possible cost. Accurate, meaningful pricing of services used and *provided* by customers—including, without limitation, their consumption of grid-delivered electricity—will be essential to making this optimization possible.

### 3.3.1 Advanced metering

Nationwide, many residential customers have only minimal access to information about their electricity consumption due to antiquated electric metering technology and related technology. At the outset of the REV effort, New York State lagged the nation in advanced metering infrastructure ("AMI") deployment. However, this late-adopter status may position New York well to lead on this issue by correcting problems that became apparent in earlier deployments in other states.

The REV process has led utilities in New York to begin moving forward on AMI deployments, but not without conditions. Notably, where many earlier deployments demonstrated functionality without necessarily enabling customer benefits, deployments by regulated utilities in New York will be required to provide benefits to customers from the onset. Ensuring data access by customers and their authorized third parties through tools such as Green Button Connect My Data[82] is a critical component of the AMI that is just getting started in the Con Edison service territory, and as soon as feasible, Con Edison will be required to begin piloting innovative tariff structures that will incentivize residential customers to change the way they think about and use electric service.

### 3.3.2 Consumption tariffs and price signals

Today, most consumers of electricity, especially residential consumers, pay for electric service based on tariffs that do not reflect the dramatic variation in the cost of the underlying service depending on the time and location of consumption. Specifically, consumers are effectively given no incentive to avoid high levels of consumption at times or locations where electric service is exceptionally costly, nor to increase consumption when it is particularly inexpensive and clean. The absence of adequate price signals means that consumers have no incentive to achieve efficient levels of consumption—and the result is higher prices overall for all consumers. It also drives bad environmental outcomes for several reasons. For example, time-variant pricing of electricity can be used to discourage use of the dirtiest generation, which is often from antiquated resources that are expensive to run; to encourage the use of non-emitting generation from intermittent resources when they are available (these typically have almost no variable costs), and deploy and operate those resources in a manner that optimizes the benefits for their owners and for the grid; and to manage consumption holistically so that demand can be balanced with intermittent supply in the most flexible manner possible. Conversely, the absence of time-variant prices makes it difficult to avoid the most polluting resources and integrate maximum amounts of intermittent supply efficiently.

Today's flat price signals also fail to reflect the fact that if consumption rises too much in certain locations, major investments in infrastructure will be needed *in the future*, and the costs of those investments will be borne by future ratepayers. Many of today's ratepayers are also future ratepayers, but without meaningful price signals reflecting both the short and long-run marginal

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[82] See Green Button Initiative. Homepage. http://www.greenbuttondata.org/ Accessed 12/27/17.

costs of additional stress on particular system elements, price signals fail to encourage them to contain the future costs that they themselves will bear.

A smarter system will be one that makes strides toward rectifying this dysfunction in pricing. As Professors Boyd and Carson have explained, "[g]iven the truly massive task of decarbonizing the power sector over the coming decades, ratemaking could turn out to be a critical tool in facilitating and scaling key innovations necessary for a low-carbon electricity system…."[83] The REV Track Two Order[84] and subsequent developments significantly advance this goal in New York. In the current market, without advanced metering, time-variant rates lack sophistication and granularity,[85] but the NYPSC has directed utilities and Staff to make the most of what they have and, even more importantly, to lay the groundwork for a more robust future market. To that end, the Track Two Order in the REV proceeding called upon each utility to propose revisions to its opt-in time-of-use rates as well as propose to test out a "Smart Home Rate."[86] Whereas current time-of-use rates are by their nature fairly crude due to the limitations of old-fashioned metering—a problem that mere revisions to the current time-of-use rates presumably will not solve—the Smart Home Rate is intended to provide residential customers who are early adopters of sophisticated technologies an opportunity to use the capabilities of those technologies to manage their electricity consumption in a manner that has favorable outcomes for the system. Such a rate will presumably be possible only with AMI, which will be in place soon in the downstate region. Moreover, the Track Two Order directed Staff to consider mass market default rate design reforms, including their bill impacts, and report back to the NYPSC by October 1, 2017.[87]

Subsequently, in the DSIP Order, the NYPSC required that in all cases where utilities propose advanced metering infrastructure, they must include proposals for innovative rate structure.[88] More recently, NYPSC has announced an intention of addressing many of these rate design innovations in a rate design working group being formed as part of the Value of Distribution Energy Resources proceeding (a REV-related proceeding further discussed below at pp. 39-41).[89] After fruitful discussion in that working group, Staff has now filed a promising proposal for how to approach the bill impact analysis that the NYPSC ordered in the Track Two Order. Staff has proposed to (1) examine an array of cost-reflective and alternative pricing structures, (2) provide

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[83] Boyd, W. and Carlson, A. (2016) at 878.
[84] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting a Ratemaking and Utility Revenue Model Policy Framework (May 19, 2016).
[85] Simple meters capable of categorizing all consumption as occurring during two or three time categories are currently available and can operate without the communications architecture characteristic of AMI; thus, crude time-variant rates, which do not reflect usage patterns during specific intervals on specific days, have been implemented in a limited manner for residential customers in New York.
[86] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting a Ratemaking and Utility Revenue Model Policy Framework (May 19, 2016) at 155-56.
[87] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting a Ratemaking and Utility Revenue Model Policy Framework (May 19, 2016) at 156.
[88] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting Distributed System Implementation Plan Guidance (April 20, 2016) at 58.
[89] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*; Case 16-M-0430, *In the Matter of Rate Design Reforms Supporting the Commission's Reforming the Energy Vision*; Case 15-E-0751, *In the Matter of the Value of Distributed Energy Resources*, Matter 17-01277; *In the Matter of the Value of Distributed Energy Resources Working Group Regarding Rate Design*, Notice of Rate Design Issues to be Addressed in VDER Proceeding (July 21, 2017).

load data and bill impact analysis tools to stakeholders to enable replication of analytical results, and (3) consider short- and long-term adjustments in customer behavior and DER adoption, as well as the impact that such behavioral changes can have on system costs and investments.

In tandem with and in response to these orders in the REV proceeding and related dockets, individual New York utilities have been progressing toward advanced pricing, with Con Edison—the first to have an AMI plan approved—taking the lead.[90] Con Edison's Customer Engagement Plan Innovative Rate Pilot is a widespread mass-market residential pricing pilot to be implemented as part of its AMI rollout.[91] The central idea is to expose typical residential customers to more advanced rates, such as a time-variant demand charge.[92] Importantly, the pilot will be implemented in a default manner, with customers to be notified that they have been placed on the rate and offered the opportunity to opt-out. The importance of having more advanced and cost-reflective tariffs be established as default rates in the future is paramount; research has proven that relying on electric customers to voluntarily choose to adopt non-standard tariffs results in very low adoption levels, thereby causing the benefits realized from new pricing structures to remain very low. Conversely, defaulting customers onto advanced rates and allowing them to opt out results in high levels of adoption and much higher aggregate benefits in terms of reduced system and environmental costs.[93] Con Edison will begin to measure baseline consumption and demand in a time-variant manner beginning in the summer of 2018, followed by a three-year pricing tariff roll-out across all boroughs of New York City, other than Manhattan, and Westchester.

While managing system costs through time-variant pricing is a promising way to contain costs to ratepayers in the future, time-variant retail pricing is also relevant to environmental outcomes because of the time-variant nature of wholesale market prices of generation and the relationship between those wholesale prices and environmental outcomes, as discussed above. Implementing time-variant volumetric pricing to recover generation costs is not only efficient, as it aligns with cost causation, but also helps discourage consumption during high demand times, which, in New York, correlate largely with the times when emissions are highest.[94]

That said, in restructured states like New York, where the monopoly utility does not own generation resources, the utility's interest and responsibility is to manage distribution system costs, so time-variant pricing for electricity may fall outside the scope of ratemaking as currently understood. The pricing pilot that Con Edison is preparing to undertake as part of its AMI

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[90] Shortly after Con Edison moved ahead with its AMI proposal, its much smaller affiliate, Orange & Rockland, did the same. The customer engagement process through which the Con Edison pilot was developed included both utilities.

[91] See NYPSC Cases 15-E-0050, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service, 16-E-0060, Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service*, and 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*. AMI Customer Engagement Plan filed by Con Edison and Orange & Rockland (July 29, 2016).

[92] A time-variant demand charge would charge customers based on their maximum 30-minute consumption window during a pre-defined peak period (for example, 4-9pm), thereby incentivizing customers to shift their loads to off-peak times.

[93] See U.S. Department of Energy (2013). "Analysis of Customer Enrollment Patterns in Time-Based Rate Programs"; Potter, Jennifer, Stephen George, and Lupe Jimenez (2014). Prepared for U.S. Department of Energy. "SmartPricing Options Final Evaluation".

[94] Martin, Nick (2015). "Carbon-Tuning New York's Electricity System: Uncovering New Opportunities for CO2 Emissions Reductions." Pace University School of Law, Pace Energy and Climate Center, November 2015.

rollout is a good example of how utilities can use rates to reduce long-term marginal costs associated with the distribution system; however, because there is a divergence between the times of peak generation system-wide and the times of greatest stress on the distribution system in the Con Edison service territory, the environmental impact may not be great. For example, in residential areas of Brooklyn, the distribution system is most stressed in the evening; however, the aggregate peak need for electricity generation (during which highly polluting peaker plants are called into service) occurs during the middle of the day, due to high industrial and commercial consumption in other locations. Conversely, in other areas, such as downtown Manhattan, the generation and distribution peaks align well; therefore, in these locations, a peak price targeting distribution costs during the middle of the day will serendipitously reduce environmental impacts while reducing stress on the distribution system. Where peak times are not in alignment, there may be tension between even the most straightforward approach to time-variant pricing for generation and time-variant pricing for use of the electric grid.

Simplicity is traditionally considered a virtue in ratemaking, but in a highly computerized future, complexity may be more tolerable to customers because their responses to complex price signals can be automated. The Smart Home Rates, which all New York utilities were directed in the Track Two Order to develop, may push the boundaries of this. For example, Con Edison's proposed Smart Home Rate Demonstration Pilot,[95] which it proposes to implement between 2017 and 2020, is intended to give residential customers who are early adopters of sophisticated technologies an opportunity to maximize the capabilities of those technologies to manage their electricity consumption in a manner that has favorable outcomes for the system. Customers in this pilot would be exposed to a more complex rate than those in the Innovate Rate Pilot—notably, a rate including an hourly price on the supply of electricity as well as a time-variant demand charge. In the future, such a rate structure may pave the way to containing system costs while simultaneously reaping the environmental benefits available from time-variant pricing of generation.

### 3.3.3 Price signals for distributed energy resources

Although almost any consumer could find ways to save money with some effort if presented with meaningful price signals, DERs provide a greater opportunity for passive consumers to become active participants in a marketplace where there is meaningful give-and-take between demand and supply. For this reason, accurate, meaningful, and actionable price signals for DERs are needed at least as urgently as accurate, meaningful, and actionable price signals for the consumption of electricity. DERs of all types—whether energy efficiency, generation, storage, demand flexibility, or other resources—may enable the avoidance of system costs, the avoidance of the most costly grid electricity, further integration of renewable resources, and

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[95] NYPSC Case 14-M-0101, *Smart Home Rate Demonstration Project Concept filed by Consolidated Edison Corporation of New York, Inc. and Orange and Rockland Utilities* (February 1, 2017). On June 9, 2017, the Commission notified Con Edison that its "Smart Meter Rate" proposal "complies with the objectives set forth in Ordering Clause 4 of the *Commission's Order Adopting Regulatory Policy Framework and Implementation Plan*, issued February 27, 2015, as well as the Smart Home Rate objectives defined in the *Order Adopting a Ratemaking and Utility Revenue Model Policy Framework*, issued May 19, 2016, "and that the Commission would begin discussing more detailed implementation plans". NYPSC Case 14-M-0101, Letter from Scott Weiner to Kerry Kirschbaum regarding Staff's Review of the Smart Home Rate Project (June 6, 2017).

other benefits. However, their potential for enabling these benefits is highly dependent on the time, location, and manner of their deployment.

In the future, when time-variant pricing for consumption of electricity may be commonplace, the challenge of accurately pricing DER services may be somewhat reduced. However, consumption tariffs are unlikely in the foreseeable future to reflect the geographic diversity of values that DERs can provide. There is a general social consensus that consumers everywhere (at least within a given utility's service territory) are equally entitled to have electric service. Consumers located in sections of the grid that are *not* at risk of needing upgrades as a consequence of high usage may be so situated because of recent investments in the section of the grid where they happen to be located. From a backward-looking perspective, those customers may be the ones who are costly to serve, and that cost has already been socialized. Customers in less well-provided-for areas are, in effect, less well-served, and all ratepayers stand to benefit from lower *future* costs if the need for future investment in those locations can be deferred or avoided. Yet, imposing higher prices for conventional, passive electric consumption on those customers who happen to be located in areas where the capacity of the grid is strained could run afoul of our society's commitment to equity, and legal requirements designed to ensure the equitable treatment of customers.

However, concerns about inequity that might inhibit geographically distinct consumption tariffs are irrelevant with respect to the opportunity presented by DERs to more "proactive consumers," electric customers who opt to engage actively in the distribution-level marketplace and receive compensation for value created by such engagement, rather than consume passively as expected in the traditional utility business model. It seems obvious that there is no reason why consumers should be accorded a right to sell services which, whether due to geographical vagaries or other issues, are not valuable to the system, or a right to sell such services at a high price that those services do not actually merit at a time and place where the consumer is in a position to offer them.

Another reason to consider DER compensation separately from underlying consumption tariffs is that as long as the price of carbon is not internalized economy-wide, resources with environmentally favorable impacts will have to be compensated for those impacts. DERs have varied environmental characteristics—separate and apart from their impact on the *system*—and accurate DER pricing will need to take those varied characteristics into account.

The NYPSC's initial foray here has been aimed at modernizing "net metering" to more accurately reflect the energy, system, and environmental values of DERs that are currently eligible for net metering in preparation for the arrival of a very large amount of PV, especially community distributed generation, on a system that previously did not have especially high PV penetration. More recently, the NYPSC's Staff and stakeholders are beginning work in earnest to develop an approach to DER compensation that could be more generally applicable, including to resources that would not have been eligible for net metering because they are not renewable.

*Net metering successor*

Early in the REV proceeding, Staff noted the need to monetize environmental externalities,[96] including the need for DERs to be compensated in a manner that reflects their full environmental value. For example, the Staff Report appended to the original Order instituting the REV proceeding posed questions such as, "How can system-wide benefits and externalities be integrated into market prices?"[97] and, "How should tariffs for DSPP[98] products be designed to monetize system benefits and externalities?"[99] Subsequently, in the Track One Order, the NYPSC adopted guidelines to govern market design that included the following (among others):

- "Fair valuation of benefits and costs—include portfolio-level assessments and societal analysis with credible monitoring and verification,"

- "Coordination with wholesale markets—align DSP market operations and products and services with wholesale market operations to reflect full value of services," and

- "Economic and system efficiency—promote investments and market activity that provide the greatest value to society, with considerations to identified externalities."[100]

In late 2015, the NYPSC set out to develop interim and long-term methodologies for valuing DERs that were eligible for net metering and, ultimately, all distributed resources. The phase of the proceeding that was dedicated to net energy metering ("NEM") eligible resources was dubbed "Phase 1," with the full panoply of resources to be addressed in a subsequent "Phase 2." After an in-depth stakeholder consultation process, the NYPSC explained the need for a new approach for NEM-eligible resources as follows in an Order adopting a new compensation methodology for such resources (issued in March 2017):

> "At relatively low levels of penetration, the inefficiencies of NEM could be tolerated. However, as both customer interest in and New York's need for clean and distributed generation increases, driven by initiatives including the CES and [Community Distributed Generation], it has become increasingly vital for compensation and incentives

[96] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Developing the REV Market in New York: DPS Staff Straw Proposal on Track One Issues (August 22, 2014) at 1.
[97] See NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, DPS Staff Report and Proposal (April 25, 2014) at 20.
[98] The term "DSPP" was used in the initial Staff Report to refer to the Distributed System Platform Provider; subsequently, in the DPS Staff Straw Proposal issued in August 2014, the term was changed to "DSP." NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Developing the REV Market in New York: DPS Staff Straw Proposal on Track One Issues (August 22, 2014) at 3.
[99] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, DPS Staff Report and Proposal (April 25, 2014) at 65.
[100] NYPSC Case 14-M-0101, *Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision*, Order Adopting Regulatory Policy Framework and Implementation Plan (February 26, 2015) at 45.

to sufficiently encourage the deployment of DG and its location, design, and operation in a manner that maximizes values to the customer, the electric system, and society."[101]

The Order established a new methodology recognizing DERs as providing several kinds of value: energy commodity ("LMP," also known as "locational marginal price," an amount based on the wholesale price of energy commodity, at a particular location and time), a capacity value that takes into account intermittency or dispatchability of the resource, distribution system value ("D"), and environmental value ("E"). The environmental compensation, E, would be the greater of the applicable Tier 1 Renewable Energy Credit ("REC") price per kWh (which is to say, the price paid for the renewable attribute of new generation participating in the CES[102]) or an amount based on the Social Cost of Carbon per kWh (Social Cost of Carbon net of the RGGI price, to avoid double payments for the same carbon savings).[103] For community distributed generation, the transition from traditional NEM compensation for first-movers to the LMP+D+E "value stack" method for subsequent adopters is to be smoothed out through a "Market Transition Credit," which was developed based on a groundbreaking consensus reached by the utilities and some solar industry parties.

*Generally applicable DER compensation*

At the time of this writing, the second—and much broader—phase of the DER compensation proceeding is just getting underway. A key question in the next phase will be how environmental values are treated in the case of DERs other than renewable resources. For example, distributed CHP has important carbon and resiliency benefits in the short and medium term. However, those same resources will also contribute to $NO_x$ air emissions in the communities in which they are located, and in the long run, natural gas-fired CHP may become a GHG liability. Certain types of DER might actually have *negative* environmental benefit under certain conditions—i.e., when they produce more emissions than the marginal resources that they displace. This quandary is one of the disadvantages of rewarding "emissions avoidance" rather than putting a price on emissions in the first place.

Although the methodologies that were developed during Phase 1 will be further honed during Phase 2, it appears that the major focus on Phase 2 will be on non-NEM resources. Some of the resources that are likely to be addressed here have been addressed by utility-specific tariffs such as "standby tariffs" and "offset tariffs." At the direction of the REV Orders, the various utilities have been working to improve their standby tariffs for some time. In the case of Con Edison, the

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[101] NYPSC Cases 15-E-0751, *In the Matter of the Value of Distributed Energy Resources*, and 15-E-00852, *Proceeding on Motion of the Commission as to the Policies, Requirements and Conditions For Implementing a Community Net Metering Program*, Order on Net Energy Metering Transition, Phase One of Value of Distributed Energy Resources, and Related Matters (March 9, 2017).
[102] See generally NYPSC Case 15-E-0302, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*; Case 16-E-0270, *Petition of Constellation Energy Nuclear Group LLC; R.E. Ginna Nuclear Power Plant, LLC; and Nine Mile Point Nuclear Station, LLC to Initiate a Proceeding to Establish the Facility Costs for the R.E. Ginna and Nine Mile Point Nuclear Power Plants,* Order Adopting a Clean Energy Standard (August 1, 2016).
[103] See NYPSC Case 15-E-0751, *In the Matter of the Value of Distributed Energy Resources*; Case 15-E-0082, *Proceeding on Motion of the Commission as to the Policies, Requirements and Conditions For Implementing a Community Net Metering Program*, Order on Net Energy Metering, Transition, Phase One of Value of DER, and Related Matters (March 9, 2017), at 106, footnote 42.

most recent rate case provided for various incremental improvements to the standby tariff.[104] A limited standby pilot calls for experimenting with different rate structures and also grapples with concerns about the localized effects of $NO_x$ from CHP by employing heightened $NO_x$ standards applicable in specified neighborhoods that are already known to face or be in danger of facing air quality challenges.

It is unclear precisely how the NYPSC anticipates moving from "standby" tariffs as currently understood to a future "DER compensation" approach in Phase 2 of the "Value of DER" proceeding, and unclear how the environmental challenges posed by these environmentally ambiguous resources will be addressed in the next phase. Perhaps resources will be compensated through a value stack methodology, similar to the value stack applicable to NEM-type resources, but with the potential for a *negative* adjustment in respect of E values that are detrimental to the electric system's overall carbon performance. However, a more efficient and elegant solution would be to require that the damage value of carbon be internalized as broadly as possible, including by electric generators of all sizes and types, in which case resources like CHP would enjoy a comparative advantage to the extent that they are beneficial but no further.

### 3.3.4 Including low-income customers in the emerging electric marketplace

The history of the construction of major infrastructure in the United States has often been a history of inequity, with low-income communities and communities of color often bearing the worst of the burdens associated with the energy system without experiencing corresponding benefits.[105] Advocacy for low-income and otherwise disadvantaged customers and communities has traditionally focused on keeping costs down and minimizing environmental impacts on communities where electric infrastructure is sited, but many advocacy groups have begun to push for more holistic, rights-based "energy justice" approaches.[106]

The emergence of clean DER as a central feature of the transformation currently underway suggests the possibility that this transformation can provide new opportunities, benefits, and environmental and public health improvements for everyone, especially disadvantaged households and communities. In its initial stages, however, the energy transformation already underway in the United States may have exacerbated inequities to some extent. For example, low-income utility customers often pay surcharges for renewable portfolio standards and energy efficiency programs but may be less well-positioned than other customers to make direct use

[104] Improvements including allowing some storage to be exempted from it, piloting exemptions and alternative rate structures for a limited amount of CHP that meets certain environmental and efficiency standards, and, as directed in the Track Two Order, replacing a "performance credit" based on CHP output with a "reliability credit" based on the customer's management of its entire demand during a specified period during which system peaks are likely to occur. See NYPSC Case 16-E-0060, *Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service*, Order Approving Electric and Gas Rate Plans (January 25, 2017).
[105] See Hernandez, D. (2015); National Association for the Advancement of Colored People, Indigenous Environmental Network, & Little Village Environmental Justice Organization (2016); and ReadMedia (2011).
[106] See, *e.g.*, No One Leaves Mid-Hudson (2016). For an analytic framework of "energy justice," see Sovacool, B. K. & Dworkin, M. H. (2015).

of the subsidies associated with those programs.[107] Making sure that low and moderate income customers can participate fully in this transformation is imperative.

In the REV context, achieving a just transition is not only essential to the well-being of disadvantaged people and communities, it is also necessary for the success of the transformation itself. 40% of New York State households are considered low- to moderate-income, meaning they earn less than 80% of the median income in their area.[108] If low-income customers and communities are unable to engage in the REV transformation, customer engagement—one of the salient goals of REV—will be limited from the outset, and the society-wide advantages that should accrue from successful transformation will likewise be limited. In addition to being essential to achieving REV's environmental goals, accomplishing a just transition by fully engaging low-income customers has the potential to materially increase economic opportunities for low-income households. This inflection point in the electric sector could open up new opportunities that previously did not exist.

Although the NYPSC has been pursuing major reforms concerning affordability for low and moderate income customers simultaneously with the REV transformation,[109] it has also been working hard to open up opportunities for those customers to participate directly in the REV transformation itself. For example, making community distributed generation ("DG") available to apartment dwellers regardless of geography and income has been an important focus.[110] Modern metering and the opportunity for more sophisticated price signals are also likely to emerge as a key focus.

Just as updating and improving upon net metering has been an important focus of REV to date, community DG, which can make some of the benefits of DG available to people who are not homeowners, has also been seen as a key pathway for REV market opportunities to reach low-income customers. Specifically, during Phase 1 of the Community DG program, the NYPSC specifically sought to encourage Community DG projects to have at least 20% low income customer participation.[111] Nonetheless, over the course of Phase 1, no project was able to

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[107] See NYPSC Case 15-M-0082, *Proceeding on Motion of the Commission as to the Policies, Requirements and Conditions For Implementing a Community Net Metering Program*, Order Establishing A Community Distributed Generation Program and Making Other Findings (July 17, 2015) at 3-4. See also Welton, S. (2017).

[108] New York State, Office of the Governor (2016).

[109] See, *e.g.*, NYPSC Case 14-M-0565, *Proceeding on Motion of the Commission to Examine Programs to Address Energy Affordability for Low Income Utility Customers*, Order Adopting Low Income Program Modifications and Directing Utility Filings (May 20, 2016); NYPSC Case 15-E-0082, *Proceeding on Motion of the Commission as to the Policies, Requirements and Conditions For Implementing a Community Net Metering Program*, Order Establishing a Community Distributed Generation Program and Making Other Findings (July 17, 2015) at 22-27; NYPSC Case 14-M-0224, *Proceeding on Motion of the Commission to Enable Community Choice Aggregation Programs*, Order Authorizing Framework for Community Choice Aggregation Opt-Out Program (April 21, 2016) at 16-17.

[110] See NYPSC Case 15-M-0082, *Proceeding on Motion of the Commission as to the Policies, Requirements and Conditions For Implementing a Community Net Metering Program*, Order Modifying Community Distributed Generation Membership Requirements (March 13, 2017).

[111] Ibid at 22.

achieve that.[112] One reason for this failure may be that low-income customers may have difficulty demonstrating creditworthiness through conventional screens (such as FICO scores) because their minimal participation in the economy creates insufficient data to generate a high score. This failure highlights the need for legal and regulatory mechanisms to make economic value of distributed resources available to low-income customers. More recently, the NYPSC has approved a proposal by Con Edison to pilot a community distributed generation opportunity specifically for low-income customers on a utility-owned basis.[113]

Apartment dwellers, who may not be directly metered by a utility company and may not own or have the ability to freely modify the building or dwelling unit in which they reside, pose a particular challenge to the REV transformation. Community DG has been conceived of as a mechanism for engaging low-income residents, including apartment-dwellers, but its usability for residents of smaller buildings was initially limited by a participant minimum of ten, which exceeded the number of units in many apartment buildings occupied by low-income residents.[114] The NYPSC addressed this by eliminating that minimum, which in effect made its Community Net Metering program available as a mechanism for placing PV on the roofs of even the smallest apartment buildings.[115] Data access is another problem; as discussed above at p. 355, New York has been a laggard in metering and data access, but the state faces additional challenges in bringing the relevant levels of data access to low-income residents due to the exceptionally high number of apartment dwellers, many of whom are not directly metered by any utility company.[116] Solving the data access problem for apartment dwellers will be an essential challenge for low-income customer engagement in New York State.

# 4. Conclusion

## 4.1 Decarbonizing electric supply

Decarbonizing the economy entails decarbonizing generation, converting non-electric energy uses to electricity, and generally operating a leaner, smarter energy system. There are clear pathways for REV-type reforms to push all participants in the distributed energy marketplace in the direction of the cleanest DER and beneficial electrification, and to push the transmission and distribution utilities in the direction of greater efficiency and flexibility. However, in New

[112] The Commission noted: "In adopting CDG, the initial Phase 1 of the program included a project eligibility option of 20% low-income off-takers for a given project. While, there was no uptake or development of projects under this stipulation, we stand by our commitment to pursue solutions to encourage low-income customer participation as discussed below." NYPSC Cases 15-E-0751 and 15-E-0082, Order on Net Energy Metering Transition, Phase One of Value of DER, and Related Matters (March 9, 2017) at 138.
[113] NYPSC Case 16-E-0622, *Petition of Consolidated Edison Company of New York, Inc. for Approval of a Pilot Program for Providing Shared Solar to Low-Income Customers*, Order Approving Shared Solar Pilot Program with Modification (August 2, 2017).
[114] NYPSC Cases 15-E-0751 and 15-E-0082, Order on Net Energy Metering Transition, Phase One of Value of DER, and Related Matters (March 9, 2017) at 7.
[115] NYPSC Case 15-M-0082, *Proceeding on Motion of the Commission as to the Policies, Requirements and Conditions For Implementing a Community Net Metering Program*, Order Modifying Community Distributed Generation Membership Requirements (March 13, 2017).
[116] New York also has significant numbers of non-low-income apartment dwellers, but the low-income apartment dwellers account for a remarkably high portion of the residents of New York City in particular, and the state as a whole.

York, it is expected that the future electric supply portfolio will continue to include large-scale generation, as contemplated in the CES Order.

A decarbonized electric generation fleet can take a number of different forms. Non-emitting resources can include a range of renewable energy generation, which may include solar, wind, and hydroelectric, as well as biogas and other technologies. All types of renewable energy generation have the advantage of not being dependent on exhaustible fuel sources, although some have disadvantages as well. Solar and wind-based generation are intermittent—meaning their output depends on weather conditions, such that these resources cannot necessarily be "dispatched" when electricity users demand power. Hydroelectric generation is eminently controllable, to such an extent that it can function as an energy storage mechanism, but impoundments cause significant environmental degradation, including material levels of methane emissions.[117] Additionally, persistent drought conditions, which may be exacerbated by evolving weather patterns influenced by climate change, may limit the availability of some hydroelectric resources. Non-renewable technologies may also have a role to play in a decarbonized grid—and these technologies present trade-offs as well. Nuclear generation produces electricity without emitting GHG or other air pollution; however, it presents other serious environmental challenges, such as waste disposal. Nuclear generation is also incapable of being dispatched in response to demand because today's nuclear plants are designed to operate at a particular level of output at all times. Even fossil fuel combustion may be able to operate with little or no emissions impact through carbon capture and sequestration, but to date, this technology has proven extremely costly.[118]

In light of the environmental drawbacks associated with hydroelectric and nonrenewable alternatives, the non-competitive cost of carbon capture and storage, and the continually declining cost of solar PV and wind energy, it is likely that intermittent renewable resources will provide a significant or even dominant share of the future low- or non-emitting generation fleet. Based on the programs currently in place,[119] that seems to be the direction that New York favors.

The most efficient approaches to achieving New York's goals would involve internalizing the externalities associated with carbon dioxide emissions on an economy-wide (not just electric sector) basis.[120] This would drive migration to cleaner generation and also decarbonization across sectors. For example, to the extent that electric vehicles cause less GHG pollution than gasoline vehicles, electric vehicles would enjoy a relative fuel cost advantage, which would naturally create incentives for a wide variety of market actors to accelerate their adoption of electric vehicles.

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[117] Magill, B. (2014).
[118] See, e.g., The Editorial Board of the Washington Post (2017).
[119] Relevant programs include the Renewable Energy Standard program, which is designed to get the state to 50% renewable generation by 2030, and the Zero Emission Credit program, which is designed to keep nuclear generation online but *only* until 2029. NYPSC Case 15-E-0302, *Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard*, Order Adopting A Clean Energy Standard (August 1, 2016) at 20, 50.
[120] While an economy-wide cost of carbon could create an incentives for cross-sector decarbonization – and thus for beneficial electrification – a cost of carbon that is limited to the electric sector could have the reverse effect.

Whatever pathway is chosen to drive the large-scale generation in the direction of decarbonization, the mix of regulatory and market tools deployed, together with technological, market, and societal developments that cannot yet be anticipated with precision, will shape outcomes in ways that may or may not be predictable. The connection between REV and any of these outcomes is not yet clear. The distribution utilities that are economically regulated by the NYPSC—the entities whose regulatory framework is being reshaped by REV—generally do not own or operate generation, nor do they select the large-scale generation that will serve their distribution customers.

## 4.2 What more could REV do?

REV's vision of electric distribution utilities as transactional platforms aligns well with the environmental imperative to use the electric system as a platform for decarbonizing the entire economy. However, although REV has gone some significant distance toward aligning utility earnings and business practices with emerging market realities and policy imperatives, more could be done to encourage the electric utilities to embrace their role as a decarbonization platform. Recent efforts to bring certain REV principles to the gas distribution business—notably the introduction of the concept of "non-pipelines solutions"[121]—may eventually dovetail well with this transformation, but more will be needed to ensure that the gas business changes, which should include significant contraction in the coming decades, are well coordinated with the changes that are needed in the electric sector. Giving distribution utilities a direct stake in a low-GHG-emissions future would be a transformative step, but for now that has not yet become a reality, nor has it been clearly directed by the NYPSC.

Under REV as currently promulgated, distribution utilities do not yet have an economic interest in minimizing carbon dioxide and other GHG output for the electric system, let alone the economy as a whole. In light of the opportunity that electric utilities have to shape the market in which their customers operate, this gap is problematic; if it is not bridged, New York will be considerably less likely to meet its environmental goals, and certainly less likely to do so in a manner that harnesses the full creative power of the marketplace.

To that end, the NYPSC and other state regulators considering REV-type reforms should consider opportunities to tie utility earnings opportunities to GHG emissions reductions writ large—or at a minimum, to more specific levers for emissions reductions. At this time, the only earnings opportunity called for in REV orders that represents a clear step in the direction of rewarding utilities for improved environmental outcomes at the scale of the entire marketplace is the EAM for improved energy intensity. While this is a laudable step, it also reflects an outdated understanding of the role of the electric system in driving environmental outcomes. It assumes that less electricity use should be the environmental goal, when in fact lower emissions overall are the goal. Less use of electricity can help reach this result—but so can a stable amount of electricity use, if the electricity comes from relatively lower-emitting sources (for example, due to strategically-timed consumption). Even increased electricity use does not necessarily

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[121] See, *e.g.*, the recent Con Edison Request For Proposals, Non-Pipeline Solutions to Provide Peak Period Natural Gas System Relief 2017, issued December 15, 2017.

preclude emissions reductions, if that increased use means that comparatively low-emitting electric energy is being substituted for higher-emitting fossil fuel combustion (i.e., environmentally beneficial electrification).

Indeed, thanks to environmentally beneficial electrification, the long-term future may be one of higher electricity consumption, and greater customer reliance on the electric grid may be critically important to the utilities' financial health in the future.[122] Instead of giving the utilities a small economic interest in a metric that could have perverse results, it might be preferable to give them a substantial economic interest in metrics that accurately capture what society needs them to accomplish. The Con Edison EAM collaborative has provided a welcome opportunity to begin envisioning how such metrics might operate. A GHG-reduction EAM could consist of a utility earnings opportunities that relates to a wide range of activities that their customers engage in in order to give the utilities a reason to want to be maximally supportive of such customer activities. For example, utilities could have earnings opportunities associated with their customers' increased reliance on renewable generation, with the emissions efficiency of their customers' electricity use, or with their customers' deployment of environmentally beneficial electrification.[123] It may not be readily apparent what the electric utilities can do to realize these earnings opportunities, but *that is the purpose of the EAMs*: to encourage utilities to innovate outside the approved programs that their regulator has already directed them to execute and for which they have been provided with funding.

Further, in light of the critical role of the electric system as a platform for economy-wide decarbonization, the NYPSC and other regulators would do well to think as holistically as possible about these earnings opportunities. For example, where possible, electric utilities should be directed to consider their customers' full GHG footprint—at least as related to natural gas and electricity, but even, to the extent jurisdictionally possible, emissions associated with customers' transportation habits. While electric utilities lack direct *control* over these non-electric emissions sources, their systems may hold the key to reducing the emissions associated with them, and their business practices and rates may play a central role in shaping how customers change their electric consumption habits. Earnings opportunities that reward utilities for optimizing this potential of their system would give them reason and opportunity to think broadly about how customers and other market participants might accelerate their movement away from fossil fuels, and what they can do to facilitate that transformation.

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[122] See Weiss, J., et al. (2017).

[123] Because electric utilities have a natural inclination under their *traditional* business model to favor *all* electrification (electrification means more electric sales in a given period and could drive opportunities for new capital improvements over time), any EAM for environmentally beneficial electrification needs to be well-designed to ensure that it provides a utility incentive specifically for electrification to have environmentally favorable outcomes over some reasonable time horizon.

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