Institute *for* Policy Integrity
NEW YORK UNIVERSITY SCHOOL OF LAW

September 16, 2019

**To**: NJ Energy Master Plan Committee

**Re**: New Jersey 2019 Draft Energy Master Plan

The Institute for Policy Integrity (Policy Integrity) respectfully submits comments on New Jersey's 2019 draft Energy Master Plan (EMP) to the members of the EMP Committee. Policy Integrity is a non-partisan think tank dedicated to improving the quality of governmental decisionmaking through advocacy and scholarship in the fields of administrative law, economics, and public policy. Policy Integrity regularly participates in proceedings before public utility commissions and has written numerous reports and articles on energy policy design.

The 2019 draft EMP outlines how New Jersey can achieve the emissions reduction target set by the Global Warming Response Act of 80% below 2006 levels by 2050, and the 100% clean energy goal established by Governor Murphy's Executive Order 28.[1] To meet these objectives, the draft EMP calls for, among others, 100% carbon-neutral electricity generation by 2050 and maximum electrification of the transportation and building sectors.[2] Since 1977, pursuant to statute, New Jersey has prepared energy master plans every three years.[3] This EMP, which spells out what will be required to transform New Jersey's electricity, transportation, and building sectors to conform with the State's "80 by 50" emissions goal, is unprecedented in its ambition. Implementing the contents of the draft EMP will require coordinated efforts among the Board of Public Utilities (BPU), Department of Environmental Protection, Department of Transportation, Department of Community Affairs, Department of Labor and Workforce Development, Economic Development Authority, and NJ Transit.

Policy Integrity has previously filed comments on the EMP during the scoping phase. In those comments, Policy Integrity urged the BPU to:

[1] EXECUTIVE ORDER 28 (May 23, 2018), *available at*: https://nj.gov/infobank/eo/056murphy/pdf/EO-28.pdf
[2] State of New Jersey, Draft 2019 New Jersey Energy Master Plan: Policy Vision to 2050 (Jun. 10, 2019) [hereinafter "Draft EMP"] at 9.
[3] N.J.S.A. 52:27F-14.

- Consider grid resilience in a holistic manner and apply cost-benefit analysis to evaluate resilience plans and investments;
- Adopt a granular approach to rate design, rather than use net metering, including for distributed energy resources; and
- Design an incentive structure for energy storage operators to ensure that the use of energy storage systems reduces greenhouse gas emissions.

Policy Integrity applauds the improved the EMP, and respectfully makes further suggestions on the EMP. Specifically, we recommend that New Jersey:

- Establish a technology-neutral policy framework to achieve its "80 by 50" emissions reduction goal;
- Compensate distributed energy resources (DERs) accurately in a way that reflects their full social value (e.g., the value of avoided emissions) and recognizes how that value varies with location and timing of operation;
- Implement regulatory reforms to advance technological and regulatory frameworks that are necessary to realize its goals.

**New Jersey should establish a policy framework to achieve its "80 by 50" emission reduction goal that is neutral with respect to the scale and type of energy resource**

To reduce emissions and achieve other, related goals in an economically efficient manner, New Jersey should make the EMP the foundation for a policy framework that (A) imposes economy-wide emissions pricing (or a sector-by-sector approach that achieves similar coverage and outcomes) and (B) values all types and scales of energy resources using a consistent perspective and analysis.

**Emissions pricing**

New Jersey has recognized the causes and effects of climate change through legislation and regulation,[4] and has just rejoined the Regional Greenhouse Gas Initiative (RGGI), which it expects will help to reduce its electricity sector emissions by 30 percent by 2030.[5] While developing the final EMP, [6] the state is also exploring ways to more fully integrate the need for climate action into policy, in part because, as the draft EMP acknowledges, participating in RGGI may not be sufficient for the state to meet all of its emissions reduction and clean energy goals.[7] Accordingly, the EMP Committee should consider how the state can more fully internalize the climate damages caused by greenhouse gas emissions.

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[4] *See*, *e.g.*, Global Warming Response Act of 2007, P.L. 2007 ch. 112.
[5] https://nj.gov/governor/news/news/562019/approved/20190617a.shtml
[6] Draft EMP at 50 (Goal 2.1.9 of the draft EMP is to "Begin stakeholder engagement to explore rules to limit $CO_2$ emissions from Electric Generating Units.").
[7] Draft EMP at 50-51.

Economy-wide emissions pricing is the most economically efficient approach to reducing emissions.[8] It leads economic actors to internalize the full external costs of emissions arising from their production and consumption decisions.[9] And, in contrast to sector-by-sector regulations or technology-specific mandates,[10] it helps the market to identify the most cost-effective opportunities for emissions reductions across all sectors, so that economic actors reduce emissions in the cheapest possible way. Given that New Jersey would like to reduce emissions from multiple sectors, the state should consider economy-wide emissions pricing. Doing so would cause markets to allocate resources to the cheapest emissions reduction pathways across and within the electricity generation, transportation, or buildings sectors. By contrast, if New Jersey adopts an approach that expressly or implicitly assigns different values to emissions reductions in different sectors, it would risk causing market actors to forego cost-effective emissions reduction opportunities and thereby slow the state's progress towards its "80 by 50" goal.

If economy-wide emissions pricing is politically impossible, New Jersey should aim to achieve outcomes that would be consistent with an economy-wide emissions pricing by, for example, setting sector-specific regulations and mandates that would ultimately achieve levels of technology adoption and emission reductions similar to those that would have been achieved by an economy-wide emissions price.

Consistent with these points, Policy Integrity urges that the Integrated Energy Plan study, which is being developed by the BPU and other members of the EMP Committee along with Rocky Mountain Institute and Evolved Energy Research, should model the effects of a state-wide economy-wide carbon tax, as well as alternative sector-by-sector regulations that rely on both sector-specific carbon pricing and mandates, to assess which strategy best meets New Jersey's goals.

**Consistent valuation of energy resources**

Whether they are subject to an economy-wide emissions price or not, the benefits of energy resources deployed in New Jersey should be valued according to uniform criteria rather than according to a categorization that is based on technology or scale. Put another way, New Jersey's approach should assign easy-to-compare values to services, whether those services are performed by an energy efficiency improvement, demand response resource, distributed solar PV installation, utility-scale offshore wind facility, or some other resource. This framework would help to ensure that price signals in energy markets reflect the value of the

[8] For a concise but thorough description of benefits, considerations, and mechanisms related to emissions pricing, see Resources for the Future, Carbon Pricing 101, https://www.rff.org/publications/explainers/carbon-pricing-101/.
[9] M.L. Weitzman, *Prices vs. Quantities*, 41 REV. ECON. STUD. 477–91 (1974) (providing the theoretical basis for preferring taxes over emission quantity restrictions given the nature of climate change). For direct support of a carbon tax, *see*, *e.g.* Reuven S. Avi-Yonah & David M. Uhlmann, *Combating Global Climate Change: Why a Carbon Tax Is a Better Response to Global Warming than Cap and Trade*, 28 STAN. ENVTL. L.J. 50 (2009).
[10] Erik Paul Johnson, *The Cost of Carbon Dioxide Abatement from State Renewable Portfolio Standards*, 36 RES. ENERGY ECON. 332, 349–50 (2014); Karen Palmer & Dallas Burtraw, *Cost- Effectiveness of Renewable Electricity Policies*, 27 ENERGY ECON. 873, 893 (2005); Carolyn Fischer & Richard G. Newell, *Environmental and Technology Policies for Climate Migration*, 55 J. ENVTL. ECON. MGMT. 142, 160 (2008) (finding that lowest cost emissions reductions come from a combination of an emissions price with a small "learning subsidy").

diverse resources accurately and without distortion. To do otherwise makes it likely that similar services will be compensated differently just because they are provided by a particular technology or by a resource of a particular scale, distorting the efficiency of outcomes. As with uniform emissions pricing, consistent valuation across energy resource types helps market participants to allocate resources in ways that achieve New Jersey's objectives in the most cost-effective ways possible.

Implementing this sort of uniform approach to resource valuation in New Jersey would require multiple complementary reforms such as implementing better retail electricity rate design and changing utility regulations, discussed in sections II and III.B of these comments. The centerpiece of those reforms should be a value stacking mechanism that determines compensation for all energy resources, including utility-scale facilities, energy efficiency investments, and DERs alike.

**New Jersey should compensate DERs accurately, recognizing that their value varies with location and timing of use**

DERs such as rooftop solar panels and energy storage will be central to efforts to achieve several of the goals listed in New Jersey's draft EMP, including: the compensation of DERs (goal 2.1.6), establishment of community solar and distributed solar incentive programs (2.3.1, 2.3.2), support for energy storage deployment (2.3.5), reduction of peak demand (3.2.1) and encouragement of demand flexibility (3.2.2), development of Integrated Distribution Plans (5.1.1), call for non-wires solutions by utilities and others (5.1.4). The touchstone of each of these goals should be the accurate reflection of—and compensation for—the value provided by DERs at a given time and location.

New Jersey's approach to about deploying and compensating DERs can benefit from insights in academic literature as well as lessons learned in other states. The most important of those lessons, which are discussed more fully in the enumerated subsections below, are:

- The value of DERs varies significantly across time and location;
- In the absence of a retail tariff that reflects the time-and-location-specific costs of electricity service provision, a value stack is the best tool for recognizing and capturing DERs' time-and-place-specific values;
- DERs' ability to avoid the emission of air pollutants and to improve electricity system resilience are both important factors in its value;
- Deploying energy storage resources *can* but does not necessarily help to reduce the emissions resulting from electricity generation; and
- Rate designs that include time-of-use elements can help to coordinate the operation of several types of resources, including distributed generation (DG) and demand response resources, as well as encouraging consumers who do not own DG or participate in demand response programs to engage in a greater degree of demand flexibility.

**A. The value of DERs depends on where they are installed and when they operate**

DERs can yield more value than utility-scale facilities if they are located in places and operated at times that are relatively expensive for centralized facilities to serve.[11] However, if measured in terms of costs per unit of electricity, DERs tend to cost more to install and operate than utility-scale generation facilities.[12] Strategy 2 of New Jersey's draft EMP calls for the development of both utility-scale renewable generation capacity *and* deployment of carbon-neutral DERs—a pairing that makes good sense given that these resources can make complementary contributions toward reducing power sector emissions. Decisions about which scale of resource to deploy should be informed by a uniform approach to valuation, as described in section I.B above. Such an approach will serve both to reduce emissions cost-effectively and to make electricity service as economically efficient as possible.

**New Jersey should compensate DER using a "value stacking" mechanism**

New Jersey's draft EMP is right to call for use of a value stack,[13] because that is the best tool for incorporating the locational and temporal factors that determine DERs' relative values into energy resource compensation. As Policy Integrity explained in a 2017 article on DER valuation, DER compensation rules that value DERs accurately will both indicate where DERs should be developed *and* where they should *not* be developed because other resources can more cost-effectively provide services necessary at that time and location.[14] Several jurisdictions, including California, Minnesota, and New York, have developed and tested methodologies for estimating the benefits/avoided costs of DERs to utilities and ratepayers.[15] Those methodologies are broadly consistent, and their differences are attributable primarily to institutional factors rather than disagreement about what to value or how to estimate it in monetary terms. A New Jersey value stacking mechanism would thus be a proven approach to valuing DERs more accurately than net metering or solar renewable energy credit programs do.

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[11] Scott Burger et al., *Why Distributed? A Critical Review of the Tradeoffs Between Centralized and Decentralized Resources*, IEEE POWER & ENERGY MAG., Mar./Apr. 2019, 16, 17.

[12] Ignacio Pérez-Arriaga et al., MIT Energy Initiative, Utility of the Future 296-300 (Dec. 2016), https://perma.cc/56VC-H8EN.

[13] Draft EMP at 49.

[14] *See* Richard L. Revesz & Burcin Unel, *Managing the Future of the Electricity Grid: Distributed Generation and Net Metering*, 41 HARV. ENVTL. L. REV. 43, 104-05 (2017), https://policyintegrity.org/files/publications/Managing_the_Future_of_the_Electricity_Grid.pdf; Joint Comments of EDF & Policy Integrity in Response to the Notice Soliciting Comments and Proposals on an Interim Success to Net Energy Metering and of a Preliminary Conference, N.Y. Pub. Serv. Comm'n Case 15-E-0751, In the Matter of the Value of Distributed Energy Resources and Options Related to Establishing an Interim Methodology (Apr. 18, 2016), https://policyintegrity.org/documents/NYPSC_Comments_April2016.pdf.

[15] Decision adopting cost-effectiveness analysis framework policies for all distributed energy resources, Order Instituting Rulemaking to Create a Consistent Regulatory Framework for the Guidance, Planning, and Evaluation of Integrated Distributed Energy Resources, Cal. Pub. Util. Comm'n, RM 14-10-003, at 65-67 (May 21, 2019), http://docs.cpuc.ca.gov/PublishedDocs/Published/G000/M293/K833/293833387.PDF; Order Establishing the Benefit Cost Analysis Framework, N.Y. Pub. Serv. Comm'n Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision 1-2 (Jan. 21, 2016), http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRefId=%7BF8C835E1-EDB5-47FF-BD78-73EB5B3B177A%7D; Minn. Dep't of Commerce Div. of Energy Resources, MN Distributed Solar Value Methodology 8 (Mar. 4, 2014), https://perma.cc/3Y68-TW39.

**New Jersey's value stack should reflect value to the electric system as well external values such as avoided emissions**

In addition calling for development of a value stacking mechanism to compensate DERs, the Draft EMP indicates that the BPU will evaluate "which streams of value . . . are prudently compensated . . . and which are not."[16] Policy Integrity encourages New Jersey to adopt a value stack that assigns quantitative value to the benefits (or avoided costs) listed in table 1.

**Table 1. Benefits to include in a DER value stack, by perspective and category**

| *Perspective* | *Category* | *Benefit/Avoided Cost* |
|---|---|---|
| Electricity system | Bulk power segment | Avoided energy costs |
| | | Avoided generation capacity costs |
| | | Avoided reserves & ancillary services costs |
| | | Avoided transmission capital costs and line loss |
| | | Avoided financial risk of primary energy source price volatility |
| | | Avoided environmental compliance costs |
| | Distribution segment | Avoided distribution capital costs and line loss |
| Beyond the electricity system | Public health & safety | Public health benefits of avoided local emissions |
| | | Improved resilience to disruptive hazards and stressors |
| | Environmental | Environmental benefits of avoided local emissions |
| | | Avoided greenhouse gas emissions |

Inclusion of electricity system-related benefits in a DER value stack is uncontroversial, and several resources exist to guide the development of monetary estimates for the value of the avoided electric system costs.[17] They indicate, for example, how the avoided energy value of DER injections can be derived from the locational marginal price of energy that is calculated by regional transmission operators like PJM. Notably, new techniques also promise to make specification of several benefits of DERs to the electricity system more granular, such as development of a distribution locational price that takes into account reactive power.[18] Indeed, software packages now exist that draw on advances in engineering and data science to enable utilities or grid managers to calculate these combined value streams in short time increments (e.g., 5- or 15-minutes).[19] New Jersey could therefore adopt a DER value stack that incorporates these components.

[16] Draft EMP at 49.

[17] *See*, *e.g.*, John Larsen & Whitney Herndon, Rhodium Grp. for U.S. Dep't of Energy,What Is It Worth? The State of the Art in Valuing Distributed Energy Resources 13-14 (Jan. 2017), https://perma.cc/KQ96-3C9U; Nat'l Ass'n Reg'y Util. Comm'rs, Distributed Energy Resources Rate Design and Compensation 43-44 (Nov. 2016), https://perma.cc/37A5-D5S6.

[18] Michael Caramanis et al., *Co-Optimization of Power and Reserves in Dynamic T&D Power Markets With Nondispatchable Renewable Generation and Distributed Energy Resources*, 104 Proc. of the IEEE 807 (Apr. 2019), https://perma.cc/4Y86-672N.

[19] *See*, *e.g.*, Opus One Solutions, Customers & Projects, https://www.opusonesolutions.com/customers_projects/.

In addition, consistent with the goals of the EMP, New Jersey should include in its value stack the value of avoiding the costs of emissions and of improved electricity system resilience. These values and methodologies for specifying them are described in more detail below.

*Greenhouse gas emissions.* Many states have begun assigning value to climate-damaging emissions from electricity generation using the federally-developed social cost of greenhouse gases that was developed by the federal government's Interagency Working Group (IWG) on the Social Cost of Greenhouse Gases, which operated from 2009-2017. While, this value reflects a conservative estimate of the costs of the harms that each additional ton of greenhouse gas emissions will cause, it is still the best available estimate for emission damages.[20] For more information on how to use the social cost of greenhouse gases in state policymaking, see Policy Integrity's reports, *The Social Cost of Greenhouse Gases and State Policy*,[21] and *Opportunities for Valuing Climate Damages in State Electricity Policy*.[22]

Properly sited and operated DERs can provide value by avoiding the greenhouse gas emissions that other energy resources would have emitted. However, because that value is currently not fully internalized by electricity markets in New Jersey, compensating DERs for that value will require new policy measures. Policy Integrity urges New Jersey to consider adopting the methodology described in our report, *Valuing Pollution Reductions: How to Monetize Greenhouse Gas and Local Air Pollutant Reductions from Distributed Energy Resources*.[23] That methodology, which specifically discusses how the environmental of DERs can be calculated in a value approach, employs the IWG's Social Cost of Greenhouse Gases.

*Local air pollution*. As with greenhouse gas emissions, the value of avoiding local air pollution in New Jersey can and should be included in a value stack because that value is material, readily calculable, and the goal of reducing air pollution and its adverse effects is already recognized by state law. As explained in Policy Integrity's *Valuing Pollution Reductions* report, calculating this value is only somewhat more information-intensive than calculating the value of avoided greenhouse gas emissions. Notably, because local pollutants disproportionately affect vulnerable populations, including avoided local air pollution in the location-specific value stack would also ensure DER deployment could help reduce disparate air quality burdens.

*Resilience*. Resilience refers to the ability to resist, absorb, recover from, and adapt to high-impact, low-probability external shocks.[24] New Jersey, hit hard by Superstorm Sandy in

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[20] *See generally* Richard L. Revesz et al., *Best Cost Estimate of Greenhouse Gases*, 357 SCIENCE 655 (2017). For a discussion of why the Trump administration's efforts to weaken the IWG's SCC are methodologically flawed see Inst. for Pol'y Integrity, How the Trump Administration is Obscuring the Costs of Climate Change (2018), https://policyintegrity.org/files/publications/Obscuring_Costs_of_Climage_Change_Issue_Brief.pdf.

[21] Available at: https://costofcarbon.org/resources/entry/the-social-cost-of-greenhouse-gases-and-state-policy-a-frequently-asked-que

[22] Available at: https://costofcarbon.org/resources/entry/opportunities-for-valuing-climate-impacts-in-u.s.-states

[23] Jeffrey Shrader et al., Inst. for Pol'y Integrity, *Valuing Pollution Reductions: How to Monetize Greenhouse Gas and Local Air Pollutant Reductions from Distributed Energy Resources* (2017), https://policyintegrity.org/files/publications/Valuing_Pollution_Reductions.pdf.

[24] *See* Burcin Unel & Avi Zevin, Inst. for Pol'y Integrity, Toward Resilience: Defining, Measuring, and Monetizing Resilience in the Electricity System 1 (2018), https://policyintegrity.org/files/publications/Toward_Resilience.pdf.

2012, has adopted a variety of policy measures that recognize the importance of resilience but do not specify its value.[25] Researchers have not only described electricity system resilience thoroughly,[26] but have also developed procedures for measuring its value.[27] New Jersey should draw on existing resources —including Policy Integrity's report, *Toward Resilience: Defining, Measuring, and Monetizing Resilience in the Electricity System*[28]—to specify the resilience value of DERs to the electricity system.

**To prevent perverse outcomes, the environmental component of a value stack should be based on marginal emissions rates of electricity generation**

Some policies and technologies that *can* reduce emissions from electricity generation will not necessarily do so unless paired with right incentives. Time-of-use rates and "clean peak" incentives are examples of policies that aim at emissions reductions but, if they are not steered by systemwide marginal emissions rates, sometimes miss.[29] Indeed, several states, including New Jersey,[30] have recognized that energy storage can potentially increase emissions relative to the status quo.[31] So, to achieve its storage deployment *and* emissions reduction goals,[32] New Jersey should use the environmental component of a value stacking mechanism to compensate resources based in part on how well they actually reduce electricity system emissions.[33]

As New Jersey recognized in its Energy Storage Analysis, aligning energy storage operations with the state's emissions reductions goals requires that New Jersey incentivizes charging in periods with lower marginal emission rates and charging in periods with higher marginal emission rates. And, it is critical for this sort of alignment to focus on the *marginal* emissions

[25] *See, e.g.*, N.J. Dep't of Envtl. Prot., *Resilient NJ: Regional Planning for a Stronger New Jersey*, https://perma.cc/4EFC-VBSW (accessed Aug. 9, 2019); State of New Jersey, New Jersey Energy Resilience Bank: Sustainable Business Initiative (Oct. 2014), https://perma.cc/6S6A-765G.
[26] Nat'l Acad. of Sci., Eng'g & Med., Enhancing the Resilience of the Nation's Electricity System, at vii (2017), https://www.nap.edu/catalog/24836.
[27] *See, e.g.*, Alex Stankovic, IEEE Power & Energy Soc'y, The Definition and Quantification of Resilience (Apr. 2018).
[28] Unel & Zevin, *supra* note 24.
[29] J. Scott Holladay et al., *The Perverse Impact of Calling for Energy Conservation*, 110 J. ECON. BEHAVIOR & ORG. 1 (Feb. 2015); Ahmad Faruqui et al., Reg. Assistance Project, Time-Varying & Dynamic Rate Design, 10 (2012); Stephen P. Holland & Erin T. Mansur, *Is Real-Time Pricing Green? The Environemntal Impacts of Electricity Demand Variance*, 90 REV. ECON. & STATISTICS 550, 558-60 2008).
[30] Rutgers Univ. (for the State of New Jersey), New Jersey Energy Storage Analysis (ESA)--Final Report 19 (May 2019) [hereinafter "NJ ESA"], https://perma.cc/5UH6-5SZ4.
[31] Decision Approving Greenhouse Gas Emission Reduction Requirements for the Self-Generation Incentive Program Storage Budget, Order Instituting Rulemaking Regarding Policies, Procedures and Rules for the California Solar Initiative, the Self-Generation Incentive Program and Other Distributed Generation Issues, Rulemaking 12-11-005, Decision 19-08-001 (Aug. 1, 2019); Mass. Acts of 2018, ch. 227 §§ 7, 13.
[32] Goal 2.3.5 of the draft EMP calls for deploying 600 MW of energy storage capacity by 2021 and 2,000 MW by 2030 in order to capture several benefits, which include integration of distributed solar and offshore wind resources, lower generation peaks and related cost savings, and improved local electricity system resilience. Draft EMP at 57.
[33] Because New Jersey does not plan to adopt a tax or emissions-pricing scheme that would require emitters to pay the full social costs of emissions (either greenhouse gases or ambient air pollutants), this harmonization must focus on how the emissions segment of the value stack is calculated. *See* Madison Condon et al., Inst. for Policy Integrity, Managing the Future of Energy Storage: Implications for Greenhouse Gas Emissions 11-12 (Apr. 2018).

rates (rather than *average* rates) of the resources that storage draws upon when charging.[34] California, and New York are each employing different policy measures to try to achieve this alignment:

- California has adjusted the rules governing its Self-Generation Incentive Program (SGIP) to (1) establish a "greenhouse gas signal" that indicates the marginal emissions rate in 5-minute increments and forecasts it for 15-minute, 72-hour-ahead, month-ahead, and year-ahead intervals;[35] (2) impose metering, emissions reduction, and minimum usage requirements on commercially-owned storage facilities;[36] and (3) require residential storage owners to adhere to a minimum usage requirement and either enroll in an approved time-varying rate program or pair their storage with solar-only charging or a solar self-consumption system.[37]
- New York plans to take several "clean peak actions"[38] to ensure that energy storage deployments "time-shift cleaner generation to displace higher emitting generation sources."[39] The focus of those actions is on New York City, Long Island, and nearby areas, which are home to older, dirtier plants used primarily to meet the highest annual peak loads. Policy measures that have been identified to reduce systemwide emissions, in part by replacing those peaking plants, include: reliance on the environmental or "E" value segment of the value stack that determines compensation of DERs, use of combinations of DERs (called "non-wires alternatives") to reduce system peak loads and thereby avoid distribution facility upgrades, and incentives for storage deployment that reward greenhouse gas emissions reductions and pairing storage with solar and other renewables. These measures have yet to be finalized or presented publicly in detail.[40]

Massachusetts is also developing a policy measure—the Clean Peak Standard (CPS)—to address the risk that storage resources increase emissions by charging at times when marginal emissions rates are high. The CPS is *intended* to give energy storage owners incentives to charge using cleaner sources at off-peak times and to discharge during peak times when doing so can displace dirtier sources.[41] However, the current draft CPS assumes that storage resources will shift renewable energy to peak from off-peak times if storage discharges at peak times and charges during specified "charging windows" (the window for solar shifts seasonally; the window for wind is consistent year round). This assumption requires validation with periodic reference to marginal emissions data.

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[34] NJ ESA, *supra* note 30, at 22-23.
[35] Decision 19-08-001, *supra* note 31 at 14.
[36] *Id.* at 18-30.
[37] *Id.* at 39, 44-48, 50-52.
[38] N.Y. Pub. Serv. Comm'n, Order Establishing Energy Storage Goal and Deployment Policy, Case 18-E-0130, In the Matter of Energy Storage Deployment Program 86-91 (Dec. 13, 2018),https://perma.cc/FSZ8-D8BE.
[39] New York State Energy Res. and Dev. Auth., Energy Storage Market Acceleration Incentives--Implementation Plan 2 (Aug. 1, 2019), https://perma.cc/T8W3-YTVC.
[40] *Id.* at 2-3, 9, 16; Order Establishing Energy Storage Goal and Deployment Policy, *supra* note 38 at 88-91.
[41] Mass. Dep't of Energy Resources, The Clean Peak Energy Standard: Draft Regulation Summary (Aug. 6, 2019), https://perma.cc/9SEP-CF6N.

In sum, the environmental component of any value stacking mechanism should reflect marginal emission rates derived using the shortest practicable monitoring intervals. Such valuation puts on a level playing field diverse technologies including stand-alone storage, storage paired with other DERs, and electric vehicles.

**Appropriate rate design is indispensable for realizing the benefits of DERs**

Because DERs have diverse profiles—some reduce or shift consumption, others generate enough electricity to inject it back into the grid—rate design reforms that complement a value stacking approach to compensation are necessary to realize DERs' full value. More specifically, rate design can facilitate or undermine the ability of a value stack to translate information about locational and temporal value into compensation for DER owners.[42] Therefore, New Jersey's BPU should adopt both a value stacking mechanism and a rate design that conform to the following three key principles.

First, because the costs of electricity generation vary by time, rate components should reflect the time-varying nature of the costs they seek to capture. Second, because demand at peak periods is the driver of generation and network costs, any demand charges applied to DER owners should be based on customers' coincident peak demand, and not non-coincident peak demand. And third, the time-varying components of the rate charged should be proportionate to the costs they seek to capture, regardless of whether those costs are internal to the electric system or external, such as the costs of emissions. A critical reason for this third parameter is that, even if New Jersey adopts a carbon price for the electricity sector or the economy as a whole, retail consumers would not be led to differentiate between cleaner and dirtier times of electricity consumption without a rate design that translates those granular differences into consumer charges. Whereas a time-varying retail rate design would complement carbon pricing, maintaining existing, time-invariant rates would limit the effectiveness of carbon pricing.

**New Jersey should implement complementary regulatory reforms**

In addition to establishing a technology neutral framework for meeting the state's 80x50 goal and compensating DERs accurately, New Jersey should implement regulatory reforms to advance technological and regulatory frameworks that are necessary to realize its goals. New Jersey must take into account its intended participation in RGGI and its status as a member of PJM, and look to the retail electricity market, to understand what beneficial reforms are possible.

**A. Regional programs and wholesale markets**

As New Jersey finalizes the EMP and creates clear guidelines for implementation, it should take into account that there are other constraints from outside the state that its electricity

[42] *See* Richard L. Revesz & Burcin Unel, *Managing the Future of the Electricity Grid: Modernizing Rate Design*, 44 HARV. ENVTL. L. REV. (forthcoming 2020) (manuscript at 15-18), available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3373163.

market is subject to. In particular, if New Jersey is dedicated to rejoining RGGI, it must be specific about how any new EMP policies relate to participation of the state's larger stationary generators in the regional carbon trading market. In addition, because New Jersey is a member of PJM, decisionmakers should explore what policies are possible through the wholesale market.

**RGGI**

A number of RGGI states have explored emissions reduction policies that are separate from the rules governing their RGGI participation. All RGGI states have renewable portfolio standards, for example.[43] As mentioned above in Section II.A.2., some of the RGGI member states have decided to use the IWG Social Cost of Greenhouse Gases in their electricity policy.[44] Some of these states have concluded that subtracting the RGGI price from the IWG Social Cost of Greenhouse Gases is appropriate to value this externality, and ensure that the policies are complementary and avoid double counting. [45] In other words, because RGGI prices are already part of the market in these states, some of the externalities caused by greenhouse gas emissions have been partially internalized in the market, and new policies should take that into account. In Maryland and Maine, for example, reports prepared for the electricity regulators on the value of solar power included formulas to derive the externality caused by greenhouse gas emissions by subtracting the RGGI allowance price from the IWG the social cost of greenhouse gases.[46] Similarly, in January 2016, New York's Public Service Commission (NY PSC) issued an order that prescribes valuing the marginal externality costs from carbon dioxide emissions at "the difference between the [IWG]'s SCC value" and the forecasted carbon dioxide trading price in RGGI.[47] New York uses this net externality cost of greenhouse gases to determine which DERs to develop under the REV program, discussed above in Section II.A.3.

[43] Nat'l Conf. of State Legs. State Renewable Portfolio Standards and Goals (Feb 2019), *available at*: http://www.ncsl.org/research/energy/renewable-portfolio-standards.aspx.

[44] E.g. New York has proposed subtracting the RGGI allowance price from the IWG social cost of greenhouse gases in the proceeding under the State's Reforming the Energy Vision plan, see N.Y. Pub. Serv. Comm'n, Order Establishing the Benefit Cost Analysis Framework, Case 14-M-0101 (Jan. 21, 2016) http://documents.dps.ny.gov/public/Common/ViewDoc.aspx?DocRef Id=%7bF8C835E1-EDB5-47FF-BD78-73EB5B3B177A%7d.

[45] *Id*.

[46] Maine's PUC has used the SCC in a distributed solar valuation study, but has not yet issued orders using this metric. *See* ME. PUB. UTIL. COMM'N, MAINE DISTRIBUTED SOLAR VALUATION STUDY (2014), https://www.maine.gov/mpuc/electricity/elect_generation/documents/MainePUCVOS-FullRevisedReport_4_15_15.pdf [hereinafter MAINE DISTRIBUTED SOLAR VALUATION STUDY].; Maryland's Public Service Commission has released a report studying the costs and benefits of distributed solar that uses the SCC but has not yet issued any orders using this metric. *See* MD. PUB. SERV. COMM'N, BENEFITS AND COSTS OF UTILITY SCALE AND BEHIND THE METER SOLAR RESOURCES IN MARYLAND (2018), https://cleantechnica.com/files/2018/11/MDVoSReportFinal11-2-2018.pdf [hereinafter BENEFITS AND COSTS OF UTILITY SCALE IN MARYLAND].

[47] Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, PSC Case No. 14-M-0101, Order Establishing the Benefit Cost Analysis Framework, Filing No. 680. For a discussion of why this approach is appropriate see Institute for Policy Integrity, Comments on New York State's Benefit Cost Analysis Handbooks (Sept. 26, 2016), https://policyintegrity.org/documents/BCA_Handbook_Reply_Comments.pdf.

New Jersey should consider the potential trade-offs of other types of policies to reduce emissions. Because New Jersey has already adopted the rules to rejoin RGGI, any complementary policies to reduce greenhouse gas emissions that are not market-based would "reduce the market flexibility inherent in cap-and-trade and may prove more expensive."[48] Because RGGI does not cover all emitters and because RGGI prices are—and are expected to continue to be—lower than the SCC, however, there may be room for complementary policies that would not increase the overall cost of achieving New Jersey's emissions reduction goals.[49] Any such policy would need to address market failures.[50]

An example of such a policy would target the smaller emitters not already covered by RGGI. RGGI currently covers resources only if they are 25 MW and larger, so New Jersey could create a state-wide cap-and-trade program for resources smaller than 25 MW. The cap of this program should be based on the state's goals for emissions reduction in the electricity sector, taking into account what reductions can be achieved through other policy measures, including the available RGGI allowances for larger emitters. Allowances for this small emitters trading program could be auctioned, which could increase the net social welfare if the auction revenues could be used to reduce some of the existing distortions such as taxes.[51]

New Jersey should be aware that, contrary to purpose of the state's policy, additional emissions limits on New Jersey power plants might have the perverse result of not actually reducing greenhouse gas emissions globally due to leakage. Leakage occurs when imposing emissions limits in one jurisdiction leads to an increase in emissions in a neighboring jurisdiction that does not impose such limits. For the electricity sector, this means that if less electricity is produced in-state because regulation increases the costs for such in-state generation, so out-of-state generators become less expensive and would therefore be dispatched before the in-state generators. Moreover, New Jersey law includes multiple provisions that instruct state agencies to mitigate or otherwise take into account leakage.[52]

**PJM**

Another avenue for monetizing greenhouse gas emissions could be through the implementation of carbon pricing in the wholesale market. New Jersey's utilities purchase

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[48] Ann E. Carlson, *Designing Effective Climate Policy: Cap-and-Trade and Complementary Policies*, 49 HARV. J. LEGIS. 207, 224 (2012).
[49] *Id*.
[50] *Id*.
[51] *See* Institute for Policy Integrity, Comments on Proposed Federal Plan Requirements for Greenhouse Gas Emissions from Electric Utility Generating Units Constructed on or Before January 8, 2014; Model Trading Rules; Amendments to Framework Regulations, 80 Fed. Reg. 64,966 (Oct. 23, 2015) at 14-16, available at: https://policyintegrity.org/documents/PolicyIntegrity_CommentsonFederalPlanandModelRules.pdf.
[52] *See* New Jers. Ann. Stat. 48:3-87(c)(2) ("By July 1, 2009, the board shall adopt, pursuant to the "Administrative Procedure Act," P.L.1968, c. 410 (C.52:14B-1 et seq.), a greenhouse gas emissions portfolio standard to mitigate leakage or another regulatory mechanism to mitigate leakage applicable to all electric power suppliers and basic generation service providers that provide electricity to customers within the State."); See also New Jers. Ann. Stat. 26:2C-47 ("The department shall review its position with any regional auction on an annual basis, including the amount of allowances that should be included in a regional auction. This annual review shall include consideration of the environmental and economic impact of the auction, leakage impacts, and the impact on electric generation facilities and ratepayers in the State.")

wholesale electricity services through the PJM regional transmission organization, which is currently exploring the adoption of some form of carbon pricing. Whether or not PJM's exploration leads to adoption of a new mechanism or policy, New Jersey would need to reconcile any emission pricing policy it adopts with PJM's market rules and administrative procedures.

Another New York example can aid New Jersey regulators, if PJM adopts a carbon price for the wholesale market. The New York Independent System Operator (NYISO) has been developing a "carbon adder" policy "to price carbon in the NYISO's wholesale electricity markets in order to improve the price signals in its energy and related capacity markets."[53] The December 2018 proposal from NYISO would assign a price to carbon emissions from power plants in New York State equal to the IWG social cost of greenhouse gases; for power plants also subject to RGGI, the RGGI allowance price would be subtracted from the price specified by the IWG. [54] The policy would also have adjustments for imports and exports.[55]

The think-tank Resources for the Future (RFF) recently modeled policy outcomes based on scenarios with the NYISO carbon pricing proposal and without such a policy. RFF finds that a state-wide carbon price alongside RGGI and New York's other clean energy and climate policies would reduce emissions *from all RGGI states taken together*.[56] Therefore, while working to establish an economy-wide carbon price, New Jersey should also consider working with PJM and other member states to implement a carbon pricing policy in the electric sector.

RFF further finds that a carbon price above the social cost of greenhouse gases ($51 in 2018 dollars for 2020 emissions) is necessary in order for New York to reach its clean energy goals.[57] New Jersey would similarly have to assess if the social cost of greenhouse gases would be an adequate carbon price for it to meet its ambitious goal of 100% clean energy by 2050, and whether other complementary policies are necessary.

### B. New Jersey should consider reforms to its regulation of retail electric utilities

New Jersey recognizes the importance to the EMP's various goals of amending state regulations of retail electricity utilities—Goal 5.3 calls on the state to "modify current rate design and ratemaking process to empower customers' energy management, align utility incentives with state goals, and facilitate long-term planning and investment strategies."[58]

[53] D. Shawhan et al. Benefits and Costs of Power Plant Carbon Emissions Pricing in New York, Resources for the Future (July 2019) [hereinafter "RFF"] at 1.
[54] New York Indep. Sys. Operator, IPPTF Carbon Pricing Proposal 5-6 (Dec. 7, 2018), https://perma.cc/ZG84-FL2X.
[55] *Id*.
[56] RFF at 3 (emphasis added).
[57] RFF at 4. New York's current goal is 88% clean energy by 2030.
[58] Draft EMP at 77.

In keeping with that point, Policy Integrity encourages New Jersey consider undertaking—or to implement without delay its existing plans for—measures like those discussed below.

**Assess the net benefits of advanced metering infrastructure (AMI) and deploy it wherever it would be net-beneficial to facilitate progress towards other goals**

According to data collected by the U.S. Energy Information Administration, AMI has only been installed for a very small percentage of New Jersey electricity consumers.[59] As the draft EMP explains, New Jersey's BPU issued a moratorium on pre-approvals for AMI deployment in 2017, pending completion of a cost-benefit analysis, and plans in the coming year to make recommendations about AMI rollout based on the conclusions of that ongoing analysis.[60]

Policy Integrity recommends that the analysis should take into account potential emissions reductions as well as cost savings that are internal to the operation of the electricity system. In addition, New Jersey should consider the role that AMI would play in supporting implementation of the value stacking approach to DER compensation described above. Because AMI makes it possible to capture more granular detail about electricity usage, and to communicate more information to consumers, its deployment would facilitate value stacking and make DER compensation levels more accurate. And these benefits should also be considered when interpreting the results of the ongoing cost-benefit analysis.

**New Jersey should align utility incentives with EMP goals by adopting one or more forms of Performance Based Regulation**

Just as the EMP envisions the alignment of societal goals with the nature and operation of New Jersey's energy system, the regulations that steer retail electric utilities in New Jersey should align their incentives with the goals of decarbonization and more cost-effective approaches to electricity service provision. The following measures, which are examples of Performance Based Regulation,[61] could help the state to better achieve that sort of alignment—more so if they are employed in combination.[62]

*Revenue decoupling*. Traditionally, utilities have charged electricity consumers for the volume of electricity they consume over each billing period. With this type of traditional regulation, utility revenues could vary up or down, creating incentives for utilities to increase electricity sales and a matching disincentive to avoid reductions in electricity consumption.

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[59] EIA, Form 861 "Advanced_Meters_2017" (indicating that almost 99% of meters are neither AMI nor capable of supporting automated meter reading (AMR)).
[60] Draft EMP at 78.
[61] *See* Dan Cross-Call et al., Rocky Mtn. Inst., Navigating Utility Business Model Reform: A Practical Guide to Regulatory Design 29-30, 33 (2018).
[62] For a description of how Maryland's behavioral demand response program builds on several policies, including examples of Performance Based Regulation, see Dan Cross-Call et al., Rocky Mtn. Inst., Case Study: Navigating Utility Business Model Reform (2018), *available at* https://info.aee.net/navigating-utility-business-model-reform-case-studies.

As a result, utility incentives are not aligned with increasing deployment of new technologies that could reduce the volume of electricity sales, such as DERs.

Revenue decoupling, on the other hand, removes that incentive by replacing the traditional formula for utility revenue with one that provides a set level of revenue for the utility, with prices floating up and down to ensure the utility could collect that set level of revenue.[63] As a result, utilities' financial well-being, and hence incentives, no longer depend on trying to increase the actual amount of sales. As of March 2019, 19 other states have decoupled their electric utility revenues, and evidence suggests that doing aided their energy efficiency programs.[64] Two of New Jersey's natural gas utilities have decoupled their revenues from sales for over a decade, but the state has not pushed electric utilities to do the same.

Decoupling New Jersey electric utilities' revenues from the volume of electricity they sell could facilitate progress toward many of the goals enumerated in the draft EMP. The most obviously relevant are the goals under Strategy 3, Maximize Energy Efficiency and Conservation and Reduce Peak Demand, and Strategy 4, Reduce Energy Consumption and Emissions from the Buildings Sector, but the goals under Strategy 2, Accelerate Deployment of Renewable Energy and Distributed Energy Resources, and Strategy 5, Modernize the Grid and Utility Infrastructure. Put another way, until utilities' current incentive to promote electricity consumption, other objectives—such as the improvements to energy efficiency and deployment of DERs called for in the draft EMP—will compete for priority. Such competition will, in turn, make utilities less likely to achieve EMP goals.

*Performance incentive mechanisms*. Whereas revenue decoupling frees utilities from a constraining, overarching incentive to sell more electricity, targeted performance incentive mechanisms reward utilities for achieving policy aims more specific than containing their costs of service. Such mechanisms, which have been used in over 25 states, generally set targets and reward utilities financially for exceeding them—or impose financial penalties on utilities for failing to meet them.[65] They are highly flexible. Numerous states use them to reward utility-led improvements in energy efficiency, and several states use them to encourage utility investments in improved reliability measures. New York, which calls them "Earnings Adjustment Mechanisms," uses them to encourage load peak reduction and the speedy interconnection of DG units, among other things.[66] Performance incentive mechanisms could be especially useful to New Jersey now, given the draft EMP's wide range

[63] Jim Lazar et al., Reg'y Assist. Project, Revenue Regulation and Decoupling: A Guide to Theory and Application 2-3 (Nov. 2016), https://perma.cc/2T74-6PV9.
[64] *See*, *e.g.*, Will Nissen & Samantha Williams, *The link between decoupling and success in utility-led energy efficiency*, 29 ELECTRICITY J. 59 (2016).
[65] Cross-Call et al., RMI, *supra* note 61, at 44-46.
[66] 2017 Outcome-based EAM Collaborative Report, N.Y. Pub. Serv. Comm'n, 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 3-14 (Aug. 23, 2017), https://perma.cc/GVW4-55ZD; *see also* Order Adopting a Ratemaking and Utility Revenue Model Policy Framework, N.Y. Pub. Serv. Comm'n, Case 14-M-0101, at 53-93 (May 19, 2016) (authorizing use of EAMs), https://perma.cc/35D8-N2K2.

of goals, and utilities' central role in many of the implementation efforts devised to achieve those goals.

*Shared savings mechanisms*. These are similar to performance incentive mechanisms in their operation, but they are less prevalent and tend to be employed to encourage utilities to undertake large investments that use new techniques or technologies. New York and Hawaii have adopted them to encourage utilities to develop non-wires alternatives, which are combinations of DERs that can substitute for the expansion of existing distribution capacity.[67] They could be especially useful in New Jersey to help pursue goals enumerated in the draft EMP, including but not limited to transportation electrification, DER deployment, and grid modernization.

**Utilities must either share or use information about the costs of distribution service to make value stack-based compensation accurate**

Nearly all of the benefits of DER deployment listed in table 1 above owe to DERs' ability to avoid particular costs of providing electricity services through the centralized electricity grid; the one exception is electricity system resilience, to which DERs can contribute directly. The value of DER benefits is, therefore, very closely related to the costs of developing, operating, and maintaining the centralized grid—activities undertaken by utilities. Utilities, because of their central operational role, control key information about where, when, how, and how much the installation and operation of DERs would yield value to DER owners and to society more generally. Examples of this information include local distribution system capacity to host additional DERs, power system flows, and load profiles. Because developing and integrating DERs in an economically efficient way requires access to such information, it must be available to DER developers—whether they are third-party firms or the utilities themselves.

Broadly speaking, there are two ways to make information controlled by utilities available for the purpose of DER installation and operation. One approach involves directing utilities to provide that information to third-party developers who contract with owners of the properties where DERs will be located. This might involve requiring utilities to share load data using "Green Button" programs or creating programs that align utilities' and developers' incentives with respect to sharing information about key features of local distribution systems. Public service commissions in California, Hawaii, and New York have over the past several years worked with stakeholders to determine what information utilities must share with developers. The results have included disclosures of relevant data,[68] as well as

[67] Robert Walton, *Hawaii adopts performance-based rate tools to accelerate clean energy transition*, UTILITYDIVE, May 28, 2019, https://perma.cc/GP94-YMHA; Cross-Call et al., RMI, *supra* note 61, at 41-43.
[68] *See, e.g.*, Philip Q. Hanser et al., The Brattle Grp., Marginal Cost of Service Study, prepared for Orange & Rockland 16 tbl.8, 27 (May 7, 2019), https://perma.cc/9ACL-4QS2; *see also* Tim McDuffie, *Distributed Energy Resource Optimization*, SOLARPRO, July/Aug. 2018, at 39-40 figs.2,3 & 4 https://www.solarprofessional.com/account/archive-download (showing maps developed by Southern California Edison to show DER hosting capacity and likely value of deployment based on expected load growth).

responses to follow-up requests for more detailed information.[69] Public service commissions have overseen these processes, and have some in cases engaged directly in disputes over particular steps.[70]

Another approach is for utilities to procure DERs directly, as Consolidated Edison of New York has done with the Brooklyn-Queens Demonstration Project, which was first proposed in 2014 and was reauthorized by the New York Public Service Commission in 2017.[71] Whereas an approach oriented to third-party developers involves compelling utilities to *share* granular, accurate, and up-to-date information, utility-led approaches require public service commissions to monitor, evaluate, and—if necessary—steer implementation. Performance-based regulation and shared savings mechanisms can be used for this purpose.

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[69] *See, e.g.*, Orange and Rockland Utilities, Inc. Responses to SEIA Questions on MCOS Studies, N.Y. Pub. Serv. Comm'n, Case 16-M-0411, In the Matter of Distributed System Implementation Plans (June 7, 2019), https://perma.cc/2V8X-VRU7.

[70] *See, e.g.*, Jeff St. John, *California Utilities Ordered to Reopen Grid Maps*, GREENTECH MEDIA, Oct. 10, 2018, https://perma.cc/8RWK-HRKK.

[71] Order Extending Brooklyn/Queens Demand Management Program, N.Y. Pub. Serv. Comm'n Case 14-E-0302, Petition for Extension of Time to Implement Brooklyn/Queens Demand Management Program (Issued & Effective July 13, 2017), https://perma.cc/U5XS-HTBL; Petition of Consolidated Edison Company of New York, Inc. for Approval of Brooklyn Queens Demand Management Program, N.Y. Pub. Serv. Comm'n (July 15, 2014), https://perma.cc/YCN9-QNE3.