



New York State Comptroller  
**THOMAS P. DiNAPOLI**

# Renewable Electricity in New York State

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## Review and Prospects

August 2023

# Message from the Comptroller

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August 2023

To carry out the goals and directives of the Climate Leadership and Community Protection Act, New York is pursuing an aggressive campaign to reduce its greenhouse gas emissions to levels identified by climate scientists as necessary to limit the most dangerous impacts of climate change. While this effort will require changes in the use of energy across all economic sectors, success in these efforts is predicated on our ability to encourage the development of a large supply of zero-emitting renewable electricity.



In this undertaking, the State joins a widespread effort in the U.S. and abroad involving countries, regional governments, cities and companies representing over 90 percent of global gross domestic product. All of these actors are engaged in an effort to prevent a worsening of the damaging and deadly storms, floods, heat waves, droughts and fires impacting communities around the world due to climate change. In this vital endeavor we cannot simply rely on other parties to take action on our behalf; the urgency involved requires all parties to act simultaneously. Importantly, New York's actions link with federal policies, such as the Inflation Reduction Act of 2022, that will provide funds in support of our efforts.

Shifting our electric generation away from power plants that rely on fossil fuels will have benefits that go beyond reducing the State's contribution to climate change. The State's power sector is a significant source of the pollutants that plague our cities and shifting to renewable electricity can help to limit emissions of harmful substances that have been linked to asthma and heart disease. Since these facilities are often sited in low income or minority communities, they impact the health of some of the State's most vulnerable residents.

Increasing our supply of renewable electricity can also help reduce our expenditures on fossil fuels imported from outside the State, keeping our money at home where it can help support our local businesses and build the State economy. Development of renewable electricity and associated transmission and distribution infrastructure can also help create jobs for New Yorkers. Importantly, the State has mandated worker protections such as project labor agreements and training programs and required larger projects to pay the State's prevailing wage and provide apprenticeship programs to promote the creation of good jobs with benefits.

This report charts New York's progress since the State began work on its renewable portfolio standard in 2004 and identifies strengths, weaknesses and recommendations to inform policymakers as they navigate New York's energy future. New York's energy goals are within reach, but require careful attention and management to address challenges and avoid future pitfalls. I hope you will find the report useful and informative.

Thomas P. DiNapoli  
State Comptroller

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# Executive Summary

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In 2019, New York State adopted the Climate Leadership and Community Protection Act (CLCPA), a sweeping law intended to put the State on a pathway to reduce its greenhouse gas emissions.<sup>1</sup> Among the goals established by the CLCPA are requirements to:

- Generate 70 percent of electricity used in New York from renewable sources by 2030;
- Install six gigawatts of distributed solar electric capacity by 2025; three gigawatts of storage by 2030; and nine gigawatts of offshore wind capacity by 2035;<sup>2</sup>
- Reduce energy consumption economy-wide by 54,220 gigawatt hours by 2035;<sup>3</sup> and
- Eliminate greenhouse gas and other pollutant emissions from the generation of electricity used in New York State by 2040.

These goals are interrelated: improvements in energy efficiency and declines in consumption will lower the threshold for meeting renewable electricity targets; increased solar and wind generation capacity will be an essential strategy for increasing renewable production; and production and use of cleaner energy sources will lead to reductions in greenhouse gas emissions.

The New York Independent System Operator (NYISO) projects New York will consume 157,660 gigawatt hours of electricity in 2030. This projection includes electric consumption offsets from existing and projected behind-the-meter solar generation. Watt hours are used to measure electric consumption or generation over a period of time, and watts measure the amount of electricity an electric generator has the potential to produce, or the amount a device needs to function at a moment in time. "Giga" is a prefix used to denote one billion watts or watt hours.

Currently, New York ranks sixth in the nation in renewable energy generation, including renewable fuels like biodiesel.<sup>4</sup> As of 2022, approximately 29 percent of the electricity generated in the State came from renewable sources. Of this renewable generation, roughly 75 percent came from hydroelectric generation, with the remaining 25 percent primarily split between wind and solar.<sup>5</sup> Based on NYISO's projected electric consumption, to reach the CLCPA goal of 70 percent in 2030, renewable generators in New York would need to produce an additional 78,073 gigawatt hours above 2022 production levels, an increase of over 200 percent.

An analysis by the NYISO found that to meet the CLCPA 2030 renewable electricity goal, the State will have to more than triple the installed 2022 renewable capacity of roughly 6.5 gigawatts by adding an additional 20 gigawatts over an eight-year period.<sup>6</sup> As a point of reference, the State added 12.9 gigawatts of total electric generation, including both fossil fuel and renewable sources, in the last 20 years.<sup>7</sup> Clearly, achieving the renewable electricity goal will require an increase in recent performance.

In New York State, there are three parallel processes that are needed to bring renewable generation capacity online: incentives, permitting, and interconnection.

- The New York State Energy Research and Development Authority (NYSERDA), manages a process to incentivize new renewable generation under the oversight of the New York State Public Service Commission (PSC);
- The Department of State's Office of Renewable Energy Siting (ORES) operates a permitting process to ensure that new renewable facilities are consistent with State and local laws; and
- The NYISO, operating under the oversight of the Federal Energy Regulatory Commission and the PSC, manages a process to ensure that the addition of the new generation is supported by the infrastructure necessary to transmit the generated electricity and will support reliable operation of the State's electric grid.

The CLCPA is not the State's first effort at increasing renewable electricity; prior efforts include the Renewable Portfolio Standard (RPS) and the Clean Energy Standard (CES).<sup>8</sup> Review of the experience under the RPS and CES indicates the state has faced challenges in each of the processes necessary for the development of renewable electricity:

- **Inconsistent provision of incentives resulted in slow progress in early years.** Inconsistent funding under the RPS led to slow progress that hindered the State's ability to meet its prior goals.
- **Project cancellations further slowed progress.** Between 2005 and April 2023, 28 projects totaling 1,319 megawatts, or 11.3 percent of contracted capacity, have been canceled. Since 2015, only approximately 294 megawatts, or 3.1 percent of the total megawatts of projects receiving contract awards, have become operational.<sup>9</sup> A megawatt is equal to 1 million watts.
- **Delays in siting and operationalization contributed to lengthy project timelines.** Long project timelines can be attributed to numerous factors, including local opposition to projects, the PSC siting process, and delays in completing interconnection studies at the NYISO. The NYISO interconnection process has been identified as one of the longest in the country.

Some of these challenges are being addressed through State action. Increased and consistent funding in the CES largely ameliorated issues with incentives and facilitated large increases in the development of renewable electricity generation. Between 2017 and 2021, at least 1,100 megawatts of projects came under contract annually – compared to between 0 and 726 megawatts in the preceding years.<sup>10</sup>

In 2020, the Department of State's Office of Renewable Energy Siting (ORES) was formed to streamline the permitting process and has made progress in its early efforts. The 60-day window to determine application completeness and one-year limit to issue a final permit have helped expedite some projects; as of June 2023, ORES has permitted 13 renewable electric generating facilities, totaling 2.1 gigawatts of generation capacity.

Reforms are also needed to the interconnection process overseen by the NYISO. NYISO has begun streamlining this process to more quickly bring renewable electricity generation projects online and has made some progress. It will still be necessary to significantly reduce the amount of time it takes to bring renewable projects into production if the State is going to reach its 2030 goal.

In addition, the State will face other challenges as it contends with a massive scale of new projects. First, it will have to add significant new electric transmission infrastructure to allow for the transmission of renewable electricity to customers throughout the State. According to the NYISO, meeting the 2040 goal will require the development of new dispatchable generation technologies. Second, the State will have to consider and be transparent about the costs of this transition to the State's electric customers. The costs of incentives to encourage renewable siting and the costs of transmission projects approved by the PSC are integrated into electric bills and care must be taken to hold down these costs.

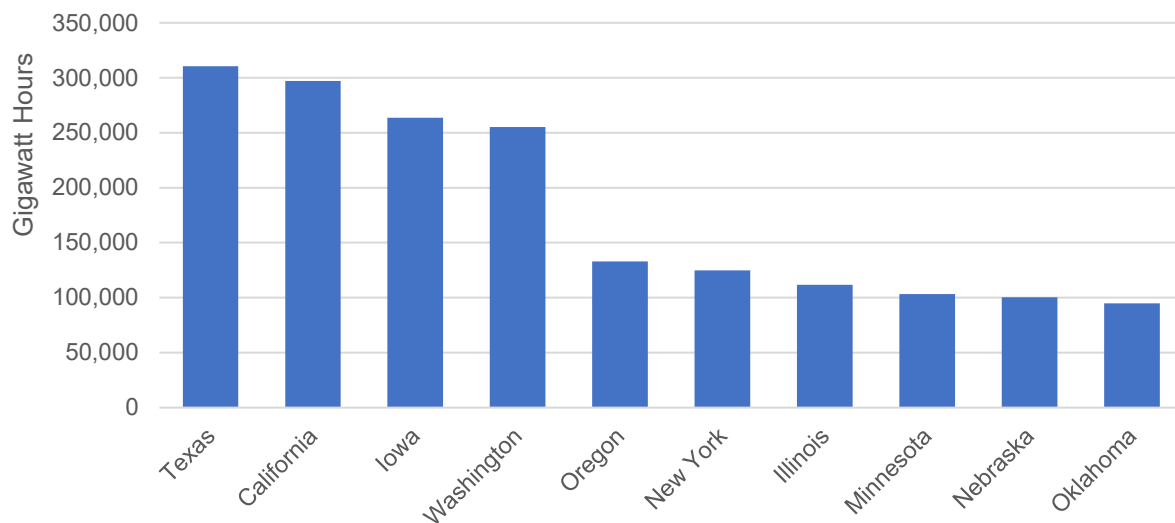
# Renewable Energy: The Current Landscape

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## Renewable Energy Generation

In 2020, New York produced 124,912 gigawatt hours of renewable energy, ranking sixth in the nation. (See Figure 1.) The renewable energy sources that make up this figure include both renewable fuels, such as biodiesel, and renewable electricity sources, including hydropower. New York was 3<sup>rd</sup> in the nation after Washington and Oregon in the generation of hydroelectric power, 10<sup>th</sup> in generation of solar electricity and 18<sup>th</sup> in generation of electricity with wind.<sup>11</sup>

**Figure 1**  
**Total Renewable Energy Production in Top States, 2020**

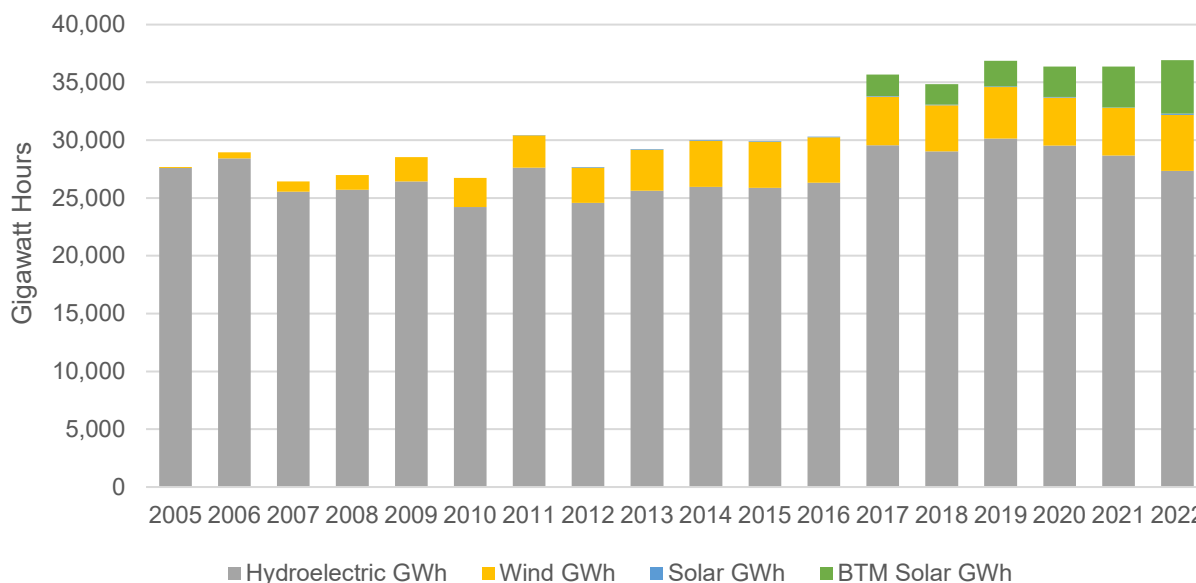


Source: U.S. Energy Information Agency

In 2022, the most recent year for which data are available, New York generated a total of 36,924 gigawatt hours, or billions of watt hours, of renewable electricity, as shown in Figure 2.<sup>12</sup> Hydroelectric generation makes up the vast majority of renewable electricity in New York—nearly 75 percent. The State’s largest hydropower facility, the New York Power Authority’s (NYPA) Robert Moses Niagara Power Project located in Niagara Falls, was the State’s largest generator in 2022, generating 15,490 gigawatt hours of electricity.<sup>13</sup>

After hydropower, the next largest source of renewable electricity generation in New York is wind power. In 2022, wind power was responsible for 4,825 gigawatt hours, or 13.1 percent of renewable electricity generation. Solar power, including behind-the-meter (BTM) solar which generates power primarily for personal use, was responsible for 12.9 percent.<sup>14</sup>

**Figure 2**  
**Gigawatt Hours of Renewable Electricity Produced in New York by Source, 2005-2022**



Note: Figures for behind-the-meter (BTM) solar generation were drawn from NYISO Gold Book Table 1-9b Solar PV Annual Energy Reductions, Behind-the-Meter.

Source: New York Independent System Operator

New York’s renewable electric generation was comprised almost entirely of hydroelectric power in 2005. As wind generation capacity was added, renewable electricity sources provided an average of 28,575 gigawatt hours through 2016, as shown in Figure 2. Renewable electricity production began to grow to new levels in 2017 as wind production increased and BTM solar generation became increasingly common.

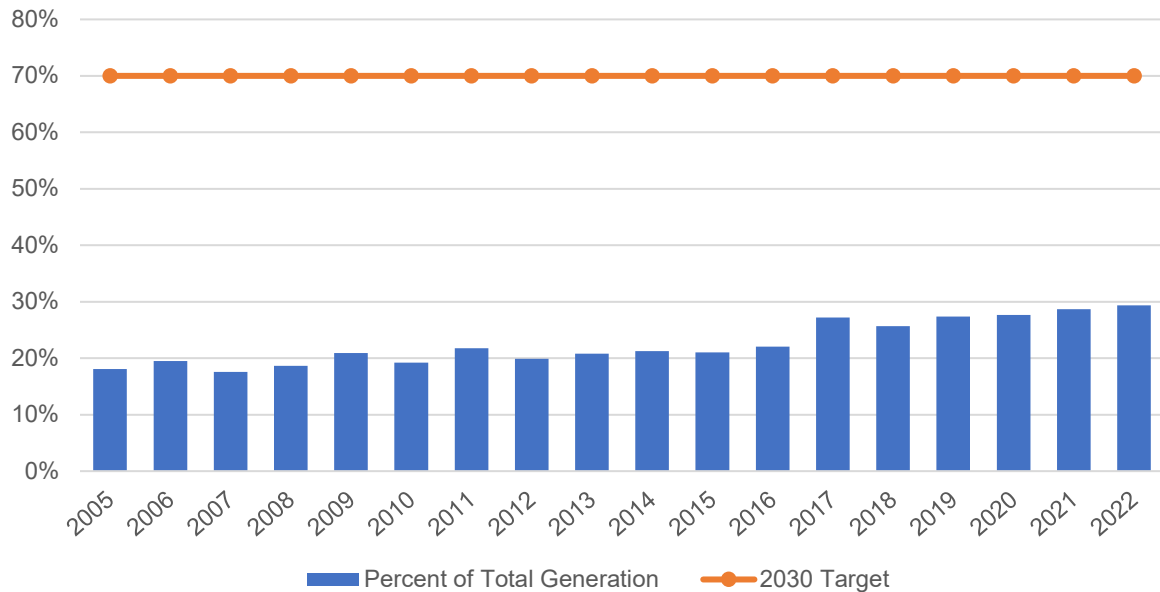
## Renewable Electricity Generation Goals

As shown in Figure 3, the State’s renewable electric generation averaged 20 percent of total electric generation between 2005 and 2016. Since then, the share grew to approximately 29 percent of State generation in 2022. To reach the CLCPA goal of 70 percent in 2030, renewable generators in New York would need to produce an additional 78,073 gigawatt hours above 2022 production levels, an increase of over 200 percent.<sup>15</sup>

The NYISO’s *2021-2040 System & Resource Outlook* discusses the necessary new renewable, transmission and dispatchable capacity required to meet the CLCPA goals. The NYISO identifies a need for 20 gigawatts of new renewable electric generation and new transmission infrastructure to meet the 2030 goal.<sup>16</sup> For reference, currently installed renewable capacity is approximately 6.5 gigawatts, so the State will have to more than triple its current renewable capacity by 2030.<sup>17</sup> To do so, the State will have to increase the rate at which renewable electricity projects are permitted and approved for interconnection to the State electric grid as over the last 20 years the State has only added 12.9 gigawatts of projects of both renewable and fossil projects.<sup>18</sup>



**Figure 3**  
**New York’s Renewable Electricity as a Percent of Total Electric Generation, 2005-2022**



Source: New York State Independent System Operator

The projections are based on the assumption that New York achieves NYISO’s projected electric consumption for 2030 of 157,660 gigawatt hours.<sup>19</sup> According to the NYISO, State electric use has generally trended downward over the last decade with occasional fluctuations. This trend is projected to continue until 2024, when increasing electrification of transportation and building systems are projected to cause use to begin to trend up again.

When completed, the Champlain Hudson Power Express powerline may reduce the required additional renewable electricity somewhat with imported hydropower from Quebec. Nevertheless, even if the positive contributions from additional hydropower materialize, the State’s renewable electricity generation will still need to increase significantly from 2022 levels to meet the 2030 goal.

# Challenges to Meeting Past State Renewable Electricity Goals

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From 2004 through 2015, the State's Renewable Portfolio Standard (RPS) was established through a PSC proceeding and included programs for both large scale facilities and for customer-sited facilities. In 2011, the State initiated a customer-sited solar program called NY-Sun and in 2015, the State created the Clean Energy Standard (CES) which replaced the RPS.<sup>20</sup>

Initially, the RPS set a goal of producing 25 percent of the State's electricity from renewable sources. This goal was revisited in 2010 and increased to 30 percent of the State's electricity by 2015. With the adoption of CES in 2016, the renewable electricity production goal was increased to 50 percent. As shown in Figure 3, prior State programs failed to achieve their generation goals in a timely way.

New York has also had difficulty achieving energy efficiency goals in the past, failing to meet a goal to reduce electric sales by 15 percent in 2015 compared to a 2008 baseline.<sup>21</sup> This is important because efficiency gains in electric use help reduce the amount of renewable electricity that must be brought onto the grid and will make it easier to meet the State's renewable energy goals.

There are three interrelated processes that play a role in the development of renewable electric generation resources in New York, and the State has faced challenges in each of these processes. These processes work on a parallel basis and project developers do not need to have completed any of the processes before they can enter one of the other processes. Two of them, permitting and grid interconnection, are required for any all-new sources of generation.

- **Incentives** – Through various programs, particularly renewable energy certificates, incentives are provided to stimulate the market and ensure that there are enough renewable electric generation projects to meet State goals.
- **Permitting and Siting** – The permitting process is intended to ensure that projects are sited in areas and under conditions consistent with State and local laws and regulations.
- **Interconnection** – The interconnection process is intended to ensure that there is sufficient electric transmission and distribution infrastructure to move the electricity generated by the facilities to consumers and that electric service reliability standards are met.

The State faced three key challenges that hindered its progress: inconsistent provision of incentives; project cancellations; and lengthy project timelines due to delays in siting and operationalization.

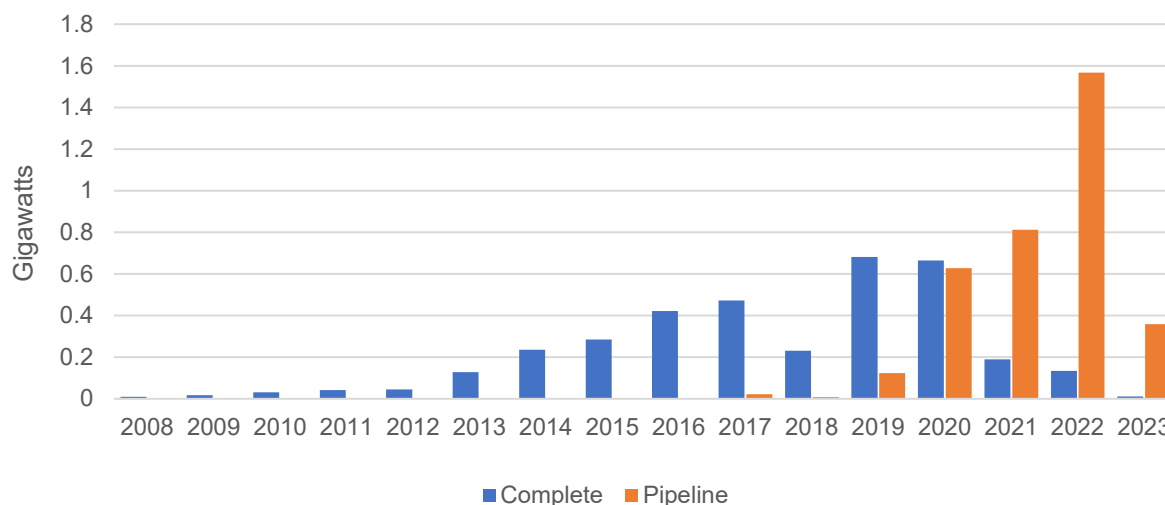
## Inconsistent Provision of Incentives

New York State has used two basic approaches to incentivize the development of renewable electricity generation: contracts for the purchase of renewable energy certificates (RECs) from project developers proposing to build large scale facilities that sell electricity into the State grid; and incentives to reduce the cost of installing small facilities sited behind a customer meter that primarily generate electricity for the customer’s use, but also sell unused electricity into the distribution grid (BTM solar). Incentives for BTM solar installations include State and federal tax credits and compensation for electricity generated in excess of the needs of the home or business through a form of net metering. Technologies eligible for this arrangement include wind and solar photovoltaic generators and electric storage. Large scale facilities are also eligible for federal tax credits.

### Steady Increases in BTM Solar

Figure 4 shows that distributed solar generation capacity grew steadily, first under the RPS Customer-Sited Tier and then under the successor NY-Sun, through 2019 when the CLCPA doubled the State’s distributed solar goal from 3 to 6 gigawatts of installed capacity and corresponding PSC action increased the funding commitment for this program, producing a large increase in projects.<sup>22</sup> In 2022, the PSC further increased the NY-Sun goal to 10 gigawatts due to the success of the program in approaching its 2025 goal.<sup>23</sup> As of April 2023, under NY-Sun, the total combined capacity of complete projects and those in the pipeline for all years was approximately 7.1 gigawatts.

**Figure 4**  
**Behind-the-Meter Solar Generation Capacity by Status, 2008-2023**



Note: Data for 2023 is current through April and does not represent total project information for the year.

Source: New York State Energy Research and Development Authority

### Mixed Early Results for RECs

In contrast to these positive results, results for increasing large-scale renewable generation capacity through RECs have been more mixed. In the REC process, prospective developers bid for competitive contracts to sell a set amount of RECs to the State. Each REC represents a

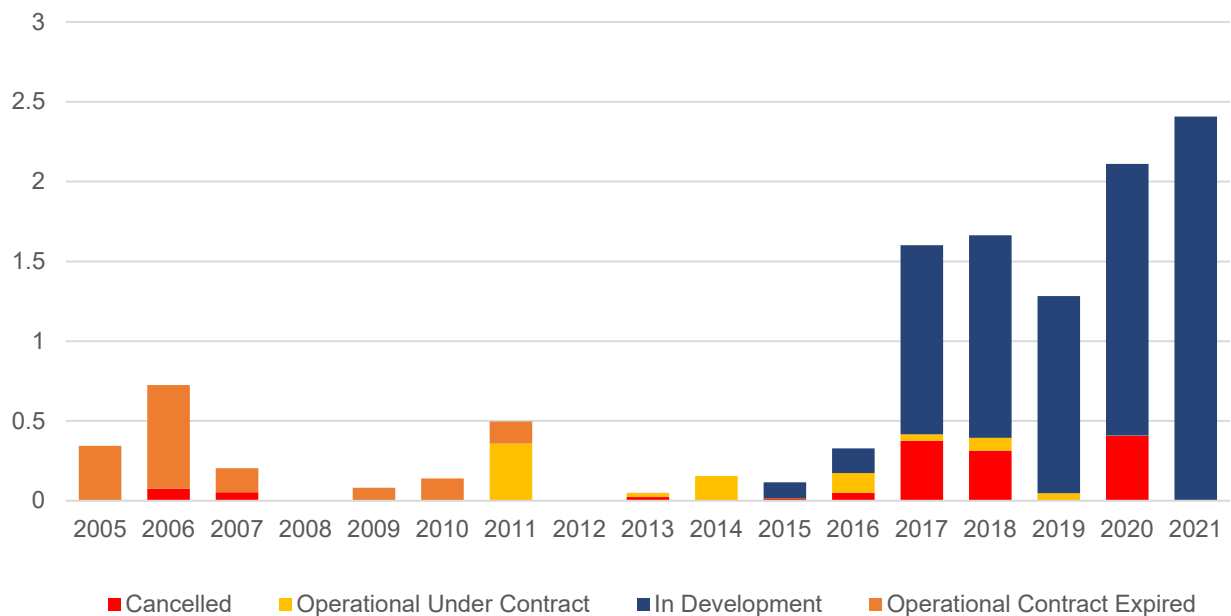
megawatt hour of electricity sold into the State’s electric grid. Most, but not all, of the large-scale renewable electricity generators that move through the permitting and interconnection processes are recipients of REC contracts.

An Office of the State Comptroller analysis of projects receiving REC contracts with projects completing the NYISO interconnection process and projects receiving a permit from the State Office of Renewable Energy Siting (ORES) found that in 2023, 70 percent of the solar and wind projects that received approval to interconnect to the State grid and 77 percent of the projects that have received a siting permit from ORES were previously awarded REC contracts.

As shown in Figure 5, NYSERDA efforts to procure capacity to meet goals under the RPS had uneven results, with relatively smaller amounts of renewable capacity procured in 2007, 2009, 2010, 2013, 2014 and 2015 and no procurements in 2008 and 2012.<sup>24</sup> The amounts of funding committed varied widely across the procurements, ranging from \$66 million in 2013 to \$400 million committed in two procurements in 2011. Across the eight RPS procurements for which RFPs provide a funding commitment—those conducted from 2009 through 2016—the total amount contracted for REC purchases failed to meet the total commitment for those procurements by \$101 million.<sup>25</sup> As a result, NYSERDA was unable to procure sufficient renewable capacity to meet the goals of the time.

Funding commitments under the State’s CES increased dramatically, resulting in a significant increase in the projects under contract, as shown in Figure 5.<sup>26</sup> Whereas the last procurement under the RPS in 2016 carried a commitment of \$360 million, the funding commitment for the 2017 procurement was approximately \$1.4 billion.<sup>27</sup>

**Figure 5**  
**Gigawatts of Projects Awarded REC Contracts by Status, 2005-2021**



Source: New York State Energy Research and Development Authority

Over 20 years, NYSERDA has procured RECs from projects with the potential capacity to generate 14.6 gigawatts and up to 26,244 gigawatt hours of electricity if completed. This excludes projects that have been canceled, and assumes all projects in development will be completed. NYSERDA estimates that if its current pipeline of projects is completed, the projects will provide 66 percent of the State's projected 2030 electricity needs.<sup>28</sup>

## Project Cancellations

Even as funding commitments have increased, the State has faced challenges moving projects to completion. Between 2005 and April 2023, 28 projects totaling 1.3 gigawatts were canceled—an amount equal to 11.3 percent of capacity under contract during those years—with the largest amount of capacity canceled in 2017, 2018 and 2020. In these years, canceled projects represented 20.4 percent of contracted capacity. Projects may be canceled for a variety of reasons including opposition to the project, changes in the finances of the developer, or unforeseen costs for transmission needed for grid integration.

Figure 5 shows the cumulative gigawatts of renewable capacity contracted by year and the status of these projects. In addition to canceled projects, there are:

- 101 projects currently operating. Of these facilities, 61 totaling 1.5 gigawatts reached operational status, but NYSERDA's contract with the facilities has expired and the facilities no longer have an obligation to sell the renewable attributes of their power in New York. These facilities could potentially enter into long term contracts with consumers outside of the State, which could prevent their generation from counting toward State goals. Another 40 of these facilities, totaling .83 gigawatts, are operating under contract to NYSERDA.
- 97 projects totaling 8.1 gigawatts are in development, either working through the process of pursuing grid integration studies, acquiring project financing, applying for required State permits, or negotiating property tax agreements with local governments.

Not shown in Figure 5 are four NYSERDA contracts for the purchase of offshore wind RECs from Beacon Wind, Empire Wind 1, Empire Wind 2 and Sunrise Wind. The combined capacity of these projects is 4.3 gigawatts. In addition, the Long Island Power Authority has entered into a contract for construction of the South Fork Wind Farm, a 130 megawatt installation.<sup>29</sup>

## Lengthy Project Timelines from Delays in Siting and Operationalization

Since 2015, only approximately .294 gigawatts, or 3.1 percent, of the total renewable electricity generation capacity under contract awards have become operational. Long project timelines can be attributed to numerous factors, including local opposition to projects, the lengthy PSC siting process, and delays in completing interconnection studies at the NYISO.<sup>30</sup> Delays in bringing additional renewable electric generation and transmission capacity further complicate decarbonization efforts as recent reports from the NYISO acknowledge that the State's electric generation capacity needs may require certain fossil fuel plants to remain operational beyond planned closure dates.<sup>31</sup>

## Permitting

During much of the decade between 2011 and 2020, renewable electricity generation projects with a capacity of 25 megawatts or larger were sited through Article 10 of the New York State Public Service Law. Many parties identified this process as lengthy.<sup>32</sup> As noted by the New York League of Conservation Voters Education Fund, as of December 2018, only one renewable electricity generation project had been approved through this process.<sup>33</sup>

To address delays in siting, the State Fiscal Year (SFY) 2020-21 Budget included a new siting process housed in the New York State Department of State (DOS) for renewable electricity facilities with a capacity greater than 25 megawatts that included a requirement that facility permits be issued within a year of submission of a complete application. The new siting law also required DOS to develop regulations creating uniform siting standards, provided for host community benefits, required NYSERDA to develop a program to acquire and permit shovel ready sites for renewable facilities and mandated the creation of a plan to update the State's electric transmission and distribution infrastructure to provide capacity transmission of electricity from new renewable facilities around the State.

Early results from the DOS Office of Renewable Energy Siting (ORES) indicate that progress is being made. As of June 2023, ORES has issued permits for 13 renewable electric generating facilities with generation capacity of 2.1 gigawatts.<sup>34</sup>

Subsequently, provisions of the new siting law were amended to require that State prevailing wage be applicable and that other labor protections apply to all renewable electric facility projects with which the State contracts for the purchase of RECs.

## Interconnection

The reforms of the siting process may not be all that is needed to facilitate renewable electric siting. The Lawrence Berkeley National Laboratory (LBNL) has found that the studies required for a project to connect to the transmission system are delaying the completion of solar, wind and electric storage projects nationwide.<sup>35</sup> These studies are necessary to identify any transmission upgrades that may be necessary for the project to connect to the system and typically assign the costs of these upgrades to the project developer. The LBNL nationwide

### More About ORES

State law requires all renewable electric generating projects with a capacity of 25 megawatts or higher to receive a siting permit issued by ORES. (One thousand megawatts are equal to one gigawatt.) Additionally, projects with a capacity between 20 and 25 megawatts may opt into the process. The ORES siting process requires project sponsors to consult with local governments and the community. When a complete application is received, ORES issues draft permit conditions for public review and comment. The ORES process includes time limits including a 60-day limit to determine application completeness and a one-year limit to issue a final permit once an application has been determined to be complete. The one-year time limit contracts to six months when projects are proposed on brownfields and other abandoned and underutilized sites. Projects with a capacity under 25 megawatts do not undergo ORES review, but are subject to local statutes and ordinances and review under the State Environmental Quality Review Act. The ORES time limits do not apply in the local permitting process.

analysis of projects waiting for interconnection studies by regional grid operators found an expanding universe of project applications and corresponding increases in the time it takes to complete these studies.<sup>36</sup>

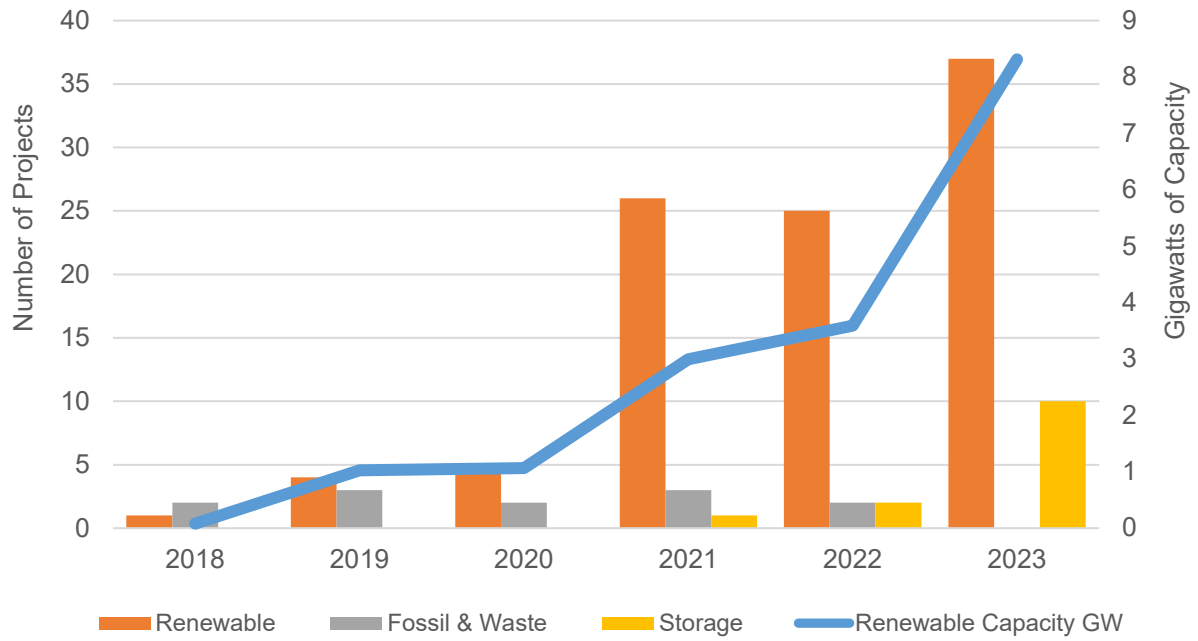
The NYISO interconnection process for renewable electric projects includes a series of studies that evaluate the impacts of proposed facility on the State's transmission grid.<sup>37</sup> The studies determine whether a new project poses reliability problems for the grid and, if so, what system upgrades are required. Project developers are responsible for the costs of any needed system upgrades and must accept these costs for their project to be approved. Interconnection studies include:

- An optional feasibility study that identifies potential problems with the project's proposed interconnection point;
- A system impact study which evaluates the grid impact of each project individually and identifies if there is a need for system upgrades; and
- A facilities study, or class year study, which groups projects that have achieved a similar stage in the process in a class year and evaluates the cumulative impacts of these projects. This study identifies specific system upgrades and binding costs that individual project sponsors must accept or reject. If a project sponsor rejects the costs of the system upgrades, their project is pulled from the class and the study is repeated with the remaining projects. Projects that have completed a facilities study and accepted system upgrade costs are deemed to have completed the interconnection process.

According to LBNL analysis, between 2018 and 2022, the NYISO was one of four independent system operators with wait times over three years, the longest in the country.<sup>38</sup> The grid operators with the shortest wait times, the Electric Reliability Council of Texas, the Southern Company and the Seminole Electric Cooperative had wait times that are approximately half of those at NYISO.

To address the relatively long interconnection wait times, the NYISO has worked to increase its ability to move projects through this process while continuing to maintain its primary responsibility to maintain the reliability of electric service. Figure 6 shows the dramatic annual increase in both the overall numbers of projects receiving final interconnection approval and the total gigawatts of renewable generating capacity approved on an annual basis. In 2023, projects with a total of over 8 gigawatts of renewable capacity, including two of the State's offshore wind projects, completed the NYISO interconnection process.<sup>39</sup> In 2023, the NYISO identified another 6.8 gigawatts of solar generation, or solar plus storage projects and 9.5 gigawatts of wind generation projects that were candidates for future class year studies. This data, covering 204 projects, is presented in the 2023 Gold Book, but in its 2023 Interconnection Process Report, the NYISO refers to a total of 457 projects in its interconnection queue. According to the agency, the roughly 253 projects are less advanced in the interconnection process, but this number indicates the magnitude and complexity of its workload.

**Figure 6**  
**Projects Added and Annual Additional Renewable Electricity Generating Capacity**  
**Completing the NYISO Interconnection Process, 2018-2023**



Source: NYISO



# Additional Future Considerations

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## Electric Transmission and Distribution Upgrades

New electric transmission and distribution capacity will be needed to connect the new renewable electric generation required to meet the CLCPA goals to the grid. Transmission capacity connecting upstate regions to New York City is limited and renewable facilities in some upstate regions are already being forced to curtail generation due to transmission constraints.<sup>40</sup>

PSC plans and programs to address this need include:<sup>41</sup>

- Utility investments in 1,970 MW of distribution capacity to facilitate distributed generation;
- Transmission projects adding 5,710 MW of capacity to allow access to bulk transmission for upstate renewable generation in generation pockets;
- Transmission projects adding 910 MW of capacity to allow for exit of the bulk transmission system to downstate load pockets; and
- The 2040 goal will likely require projects to interconnect offshore wind projects that will require additional export capacity from Long Island and additional bulk transmission connecting New York City and Long Island to upstate.

Completion of these projects will be necessary to meet the CLCPA goals for 2030 and 2040. Two large scale transmission projects, Champlain Hudson Power Express (CHE) and the Clean Path NY (CPNY), projected for completion in 2026 and 2027 respectively, will be important to bring renewable electricity into the New York City market. The CHE will bring hydroelectric power generated in Quebec into New York City and CPNY will help eliminate transmission constraints between upstate and New York City, bringing additional renewable electricity into New York City and helping to prevent the curtailment of renewable electric generation upstate.

## Paying for the Transition

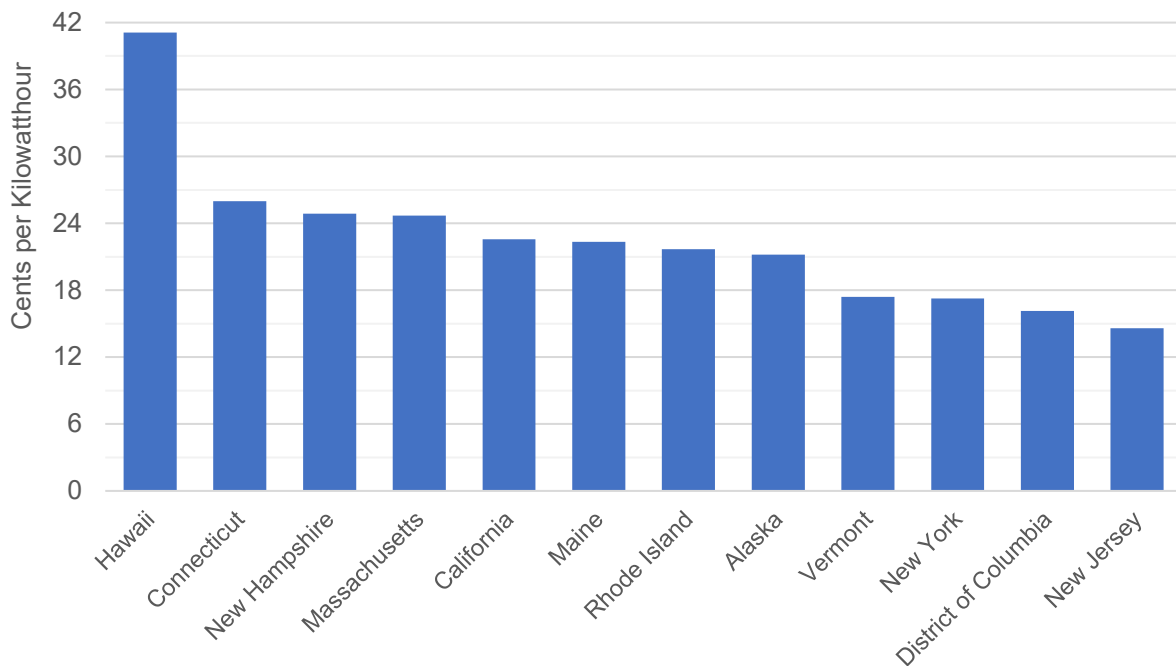
The costs of incentivizing renewable electricity development and transmission upgrades are borne almost exclusively by New York's utility customers through a charge per kilowatt hour of electricity consumed. In the 12 years from SFY 2008-09 through SFY 2020-21, NYSERDA spent roughly \$6.7 billion of ratepayer funds on a variety of clean energy programs.<sup>42</sup> In recent months, companies in receipt of offshore wind REC contracts have requested price increases to address rising costs due to inflation. If approved, such increases would drive up the cost of these projects for consumers of electricity in the State; if not approved, the sponsors may cancel or delay construction of the project.

In addition, investments in the new transmission needed to bring renewable electricity to market will be significant, including \$22.1 billion for CPNY and CHE<sup>43</sup> and \$4.4 billion for transmission projects located in the Southern Tier, Northern and Capital District regions.<sup>44</sup> These areas have been identified by the NYISO as areas where a lack of transmission capacity prevented

renewable electricity from reaching broader markets throughout the State and especially in the New York City metropolitan area.

Since the funding to support these programs is derived from charges on each kilowatt hour of electricity a customer uses, the ongoing costs of upgrading transmission and distribution grids and incentivizing renewable electricity projects add to the costs of electricity to consumers in New York State, which are 10<sup>th</sup> highest in the nation, as shown in Figure 7.<sup>45</sup>

**Figure 7**  
**Average State Retail Electric Rates, States with Highest Rates, March 2023**



Source: U.S. Energy Information Agency

Researchers have found that mechanisms that rely on charges per unit of electricity used tend to put a greater economic burden on lower income households than wealthier households.<sup>46</sup> There are several existing programs and proposals under consideration to address the potential cost impacts of incentives paid to renewable electricity facilities and transmission projects as well as those of transmission and distribution system upgrades required by the PSC. For example, the PSC has created programs by which the State’s low-income electric customers may receive bill credits, lowering overall costs, through community solar programs, such as the Solar for All Program.<sup>47</sup> In addition, the Enacted Budget for SFY 2023-24 included a provision to hold the electric bills of low-income customers to 6 percent of household income if the customers participate in State programs to electrify home heating and appliances and undertake efficiency upgrades.

# Conclusion

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In order to achieve the goals of the CLCPA, New York will have to take steps to increase renewable electricity generation. If the projects currently under contract to sell RECs to the State and the projects in the NYISO's interconnection queue are able to move through the interconnection and construction process and needed transmission and distribution infrastructure is completed in a timely way, the CLCPA's goal of generating 70 percent of the State's electricity with renewable technologies appears to be in reach.

But this is a big "if". While the State's recently adopted reform of the siting law for renewable electricity facilities appears to have reduced the time required to permit facilities, it may need to be further expedited in a manner that continues to be protective of the environment and community concerns. Similarly, while the NYISO is completing significantly more interconnection studies on an annual basis than previously, addressing the wait times for interconnection of renewable facilities to the grid continues to be a challenge.

In reviewing the State's prior performance, a case can be made that the State was inconsistent in its funding commitments to meet the goal of generating 30 percent of electricity from renewable sources by 2015. To ensure that the State meets its CLCPA goals, agencies must be consistent and proactive in addressing problems, such as delays in siting, interconnection, and making the necessary investment in transmission and distribution infrastructure.

It will also be important for policymakers charged with implementing the CLCPA to consider mechanisms to hold down the cost of meeting its goals on the State's electric consumers. Given the ongoing concerns with affordability of electricity and the difficulty that some State residents face in paying their electric bills, the State could consider alternative funding mechanisms to per kilowatt hour charges on electric consumption. The Climate Action Fund, created in the SFY 2023-24 Enacted Budget, provides one such option. Every effort should be made to clearly identify how the transitions to the State's electric generation fleet and transmission grid will affect consumer electric bills in the future and to hold down costs to the State's electric customers.

# Endnotes

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- <sup>1</sup> See Chapter 106 of the Laws of 2019. Reduction to these levels would be consistent with recommendations included in reports produced by the United Nations Intergovernmental Panel on Climate Change (IPCC).
- <sup>2</sup> Watts and watt hours are electrical power units. “A watt is equal to one ampere under a pressure of one volt and is equal to 1/746 horsepower.” “A watt hour is equal to one watt of power supplied to, or taken from, an electric circuit steadily for one hour.” See: U. S. Energy Information Administration, “Glossary,” accessed May 15, 2023, available at <https://www.eia.gov/tools/glossary/index.php?id=W>.
- <sup>3</sup> This figure represents a conversion of the CLCPA goal from British Thermal Units (BTU) to watt hours using a conversion equivalent published by the U.S. Energy Information Agency in which 1 Kilowatt hour equals 3,412 BTUs. Most energy figures throughout the report are converted to gigawatt hours for consistency. See: U. S. Energy Information Administration (EIA), “Units and Calculators Explained,” accessed May 15, 2023, available at <https://www.eia.gov/energyexplained/units-and-calculators/energy-conversion-calculators.php>.
- <sup>4</sup> EIA, *State Energy Data System (SEDS): 1960-2020*.
- <sup>5</sup> New York Independent System Operator (NYISO), *2023 Load and Capacity Data Report (Gold Book)*, Table III-3.
- <sup>6</sup> NYISO, *2023 Gold Book*, Figure III-2, April 2023.
- <sup>7</sup> NYISO, *2021-2040 System and Resource Outlook: A Report from the New York Independent System Operator*, September 22, 2022, available at [https://www.nyiso.com/documents/20142/32663964/2021-2040\\_System\\_Resource\\_Outlook\\_Report\\_DRAFT\\_v15\\_ESPWG\\_Clean.pdf/99fb4cbf-ed93-f32e-9acf-ecb6a0cf4841](https://www.nyiso.com/documents/20142/32663964/2021-2040_System_Resource_Outlook_Report_DRAFT_v15_ESPWG_Clean.pdf/99fb4cbf-ed93-f32e-9acf-ecb6a0cf4841).
- <sup>8</sup> New York State Public Service Commission (PSC), *Order Regarding Retail Renewable Portfolio Standard. Case 03-E-0188—Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard*, September 24, 2004; and *Order Adopting Clean Energy Standard*, Case 15-E-0302, August 1, 2016.
- <sup>9</sup> Data.NY.Gov, “Large-scale Renewable Projects Reported by NYSERDA: Beginning 2004,” accessed May, 16 2023, available at <https://data.ny.gov/Energy-Environment/Large-scale-Renewable-Projects-Reported-by-NYSERDA/dprp-55ye>.
- <sup>10</sup> Ibid.
- <sup>11</sup> EIA, *State Energy Data System (SEDS): 1960-2020*.
- <sup>12</sup> This figure includes large scale hydroelectric, wind and solar generation for 2022 found in Figure III-3: 2022 NYCA Energy Production by Fuel Type from the NYISO *2023 Gold Book* and the estimate for 2022 behind the meter solar generation found in Table 1-9b: Solar PV Annual Energy Reductions, Behind-the-Meter, found in the NYISO *2022 Gold Book*.
- <sup>13</sup> NYISO, *2023 Gold Book*, Table III-2a NYISO Market Generators.
- <sup>14</sup> Behind the meter generation, whether using solar generating or other technologies, refers to a generating unit that is installed behind the customers electric meter and which generates power primarily for the customers use. Excess power generated beyond the customer’s needs can be sold back to the utility through an arrangement called net-metering.
- <sup>15</sup> In calculating the amount of additional renewable electricity production needed in 2030, the behind the meter solar generation estimate is not included as the NYISO subtracts this estimate from its projected 2030 electric consumption.
- <sup>16</sup> NYISO, 2021-2040 op. cit.
- <sup>17</sup> NYISO, *2023 Gold Book*, Figure III-2, April 2023.
- <sup>18</sup> NYISO, 2021-2040 op. cit.
- <sup>19</sup> NYISO’s 2023 estimate for 2030 electric consumption, found in the NYISO *2023 Gold Book*, was revised upward from its 2022 estimate by 5,602 gigawatt hours.
- <sup>20</sup> The RPS, CES, EEPS and other renewable energy goals were set through PSC regulatory proceedings. NY-Sun was established by PSC, *Order Authorizing the Expansion of the Solar Photovoltaic and Geographic*

*Balance Programs from 2012 Through 2015 and the Reallocation of Main-Tier Unencumbered Funds*, April 14, 2012. The CLCPA set State renewable energy goals in statute.

<sup>21</sup> In a 2015 Order establishing the Reforming the Energy Vision Proceeding the PSC noted that by 2013, only 55 percent of the Energy Efficiency Portfolio Standard goals were met and that the goals appeared to be thus far unattainable. See: PSC, *Order Commencing Proceeding*, Cases 14-M-0094, 14-M-0101, 10-M-0457, 07-M-0548, 03-E-0188, May 8, 2014, pg. 2.

<sup>22</sup> PSC, *Order Extending and Expanding Distributed Solar Incentives*, Case 19-E-0735, May 14, 2020.

<sup>23</sup> PSC, *Order Expanding NY-Sun Program*, Case 19-E-0735, April 14, 2022.

<sup>24</sup> In the first two years of the RPS, request for proposal documents (RFPs) specify the amount of RECs sought by NYSERDA, but not the amount committed to the procurement, while in most other years RFPs provide an amount of funding committed for RECs, but no figures for amount of RECs sought.

<sup>25</sup> These figures are derived from RFPs and procurement summaries available on the NYSERDA website, NYSERDA, "Past Main Tier Solicitations Under the RPS," accessed July 5, 2023, available at <https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Standard/Important-Orders-Reports-and-Filings/Renewable-Portfolio-Standard/Past-Main-Tier-Solicitations>.

<sup>26</sup> PSC, *Order Adopting Clean Energy Standard*, Case 15-E-0302. August 1, 2016.

<sup>27</sup> Funding commitments for many of the RPS procurements, including 2016 are available on the NYSERDA website at NYSERDA, "Past Main Tier Solicitations Under the RPS," accessed July 5, 2023, available at: <https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Standard/Important-Orders-Reports-and-Filings/Renewable-Portfolio-Standard/Past-Main-Tier-Solicitations>. Funding commitments for the 2017 procurement and other Clean Energy Standard procurements are available at NYSERDA, "2017 Solicitation," available at: <https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Standard/Renewable-Generators-and-Developers/RES-Tier-One-Eligibility/Solicitations-for-Long-term-Contracts/2017-Solicitation> (accessed July 5, 2023).

<sup>28</sup> This statement can be found in multiple locations including, NYSERDA, "Governor Hochul Announces 22 Large Scale Renewable Energy Projects," June 2, 2022, available at <https://www.nyserda.ny.gov/About/Newsroom/2022-Announcements/2022-06-02-Governor-Hochul-Announces-22-Large-scale-Renewable-Energy-Projects>.

<sup>29</sup> NYSERDA, Offshore Wind Projects, available at <https://www.nyserda.ny.gov/All-Programs/Offshore-Wind/Focus-Areas/NY-Offshore-Wind-Projects>.

<sup>30</sup> Sud, Rayan and Sanjay Patnaik, *How Does Permitting for Clean Energy Infrastructure Work?*, Brookings Institution, September 28, 2022.

<sup>31</sup> NYISO, *Short-Term Assessment of Reliability:2023 Quarter 2*, July 14, 2023, available at <https://www.nyiso.com/documents/20142/16004172/2023-Q2-STAR-Report-Final.pdf/5671e9f7-e996-653a-6a0e-9e12d2e41740?>

<sup>32</sup> See Wiseman, Hannah, *Balancing Renewable Energy Goals with Community Interests*. Kleinman Center for Energy Policy, University of Pennsylvania. May 2020. See also New York League of Conservation Voters Education Fund, *Breaking Down the Barriers to Siting Renewable Energy in New York State*, 2019.

<sup>33</sup> New York League of Conservation Voters Education Fund, *Breaking Down the Barriers to Siting Renewable Energy in New York State*, 2019.

<sup>34</sup> See: Office of Renewable Energy, "Siting Permit Applications," accessed May 30, 2023, available at <https://ores.ny.gov/permit-applications>.

<sup>35</sup> Rand, Joseph, et. al. *Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection*, Lawrence Berkeley National Laboratory, April 2022, available at <https://emp.lbl.gov/queues>.

<sup>36</sup> Ibid.

<sup>37</sup> NYISO, *The NYISO Interconnection Process: Maintaining Reliability for a Grid in Transition*, January 2023, available at: <https://www.nyiso.com/documents/20142/35688159/2023-NYISO-Interconnection-Process-Report.pdf>.

<sup>38</sup> Rand, Joseph, et. al. *Queued Up: Characteristics of Power Plants Seeking Transmission Interconnection*, Lawrence Berkeley National Laboratory, April 2022, available at <https://emp.lbl.gov/queues>.

<sup>39</sup> The new capacity completing the interconnection process in 2023 is close to half of the additional renewable capacity identified by the NYISO as needed to meet the 2030 CLCPA renewable energy goal.

<sup>40</sup> NYISO, 2021-2040 op. cit.

<sup>41</sup> PSC, *Initial Report on the New York Power Grid Study*, January 19, 2021.

<sup>42</sup> Examples include: Clean Energy Standard Zero Emission Certificates - \$2.0 billion; Renewable Portfolio Standard - \$1.7 billion; Energy Efficiency Portfolio Standard – \$910.3 million; System Benefits Charge - \$902.6 million; Market Development, Innovation and Research - \$763.7 million; NY-Sun - \$418.1 million; Clean Energy Standard Renewable Energy Certificates - \$26.1 million; and New York Green Bank - \$2.3 million. These figures were derived from NYSERDA budgets filed as required by Part 203 of New York Codes Rules and Regulations.

<sup>43</sup> PSC, *Order Approving Contracts for the Purchase of Tier 4 Renewable Energy Certificates*. Case 15-E-0302, April 14, 2022.

<sup>44</sup> PSC, *Order Approving Phase 2 Areas of Concern Transmission Upgrades*, Case 20-E-0197, February 16, 2023. This Order followed an earlier Order directing utilities to propose “phase 1” projects, or those that are necessary to maintain safety and/or reliability, but also facilitate the deliverability of renewable energy. The “phase 2” projects are those solely needed to support new renewable generation sources. The PSC has approved investments in “phase 1” projects in NYSEG and National Grid service territories.

<sup>45</sup> According to the EIA, during March 2023, the average electric rate in New York State was the tenth highest in the US. See: EIA, State Energy Profile Data, [https://www.eia.gov/state/seds/data.php?infile=/state/seds/sep\\_sum/html/rank\\_pr\\_cl\\_es.html&sid=US](https://www.eia.gov/state/seds/data.php?infile=/state/seds/sep_sum/html/rank_pr_cl_es.html&sid=US).

<sup>46</sup> Research has identified mechanisms to promote more equitable approaches to funding clean energy incentives and improvements to the grid, including carbon taxes, charges based on income, energy bill rebates and focusing program incentives on lower income households. See: Borenstein, Severin, et. al. *Designing Electricity Rates for An Equitable Energy Transition*, Energy Institute at Haas, White Paper 314, February 2021; Mastopietro, Paolo, *Who Should Pay to Support Renewable Electricity? Exploring Regressive Impacts, Energy Poverty and Tariff Equity*, Energy Research and Social Science No. 56 (2019); and Sunderland, Louise, et. al. *Equity in the Energy Transition. Who Benefits and Who Pays*, Regulatory Assistance Project, May 2020.

<sup>47</sup> PSC, *Order Approving Expanded Solar for All Program with Modifications*, Case 19-E-0735, January 20, 2022.

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