Renewable Energy Standard Program Impact Evaluation and Clean Energy Standard Triennial Review

Final Report

Prepared for:

New York State Energy Research and Development Authority

Albany, New York

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June 2020

NYSERDA Record of Revision

Document Title
Renewable Energy Standard Program Impact Evaluation and Clean Energy Standard Triennial Review June 2020

Revision Date	Description of Changes	Revision on Page(s)

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Summary

S.1 Background

The 2015 State Energy Plan sets a renewable energy goal of 50 percent by 2030. The Clean Energy Standard (CES) converts this goal into mandated requirements. Subsequently, the Climate Leadership and Community Protection Act (CLCPA) mandated 70 percent renewable energy by 2030 and 100 percent carbon neutrality by 2040.

This report includes the *RES Program Impact Evaluation* and the *CES Triennial Review* in fulfillment of the CES reporting requirements outlined in the CES Implementation Plans. It provides an analytical review of Renewable Energy Standard (RES) activities to date and the resulting progress towards CES goals. The *RES Program Impact Evaluation Report* is primarily concerned with the results of the RES program, and the *CES Triennial Review* considers those results in the context of policy and design choices.

S.2 Key Findings: RES Program Impact Evaluation

S.2.1 RES Program Results

The renewable energy development pipeline in New York is robust, and RES procurements have been competitive to date. The quantity of Tier 1 RECs procured through RES has dramatically exceeded Tier 1 RES procurement targets. In three years, the RES has resulted in contracts for twice the amount of new renewable capacity supported through ten years of RPS procurement. In total, NYSERDA has made contract awards for 218% of its procurement targets across its three RES request for proposals (RFPs) to date. Projects are taking longer than expected to reach commercial operation, however, and RES Tier 1 RECs delivered to NYSERDA are lagging Tier 1 obligation targets. The recent adoption of the *Accelerated Renewable Energy Growth and Community Benefit Act,* which establishes a new

permitting program for large-scale renewable energy projects under the Department of State, is intended to mitigate the length to time required to reach permitting decisions.[1]

While Tier 1 REC prices contracted through RES RFPs were initially higher than those contracted through the Renewable Portfolio Standard (RPS), the weighted average cost of all NYSERDA-contracted Tier 1 RECs is expected to decline from $22 in 2019 to approximately $20 by 2023. Finally, while NYSERDA has and will continue to play a key role in generating Tier 1 REC supply, market RECs (those not accounted for by exports, NYSERDA contracts, or VDER resources) have been a material source of supply towards the RES obligations – making up approximately 32% of 2017 Tier 1 REC supply and 45% percent of 2018 Tier 1 REC supply used by LSEs for Tier 1 compliance.

S.3 RES Economic Impacts

Based on an extrapolation of 3-year economic benefit claims submitted with project bids, RES Tier 1 projects under contract with NYSERDA are expected to produce $2.21 billion in New York State benefits over the 20-year contract duration. Solar and wind benefits comprise approximately 70% and 30% of this value, respectively. The three RES procurements conducted to date are expected to result in projects that create at least 6,716 short-term jobs and 117 long-term full-time equivalent (FTE) jobs. Long-term job benefits are expected to total $9 million per year. Payments to NYS and Municipalities are estimated at $656 million, payments for Resource Access are estimated at $673 million, and the value of Local Sourcing of Goods and Services is estimated at $699 million.

S.3.1 Contribution to Greenhouse Gas Emissions Reductions

If all Tier 1 resources under contract to NYSERDA reach commercial operation, total greenhouse gas reductions are estimated to be approximately 5 million metric tons by 2030.

[1] New York State Assembly/Senate. (2020, January 22). State of New York A. 9508/S. 7508 Accelerated Renewable Energy Growth and Community Benefit Act. Retrieved from https://nyassembly.gov/2020budget/2020budget/A9508b.pdf

S.3.2 Evaluation of RES Program's Progress toward RES and CES Goals

Tables S-1 and S-2 summarize the progress of the RES program towards the achievement of the RES and CES goals. Evaluation metrics and results are shown for each goal and discussed from multiple stakeholder perspectives.

Table S-1. Summary of RES Contributions to State Clean Energy Goals

Goal	*Metrics* & Measures of Success	Conclusion from relevant perspectives
Increase renewable energy production consumed in New York State	***Total renewable energy consumed in New York State***. Total renewable energy went from 25.9% in 2014 to 26.8% in 2018	Policymakers: modest progress to date towards achieving the state's renewable energy goals, but an accelerated upward trend is necessary to meet those goals.
	New renewable energy production consumed in New York State. Total Tier 1 RECs consumed for all purposes in New York was 232% of LSE obligations in 2017 and 75% of 2018 obligations. LSEs opted to utilize ACPs to meet 24% of 2017 obligations and 52% of 2018 obligations.	Policymakers: The pace of new renewable energy growth thus far has not met policymakers' expectations. Ratepayers: LSEs used ACPs in 2017 for administrative ease rather than by necessity (i.e. there was not a REC shortage). In 2018, however, shortfalls in REC availability relative to Tier 1 targets results in a reliance by LSEs on ACPs for a material portion of compliance. Developers: The level of contracted supply reaching commercial operation to date has not met the goals of renewable energy developers, owners, and investors.
	Baseline renewable energy production consumed in New York State. Total Non-Tier 1 generation increased from 2014 to 2018 by 0.9% of load. Of that total, hydroelectric and non-Tier 1 solar production increased by almost 2.2 TWh. Baseline wind, biomass, and biogas consumption in New York decreased by 1.15 TWh due to changes in production and exports. Exports of baseline wind, biogas and non-NYPA hydroelectric totaled 1.67 TWh in 2018.	Policymakers: Supply from wind, biomass and biogas in the baseline has fallen by 1.15 TWh since 2014. If not ultimately retained, these quantities will need to be made up by additional new renewables to meet CES and CLCPA targets. Ratepayers: If the cost of replacing baseline renewables with new renewables exceeds the cost to retain baseline renewables in New York, costs could increase due to a loss of baseline resources, Owners of baseline renewable generation: Owners of baseline wind, biogas and non-NYPA hydro resources exported approximately 0.5 TWh more of New York baseline RECs in 2018 than in 2014, presumably to access higher priced markets.

Table S-2. Summary of RES Contributions to State Clean Energy Goals (continued)

Increase Renewable Energy Development	***Investment by renewable energy developers in the NY development pipeline.*** The number of Article 10 cases initiated and projects entering the NYISO interconnection queue increased materially since 2015. Developer response to RESRFPs has been robust. Developer market entry shows material and increasing interest in New York and investment in New York development activities, from companies with diverse focus, scope, experience, and capitalization.	Policymakers: Revisions to the RES procurements and program have successfully increased developer activity and investment in the development pipeline. Developers: Dependable annual procurements have led to significant market interest. Developer activity since the announcement of the 50% by 2030 target in 2015 indicate that the RES program has been successful in stimulating investment and interest.
	Increasing successful renewable energy procurement. RES procurements have led to a large and increasing number of renewable energy projects with contracts, which far exceeds those achieved under the RPS. Although NYSERDA has experienced only modest contract attrition to date, projects are taking significantly longer to develop than expected.	Policymakers: NYSERDA's procurements have been successful at generating contracts with projects that would produce RECs to meet or exceed targets; however, projects are taking significantly longer to reach commercial operation than expected. Developers: Highly competitive bids submitted to NYSERDA procurements suggest optimism in the market, but delays in projects reaching commercial operation indicate challenges that must be addressed to be fully successful.
Reduce greenhouse gas emissions towards state goals	***Estimated emission reductions from RES-contracted resources***. RES-contracted resources are expected to contribute approximately 5 million metric tons of GHG emission reductions towards the SEP and CLCPA goal of reducing emissions 40% below 1990 levels by 2030.	Policymakers: Reductions from previously contracted resources indicate that the RES is making progress towards the state's emission goals, but 1 to over 2 years behind the pace initial envisioned in the CES August 2016 Order.
Stimulate economic benefits and job creation in New York	***Total economic benefits and jobs generated from RES-contracted resources***. Based on a 20-year extrapolation of 3-year economic benefit claims submitted with project bids, contracted resources will generate ~$2.2 billion in direct investment in New York State. RES resources will generate 117 long-term jobs and 3,671 short term FTEs.	Ratepayers and Policymakers: The RES is stimulating material direct economic impacts, at a level of approximately two thirds of the state's direct investment, while creating short-term and long-term jobs.
Minimize ratepayer costs by meeting RES, CES, and CLCPA targets in a cost-effective manner	***Declining REC Prices.*** REC prices dropped from a weighted average of $21.71 in RESRFP17-1 to $18.59 in RESRFP19-1, despite falling federal tax incentives. ***Estimated LSE compliance costs***. Estimated LSE compliance costs have been higher than the costs of complying completely with RECs purchased from NYSERDA by 3% in 2017 and 7% in 2018. LSEs have paid almost $200,000 more for RECs than NYSERDA's costs of purchasing those RECs.	Ratepayers, Policymakers and LSEs: The lag in contracted supply resulted in a reliance on ACPs in 2018 and has resulted in LSEs complying at a higher cost than actually incurred by NYSERDA in purchasing RECs.

S.3.3 Comparison of Other States' Programs to New York's RES Approach

A review of programs and policies in New England and PJM reveals several important findings about the range of RPS and procurement policy design choices and their implications.

- As RPS markets mature, increases to annual and final RPS targets are common, as states compare their own goals to their neighbors.'
- Eligibility criteria are a powerful tool with the potential to dramatically impact market supply, demand, and price dynamics.
- Carveouts and dedicated tiers are an effective way for policymakers to isolate and provide benefits to specific resources or technologies, including solar and offshore wind.
- A degree of uniformity among states would help to minimize arbitrage between Tier 1 markets.

S.4 Impact of Voluntary Markets on Policy Goals and Targets

The Commission and NYSERDA are actively trying to stimulate voluntary demand to both retain and support continued operation of in-state legacy renewables, and to stimulate additional demand for new renewables. For example, NYSERDA's Clean Energy Communities program encourages municipalities to join Community Choice Aggregations (CCAs) with a 100% renewable energy supply mix and the Commission has ordered the offering of a renewable supply option by ESCOs serving mass markets as one of three alternative conditions of qualification. Going forward, voluntary demand will be impacted primarily by interest from large institutions and growth in CCAs. Finally, potential approval by the Commission of a program for competitive procurement of Tier 2 resources may offer another outlet for some legacy supply.

S.5 Key Findings: CES Triennial Review

S.5.1 Procurement Structure

In aggregate, active Tier 1 contracts in New York create annual REC commitments larger than any of the other individual states reviewed for this analysis. On a control area basis, New York's Tier 1 procurement volume to date is approximately 85% of New England's total procurement quantities since 2005. In addition, the frequency and predictability of solicitations in New York is more favorable for developers and investors. Therefore, New York can be expected to attract more consistent bidder interest than the New England states in the future. On a portfolio-wide basis, NYSERDA's expected weighted average REC costs appear less than imputed REC premiums associated with a sample of New England EDC

contracts with operating projects. The contract structure and degree of hedging differs between the markets, however, which prevents a direct and reliable comparison on a $/MWh basis.

S.5.2 Adequacy of Resources

Leading indicators of resource adequacy include the NYISO interconnection queue and Article 10 applications. While the ultimate success rate of proposed projects is unknown, the quantities revealed herein are nonetheless informative and indicative of the potential adequacy of resources. The scale of the Tier 1 development pipeline is material relative to the scale of the increments necessary to reach CES and CLCPA 2030 targets.

S.5.3 Assessment of Legacy Supply Retention

The 'CES Renewable Energy Baseline' is the quantity of generation associated with renewable energy facilities with a commercial operation date prior to January 2015. This supply totaled 41,296 GWh and constituted 25.9% of the 2014 EDP Statewide Fuel Mix.[2] Falling commodity market revenues in NYISO create a risk that legacy renewable generators may not be able to cover their costs. These facilities have options to export to neighboring RPS compliance markets and will do so if the REC revenue opportunity is greater than New York's voluntary market, and if basis risk can be effectively mitigated. Exports of legacy supply have increased since 2014 by about 0.5 TWh, and unless reversed would need to be made up from incremental sources of supply in order to achieve RES targets. In addition, NYSERDA has proposed a program for the competitive procurement of legacy Tier 2 supply, coupled with a matching LSE obligation.[3] The program has the potential to retain some portion of the legacy supply between 2021 and 2025.

S.5.4 NYSERDA Tier 1 REC Resales

NYSERDA's Tier 1 REC resales approach has been effective in conveying NYSERDA-procured RECs to LSEs and controlling ratepayer costs. NYSERDA's Tier 1 REC resales price sets the 'price to beat' in the Tier 1 REC spot market in years in which NYSERDA may have a surplus of Tier 1 RECs. In 2018,

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2 New York State Energy Research and Development Authority. (2019, December). Clean Energy Standard Annual Progress Report: 2018 Compliance Year. ("2018 CES Progress Report").

3 New York State Energy Research and Development Authority. (2020, January 24). Case 15-E-0302, Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard, Petition Regarding Clean Energy Standard: Competitive Tier 2 Program for Baseline Renewable Generation. ("NYSERDA Competitive Tier 2 Petition").

however, the volume of Tier 1 RECs offered for resale was less than the Tier 1 target and less than initial estimates. As a result, NYSERDA has been able to sell most Tier 1 RECs in the year of production, has carried forward only a small bank balance to date, and has avoided having any Tier 1 RECs expire before resale.

S.5.5 Alternative Compliance Payments

New York's Tier 1 ACP is set one year at time – at 110% of the NYSERDA's prospectively estimated Tier 1 REC resale price. The approach to setting the ACP level adopted by the Commission and implemented by NYSERDA is mostly working as intended. Relative to the much higher ACP levels in other northeastern states, the 10% margin of ACP above the NYSERDA REC resale price may not incentivize LSE procurement of RECs to meet current demands and may not encourage market participants to procure market-driven supply outside of NYSERDA procurement. For these reasons, the level of LSE reliance on ACP might not always be as true a measure of REC shortage as for other states.

S.5.6 Use of Banking and Assessment of Banking Rules

New York's approach to banking of RES Tier 1 RECs by competitive LSEs, IOUs, and NYSERDA has provided LSEs with a degree of compliance flexibility and NYSERDA with a means to dispose of RECs that it is unable to resell in the year they were produced. Some LSEs have banked Tier 1 RECs even in the presence of supply shortfalls. This trend suggests that some LSEs are using banking for compliance flexibility to manage their exposure. Even so, LSE banking may be suppressed by the fact that the ACP prevents REC prices from increasing materially above their cost. It is premature to conclude whether Tier 1 REC price fluctuations have been dampened by banking, as the spot Tier 1 REC market is still immature.

1 Introduction

This report was prepared by Sustainable Energy Advantage, LLC (SEA) for the New York State Energy Research and Development Authority (NYSERDA). It includes the *RES Program Impact Evaluation Report* and the *CES Triennial Review Report*, both of which are required by New York State's Clean Energy Standard (CES) program. This combined report provides an analytical view of the New York renewable energy market and the achievements to date of the Renewable Energy Standard (RES) program and the CES towards meeting the state's clean energy goals.

1.1 Background

The 2015 State Energy Plan (SEP) states that 50 percent of all electricity used in New York State by 2030 should be generated from renewable energy sources (the 50 by 30 goal). In December 2015, Governor Andrew Cuomo requested the develop a Clean Energy Standard (CES) that converts the SEP targets to mandated requirements. On August 1, 2016, the Public Service Commission (Commission) issued an *Order Adopting a Clean Energy Standard* (CES Order),[4] authorizing NYSERDA as the Central Administrator of the RES program. Pursuant to this order the Final Phase 1, the Final Phase 2, and the Final Phase 3 Implementation Plans[5] were filed on March 24, 2017, December 18, 2017 and January 2019 respectively. On July 18, 2019, Governor Cuomo signed the Climate Leadership and Community Protection Act (CLCPA), which adopted the most ambitious and comprehensive climate and energy legislation in the country.[6] The CLCPA mandates that at least 70 percent of New York's electricity come from renewable energy sources by 2030 and that the state's power system is 100 percent zero emission by 2040.

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4 New York State Public Service Commission. (2016, August 1). Case 15-E-0302, Proceeding to Implement a Large-Scale Renewable Program and a Clean Energy Standard, Order Adopting a Clean Energy Standard. *("CES Order")*.

5 New York State Energy Research and Development Authority and New York State Department of Public Service. (2017, March 24). Case 15-E-0302, Clean Energy Standard Final Phase 1 Implementation Plan. *("Phase 1 Implementation Plan")*; New York State Energy Research and Development Authority and New York State Department of Public Service. (2017, December 18). Case 15-E-0302, Clean Energy Standard Final Phase 2 Implementation Plan. *("Phase 2 Implementation Plan")*; New York State Energy Research and Development Authority and New York State Department of Public Service. (2019, January 11). Case 15-E-0302, Clean Energy Standard Final Phase 3 Implementation Plan. *("Phase 3 Implementation Plan")*

6 New York State Assembly/Senate. (2019, June 8). State of New York A. 8429/S. 6599, Climate Leadership and Community Protection Act. Albany, NY, USA. Retrieved from https://legislation.nysenate.gov/pdf/bills/2019/S6599 (*"Climate Leadership and Community Protection Act"*)

1.2 Purpose

The Phase 1 Implementation Plan outlined a set of reporting requirements for the CES. The Phase 3 Implementation Plan adjusted these requirements, detailed the need and criteria for a Triennial Review, and provided additional guidance on RES and CES reporting in general. In particular, the Implementation Plan requires a *RES Program Impact Evaluation Report* and a *CES Triennial Review*. NYSERDA's programmatic reporting requirements – and associated timing – are summarized in the Phase 3 Implementation Plan. [7] NYSERDA uses OpenNY – the state's data warehousing and analysis tool – to support fulfillment of these reporting requirements.[8] The purpose of this Report is to provide NYSERDA with an analytical review of the New York market and deliver a Report to fulfill the requirements of the *RES Program Impact Evaluation Report* and a *CES Triennial Review*.

1.3 Scope

This report includes the necessary items to fulfill the reporting requirements of the *RES Impact and Evaluation Report* and the *CES Triennial Review*. As directed by the Phase 3 Implementation Plan,[9] the Triennial Review report will not include a review of the Zero Emissions Credit (ZEC) program.

This report considers two different perspectives towards accomplishing state goals. The *RES Program Impact Evaluation Report* primarily focuses on NYSERDA procurements and the activities of jurisdictional load serving entities (LSEs) to comply with RES obligations. The statewide portfolio perspective, including the renewable energy purchases by the New York Power Authority (NYPA) and the Long Island Power Authority (LIPA), and voluntary renewable energy purchases, is also considered in the Triennial Review and throughout both reports.

This report reviews and provides observations on the past activities, results, and data resulting from the RES program to date, as a "look back". It does not make predictions of future impacts and does not make recommendations for program changes. It is intended as a basis from which NYSERDA, together with the

7 Phase 3 Implementation Plan, p. 20

8 https://data.ny.gov/

9 Phase 3 Implementation Plan, p. 15

DPS Staff, may draw conclusions and make policy recommendations as necessary to meet the state's renewable energy goals.

This report relied on data available and analysis completed through early March 2019, before the impact of the COVID-19 pandemic was apparent. The effect of the pandemic may impact future expectations (such as load forecasts, future production, and associated economic benefits from contracted projects) incorporated herein.

All values presented in this report are in nominal dollars.

1.4 Organization of this Report

This report is comprised of two distinct sections – one to address the requirements of the *RES Program Impact Evaluation Report* and a second to address the *CES Triennial Review*.

The *RES Program Impact Evaluation Report* assesses the RES program's impacts and success to date, including an evaluation of the program's economic impacts, contribution to greenhouse gas emission reductions, and progress towards achieving the state's clean energy goals. It considers these achievements in comparison to similar programs in other states and examines how voluntary purchases of renewable energy impact the RES program and its progress towards achieving the state's clean energy goals.

The *CES Triennial Review*, as directed in the Phase 3 Implementation Plan, evaluates the efficacy of the CES and assesses the potential need for programmatic changes to obtain the State's renewable energy goals at an appropriate cost to consumers. It considers the results of the most recent divergence test, and an assessment of the trends and insights revealed by those results. It provides an assessment of the individual components of the CES program design, excluding the ZEC requirement.

The *RES Program Impact Evaluation Report* is primarily concerned with the results of the RES program, and the *CES Triennial Review* considers those results in the context of policy and design choices that impact those results. The requirements of the two reports have significant areas of overlap, as RES program results feed into the Triennial Review, and the Triennial Review examines in greater detail factors that contribute to the RES outcomes. This report aims to minimize duplication while satisfying mandatory reporting requirements.

Part I: RES Program Impact Evaluation

2 RES Program Results

The Renewable Energy Standard (RES) is a component of the New York Clean Energy Standard (CES), which was adopted by the Commission in 2016. The RES is the successor program to the Renewable Portfolio Standard (RPS) Main Tier (with offshore wind procurements and distributed solar programs) and has been the primary policy tool to achieve the State's renewable energy goals.[10] The RES is composed of procurement activities conducted by NYSERDA as a central procurement administrator, and the RES Tier 1 obligation placed upon New York's jurisdictional[11] load-serving entities (LSEs). This report relies largely on historical data that were settled and finalized through 2018.[12] Therefore, comparisons after 2018 are limited, and are estimated based on information available as of March 2020. In addition, only three rounds of RES procurement have been conducted to date, and none of the projects awarded through those procurements have yet to reach commercial operation. As a result, statistics on impacts presented for those procurements herein are based on expectations subject to stated assumptions. Finally, this report relies largely on historical data, which has been finalized for procurement through 2019; while REC statistics have only been settled and finalized through 2018.

2.1 NYSERDA RES Tier 1 Large-Scale Renewable Procurement Results

Pursuant to the August 2016 CES Order[13] NYSERDA has been charged with procuring renewable energy certificates (RECs) from RES Tier 1 eligible large-scale renewable (LSR) energy generators. This responsibility evolved from NYSERDA's previous central procurement role under the prior RPS

[10] This report refers throughout to the CES 50% by 2030 renewable energy goal and the CLCPA 70% by 2030 renewable energy goal as the state's renewable energy goals.

[11] The Long Island Power Authority and New York Power Authority are not subject to the Commission's authority but have committed to voluntarily meeting the CES and CLCPA long-term targets. Their demand, and activities, are referred to as *non-jurisdictional* throughout this report and are included in totals referred to as *statewide*.

[12] The RES compliance year concluded December 2018. The ZEC compliance year concluded in March of 2019 and final NYISO load data for the ZEC compliance year was received in August 2019. NYSERDA then provides a reasonable amount of time for LSEs to reach compliance based upon the final data. Once the ZEC program compliance has been completed, NYGATS can run the annual settlement.

[13] CES Order

policy. Section 2.1 summarizes NYSERDA's historical procurement activities related to large-scale Tier 1 renewable energy facilities.[14]

NYSERDA is required to conduct at least one LSR procurement for Tier 1 RECs annually. If the procurement target is not reached in the first solicitation, NYSERDA is authorized to conduct a second solicitation in the same calendar year. NYSERDA has conducted three RES solicitations to date: RESRFP17-1, RESRFP18-1, and RESRFP19-1; issued in June 2017 and April 2018 and 2019, respectively, with award selection in the fall of each year. Table 1 summarizes NYSERDA's REC procurement targets, in MWh per year, initially announced in each RES procurement; the degree of market response (quantified as the number of applications received); the quantity of expected RECs per year from selected projects; and the associated number of resulting contracts offered[15] by NYSERDA.

Table 1. Summary of RES Tier 1 Procurement Targets, Bidder Response and Contracts[16]

Procurement Results Summary	RESRFP17-1	RESRFP18-1	RESRFP19-1
Approximate Procurement Target (MWh)	1,500,000	1,500,000	1,500,000
# of Applications Received	88	90	87
Application Capacity (MW) Bid (New Renewable)	3,916	3,982	5,697
# of Proposing Developers	29	23	26
Bid Quantity from Awarded Contracts (MWh)	3,283,737	3,873,087	2,556,513
# of Resulting Contracts	26	20	21
Contracted Capacity (MW) (New Renewable)	1,383	1,654	1,278
Weighted Average Award Price[17]	$21.71	$18.52	$18.59

In addition to NYSERDA's RES procurement, eighteen (18) Tier 1-eligible facilities with on-line dates on or after January 1, 2015 were contracted to sell RECs to NYSERDA through four RPS Main Tier

[14] The CLCPA altered the definition of eligible renewables going forward by omitting fuel-using resources. This section summarizes data based on the CES Order's definition of eligible Tier 1 resources, the definition of which can be found in Appendix A of the CES Order.

[15] Most of these contracts have been executed. Contracts offered but not yet executed are also included in this analysis but are not identified individually due to confidentiality.

[16] Sources: RES Procurement Reports and Bid Documents

[17] As initially announced by NYSERDA (see: NYSERDA Solicitations for Large-scale Renewables web portal); may differ slightly based on contract terminations from other data in this table.

solicitations[18] pre-dating the RES procurements. The actual and expected production of RES Tier 1 eligible RECs from these facilities is also included in this section, under the heading "Tier 1 from RPS."

After projects are awarded and contracted, the developers of these Tier 1 facilities must then obtain required permits and interconnection authorization, secure financing, complete the development and construction process, and enter commercial operations. Most projects begin delivering RECs to NYSERDA upon commercial operation.[19] Each operational Tier 1 eligible generator creates a Tier-1 REC for every Megawatt hour of energy produced. NYSERDA will pay a fixed price for each Tier-1 REC generated by each project for the life of the contract term.

Development pace and schedules vary by project, and success is not guaranteed. Project attrition is a well-understood component of renewable energy market development. Contracts may also be cancelled for reasons other than project failure, such as if a project moves forward under a different program or offtake agreement. The evaluation criteria within NYSERDA's RPS and RES procurement process are intended to mitigate attrition risk, although some contract failure is nonetheless expected. Table 2 summarizes the status of contracted facilities from each solicitation, as of March 2020.

Table 2. Status of Contracted Facilities[20]

# of Facilities	Tier 1 from RPS	RESRFP17-1	RESRFP18-1	RESRFP19-1
Operating	11	0	0	0
Under Development	5	21	19	21
Active Contracts	**16**	**21**	**19**	**21**
Contract Terminations	2	5	0	0
Awarded, not contracted	0	0	1	0[21]
Total Contracts	**18**	**26**	**20**	**21**

[18] RPS Solicitations 2554, 2985, 3084, and 3257. Two of these contracts were subsequently cancelled.

[19] A small subset of awarded Main Tier RPS projects commenced delivery to NYSERDA pursuant to their REC Purchase and Sale Agreements at a later date. In addition, operating facilities are eligible to respond to RES procurements, so that in the future it is possible that the commencement of REC deliveries to NYSERDA may lag a project's commencement of commercial operation.

[20] Sources: RPS Annual Reports, RES Procurement Reports and Bid Documents, and OpenNY. Contract terminations include both (i) project failures and (ii) projects that remain in active development, but whose owners terminated a NYSERDA REC Purchase and Sale Agreement, but subsequently continued their efforts to develop the projects through other means.

[21] The contracting process was not yet complete at the time this Report was completed. For the purpose of this Report, all awards are assumed to be successfully contracted.

Table 3 summarizes the associated annualized production expected to derive from these facilities.

Table 3. Status of Contracted Facilities – Anticipated Annual Bid Quantity[22]

(MWhs)	Tier 1 from RPS	RESRFP17-1	RESRFP18-1	RESRFP19-1
Operating	503,365	0	0	0
Under Development	938,580	3,161,898	2,978,866	2,556,513
Active Contracts	**1,441,945**	**3,161,898**	**2,978,866**	**2,556,513**
Contract Terminations	27,419	121,839	0	0
Awarded, not contracted	0	0	894,221	0[23]
Total Contracts	**1,469,364**	**3,283,737**	**3,873,087**	**2,556,513**

Contract terminations include both (i) projects that fail to advance and (ii) projects that remain in active development, but whose owners have terminated a REC Purchase and Sale Agreement with NYSERDA pursuant to its terms, and subsequently continued their efforts to develop the projects through other means. To date, attrition associated with RPS and RES contracts can be attributed primarily to challenges with the siting, permitting, and interconnection processes. In addition, the Fixed-Price REC price structure used to date under both programs exposes bidders to risks of declining forward prices for unhedged energy and/or capacity revenues, which may impair a project's financial viability at the REC price offered to NYSERDA. In January 2020, the Commission issued an Order allowing for the use of Index REC bids in NYSERDA procurements to address this concern.[24]

The data in this section reflects all contracts that remain in effect as of March 2020 ("active projects"), an "all active contracts" view. Terminated contracts are not included. In addition, the analysis presented herein counts the expected production of all active contracts under the timing assumptions detailed below, thus reflecting an assumption of no further attrition (all active contracts reach fruition). It therefore does not represent a *forecast* of expected production, as it would be unrealistic to assume no further attrition or delays. All active projects are assumed to come online the first of the month following their contractual

22 Sources: RPS Annual Reports, RES Procurement Reports and Bid Documents, and OpenNY.

23 The contracting process was not yet complete at the time this Report was completed. For the purpose of this Report, all awards are assumed to be successfully contracted.

24 New York State Public Service Commission. (2020, January 16). Case 15-E-0302, Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard, Order Modifying Tier 1 Renewable Procurements. ("Index REC Order").

Commercial Operation Milestone Date (COMD) reported as of March 2020.[25] Uncertainty in the actual timing of energy delivery and risk of contract termination remains, however. NYSERDA's Standard Agreement provides developers the flexibility to extend their COMD, by up to two or three years, either by providing additional contract security or demonstrating development progress by providing a fully executed Interconnection Agreement.[26] Developers may exercise the option to extend the COMD at set intervals throughout the development cycle. Therefore, the data presented in this section is valid as of March 2020.

Potential drivers of project delays and attrition include permitting approval delays, interconnection approval delays, availability of investment capital, loss of tax credits, financial viability of the project at the bid price, construction delays (related either to the availability of equipment and skilled labor, weather, or other unforeseen factors), or other project-specific concerns.[27] Actual commercial operation dates (CODs) and historical delivery quantities for operating projects have been applied, where applicable.

Table 4 characterizes expected REC deliveries to NYSERDA from contracted projects either operating or in active development as of March 2020.

25 Additional simplifying assumptions to estimate production in the first year of a contract include: commercial operation year as specified in OpenNY; one twelfth of annual Bid Quantity production in each of month of the year; and an assumed REC production volume estimated by a weighted average REC delivery date of March 1 of the first year of commercial operation applied to all projects for which a project-specific expected start month has not been provided by NYSERDA (which represents, for example, a blend of projects commencing operation at the very end of the prior year, and late in the year specified in OpenNY.).

26 For example, the RESRFP17-1 projects had an initial COMD of November 30, 2019, with the ability to extend the COMD every six months through November 30, 2021.

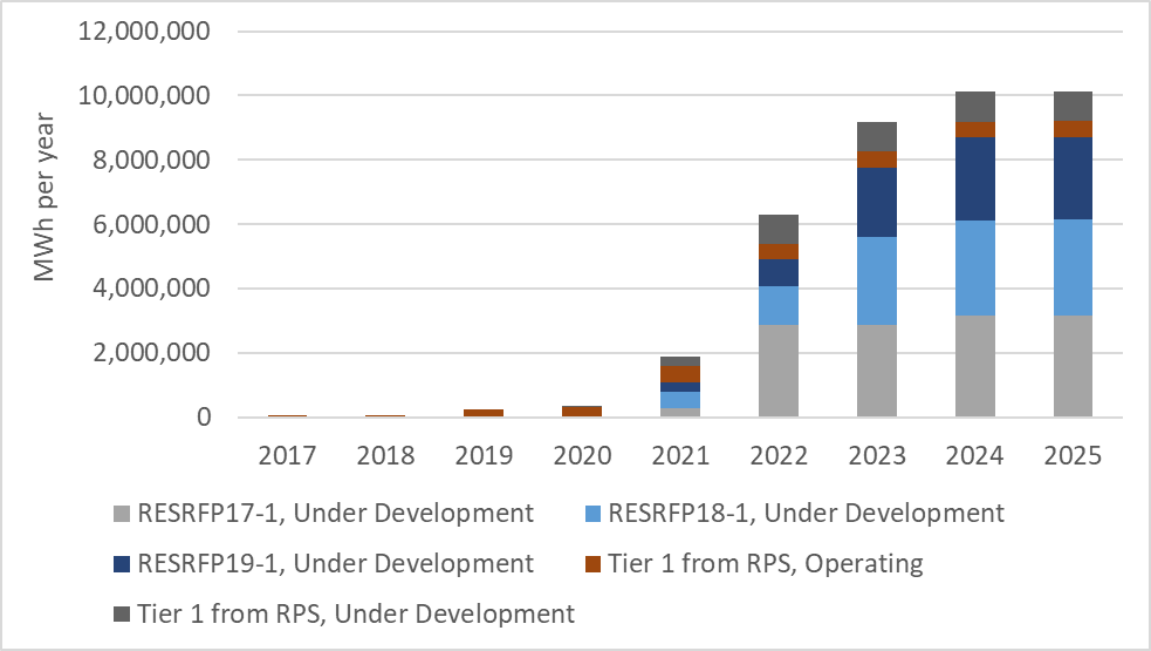
27 NYSERDA regularly requested Progress Reports from developers regarding the status and progress of each project. These reports are provided at set intervals 3/1, 6/1, 9/1, and 12/1 each year while the project is in development. These Progress Reports are intended to describe project successes and challenges and provide NYSERDA with information regarding possible project delays.

Table 4. Overview of NYSERDA-Contracted[28] RES Tier 1 REC Generation by Year

Est. Delivery (GWh/year)	2017	2018	2019	2020	2021	2022	2023	2024	2025
Tier 1 from RPS, Total	42	46	256	317	787	1,389	1,442	1,442	1,442
RESRFPs, Total	0	0	0	17	1,096	4,899	7,752	8,688	8,697
Tier 1 from RPS + RESRFPs	42	46	256	334	1,883	6,288	9,194	10,130	10,139

Figure 1 summarizes the quantity of Tier 1 RECs expected to result from RPS and RESRFP procurements to date. Figure 2 summarizes expected REC quantities by technology. Figure 3 summarizes expected REC quantities by NYISO Zone.

Figure 1. RPS and RES Tier 1 Contracted REC Generation by year, procurement vintage and project status



[28] Contracted, as used here and in similar instances elsewhere in this report, means reflecting currently contracted quantities as of February 20, 2020, and does not reflect any future attrition due to delay, termination or project downsizing.

Figure 2. RPS and RES Tier 1 Contracted REC Generation by year, by technology

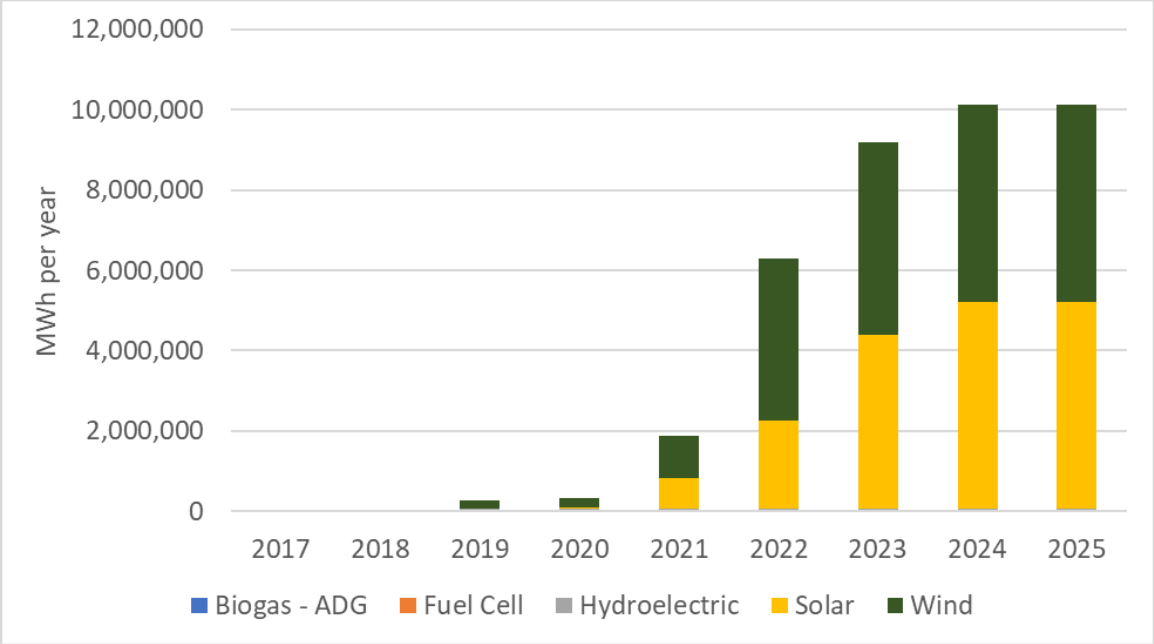
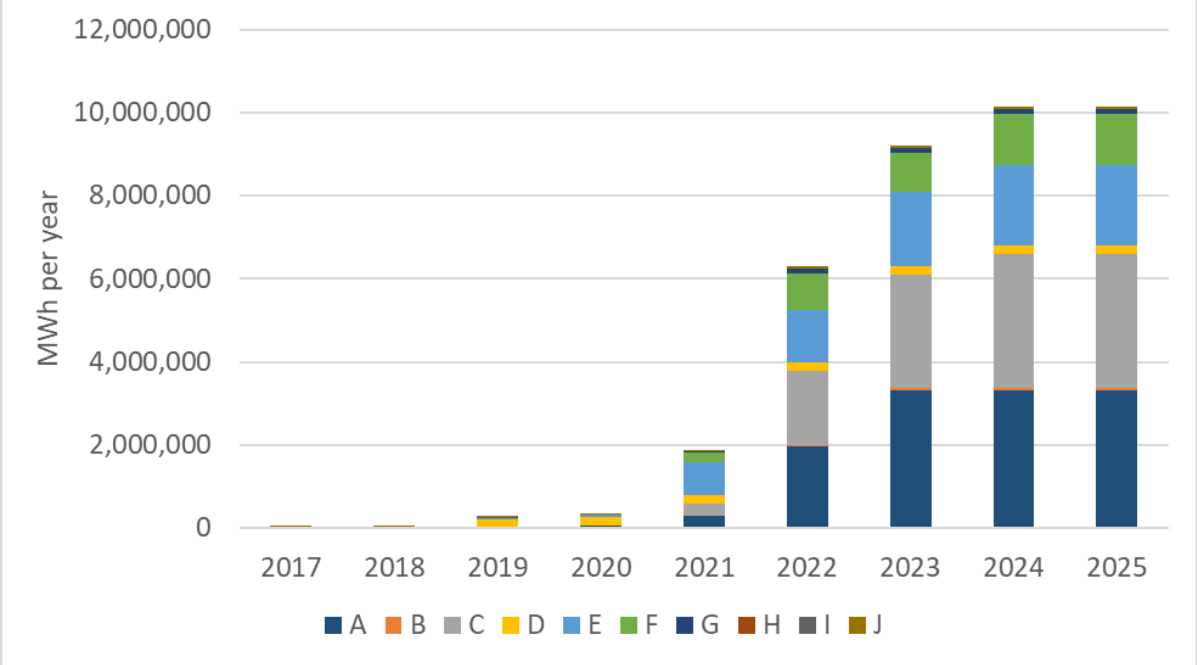


Figure 3. RPS and RES Tier 1 Contracted REC Generation by year, by NYISO Zone



Several projects selected in the first three RESRFPs include co-located storage facilities. These facilities are summarized in Table 5.

Table 5. Co-located RES Tier 1/Energy Storage Facilities

RFP #	Project Name	Energy Storage (MW)	Storage Capacity (MWh)	Est. Delivery Start Date
RESRFP17-1	Bluestone Wind	6.2	6.2	2021
RESRFP18-1	High Bridge Wind and Battery	5	20	2022
RESRFP18-1	Excelsior Energy Center: Solar + Storage 2	20	80	2022
RESRFP19-1	South Ripley Solar and Storage	20	80	2022
RESRFP19-1	Garnet Energy Center Storage 1	20	80	2023

The remaining figures in this section summarize REC prices by procurement group, project status, renewable energy technology, and NYISO zone. Figure 4 summarizes the weighted average REC price expected to result from active projects in each procurement as of March 2020. Figure 5 summarizes weighted average REC price by technology. Figure 6 summarizes weighted average REC price by NYISO Zone.

Figure 4. NYSERDA Tier 1 Contracted REC Price by expected Commercial Operation Year, by procurement vintage

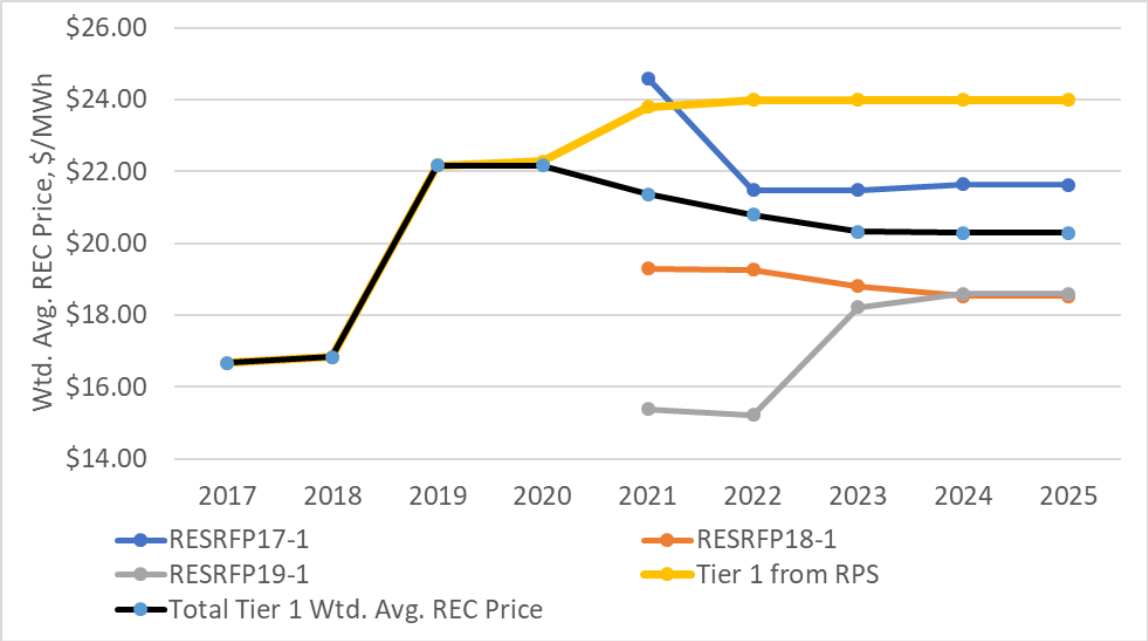


Figure 5. NYSERDA Tier 1 Contracted REC Prices by expected Commercial Operation Year, by technology

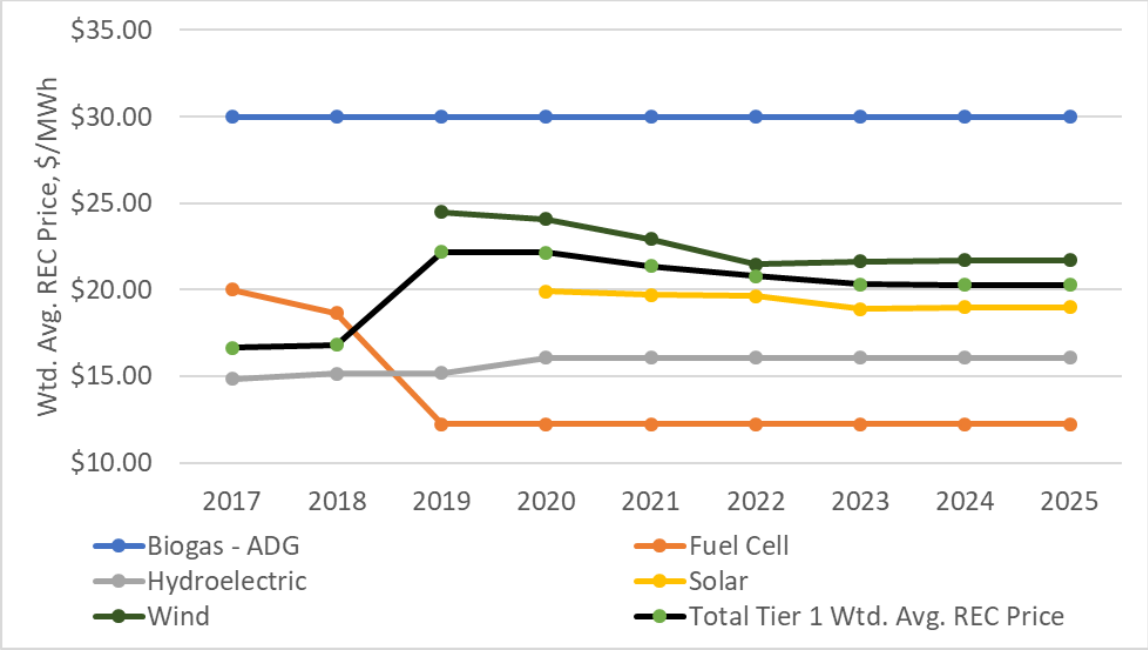
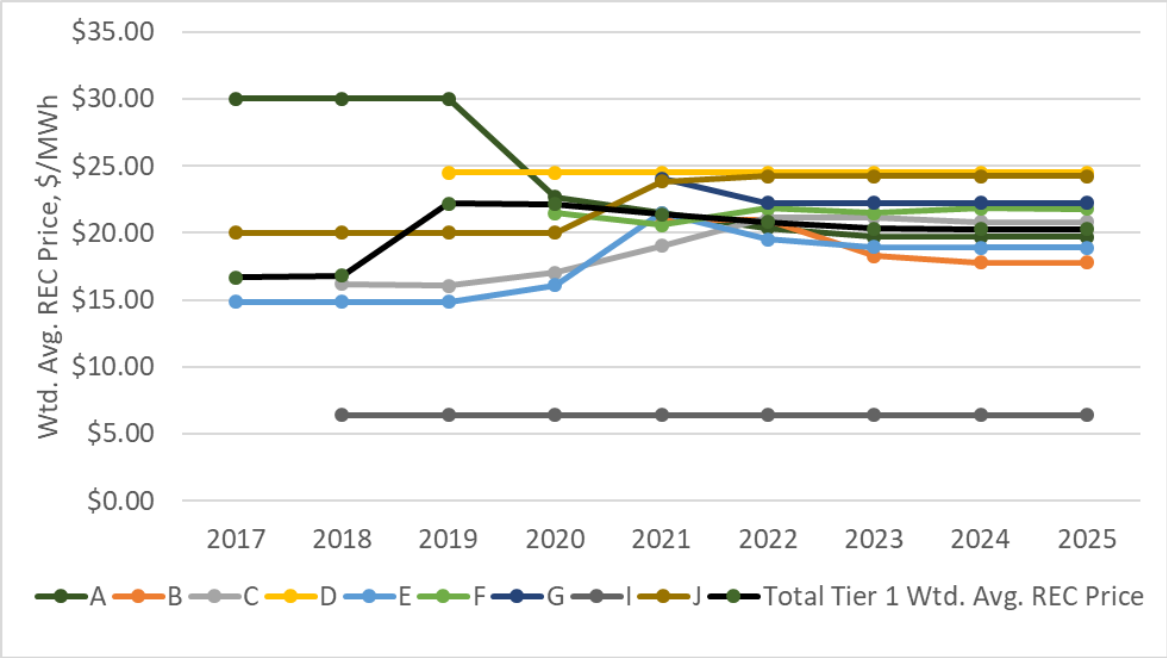


Figure 6. NYSERDA Tier 1 Contracted REC Prices by expected Commercial Operation Year, by location (NYISO Zone)



2.2 Tier 1 Load-Serving Entity Obligations

The Tier 1 RES operates through a demand obligation on LSEs, who must either procure RECs produced by eligible Tier 1 facilities to serve a specified percentage of their load or make up any shortfall through Alternative Compliance Payments (ACPs) to NYSERDA. The LSE obligation, which has been set from 2017 through 2022, is determined based on projections of the sum of (i) expected available volume of Tier 1-eligible RECs under contract to NYSERDA, and (ii) expected Tier-1 eligible RECs conveyed to the investor-owned utilities (IOUs) from the Value of Distributed Energy Resources (VDER) programs, referred to throughout this report as Tier 1-eligible VDER RECs.[29] The Commission's August 2016 CES Order and November 2016 Order Providing Clarification set LSE obligation percentages through 2021,

[29] The obligations originally set in the CES Order were based on projections of Tier 1 eligible RECs under contract to NYSERDA through its RPS and RES procurements, and did not account for VDER RECs, as the CES Order preceded the Commission's March 2017 Order establishing the VDER program and outlining the Tier 1 eligibility of VDER RECs. The Phase 2 Implementation Plan updated the LSE obligations to include a projection of Tier 1-eligible VDER supply, as well as lags in the commercial operation of contracted large-scale renewables projects.

and directed DPS Staff and NYSERDA to set the LSE obligation on a three year rolling trajectory for subsequent years. DPS Staff and NYSERDA set the 2022 obligation in the 2019 Divergence Test.

The August 2016 CES Order and three subsequent Implementation Plans outlined the methodology that DPS Staff and NYSERDA followed to establish the LSE obligation percentages, which required: (1) estimating the number of Tier 1 RECs that will be generated in the compliance year from projects under RPS Main Tier contracts, RES contracts, and VDER tariffs; and (2) dividing the total available RECs by forecasted aggregate jurisdictional load.

The result is an annual percentage target applicable to the actual wholesale load[30] of each LSE. Specifically, the Phase 2 Implementation Plan states that the "*LSE mandated obligations will apply to actual load supplied through transactions with the New York Independent System Operator and certain load-modifier facilities, which includes facilities receiving Tier 1 RECs under VDER*." The Tier 1 RES annual LSE Obligation targets determine annual demand for Tier 1 RECs as outlined in Table 6 – which shows both jurisdictional and statewide Tier 1 REC targets.

Table 6. Jurisdictional & Statewide Tier 1 REC Demand

Year	LSE Obligation[31]	Actual or Projected Jurisdictional Load[32]	Jurisdictional Tier 1 REC target[33]	Actual or Projected Statewide Load	Statewide Tier 1 REC target
2017	0.035%	115,966,979	40,582	153,162,582	53,601
2018	0.150%	119,636,259	179,377	157,768,468	236,574
2019	0.780%	*116,274,000*	906,937	*158,497,000*	1,236,277
2020	2.840%	*116,026,000*	3,295,138	*158,158,000*	4,491,687
2021	4.200%	*114,861,000*	4,824,162	*156,571,000*	6,575,982
2022	8.400%	*112,260,500*	9,429,882	*153,024,836*	12,854,086

30 Corresponding to retail sales plus delivery losses.

31 Phase 2 Implementation Plan, New York State Public Service Commission. (2016, November 17). Case 15-E-0302, Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard, Order Providing Clarification. *("November 2016 CES Order Providing Clarification")*.

32 Load represents actual load for 2017 and 2018 and is sourced from CES Progress Reports and NYSERDA data. *2019-2021 is predicted load* sourced from the Phase 2 Implementation Plan. 2022 is statewide projected load provided by NYSERDA, proportioned to jurisdictional load based on the same proportional shares of jurisdictional, LIPA, and NYPA load in the Phase 2 Implementation Plan.

33 2017 value as provided by NYSERDA; 2018 value per CES 2018 Progress Report. Subsequent years equal the product of LSE obligation and load.

While the Tier 1 RES obligation only applies to LSEs under the jurisdiction of the Commission, LIPA and NYPA have stated that they will aim to meet the CES goals, in proportion to their load served. LIPA has indicated that it is on track to meet its share of the state targets through 2019 via distributed solar supported by a LIPA feed-in-tariff and past renewable procurements, and plans to meet future targets through a combination of those same resources plus its procurement of the South Fork Offshore Wind project.[34] LIPA met its full CES "obligation" in 2017 and 2018 by retiring Tier 1 RECs. NYPA did not retire any Tier 1 RECs towards its "obligation" in 2018 but has indicated its plans to meet the ultimate 2030 targets at its own pace. NYPA has contracted with the 290 MW Canisteo Wind project as a result of its 2017 large scale renewables RFP and expects to issue additional large-scale renewables procurements in the future. The 2018 CES Progress Report notes that NYPA is collaborating closely with its customers to achieve the CES goals in ways that best meet their varying needs. As customer contracts are renewed, NYPA is including provisions to allow for recovery of costs associated with the CES and expects that the vast majority of customer contracts will include CES provisions by 2021.[35]

2.3 RES Supply and Demand

2.3.1 NYSERDA-Procured Tier 1 RECs

Though LSE Obligations are set based on expectations of the available supply of Tier 1 RECs, actual supply will differ based on a range of factors. The LSE Obligations through 2021 were revised in the Phase 2 Implementation Plan Proposal, filed in May 2017. The 2019 Divergence Test included an assessment of future available supply and set the 2022 LSE Obligation target. As discussed further in Sections 11.2 and 12.4, the 2019 Divergence Test found that a potentially problematic undersupply of RECs was present, but concluded that no corrective action was needed before the Triennial Review. A year later, this report (in Table 7 and Figure 7) provides an assessment of expected Tier 1 REC supply, based on known sources, in comparison with LSE Obligations (demand).

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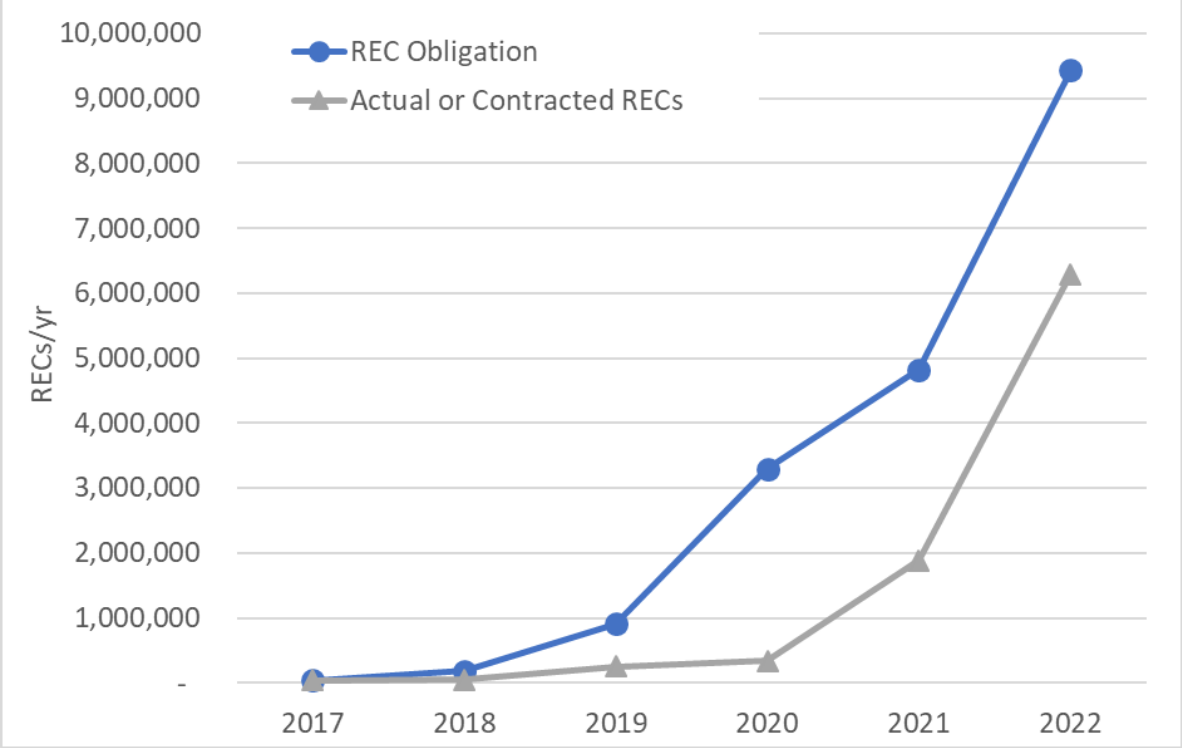
34 PSEG-Long Island. (2019, July 24). Annual Report to LIPA Board of Trustees on Resource Planning, Energy Efficiency, and Renewable Energy. Retrieved from https://www.lipower.org/wp-content/uploads/2019/07/Annual-Report-Resource-Planning-Policy.pdf

35 New York State Energy Research and Development Authority. (2019, December). Clean Energy Standard Annual Progress Report: 2018 Compliance Year. *("2018 CES Progress Report")*, p 7-8

Table 7. Jurisdictional LSE Obligations Compared to Actual or Contracted REC Supply[36]

	2017	2018	2019	2020	2021	2022
Tier 1 REC Obligation (%)	0.035%	0.150%	0.780%	2.840%	4.200%	8.400%
Tier 1 REC Obligation (MWh)	40,582	179,377	906,937	*3,295,138*	*4,824,162*	9,429,882
Actual or NYSERDA-*Contracted* Tier 1 REC Quantity (MWh)[37]	41,891	46,156	256,001	*333,453*	*1,883,015*	6,288,279

Figure 7. NYSERDA Contracted Tier 1 RECs versus Tier 1 REC Obligation



As shown in Table 7 and Figure 7, there is a shortfall of REC supply compared to mandated REC demand increases over time, resulting in supply lagging 1 to 2 years behind initial projections. This result is notable in light of the demonstration (in Table 1) that NYSERDA has contracted for RECs in quantities significantly exceeding procurement.

[36] Actual REC targets for 2017 and 2018 sourced from NYSERDA data and the 2018 CES Progress Report, respectively. 2019-2022 REC targets are calculated as obligation times predicted jurisdictional load (2019-2021 from Phase 2 Implementation plan, 2022 as derived from NYSERDA data as described in Footnote 29).

[37] As derived for this report.

2.3.2 VDER Tier 1 RECs

The second key component of RES Tier 1 supply is RECs conveyed to Investor-Owned Utilities (IOUs) from eligible behind-the-meter and distributed energy resources. Under the state's VDER program, projects receiving compensation through the VDER Value Stack generate Tier 1 RECs that the interconnecting utility may use to meet its RES compliance obligation.[38] This is the default option and is expected to capture the majority of Tier 1-eligible VDER projects. Alternatively, VDER Customers may elect to retain their Tier 1 RECs and forego the "Environmental Value" part of the VDER Value Stack compensation; however, the default option, which so far has applied to nearly all Tier 1-eligible VDER projects, is that customers will receive the full Value Stack and the RECs will be conveyed to the interconnecting utility. RECs generated by VDER projects are not tradable, and therefore may only be used by the interconnecting IOU. DPS Staff and NYSERDA incorporated projections of Tier 1 RECs from VDER in setting the LSE Obligations for 2018-2021.

Table 8 presents projections of VDER supply from the Phase 2 Implementation Plan, compared to the actual available Tier 1 VDER RECs reported in NYGATS to date. Though the data to complete an updated projection of VDER supply in the near term are not available, Table 8 demonstrates that there has been a shortfall of VDER supply compared to initial projections. All VDER Tier 1 RECs issued in 2017 and 2018 were used for RES compliance.

Table 8. Projected vs Actual Tier 1 VDER Supply

	2017	2018	2019[39]
Projected VDER Supply (MWh)[40]	N/A	107,000	232,000
NYGATS VDER Tier 1 Certificates Issued (MWh)	1	2,427	43,350

38 New York State Public Service Commission. (2017, March 9). Case 15-E-0751, Proceeding In the Matter of the Value of Distributed Energy Resources, Order on the Net Energy Metering Transition, Phase One of Value of Distributed Energy Resources, and Related Matters (VDER Order). *("Phase One VDER Order")*.

39 VDER Tier 1 REC projections are depicted in whole number GWh, so the MWh presented in this table are a rounded approximation.

40 Phase 2 Implementation Plan, p 6. 2019 Certificate data is not yet finalized in NYGATS, and the numbers presented here for issued RECs may be lower than actual issued 2019 RECs. Represents data as of March 29, 2020.

2.3.3 Market Supply of Tier 1 RECs

The third source for Tier 1-eligible RECs used for RES compliance is market supply. Market supply is comprised of RECs purchased from third-party suppliers or directly from generators. Potential sources of market supply of Tier 1 RECs include:

- **Merchant New York Supply:** Merchant RECs could come from; (A) any new Tier 1-eligible supply source not already contracted to NYSERDA, or (B) Tier 1-eligible Main Tier RPS projects that are not contracted to be sold to NYSERDA.[41]
- **Merchant Imports:** Qualifying RECs may be imported into the New York Control Area (NYCA) from adjacent control areas (PJM, New England, Quebec or Ontario). If the supply is Tier 1-eligible in more than one market, RECs will flow based on the relative market economics.
- **Supply Contracted by Other Parties Resold into RES Market:** Contracted RECs from RES Tier 1 eligible generators located in New York or New England could be resold into New York, so long as energy is delivered into the NYCA.

While RES obligations were determined based on expectations of NYSERDA contracted supply and VDER projects, without expectation of material supply of market RECs, REC transaction data from the past three years indicate that a material quantity of market Tier 1 REC supply has been used towards or available for RES Tier 1 compliance. Table 9 summarizes the number of Tier 1 Certificates issued by NYGATS and retained in New York State, by vintage year, compared to the number of issued VDER Tier 1 Certificates and the known supply of operating Tier 1 eligible resources under NYSERDA contract. The remainder – Tier 1 RECs not accounted for by exports, NYSERDA contracts, or VDER resources – represents a combination of market supply held or retired by LIPA towards its share of RES obligations.

[41] Solicitations under the Main Tier RPS limited NYSERDA contracts to 95% of a project's output. The remaining 5% of un-committed RECs from post-1/1/2015 projects can be a modest source of potential supply if it remains in the NY market. Project owners may alternatively deliver energy and associated RECs into adjacent RPS markets.

Table 9. Market Supply of Tier 1 RECs (MWh)[42]

	2017	2018
Total Tier 1 RECs Issued[43]	337,344	458,569
Tier 1 RECs Exported	212,971	280,475
Tier 1 RECs Retained in New York	124,373	178,094
NYSERDA Procured RECs[44]	41,891	46,159
VDER Tier 1 RECs issued	1	2,427
Market Supply of Available RECs	82,481	129,511
Market RECs as % of Total Tier 1 RECs Retained in New York	66%	73%

Based on the known volume of RECs that LSEs procured from NYSERDA, and the number of RECs of the same vintage used for compliance, it is possible to deduce a minimum amount of market supply that was used to meet compliance obligations in 2017 and 2018. Table 10 presents that estimation, based on data reported in the 2017 and 2018 CES Progress Reports. These estimates are minimums, as LSEs may have banked some of the RECs they purchased from NYSERDA rather than using them for RES compliance in the same year.

Table 10. Estimated Market RECs used for Compliance by Jurisdictional LSEs[45]

	2017	2018
Vintage RECs used for Compliance in the same year	40,851	80,048
NYSERDA sales of vintage by date of CES Progress Report	27,803	44,369
Vintage market RECs used for compliance	13,048	35,679

Table 11 considers RES supply and demand from the compliance perspective and shows the number of Tier 1 RECs (of any eligible vintage) that were used to meet the compliance year's RES obligation. It also indicates the number of ACPs made to meet LSE obligations.

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42 New York Generation Attribute Tracking System. (2020). Certificate Statistics Annual. (*"NYGATS Certificate Statistics Annual Report".)* Retrieved from https://nygats.ny.gov/ng/Report/getdto_view_Report_PublicCertificatesStatAnnualP

43 Total Tier 1 RECs Issued includes VDER Tier 1 RECs.

44 For 2017-2018, volume of Tier 1 RECs purchased by NYSERDA from contracted resources and offered for resale to LSEs as reported in New York State Energy Research and Development Authority. (2019, February). Clean Energy Standard Annual Progress Report: 2017 Compliance Year. *("2017 CES Progress Report")* and the 2018 CES Progress Report.

45 2017 CES Progress Report, 2018 CES Progress Report

Table 11. RES Compliance through Tier 1 RECs and ACPs[46]

	Jurisdictional Tier 1 REC Obligation	Tier 1 RECs Retired for Compliance	% of Obligation met with RECs	ACPs for Compliance	% of Obligation met with ACPs
2017	40,588	34,546	85%	6,098	15%
2018	179,377	80,048	48%	92,169	51%

As shown, LSEs used ACPs to a significant amount both years of the program to date. The reliance on ACPs in aggregate is relatively high and increased from 2017 to 2018. (See Section 12 for a deeper discussion of ACPs.) There was also a small level of noncompliance in 2018, due to bankruptcy or departure from the market by small LSEs.[47]

However, as demonstrated below in Table 12, while some LSEs used ACPs to meet their compliance obligations, others banked Tier 1 RECs. The banking rules outlined in the Phase 1, 2, and 3 Implementation Plans allow LSEs to only bank Tier 1 RECs once they have met the current year's compliance obligation. Thus, concurrent banking and ACP payments in the aggregate demonstrate that some LSEs procured RECs beyond their compliance needs, while others were short. VDER Tier 1 REC bank balances of 0 are shown, indicating that although the Commission granted IOUs a higher allowance for banking VDER Tier 1 RECs in response to their concerns of over-supply of such RECs,[48] the IOUs have not had excess supply of VDER RECs to bank.

46 2017 CES Progress Report, 2018 CES Progress Report

47 2018 CES Progress Report

48 New York State Public Service Commission. (2018, July 16). Case 15-E-0302, Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard, Order Providing Limited Modification to Certificate Banking Restrictions. ("Order Modifying Banking Restrictions").

Table 12. LSE and NYSERDA Banking Activity

	6/30/2017	6/30/2018	6/30/2019	12/10/2019[49]	3/4/2020[50]
Aggregate LSE Bank Balance, non-VDER Tier 1 RECs	0	36,010	110,348	112,730	7,375
Aggregate VDER Tier 1 Bank Balance	0	0	0	0	0
NYSERDA Tier 1 Bank Balance[51]	0	14,088	2,382	Unavailable	Unavailable

2.3.4 RES Compliance and Banking Activity

LSE Banking increased from June 2018 to June 2019, then decreased in the first quarter of 2020. As of March 2020, no Vintage 2017 Tier 1 RECs remain in LSE bank balances, which is expected given that LSEs may only bank Tier 1 RECs to use for compliance within the next 2 subsequent years. The timing of the bank balance decline suggests that LSEs have withdrawn Tier 1 RECs to use for compliance in the 2019 Compliance Year. LSEs did not retire any banked RECs for RES compliance in 2017 or 2018.

NYSERDA bank balances are not publicly available through NYGATS but are provided as of the end of the trading period in the CES Progress Reports. The NYSERDA bank balance declined over the period provided, indicating that NYSERDA sold RECs to LSEs from its bank balances. During that same period, the aggregate bank balances for LSEs increased. These data showing contemporaneous banking and REC purchases by LSEs further indicate a significant degree of variability in LSE REC position and compliance strategy.

[49] Aggregate LSE Tier 1 Bank Balances as of 12/10/2019 include 95,145 Vintage 2018 RECs and 17,585 Vintage 2017 RECs.

[50] Aggregate LSE Tier 1 Bank Balances as of 3/3/2020 include 7,300 Vintage 2018 RECs and 75 Vintage 2019 RECs.

[51] NYSERDA Bank Balances are not public data in NYGATS; balances for 6/30/2018 and 6/30/2019 are provided in the CES Progress Report

2.4 Impact of Non-Tier 1 Renewable Supply on RES Target Setting

From the statewide portfolio perspective, the RES is one of several sources and drivers of renewable energy supply that contributes to meeting the CES goal. The Commission's August 2016 CES Order[52] indicated that the establishment of future RES Tier 1 targets will be designed to fill the gap between the state's renewable energy goals and the expected contribution of other source of non-Tier 1 renewable supply toward the 2030 renewable energy goal, including:

- **Offshore Wind**. Procurement to date and at a minimum the next round of offshore wind procurement will be implemented outside of the RES.
- **Distributed Energy Resources.** Contributions from non-Tier 1 VDER, the NY-Sun program and Customer-Sited Tier DG renewable supply will be counted towards meeting the ultimate CES and CLCPA targets. VDER projects that do not create Tier 1 RECs (i.e., Phase One net metering projects) still count towards the 2030 goals (see discussion in Section 2.3)
- **NYPA and LIPA Procurements.** If NYPA and LIPA procure precisely their pro rata share of RES targets to match the contribution of LSEs, then these activities may not affect the RES targets.
- **Legacy (baseline) resources.** The degree of continued availability of legacy baseline resources will influence the quantity of incremental renewables required to meet the State's renewable energy goals. To the extent that the Baseline experiences variation due to any combination of reduced annual energy production, facility closure, or export of renewable energy to neighboring markets, then it must be replaced for New York to reach its renewable energy targets. For resources not contracted with NYSERDA or procured through NYSERDA's proposed competitive Tier 2 program, the voluntary market is one of the potential outlets for this supply that may help retain its contribution towards New York's goals. Baseline renewables are discussed in more detail in Section 10.
- **Voluntary**. Voluntary purchases of new, New York-based renewable energy supply well be counted on to meet a portion of the state's renewable energy goals.

The Commission noted in the CES Order that voluntary purchase and retirement of incremental New York-based renewable energy (Tier 1 supply) would count towards CES goals.[53] Voluntary demand for RECs associated with Baseline supply will contribute to the CES goals as well through retention of

[52] CES Order

[53] CES Order, p 87-90

Baseline supply. The ultimate volume of activity in both these voluntary market segments will impact the setting of RES targets. The Commission has considered how this linkage to RES obligations may adversely impact the additionality objectives that motivate many voluntary renewable energy buyers.[54]

Voluntary demand for RECs tracked in NYGATS associated with energy serving load in New York can be driven by mass market activity such as supply to participants of Community Choice Aggregations (CCAs) whose supply of Tier 1 RECs exceeds the annual RES target percentage, or from mass market purchases by customers of ESCOs offering 'green' products backed by RECs from renewables whose energy is consumed in New York supply. Demand can also come from voluntary procurement by larger commercial, industrial, institutional or government end-use customers. Voluntary markets are further discussed in Section 7.

2.5 Conclusions/Key Findings

The review of RES program activity to date reveals the following key findings:

- **The renewable energy development pipeline in New York is robust, and RES procurements have been competitive to date.** The quantity of Tier 1 RECs procured through RES has dramatically exceeded Tier 1 RES procurement targets to date. In total, NYSERDA has made contract awards for 218% of its procurement targets across its three RESRFPs.
- **Projects are taking longer to reach Commercial Operation than expected**. In 2019, RECs delivered from NYSERDA-contracted facilities was 33% of DPS Staff's initial assumption, which was based on an assumed timeline of 3 years from bid to commercial operation for contracted supply. Contracted supply is anticipated to produce approximately 11% of DPS Staff's projected quantities in 2020, and 41% in 2021. Contracted REC supply appears to be lagging Tier 1 targets by two years or more. The reasons for the current and expected shortfall include:
    - NYSERDA contracted supply has experienced material development and construction delays – resulting in postponements to commercial operation dates. Several Tier 1-eligible RPS projects have yet to attain commercial operation, and no RESRFP projects are currently operational. These delays are largely attributable to the permitting and interconnection processes (including the NYISO Class Year). To help mitigate the length of time required to reach permitting decisions, on April 2, 2020 Governor Cuomo announced the enactment of the Fiscal Year 2021 State Budget which included the adoption of the *Accelerated Renewable Energy Growth and Community Benefit Act* establishing a new permitting office

[54] CES Order, p 80 (Footnote 58)

for large-scale renewable energy projects under the Department of State, discussed further in Section 9.2.[55]

- NYSERDA REC contracts have experienced only modest attrition to date, but it is premature to conclude the ultimate amount of contract attrition. Not all contracts lead to operating projects, for reasons such as delays as discussed above, or inability to finance (typically due to unexpected costs or a drop in expected unhedged revenues). It is difficult to accurately quantify attrition rates, as no contracted projects have reached their drop-dead dates.[56] To date, as shown in Table 2 two Tier 1 RPS contracts and five RESRFP17-1 contracts have been terminated. One contract from RESRFP18-1 was awarded but not signed. There has been no attrition yet for RESRFP19-1. To date, attrition is less than industry norms[57], although for the reasons outlined above it is premature to reach a definitive conclusion.
- Solar has become the largest contributor to the RES development portfolio, and RES procurements have resulted in less technology diversity than RPS solicitations. Solar was not yet competitive during the RPS procurements, but due to sharply declining costs, solar has become the dominant technology of RES procurements under the RES procurements. This can be seen in the number of proposals and the number of REC anticipated under the RES procurements. Generally, RES Tier 1 projects contracted under RPS solicitations include wind, solar, hydroelectric, fuel cell, and biogas technologies. By comparison, wind and solar make up nearly 100% of projects contracted through RESRFPs to date. One hydroelectric project was contracted in RESRFP17-1 and ultimately rescinded the award in favor of a Maintenance Agreement.

- **Central and Western NY dominate contract awards; Capital Zone participation has increased as solar has become more competitive**. Upstate zones have provided the vast majority of RPS and RES REC contracts to date, although recent procurements have produced an increasing quantity of solar project awards in the Zone F. Zone C and Zone A each host approximately one-third of renewable energy projects awarded contracts by NYSERDA. This finding is intuitive as a result of their geographic reach and lesser population density. Zone E and Zone F host approximately 20% and 12% of RES Tier 1 contracted projects, respectively. Zones B, D, G, I, and J combined make up less than 5% of expected award volumes. No contract awards were made to projects in Zone H or Zone K.

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55 New York State Assembly/Senate. (2020, January 22). State of New York A. 9508/S. 7508 Accelerated Renewable Energy Growth and Community Benefit Act. Retrieved from https://nyassembly.gov/2020budget/2020budget/A9508b.pdf

56 NYSERDA extended the milestones in RPS agreements as of April 24, 2020.

57 A 2006 study conducted for the California Energy Commission reported approximate 30% attrition rates (by number of projects) across all technologies. California Energy Commission. (2006, January). Building a "Margin of Safety" Into Renewable Energy Procurements: A Review of Experience with Contract Failure. Retrieved from https://ww2.energy.ca.gov/2006publications/CEC-300-2006-004/CEC-300-2006-004.PDF

- **Weighted average REC prices are expected to decline through 2023.** While Tier 1 REC prices contracted through RESRFPs were initially higher than those contracted through the RPS, the weighted average cost of all NYSERDA-contracted Tier 1 RECs is expected to decline from $22 in 2019 to approximately $20 by 2023.
- **Solar RECs outcompete wind on price in RESRFPs to date.** The weighted average price of contracted Tier 1 solar and wind RECs are estimated at approximately $19/MWh and $22/MWh, respectively.
- **Tier 1 RECs were in short supply for meeting RES Tier 1 obligations in the early years of the RES, but supply will increase as RES contracted projects come online.** As new large-scale projects typically take several years until they reach Commercial Operation, LSE compliance data shows a significant use of ACPs rather than Tier 1 RECs to comply with RES obligations, particularly in 2018. Based on estimates of projected supply from contracted resources, the market is likely to remain short through 2022, the latest year for which LSE obligations are currently set under the Phase 2 Implementation Plan.[58] However, as described above, a significant amount of the Tier 1-eligible pipeline is expected to become available, significantly increasing REC supply. Tier 1-eligible VDER projects, which were inconsequential contributors to meeting RPS obligations in 2017 and 2018, were starting to contribute RECs to the market in 2019 and will further contribute to closing the supply-demand gap as projects in the queue reach operation.
- **Market RECs have been a material source of supply towards the RES obligations,** making up approximately 66% of 2017 Tier 1 REC supply and 73% percent of 2018 Tier 1 REC supply. While NYSERDA's role as a central procurement agency has and will continue to play a key role in generating Tier 1 REC supply, LSEs used RECs from third-party suppliers to meet a substantial portion of compliance obligations in 2017 and 2018, and early 2019 data indicate that a material amount of market supply will be available towards 2019 obligations as well.

[58] Phase 2 Implementation Plan. Future RES obligation targets have been amended in the past, and are subject to possible future amendment, e.g., through the Divergence Test or Triennial Review processes.

3 RES Economic Impacts

One of the objectives of New York State's RES is to stimulate direct in-state investments by renewable energy generators. As required by the Commission in its August 2016 Order,[59] NYSERDA was required to continue to utilize 'non-cost economic benefits' that constituted 30% of the evaluation weight in Main Tier RPS procurements as part of the RES evaluation criteria, unless the approach could be demonstrated to be ineffective. In the Phase 1 Implementation Plan, DPS Staff and NYSERDA concluded that the overall approach used in the RPS was effective, although changes to the categorization and process were modified to streamline the approach for use in the RES procurements.[60] This section summarizes economic benefits as reported by projects selected for contracts under RESRFPs to date. All values presented in this report are in nominal dollars. Economic benefits claims are New York specific; some bidders may plan to spend additional funds out-of-state.

For the three RES LSR procurements to date, NYSERDA has conveyed 10% of the total scoring weight to Economic Benefits to New York State. To earn evaluation points, bidders may at their option include an Incremental Economic Benefits Claim in their proposals. As no RES projects are yet operating, the analysis presented is based solely on economic benefit claims as submitted with proposals. Following the third anniversary of commercial operation, Sellers must submit an independent audit and verification comparing the Bid Facility's actual Incremental Economic Benefits through the first three years of operation to the claimed Incremental Economic Benefits. Therefore, NYSERDA does not expect to validate these claims until four years from the date of this report at the earliest. As NYSERDA retains the right to reduce contractual REC payments if developers fail to demonstrate at least 85% of their claimed benefits, bidders take a conservative approach to claiming these benefits.[61] The results of 41 RPS Verifications to date show that actual economic benefits accruing to New York are greater than those claimed in solicitation bids. For example, "Verified Direct Investments" summarized in NYSERDA's

59 CES Order, p 114-115.

60 Phase 1 Implementation Plan, p 23-25.

61 New York State Energy Research and Development Authority. (2019, April 23). Renewable Energy Standard Request for Proposals 19-1. *("RESRFP19-1")*. Retrieved from https://portal.nyserda.ny.gov/servlet/servlet.FileDownload?file=00Pt000000EAkH9EAL, p. 53

RPS Main Tier 2013 Program Review[62] demonstrate that "*all 18 facilities were determined to be at or above their contract compliance obligation*." Based on verified economic benefits data, the 2013 Program Review estimates that these projects will produce $27 in direct investment for every MWh of production over the project's operating life. Future verifications of projects selected in RESRFPs are expected to produce similar results.

Short-term and long-term benefits are discussed separately. Generally, short-term, or non-recurring, benefits are experienced during periods up to commercial operation. Typically, long-term benefits are recurring annual benefits and are estimated over the 20-year RES contract duration.[63] For purposes of this analysis, annual expenditures in categories associated with long-term benefits claimed for operating years one through three are extrapolated at their average value and assumed to remain constant at that level for the remainder of the contract term. Expenditures are examined in Economic Benefits categories determined by NYSERDA, including: (1) long-term job creation, (2) payments to New York State or municipalities, (3) payments for resource access (including land use payments), and (4) expenditures on local sourcing of goods and services (which included short-term job creation).

3.1 Total Expected Economic Benefits

As analyzed from project bid data for this report and demonstrated in the figures and tables below, RES contracts awarded through RESRFP17-1, RESRFP18-1 and RESRFP19-1 are expected to generate approximately $2.21 billion in direct benefits to New York State. Approximately 30% (~$700 million) of these are short-term benefits – expected to accrue before (or shortly after) the respective project's commercial operation dates. The remaining 70% of benefits are expected to be realized over the 20-year contract period, which applies to all RESRFP awardees to date.

62 New York State Energy Research and Development Authority. (2013, September 5). Renewable Portfolio Standard Main Tier 2013 Program Review: Direct Investments in New York State. Retrieved from https://www.nyserda.ny.gov/-/media/Files/EDPPP/Energy-and-Environmental-Markets/RPS/RPS-Documents/2013/2013-RPS-investments-NYS.pdf

63 All projects contracted under the RES procurements to date have a 20-year contract. Some Tier 1 projects contracted under RPS Main Tier solicitations have a different contract term, but Main Tier contracts are not included in this analysis.

Active NYSERDA RES Tier 1 agreements as of March 2020 are comprised entirely of solar and wind projects.[64] Wind and solar projects are expected to produce similar New York State economic benefits on a dollar per MW basis over the 20-year contract term – on average $556,166 of benefit per MW of solar compared to $565,254 of benefit per MW of wind. Table 13 summarizes these total economic benefits by solicitation and by technology.

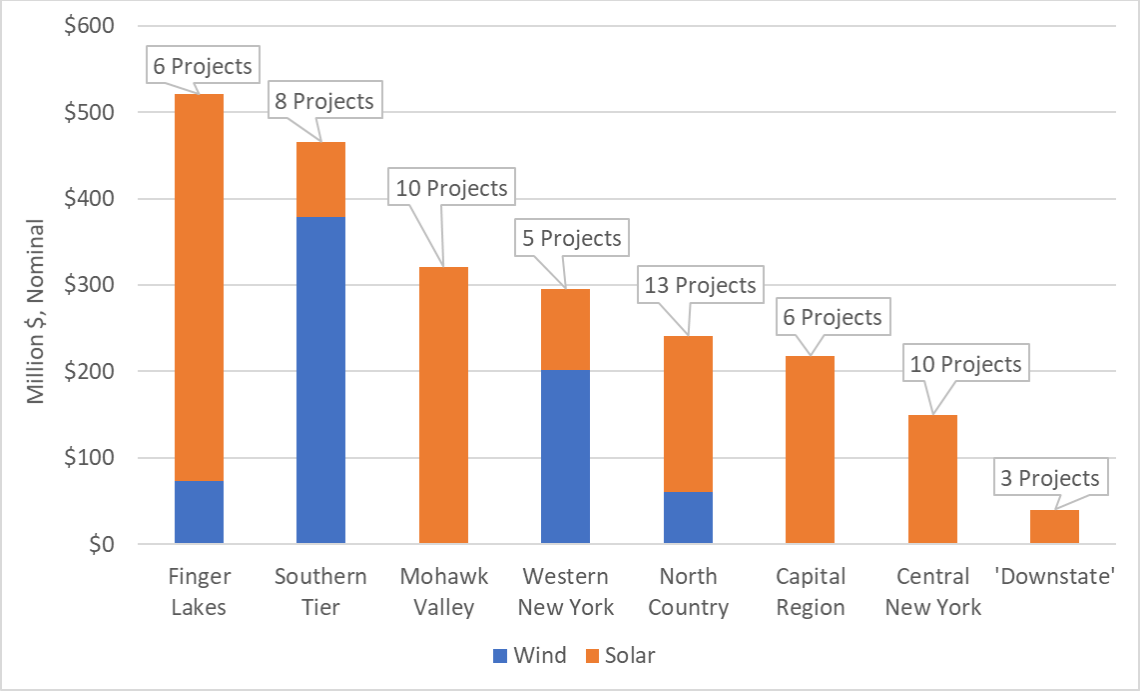
Table 13. Total Expected Economic Benefits, by Technology, by Solicitation

Contracts	Wind		Solar		TOTAL	
	Total (M$)	$/MW	Total (M$)	$/MW	Total (M$)	$/MW
RESRFP17-1	417.2	568,690	397.0	690,494	814.2	622,211
RESRFP18-1	193.7	598,459	599.0	575,700	792.7	581,101
RESRFP19-1	93.1	494,708	508.6	466,652	601.7	470,782
TOTAL / Weighted Average	704.0	565,254	1,504.6	556,166	2,208.5	559,031

Figure 8 summarizes total expected economic benefits by Regional Economic Development Council (REDC) and technology. On a percentage basis, claimed economic benefits are associated with projects in each REDC as follows: Finger Lakes (23%), Southern Tier (21%), Mohawk Valley (14%), Western New York (13%), North Country (11%), Capital Region (10%), Central New York (7%), and Downstate (2%).

[64] One hydroelectric project was contracted in RESRFP17-1 and ultimately rescinded the award in favor of a Maintenance Agreement.

Figure 8. Total Expected Economic Benefit by REDC and Technology



3.2 Expected Economic Benefits by Category

Through the development of RESRFP bid criteria, NYSERDA created the following categories for the evaluation of economic benefits:

1. Long-Term Job Creation
2. Payments to New York State or Municipalities,
3. Payments for Resource Access, and
4. Local Sourcing of Goods and Services

For RESRFP17-1 and RESRFP18-1, bidders submitted expected economic benefits in the four categories outlined above. For RESRFP19-1, the *Payments to New York State or Municipalities* and *Payments for Resource Access* were aggregated with Long-Term Job Creation into a new category called *Long-Term Payments/Benefits to New York State*. This report summarizes economic benefits in the four original categories based on detailed information submitted at the project level (for RESRFR19-1 bids, the authors attributed itemized spending to the most relevant category).

Table 14 summarizes total economic benefits by evaluation category and technology. The first three rows represent long-term benefits. The last row represents short-term benefits. While a small fraction of expenditures in the first three categories may be one-time costs, these are assumed to be di minimis. Benefits in years 4 through 20 are estimated at the average level claimed for years 1 through 3. Likewise, while a minority of expenditures in the fourth category may be recurring, for purposes of this analysis they are all assumed to be non-recurring costs. This treatment is supported by the majority of claims documentation submitted by bidders.

Table 14. Expected Economic Benefits by Category, by Technology

Contracts		Long-Term Jobs	Payments to NYS/ Municipalities	Payments for Resource Access	Local Sourcing of Goods and Services	TOTAL / Weighted Average
Wind	Total (M$)	98	237	202	182	720
	Annual (M$)	5	12	10	9	36
	$/MW	78,981	190,666	162,400	146,176	578,223
Solar	Total (M$)	82	419	471	517	1,488
	Annual (M$)	4	21	24	26	74
	$/MW	30,389	154,798	174,074	190,935	550,195
TOTAL	Total (M$)	181	656	673	699	2,209
	Annual (M$)	9	33	34	35	110
	$/MW	45,707	166,105	170,394	176,825	559,031

3.2.1 Long-Term Job Creation

Long-term job creation in NYS from the RES Tier-1 projects is tied to facility operations. As no RES Tier-1 projects are currently operational, and verification of Bidder claims is not yet feasible, this section reports expected job creation as submitted with each Bidder's claim form. Table 15 summarizes expected long-term job benefits.

Table 15. Summary of Expected Long-Term Job Benefits

Contracts		RESRFP 17-1	RESRFP 18-1	RESRFP 19-1	TOTAL / Weighted Average
Wind	Total (M$)	38	32	12	82
	Annual (M$)	2	2	1	4
	$/MW	51,863	99,054	64,327	66,012
Solar	Total (M$)	28	35	35	98
	Annual (M$)	1	2	2	5
	$/MW	48,371	34,028	32,247	36,359
TOTAL	Total (M$)	66	67	47	181
	Annual (M$)	3	3	2	9
	$/MW	50,329	49,459	36,969	45,707

Long-term jobs are defined as those lasting more than three years. Bidders submitted claims describing the degree to which the development, construction, and operation of each Bid Facility will directly create long-term jobs for New York workers. Examples of such jobs include, but are not limited to, jobs associated with operations and maintenance, and long-term project management. Bidders provided the type of jobs and number of jobs in Full Time Equivalents (FTEs), and the expected average annual salary and/or total compensation and direct benefits (excluding overhead for normal operations) for all long-term jobs during the first three Contract Years of operation.

At least 117 long-term FTEs are projected to be created by projects selected through RESRFP17-1, RESRFP18-1, and RESRFP19-1. Job creation claim totals for wind and solar projects vary considerably. Solar facilities are expected to create more long-term jobs in aggregate, while wind facilities create more jobs on a per MW basis. The first three RES solicitations project a total of approximately 51 long-term FTEs from contracted wind facilities and 66 long-term FTEs from contracted solar facilities. Three of the ten wind projects are upgrades associated with existing facilities. These projects represent the maintenance of existing long-term jobs. As such, these upgrade projects did not claim incremental long-term jobs in their Bid Proposals. Table 16 summarizes expected long-term jobs by solicitation and technology.

Table 16. Expected Long-Term FTEs by Solicitation and Technology

Contracts	Wind		Solar		TOTAL
	Total	Per MW	Total	Per MW	Total
RESRFP17-1	27.2	0.04	24.6	0.04	51.7
RESRFP18-1	16.0	0.05	20.8	0.02	36.8
RESRFP19-1	8.0	0.04	21.0	0.02	29.0
TOTAL/*Weighted Average*	51.2	*0.04*	66.3	*0.02*	117.5

The expected average salary for long-term FTEs claimed across all RES Tier 1 solicitations to date is $76,865 per year. Annual average wind FTE salary equivalents are slightly higher ($80,361) than average solar FTE salary equivalents ($74,168). Total long-term FTE compensation for all facilities over the first three years of operation is over $27 million.

3.2.2 Payments to New York State or Municipalities

Benefits to New York State and its municipalities include expected state and local tax payments, payments in lieu of taxes (PILOTs), host community agreements, Industrial Development Agency (IDA) fees, stormwater fees, fire departments taxes, interconnection tax increases, sales taxes, State Historic Preservation Officer (SHPO) mitigation, legal costs, and others. Solar facilities generally claim only PILOT agreements.

Table 17 summarizes expected payments to NYS and municipalities by solicitation and technology.

Table 17. Summary of Expected Payments to New York State or Municipalities

Contracts	Wind			Solar			TOTAL		
	Total (M$)	Annual (M$)	$/MW	Total (M$)	Annual (M$)	$/MW	Total (M$)	Annual (M$)	$/MW
RESRFP17-1	160.5	8.0	218,767	101.5	5.1	176,472	262.0	13.1	200,183
RESRFP18-1	52.1	2.6	160,875	184.8	9.2	177,609	236.9	11.8	173,638
RESRFP19-1	24.9	1.2	132,341	132.5	6.6	121,587	157.4	7.9	123,170
TOTAL / *Weighted Average*	237.5	11.9	*190,666*	418.8	20.9	*154,798*	656.2	32.8	*166,105*

3.2.3 Payments for Resource Access

Payments for fuels and resource access includes lease payments to landowners, land agent success payments, good neighbor agreements, construction and development fees, land purchases (including O&M building, substation, met tower), easement agreements, and more. Land leases tend to be the largest economic contributor in this category. Table 18 summarizes expected payments for resource access. Solar provides more than twice the aggregate resource access benefit of wind. In a subset of contributors to this category, solar may produce greater resource access payments on a $/MW basis.

Table 18. Payments for Resource Access

Contracts	Wind			Solar			TOTAL		
	Total (M$)	Annual (M$)	$/MW	Total (M$)	Annual (M$)	$/MW	Total (M$)	Annual (M$)	$/MW
RESRFP17-1	127.3	6.4	173,549	126.8	6.3	220,526	254.1	12.7	194,191
RESRFP18-1	49.7	2.5	153,640	182.3	9.1	175,254	232.1	11.6	170,125
RESRFP19-1	25.2	1.3	133,997	161.8	8.1	148,442	187.0	9.3	146,316
TOTAL / *Weighted Average*	**202.3**	**10.1**	**162,400**	**470.9**	**23.5**	**174,074**	**673.2**	**33.7**	**170,394**

3.2.4 Local Sourcing

Local sourcing includes both short-term job creation, and in-state purchases and consumption of goods. These jobs are associated with development and construction of individual facilities rather than long-term operation. Short-term employment tends to be the largest economic contributor in this category, followed by in-state purchases. In-state purchases includes not only local goods and services and other materials sourced within NYS. For RESRFP19-1, this also included ongoing operations and maintenance expenses and other short-term economic benefits. Ongoing operations and maintenance expenses tends to be the smallest economic contributor in this category, and for simplification these costs were treated as non-recurring expenditures. Local goods and services include travel expenses (lodging, meals, fuel) or non-local employees. Table 19 summarizes expected local sourcing benefits by solicitation and technology.

Table 19. Local sourcing by solicitation and technology

Contracts	Wind		Solar		TOTAL	
	Total (M$)	$/MW	Total (M$)	$/MW	Total (M$)	$/MW
RESRFP17-1	91.3	124,512	140.9	245,124	232.3	177,509
RESRFP18-1	59.8	184,890	196.4	188,809	256.3	187,879
RESRFP19-1	30.9	164,043	179.2	164,376	210.0	164,327
TOTAL / *Weighted Average*	182.0	*146,176*	516.5	*190,935*	698.6	*176,825*

3.2.4.1 Short-Term Job Creation

Short-term jobs are classified as those lasting less than three years. Bidders submitted claims describing the degree to which local and state economic activity will increase as a result of employment of New York workers in the form of short-term jobs. Examples of such jobs include, but are not limited to, NYS construction, rail and port workers, contractors and laborers, engineering or environmental service providers, consultants, financial service advisors, and legal service providers associated with the development and construction/modification of the Bid Facility. Bidders provided the type of jobs and the expected duration of such jobs, along with the number of jobs, including FTEs,[65] and the expected average annual salary and benefits for all short-term jobs through the first three Contract Years of operation. Table 20 summarizes expected short-term jobs by solicitation and technology.

Table 20. Short-Term Jobs by Solicitation and Technology

Contracts	Wind		Solar		TOTAL
	Total	per MW	Total	per MW	Total
RESRFP17-1	361	0.49	2,224	3.87	2,585
RESRFP18-1	279	0.86	1,901	1.83	2,180
RESRFP19-1	133	0.71	1,818	1.67	1,951
TOTAL/*Weighted Average*	773	*0.62*	5,943	*2.20*	6,716

Solar bid facilities are projected to create most of the short-term employment, approximately 5,940 short-term jobs corresponding to 3,200 short-term FTEs, compared to approximately

[65] Calculated by taking the number of short-term jobs per 40-hour work week multiplied by the number of weeks worked divided by 50.

770 short-term jobs corresponding to 460 short-term FTEs for wind facilities. Table 21 summarizes expected short-term FTEs by solicitation and technology.

Table 21. Short-Term FTEs by Solicitation and Technology

Contracts	Wind		Solar		TOTAL
	Total	Per MW	Total	Per MW	Total
RESRFP17-1	193	0.26	797	1.39	990
RESRFP18-1	211	0.65	1,278	1.23	1,489
RESRFP19-1	62	0.33	1,129	1.04	1,192
TOTAL/*Weighted Average*	467	*0.40*	3,204	*3.65*	3,671

3.3 Conclusions/Key Findings

The review of data on expected New York economic benefits reveals the following key findings. All data relate to expected benefits extrapolated over a 20-year duration of contracted deliveries to NYSERDA:

- Total New York State economic benefits are estimated at $2.21 billion over the contract duration for all RES Tier 1 facilities contracted to date.
  - Solar and wind benefits comprise approximately 70% and 30% of this value, respectively.
- The three RES procurements conducted to date are expected to result in projects that create at least 6,716 short-term jobs and 117 long-term FTE jobs. Long-term job benefits are expected to total $9 million per year.
- Together, projects in NYISO zones A, C, E, and F produce 97% of expected benefits. These benefits accrue not just within these zones but across New York State.
- Long-term benefits of a comparable magnitude are expected to derive across three sub-categories:
  - Payments to NYS and Municipalities: $656 million
  - Payments for Resource Access: $673 million
  - Local Sourcing of Goods and Services: $698 million
- Solar bid facilities are expected to create 88% of the short-term employment.
- Solar facilities are expected to create more long-term jobs in aggregate, while wind facilities create more jobs on a per project and per MW basis.
- As the number of solar projects proposed grows, the share of benefits from wind projects is declining, and wind upgrade projects create fewer benefits than would be created from new wind projects. No incremental long-term employment benefits were reported for upgraded wind projects.

4 Contribution to Greenhouse Gas Emissions Reductions

In establishing the CES and the RES through its August 2016 Order, the Commission adopted the State Energy Plan Goal of 50% renewable energy by 2030 as a cornerstone strategy to reduce statewide greenhouse gas emissions by 40% by 2030.[66] The CLCPA has boosted renewables goals consistent with even more aggressive greenhouse gas reduction goals of net zero emissions by 2050.[67]

This section provides an evaluation of the RES program's contribution to greenhouse gas emission reductions through RES procurement activities by estimating both actual reductions to date and expected reductions over the remaining durations of NYSERDA contracts. The analysis takes the simplified approach of applying the Commission's currently approved all-hours average marginal carbon intensity factor[68] for the NYISO to the actual and projected MWh of renewable energy production resulting from NYSERDA procurement of RES Tier 1-eligible RECs, as described in Section 2.1. VDER RECs and market RECs are not considered in this calculation, as they are not unambiguously attributable solely to the RES. The values in this section do not include the impact of NYPA and LIPA procurement activities.

The average marginal emission rate factor is currently at 1,103 pounds of CO_2 per MWh. This rate was applied equally to solar, wind, hydroelectric, and anaerobic digesters.[69] For fuel cells, the average marginal emission rate is estimated as 220 lbs/MWh, the difference between 1,103 lbs./MWh and the EIA's estimated fuel cell emissions factor of 883 lbs/MWh. The resulting greenhouse gas reduction estimates are presented in metric tons (Mt) per year.

66 CES Order, p. 2.

67 Climate Leadership and Community Protection Act

68 Per the Clean Energy Advisory Council (CEAC) Metrics, Tracking and Performance Assessment (MTPA) Working Group, NYSERDA has adopted a marginal electricity grid emission factor of 1,103 pounds CO2e/MWh for projects completed after 2015 (http://documents.dps.ny.gov/public/MatterManagement/MatterFilingItem.aspx?FilingSeq=190731&MatterSeq=50399).

69 For aerobic digesters, 1,103 lbs/MWh was also applied, as a conservative assumption relative to the CO_2-equivalent impact of methane that would otherwise be released to the atmosphere from decomposition of organic matter.

4.1 Greenhouse Gas Reductions for Procurements to Date

Estimated greenhouse gas reductions resulting from NYSERDA-procured resources are summarized below in Table 22, shown by year and by procurement vintage. Emission reductions are low in early years as few contracted resources are operating but are expected to increase significantly over time as additional contracted resources reach commercial operation. All RES-eligible resources procured through the RPS solicitations are expected to be operating by 2023 and contributing over 716 thousand Mt of CO_2 reductions on an annual basis. The resources contracted through RESRFPs to date are projected to be operating by 2025 and contributing approximately 4.4 million Mt of annual CO_2 emission reductions.

Table 22. Annual Greenhouse Gas Reductions from Procured Resources by Procurement Vintage

Est. CO_2 Reduction Profile (Thousands Mt/year)	2017	2018	2019	2020	2021	2022	2023	2024	2025
RESRFP17-1 Subtotal	0	0	0	0	147	1,441	1,442	1,578	1,582
RESRFP18-1 Subtotal	0	0	0	8	249	601	1,358	1,490	1,490
RESRFP19-1 Subtotal	0	0	0	0	152	409	1,079	1,279	1,279
RESRFPs Procurement Total	0	0	0	8	548	2,451	3,878	4,347	4,351
RES Tier 1 Supply Procured via RPS	19	21	123	153	388	690	716	716	716
Total Reduction from RES Tier 1 Supply	19	21	123	161	937	3,141	4,594	5,063	5,067

Supply procured to date through the RES, and its associated greenhouse gas emission reductions, are projected to level off by 2025, continuing at that level through 2030. Tier 1 supply procured through RPS procurements, and associated greenhouse gas emission reductions, will peak in 2025 and decline slightly thereafter as some biomass, biogas and fuel cell contracts reach their end. Total greenhouse gas emission reductions by 2030 are approximately 5.1 million Mt/year.

4.2 Key Findings

If Tier 1 contracted resources operating or under development all reach successful commercial operation, their contributions to the state's greenhouse gas reduction goals will be as follows:

- **Total greenhouse gas reductions** from Tier 1 resources contracted by NYSERDA are estimated to be approximately 5 million metric tons by 2030.
- **Greenhouse gas reductions from operating projects** account for 244 thousand metric tons of the 2030 emission reductions.
- **Greenhouse gas reductions from projects under development** are the majority of the 2030 reductions, accounting for approximately 4.8 million of the 2030 emission reductions.

The RES will continue to contribute additional emission reductions towards state goals as NYSERDA procures additional renewable resources through future RES solicitations.

5 Evaluation of RES Program's progress toward the RES and CES Goals

5.1 Goals

The RES plays a key role in furthering the state's energy goals, as outlined in the 2015 State Energy Plan,[70] the Commission's Track One Reforming the Energy Vision Order,[71] the CES August 2016 Order and the CLCPA. This report assesses the progress of the RES in meeting the following goals, as outlined by the policy rationales and objectives identified in those documents and through discussion with NYSERDA:

A. Increase renewable energy consumed in New York, examined by considering data on:

    1. Total renewable energy production consumed in New York State;
    2. New renewable energy production consumed in New York State; and
    3. Baseline renewable energy production consumed in New York State.

B. Increase renewable energy development in New York State, examined by assessing:

    1. The level of project development activities necessary to create a pipeline of projects that can be brought to commercial operation; and
    2. The degree of success in turning procured (contracted) REC generation into operating projects on a timely basis.

C. Reduce greenhouse gas emissions towards SEP and CLCPA goal.
D. Stimulate expenditures creating economic benefits and job creation in New York associated with meeting the CES and CLCPA targets; and
E. Minimize ratepayer costs by meeting RES, CES, and CLCPA targets in a cost-effective manner.

In addition to these primary goals, which are analyzed in this report, the implementation of the RES and CES will impact several other objectives identified by policy makers in New York State, including encouraging geographic diversity of renewable energy projects, animating customer choice, preserving existing zero-emissions nuclear generation resources as a bridge to the clean energy future, ensuring a

[70] New York State Energy Planning Board. (2015). 2015 New York State Energy Plan. Retrieved from https://energyplan.ny.gov/Plans/2015.aspx

[71] New York State Public Service Commission. (2015, February 26). Case 14-M-0101, Proceeding on Motion of the Commission in Regard to Reforming the Energy Vision, Order Adopting Regulatory Policy Framework and Implementation Plan. *("REV Track One Order")*.

modern and resilient energy system, and accomplish its objectives in a fair and cost-effective manner. These goals are implicit in the design of the RES and CES, but their consideration is beyond the scope of this report. Additional policy goals were identified in the CLCPA subsequent to the design of the RES and CES. These goals, including ensuring environmental justice to all New Yorkers, working towards a just transition to an inclusive renewable energy economy, reliability, and energy security, will be considered through the implementation process of the CLCPA, and not examined in this report.

5.2 Perspectives Considered

Different stakeholders or stakeholder groups may have different goals or means of determining progress. New York's electric energy ecosystem is comprised of a diverse set of stakeholders with varying priorities, objectives, and concerns regarding increasing the use of renewable energy in New York State. While the goals evaluated in this section have been identified with the policymaker perspective in mind, the perspectives of other stakeholders are integral to achieving the state's goals and/or who is directly impacted by the RES. The following stakeholder perspectives are considered, as they relate to the goals outlined above:

- **Policymakers** have established the statewide goals and are responsible for designing and implementing the programs to achieve them.
- **Ratepayers** ultimately bear the costs of procuring renewable energy through the RES, as the obligated LSEs pass the costs of Tier 1 compliance to their customers.
- **Developers, investors, and owners of new renewable generation** make investments and business decisions directly impacting the supply of renewable energy available to New York consumers.
- **Owners of legacy renewable generation** face key decisions on whether to export energy and attributes, find an in-state off-taker, or cease operation. These decisions strongly influence the supply of baseline renewable energy contributing to New York's goals.
- **LSEs** under the jurisdiction of the Commission bear the RES Tier 1 compliance obligations. The decisions these competitive ESCOs and IOUs make regarding how to meet compliance obligations (purchase Tier 1 RECs from NYSERDA, purchase market RECs, or pay ACPs) influences the success of the RES in contributing to new renewable energy consumed within New York State.
- **IOUs** as retail suppliers of last resort have a similar perspective on the RES as competitive LSEs. IOUs are also impacted through their role in the VDER regime. The interconnecting IOU retains Tier 1 RECs from most VDER projects to use towards RES obligations, but face restrictions on the tradability and bankability of those VDER Tier 1 RECs.

5.3 Goal: Increase renewable energy production consumed in New York State

The primary goal of the RES is to increase the amount of renewable energy consumed by electricity customers in New York State. As discussed in Section 2.4, the RES is one part of a multi-pronged strategy to achieve that goal. Three lenses through which to assess progress include: trends in the total level of renewable energy consumed in New York, the amount of new renewable energy production consumed in New York, and the degree of historic, or legacy, baseline renewable energy production continuing to operate and retained in New York.

5.3.1 Total Renewable Energy Production Consumed in New York State

Table 23 is reproduced from the 2018 CES Progress Report and shows the changes over time in Tier 1 renewable production, other renewable production ("Baseline"), total statewide load, and the resulting percent of load served by renewable energy. The quantities shown reflect all compliance year renewable energy supply settled in the State, through NYGATS, and considers all renewable energy imports and exports. [72] The total quantity of renewable energy consumed in New York State increased from 2014 to 2017 but declined from 2017 to 2018. Relative to 25.9% of load during the baseline period of calendar year 2014, the percentage of renewable energy serving New York load increased to 28.1% in 2017 and then fell to 26.8% in 2018.

[72] 2018 CES Progress Report, Table 1.

Table 23. Summary of New York System Mix[73]

	2014	2017	2018	Percentage Change 2014 to 2018
Generation from Baseline Renewable Energy (MWh)	41,295,663	42,964,344	42,161,126	2.1%
Generation from Tier 1-Eligible Generation (MWh)[74]	N/A	124,373	178,094	
Total Renewable Energy (MWh)	41,295,663	43,082,717	42,331,563	2.5%
Total Load (MWh)[75]	159,146,663	153,162,582	157,768,468	-0.9%
% Renewable Energy Serving Load (%)	25.9%	28.1%	26.8%	

Overall, these figures show modest progress to date towards achieving the 50% CES goal and 70% CLCPA goal, and a slippage in the upward trend necessary to meet those goals. As shown in Table 23 and as described in the 2018 CES Progress Report, the decline by 1.3% of load from 2017 to 2018 in the total percentage of renewable energy is influenced by an increase in electric load, an increase in imports from PJM (with a low percentage of renewables in its system mix) which brings down the New York total, and a slight decrease in hydro production due to less rainfall than the prior year.[76] There are several additional underlying trends embedded in the changing baseline renewable energy figures which merit further analysis, which are discussed further below.

[73] 2018 CES Progress Report, Table 1

[74] Tier 1 Energy includes generation from Fuel Cells that are fired by Natural Gas as this technology is eligible under Tier 1. Since these generation projects are fired with Natural Gas their MWhs are reported as Natural Gas in the New York System Mix, which is consistent with the fuel reporting in the 2014 Statewide Fuel Mix. Therefore, the Baseline Renewable Energy plus Tier 1-Eligible Energy will not equal the Total Renewable Energy.

[75] Includes LSEs, Municipal Utilities, and Direct Customers. Pursuant to the NYGATS Operating Rules, load is calculated by using NYISO version 2 settlement data and adding generation from load modifiers utilized by distribution utilities. The load modifier data adjusts the total load as well as the total load served by the LSE utilizing the load modifier(s). The adjusted total load served by each LSE is then divided by the adjusted total statewide load to determine the percentage of total load served by each LSE. The total quantity of renewable energy serving State load includes both baseline and Tier 1 energy supply.

[76] 2018 CES Progress Report, Page ES-1.

5.3.2 New Renewable Energy Production Consumed in New York State

The primary intent of the RES is to increase new renewable energy production that will contribute to the overall CES 50 by 30 goal[77] as well as the CLCPA 70 by 30 goal. To evaluate the RES progress towards the goal of increasing new renewable energy production consumed in New York State, this report examines:

- The number of Tier 1 RECs produced associated with new generation consumed in New York, and the percent of load those Tier 1 RECs represent;
- The number of ACPs that LSEs made to comply with RES obligations; and
- Expected production associated with new renewable energy projects with NYSERDA Contracts that are not yet operating.[78]

Table 24 shows the total number of Tier 1 RECs serving New York load, based on data as reported by NYGATS. NYGATS reports the total number of Tier 1 RECs issued by vintage year and the number of those that were exported out of state. As no Tier 1 RECs were imported in 2017 or 2018, the difference between these values equals Tier 1 RECs associated with generation retained in New York State, whether they are retired towards RES compliance or used in some other manner. The total shown as Tier 1 RECs "Retained in NY" are composed of market RECs, NYSERDA-procured RECs and VDER RECs. As only a portion were used for RES Tier 1 compliance (44,134 2017 RECs and 178,094 2018 RECs), the total is reflective of growth in supply contributing to the CES goal, more so than the RES. Nonetheless, this total indicates the number of RECs and percentage of Tier 1 RECs that could contribute to the sum of meeting RES obligations of jurisdictional LSEs plus the voluntary compliance with RES targets by LIPA and NYPA.

[77] CES Order

[78] While other non-RES Tier 1 sources of new renewable energy, such as distributed solar and voluntary purchases of renewables, are counted in the state's progress towards the 50 by 30 goal and included in the Non-Tier 1 "Baseline," they are outside the scope of how the RES has contributed to meeting the state's goals.

Table 24. Tier 1 RECs Produced and Retained in New York State[79]

	2017	2018
Issued	337,344	458,569
Exported	212,971	280,475
Retained in NY	124,373	178,094
Statewide Load	153,162,582	157,768,468
Actual Tier 1 RECs Available as % of Load	0.081%	0.114%
Statewide Tier 1 REC Obligation (%)	0.035%	0.150%
Statewide Tier 1 REC Obligation (MWh)	53,601	236,574
Actual Tier 1 RECs Available as % of Obligation	232.0%	75.3%

Compared to the RES Tier 1 obligation, the number of Tier 1 RECs available for consumption in New York exceeded the standard in 2017 but fell short in 2018. Though only two years of data are available, they indicate that the pace of new renewable energy growth has not yet met policy makers' goals.

As detailed in Section 2.1, NYSERDA procurement of Tier 1 RECs from LSRs through RES procurements in 2017 through 2019, and prior Main Tier RPS procurements of RECs from Tier 1-eligible projects with commercial operation dates on or after January 1, 2015, are expected to contribute significantly to boosting new renewable energy production consumed in New York State in the coming years. Table 25 shows that by 2022, RECs contracted by NYSERDA (as of March 2020) would represent approximately 5.6% of load, compared to the 2022 RES obligation percentage of 8.4%, assuming no further delay or attrition. While the commitments from NYSERDA procurements to date are expected to materially increase the overall supply of new renewables, as can be seen in Figure 7 in Section 2.3, this source of additional supply is lagging behind 2022 RES targets by between one to over two years.

[79] NYGATS Certificate Statistics Annual Report, 2017-2018

Table 25. Jurisdictional LSE Obligations Compared to Contracted REC Supply

	2017	2018	2019	2020	2021	2022
Tier 1 REC Obligation (%)	0.035%	0.150%	0.780%	2.840%	4.200%	8.40%
Tier 1 REC Obligation (MWh)[80]	40,582	179,377	906,937	3,295,138	4,824,162	9,429,800
Actual or Projected Load (MWh)[81]	115,966,979	119,636,259	116,274,000	116,026,000	114,861,000	112,259,523
NYSERDA-Contracted REC Quantities[82] (MWh)	41,891	46,156	256,001	333,453	1,883,015	6,288,279
Projected Tier 1 RECs Procured as % of Load	0.036%	0.039%	0.220%	0.287%	1.639%	5.602%

The lag is expected to be a temporary trend, however, as New York is expected to reap significant contributions in subsequent years as a result of procurement activities to date.[83] In addition to the estimates shown in Table 25, the 8,969,800 MWh per year of expected Offshore Wind Renewable Energy Credits (ORECs)[84] from two offshore wind projects contracted by NYSERDA as a result of ORECRFP18-1, if successfully developed, would contribute an additional 8% of load in the mid-2020s. In addition, production of VDER RECs is also expected to grow significantly as a result of VDER tariff and Community Distributed Generation (CDG) installations under development.

80 2017 and 2018 figures represent actual REC obligations (2017 CES Progress Report, Table 5 and 2018 CES Progress Report, Table 5); Derived as obligation % *Forecasted load for 2019-2022

81 Load represents actual load for 2017 and 2018 and is sourced from CES Progress Reports and NYSERDA data. 2019-2021 is predicted load from the Phase 2 Implementation Plan. 2022 is projected load from statewide NYSERDA data, proportioned to jurisdictional load based on the same proportional shares of jurisdictional, LIPA, and NYPA load in the Phase 2 Implementation Plan.

82 RPS Annual Reports, RES Procurement Reports and Bid Documents, and OpenNY.

83 2018 CES Progress Report, p. ES-1.

84 New York State Energy Research and Development Authority. (2020, March). New York State Clean Energy Standard: Results of Renewable Energy Standard, Offshore Wind Standard, and Renewable Portfolio Standard Solicitations for Long-Term Contracts through December 31, 2019, Final Report. ("CES 2019 Annual Procurement Report"). Retrieved from https://www.nyserda.ny.gov/-/media/Files/Programs/Clean-Energy-Standard/2019/Case-15-E00302-CES-2018-Annual-Progress-Report.pdf, p. 16.

As indicated in the results of NYSERDA's 2019 Divergence Test (see Section 12.4), another view of available Tier 1 (new) renewable energy supply is the number of ACPs used to meet RES obligations in 2017 and 2018. The number of ACPs made in comparison to the RES obligation is an indication of whether sufficient REC supply exists, as using RECs to comply is a lower cost option than ACPs.

In both years with complete data available, LSEs used ACPs to meet a significant portion of the obligation. Particularly in 2018 when ACPs were used to meet over half of the jurisdictional obligation, the level of ACP activity indicates a shortfall in supply of Tier 1 RECs relative to demand. Some reliance on the ACP in 2017 may be a result of LSEs finding that the administrative ease of complying with ACP justified the cost premium given the small size of the LSE obligation.

5.3.3 Baseline Renewable Energy Production Consumed in New York State

The CES August 2016 Order[85] established the year 2014 as the year to measure the CES Renewable Energy Baseline (Baseline), which was calculated as 41,296 GWh, or 25.9% of the 2014 Statewide Fuel Mix as tracked by the Department's Environmental Disclosure Program (EDP). This baseline includes NYPA hydropower assets, supply procured under NYSERA's Main Tier and Customer-Sited Tier (CST) programs, RPS Maintenance Resources, imported renewable energy, voluntary renewable energy purchases, and other independently owned renewable energy generation resources.[86]

Tracking changes in the Baseline with precision poses a challenge, as renewable energy production consumed in New York State is now tracked through NYGATS, rather than EDP, and NYGATS was not operational in 2014 when the CES baseline was derived. The CES Progress Reports include all non-Tier 1 renewable energy within its tracking of the metric of baseline renewables, which could include new distributed renewables. Table 51 in Section 10 shows the change in non-Tier 1 renewable energy over time, as reported in the 2018 CES Progress Report, documenting an increase in baseline renewable energy of approximately 1.0 TWh, a 2.1% increase over 2014 corresponding to a 0.9% increase as a percent of load. The change is driven by increases in solar and hydroelectric totaling approximately 2.2 TWh, and decreases in wind, biomass, and biogas totaling about 1.15 TWh. Given the definition of baseline as all non-Tier 1 renewables, the increase in solar production is predominately

85 CES Order, p. 36.

86 CES Progress Report, p. 4.

attributable to growth in new non-Tier 1 solar, likely driven by distributed and behind-the-meter solar incentives. Solar growth alone represents over 86% of the growth in baseline from 2014 to 2018 shown in Table 51. Biomass, biogas and wind production consumed in New York fell by almost 1.15 million MWh per year from 2014 to 2018 (or 24% of their 2014 total), driven by reductions in annual production and an increase in exports.

Because of the change in tracking methods, the trends shown in Table 51 do not hold the mix constant, are therefore are not quite a true picture of baseline trends. An examination of underlying trends can help form a more accurate assessment of trends on baseline renewable energy and is provided in Section 10.

5.3.4 Conclusions

Total Renewable Energy: From the policymaker perspective, progress towards increasing renewable energy consumed in New York State is measured by the degree to which the total renewable energy production increased from the 2014 baseline towards the state's renewable energy goals. Overall, the initial results of the first two years of the RES show modest progress to date towards achieving the state's renewable energy goals, but a slippage in the upward trend necessary to meet those goals. Relative to both the Order's initial expectations (which call for renewable energy to reach 30.5% of load by 2021) and the state's 2030 goals, renewables will need to increase dramatically over the remaining years. An understanding of the trend in total renewables can be better understood by tracking the two major underlying trends, the addition of new renewables, and the retention of baseline renewables.

New Renewable Energy: From the policymaker perspective, increasing *new* renewable energy is measured by the increase in production from new (post-2015) renewable resources, compared to the increasing RES Tier 1 obligations. While production of Tier 1 RECs serving load in New York increased from 2017 to 2018, the increase did not keep pace with the RES Tier 1 obligation. The commitments from NYSERDA procurements to date are expected to materially increase the overall supply of new renewables, however, this source of additional supply is lagging behind 2022 RES targets by between one to over two years. Developers, investors, and owners of new renewable energy generation are primarily concerned with how effective the RES has been in bringing new supply into operation (and thus producing returns on their investments) in a timely and effective manner. By that

perspective, contracted supply is lagging behind the RES obligations established based on a faster transition of contracted to operating supply than has materialized to date. The state's efforts to address siting issues through the Accelerated Renewable Energy Growth and Community Benefit Act was passed to mitigate some of the key obstacles to meeting new renewable energy development goals.[87]

Baseline Renewable Energy: From the policymaker perspective, maintaining the supply of baseline renewable resources contributes to meeting the state's renewable energy goals. While the 2018 CES Progress Report finds that the contribution from baseline (all non-Tier 1) renewable resources increased by 0.9% of load from 2014 to 2018, the change is driven by increases in solar and hydroelectric, and decreases in wind, biomass, and biogas. To owners of baseline renewable generation, RES program effectiveness is measured by its ability to offer sufficient revenue and incentive to keep baseline resources operating and continuing to serve New York load. Declining production and export of non-NYPA baseline supply suggests that facilities choosing to export or cease operations have been unable to economically justify supplying their historical level of electricity and attributes to New York state load. Ratepayers will be negatively impacted by a loss of baseline resources, if the cost of replacing existing renewables with new renewables exceeds the cost to retain the baseline renewables in New York. As discussed later in the report in Section 10, policymakers are considering a number of options designed to retain baseline resources.

5.4 Goal: Increase Renewable Energy Development

To successfully increase renewable energy serving New York load, continued development of new renewable energy projects is necessary. The RES aims to stimulate renewable energy development activities through offering ongoing REC procurements (to provide a financeable revenue stream) and establishing Tier 1 REC obligations on LSEs (to create demand for new renewable energy generation). Progress towards achieving the goal of increasing renewable energy development activity can be measured through observing the pipeline of projects in New York State, and by observing projects that reach successful commercial operation.

[87] Accelerated Renewable Energy Growth and Community Benefit Act

5.4.1 Design Improvements under RES to Date

New York's central procurements of RECs under long-term agreements plays a key role in establishing a route to revenue stability which is usually necessary to secure investment in building a project. Design decisions can make the New York market more or less effective at successfully capturing developer interest. Elements of program design that affect a developer's perception of risk and opportunity include the procurement structure, contract structure, what is purchased and how revenues are hedged through a contract, the transparency and predictability in procurement timing, frequency, and quantities sought, the scale and visibility of Tier 1 targets, the setting of the ACP level, and the perceived fairness and competitiveness of bidding and award selection. Table 26 summarizes some key design element improvements implemented since the Main Tier RPS designed to stimulate developer interest.

Table 26. RES Design Changes to Increase Predictability and Certainty to Developers

Design Element	Improvements Implemented Since RPS	Expected Impact
Contract Structure	More flexible contract quantity; Index REC providing hedge of energy and capacity revenue	Reduced developer risk translating to lower Fixed-Price RECs
Development Milestones	Aligning award period with contract security due dates; Extending period from award notification to initial Commercial Operation Milestone Date to 2 years; adding two additional 6-month milestone extension periods in RESRFP19-1	Aligned agreement with interconnection and permitting processes and timelines
Procurement Frequency, Timing, Visibility	Introduced annual procurement schedule	Long-term visibility aligns with payback timeline on early development investments, timing of interconnection study periods
Obligation Target Visibility, Quantities Sought	Targets announced several years in advance	Enhanced investor confidence in developers' opportunity to secure a contract

The following discussion elaborates on two of these examples.

Frequency of procurement: The Commission required that NYSERDA issue at least one procurement for Tier 1 RECs annually during the first half of the year, with the option to issue a second solicitation in the same year if the first is unable to procure the targeted amount. The Order makes the case for regularly scheduled, ongoing procurements in contrast to the RPS, under which procurements were budget-bounded

and offered on a periodic basis with no predictable schedule.[88] Table 27 demonstrates that since the start of the RES, NYSERDA has successfully issued a Tier 1 REC procurement on an annual basis. The procurement schedule to date has shown significantly more predictability than procurements under the RPS. While awarded developers were all confidentially notified of their awards on a timely basis, there has been some inconsistency in the time between bid submission and public announcement of awards.

Table 27. Timing of RESRFPs

	Date Issued	Final Submission of Bids	Awards Announced
RESRFP17-1	June 2, 2017	September 28, 2017	March 2018
RESRFP18-1	April 25, 2018	August 16, 2018	January 2019
RESRFP19-1	April 23, 2019	September 10, 2019	March 2020

Hedging opportunities through awarded contract: The procurements under the RES to date have offered contracts for a Fixed-Price REC. As discussed in Section 6.1, this approach differs from renewable energy procurement in several neighboring states, where products purchased through a solicitation also include energy and sometimes capacity rights. There is little data available, however, to assess how New York's Fixed-Price REC structure influenced developers' decisions on whether to operate in New York. The decisions by several New York wind and solar projects to seek and secure long-term contracts with utilities in New England, as discussed in Section 8.6, provides evidence of developer preference for a fully hedged offtake. Adoption of the Index REC approach, to be included for the first time in RESRFP20-1, is intended to materially enhance the revenue stability offered to bidders by hedging energy and capacity revenues. Section 8 details NYSERDA's experience with a Fixed-Price REC to date, and the expected impact of plans to accept Index REC bids in RES procurements.

5.4.2 Stimulating investment by renewable energy developers in the New York development pipeline

It takes considerable time and financial investment for a company to establish a business presence in a new market, and advance early-stage development activities. Early stage development activities include site screening, securing site control, conducting environmental and engineering surveys and studies, performing design work, seeking interconnection authority and permits, and establishing communications

[88] CES Order, p 113

with local communities. Developers and their investors work entirely at-risk until commercial operation. Because most developers engage in development activities across multiple markets, attracting renewable energy development in New York State requires that the state offer a business environment perceived as attractive compared to opportunities elsewhere.

Pipeline Activity: Evidence of investment in the development pipeline can be observed in interconnection queues and permitting applications. Section 9 provides a more in-depth evaluation of the status of Article 10 applications and the NYISO interconnection queues. The number of Article 10 cases initiated by year since 2015 (Table 28), and the number of projects entering the interconnection queue since 2015 (Table 29) demonstrate a general increasing trend in development activity since the August 2016 CES Order. Most active Article 10 cases relate to RES-eligible projects, and the majority have been initiated in 2017 or later, after the start of the RES program. Similarly, there has been a notable uptick in interconnection applications after 2015. Projects continued to enter the queue in significant numbers in 2017 and beyond. Most of the growth has come from utility-scale solar development activity, while land-based wind development activity has declined.

Table 28. Article 10 Cases Initiated, by Year[89]

Year	# of Wind Projects	MW of Wind	# of Solar Projects	MW of Solar	Total # of Projects	Total MW
Prior to 2015, total[90]	3	360	0	0	3	360
2015[91]	2	692	0	0	2	692
2016[92]	8	1,478	0	0	8	1,478
2017	1	340	9	736	10	1,076
2018	1	100	5	725	6	825
2019	1	147	17	3,543	18	3,690
2020 through Q1	0	0	9	1,495	9	1,495
Total	**16**	**3,117**	**40**	**6,499**	**56**	**9,616**
Under Contract	7	1,215	15	2010	22	3,225

89 New York State Board on Electric Generation Siting and the Environment. (2020, March 17). Active Article 10 Queue. Retrieved March 31, 2020, from http://www3.dps.ny.gov/W/PSCWeb.nsf/All/763B187DD5A792DE8525847400667D6B?OpenDocument

90 Excludes one project that has since withdrawn from Article 10 Review

91 Excludes one project that has since withdrawn from Article 10 Review

92 Excludes one project that has since withdrawn from Article 10 Review

Table 29. Renewable Projects Entering NYISO Interconnection Queue[93]

Year	# of Wind Projects	MW of Wind	# of Solar Projects	MW of Solar	Total #	Total MW
Prior to 2015, total	9	1,155	2	115	11	1,270
2015	7	1,212	2	111	9	1,323
2016	6	1,060	16	319	22	1,379
2017	1	339	18	1,588	19	1,927
2018	1	101	29	2,368	30	2,469
2019	2	445	46	5,492	48	5,938
2020 through Q1	0	0	1	20	1	20
Totals	**26**	**4,312**	**114**	**10,013**	**140**	**14,325**
Under Contract	7	1,362	51	2,710	58	4,072

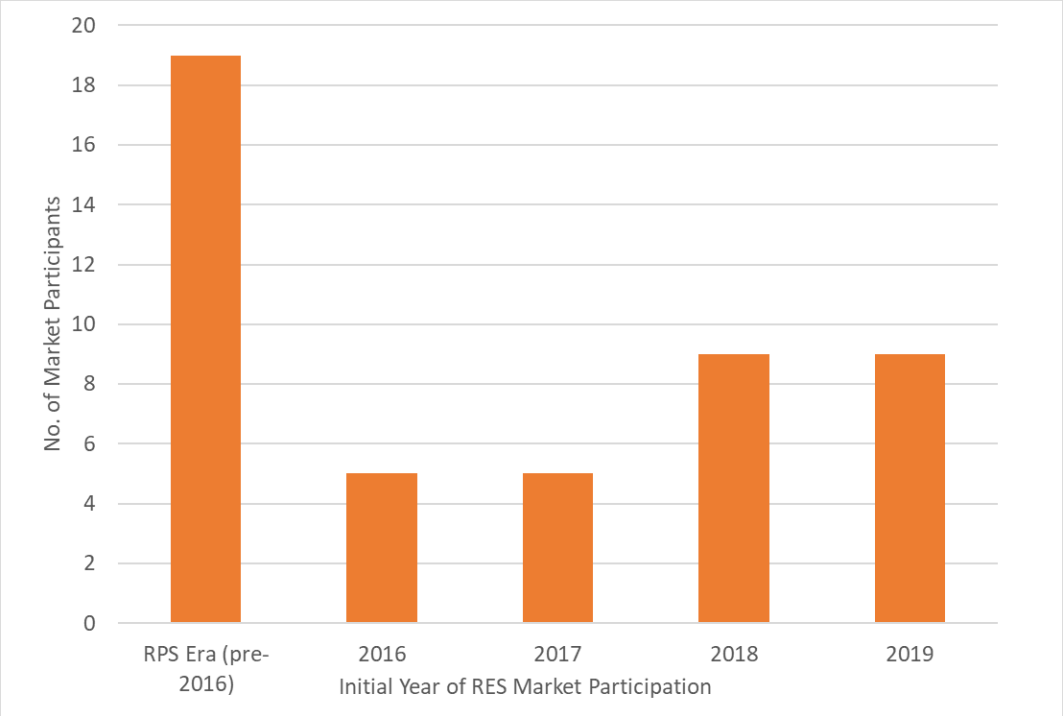
Developer response to RFPs: Another data point to understand how developers perceive the attractiveness of the New York market, and particularly NYSERDA's procurements under the RES, is the number of bids received in response to each solicitation. Table 1 in Section 2.1 summarizes the robust response evidenced by the number of applications received for each RES procurement and the number of developing entities submitting the bids.

Additional indicators of developer interest include trends in market entry into New York by new developers over time. Figure 9 compares the number of developers new to New York that have entered the LSR market with the developer cohort active in the state in the prior RPS era, year of entry represents the entry of a developers' first project in the NYISO interconnection queue. This figure shows that an additional 28 developers have entered the New York LSR market, and at an increasing rate, compared to 19 active during the RPS era. New entrants represent a diverse range of development companies, varying by geographic range of renewable energy development activity (international, national, regional, local, single asset), scale, scope (developer, owner/operator or both), focus (renewable energy vs. broader range of generation), and affiliation (independent and utility affiliate). The majority of the newest entrants into the New York market have a solar focus, and several developers whose initial forays into New York's

[93] New York Independent System Operator. (2020). Interconnection Queue. ("NYISO Interconnection Queue.") Retrieved February 29, 2020, from https://www.nyiso.com/documents/20142/1407078/NYISO-Interconnection-Queue.xlsx/b5d2d932-225a-10e6-5b45-075acb4fb4a9?t=1583780816556

LSR market were focused on wind, hydroelectric or biomass have added solar to their development efforts. Overall, this data reveals a material and increasing boost of interest in New York and investment in advancing development in New York from a wide variety of development companies with diverse focus, scope, experience and capitalization.

Figure 9. New Developer Entry into New York LSR Market



5.4.3 Increasing Successful Renewable Energy Procurement

The ultimate measure of increasing development is how successfully New York's procurements result in contracts with viable projects that produce renewable energy in the expected timeframes and quantities.

Projects receiving NYSERDA contracts: A primary metric to evaluate the success of state procurements is to consider the number of Tier 1 eligible renewable energy generators supported by NYSERDA procurements. As shown in Table 2, in Section 2.1, NYSERDA has contracted with a total of 67 new renewable energy projects (including incremental upgrades), supporting a total of over 4 GW of new generation under development. In comparison, NYSERDA contracted with 87 projects from 2004 – 2016 under the RPS, with total capacity of 2.5 GW. Thus, in only three years, the RES has already contracted

with almost twice the amount of new renewable capacity supported through over ten years of the RPS. In comparison to the procurement targets in each of the RES solicitations, NYSERDA procured a quantity significantly higher than the targets announced in each RFP.

Contract attrition and project delays: As discussed in Section 2, NYSERDA has seen only modest attrition from awarded REC contracts to date. Contract terminations shown here include both (i) project failures and (ii) projects that remain in active development, but whose owners terminated a NYSERDA REC Purchase and Sale Agreement, but subsequently continued their efforts to develop the projects through other means.

As noted in Section 2.5, the ultimate level of contract attrition is not yet visible, as projects have not reached the limit of the allowable extensions to reach commercial operation. However, due to development and construction delays, anticipated generation from contracted resources has been delayed. Figure 7 shows that contracted REC supply is lagging 1 to 2 years behind initial expectations of procurement activity used to set LSE obligations, as there are no projects selected under the RESRFPs that have reached commercial operation to date.

5.4.4 Conclusions

The policymaker objective in increasing the renewable energy development pipeline is to (i) ensure sufficient investment by developers in a robust pipeline of renewable energy projects under development to achieve the state's renewable energy targets, and (ii) with sufficient competition to minimize costs. The Commission and NYSERDA have made several revisions from the earlier Main Tier RPS procurements, establishing, executing and evolving the RES procurements and program to increase the attractiveness of the New York market.

Those steps have resulted in increased activity in the development pipeline, demonstrated by:

- A growing number of projects and MW entering the NYISO interconnection queue and submitting Article 10 siting applications;
- Robust response to NYSERDA procurements; and
- Accelerating entry into the New York market by developers with a wide variety of characteristics, notably including a significant number of national and international players with a high degree of sophistication and market experience.

The design features of the RES program have allowed NYSERDA to attract robust competition, attractive pricing, and a significant volume of bids. If all of the contracted projects are successfully brought to commercial operation, NYSERDA would exceed its targets in all three solicitations. However, many of these projects have not reached successful commercial operation on the anticipated three-year timeline used to set LSE obligations. Project delays indicate significant challenges that must be addressed in order to continue investment in the development pipeline; one approach to address these challenges is the recent enactment of the *Accelerated Renewable Energy Growth and Community Benefit Act*, discussed further in Section 9.2.

5.5 Goal: Reduce GHG emissions towards state goals

The State Energy Plan outlined a goal of reducing New York State greenhouse gas emissions 40% below 1990 levels by 2030.[94] That goal was reaffirmed through the CLCPA, which further expanded the State's goals to reduce emissions 85% by 2050. Section 4 summarizes the estimated greenhouse gas emission reductions resulting from RES-eligible renewable energy resources contracted to date by NYSERDA. Total greenhouse gas reductions from Tier 1 resources contracted by NYSERDA to date, should projects be successfully developed, are estimated to be approximately 5 million metric tons per year by 2030.

The emission reductions presented in Section 4 represent only the contributions from resources contracted to date, with future procurements expected to contribute additional emission reductions. Procurement targets increase through 2022, and offshore wind and programmatic activity through NY-Sun and the VDER program are also expected to support new renewable resources. Thus, the reductions from previously contracted resources indicate that the RES is making progress towards the state's emission goals, but 1 to over 2 years behind the pace initially envisioned in the CES August 2016 Order, which assumed projects would be available 3 years following a NYSERDA award.

94 CES Order

5.6 Goal: Stimulate economic benefits and job creation in New York

The CES August 2016 Order emphasizes the role that the RES and CES will have in creating opportunities for investment, economic growth, and maintaining and creating clean energy jobs.[95] The RES aims to achieve these objectives in large part by including economic benefit claims as evaluation criteria in NYSERDA's procurements, worth 10% of the overall bid score. As discussed in Section 3, economic benefits claims are verified by NYSERDA once a project enters year four of commercial operation and NYSERDA has the right to impose a contractual adjustment on the REC bid price should any project fail to meet 80% of those claims. The development and operation of contracted renewable energy projects is estimated to generate over $1.5 billion in long-term economic benefits to New York State, plus almost $700 million in short term spending.

It is worth noting that the total economic benefits summarized in this report represent anticipated direct investments made in New York State to support the development and operation of contracted resources only, and do not include indirect economic benefits resulting from those projects.

The economic benefits and jobs stimulated by the RES are of high importance to policymakers, as well as to ratepayers, some of whom also benefit from economic growth in the state. From both perspectives, the RES is stimulating positive economic impacts. The economic benefits represent only a portion to the state's investment, as expected, given the primary objectives of the RES to increase renewable energy generation. When considering job growth and indirect economic benefits, the contribution to economic growth is more positive, but difficult to quantify in relation to the public investment.

5.7 Goal: Minimize ratepayer costs by meeting RES, CES, and CLCPA targets in a cost-effective manner

The CES Order also sets forth the objective that the state meet its renewable energy goals in a cost-effective manner.[96] Several aspects of the RES are designed with that objective in mind, including: the use of a competitive procurement evaluated with 70% weight on cost; an option for LSEs to comply

95 CES Order, p 7

96 CES Order, p 17

with their obligations via an ACP, which caps compliance costs at a 10% premium above NYSERDA REC resale prices; the ability of LSEs to bank Tier 1 RECs for compliance in the subsequent two compliance years; and the option for LSEs to purchase Tier 1 RECs from the market.

One measure of the program's effectiveness at minimizing ratepayer cost is successfully deploying a competitive procurement process that drives down REC prices over time. As shown in Table 1 in Section 2.1, REC sale prices dropped from a weighted average of $21.71 per REC in RESRFP17-1 to $18.52 per REC in RESRFP18-1, roughly leveling off at $18.59 in RESRFP19-1. This trajectory, especially in the face of declining federal tax incentives and past deployment of many of the easiest best (from a resource perspective) and easiest (from a siting perspective) project locations, is an indicator of success resulting from robust competition and declining costs.

Ratepayers ultimately cover the costs of the RES program through payments to their LSEs for electric supply service. Thus, minimizing LSE compliance costs minimizes ratepayer costs. The exact level of LSE compliance costs in the first years of the program are not definitively knowable from the data available but may be approximated. Table 30 presents an estimate of LSE compliance costs, based on the following simplifying assumptions:

- All Tier 1 RECs that LSEs purchased from NYSERDA by the issuance of each year's CES Progress Report were used for compliance in the same vintage year;
- Prices for market Tier 1 RECs are estimated to be halfway between NYSERDA's resale price and the ACP, consistent with shortage conditions. The market is still developing for Tier 1 RECs, and this value represents a reasonable estimate given the lack of data on market REC prices; and
- All RECs banked by LSEs used for compliance in 2018 are market vintage 2017 RECs previously banked.

Table 30. Estimated LSE Compliance Costs

	2017			2018		
	MWhs	$/MWh	Total Cost	MWhs	$/MWh	Total Cost
Estimated CY Vintage RECs from NYSERDA	27,803	$21.16	$588,311	44,369	$17.01	$754,717
Estimated CY Market RECs[97]	6,743	$22.22	$149,816	35,679	$17.86	$637,245
VDER RECs	1	$24.24	$24	2,427	$27.41	$66,524
Banked RECs	0	-	$0	3,282	$22.22	$72,919
ACPs	6,098	$23.28	$141,937	92,169	$18.71	$1,724,482
Total	40,645		$880,089	177,926		$3,255,887

LSE compliance costs have an upper limit, the cost of using ACPs for all compliance. The lower limit of compliance costs is less precisely knowable, as market RECs could be higher or lower than the resale price of NYSERDA-procured RECs. In the presence of a true surplus, market RECs would likely have a lower price than the NYSERDA resales price, and if enough market RECs were available, compliance could be met entirely with market RECs.[98] Since 2018 did not have a REC surplus, and several LSEs used ACPs to comply in 2017, the estimated LSE costs as presented in Table 30 can be compared with the upper limit of costs (100% ACP compliance) and a lower bound estimate (100% NYSERDA CY Vintage RECs). As shown in Table 31 the estimated LSE compliance costs falls midway between the two bounds, slightly closer to the lower bound in 2017 and closer to the higher bound in 2018.

Table 31. Range of Possible LSE Compliance Costs[99]

	2017	2018
LSE Obligation (MWh)	40,582	179,377
ACP ($/MWh)	$23.28	$18.71
Upper Bound: Total Cost - 100% ACPs	$944,749	$3,356,144
NYSERDA REC Resale Price ($/MWh)	$21.16	$17.01
Lower Bound: Total Cost - 100% NYSERDA RECs	$858,715	$3,051,203
Estimated Compliance Costs	$880,089	$3,255,887
Estimated Cost due to REC Shortfall (%)	2.5%	6.7%

97 Estimated at halfway between the NYSERDA Resale Price and the ACP, during years in which there is an overall market shortage.

98 Going forward, broker quotes for Tier 1 RECs in 2019 and thereafter may make market REC prices, and overall compliance costs, more transparent.

99 Totals shown may differ

LSE costs of purchasing RECs may also be compared to NYSERDA's costs of procuring those same RECs. Section 2.1 presents the actual weighted average REC price to NYSERDA in 2017 and 2018 resulting from the composition of projects operating and producing RECs. This actual weighted average REC cost to NYSERDA differs from the REC resale price charged to LSEs, which was based on earlier estimations of contracted supply that would be online. Table 34 summarizes the difference between NYSERDA's actual costs and revenues driven by this variance in REC price.

Table 32. Total NYSERDA Costs of Procuring RECs, 2017-2018

	2017	2018
NYSERDA's Actual Weighted Average REC Cost[100]	$16.67	$16.83
NYSERDA REC Resale Price ($/MWh)	$21.16	$17.01
Number of RECs procured[101]	41,891	46,156
Total NYSERDA Costs	$698,264	$776,577
Total NYSERDA Resale Revenue	$ 886,414	$785,114
Cost Variance	$188,150	$8,536

This variance represents a cost born by ratepayers, as LSEs have purchased RECs at a price above NYSERDA's cost to purchase. Thus, the total costs above the lowest possible cost outcome (compliance with 100% NYSERDA resold RECs at the same value as purchased) are presented in Table 33. The comparison is most telling over the total two-year period, as REC sales may occur in a year past the vintage of that REC.

Table 33. Total RES Cost vs Ideal

	2017	2018	Total
Lower Bound Compliance Costs: 100% NYSERDA RECs @ Price NYSERDA Paid	$676,444	$3,018,028	$3,694,473
Estimated Compliance Costs	$880,089	$3,255,887	$4,135,976
Total Cost Above Minimum (%)	30.1%	7.9%	12.0%

[100] Weighted average cost of RECs actually acquired by NYSERDA

[101] Total costs differ from the product of the REC Cost and # of RECs shown in the table due to rounding (totals shown based on more precise value of actual weighted average REC Cost).

The ratepayer and policymaker perspectives in achieving this goal are the most pronounced, though LSEs share the objective of minimizing costs to their customers. As noted in Section 13, some LSEs have utilized banking to mitigate their cost exposure in the presence of expected REC shortages. The analysis above demonstrates that the heavy reliance on ACPs to date, particularly in 2018, has resulted in total costs that are moderately higher than a reasonable estimate of minimum compliance costs by 3% in 2017 and 7% in 2018. LSEs have also incurred higher costs of REC purchases than the costs to NYSERDA to procure the same REC, driven by the lag in contracted supply becoming available. Combined, the use of ACP payments and the REC price differential results in a 12% increase over the lowest cost outcome across the two years of the RES program. [102]

5.8 Conclusions/Key Findings

Table 34 and Table 35 summarize the progress of the RES program towards the RES and CES goals, highlighting for each goal the metrics used to evaluate progress towards the goal, the results of the analyses to measure success, and the conclusions on how much progress has been made from the perspectives of the most relevant stakeholders.

[102] NYSERDA is under direction from the Commission to use any such collections to reduce programmatic costs for ratepayers.

Table 34. Summary of RES Contributions to State Clean Energy Goals

Goal	*Metrics* & Measures of Success	Conclusion from relevant perspectives
Increase renewable energy production consumed in New York State	***Total renewable energy consumed in New York State***. Total renewable energy went from 25.9% in 2014 to 26.8% in 2018	Policymakers: modest progress to date towards achieving the state's renewable energy goals, but an accelerated upward trend is necessary to meet those goals.
	New renewable energy production consumed in New York State. Total Tier 1 RECs consumed for all purposes in New York was 232% of LSE obligations in 2017 and 75% of 2018 obligations. LSEs opted to utilize ACPs to meet 24% of 2017 obligations and 52% of 2018 obligations.	Policymakers: The pace of new renewable energy growth thus far has not met policymakers' expectations. Ratepayers: LSEs used ACPs in 2017 for administrative ease rather than by necessity (i.e. there was not a REC shortage). In 2018, however shortfalls in REC availability relative to Tier 1 targets results in a reliance by LSEs on ACPs for a material portion of compliance. Developers: The level of contracted supply reaching commercial operation to date has not met the goals of renewable energy developers, owners, and investors.
	Baseline renewable energy production consumed in New York State. Total Non-Tier 1 generation increased from 2014 to 2018 by 0.9% of load. Of that total, hydroelectric and non-Tier 1 solar production increased by almost 2.2 TWh. Baseline wind, biomass, and biogas consumption in New York decreased by 1.15 TWh due to changes in production and exports. Exports of baseline wind, biogas and non-NYPA hydroelectric totaled 1.67 TWh in 2018.	Policymakers: Supply from wind, biomass and biogas in the baseline has fallen by 1.15 TWh since 2014. If not ultimately retained, these quantities will need to be made up by additional new renewables to meet CES and CLCPA targets. Ratepayers: If the cost of replacing baseline renewables with new renewables exceeds the cost to retain baseline renewables in New York, costs could increase due to a loss of baseline resources, Owners of baseline renewable generation: Owners of baseline wind, biogas and non-NYPA hydro resources exported approximately 0.5 TWh more of New York baseline RECs in 2018 than in 2014, presumably to access higher priced markets.
Increase Renewable Energy Development	***Investment by renewable energy developers in the NY development pipeline.*** The number of Article 10 cases initiated and projects entering the NYISO interconnection queue increased materially since 2015. Developer response to RESRFPs has been robust. Developer market entry shows material and increasing interest in New York and investment in New York development activities, from companies with diverse focus, scope, experience, and capitalization.	Policymakers: Revisions to the RES procurements and program have successfully increased developer activity and investment in the development pipeline. Developers: Dependable annual procurements have led to significant market interest. Developer activity since the announcement of the 50% by 2030 target in 2015 indicate that the RES program has been successful in stimulating investment and interest.

Table 34 continued

Goal	*Metrics* & Measures of Success	Conclusion from relevant perspectives
	Increasing successful renewable energy procurement. RES procurements have led to a large and increasing number of renewable energy projects with contracts, which far exceeds those achieved under the RPS. Although NYSERDA has experienced only modest contract attrition to date, projects are taking significantly longer to develop than expected.	Policymakers: NYSERDA's procurements have been successful at generating contracts with projects that would produce RECs to meet or exceed targets; however, projects are taking significantly longer to reach commercial operation than expected. Developers: Highly competitive bids submitted to NYSERDA procurements suggest optimism in the market, but delays in projects reaching commercial operation indicate challenges that must be addressed to be fully successful.
Reduce greenhouse gas emissions towards state goals	***Estimated emission reductions from RES-contracted resources***. RES-contracted resources are expected to contribute approximately 5 million metric tons of GHG emission reductions towards the SEP and CLCPA goal of reducing emissions 40% below 1990 levels by 2030.	Policymakers: Reductions from previously contracted resources indicate that the RES is making progress towards the state's emission goals, but 1 to over 2 years behind the pace initial envisioned in the CES August 2016 Order.
Stimulate economic benefits and job creation in New York	***Total economic benefits and jobs generated from RES-contracted resources***. Based on a 20-year extrapolation of 3 year economic benefit claims submitted with project bids, contracted resources will generate ~$2.2 billion in direct investment in New York State. RES resources will generate 117 long-term jobs and 3,671 short term FTEs.	Ratepayers and Policymakers: The RES is stimulating material direct economic impacts, at a level of approximately two thirds of the state's direct investment, while creating short-term and long-term jobs.
Minimize ratepayer costs by meeting RES, CES, and CLCPA targets in a cost-effective manner	***Declining REC Prices.*** REC prices dropped from a weighted average of $21.71 in RESRFP17-1 to $18.59 in RESRFP19-1, despite falling federal tax incentives. ***Estimated LSE compliance costs***. Estimated LSE compliance costs have been higher than the costs of complying completely with RECs purchased from NYSERDA by 3% in 2017 and 7% in 2018. LSEs have paid almost $200,000 more for RECs than NYSERDA's costs of purchasing those RECs.	Ratepayers, Policymakers and LSEs: The lag in contracted supply resulted in a reliance on ACPs in 2018 and has resulted in LSEs complying at a higher cost than actually incurred by NYSERDA in purchasing RECs.

6 A Comparison of Other States' RPS programs to New York's RES Approach

This section evaluates the progress of New York's RES Program compared with the progress of policy-driven renewable energy long-term contracting requirements or programs in other states. Comparisons of states' relative progress are made with respect to:

- **Procurement:** A state's level of renewable energy procurements and its success in bringing procured projects to fruition.
- Current Status of LSEs Meeting their Obligations: This is a function of:
  - **Targets:** A state's LSE Tier 1 [103] percentage target obligations.
  - **Success in achieving targets:** A state's success at increasing the amount of renewable energy consumed in the state, through indicators of surplus or shortage including use of RECs versus ACPs for compliance, as well as market REC prices.
- **Evolution of Policy:** How the renewable energy policy mechanisms have evolved over time.

The markets evaluated in this section as benchmarks for New York are other northeast and mid-Atlantic states the with similar competitive market structures and renewable energy targets, including the New England states of Connecticut, Massachusetts, Maine, New Hampshire and Rhode Island, and the PJM states of Maryland, New Jersey and Pennsylvania.

6.1 Renewable Energy Solicitation Progress

New York is unique among the states evaluated in this Report because of its use of NYSERDA as a central procurement agent for Tier 1 renewable energy supply. In the other markets evaluated here, procurement authority is enabled by each state's legislature, and implemented through contracts with the state's investor-owned electric distribution utilities (EDCs), who provide (with the backing of regulatory approval collections from ratepayers) the credit necessary to enable project financing. Procurements are conducted by either the EDCs with state agency oversight, by state agencies, or by EDCs and agencies together, with precise roles varying by state. The distribution utilities serve as the contract counterparty in all cases. In New York, the RES procurement and Tier 1 obligation are intimately tied, with procurement intended to feed the obligation with most of its supply and NYSERDA as the primary and central source of compliance RECs to obligated LSEs. In the benchmark states, solicitations offering long-term

[103] Referred to as "Class I" in many markets, and "new" in Rhode Island.

contracts to renewable generators represent policies to support financing that have generally been developed separately from RPS targets (this Report uses the term RPS when referring to this type of policy generally and across multiple markets). RECs are often resold into regional markets and may in such cases end up being used for compliance in a state other than the one sponsoring the procurement.

The New England states have been conducting sporadic long-term procurements for Tier 1 (this Report uses the term Tier 1 when referring to this type of REC generally and across multiple markets) renewable energy, both independently and on two occasions[104] jointly, since 2005. This provides useful benchmarks regarding participating technologies, quantities procured, and rates of contract cancellation. By comparison, the PJM benchmark states have not adopted policy-driven procurement as a mechanism to drive renewable energy deployment. The exceptions to this general experience are New Jersey and Maryland's dedicated offshore wind renewable energy credit (OREC) procurements.

While offshore wind procurement is generally outside the scope of this Report, it is nonetheless important to note how offshore wind contributes to renewable energy targets in each market. New York and PJM largely treat offshore wind as an OREC carveout not directly applied towards compliance with Tier 1 LSE obligations, producing no Tier 1 RECs. The exact opposite is true in New England – where offshore wind facilities create RECs for Tier 1 compliance and not only participate in dedicated offshore wind RFPs but also head-to-head (sometimes successfully) with land-based resources in other competitive solicitations. While these differences are important from a policy design perspective, offshore wind procurement is included for all states in this analysis in order to generate a fair comparison of procurement activity to date. More detail regarding the features and characteristics differentiating these procurement policies is provided in Section 8.

6.1.1 Competitive Procurements in New England

In New England, the majority of state-sponsored competitive procurement of LSRs to date has originated through legislation in Massachusetts, Connecticut, Rhode Island and Maine. Long-term RPS Tier 1 contracts in New England have varied in duration from five to twenty

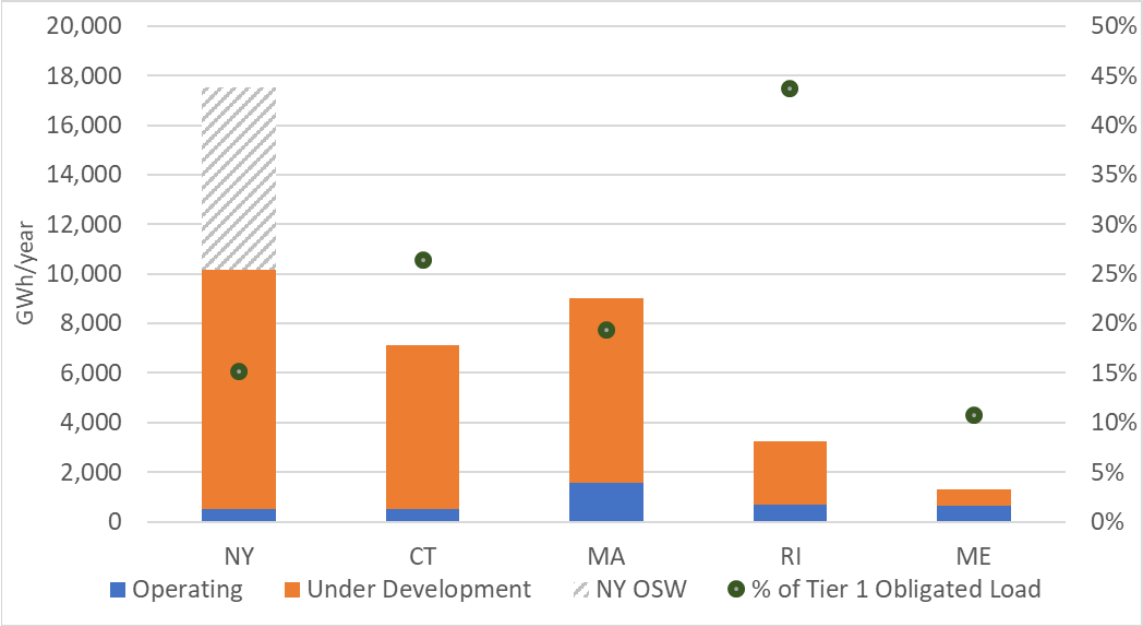
[104] One such joint exercise was the tri-state Clean Energy RFP, discussed further below; the other was the first Massachusetts Section 83C offshore wind RFP, which allowed other states to opt-in to reviewing proposals and selecting projects to contract with, and which resulted in a Rhode Island offshore wind contract.

years. The percentage of total production conveyed under resulting contracts has varied widely but is typically between 50% and 100%. The EDCs are always the contract counterparty, but the product or products purchased varies by state. The earliest long-term contracts in New England created a fully bundled hedge – energy, capacity, and RECs were all sold by the asset owner to the EDC. Today, partial hedges are the norm, although the details differ by state. For example, in Massachusetts and Rhode Island, long-term contracts typically include energy and RECs, with most RFPs offering REC-only options as well. In Connecticut, long-term contracts may be either energy and RECs or REC-only, depending on the program. No capacity hedge is currently offered in either state. In Maine, large-scale[105] renewable energy contracts to date have, due to their different statutory drivers as well as changes to prevailing statutory authority over time, typically offered energy and capacity, or REC-only options, but not both. Looking ahead, however, the Maine PUC recently authorized bidders to the forthcoming 2020 large-scale renewable solicitation to include offers for energy *and* RECs. Another important consideration is the EDCs' disposition of energy and/or RECs purchased through policy-driven long-term contracts. In New England, either all energy, capacity (if procured) and RECs, or in many cases just excess RECs (those not required to meet the utilities' Tier 1 obligations), must be resold – with the net proceeds credited (if resale price exceeds cost) or charged (when cost exceeds resale revenue) to all distribution customers. The implications of energy, capacity, and REC purchases, REC disposition policies, and other characteristics of these procurements are described in more detail in Section 8.

Figure 10 compares RES procurement activity in New York to RPS activity New England. The stacked bars measure GWhs currently under contract, by state and project status. The green circles denote the percentage that this contracted supply represents as a percentage of RES obligated load and is measured on the right-hand axis. While New York's offshore wind policy is implemented separately from RES Tier 1 procurement, contracted offshore wind quantities are included here for comparison purposes because the New England states fully integrate offshore wind as a tool for Tier 1 RPS compliance.

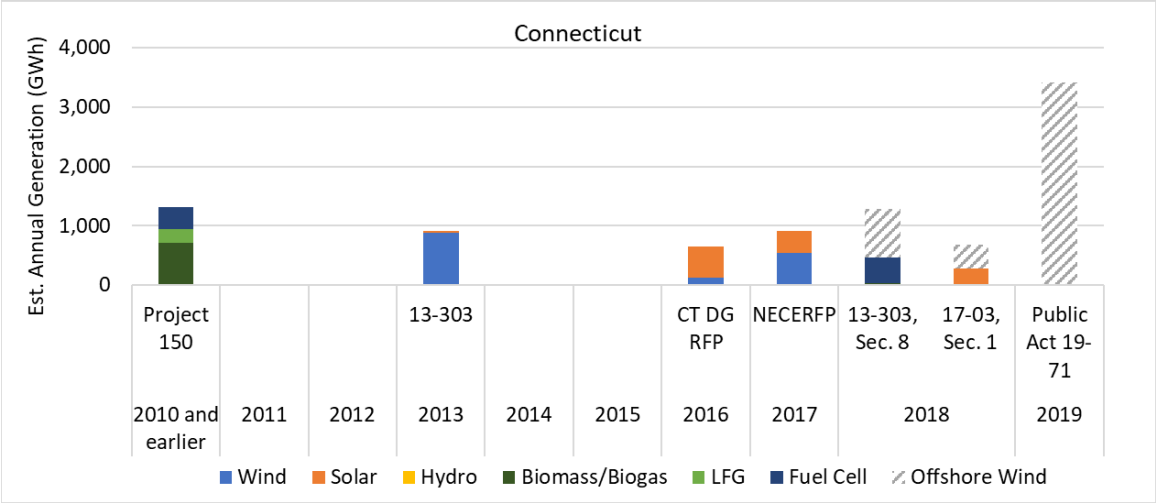
[105] Maine's small-scale Community Renewable Energy Pilot Program offers contracts for both energy and RECs.

Figure 10. Tier 1 Procurement by State & Status, and as % of Tier 1 Obligated Load



The following figures show procurement activity for each of the benchmark states by year[106], by technology. Procurement of offshore wind resources is called out to help facilitate discussion of the differential treatment of offshore wind for Tier 1 compliance between New England and New York. Figure 11 summarizes Connecticut procurement to date by technology.

Figure 11. Connecticut Solicitation Annual Tier I Production, by Technology



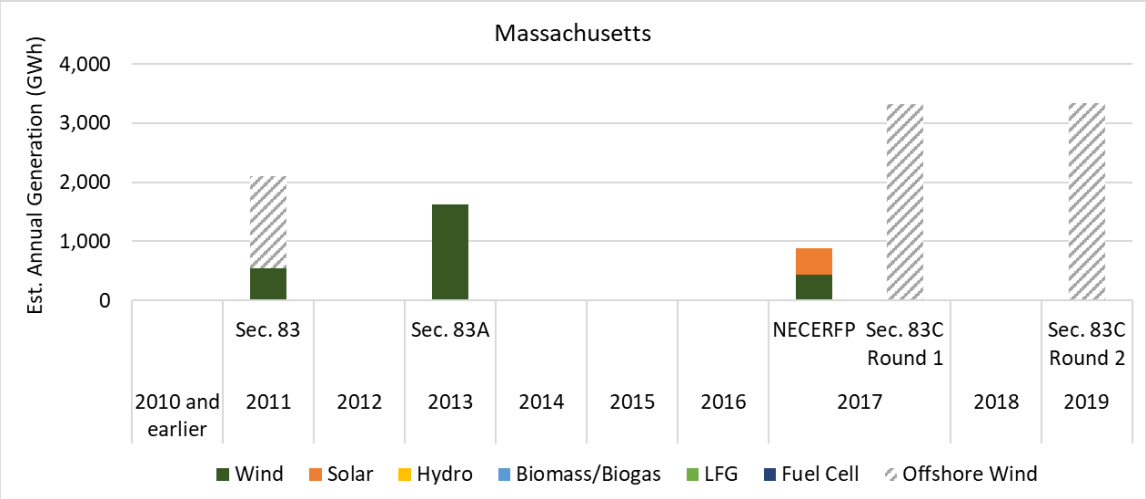
[106] The calendar year in which awards were made.

Connecticut has had a sporadic approach to renewable energy procurement under a broad range of distinct procurement authorities. The state was an early adopter of long-term contracts as a renewable energy policy tool. It's earliest RFP dates to 2005. By 2013, CT had contracted for approximately 2,000 GWh per year from Class I-eligible facilities. An incremental 3,500 GWh were added between 2016 and 2018. The 2018 procurement included Connecticut's first 300MW of offshore wind. In 2019, CT selected another 3,500 GWh per year from 804MW of offshore wind through a targeted offshore wind procurement under its Public Act 19-71 authority. The various procurement statutes have vested a substantial amount of remaining unused renewable energy procurement authority with the Connecticut Department of Energy and Environmental Protection (DEEP). DEEP has foreshadowed its intent to lay out a plan for future procurement using this aggregate authority in its Integrated Resource Plan, to be issued in mid-2020.[107]

Massachusetts issued its first solicitation for large-scale renewables in 2011. Commonly referred to by the section number from its enabling legislation, this Section 83 solicitation is notable in that five of the seven selected facilities terminated their contracts within several months of approval. Another project, the 468 MW Cape Wind project, was contracted by the state's two largest EDCs under this authority on a negotiated (non-competitive) bases, but despite contract approval, the project ultimately failed after being tied up in years of litigation. Approximately 1,500 GWh of Class I RECs are now produced by land-based wind facilities that received contract under either the Section 83 RFP or subsequent Section 83A RFP. After several years of legislative debate, additional procurement authority was passed, and competitive solicitations resumed in 2017. Figure 12 summarizes Massachusetts procurement to date by technology.

[107] See: http://www.dpuc.state.ct.us/DEEPEnergy.nsf/$EnergyView?OpenForm&Start=1&Count=30&Expand=7&Seq=4.

Figure 12. Massachusetts Solicitation Annual Tier I Production, by Technology

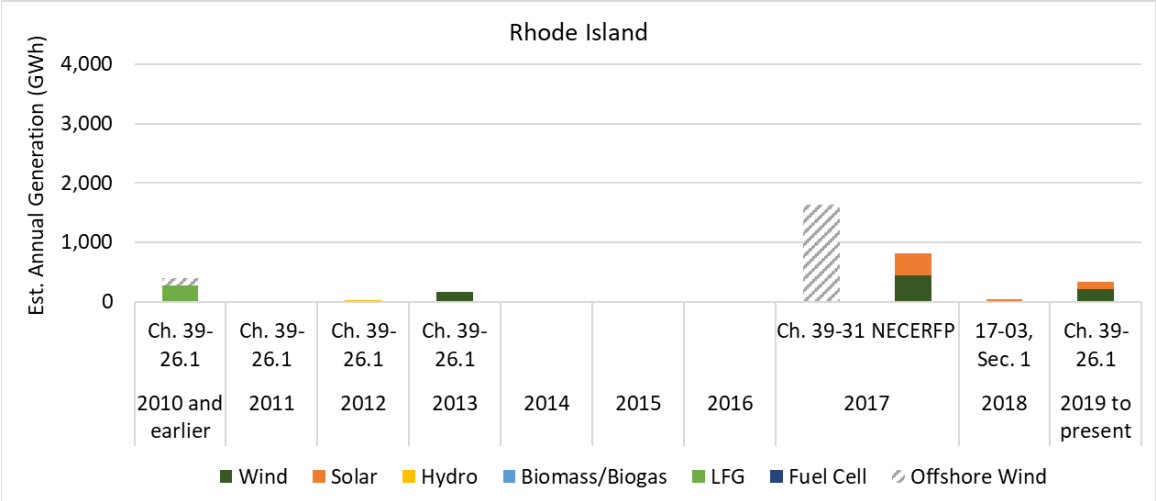


The timing of Rhode Island's large-scale procurements generally mirrors Connecticut and Massachusetts. It has been conducted under two distinct statutory authorities, the state's 2009 Long-Term Contracting Standard for Renewable Energy,[108] which contained provisions for LSRs as well as offshore wind, and the 2014 Affordable Clean Energy Security Act,[109] which provides much more flexible procurement authority. Procurement volumes are smaller, but in total are more aggressive in proportional to Rhode Island's much smaller load. Rhode Island procurement to date includes both land-based and offshore resources – including the pilot-scale 30 MW Block Island Wind Farm, representing the first offshore installation in the United States, and a commercial-scale 400 MW selected via the first Massachusetts Section 83C solicitation (which invited other states to participate), but approved pursuant to the state's own procurement authority statutes Figure 13 summarizes Rhode Island procurement to date by technology.

[108] See: http://www.energy.ri.gov/policies-programs/ri-energy-laws/long-term-contracting-standard-for-renewable-energy-2009.php.

[109] See: http://www.energy.ri.gov/policies-programs/ri-energy-laws/affordable-clean-energy-security-act-2014.php.

Figure 13. Rhode Island Solicitation Annual Tier I Production, by Technology

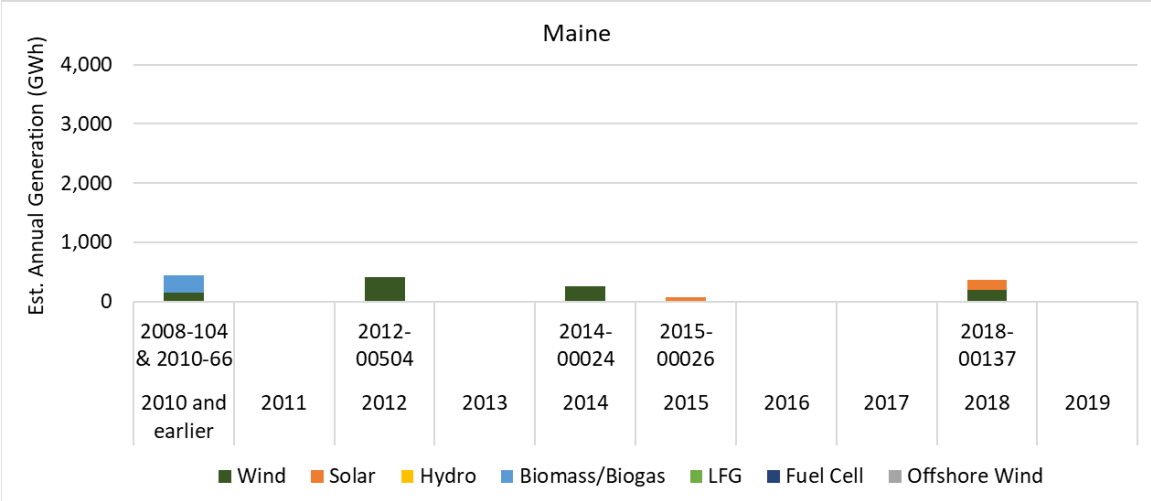


Maine has facilitated long-term procurement offering long-term contracts between renewable energy generators and the state's distribution utilities since 2010.[110] Approximately 1,000 GWh per year of Tier 1 supply is currently operating, and another 650 GWh per year have been awarded Public Utility Commissions (PUC) approved Term Sheets, although with varying expectations of whether it will ultimately come on-line.[111] Figure 14 summarizes Maine procurement to date by technology.

110 See: https://www.maine.gov/mpuc/electricity/rfps/longterm2018/index.shtml and https://mpuc-cms.maine.gov/CQM.Public.WebUI/Common/CaseMaster.aspx?CaseNumber=2018-00137.

111 Much of Maine's selected renewable energy supply has been awarded a Term Sheet with one or both of the state's EDCs as a result of one of six PUC-run procurements, for some combination of energy, capacity and/or RECs. The PUC-approved Term Sheets have historically been open-ended in terms of progress milestones and provided for a right for the proposer to enter an offtake contract if and when the project choses to move forward. Several projects awarded term sheets between 2012 and 2015 have yet to move forward to contracting, suggesting that the projects or their associated prices, terms and conditions may not be viable. In the absence of firm milestones, these selections are still 'on the books'.

Figure 14. Maine Solicitation Annual Tier I Production, by Technology



New England's earliest competitive RPS Tier 1 RFPs drew somewhat immature projects, which led to a material degree of speculative bidding and immature proposals with significant development hurdles remaining. This can in part be attributed to the lack of solicitation frequency and visibility. When there is only one known event, developers have little choice but to offer up what they have in the pipeline, not knowing if there will be a more suitable opportunity to bid if they wait until their efforts are more mature.

More restrictive threshold criteria have since been applied to reduce contract attrition. In some cases, RFPs have been tailored to achieve specific policy objectives related to siting (i.e. prioritize brownfields), increasing supply during periods of peak load, or encouraging the pairing of storage with renewable energy generation.

6.1.2 Competitive Procurements in Select PJM States

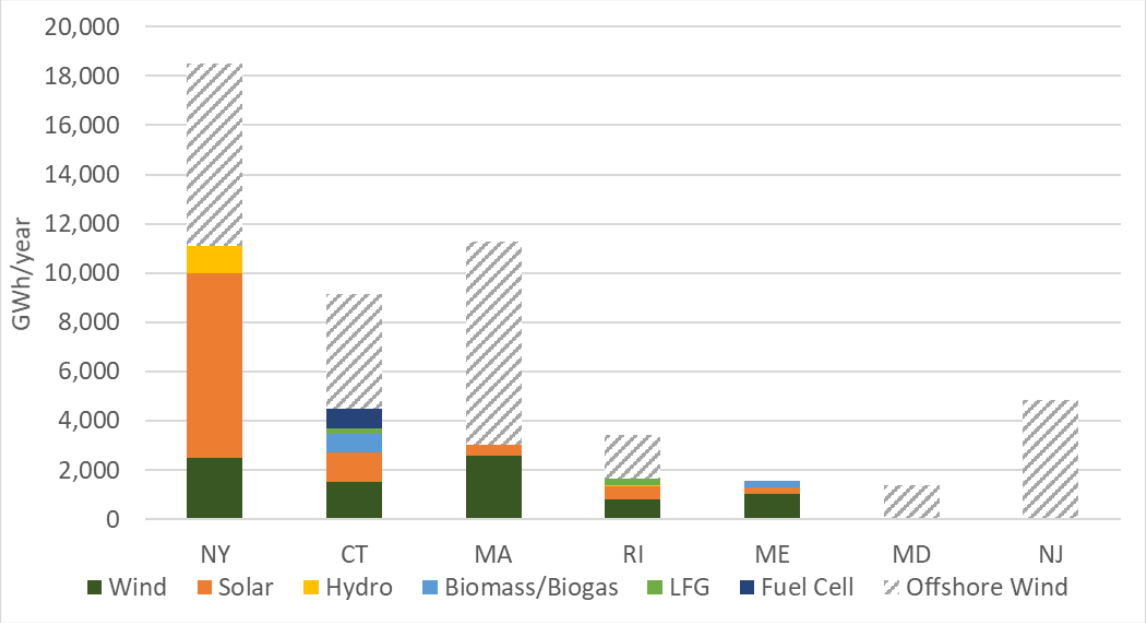
This report limits benchmark analysis of PJM to Pennsylvania, New Jersey and Maryland. While each state hosts an array of renewable energy policies, competitive solicitations for large-scale, long-term purchases of renewable energy have historically not been part of these states' policy suites, with the exception of offshore wind. New Jersey and Maryland are similar to New York in that their offshore wind policies function on a standalone basis, as OREC carveouts, separate from RES Tier 1 compliance. To date, via dedicated OREC procurement processes, New Jersey has contracted for nearly 5,000 GWh of offshore wind per year and Maryland has contracted for approximately 1,300 GWh per year. Pennsylvania has not conducted any large-scale, long-term

renewable energy solicitations to date for either land-based or offshore resources. The Pennsylvania PUC has the authority to consider long-term contracts on a case by case basis as part of EDC default service cases, but no specific proposals are being considered at this time.

6.1.3 Tier 1 Procurement Activity in Benchmark States

Figure 15 summarizes RPS procurement by state, by technology, for all projects that are either operating or still under development. Offshore wind is shown as its own category, for transparency.

Figure 15. Tier 1 Procurement by State, by Technology



6.1.4 Treatment of Offshore Wind Procurement

Other than ORECs procured by New York, New Jersey and Maryland, production of RECs from offshore wind facilities will count towards the satisfaction of Tier I RPS targets. The procurement of offshore wind generation is occurring through both stand-alone solicitation processes open only to proposed offshore wind generation (New York, Massachusetts, New Jersey and Maryland) and combined solicitations open to both land-based renewables and offshore wind (Massachusetts, Maine, Connecticut and Rhode Island). While offshore wind RECs may not currently be applied towards New York's RES Tier 1 compliance obligation, all offshore wind

generation is nonetheless counted towards the 70% by 2030 goals. As a result, offshore wind delivery and Tier 1 compliance remain linked because anticipated offshore wind REC volumes will impact the scale of the Tier 1 obligation, and the scale of RES Tier 1 LSR procurement designed to help meet it, in future years.

New York has successfully completed its first offshore wind procurement. In October 2019, NYSERDA announced the execution of contracts with Equinor's 816 MW Empire Wind project and Ørsted/Eversource's 880 MW Sunrise Wind project. A detailed summary of New York's offshore wind efforts to date are provided in Launching New York's Offshore Wind Industry: Phase 1 Report.[112] A second offshore wind procurement was recently approved by the Commission[113] and is anticipated for 2020.

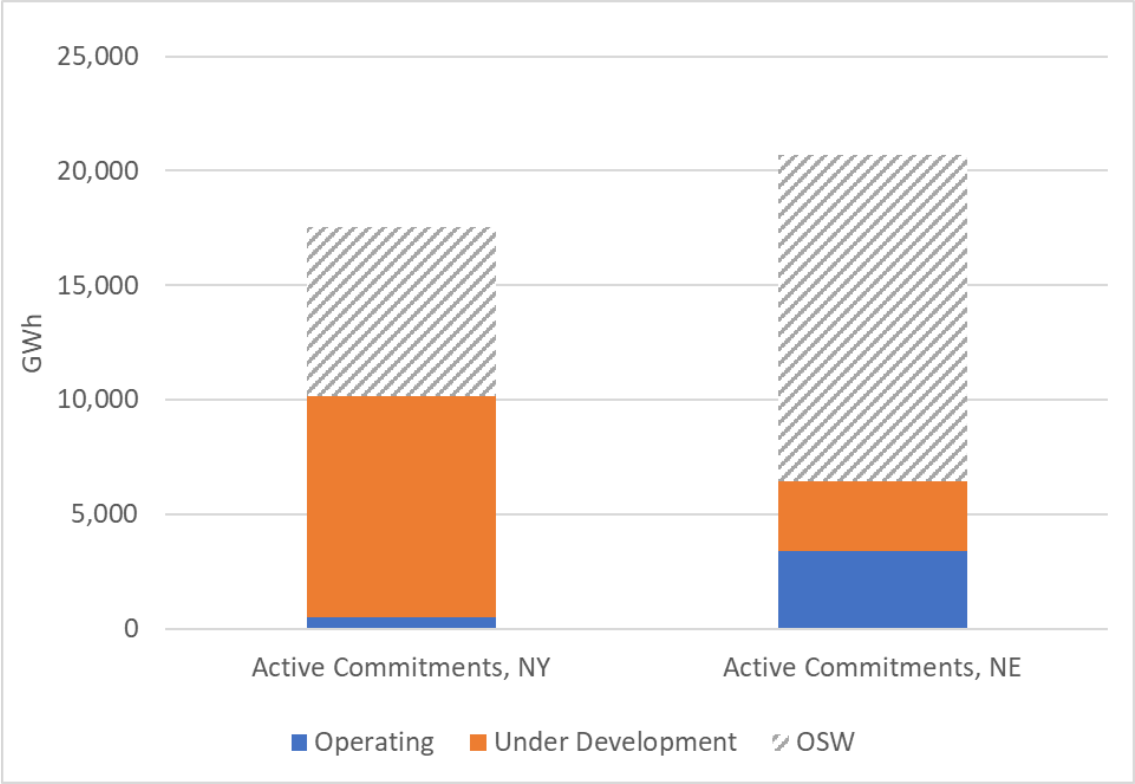
6.1.5 Key Findings

In aggregate, active contracts in New York (which excludes those selected but terminated to date for any reason) create annual REC commitments larger than any of the other individual states reviewed for this analysis. On a control area basis, where New England's RPS obligated load is slightly larger than New York's jurisdictional load but significantly smaller than New York's total load, New York's Tier 1 procurement volume to date is approximately 85% of New England's total procurement quantities since 2005. If you extend this metric to include NYSERDA's RPS contracts with non-Tier 1 renewable energy generators operating or under development, then New York's total annual contracted RECs surpass New England as a whole. Figure 16 compares large-scale Tier I commitments in New England and New York.

112 New York State Energy Research and Development Authority. (2019, October). Launching New York's Offshore Wind Industry: Phase 1 Report. ("Offshore Wind Phase 1 Report"). Retrieved from https://www.nyserda.ny.gov/-/media/Files/Programs/offshore-wind/osw-phase-1-procurement-report.pdf

113 New York State Public Service Commission. (2020, April 23). Case 18-E-0032, In the Matter of Offshore Wind Energy, Order Authorizing Offshore Wind Solicitation In 2020.

Figure 16. Comparison of Long-Term Contracts in New York and New England



- New York is unique in its use of a central procurement agent to administer competitive solicitations and enter long-term contracts for renewable energy supply.
    - NYSERDA expects over 10,000 GWh per year of RES Tier 1 RECs from projects either operating or under development.
- Utilities in ISO-NE expect over 20,500 GWh per year of Tier 1 supply from projects either operating or under development.
- The PJM states have not adopted long-term competitive procurements as a key policy tool to support state RPSs. Dedicated offshore wind procurements, however, have resulted in OREC procurement for nearly 5,000 GWh per year in New Jersey and approximately 1,350 GWh per year in Maryland.

6.2 Current Status of LSEs Meeting their Obligations

The obligation to comply with state RPS mandates generally falls upon LSEs throughout New York, New England and Mid-Atlantic markets. Most of these states have multiple RPS tiers. The tier that is comparable to New York's RES Tier 1, and that is the focus of this section, is the growth tier structured to drive an increase in new renewables, and in the majority of the

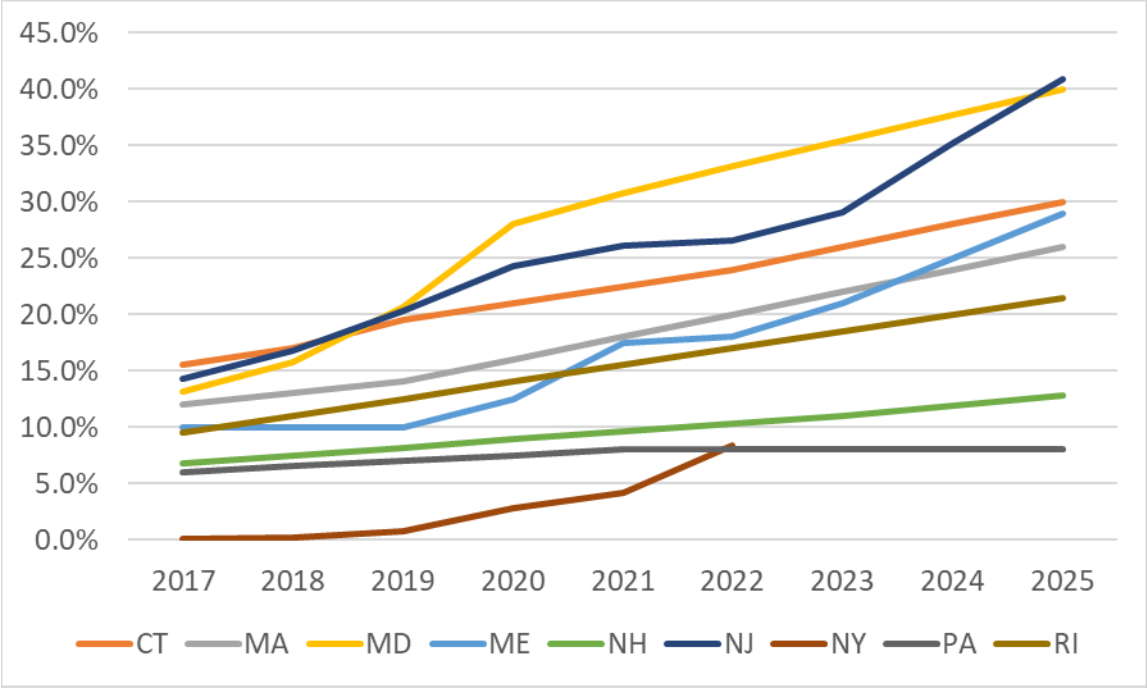
benchmark states it is designated Tier I. Each LSE's RPS obligation is calculated as the product of its annual retail load (including the losses sustained to serve such load, in most markets) and its annual RPS Tier 1 target (expressed as a percentage). Annual RPS targets are administratively determined by the applicable regulatory authority.

The current status of LSEs compliance with their Tier 1 obligations in the benchmark states can be compared against New York's RES Tier 1 obligation compliance status based on the state's Tier 1 target obligations, and measures of success in achieving those targets. Indicators of shortage or surplus include the annual proportions of REC retirement versus ACPs used for compliance, and spot market REC prices, which serve as a proxy for market supply-demand balance.

6.2.1 LSE obligation targets

In New England and PJM states, RPS targets are established by legislation for each year until the target percentage is reached. In New York, RES Tier 1 targets are the residual quantity required after taking other sources of supply into account (as described in Section 2.4), and have only been established through 2022. Figure 17 summarized Tier 1 LSE obligations by state.

Figure 17. Tier 1 LSE obligations, by state



6.2.2 Tier 1 Compliance Experience

A state's success at increasing the amount of renewable energy consumed in the state to meet their targets can be measured through indicators of surplus or shortage including use of RECs versus ACPs for compliance. Table 36 presents compliance results in New England benchmarks states for 2017, and for 2018 for the two states with publicly available data.[114]

Table 35. Regional Tier 1 RPS Compliance – New England

	2017					2018	
	MA	CT	RI	ME	NH	CT	NH
Obligation as % of Load	7.96%	15.50%	9.50%	10.00%	6.80%	17.00%	7.50%
Total Obligation (MWh)	3,640,026	4,179,631	735,485	1,198,000	709,301	4,332,855	796,343
Tier 1 RECs used for Compliance	3,636,734	4,111,975	735,485	999,758	-	4,270,511	-
% Tier 1 RECs	99.91%	98.38%	100.00%	100.00%	-	98.56%	-
ACPs used for Compliance	1,676	11,408	-	-	5,529	56,051	843
% ACPs	0.05%	0.27%	0.00%	0.00%	0.78%	1.29%	0.11%
Total Compliance	99.96%	98.65%	100%	100%	100%	99.85%	-

As shown, the use of ACPs in the New England benchmark states is trivial for 2017, and very small for 2018, with a maximum of 1.29% in Connecticut in 2018. The high use of RECs for compliance, and commensurate low use of ACPs in New England states during this period, is in part due to ample supply of Tier 1 RECs and the availability of excess compliance banked from prior years. In contrast, New York LSEs used ACPs to meet 15% of the obligation in 2017 and 51% of the obligation in 2018. However, LSEs in New England states had in many prior years relied more heavily on ACPs during earlier years of shortage before development caught up with demand in the periods covered by Table 36.

[114] Note, the compliance data presented by states in RPS compliance reports is not uniform; for example, New Hampshire and Maine do not indicate the total obligated load, and New Hampshire does not indicate the number of Class 1 RECs used for compliance. All states, however, indicate the level of ACPs made (or due) to reach compliance, and where a state's compliance report does not indicate actual obligated load, it is possible to approximate given known total state load and the RPS obligation percentage. The authors have estimated these in Table 38.

In Pennsylvania, New Jersey, and Maryland, over 99.99% of 2017 and 2018 Tier 1 obligations were met with RECs. The use of ACPs is so low in the PJM benchmark states during this period that it suggests very small competitive supplier(s) with very small obligation chose to use ACPs as a financial decision to avoid the transaction cost of identifying, purchasing, transferring and reporting a very small quantity of RECs.

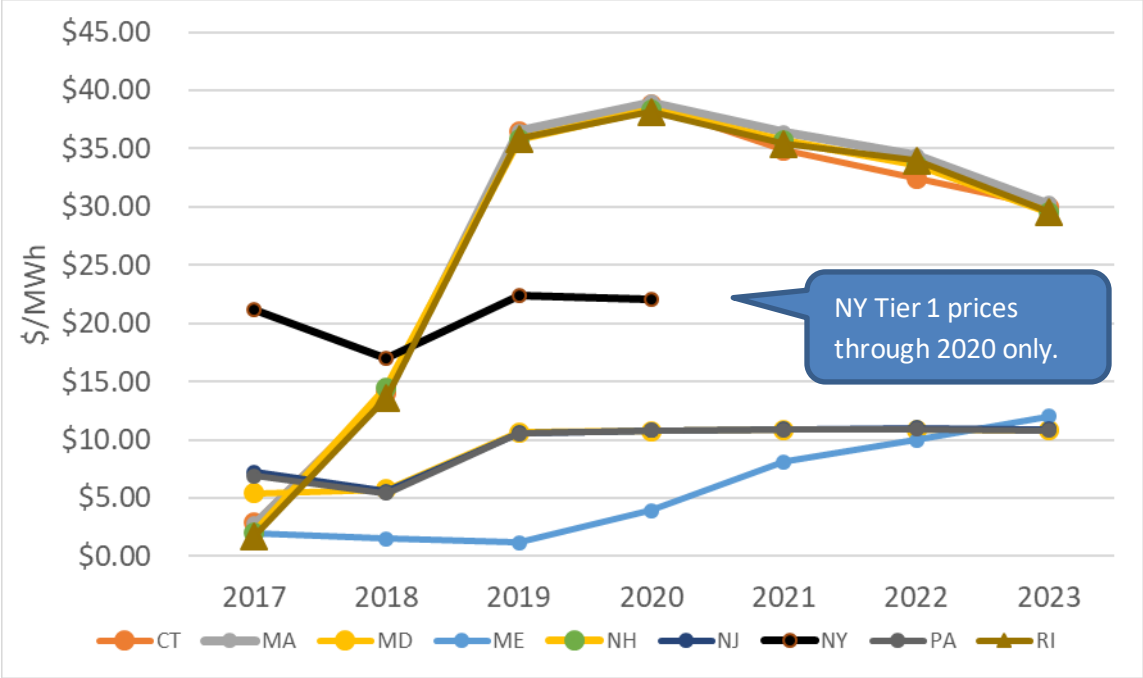
6.2.3 Market REC Prices

Class I REC prices are a function of regional supply and demand dynamics, as well as policy factors like banking allowances and ACPs. Figure 18 compares short-term REC market prices in the ISO-NE and PJM benchmark states with published spot prices in New York. During the period 2017 through 2023, several of the markets show dynamic REC prices. In contrast to New York's prices, which are relatively steady due to supply shortage and ACP price level, Massachusetts, Connecticut, Rhode Island, and New Hampshire Class 1 prices have moved from a period of low prices in 2017 and 2018 (indicative of surplus), to much higher prices thereafter (indicative of the market's return to equilibrium). The level of prices rises above New York prices in part because of higher ACPs, which allow for a wider price swing reflecting shortage and surplus price signals. In contrast, Maine's more liberal eligibility and flatter target trajectory has resulted in low REC prices reflective of surplus, that only slightly start to rise as recently increased targets absorb surplus and past banked compliance.

Maryland, New Jersey and Pennsylvania REC prices move in tandem during the period shown, due to very similar eligibility and fungibility of their RECs. The level trajectory shown is indicative of a material surplus with prices well below the states' ACP prices.

The absolute level of spot market prices is not a very transparent indicator of supply-demand balance by itself, since (for example) Massachusetts, Connecticut, Rhode Island and New Hampshire prices surpass those in New York during 2019, and year in which New York is in shortage and the other states are nearing supply-demand balance. However, it is valuable as an indicator of supply-demand balance when analyzed in the context of market rules and dynamics.

Figure 18. Comparison of NY Tier I REC Prices with Tier I REC Prices in Regional Markets ($/MWh)[115]



6.2.4 Analysis/Conclusions

The review of how obligated entities meet their RPS requirements reveals the following key findings:

- In 2017 and 2018 the benchmark states meet nearly their entire RPS obligations with RECs.
- Reliance on alternative compliance mechanisms is de minimis in both New England and PJM.
- During 2017 and 2018, broker quotations for short-term REC market prices were below $10/MWh.
- Collectively, this suggests an ample supply of regional RECs to meet RPS obligations at that time.
- Market REC prices are increasing in New England as the market trends towards equilibrium.

[115] Data distilled by the authors from a compendium of broker quotes and represent the average of the bid-ask spread for the applicable vintage year.

6.3 Policy Evolution

Like most public policies, renewable energy policies are not static. While regulatory stability is critical to attracting market participation and achieving success, changes in market dynamics or policy priorities may make the evolution of market rules appropriate to help maintain progress toward policymaker objectives.

6.3.1 LSE Tiers and Targets

The most common evolution related to RPS tiers is the creation of additional tiers, or of carveouts to existing tiers, that enable state policy objectives targeting specific resources. New York's treatment of offshore wind provides a good example. Offshore wind contributes toward New York's CES and CLCPA policy objectives but is not explicitly a Tier 1 RES resource. It is effectively its own tier. New Jersey and Maryland created offshore wind carveouts as amendments to their original RPS policies. In all three states, offshore wind generation creates ORECs rather than RECs. This provides a unique currency to verify LSE compliance with a dedicated tier or carveout. In the carveout approach, excess supply effectively reduces the net demand for other Tier I resources. In the stand-alone tier approach, by comparison, excess supply can usually be banked toward meet future compliance obligations associated with that tier.

As RPS programs mature, it is also common for policymakers to adjust either annual or final target obligations. State regulators often have the authority to adjust or delay annual target increases if supply is – or is perceived to be – insufficient to meet RPS demand. The Rhode Island PUC, for example, delayed a 1.5% RPS increase between 2014 and 2015 as a result of an adequacy review. The PUC rationalized that the 2014 demand targets was sufficient to support continued market development but than an additional 1.5% increase at that time would result in undue burden to ratepayers through increased ACPs. In contrast, several years later Massachusetts passed legislation to double its annual RPS increase to 2% per year for the period between 2020 and 2029.

6.3.2 Eligibility

Comparing RPS eligibility across states is complex. While some criteria are shared, many vary from state to state based on available resources and policy objectives. Eligibility modifications may result from evolving policy objectives, or as a cost control mechanism (i.e. to quickly bring

a market from shortage to equilibrium and reduce reliance on ACPs). Table 37 summarizes recent changes to RPS eligibility criteria, by state. Table 38 provides a snapshot of current RPS Tier 1 eligibility criteria across markets.

Table 36. Summary of Changes to RPS Eligibility Criteria

	Original RES Eligibility	Updated RES Eligibility
NY	Included emitting resources like biomass, landfill gas, and biogas.	The CLCPA excluded emitting resources from the definition of "renewable", making biogas, biofuels, and fuel cells using conventional fuels ineligible to count towards the state's 70 by 30 goal.
CT	Hydro: RoR[116] <5MW Biomass and landfill gas meeting emissions criteria	Hydro: RoR cap increased to <30MW; FERC-relicensed RoR hydro made eligible.[117] This change introduces "existing" supply into a "new" tier. Biomass: CT DEEP has the authority to reduce the RPS compliance value of biomass and landfill gas generators and has signaled its intent to limit the number of RECs for these technologies to ½ of total production, through ts pending Integrated Resource Plan.
ME	Hydro <100MW Repowered resources and resources returning to service after at least 2 years offline	Hydro: Adds a new category for Qualified Hydro Output (QHO) – Output from FERC-licensed hydro generators with a commercial operation date prior to January 1, 2019, that are greater than 25 MW, interconnected to an electric distribution system located in the state, and not located in a critical habitat for Atlantic salmon.[118] Resources returning to service are not eligible for the new Class 1A.
MA	Biomass meeting vintage criteria Hydro capped at 25MW.	Biomass demonstrating >50% efficiency for ½ REC and >60% efficiency for 1 REC/MWh. MA has *proposed* to further revise the biomass standard to exempt from the efficiency standard any facility >95% forest salvage or non-forest derived residues. Hydro cap increased from 25 to 30MW.

116 Run-of-River

117 The amendment also limits RPS-obligated entities to using this supply for no more than 1% of load. Total demand for this supply would be equal to around 200-300 GWh/year if every LSE used its maximum eligible quantity.

118 The total QHO as a percentage of total electrical output that is eligible for treatment as Class I or Class IA resource ramps up over time, starting at 40% in 2020, increasing at a rate of 10% of total QHO per year until 100% of QHO is eligible for treatment as a "New" resource in 2026.

Table 37. Snapshot of Current RPS Tier 1 Eligibility Criteria & First Compliance Year

	Tier 1 Vintage: On or after date specified	First Compliance Year	Eligible Resources
NY	1/1/2015[119]	2017	Hydroelectric (low impact RoR and upgrades), Wind, Solar, Tidal/Ocean.
CT	7/1/2003 for hydro; otherwise none	2004	Wind, Solar, RoR Hydro <30MW; FERC-relicensed RoR hydro,[120] Biomass w/ NOx ≤0.75lbs/MMBtu, landfill gas (incl. via pipeline), ocean energy, geothermal, fuel cells
ME	9/1/2005	2008	Wind, Solar, Hydro[121], Biomass (incl. fueled by black liquor), landfill gas, ocean energy, geothermal, fuel cells run on renewable fuels. Repowered facilities and, for Class 1 only) facilities returning to service after at least 2 years offline.
MA	1/1/1998	2003	Wind, Solar, LIHI-certified Hydro <30MW[122], Biomass meeting fuel and efficiency criteria, landfill gas, ocean energy, geothermal, fuel cells run on renewable fuels
NH	1/1/2006	2009	Wind, Solar, incremental Hydro over historical baseline, Biomass w/ NOx ≤0.75lbs/MMBtu and PM ≤0.02lbs/MMBtu, landfill gas, ocean energy, geothermal, fuel cells run on renewable fuels
RI	1/1/1998	2007	Wind, Solar, Hydro <30MW (with salinity limits and no new impoundments), Biomass meeting fuel sourcing criteria, landfill gas, ocean energy, geothermal, fuel cells run on renewable fuels
PA		2007	Wind, Solar, Low-Impact Hydro, landfill gas, Biomass meeting fuel sourcing criteria, geothermal, fuel cells, coal mine methane.
NJ		2004[123]	Wind, Solar, landfill gas, Biomass cultivated and harvested in a sustainable manner, geothermal, anaerobic digestion fuel cells run on renewable fuels, ocean energy.
MD		2006	Wind, Solar, landfill gas, Hydro ≤30MW, Biomass cultivated and harvested in a sustainable manner, geothermal, anaerobic digestion fuel cells run on renewable fuels, ocean energy.

When eligibility changes affect supply that is already operating or supply able to begin delivering energy and participating in the RPS market on relatively short notice, the market impacts can be swift, causing REC prices to vary dramatically. Eligibility changes that allow resources to

[119] With exemptions for material project upgrades, projects returning to service after 48 consecutive months offline, and projects relocated to New York or an adjacent control area after 1/1/2015.

[120] The amendment also limits RPS-obligated entities to using this supply for no more than 1% of load. Total demand for this supply would be equal to around 200-300 GWh/year if every LSE used its maximum eligible quantity.

[121] Resources other than wind and solar are subject to a 100MW cap on nameplate capacity.

[122] MA Class 1 RPS also requires that there be no new impoundments after 1997.

[123] New Jersey compliance years begin June 1st and run through May 31st of the following year.

migrate from an existing tier to a new tier can be disruptive to market dynamics for the same reason. Such changes may be nonetheless endorsed by policymakers in order to support specific types of generators whose continued operation is challenged (see discussion in Section 10) or as a cost mitigation mechanism for ratepayers.

6.3.2.1 Repowered Wind Resources

Understanding the eligibility criteria for repowered and restarted facilities is important to understanding market dynamics. Older wind projects may eventually become candidates for repowering, a form of upgrade or retrofit to install newer equipment. Repowering typically boosts the site's energy production and extends its economic life at lower cost than a greenfield facility. New York has almost 2 GW of land-based wind predating the RES Tier 1 eligibility threshold of January 1, 2015. Many of these facilities are candidates for repowering. As prescribed in the March 16, 2018 the Commission's *Order Adopting Measures for the Retention of Existing Renewable Baseline Resources*[124], under current RES eligibility rules only the incremental production (above pre-2015 baseline generation) of a repowered project is eligible to produce RES Tier 1 RECs. Repowering legacy land-based wind projects can provide unique contribution to the achievement of CES and CLCPA goals by:

- Mitigating baseline attrition that would result from performance and availability degradation or projects reaching the end their useful lives;
- Relieving the pressure of developing greenfield sites (siting, permitting and interconnection challenges); and
- Increasing the contribution to incremental new renewable generation at a capital cost that could be 15% - 25% lower than its greenfield counterpart.[125]

6.3.3 Alternative Compliance Payments

State-by-state Alternative Compliance Payment (ACP) levels are summarized in Section 12.3.1. In all states other than New York, ACP levels are statutorily- or administratively-determined in advance and for an extended period. In New York, ACPs are a function of NYSERDA's realized

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124 2018 Order on Retention of Baseline

125 These percentages were derived based on public studies and were benchmarked against public data on currently planned repowering land-based wind projects in New York as published by Terraform Power in December 2019: TerraForm Power, Inc. (2019, December 12). Investor Presentation. Retrieved April 20, 2020, from https://seekingalpha.com/article/4312205-terraform-power-terp-investor-presentation-slideshow?dr=1&utm_medium=email&utm_source=seeking_alpha

REC prices and therefore change each year. In either case, ACPs may be adjusted over time as market conditions or policy objectives change, or as external influences on markets shift the role of ACPs in RPS compliance. Several benchmark states have altered, or proposed changes to, their ACPs in recent years:

- **Connecticut**: The ACP was originally fixed at $55/MWh, in a region where all other ACPs were adjusted by inflation. Connecticut recently changed its ACP to $40, which will take effect in 2021 and remain fixed thereafter.
- **Massachusetts**: The Massachusetts Class 1 ACP was established at $50 in 2003 and has been adjusted annually using the consumer price index (CPI). Massachusetts is considering a change to a fixed $70/MWh – compared to the 2020 ACP of $71.57.
- **Maine**: Historically, Maine's Class I ACP has tracked MA. As part of 2019 legislation amending RPS targets and establishing an RPS procurement policy, the Maine legislature established a maximum ACP of $50/MWh beginning in 2020.
- **New Hampshire**: While MA and RI ACPs change annually with CPI, NH adopted an annual change equal to ½ of the change in CPI.

The purpose of the ACP is to provide a mechanism for compliance, at a known cost, if RECs are not available. It is important, therefore, that ACPs be set far enough in advance to provide market participants with visibility into the potential cost of RPS compliance in future years. Without this information, it will be difficult for market participants to make educated decisions regarding purchasing RECs in the current market and banking compliance for future years. More generally, ACPs that are too low may tend dampen market activity outside of state-mandated procurement. Conversely, ACPs that are set too high may expose ratepayers to unreasonably high compliance costs. A degree of uniformity among states may minimize arbitrage between Tier 1 markets. State reliance on ACPs to meet RES compliance obligations is discussed in Section 12.

6.3.4 Analysis/Conclusions

The review of policy evolution reveals the following key findings:

- Carveouts and dedicated tiers are an effective way for policymakers to isolate and provide benefit to specific resources or technologies
  - Paring such demand-side policies with dedicated procurements provides an even stronger incentive to support the development of new technologies – or new industries like offshore wind.
- As RPS markets mature, increases above original values for both annual and final targets are common, as states compare their own goals to their neighbors' and as market conditions create opportunities to accelerate renewable energy purchases cost-effectively.

- Eligibility criteria are a powerful tool with the potential to dramatically impact market supply, demand, and price dynamics. Prior to adjusting eligibility criteria, policymakers should carefully consider the quantity supply at play, the time required for this supply to reach the market, overall market conditions, and the potential impact on the current suite of eligible resources.
- ACPs that are too low may discourage market participation (other than through long-term procurement). ACPs that are too high may expose ratepayers to unreasonably high compliance costs. A balance that enables market development is most attractive. At a 10%[126] margin above RES procurement costs, New York's current approach sets the ACP at a level prioritizing the minimization of ratepayer exposure to high compliance cost risk.
- A degree of uniformity among states would help to minimize arbitrage between Tier 1 markets. Several of the benchmark states have recently adjusted their ACPs downward to limit ratepayer cost while still providing a material incentive for compliance by retiring RECs. Each of these states has nonetheless maintained its ACP at a materially higher rate than New York's.

[126] The Phase 4 Implementation Plan increases the margin to 15%, but the policy objective remains the same. New York State Energy Research and Development Authority and New York State Department of Public Service. (2020, April 17). Case 15-E-0302, Clean Energy Standard Final Phase 4 Implementation Plan. *("Phase 4 Implementation Plan")*.

7 Impact of the Voluntary Market on Policy Goals and Targets

As discussed in Section 2.4, the establishment of future RES Tier 1 targets will be designed to fill the gap between the CES (and CLCPA) goals and the expected contribution of other source of non-Tier 1 renewable supply toward the 2030 renewable energy goal, including voluntary renewable energy purchases of new, New York-based renewable energy supply. In addition, the Commission and NYSERDA are actively trying to stimulate voluntary demand to both retain and support continued operation of in-state legacy renewables, and to stimulate additional demand for new renewables. For example, as discussed in Section 10.4.1, NYSERDA's Clean Energy Communities Program encourages communities to join CCAs with a 100% renewable energy supply mix and the Commission has ordered the offering of a renewable supply option by ESCOs serving mass markets as one of three alternative conditions of qualification. Finally, the Commission has created mechanisms for VDER projects receiving Value Stack compensation to voluntarily retain RECs. Data is available for 2017 and 2018 on the retirement of RECs associated with various categories of voluntary market activity, as shown in Table 39.

Table 38. Voluntary Activity Reported in NYGATS[127]

	2017 RECs	2018 RECs
Total Voluntary Activity in LSE EDP Subaccounts	4,019,475	2,814,781
Corporate or Individual Retirements	188,279	111,010
Customer-sited DER Retirements	1,114,207	1,594,654
Non-Tier 1 RECs Banked	2,601,389	916,000

Voluntary retirements of 2017 certificates are significantly higher than voluntary retirements of 2018 certificates, with the difference being largest for retirements towards LSEs. There are fewer 2018 certificates retired towards corporate or individual accounts, and also fewer banked RECs. The volume of customer-sited DER retirements increased from 2017 to 2018.

The total voluntary renewable supply also includes legacy renewables and new non-Tier 1 renewables. Customer-sited distributed renewables are likely to be the majority of new non-Tier 1 renewables, and are represented in row 3 of Table 39. Other new renewable

[127] 2017 CES Progress Report, Table 8 and 2018 CES Progress Report, Table 8

energy supply going towards voluntary purposes may appear in row 2 of Table 39 as unbundled REC purchases of renewable energy. The majority of the voluntary retirements shown in Rows 1 is from legacy supply, although the exact breakdown is not available through NYGATS reports

Data is also available on Community Choice Aggregation, a key source of voluntary renewable activity, as of July 2019 and as shown in Table 40.

Table 39. CCA Activity as of July 2019[128]

No. of Communities served by CCAs	Estimated No. of CCA Accounts	Estimated No. of Renewable Accounts	Estimated No. of Basic Accounts	Estimated CCA Annual Load (MWh)	Estimated Renewable Load (MWh)	Estimated Renewable Load as % of CCA Load
61	126,826	89,076	37,750	1,165,114	799,024	69%

There are four active CCAs in New York, in aggregate covering 61 communities throughout the state as of July 2019. Three of the four CCAs provide communities with a 100% renewable energy option, and 38 of the 61 communities have selected the 100% renewable option. In total, CCA programs are serving approximately 1,165 GWh of load annually with renewable energy. This total includes Tier 1 RES requirements, plus incremental renewable supply. As of July 2019, the CCA supply contracts supply all renewable energy above RES requirements from existing hydroelectric resources.[129]

Going forward, voluntary demand will be impacted by a number of drivers, such as:

- Interest from large institutional purchases of renewable energy. The State University of New York, for example, has announced plans to source all of its energy serving campuses from renewable sources.[130]

[128] Data provided by NYSERDA on February 4, 2020. All load and number of account figures are a combination of reported values and estimates using Utility Energy Registry (UER) community energy use data. For more information, please see Public Service Commission Case 14-M-0224: Proceeding on Motion of the Commission to Enable Community Choice Aggregation Programs.

[129] Email communications with NYSERDA, January 30, 2020

[130] The State University of New York. (2019). State University of New York Clean Energy Roadmap. Retrieved from https://www.nypa.gov/-/media/nypa/documents/document-library/cleanenergy/suny-clean-energy-roadmap.pdf

- Requirements on ESCOs serving mass market customers. In December 2019, the Commission required that ESCOs serving mass market customers must offer guaranteed savings, provide a compliant fixed-price product, or be 'renewably sourced'.[131]
- Growth in CCAs. Interest in CCAs is growing, and programs are expanding into more communities, many of whom are choosing a supply option with renewables above the RES requirements. For example, several additional communities including the City of Albany have been approved to join MEGA's aggregations through early April 2020.
    - Approval by the Commission of a program for competitive procurement of Tier 2 resources resulting from NYSERDA's pending proposed filed with the Commission (discussed in further detail in Section 10.4). If a program is adopted, it may offer a higher value outlet for some legacy supply than the voluntary market.

[131] New York State Public Service Commission. (2019, December 12). Cases 12-M-0476/15-M-0127/98-M-1343, Proceeding in the Matter of Eligibility Criteria for Energy Service Companies, Order Adopting Changes to the Retail Access Energy Market and Establishing Further Process.

Part II: CES Triennial Review

The Phase 3 Implementation Plan requires a *CES Triennial Review*. The purpose of Part II of this Report is to provide NYSERDA with an analytical review of the New York market in fulfillment of these requirements.

8 Procurement Structure

Experience shows that large-scale renewable energy projects typically need revenue predictability to attract investment on commercially attractive terms. In competitive electricity markets, revenue stability can be achieved either through long-term contracts or – for a shorter duration – through financial instruments (sometimes referred to as market hedges) or virtual Power Purchase Agreements. In either case, the central feature is a long-term hedge provided by a creditworthy offtaker to the renewable energy project and its financiers. NYSERDA conducts competitive solicitations on an annual basis, and awards contracts to enable the financing and construction of new, Tier 1 resources. NYSERDA's RES Tier 1 procurement volumes have been established by the Commission through 2021. [132]

From the beginning of the RPS program through RESRFP19-1, NYSERDA has used a Fixed-Priced REC approach to long-term contracting. NYSERDA purchases RECs over a maximum 20-year term at prices and quantities as bid. Under the Fixed-Price REC methodology, energy and capacity commodity price risk resides with the asset owner. This aspect of project revenue is not hedged in the Fixed-Price REC approach. This structure was intended to facilitate a smooth transition from the RPS to the RES. [133] Looking forward, the Commission has authorized, and NYSERDA plans to offer in its future RESRFPs an "Indexed REC" pricing option. [134] The Index REC approach would enable the proposed facility to hedge its total energy and REC revenue requirement with a single contract, thereby more effectively mitigating a key financing risk.

[132] CES Order

[133] CES Order

[134] Index REC Order

New York has already adopted and deployed a similar Indexed OREC approach in its first offshore wind solicitation, which resulted in almost 1,700 MW contracted and represents the largest single renewable energy procurement by a state in U.S. history. [135]

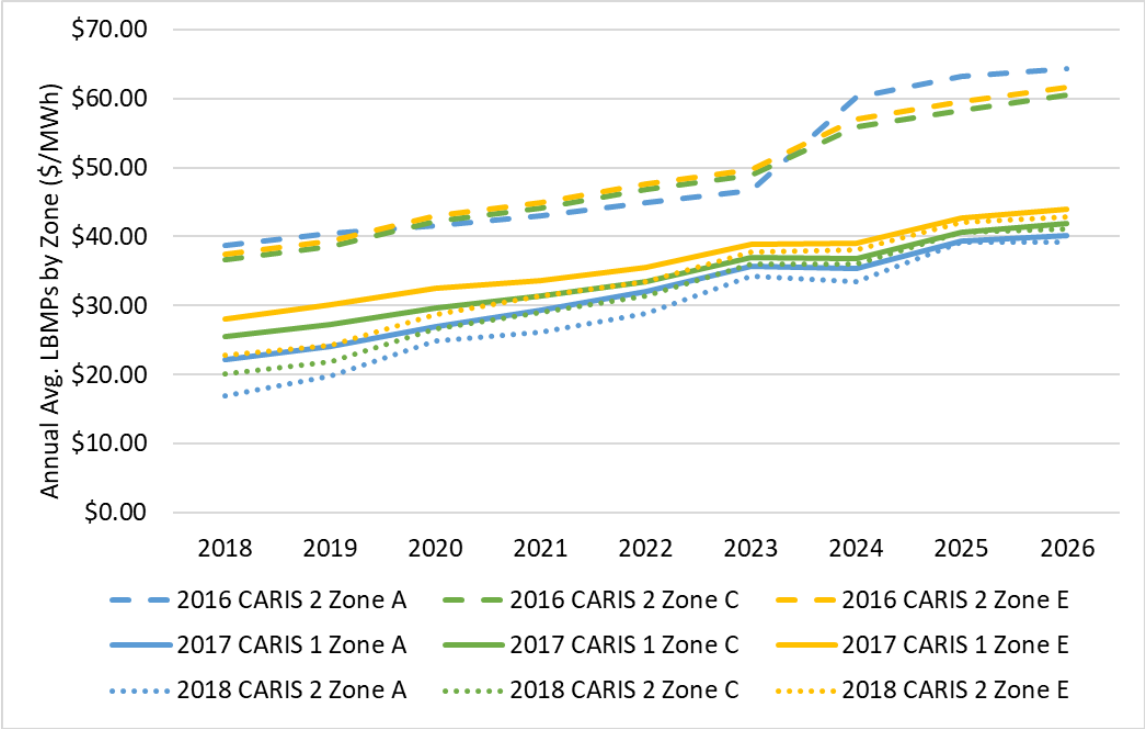
8.1 Impact of Fixed-Price REC Pricing Mechanisms on Outcomes to Date

Since the inception of the Main Tier RPS and continuing through the first three RES procurements, New York has been using a Fixed-Price REC as its long-term pricing structure for procuring LSRs. While the Fixed-Price REC approach is simple, clear, and easy to evaluate, and is compatible with central procurement by NYSERDA (who has no electric load) and with wholesale and retail competitive markets, it places commodity market price risk on developers which would, in part be mitigated with the now-applicable Index REC approach. This risk has several repercussions:

- **Risk to project viability**. Compared to contracting and pricing options that hedge most or all of the commodity price risk, the Fixed-Price REC poses a substantial project viability risk exposure. While NYSERDA has experienced some project termination to date, as described in Section 2.1, projects have taken longer to develop than anticipated. At the same time, wholesale market energy prices have fallen, as shown in Figure 19. This suggests that a portion of Fixed-Price REC agreements may be challenged to proceed through financing as the expected project revenues from energy and capacity prices may not provide investors with an acceptable rate of return on their investment. This may be especially true for projects that do not have an agreement for the energy portion of their project.

[135] Offshore Wind Phase 1 Report

Figure 19. Falling Trends in NYISO Wholesale Market Price Expectations[136]



- **Developer interest**. While developer interest in NYSERDA solicitations has been robust, NYSERDA may have seen even greater interest if its LSR procurements had offered a better commodity hedge. The Fixed-Price REC pricing structure can influence developer interest in several ways: (i) If expected commodity revenues fall below assumptions used in crafting a Fixed-Price REC bid after a project is financed, it can lead to actual returns to investors well below targets. If this outcome is realized, project owners may bid less aggressively in future solicitations, which could result in higher REC prices. In forthcoming procurements, NYSERDA's new Index REC pricing option will relieve this concern. (ii) Given the contemporaneous choice between a Fixed-Price REC contract and a more complete hedge, developers are likely, all else equal, to favor the lower risk opportunity. Contracts between New York projects and New England utilities provides some evidence of this, although it is important to remember that a broader series of risks need to be mitigated in order for export transactions to be viable. (iii) Projects in New York may seek lower revenue risk. As noted in Section 8.6, four New York LSR projects secured bundled PPAs with New England utilities as a result of LSR solicitations in the last few years. In addition, a 2018 LSR solicitation by National Grid in Rhode Island attracted bids from two New York utility-scale solar projects totaling almost 300 MW.[137]

[136] New York Independent System Operator. (n.d.). Congestion Assessment and Resource Integration Study (CARIS) LBMP Projections. 2016 CARIS 2, 2017 CARIS 1, and 2018 CARIS 2 Reference Cases.

[137] See: https://ricleanenergyrfp.com/public-versions-of-bids.

- **Price.** Although it is not possible to know what REC prices would have been under a different approach, several NYSERDA studies[138] have concluded that the long-term expected value of REC prices may have been lower under a pricing structure offering a superior commodity revenue hedge compared to the Fixed-Price REC approach. See Section 8.8.
- **Policy Uncertainty**. NYISO's pending proposal to institute a carbon price in its energy market, discussed in Section 14.3, presents what some stakeholders have asserted is an upside risk to ratepayers of a possible windfall for generators and double payment by ratepayers. However, as discussed in Section 14.3.2, the pending question over whether and when such a NYISO pricing scheme may be adopted has created pricing uncertainty for bidders entering the last two NYSERDA Tier 1 RES solicitations.

8.2 Integration of an Index REC Pricing Structure into Tier 1 REC Procurements

In March 2019, the Alliance for Clean Energy New York (ACE NY) and the American Wind Energy Association (AWEA) filed a Petition[139] requesting that the Commission authorize NYSERDA to use an Indexed REC pricing approach in future Tier 1 Renewable Energy Standard procurements. In response to the ACE NY and AWEA Petition, in October 2019, NYSERDA filed comments[140] supporting the Petition and proposing an Index REC procurement structure for its Renewable Energy Standard procurements. NYSERDA's stated objectives in implementing an Index REC approach were to improve cost-effectiveness and resulting program costs to ratepayers. An Index REC approach could do so by: being responsive to changing market

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138 See, for example, New York State Energy Research and Development Authority. (2015, June). Large-Scale Renewable Energy Development in New York: Options and Assessment, Final Report. *("2015 CES Options Paper")*. Retrieved from https://www.nyserda.ny.gov/-/media/Files/Publications/PPSER/NYSERDA/Large-Scale-Renewable-Energy-Development.pdf; New York State Energy Research and Development Authority. (2016, April 8). Clean Energy Standard White Paper - Cost Study . *("2016 CES Cost Study")*.; New York State Energy Research and Development Authority. (2018, January 29). Offshore Wind Policy Options Paper. *("2018 Offshore Wind Policy Options Paper")*. Retrieved from https://www.nyserda.ny.gov/-/media/Files/Publications/Research/Biomass-Solar-Wind/Master-Plan/Offshore-Wind-Policy-Options-Paper.pdf); and New York State Energy Research and Development Authority. (2019, November 15). Case 15-E-0302, Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and Clean Energy Standard, Reply Comments on AWEA/ACE-NY Petition Regarding Integration of an Index REC Procurement Structure into Tier 1 REC Procurements. *("NYSERDA Reply Comments on AWEA/ACE-NY Index REC Petition")*.

139 American Wind Energy Association and Alliance for Clean Energy New York. (2019, March 13). Case 15-E-0302, Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard. Petition for An Order Modifying the Clean Energy Standard Tier 1 Procurement Process. *("AWEA and ACE-NY Index REC Petition")*.

140 New York State Energy Research and Development Authority, *NYSERDA Comments on the AWEA/ACE-NY Petition Regarding Integration of an Index REC Procurement Structure into Tier 1 REC Procurements Under the Clean Energy Standard,* NYS DPS. October 2, 2019.

conditions, such as wholesale electricity market carbon pricing; reducing ratepayer exposure to market volatility; and lower projects' financing costs by reducing risk exposure, relative to a Fixed-Price REC procurement approach.

On January 16, 2020, the Commission issued an *Order Modifying Tier 1 Renewable Procurements*,[141] approving NYSERDA's proposal, with modifications. The Order directed NYSERDA to give Renewable Energy Standard procurement bidders the option to offer either an Index REC bid or a Fixed-Price REC bid, beginning with NYSERDA's 2020 Renewable Energy Standard procurement. The Commission found that allowing project developers to choose their preferred REC option would reduce developers' risk premiums, allow developers to more effectively structure their bids to meet their financing and operational needs, and avoid potential double-compensation for projects that could receive higher wholesale market revenue, should NYISO ultimately implement its carbon pricing proposal. The Order also established a ceiling on the Index REC Price equal to the project's specified revenue requirement value, to limit payments to generators operating while wholesale market energy prices are below zero. Additionally, the Order established a monthly settlement period for energy and capacity prices, an hourly day-ahead simple average zonal Reference Energy Price based on the project location, and an ICAP spot-market auction single-zone Reference Capacity Price using either fixed or custom UCAP factors. NYSERDA has announced that it is moving forward with incorporating this Index REC option in RESRFP20-1, to be issued in 2020. Future reviews will consider the results of this change in the context of a portfolio that will likely be a blend of both Fixed-Price REC and Index REC contracts.

8.3 Comparative Results of Procurements: Solicitation Events, Characteristics and Outcomes

Despite its provision of only a partial hedge, NYSERDA's Fixed-Price REC contract offerings have successfully attracted a significant degree of LSR development activity to New York State. As shown in Table 1, NYSERDA awarded total REC contract quantities of more than double[142] the procurement target for both RESRFP17-1 and RESRFP18-1, and over 165% of the

141 New York State Public Service Commission. (2020, January 16). Case 15-E-0302, Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard, Order Modifying Tier 1 Renewable Procurements.

142 After accounting for contract attrition to date, active contracts are still approximately double the procurement targets.

procurement target for RESRFP19-1. To this end, NYSERDA's Fixed-Price REC experience has been successful. Total developer response to NYSERDA procurements is described in more detail in Section 8.4. Additional details associated with the quantities, technologies and locations of projects selected through New York's three RES procurements to date were provide in Section 2.1. Table 41 compares the characteristics of LSR procurement activities in New York and New England.

Table 40. Characteristics of LSR Procurement in New York and New England

	New York	Massachusetts	Connecticut	Rhode Island	Maine
Offtaker	NYSERDA	EDCs	EDCs	EDCs	EDCs
Products Procured	Tier 1 REC-Only	Energy + RECs, or REC-only [143]	Energy + RECs, or REC-only	Energy + RECs, or REC-only	Energy, Energy + Capacity, or RECs [144]
% of Output Procured	Up to 120% of a specified bid quantity	Up to 100% of actual production	Up to 100% of actual production	Up to 100% of actual production	Up to 100% of actual production
Contract Duration	Up to 20 years	Up to 20 years	Up to 20 years	Up to 20 years	Up to 20 years
Pricing Mechanism	As Bid	As Bid	As Bid	As Bid	As Bid
Scoring	Multi-attribute: price (70%), project viability (10%), incremental economic benefits (10%), operational flexibility and peak coincidence (10%)	Multi-attribute: quantitative factors (75%) including costs & benefits - direct and to retail consumers; qualitative factors including project viability, operational viability, siting & permitting, reliability benefits, contract risk, environmental impacts	Multi-attribute: quantitative factors (75%) including price, direct contract benefits & indirect economic benefits; qualitative factors including viability, environmental impacts, emissions reductions, economic development benefits, contribution to CT installed capacity & local source requirements	Multi-attribute: price (80%), siting, permitting, and environmental impacts, project development status, operational viability, experience & capabilities, interconnection, financing, contract risk, economic benefits	Multi-attribute: ratepayer benefits (70%), economic benefits (30%) [145]
Frequency and Predictability of Solicitations	1 to 2 times per year	Sporadic, per RFP date specified by legislation	Sporadic, until authority is filled.	Periodic. Until authority is filled.	Sporadic, per RFP dates specified by PUC or legislation
Technology Eligibility	Tier 1. Offshore wind has dedicated procurement.	Class 1, including offshore wind. Offshore wind also has dedicated procurements.	Class 1, including offshore wind. Offshore wind also has dedicated procurements.	"New", including offshore wind.	Class 1, including offshore wind.
Geographic Eligibility	NYISO or delivered to NYISO	ISO-NE or delivered to ISO-NE	ISO-NE or delivered to ISO-NE	ISO-NE or delivered to ISO-NE	ISO-NE or delivered to ISO-NE

[143] The earliest long-term contracts in MA also offered the purchase of capacity; more recent procurements do not.

[144] The Maine PUC recently authorized bidders to the forthcoming 2020 large-scale renewable solicitation to include offers for energy *and* RECs.

[145] Reflects scoring criteria adopted for most recent solicitation (2020).

New York is unique in its use of NYSERDA as a central procurement agent. All other benchmark states implement contracting through the distribution utilities. Products procured vary, with all states either providing or trending towards a combined energy and REC award and trending away from any options that include the purchase of capacity. Massachusetts, Connecticut, and Rhode Island current offer bundled energy and REC contracts, while Maine is transitioning to offering energy and RECs. The contract price paid in each state is based on the price offered by bidder (e.g., as bid), and in each state, evaluation is based on a combination of price and non-price characteristics, with many similarities in the general types of non-price attributes considered, but differences in the details, the structure, scoring weights, and visibility of scoring weights.

The benchmark states differ from New York, as well as each other, with respect to solicitation frequency and predictability. New York provides the greatest degree of predictability for market participants, with solicitations no less than annually. This type of visibility is critical to market development and will help New York attract developer and investor attention when there is competition between states for finite resources. The New England benchmark states do not provide a schedule for periodic solicitations. Rather, enabling legislation often provides an end date by which one or more solicitations must have been issued, and projects selected for contracting. Solicitations are offered periodically until contracting authority is fulfilled. While all forms of long-term contracting provide opportunities for market growth, the lack of visibility into the frequency, timing, and quantity associated with New England RFPs have tempered developers' willingness to invest aggressively in project development in between RFPs.

An additional trend in procurement is the combination of transmission and generation proposals into single procurements. This enables evaluators to consider the potential benefits to ratepayers of contracting for both types of assets at the same time. One more trend in renewable energy procurement is the shift from states exclusively offering open, technology-neutral solicitations (in which wind, solar, biomass, hydro and other resources have the opportunity to compete head to head) to legislatively-directed targeted procurements – in which solicitations dedicated to a narrowed set of technologies or a single technology are released in order to maximize competition and market acceleration in those areas. Offshore wind solicitations provide the most notable example of targeted procurement.

8.4 Comparative Results of Procurements: REC Prices

REC pricing provides a useful metric for comparing renewable energy procurement results. Due to the differences in procurement policies between New York and New England, however, analysis and context are required in order to facilitate a meaningful comparison.

New York's historical Fixed-Price REC approach provides transparency for RES Tier 1 compliance costs. New England's bundled (energy and REC) contract approach provides a more complete hedge, but the seller remains at risk for capacity market revenues. In order to create a REC price comparison, a methodology to parse the energy and REC components of New England's bundled bid pricing[146] is required.

In New England, the states require the contracting EDCs to resell the energy from bundled contracts at market prices, and either apply the RECs to their own RPS compliance obligation or resell those at market prices as well. The difference between the bundled contract price and the total resale revenue represents the bundled contract's over (or under) market price in each year. The EDCs make periodic filings to support this reconciliation, and the over- or under-market cost of contracted renewables is passed through to ratepayers.

To compare REC price outcomes in New York and New England, two approaches to estimating REC prices are required. Since NYSERDA has offered only Fixed-Price REC contracts to date, the New York approach is straight-forward. The New York prices in Table 42 represent the annual average production-weighted REC price for the NYSERDA RES Tier 1 REC contract portfolio – based on estimated annual production for each contracted facility. For New England, the REC price is derived by subtracting the known or estimated market value of energy – for the specified period and location – from the project-specific contract price. The production-weighted average for each state or utility is then calculated using these (implied) REC prices.

[146] Some New England solicitations have required bidders to provide separate price schedules for energy and RECs in addition to the bundled bid. With a REC price schedule in hand, the buyer has a quantified value – provide by the seller – to point to future changes to the RPS will render the seller's facility ineligible. If the generator is no longer eligible for the RPS, the utility would be relieved of paying this portion of the contract price. Some buyers (e.g. National Grid in Rhode Island) have imposed a reasonable benchmark test on the REC price schedule.

Table 41. Comparison of Portfolio Costs of NYSERDA Fixed-Price REC to Imputed[147] REC Premium from New England Bundled Energy and REC Contracts

$/MWh	2017	2018	2019
New York: NYSERDA[148]	$16.67	$16.83	$22.17
Massachusetts: National Grid	$39.17	$38.42	NA
Rhode Island: National Grid (w/ Block Island Wind)	$203.73	$194.46	$95.34
Rhode Island: National Grid (w/o Block Island Wind)	NA	$57.70	$30.99

The values above reflect contracts for renewable energy projects with commercial operation dates on or after January 1, 2015. For Rhode Island, portfolio average pricing is shown with and without the 30MW Block Island Wind Project – which, as a pilot project (and sub-scale for offshore wind), has significantly higher pricing than the projects selected through large-scale competitive solicitations.

The derivation of New England's imputed REC premium is somewhat analogous to way Index REC prices will be calculated, although the degree of hedging is different and should be considered when comparing REC prices. Capacity revenues are not hedged in New England; therefore, New England's imputed REC prices appear higher because the potential value of participation in capacity markets is not included. Separately, because energy and capacity values are likely to increase over time, the imputed REC values shown here for the early contract years reflect greater premiums than would be expected if this analysis were conducted in the second half of the contract life. By comparison, the New York REC values are fixed and effectively represent a levelized value that already takes into account higher energy and capacity values in future years.

8.5 Procurement Interaction with LSE Obligation

New York's approach to the resale of Tier 1 RECs procured to Tier 1 RES-obligated LSEs results in a direct connection between state procurement of renewable resources and the obligation on LSEs to procure a specific amount of renewable energy. The volumes of RECs

147 Energy values are estimated on a 6-month basis and a straight average was subtracted from the bundled contract price.

148 NYSERDA Weighted Average Cost of RECs: Calculated from data in OpenNY Database at https://data.ny.gov/Energy-Environment/Large-scale-Renewable-Projects-Reported-by-NYSERDA/dprp-55ye/data

NYSERDA procures is intended to provide most of the market supply, and NYSERDA offers to resell available non-transferable RECs at cost, only to LSEs, at volumes based on a pro rata share of each LSE's load.

As discussed in Section 2.2, LSE obligations under the RES are set based on expectations of contracted supply from NYSERDA's procurements, plus anticipated supply from Tier 1 eligible VDER projects. Thus, delays and attrition of contracted projects will create supply challenges for LSEs to meet obligations, unless there is sufficient availability of market or VDER RECs. To date, RES procurements have resulted in a sizeable pipeline of Tier 1 REC supply, but the supply that has come online so far is lagging 1 to over 2 years behind initial expectations, and by extension, lagging behind the RES obligations (see Figure 7 in Section 2.3). NYGATS data indicate that there is a material amount of non-NYSERDA Tier 1 REC supply in the New York market. However, there is no visibility into the amount of that supply that is obligated to LIPA or previously committed to voluntary purposes – amounts not available to LSEs – versus market RECs available to LSEs for RES Tier 1 compliance.

The degree to which LSEs have used ACPs to meet obligations indicates whether quantities of Tier 1 RECs, from NYSERDA's procurement or from market supply, were enough to meet obligations. As jurisdictional LSEs met 15% of the obligations in 2017 with ACPs, and 51% of obligations with ACPs in 2018, the data suggest that the market has so far not offered enough low-cost, third party RECs to make up for the lag in operation dates of NYSERDA-contracted supply. As discussed in Section 5.7, the short supply of RECs and use of ACPs for RES compliance has a material impact on compliance costs borne by ratepayers. Though the data are not available to breakdown different compliance strategies among LSEs, based on concurrent bank injections of Tier 1 RECs and ACPs, some LSEs had Tier 1 REC supply in excess of obligations, while others were short.

There are a few characteristics of LSEs that may influence use of VDER RECs, NYSERDA resale RECs, market RECs and use of ACPs for compliance:

- IOUs are granted the RECs from certain VDER projects[149] that choose the default Value Stack option to receive Environmental Value compensation in exchange for the project's RECs. The IOUs may retire those RECs produced by those projects towards their RES obligations, but they may not trade VDER Tier 1 RECs. Thus, IOUs with a proportionally large volume of VDER projects relative to their load may in theory have VDER RECs in excess of their obligations (although this has not happened to date).
- While the ACP is higher than the NYSERDA resale price of the same vintage RECs, the cost to LSEs of forgoing NYSERDA REC purchases for ACPs increases cost by only 10%. For LSEs with small loads and obligations, the total cost differential between complying with ACPs and Tier 1 RECs may not exceed the transaction cost of acquiring the necessary amount of Tier 1 RECs, and foregoing purchases from NYSERDA (a process with low transaction costs) for making ACPs up to a year later may better align their commitments with actual loads[150] and improve cash flow.
- Similarly, even if market RECs are available at prices below the ACP, LSEs with small loads and obligations may not find it economical (or sufficiently economically compelling) to develop the expertise and expend the time and effort to optimize what in absolute terms may be small compliance costs by seeking and obtaining market RECs rather than making ACPs.

Lastly, this section considers more broadly the extent to which RECs used to satisfy Tier 1 RES compliance obligations are generated from projects developed in New York State. To date, 100% of Tier 1 RECs procured by NYSERDA are generated by projects located in New York State.[151] Uncontracted (market) RECs are also used for Tier 1 compliance provided that all eligibility criteria are met. In addition, uncontracted (market) RECs may also be used for Tier 1 compliance provided that all eligibility criteria are met. As indicated in the Clean Energy Standard Annual Progress Reports for each respective year, all market RECs used for compliance in 2017 and 2018 came from in-state projects.

8.6 Average RES Procurement Bill Impacts for Residential Customers

The RES procurement structure influences the costs ultimately born by ratepayers through electricity bills. Table 43 presents an estimate of the bill impacts on a typical residential

149 CDG, RNM, and onsite projects >750 kW

150 This was particularly an issue in 2017, when LSEs had to commit to REC purchase volumes from NYSERDA well before knowing their obligations; subsequent changes to quarterly sales have mitigated this uncertainty.

151 Of all non-Tier 1 REC contracts entered by NYSERDA through RPS solicitations, only four were with projects located outside of New York. Two of these contracts have already expired, and the remaining two will expire in 2021 or 2022.

electricity customer served by one of the state's jurisdictional LSEs. Total costs are provided as estimated in Section 5.7, converted to an average $/MWh figured based on total obligated load, and then applied across the usage of a typical residential customer in New York.

Table 42. Residential Bill Impacts

	2017	2018
Weighted Average Compliance Cost ($/MWh)[152]	$21.65	$18.30
RES Tier 1 Obligation (%)	0.035%	0.150%
Average Residential Usage (kWh/Month)[153]	600	600
Average Residential Bill Impact ($/Month)	$0.005	$0.016

The bill impact for a typical residential consumer in New York comes out to be approximately half a cent per month in 2017 and a cent and a half in 2018. The low magnitude of bill impacts reflects that RES obligations are a fraction of a percent of load in 2017 and 2018.

8.7 Rate of Entry by Competitive Developers

Successful procurement by state entities, or ordered by state entities, helps to ensure that there is renewable energy supply available to serve state targets. A key metric for whether a procurement is successful is the degree of developer response to the solicitation. A lack of competitive bids may indicate an unattractive procurement structure or risk profile, or underlying problems with the development environment in eligible geographies. Conversely, many diverse bids from a wide array of entities indicates that the procurement has created an attractive business opportunity, and further produces lower cost and higher quality awards. This section evaluates the responses to

NYSERDA procurements under the RES to date, as well as developer pipeline activity that indicates interest in the New York market. Projects often change hands during or after the development stages, and thus the composition of bidders may not represent the composition of long-term asset owners, but still reflects the industry interest in the market.

Developer response to NYSERDA procurements can be observed both through actual bids submitted to RES RFPs and through other early stage development activity that could support

[152] Based on Table 33: Estimated LSE Compliance Costs.

[153] Monthly average usage of a residential consumer in New York, from EIA Form 861 for 2018.

a successful bid. Section 5.4 discusses the developer activity and investment in a pipeline of projects in New York State. The uptick in the number of Article 10 cases initiated in recent years (Table 28) and the number of projects entering the interconnection queue (Table 29) demonstrate an increase in development activity over time since the August 2016 CES Order. Approximately 60% of the projects in the NYISO interconnection queue have bid into a RES procurement, indicating both that developers of early-stage projects are focused on NYSERDA procurements and that nearly one half of all proposed projects have yet to participate in any RES RFP. Section 9 further breaks down the interconnection queue and Article 10 permitting applications by technology, timing, and contracted vs un-contracted supply.

Table 44 summarizes the developer response to RES RFPs to date and reveal trends related to technology and project size that are summarized below.

Table 43. Developer Bids to RES RFPs[154]

Solicitation	Tech.	# of Bids	# of Unique Projects	# of Developers[155]	Total MW Bid	Average Project Size (MW)	Estimated MWh[156]
RESRFP 17-1	Wind	8	8	5	1,610.3	201.3	592,109
	Solar	60	56	18	1,821.1	32.5	60,678
	Hydro	1	1	1	3.3	3.3	13,130
	Biogas	3	3	1	10.5	3.5	26,092
	Total	72	68	25	3,3445.2	50.7	700,416
RESRFP 18-1	Wind	15	11	6	2,248	204	440,908
	Solar	45	43	16	2,328	54	96,533
	Total	60	54	20	4,576	85	537,441
RESRFP 19-1	Wind	8	8	5	517	65	189,991
	Solar	47	46	17	4,077	89	161,843
	Total	55	54	22	4,593	85	351,834

154 Sources: List of RESRFP17-1 bids provided by NYSERDA, SEA pulls of public bid information released for RESRFP18-1 and RESRFP19-1.

155 Some developers submitted bids for both solar and wind projects, thus the totals column does not represent the sum of wind and solar developers.

156 MWh were estimated using average capacity factor for NYSERDA contracted operational projects for wind, solar, and biogas. For hydro, MWh calculated using average capacity factor for NYSERDA contracted projects other than cancelled. Does not represent the total MWh actually bid from these resources.

- **Technologies**: Solar has become an increasingly larger portion of the total projects proposed and the total bid capacity. By number of projects, the proportion of solar to wind project bids grew between RESRFP18-1 and RESRFP19-1. When comparing quantity of RECs bid, the shift from wind to solar is even more pronounced – solar represented 9% of the total MWh bid in 2017, 18% in 2018, and 46% in 2019.
- **Project sizes:** Over the three RES procurements to date, the average size of wind project bids has decreased from 203 MW in RESRFP17-1 to 65 MW in RESRFP19-1. Meanwhile, the average solar project bid has increased from 38 MW in RESRFP17-1 to 89 MW in RESRFP19-1. The average solar project in development is now larger in capacity than the average wind project.
- **Concentration:** Though each RFP has drawn responses from a significant number of developers, a smaller number of developers have been responsible for a large portion of the total capacity bid. In each RFP, the largest bidder by MW was responsible for 23-34% of the total MW bid. In each successive RFP, several new developers submitted bids for the first time, demonstrating that the program is continuing to attract the attention of additional developers.
- Twenty-eight developers submitted at least one project into RESRFP17-1. The largest bidder by MW submitted proposals for 1,222 MW across four wind projects and one solar project (27% of total MW bid). Thirty-nine solar projects were proposed between 19.9 and 20 MWs by fourteen different developers.
- Twenty developers submitted at least one project into RESRFP18-1. The largest bidder by MW submitted proposals for 1,008 MW across two unique wind and three unique solar projects (23% of MW bid). Twenty-seven solar projects were proposed between 19.9 and 20 MWs by ten different developers.
- Twenty-two developers submitted at least one project into RESRFP19-1. The largest bidder by MW submitted proposals for 1,584 MW across six solar projects (34% of total MW bid). The largest project, by bid capacity, was a 270 MW solar facility.
- **Types of developers:** As discussed in Section 5.4, developer interest in the New York market is growing, as indicated through first time participation in NYSERDA solicitations, the NYISO interconnection queue, or Article 10 permitting applications. All but three developers that have entered the market in the RES era have bid into a NYSERDA solicitation. RES procurements have attracted bids from a wide variety of developers, ranging from small regional developers to major international developers and asset owners.

8.8 REC Exports: NY project participation in neighboring markets

As detailed in the prior section, NYSERDA's RES procurements to date have driven significant development activity in New York. NYSERDA contracts are not the only outlet for New York renewable energy developers and asset owners, however. Section 6.1 summarized renewable energy procurement activity in neighboring markets. While long-term contracting opportunities

in PJM have been limited to offshore wind, periodic policy-driven long-term contracting solicitations in Massachusetts, Connecticut, Rhode Island, and Maine are open to all qualifying renewable energy projects able to fulfill the delivery requirements from adjacent control areas into ISO-NE. While this delivery requirement adds both complexity and cost, the benefit – if selected – is a twenty-year contract for both energy and RECs. This degree of long-term revenue hedge is not currently available through RES procurements – although the migration to Indexed REC pricing is expected to provide a more comparable hedge.

Compared to the 67 projects awarded by NYSERDA to deliver to NYS through RES solicitations since 2017, in addition, four LSR projects located in New York have been selected through past competitive solicitations for long-term contracts with distribution utilities in New England. This cohort includes two wind projects totaling 206 MW and with an approximate annual energy production of 620 GWh, as well as two solar projects totaling 40 MW and with an approximate annual energy production of 72 GWh. Two projects are contracted to Connecticut, one to Rhode Island, and the remaining project output is divided among Connecticut, Rhode Island, and Massachusetts. One project is currently operating, while three remain under development.

While the primary purpose of this section is to understand REC exports in the procurement context, it is also important to acknowledge that certain New England states offer the opportunity for any market supply with a COD on or after January 1, 1998 to export RECs to New England.[157] Delivery requirements still apply. This option is important to consider when estimating the potential future contributions of uncontracted supply to the RES and CES goals.

[157] January 1, 1998 is the threshold eligibility date for Massachusetts Class 1 and Rhode Island "New." Connecticut has no vintage requirement for wind projects. Other vintage and eligibility requirements are described in Table 40.

8.9 Key Findings

Key findings from this section include:

- New York has procured approximately 85% of the Tier 1 REC volumes procured New England-wide since 2005.
- The frequency and predictability of solicitations in New York is more favorable for developers and investors, and the development of a robust market than the New England model. Therefore, New York can be expected to attract more consistent bidder interest than the New England states over time.
- On a portfolio-wide basis, NYSERDA REC costs are less than imputed REC premiums for New England EDCs. The contract structure and degree of hedging differs between the markets, however, which prevents a direct and reliable comparison on a $/MWh basis.
- RES procurements in 2017 and 2018 are estimated to have added 0.5 and 1.6 cents (total, not per kWh), respectively, to the average residential customer's monthly bill.
- New York is experiencing rapid market growth as measured by the number of participating developers and the number of proposed projects.
- Solar has surpassed wind with the largest number of active developers, the greatest number of proposed projects, the most total MW proposed, and the largest average project size.
- A small subset of New York renewable energy generators that would be eligible for Tier 1 have found markets in neighboring states attractive compared to NYSERDA's current Fixed-Price REC structure.
- Fixed-Price REC pricing imposes risks that affect outcomes, including risk of contact termination in the face of falling commodity revenues, suppression of bidder interest, risk premiums in cost of capital and therefore REC price, and additional termination risk associated with NYISO carbon policy uncertainty.
- The adoption of Index REC pricing directly addresses many of the risks and negative outcomes identified with the Fixed-Price REC approach.

9 Adequacy of Resources

An assessment of resource *potential* is beyond the scope of this analysis; however, independent studies of technical potential of land-based wind, utility-scale solar, and offshore wind suggest that such technical potential is ample to meet New York's targets.[158] The more practical and germane questions are the scale of developable market potential – what can get successfully interconnected, sited and permitted on an economic basis – and the feasible timeline for turning such potential into operating renewable energy projects. As noted in Section 2.4, since the ultimate level of RES targets is not defined after 2022 and is a residual of after taking into account the contributions of other components of the CES, a benchmark for measuring the adequacy of resources cannot be directly measured. Renewable resources including large hydroelectric that could be imported from other control areas but are currently constrained by transmission limitations may also contribute to the state's goals. Leading indicators of the adequacy of RES Tier 1-eligible resources entering the development pipeline in preparation for becoming available to meet RES obligations include project:

- entry into and progress through the NYISO interconnection queue;
- entry into and progress through the siting/permitting processes, in particular the pursuit of Article 10 siting review; and
- pursuit of Provisional Certification as Tier 1 eligible projects, as precondition for selection for a NYSERDA REC contract award.

This section of the report assesses the quantity of potential RES Tier 1-eligible supply suggested by each of these indicators. While an unknown proportion of these quantities will ultimately fail to be developable, the quantities revealed are nonetheless informative and indicative of the potential adequacy of resources being brought forward by developers to meet demand.

158 A 2014 resource potential conducted for NYSERDA projected over 54 TWh per year of solar Bounded Technical Potential by 2030, and over 12 TWh of land-based wind Bounded Technical Potential by 2030. See New York State Energy Research and Development Authority. (2014, April). Energy Efficiency and Renewable Energy Potential Study of New York State. Retrieved from https://www.nyserda.ny.gov/About/Publications/EA-Reports-and-Studies/EERE-Potential-Studies. AWEA cites a New York land-based wind technical potential at 80 m hub heights of over 91 GW (American Wind Energy Association. (2020). Wind Energy in New York. Retrieved from https://www.awea.org/Awea/media/Resources/StateFactSheets/New-York.pdf)

9.1 Renewables in the NYISO Interconnection Queue

The majority of Tier 1 LSR projects intend to make wholesale sales of electricity and interconnect to transmission facilities or FERC jurisdictional distribution facilities and must go through the NYISO Interconnection Queue. [159] Generation projects up to 20 MW in size may utilize NYISO's Small Generator Interconnection Procedures (SGIP), while larger projects must utilize the Large Generator Interconnection Procedures (LGIP). All projects 20 MW and above, and projects 2-20 MW seeking Capacity Resource Interconnection Service (CRIS), must go through NYISO's Class Year deliverability study process. [160] Table 45 shows the number, capacity and estimated annual energy production of LSR projects by technology currently at some stage in NYISO's interconnection process. If this substantial quantity of potential LSR supply under development (which includes projects under NYSERDA contract) were all to successfully reach commercial operation, it would comprise approximately 28% of jurisdictional load and 20.5% of statewide load in 2022.

Table 44. NYISO Interconnection Queue for Clean Energy Products [161]

Fuel Type	Total Projects in Queue	Maximum Summer Capacity (MW)	Est. Annual Electricity Output (GWh)	Total Projects subject to Article 10 (>25 MW)	Assumed Annual Net Capacity Factor [162] (%)
Land-Based Wind	26	4,312	12,685	26	33.58%
Solar	114	10,013	18,683	48	21.30%
Hydro	1	1	5	0	45.42%
Total	141	14,326	31,372	74	

159 Smaller Tier 1 projects up to 5 MW interconnecting to non-FERC-jurisdictional distribution facilities may utilize the New York State Standardized Interconnection Requirements. Such facilities' contributions to the RES targets have been minimal to date; therefore such projects are not considered material to this RES resource adequacy analysis.

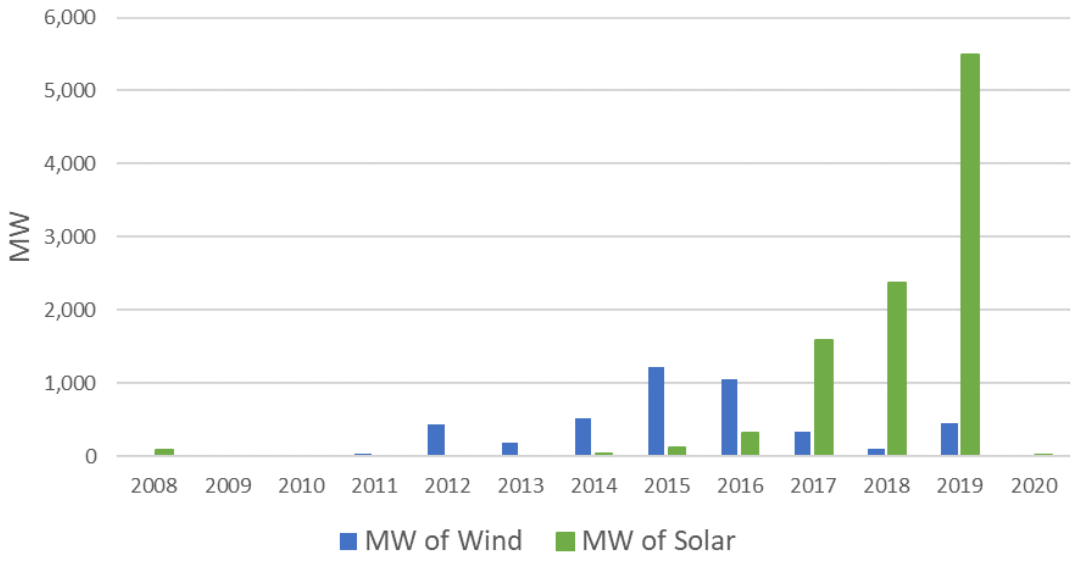
160 New York Independent System Operator. (2019). Manual 23: Transmission Expansion and Interconnection Manual. Retrieved from https://www.nyiso.com/documents/20142/7575204/M-23-TEI-Manual-v4.0-Clean.pdf/f4ca0374-4600-c04f-b9ee-9634fabeb3d6?version=1.1&t=1562697528556&download=true

161 NYISO Interconnection Queue, as of 2/29/20. Note: OSW is EXCLUDED from this dataset

162 Wind and Solar based on approximate c.f. of NYSERDA contracted/under development, Hydro based on approximate c.f. of NYSERDA all contracted of any status other than cancelled. Data from OpenNY database as of February 2020.

Table 45 shows the land-based wind and utility-scale solar projects entering the interconnection queue in each year since 2008. It shows an explosion of utility-scale solar entering the queue since the advent of the RES, but a leveling off and recent contraction of new land-based wind entering the queue, suggestive of a saturation of developable sites.

Figure 20. Land-Based Wind and Solar Projects Entering NYISO Interconnection Queue[163,164]



While the total amount of supply moving into the NYISO interconnection queue is material relative to New York's goals, these projects face hurdles with regard to the timeliness of moving through the process, which impacts project viability. Furthermore, lags in getting through the interconnection process can challenge project viability, with respect to meeting contractual milestones, or facing loss of Federal incentives as they phase down and out. NYISO guidance (for fast-tracked projects or projects that forego a Facilities Study) suggests that an SRIS (for LGIP) or SIS (for SGIP) can be completed within approximately 5 to 6 months of submitting an Interconnection Request.[165] However, as depicted in Table 46 below, recent experiences suggest average timelines closer to between 13 to 18 months, with some projects taking

163 Ibid.

164 NYISO Interconnection Queue as of 2/29/20. Note: OSW is EXCLUDED from this dataset

165 NYISO Open Access Transmission Tariff (OATT) 30 Attachment X – Standard Large Facility Interconnection Procedures and OATT 32 Attachment Z – Small Generator Interconnection Procedures

materially longer.[166] Time through the process also appears to differ by generating technology and study type (SIS/SRIS), but the small sample size of projects makes it unclear if these projects are indicative of an industry trend or if they are statistical outliers.

Table 45. NYISO Interconnection Study Timing[167]

Technology/Study	No. of Projects	Average Study Time (Months)
Solar	9	15
Battery Storage	2	13
Wind	2	18
Offshore Wind	2	16
SIS (All Technologies)	8	14
SRIS (All Technologies)	7	17
Total	15	15

As described in Table 47, recent Class Years show a slight reduction in completion timelines, but still have each taken over two years to finish. Initial project allocations have taken at least 15 months and sometimes over 2 years.

Table 46. NYISO Class Year Timing

Class Year	# of Projects (Renewables)	Time (years)	Key Issues
2011	6 (2)	2.63	Took 2.25 years to reach initial project allocations; 3 project allocations total
2012	6 (2)	2.87	Took > 2.5 years to reach initial project allocations; last overlapping Class Year study
2015	15 (3)	2.01	N/A
2017	18 (8)	2.36	Additional System Deliverability Studies needed for single project; Class Year bifurcated
2019	91 (50)	n/a	Record setting number of projects; first Class Year since Class Year/Interconnection Queue redesign process

166 Based on authors' review of project interconnection studies (System Reliability Impact Study/System Impact Study) and NYISO Interconnection Queue (10/31/19 vintage) for representative sample of solar, land-based and offshore wind, and battery storage projects filing interconnection requests from 1/14/17 to 10/23/18.

167 Ibid.

Recognizing the challenges posed by its interconnection authorization turnaround time, NYISO has proactively proposed, and is in the process of implementing, updates to the interconnection and Class Year process, including:

- Moving from annual Class Year studies (delays caused overlap) to studying 1 Class Year at a time;
- Providing project owners with additional options for proceeding forward if costly upgrades are identified early in the Class Year process, including withdrawing, limiting its CRIS MW, or electing ERIS instead of CRIS;
- Allowing developers the option to study deliverability earlier in the process (with their SRIS/SIS);
- Streamlining the cost allocation acceptance process;
- (Proposed) Requiring deliverability evaluation during SRIS and removing additional System Deliverability Upgrade studies from the Class Year process so that the rest of projects can move forward with a resolution; and
- (Proposed) For CRIS-only requests, deliverability will be studied outside of the Class Year process with a "mini-deliverability" study, in addition to various other Class Year efficiency improvements. [168]

These innovations may prove to mitigate in part some of the challenges faced by projects moving through the interconnection process.

9.2 Siting Applications for Tier 1 Renewables

Tier 1 resources with a nameplate capacity of 25 MW and greater are subject to the Article 10 permitting process, while Tier 1 resources with a nameplate capacity of less than 25 MW are reviewed and permitted under New York's State Environmental Quality Review Act (SEQRA) process and other applicable local and state laws. On April 2, 2020 Governor Cuomo announced enactment of the Fiscal Year 2021 State Budget which included the adoption of the *Accelerated Renewable Energy Growth and Community Benefit Act* establishing a new permitting program for large-scale renewable energy projects under the Department of State. This new program will be implemented by April 2, 2021 with the intent of replacing and streamlining the Article 10 process for projects over 25 MW. This new process will replace Article 10 for larger projects that have not yet initiated the Article 10 process going forward. Projects currently in the Article 10 process will have the option to continue under Article 10, or shift to the new permitting program. The

[168] NYISO Class Year Redesign Filing under ER20-638: https://elibrary.ferc.gov/IDMWS/common/OpenNat.asp?fileID=15427871.

Act also allows projects between 20-25 MW to opt into the new process rather than going through SEQRA.[169]

9.2.1 Article 10

Under the Article 10 process, the multi-agency Board on Electric Generation Siting and the Environment ("Siting Board") has been charged with reviewing permit applications and issuing Certificates of Environmental Compatibility and Public Need (CECPN) to qualifying projects.[170] As summarized in Table 48, as of February 28, 2020, 54 renewable energy projects totaling 9,041.4 MW of generating capacity were in the active Article 10 queue. Nineteen of these projects totaling 2,961.78 MW of capacity have received a NYSERDA contract under the RES procurements to date, leaving an additional 5,835 MW171 available, if successfully developed, to contribute to meeting additional REC demand. If this total quantity of potential LSR supply under development and currently seeking permits (including supply contracted to NYSERDA) were all to successfully reach commercial operation, it would comprise approximately 18.0% of jurisdictional load and 13.2% of statewide load in 2022.

Table 47. Projects in Article 10 Queue[172]

Contracts	Wind		Solar		Solar + Storage		TOTAL	
	#	MW	#	MW	#	MW	#	MW
RPS	2	197	1	47	0	0	3	244
NYSERDA RESRFP17-1	3	733	4	297	0	0	7	1,030
NYSERDA RESRFP18-1	2	246	4	601	1	170	7	1,017
NYSERDA RESRFP19-1	1	145	4	770	0	0	5	915
NYPA, LIPA, or Other Contracted, or Uncontracted	8	1,796	21	3,469	3	570	32	5,835
TOTAL MW	16	3,117	34	5,184	4	740	54	9,041
Assumed Annual Net Capacity Factor	33.6%		21.3%		21.3%			
Est. Annual Electricity Output (GWh), Total	9,170		9,673		1,381		20,224	
Est. Annual Electricity Output (GWh), Not under contract to NYSERDA	5,285		6,473		1,064		12,821	

169 Accelerated Renewable Energy Growth and Community Benefit Act

170 New York State Department of Public Service. (2011, August 4). Article 10 Law. Retrieved from http://www3.dps.ny.gov/W/PSCWeb.nsf/0/d12e078bf7a746ff85257a70004ef402/$FILE/Article10LawText%20.pdf

171 Includes supply contracted to NYPA, LIPA and (as discussed in Section 8.6) projects contracted to out-of-state purchasers.

172 Active Article 10 Queue (Updated February 28, 2020), http://www3.dps.ny.gov/W/PSCWeb.nsf/All/763B187DD5A792DE8525847400667D6B?OpenDocument

The first Article 10 CECPN was issued in January 2018, however, that project has yet to clear the Article 10 conditions processes (post-certification) and has yet to start construction in earnest. In total, 5 projects totaling 700.6 MW of capacity have been granted a CECPN since the enactment of Article 10, all of which are wind energy projects and none of which have begun erecting turbines. Of those 5 projects with a CECPN, 2 projects (207 MW) were contracted under the previous RPS, 2 projects (394 MW) were contracted under NYSERDA 2017-18 RES procurements, and 1 project (126 MW) was contracted out-of-state. [173]

Most of the capacity potential in the Article 10 queue remains in early stage development (pre-application submittal phase) and is comprised of uncontracted solar projects. The overall timelines for projects going through the Article 10 process have varied based on several factors but have been significantly longer than as expected and statutorily defined under the Article 10 process. The passage of the *Accelerated Renewable Energy Growth and Community Benefit Act* is intended to address these issues through a streamlined and responsible process.

9.2.2 SEQRA

SEQRA requires local and state government agencies to consider the environmental impacts of planning, review, and decision-making processes, including permitting, and to prepare an environmental impact statement where the agency action may have a significant adverse environmental impact. [174] As shown in Table 49, there are currently 35 solar projects totaling approximately 688 MW of capacity that have received a RES contract and are subject to the SEQRA permitting process. None of these SEQRA projects receiving RES contracts have begun operation.

[173] For various reasons, the MWs for each project reported by NYSERDA in the RES Procurement Reports do not align perfectly with the MW represented to the Siting Board. For example, sometimes projects that apply for an Article 10 certificate do not bid the full capacity of the project into the RESRFP or some projects make concessions or adapt to meet Article 10 permit conditions, thus changing project capacity.

[174] NYS Department of Environmental Conservation, *New York State Environmental Quality Review Act.* §§ 8-0101 et seq. ("SEQRA") of the Environmental Conservation Law ("ECL"); 6 NYCRR Part 617.1(c), NYS DEC. November 1, 1978. https://www.dec.ny.gov/permits/6208.html

Table 48. Renewable Energy Projects under SEQRA Review[175]

	Wind	Solar	Total
Number of Contracts	0	35	35
Capacity (MW)	0	688	688
Assumed Annual Net Capacity Factor	N/A	21.3%	N/A
Est. Annual Electricity Output (GWh), Total	0	1,284	1,284

9.3 Conclusions/Key Findings

Analysis presented in this section is summarized in Table 50, and shows that, while the Tier 1 obligation targets for 2030 are not yet established, the scale of the RES Tier 1-eligible supply development pipeline (which includes both uncontracted and contracted but not yet operational supply) - if brought to fruition - is material relative to the scale of the increments necessary to reach CES and CLCPA 2030 targets.

Table 49. Percent of 2022 NY Jurisdictional and Statewide Load: Interconnection Queue and Article 10 Permitting

Indicator	Percent of Jurisdictional Load	Percent of Statewide Load
NYISO Interconnection Queue	27.95%	20.50%
Article 10 + SEQRA Permitting	19.16%	14.05%

[175] Projects below Article 10 25 MW threshold, other than wind repowering projects, from OpenNY Database (as of February 22, 2020).

10 Assessment of Legacy Supply Retention

All renewable energy consumed in New York State is counted toward meeting the CES and CLCPA goals. Generation supported by current and future state renewable energy policies, as well as voluntary renewable energy purchases, builds upon a baseline of legacy renewable resources, including the results of past renewable energy initiatives, to achieve these renewable energy goals. The 'CES Renewable Energy Baseline' is the quantity of generation associated with renewable energy facilities with a commercial operation date prior to January 2015. As detailed in Table 51, per the state's EDP program and calculated by DPS Staff, this legacy supply totaled 41,296 GWh of renewable energy consumed by New York's energy consumers was produced by NYPA hydropower assets, other independently owned renewable energy generation resources, RPS Main Tier and Customer-Sited Tier (CST) facilities, RPS Maintenance Resources, imported renewable energy, and voluntary renewable energy purchases. It constituted 25.9% of the 2014 EDP Statewide Fuel Mix. The Non-Tier 1 MWh from 2017 and 2018 are based on NYGATS data. [176]

Table 50. Generation from Baseline Renewable Energy, 2014 - 2018 [177]

	2014 (CES White Paper)		2017 (NY System Mix)		2018 (NY System Mix)		Change from 2014 to 2018
	CES Baseline MWh	%	Non-Tier 1 MWh	%	Non-Tier 1 MWh	%	MWh
Biomass	609,293	0.4%	561,816	0.4%	474,439	0.3%	(134,855)
Hydroelectric	35,834,762	22.5%	37,951,145	24.8%	37,081,652	23.5%	1,288,212
Biogas	394,314	0.2%	236,628	0.2%	237,441	0.2%	(156,310)
Solar	681,610	0.4%	1,005,028	0.7%	1,486,575	0.9%	893,305
Wind	3,775,684	2.4%	3,209,727	2.1%	2,881,020	1.8%	(854,452)
Renewable Energy	41,295,663	25.9%	42,964,344	28.1%	42,161,126	26.8%	1,035,900

176 2018 CES Progress Report, p. 4.

177 Ibid, Table 2.

Some baseline RECs are from NYPA-owned generation allocated to NYPA's customers, while others are under contractual control of state entities, including supply contracted by LIPA, net energy metered renewables installed prior to 2015, output from project under RPS Main Tier contracts to sell RECs to NYSERDA, and production from RPS Customer-Sited Tier resources.

The baseline generation consumed in New York from renewable energy generators operating prior to January 2015 can vary year to year. Variation in the legacy supply can result from:

- Shutdowns of plants due to reasons such as reaching the end of their useful lives, or inability to cover their future operations and maintenance and necessary capital expenditures ('to-go' costs) with market revenues;
- Reduction in production of baseline generators due to reasons such as poor maintenance, reduced availability, natural degradation, or depletion of fuel supply (e.g., for landfill methane to energy projects);
- Losing CES eligibility (e.g., the CLCPA no longer counts emitting resources, such as biomass, biogas and natural gas-fired fuel cells, which were eligible under the CES);
- Differences in annual production from the baseline of hydroelectric, wind or solar generators due to weather variability; or
- Increases or decreases in imports or exports.

10.1 Market Conditions Impacting Continued Operation or Retention of Legacy Supply

Insufficient market revenues can negatively impact a power plant owner's spending on maintenance, capital projects (upgrades, refurbishments, overhauls) or major repairs, degrading its performance and availability. In the longer term, insufficient revenues can render continued operation uneconomic, if owners do not expect revenues to cover management and administration costs and provide a reasonable return. Energy and capacity revenues have fallen sharply since the 2014 period during which the baseline production was calculated.[178] Due to scale diseconomies, the smallest hydroelectric projects would generally be expected to be under the greatest revenue pressure, although costs for renewables in general and particularly hydroelectric plants tend to be quite site-specific.

[178] New York Independent System Operator. (2019). Power Trends 2019. Retrieved from https://www.nyiso.com/documents/20142/2223020/2019-Power-Trends-Report.pdf/0e8d65ee-820c-a718-452c-6c59b2d4818b?t=1556800999122, Figure 21.

Merchant legacy renewable generators not contracted to deliver energy and RECs into the NYISO market have the incentive to maximize their revenue and manage their revenue risk. Market outlets for such generators include New York's voluntary market for renewable energy and RPS compliance markets in neighboring states.

This voluntary market includes ESCO green power offerings to mass market customers,[179] customized purchases by commercial, industrial and/or institutional customers, and Community Choice Aggregations. This market is ultimately discretional and therefore can be very price sensitive. In general, state RPS compliance markets in the region require energy delivery into the applicable RTO in order to create RECs salable to obligated LSEs in those markets. Table 52 summarizes the market outlets for different types of supply. Projects qualifying for the highest value 'new' renewable tiers in neighboring markets are the most likely to export in the absence of a more attractive in-state market. New York legacy supply eligible for New England's Tier 1 RPS compliance markets has been exported in the past, as discussed further in Section 10.2.

Table 51. Competing Market Outlets for Merchant Legacy Renewables

Generation Characteristics	Eligibility
Legacy wind and hydro with Commercial Operations Date after 1997	New England and PJM Tier 1 markets
FERC Relicensed Hydro	Connecticut Class I (up to 1% of load in aggregate)
Other	Compliance tiers for existing renewables

The relative level of REC prices is one determinate of the attractiveness of competing export markets. Other factors the owner of a merchant legacy plant must weigh include transaction-related costs, the potential loss of capacity revenues, and energy market basis risk (generators may risk at times losing money on energy sales into the target market in order to reap a higher REC revenue).

[179] Under the Commission's December 2019 Order Adopting Changes to the Retail Access Energy Market and Establishing Further Process in Cases 12-M-0476/15-M-0127/98-M-1343, one of three alternative conditions for ESCO authorization to serve mass market customers is to include a total percentage of renewables at least 50% greater than the current RES requirement, using RECs meeting RES locational and delivery requirements of any vintage (described further in Section 0)

10.2 Status of Legacy Supply

Table 51 summarizes the changes in baseline generation from 2014. While weather-dependent renewable energy production and imports of renewables (comprising the majority of system power) will vary year-to-year, reduction in some categories of baseline supply has occurred due to production trends and increases in exports, while eligibility changes under the CLCPA will remove the ability to count some historical baseline supply towards CLCPA goals.[180]

10.2.1 Exports and Imports

Changes in baseline renewable energy serving New York load are strongly influenced by the amount of that production exported to, and imported from, other control areas. Table 53 shows the amount of bundled energy and RECs exported from baseline resources by REC Vintage year, as reported by NYGATS.

Table 52. Baseline Renewable Energy Exports, by REC Vintage[181]

Vintage Year	2014[182]	2017	2018
Non-NYPA Hydroelectric		12,924	178,056
Biogas		572,505	542,573
Wind		1,001,874	949,885
Non-NYPA Subtotal	1,094,558	1,587,303	1,670,514
NYPA Hydroelectric		2,008,088	1,870,715
Total		3,595,391	3,541,229

180 New non-Tier 1 solar is also included in Table 53 as a result of the chance in methodology from replying on EDP data in 2014 to NYGATS reports since 2016. As incremental solar is not part of the legacy supply, it is not discussed further in this section.

181 New York Generation Attribute Tracking System. (2020). CES Baseline Bundled REC Exports. Retrieved March 27, 2020, from https://nygats.ny.gov/ng/Report/getdto_view_Report_PublicRenewable CertificateExports

182 NEPOOL Generation Information System. (2020). By Generator Location. GIS Certificate Statistics. Retrieved May 21, 2020, from https://www1.nepoolgis.com/myModule/rpt/ssrs.asp?m=104&r=%2FPROD%2FNEPOOLGIS%2FPublic%2FNEPOOL_CertificateStatistics&apxReportTitle=GIS%20Certificate%20Statistics

Table 53 shows that exports of non-NYPA baseline renewables increased between 2014 and 2018 by roughly 0.57 TWh.[183] For baseline non-NYPA hydroelectric, exports increased sharply from 2017 to 2018, which aligns with the expansion of Connecticut Class I RPS eligibility discussed in Section 6.3.2.[184] Biogas exports are substantial, reflecting eligibility for pre-1998 facilities exporting to the Connecticut Class 1, and newer facilities participating in other New England Tier 1 markets. Many of these facilities were exporting before 2015, so most of these exports are reflected in the initial baseline.[185] As shown in Table 51, wind production consumed in New York has fallen by 854 GWh between 2014 and 2018. As more operating wind projects have rolled off early-vintage NYSERDA Main Tier RPS contracts, an increasing quantity of wind RECs have become merchant. In the absence of a material market outlet in New York, much of this supply has been exported to New England, where Class I REC prices have usually been the most lucrative outlet. No solar or biomass from the baseline was exported during 2017 or 2018.

Baseline trends are also informed by trends in renewable energy imports. Table 54 presents the total amount of renewable energy imported into New York in 2017 and 2018, as reported through NYGATS and the CES Progress Reports. From 2017 to 2018, imports of renewables increased by almost 250,000 MWh. NYGATS data shows that approximately 96.3%[186] of these imports are attributed to hydroelectric resources. Renewable energy imports have been relatively constant in the past two years.

Table 53. Imported Renewable Energy[187]

Year	Total Renewable Energy in System Mix (MWh)	% Imports	Total Renewable Imports (MWh)
2017	43,082,717	29.3%	12,623,236
2018	42,331,563	30.4%	12,868,795

183 While NYGATS was not operational in 2014, the NEPOOL Generation Information System tracked source-specific imports from New York during 2014 in a consistent manner. The authors were able to align NYGATS export data with NEPOOL GIS import data from New York for 2017 and 2018 by removing non-baseline supply from the NEPOOL imports total. As NYPA exports into New England were treated as system power and thus excluded from the total of source-specific RECs associated with generators in New York during this period.

184 NYPA hydroelectric supply exports dipped in 2018 and returned to approximately 2017 levels in 2019; however, The NYPA changes are not impacted by inter-market arbitrage, as allocations to in-state versus out-of-state customers is established under long-standing arrangements.

185 Consistent with RPS certifications of New York biogas facilities in New England states, and NEPOOL GIS records.

186 Based on NYGATS system mix and residual system mix data for imported supply in 2018.

187 2017 CES Progress Report, 2018 CES Progress Report, Figure 6, Table 1.

10.2.2 Production Trends

Production from several categories of renewable energy generation have shown evidence of ongoing decline. Biogas consumption in New York dropped by 156 GWh, while exports held relatively constant over the last few years. This attrition of biogas production is consistent with the expected reduction of production at existing landfills as their methane production depletes over time and suggesting that an increasing percentage of total biogas production in New York is being exported. As there were no exports of biomass in any of the periods examined, the reduction in biomass production is attributable exclusively to degradation or shut down of facilities. In addition, as New York's wind fleet ages, its normal year production would be expected to gradually decline. The most pronounced source of reduced production at three baseline wind projects using turbines made by Clipper Wind, who ceased turbine production in 2012. TerraForm Power, the current owner of these projects, has announced plans to repower these projects to mitigate production risks associated with "serial defects in Clipper equipment" and to enhance generation.[188] NYSERDA recently announced selection of upgrade proposals for all three projects under RESRFP19-1. Since these facilities are contracted under the RES upgrade provisions, once they return to operation these plants can effectively reset non-Tier 1 production to historical levels, mitigating baseline production losses from degraded performance

10.2.3 CLCPA Rule Changes

Another factor in the potential status of available legacy supply is a change in the definition of what resources count towards the 70% by 2030 CLCPA goal. The CLCPA altered eligibility while increasing the CES target from 50% to 70% and making it a mandate. As a result, fuel cells[189] using natural gas, biomass and biogas will no longer be eligible to count towards 70% CLCPA goal.

Reductions in legacy supply from production degradation, loss of CLCPA eligibility, and (unless reversed as a result of new policy supports) exports will need to be made up by incremental renewables to meet the CLCPA 70% target.

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188 See TerraForm Power, Inc, 2019, slide 11

189 Tier 1 energy from Fuel Cells are included in Natural Gas in NYGATS tallies of renewables referenced in Table 53, so no further reduction to these figures would result.

10.3 Status of New York Legacy Supply Policy Supports

10.3.1 Tier 2/Maintenance Tier Contracts

As summarized in the CES 2018 Progress Report,[190] the Commission's current Tier 2 program provides support to maintain commercial operations at qualifying, renewable energy generation facilities that were operational prior to the Tier 1 eligibility date of January 1, 2015. As noted above, there is currently no LSE compliance obligation related to Tier 2 of the RES, so strictly speaking, Tier 2 is not currently an LSE obligation resembling the Tier 1 obligation. Instead, New York's current policy approach to retaining legacy renewables is a successor to the RPS Maintenance Tier, in the form of extending short-term REC contracts from NYSERDA to legacy facilities that successfully appeal to the Commission for assistance by demonstrating need.

The CES August 2016 Order referenced the importance of maintaining the generation associated with existing facilities as a baseline toward the State's progress[191] and established the Tier 2 program to support renewable energy generation facilities operational prior to 2003. In March of 2018, the Commission refined the Tier 2 requirements. Petitioning eligible Tier 2 resources meeting a 'to-go-cost' standard[192] can receive financial support via a NYSERDA standard agreement of three years duration, if approved by Commission order. To be eligible, the facility must have delivered energy to New York consumers in 2014 as part of the CES renewable energy baseline. Facilities eligible for Tier 2 support include non-State owned, run-of-river hydroelectric facilities up to 10 MW, wind, and biomass direct combustion facilities, so long as they were in operation prior to January 1, 2015 and are not currently under contract to sell RECs associated with the generated energy.[193] Table 55 summarizes the four active Tier 2 contracted resources. At present, these agreements support the retention of 47,612 MWh per year of legacy production from baseline resources.

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190 2018 CES Progress Report, p. 3.

191 CES Order

192 New York State Public Service Commission. (2018, March 16). Case 15-E-0302, Proceeding on Motion of the Commission to Implement a Large-Scale Renewable Program and a Clean Energy Standard, Order Adopting Measures for the Retention of Existing Baseline Resources. *("2018 Order on Retention of Baseline")*. The Commission defines the standard for need for a Tier 2 Maintenance Contract based on an analysis of a facility's 'to-go' costs, defined as future operations and maintenance expenses (O&M), any necessary future capital expenditures plus a return on capital for such capital expenditures, plus a 5% risk contingency of forecasted O&M.

193 2018 CES Progress Report, p. 3.

Table 54. Active Tier 2 Maintenance Contract Resources[194]

Solicitation Name	Project Name	State	Project Status	Year of Delivery Start	Contract Duration (Years)	Bid Capacity (MW)	Bid Quantity (MWH)
RPS Maintenance	Azure Mountain	NY	Operational	2013	10	0.8	2,500
Tier 2 Maintenance	Finger Lakes	NY	Operational	2019	3	0.15	625
Tier 2 Maintenance	Kayuta Lake Hydro	NY	Operational	2018	3	0.46	1,897
Tier 2 Maintenance	Lyons Falls Hydro	NY	Operational	2019	3	8.59	42,590
Total						10.00	47,612

10.3.2 NYSERDA's Proposal for Tier 2 Competitive Procurement and Associated RES Tier

On January 24, 2020, NYSERDA filed a Competitive Tier 2 Petition[195] with the Commission proposing a program to competitively procure RECs from eligible existing generation over a three-year period. Facilities qualifying as renewable resources under the CLCPA (existing non-state-owned run-of-river hydropower and existing wind generators located within the State) with a commercial operation date before January 1, 2015 and no longer under a NYSERDA contract by the applicable Tier 2 solicitation period would be eligible to participate. The baseline production of an upgraded facility (including a repowered project treated as an upgrade under current RES Tier 1 eligibility rules), calculated based on historic energy generation, would also be eligible. NYSERDA proposed continuing the Tier 2 Maintenance contract program for developers not selected under the Competitive Tier 2 program or that otherwise face financial hardship. Facilities with active Tier 2 Maintenance agreements would be ineligible for competitive Tier 2 solicitations.

Subject to a confidential maximum bid price determined by NYSERDA and a capped program budget, NYSERDA proposed to seek enough Tier 2 RECs to support the majority of existing baseline renewable supply, split evenly into three annual procurements. NYSERDA proposed the first procurement for 2020, with purchases commencing January 1, 2021, with subsequent

194 2019 CES Annual Procurement Report, Table 8. Three additional projects have been approved for Maintenance Tier contracts under DPS Case 17-E-0603, but none have yet executed agreements with NYSERDA.

195 NYSERDA Competitive Tier 2 Petition

procurement tranches annually thereafter. NYSERDA described this approach to limiting annual procurement volumes as designed to (i) promote competition, so as to lower program costs and encourage generators to submit reasonable bids based on need, and (ii) allow and support growth of the voluntary market, which would be an outlet for the remaining RECs from generators not awarded a contract. NYSERDA would select eligible projects for three-year Tier 2 REC contracts based exclusively on their bid price. LSEs would be obligated to purchase their pro rata share of Tier 2 RECs from selected projects in a comparable manner to the Zero Emissions Credit program. NYSERDA suggested in its petition that any succeeding program created through CLCPA implementation *"consider the outcome of the Competitive Tier 2 procurement program and conditions in external markets*".

10.3.3 Additional State Support of Legacy Resources

In December of 2016, the Commission issued an Order in the Maintenance Tier[196] proceeding directing DPS Staff to "identify how complimentary initiatives such as Community Choice Aggregation (CCA) and other voluntary renewable energy purchases may be able to assist baseline renewable generators." Two initiatives of note hold promise for enhancing the retention of baseline supply in New York.

ESCO Reset Order. On December 12, 2019, the Commission issued an *Order Adopting Changes to the Retail Access Energy Market and Establishing Further Process*.[197] The Order created several new requirements for energy service companies (ESCOs) to be authorized to do business selling to mass market customers in New York State, including that their services must either (i) include guaranteed savings for customers, (ii) be a fixed-rate product with a price cap, or (iii) be "renewably sourced." To be considered renewably sourced, an ESCO's products must include a total percentage of renewables at least 50% greater than the current RES requirement, using renewables backed by RECs that meet RES locational and delivery requirements for REC purchases and bilateral contract agreements (i.e., the renewable energy must be deliverable to New York State), and the ESCO must include "*transparency of information and disclosures provided to [its] customers*." Notably, the Order allows ESCOs to meet their renewable energy mix requirement using resources of any vintage that meets the "renewable" criteria in the

196 2018 Order on Retention of Baseline

197 New York State Public Service Commission. (2019, August 8). Case 19-E-0530, Proceeding on Motion of the Commission to Consider Resource Adequacy Matters, Order Instituting Proceeding and Soliciting Comments.

CLCPA, rather than only Tier 1 RES resources. Therefore, the Order is likely to increase ESCOs' demand for legacy renewable resources. If this Order results in a material number of ESCOs electing the renewably sourced option, it could displace historical use in mass market green power offerings of 'national RECs' (typically from wind farms in Texas or other windy plains or western states) with New York legacy RECs, while also assuring that mass market ESCO green power products offerings are of similar quality.

Support and Incentives for Community Choice Aggregation. NYSERDA has also created resources[198] to support municipalities' efforts to create community choice aggregations (CCAs), a system that allows one or more municipalities to procure electricity and/or natural gas on behalf of their communities. Through CCAs, municipalities are able to voluntarily increase the quantity of renewable energy that they supply for ratepayers, on an opt-out basis. Incentives include NYSERDA's Clean Energy Communities Program[199] through which communities completing four out of the 10 'High Impact Actions' are designated by as a Clean Energy Community and are eligible to apply for grants to fund additional clean energy projects. The High Impact Actions include actions such as reducing energy use or greenhouse gas emissions, enabling solar, or establishing CCAs to supply electricity to participating customers that is a default 100% renewable clean energy product mix. Section 7 summarizes information on the recent acceleration of CCA adoption to date, and notes that (beyond Tier 1 RECs required to meet the Tier 1 RES), renewables content of such CCAs has to date been comprised entirely of New York's legacy renewable resources.

10.4 Key Findings

Key findings from this section include:

- Falling commodity market revenues in NYISO create a risk that legacy renewable generators may be unable to cover their 'to-go' costs.
- Many legacy plants have options to export to neighboring RPS compliance markets that hold the potential for providing greater revenue than the alternative, voluntary market outlets in New York.

198 New York State Energy Research and Development Authority. (n.d.). Clean Energy Communities - High Impact Action Community Choice Aggregation. Retrieved from https://www.nyserda.ny.gov/-/media/Files/Programs/Clean-Energy-Communities/Community-Choice-Aggregation-Fact-Sheet.pdf

199 See: https://www.nyserda.ny.gov/All%20Programs/Programs/Clean%20Energy%20Communities

- Exports of legacy supply have been increasing, and unless reversed will need to be made up from incremental sources of supply. Biomass and biogas production in the baseline has been degrading. Finally, changes in eligibility under CLCPA will result on biomass, biogas and fuel cells using natural gas being ineligible to count towards the CLCPA 70% goal. These reductions in eligible supply will also necessitating incremental sources of supply to backfill this attrition.

Four plants have active Tier 2 maintenance contract with NYSERDA, supporting approximately 47.6 GWh per year of legacy production from baseline resources.

NYSERDA has proposed a program for the competitive procurement of legacy Tier 2 supply, coupled with a matching LSE obligation. The program as proposed has the potential to retain some portion of the legacy supply between 2021 and 2025.

New York is attempting to boost the demand and value of voluntary market outlets through programs to (i) support development of Community Choice Aggregations and use of legacy renewables in their supply, and (ii) require use of legacy renewables supply by ESCOs serving mass markets as one of three alternative conditions of qualification.

11 NYSERDA Tier 1 REC Resales

11.1 Tier 1 REC Resale Experience to Date

Per the CES Order,[200] in each calendar year NYSERDA is tasked with offering for resale all RECs it has procured from RES Tier 1-eligible resources, at NYSERDA's *projected* weighted average cost. NYSERDA's REC resale approach is intended to be simple, transparent, and standardized, and to ensure NYERDA has adequate cash flow to sustain the RES program. The December 2017 Final Phase 2 Implementation Plan[201] and the January 2019 Final Phase 3 Implementation Plan[202] established NYSERDA's REC resales approach and ACP levels for Compliance Year 2018, and Compliance Year 2019 (and thereafter until changed), respectively. Key features of the NYSERDA's REC resales approach are detailed below.

11.1.1 Process and Timing

In 2017, NYSERDA offered LSEs a single opportunity at the beginning of the year to reserve and purchase 2017 Tier 1 RECs procured by NYSERDA, up to their pro-rata share based on *historical* sales. As historical sales don't correlate with projected sales, LSEs are faced with material estimation and cash flow risk. Even though NYSERDA offered to repurchase excess RECs at the end of the 2017 compliance period, these risks could disincentivize LSEs from purchasing from NYSERDA.

In its Final Phase 2 Implementation Plan, NYSERDA refined the resale approach for 2018, and under the Final Phase 3 Implementation Plan retained it with only small process modifications for 2019 and thereafter. NYSERDA now holds four quarterly Tier 1 REC sale events offering the actual number of Tier 1 RECs in NYSERDA's NYGATS account at the time of the sale. Within the calendar year, Tier 1 RECs not sold at the end of a sale period are offered again, at the same price. NYSERDA's Tier 1 REC buyback option was deemed unnecessary and discontinued beginning in 2018. These changes benefited LSEs by better aligning the timing of purchases with knowledge of their obligations, thus reducing estimation risks.

200 CES Order

201 Phase 2 Implementation Plan

202 Phase 3 Implementation Plan

11.1.2 Inventory and Pricing

NYSERDA *projected* a REC resale quantity of 56,142 for 2017. Actual RECs available for resale were 41,891 – a difference of 14,251. Beginning in 2018, NYSERDA started reconciling projected and actual REC availability on a quarterly basis. Any current year vintage RECs that remain unsold at the end of a quarter will be offered again in the subsequent quarter. If RECs remain unsold after the close of an annual sale process, NYSERDA may bank them for up to two (2) subsequent years.

11.1.3 Eligible Purchasers and Transferability

Unless modified by a future implementation plan, only RES-obligated LSEs may purchase RECs from NYSERDA. Such RECs may not be transferred to another party. The Commission's rationale for limiting eligible purchasers and transferability was to prevent increased costs to ratepayers resulting from LSEs or other market participants purchasing excess RECs from NYSERDA and reselling to LSEs at a higher price.

11.2 Implications of Divergence Test for NYSERDA's REC resales

As discussed in Section 12.4 , NYSERDA's 2019 Divergence Test analyzed 2017 and 2018 RES compliance year data to identify potential problematic under- or oversupply conditions. The Divergence Test found that the trigger for a potential undersupply condition was met, as evidenced by ACP payments corresponding to 25% and 52% of targets in 2017 and 2018, respectively, triggering a forward-looking evaluation to assess the need for to course-corrective action. NYSERDA and DPS Staff ultimately determined that the undersupply was not problematic, material, or persistent, and as a result concluded that no corrective action was needed to the LSE obligations or procurement targets prior to this triennial review and proceeded to set the 2022 LSE Obligation target.

The Divergence Test results are consistent with the findings detailed in the following section, that is, that NYSERDA had fewer RECs to sell than were required by LSEs to comply with their Tier 1 RES obligations, and in such circumstances should be able to resell the RECs purchased so long as cost-competitive market REC supply is not so plentiful as to send the market into surplus.

11.3 Outcome of NYSERDA's Tier 1 REC Resale Approach

As evident in Table 56 (rows 1 through 4), the rate of RES Tier 1-eligible REC production purchased by NYSERDA, and thus RECs available for resale to RES-obligated LSEs, fell well behind both initial estimates and estimates at the time NYSERDA calculated the offered REC resale price in 2017 and 2018, and are expected to continue to fall well short in 2019 and 2020. Likewise, the actual or expected NYSERDA Tier 1 REC resale volume fell well below the aggregate LSE Tier 1 obligation shown in Table 6 for 2017 and 2018, and based on projected successful commercial operation of contracted projects, are expected to also fall well short through 2020.

Despite the shortfall, REC resales from 2017 did not clear NYSERDA's inventory in 2017. Approximately one third of RECs went unsold, which were banked by NYSERDA and successfully sold in the two following years. This result can be attributed to the risk associated with the single prospective opportunity for LSEs to provision RECs prior to knowing their ultimate obligation, and the negligible extra cost incurred by making ACPs due to the very small obligation in the first year of the RES.[203] In 2018, LSEs came much closer to procuring all available RECs offered by NYSERDA, purchasing over 96% of current year RECs offered as well as the majority of banked RECs offered by NYSERDA. The small quantity of RECs unsold in 2018 and banked can be attributed primarily to the small scale of the obligation (and associated small cost premium associated with smaller LSEs paying ACPs rather than purchasing RECs). Ultimately, NYSERDA was able to sell all RECs purchased in 2017 and 2018. Based on the difference between REC obligations and quantities expected to be offered in 2019 and 2020, this experience and analysis of the data suggests that NYSERDA should continue to be able to resell its RECs in the compliance year produced or (if any are ultimately banked) shortly thereafter, through at least 2020.

Table 56 shows the prospectively calculated price at which NYSERDA offered RECs to LSEs, based on annual prospective estimates of RECs it expected to purchase (row 9), compared to the calculated weighted average REC prices (row 10) reflecting the currently expected production (from row 4). NYSERDA's need to estimate and lock in prices offered at a price which differs from its ultimate cost introduces risk that NYSERDA's costs will differ from its resale revenues.

[203] Delivery of RECs to NYSERDA at the end of the trading period also contributed to NYSERDA banking RECs in 2017.

In the future as resale volumes grow, this disconnect could create a collection shortfall which might require NYSERDA to call on its IOU backstop, but this has not been a problem to date. As can be seen from row 12, by the close of 2020, an aggregate overcollection of almost $240,000 is possible. Combined with the collection of ACPs, these amounts further reduce the need to rely on the IUO backstop provisions.

Table 55. NYSERDA Prospective Projections vs. Actual (Estimated) Experience, REC Resales Volumes and Prices

		Units	Production Vintage			
			2017	2018	2019	2020
1	Projected Resale Volume, Phase 2 Implementation Plan [204]	GWh	121	768	3,075	4,558
2	Projected Resale Volume, Prior to Each Compliance Year [205]	GWh	56	67	291	372
3	Actual Current Year (CY) REC Resale Production Available for Resale [206]	GWh	42	46	TBD	TBD
4	Estimated Current Year (CY) REC Resale Production Available for Resale [207]	GWh	42	46	256	333
5	Purchased from NYSERDA by LSEs in Production Year [208]	GWh	28	44	TBD	TBD
6	Purchased from NYSERDA by LSEs in Production Year+1	GWh	13	2	TBD	TBD
7	Purchased from NYSERDA by LSEs in Production Year+2	GWh	1	0	TBD	TBD
8	Unsold (expired)	GWh	0	0	TBD	TBD
9	NYSERDA Offered Annual REC Resale Price [209]	$/MWh	$21.16	$17.01	$22.43	$22.09
10	Estimated Weighted Average Cost of CY RECs Available for Resale [210]	$/MWh	$16.67	$16.83	$22.17	$22.16
11	Est. Annual Over/(Under) Collection of Costs	$	$188,150	$8,537	$66,732	$(23,742)
12	Cumulative Over/(Under) Collection of Costs	$	$188,150	$196,687	$263,419	$239,677

[204] Projected volumes for all years from Dec. 2017 Final Phase 2 Implementation Plan, Table 4, "Tier 1 LSR" column. (New York State Energy Research and Development Authority and New York State Department of Public Service, 2017).

[205] Projected volumes prior to each compliance year. NYSERDA only issued such a projection for the 2017 Compliance year. New York State Energy Research and Development Authority. (2020, April 30). *REC and ZEC Purchasers: Compliance*. Retrieved from NYSERDA Clean Energy Standard: https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Standard/REC-and-ZEC-Purchasers/Compliance. Data for 2018 to 2020 provided by NYSERDA.

[206] 2017 CES Progress Report, p. 18 and 2018 CES Progress Report, p. 20

[207] Calculated from data in OpenNY Database at https://data.ny.gov/Energy-Environment/Large-scale-Renewable-Projects-Reported-by-NYSERDA/dprp-55ye/data

[208] 2017 CES Progress Report, p. 18, and 2018 CES Progress Report, p. 20

[209] New York State Energy Research and Development Authority. (2020, April 30). *REC and ZEC Purchasers: Compliance*. Retrieved from NYSERDA Clean Energy Standard: https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Standard/REC-and-ZEC-Purchasers/Compliance

[210] Calculated from data in OpenNY Database at https://data.ny.gov/Energy-Environment/Large-scale-Renewable-Projects-Reported-by-NYSERDA/dprp-55ye/data

11.4 Treatment of Vintage REC Pricing

RECs not sold by NYSERDA after a quarterly sale event and at the end of a compliance year sale cycle may be banked by NYSERDA, to be offered again, at the same price. Tier 1 RECs not resold by NYSERDA at the end of an annual cycle may be banked by NYSERDA to be resold in either of the two subsequent compliance years and expire thereafter. For example, any unsold 2018 Tier 1 REC may be offered again in 2019 and 2020. In the event that 2018 Tier 1 RECs are still unsold at the close of 2020, the Tier 1 REC would expire unsold. NYSERDA's ability to sell past vintage Tier 1 RECs at their originally offered price depends on current (and expected) ACP levels and spot Tier 1 REC prices and availability. LSEs will presumably comply in the least cost manner (taking into account their own administrative costs).

If in the future NYSERDA banked Tier 1 RECs cannot be resold before the expiration of their 2-year banking window, NYSERDA could be forced to have Tier 1 RECs expire unsold. If the volume of unsold/expired Tier 1 RECs was to become material, the impact on NYSERDA cash flow could become material. As with the potential shortfall in Tier 1 REC resales revenue due to resale price estimation risk discussed in the prior section, in the event NYSERDA banked RECs expire unsold, NYSERDA might have to lean on its backstop with the IOUs for provide sufficient cash flow to pay for Tier 1 RECs it has contracted to purchase. The data shown in Table 56 confirms that this risk exposure is not a current concern.

To reduce the likelihood that NYSERDA would be unable to resale banked Tier 1 RECs before they expire, the Commission authorized NYSERDA to reduce its quarterly resale price for banked Tier 1 RECs set to expire after the end of the current compliance year. Specifically, NYSERDA may reduce the expiring Tier 1 REC vintage resale price to match the current year's Tier 1 REC price for Tier 1 RECs, if the price of the expiring Tier 1 RECs exceeds the current year's ACP price. In offering such repriced Tier 1 RECs to LSEs, NYSERDA must allocate Tier 1 RECs on a FIFO basis using the vintage date for NYGATS certificates in NYSERDA's NYGATS, meaning that an LSE would be required to purchase older RECs first.[211]

The efficacy, and impact of NYSERDA's approach to pricing of vintage Tier 1 RECs depends largely on how the resale price compares to the LSEs' alternatives, including market Tier 1 REC supply and ACPs. If LSEs expect Tier 1 REC prices (and ACPs) to increase, they may be more

[211] Phase 3 Implementation Plan

interested in purchasing current or prior year Tier 1 RECs that could be used the following year. If Tier 1 REC prices and ACPs are low or falling, LSEs will have a limited motivation to buy from NYSERDA. If ample spot Tier 1 RECs are available at prices below NYSERDA resale price, and NYSERDA is unable to adjust the price downward, NYSERDA could be left holding a material quantity of unsold Tier 1 RECs.

This current approach to vintage Tier 1 REC pricing leaves two potential issues unresolved. First, the authorization for NYSERDA to reduce prices is limited to the circumstance of REC resale prices exceeding the current year ACP level. If Tier 1 RECs are set to expire unsold due to other reasons – such as the availability of spot Tier 1 RECs at market prices below the ACP – NYSERDA would not be able to reduce prices to meet the 'market' price to clear its inventory under current rules. In addition, if all vintage Tier 1 RECs are offered for resale at the same price, while NYSERDA would allocate older Tier 1 RECs to LSEs under the FIFO approach, LSEs would (all else equal, and if Tier 1 RECs were being purchased by LSEs to be banked against future compliance) want the freshest Tier 1 RECs, potentially leaving NYSERDA stranded with expiring RECs.

The implications of the current approach are therefore as follows:

- Reselling Tier 1 RECs below cost (as a result of reducing banked Tier 1 REC prices as currently allowed) will have a modest impact on NYSERDA cash flow so long as the differential between cost and sales price is small and volume sold below cost is small – as it has been to date.
- NYSERDA may be exposed to expiration risk of unsold Tier 1 RECs if (i) LSEs can find cheaper Tier 1 RECs in the spot market, (ii) NYSERDA has more Tier 1 RECs than LSEs need to meet obligations; or (iii) price trends place downward pressure on future NYSERDA Tier 1 REC resale price expectations.
- If NYSERDA drops its resale price to clear inventory but is able to sell such Tier 1 RECs, it would experience a modest cash flow shortfall, and may need to rely on the IOU collections backstop (to the extent that a reserve has not been built up).
- Any material inability to resell Tier 1 RECs before expiration could materially impair NYSERDA cash flow. While the IOU backstop can mitigate the cash flow impact, the potential for a material volume of RECs to expire unsold could trigger a reconsideration by the Commission of the approach, for instance to allow for repricing at 'market'.

11.5 Impact of Index REC Pricing on REC Resales Approach

The adoption of the Index REC pricing approach for NYSERDA Tier 1 LSR procurements commencing in 2020 will have three primary impacts on the dynamics surrounding the NYSERDA REC resale approach.

Predictability: Under Fixed-Price REC, expected volume and cost of RECs from past commitments is calculable with uncertainties limited to actual timing of commercial operation dates and project success. Under Index REC pricing, so long as NYSERDA's Tier 1 REC resale prices are set as a function of NYSERDA's cost to procure its growing portfolio of RECs, the increasing volume of Tier 1 RECs over time whose annual Tier 1 REC price will fluctuate with market energy and capacity prices, and whose ultimate REC costs cannot not be known until after the fact, will mean that NYSERDA's price setting will have less precision. Prospective resale price offers to LSEs are therefore more likely to stray from actual cost, increasing the likelihood and magnitude exposure of both over- and under-collection of NYSERDA's procurement costs.

Visibility: As noted above, LSE decisions on whether to procure Tier 1 RECs offered for resale by NYSERDA are a function of several elements, including the levels of prices offered relative to the current and future value of alternatives. The unpredictability of actual costs to NYSERDA of Index RECs from year-to-year, combined with the practice of setting NYSERDA Tier 1 REC resales prices and ACPs as a function of NYSERDA costs, diminishes the visibility of the future values against which LSEs may measure the choice to procure RECs from NYSERDA in excess of their current year needs, which might impact an LSE's willingness to purchase NYSERDA RECs under some circumstances.

Directionality: The reason Index REC pricing was adopted was because of an expectation that over time the total costs of NYSERDA procured Tier 1 RECs would be lower, compared to the Fixed-Price REC approach. As a result, the expected value of Tier 1 REC prices may diminish over time, all else equal. Because (as noted above) LSE motivation to buy from NYSERDA (in excess of their current year needs) is diminished with falling future REC prices and ACPs, adoption of Index REC pricing can gradually increase the probability over time that NYSERDA may be holding banked RECs priced above current market prices.

Based on the current short supply of NYSERDA-procured Tier 1 RECs, these potential impacts are not expected to have ramifications immediately. However, their potential to have increasing impact over time should be considered in future program design.

11.6 Key Findings

Key findings from this section include:

- NYSERDA's Tier 1 REC resales approach has been effective at its core purposes: to convey NYSERDA-procured Tier 1 RECs into the hands of RES obligated LSEs; to recover NYSERDA's costs thereby ensuring the cash flow that makes NYSERDA REC purchase and sale agreements financeable; and to control cost to ratepayers.
- The requirement that NYSERDA estimate prospectively and lock in the price offered to LSEs in advance, based on expected weighted average Tier 1 REC price, has led to a small overcollection compared to NYSERDA's actual costs.
- When NYSERDA's Tier 1 REC resale volume is smaller than Tier 1 obligation (as it was in 2018), NYSERDA has been able to: (a) sell most Tier 1 RECs in the year of production, (b) carry forward only a small bank balance, and (c) avoid having any Tier 1 RECs expire before resale.
- LSEs may purchase previous vintage Tier 1 RECs that can be banked for another compliance period if they expect Tier 1 REC prices (and therefore ACPs) to increase. Conversely, in a falling Tier 1 REC price environment, LSE motivation to purchase any banked Tier 1 RECs decreases. LSEs would have little impetus to bank in excess of current needs if the expected future ACP is less than the current resale price.

The adoption of Index REC pricing will have three primary impacts:

- **Predictability:** REC costs will become less predictable, and knowable only after-the-fact, once energy and capacity values are known. This will likely increase NYSERDA's exposure to over- and under-collection.
- **Visibility:** The inability to predict NYSERDA cost, and therefore ACP, will reduce visibility for LSEs. This may make is more difficult for LSEs to determine whether to purchases RECs from NYSERDA in excess of their current year needs.
- **Directionality:** The Index REC approach is expected to result in a lower NYSERDA Tier 1 REC cost over time. If LSEs are less motivated to purchase RECs in excess of current year needs due to impaired visibility, however, NYSERDA may end up with a balance of banked RECs with a cost greater than current market values.

Implications of Continued Reliance on Current Resales Approach: As described above, the current NYSERDA Tier 1 REC Resale approach is functioning adequately and meeting its objectives. NYSERDA has experienced and will continue to experience, at a minimum, a small difference between costs of Tier 1 RECs purchased and Tier 1 REC resales revenues. The proposed Phase 4 Implementation plan, filed in April 2020, modifies the REC Resale and pricing approach and would largely mitigate this estimation discrepancy in the future.[212]

However, as discussed, the current Tier 1 REC resales approach could in the presence of a future market surplus leave NYSERDA with unsold expiring RECs and a commensurate material revenue shortfall which would require reliance on the IOU backstop to support NYSERDA's cash flow and ability to fulfill its Tier 1 REC payment obligations to generators. While the backstop was designed to address a situation like this, reliance on the backstop would shift renewables costs to distribution rate, which was not the original intent of the RES. Allowing NYSERDA the option to resell Tier 1 RECs at market pricing, if necessary, may improve NYSERDA's ability to clear its Tier 1 REC inventory.

[212] Phase 4 Implementation Plan

12 Alternative Compliance Payment Levels

12.1 NYSERDA's Current Tier 1 ACP Setting Approach

In its August 2016 Order,[213] the Commission placed the obligation to meet the RES on New York State's jurisdictional retail commodity supplier LSEs, each of whom is required to either purchase RECs to cover its annual RES Tier 1 obligations or make an ACP to NYSERDA.

ACPs are widely used in other states to accomplish two purposes. First, the ACP performs a cost control function for ratepayers by serving as a price cap on market REC prices. Payment of the ACP serves as an alternative to purchasing and retiring RECs, and therefore it is not considered a penalty for non-compliance. ACPs also contribute to establishing market price signals for developers (don't expect revenues in excess of the ACP level) and bounding forward pricing exposure for LSEs. As such, their use contributes to creating forward REC price transparency and market liquidity. Second, ACP levels are typically established by either statute or rule at a level above the forecasted cost of RECs needed for compliance, and often well above the forecasted level in order to create a strong incentive for LSEs to comply by procuring RECs rather than making payments. This second function can be more important where states rely less on central procurement (utility-led or state-led) of renewable projects. In most states, ACP levels are typically set by an annual schedule many years in advance, in most cases at either a constant nominal dollar per MWh price or escalating with inflation.

The Commission established the ACP mechanism for the explicit purpose of providing cost containment and flexibility.[214] The current Tier 1 ACP Setting Approach can be characterized as being administratively set one year at time, and for a given year at 110% of the NYSERDA's prospectively estimated Tier 1 REC resale price (plus an adder to cover NYSERDA administrative costs if those costs are not funded through other means). As the Tier 1 REC

213 CES Order

214 It also noted, in the context of the diversity test, that compliance flexibility measures such as the ACP can help to mitigate the impact of most short-term divergences between REC supply and demand.

resale price reflects the projected weighted average cost to NYSERDA of Tier 1 RECs it expects to purchase in the applicable year from RES Tier 1-eligible supply contracted under wither Main Tier RPS or RES LSR procurements, the ACP level can be described as 'cost plus 10%'. The ACP level is communicated to LSEs within the month prior to the start of the calendar year to which it applies. The amount will therefore fluctuate annually, and LSEs are provided no visibility as to the future ACP level.

In adopting the approach to setting the ACP, the Commission observed that "alignment or divergence of ACP requirements [with RPS programs throughout the northeast] can materially affect the cost of compliance" and "regional markets enabled through consistency of state requirements can contribute to reducing the cost of achieving the RES goal", before indicating an intent to work with other RGGI states to "find ways of supporting stronger regional consistency that can benefit all consumers."[215] The Commission has so far approved a continuation of the initial approach used for 2017, to "provide the marketplace with a transitional level of certainty while providing the ability to consider evolving RES design and market conditions in establishing a long-term approach to setting the ACP applicable in subsequent years", and in its Phase 3 Implementation Plan, NYSERDA opted to continue the method for setting the ACP level until otherwise modified in a future implementation plan.[216]

The Commission ordered that ACP funds be retained by NYSERDA to serve as a buffer for NYSERDA's RES program cash flow, to reduce or defer the need to call on the IOU financial backstop mechanism established to ensure timely payments for RECs procured. If NYSERDA were to accumulate more than 25% of its annual Tier 1 REC obligations, NYSERDA will file for Commission approval a proposed use of excess funds that is in the ratepayer's interest.[217]

12.2 New York's Tier 1 ACP Experience to Date

12.2.1 Tier 1 RES ACP Level

Table 57 recaps the ACPs applicable for compliance years 2017 through 2020, along with the NYSERDA offered REC Resale Price from which the ACP was derived.

[215] CES Order, p. 110.

[216] Phase 3 Implementation Plan

[217] Phase 2 Implementation Plan

Table 56. NYSERDA Tier 1 REC Resale Prices and ACPs ($/MWh)[218]

Year	REC Resale Price	ACP
2017	$21.16	$23.28
2018	$17.01	$18.71
2019	$22.43	$24.67
2020	$22.09	$24.30

12.2.2 History of ACP Payments

Data on usage of ACPs for Tier 1 RES compliance by LSEs is only available for 2017 and 2018. Table 58 shows the total number of ACPs made by LSEs in lieu of RECs used for compliance, and the resulting total dollar amount due, for each year to date. While data is not yet available for 2019 and 2020, NYSERDA expects material reliance on ACP in these years due to the difference between expected REC resales volumes and Tier 1 obligation targets. The ultimate quantity of ACPs will be dependent largely on the availability and use of spot RECs for compliance.

Table 57. NYSERDA ACPs Receipts by Compliance Year[219]

Year	ACP ($/MWh)	Number of ACPs for Compliance (MWh)	ACP Due ($)
2017	$23.28	12,811	$298,240
2018	$18.71	92,169	$1,724,482
2019	$24.67	TBD	TBD
2020	$24.30	TBD	TBD

The level of aggregate LSE reliance on ACPs in each year is also influenced by the low (10%) margin of ACP over Tier 1 REC resale price. This creates a disincentive for LSEs to avoid paying ACP by buying Tier 1 RECs because, quite simply, the savings are small. Similarly, buying excess RECs now and banking them as insurance against future ACP exposure may not create any savings for an LSE, considering the time value of money and general uncertainty.

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218 Data aggregated from NYSERDA web portal for REC and ZEC purchasers, at https://www.nyserda.ny.gov/All-Programs/Programs/Clean-Energy-Standard/REC-and-ZEC-Purchasers

219 Number of ACPs from Table 5 of 2017 and 2018 CES Annual Progress Reports. (New York State Energy Research and Development Authority, 2019) (New York State Energy Research and Development Authority, 2019). Data differs from ACPs presented in 2019 Divergence Test because the Divergence Test presents statewide expected ACPs, including ACPs from LIPA and NYPA.

As a result, the level of LSE reliance on ACP in New York might not always be a true measure of shortage. Rather, LSEs could pay ACPs simply because it is easier and administratively less costly than buying RECs from either NYSERDA or alternative REC market sources.

Finally, in 2018 a small number of LSEs failed to meet their compliance obligations with RECs or ACPs to NYSERDA. Reasons for the shortfall in ACP collections included to bankruptcy, ceasing operation during the compliance year, or no longer providing retail energy in New York.[220]

12.3 Comparative Analysis to Other Approaches Used in the Region

12.3.1 ACP Approaches, Price Levels and Visibility

Each competitive state in New England (MA, CT, RI, NH and ME) utilizes an ACP as a price cap and alternative means of compliance. In contrast to New York's practice of setting ACP one year at a time, each of them has established a long-term schedule providing visibility to obligated LSEs and project developers, either at a fixed level, or an initial level escalating as a function of an inflation index.

Table 59 summarizes the Tier 1 or equivalent ACPs across the northeastern states. As can be seen from this table, all other states have set their ACP levels at a rate much higher than New York's. Maryland, the lowest of any other state in the region, has a 2020 Tier 1 ACP which is 54% greater than New York's, while Massachusetts and Rhode Island, at the other extreme, have established ACPs at a rate almost three times that of New York. The implications of these differences include:

- New York's ACP level assures that during shortages New York's ratepayers will have a relatively low price ceiling on total RES costs.
- Compared other states, LSEs in New York have very little incentive to purchase and bank surplus RECs to insure against a future cost exposure under future REC shortfalls.
- Other states consistently set ACP at higher levels to:
    - (i) allow for the development of market price signals (including shortage price signals). New York's ACP level allows for the development of only a heavily dampened shortage price signal, and thus the market responses such price signals might stimulate are muted.

[220] 2018 CES Progress Report

- (ii) encourage LSEs to procure RECs as opposed to making ACPs. In other states, this approach creates a disincentive for LSEs to rely on ACP if they can avoid it. In contrast, New York's low ceiling of ACP over NYSERDA REC resale price does not provide a substantial disincentive to LSE reliance on paying ACP.

While these distinctions are notable, they stem in part from differences in the approaches between New York and its neighbors. The other states discussed here utilize long-term contracting to complement, and support financing in, vibrant regional renewable portfolio standard markets with a wide range of generators, intermediaries, and significant contributions of generation located throughout their regions and neighboring regions as well. As noted in Section 6, these states have limited forward visibility on long-term contracting opportunities. Thus, while ACPs levels and spot REC prices are typically insufficient to finance projects, the high prices are important in signaling and attracting development activity, as the most visible signal of future surplus or shortage. In contrast, New York relies on regularly-scheduled central procurement to supply the majority of its supply, supply and demand balances are more transparent, and the value of price signals to drive market participant action is less central to stimulating investment in early development activities.

Table 58. Comparison of NY Tier I ACPs to Tier I ACPs in Regional Markets ($/MWh)

State	2020	2021	2022	2023	2024	2025	2020 ACP Level Comparison to NY on a percentage basis
CT	$55.00	$40.00	$40.00	$40.00	$40.00	$40.00	226%
MA[221]	$71.57	$73.28	$75.02	$76.85	$78.69	$80.51	295%
MD	$37.50	$37.50	$37.50	$37.50	$37.50	$37.50	154%
ME	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	206%
NH[222]	$57.61	$58.30	$58.99	$59.71	$60.42	$61.12	237%
NJ	$50.00	$50.00	$50.00	$50.00	$50.00	$50.00	206%
NY	$24.30						100%
PA	$45.00	$45.00	$45.00	$45.00	$45.00	$45.00	185%
RI[223]	$71.58	$73.29	$75.03	$76.86	$78.70	$80.52	295%

[221] Escalating at Consumer Price Index. As part of an ongoing regulatory review process, the Massachusetts Department of Energy Resources proposed in late 2019 to alter its Class I ACP to $70/MWh commencing in 2020, to be reviewed every five years.

[222] Escalating at 50% of Consumer Price Index

[223] Escalating at Consumer Price Index

12.4 Divergence Test and Implications of ACP Approach on RES Program Success

The annual Divergence Test is required by the CES August 2016 Order.[224] The approach is laid out in the Phase 2 Implementation Plan[225] and the calculation and filing are prepared by DPS Staff and NYSERDA staff.[226] The primary purpose of the Divergence Test is to correct for significant differences between supply (driven largely by NYSERDA procurements) and demand for Tier 1 RECs. The Divergence Test applies evidence that supply and demand are (i) on diverging paths and (ii) unlikely to self-correct. As it pertains to the ACP, the test and the actions triggered in response to its results are intended to "*assure that ratepayers will not, though their LSEs, be burdened with paying for material volumes of ACPs for an extended period in the event that administratively determined targets turn out to be infeasible to meet (shortage case)*".[227]

Table 59. 2019 Divergence Test Undersupply Analysis Results[228]

Year	Total Statewide Load (MWh)	RES Obligation %	Tier 1 REC Obligation	ACPs Necessary	ACP %	Meets/Exceeds Divergence Test Criteria	Trigger Met	ACP % Trigger
2017	153,162,158	0.035%	53,601	12,811	24%	Yes	Yes	10%
2018	157,768,527	0.15%	236,574	123,147	52%	Yes		20%

NYSERDA's 2019 Divergence Test results, as of September 2019, are replicated in Table 60. It shows that LSE, LIPA, and NYPA payment of ACPs comprised 24% of the Tier 1 obligation in 2017 and 52% in 2018. Both exceeded the ACP thresholds for 2017 and 2018 of 10% and 20%, respectively. These results triggered a finding of *potential* undersupply and a forward-looking evaluation to assess whether course-correction is advisable. DPS Staff and NYSERDA performed that evaluation to determine if the undersupply condition was of sufficient concern to

224 CES Order

225 Phase 2 Implementation Plan

226 2019 Divergence Test

227 Phase 2 Implementation Plan, p. 7.

228 2019 Divergence Test

recommend mitigation prior to this Triennial Review.[229] They concluded that the 2017/2018 undersupply situation was not problematic, material, or persistent. This conclusion was based on an assessment that the RES is in its early stages, that the compliance costs are low on a total dollar basis, and that there is a large pipeline of projects contracted and/or under development that are expected to be available in the future to meet increasing LSE obligations, which contributed to the willingness of some LSEs to meet their RES compliance obligations through the use of ACPs. This assessment does not, however, preclude a different result in the future.

12.5 Key Findings

The approach to setting the ACP level adopted by the Commission and implemented by NYSERDA is mostly working as intended, by providing an alternative means to compliance used by LSEs to fulfill their RES Tier 1 obligations in lieu of retiring eligible RECs, and allowing for fulfillment of RES obligations at a modest and controlled cost to ratepayers. Key findings, including implications of continued reliance on current ACP approach, include:

- **ACP Approach.** A review of the ACP data, the Divergence Test results, and other underlying data suggests that the ACP approach does not appear to be a major driver of RES program success. However, the ACP approach (specifically, the ACP level) may disincentivize an LSE from actively seeking available spot market supply in order to avoid payment of ACP. A higher ACP in the presence of the supply versus the demand gap detailed herein might incentivized some LSEs to procure additional supply to hedge their own compliance exposure. Given the short duration between RES program launch and the first compliance obligation, compared to the long lead time required to bring new supply to fruition, there is little reason to expect that any increase in supply resulting from a higher ACP level would have been material.
- **ACP Magnitude.** Relative to the much higher ACP levels in other northeastern states, the small 10% margin of ACP prices above the NYSERDA REC resale price may:
    - Fail to incentivize LSE procurement of RECs to meet current demands, particularly when targets are low or LSEs are small);

[229] Per the Phase 2 Implementation Plan, "*If either threshold is triggered, Staff and NYSERDA shall undertake an assessment based on available information of whether, for how long and by how much the concern might persists. The assessment shall consider NYGATS certificate availability based on the status if eligible supply already certified, supply contracted for by NYSERDA or others but not yet commercially operational, the status of projects under development in the region, renewable and NYGATS and adjacent control area certificate trends across the region, trends in renewable technology costs, and any such other information brought to the attention of Staff and NYSERDA during the investigation. The assessment will consider information including, but not limited to, whether a divergence is present, or whether supply has already responded to a shortage (but has yet to come online), and if divergence is apparent, is it material or persistent enough to trigger action.*"

- Create little incentive for LSEs to make decisions (e.g., procuring and banking excess RECs) to insure against future shortage prices, as it may not save an LSE much if anything, taking into account time value of money, and compounded by uncertainty.
- Disincentivize actions to stimulate or procure market-driven supply activity outside of NYSERDA procurement.

For these reasons, the level of LSE reliance on ACP *might* not always be as true a measure of REC shortage as for other states.

- **Price-setting Approach.** The current approach to setting ACPs creates some risk that NYSERDA may be left with Tier 1 RECs it cannot resell. Continuing the approach of setting ACP at 110% of the weighted average REC resale price could, in the presence of declining ACPs, allow NYSERDA REC resale prices of past vintages to be above the current year ACP, making clearing of vintage REC inventories difficult. If NYSERDA doesn't sell all of its REC inventory in a given year (banking them forward to the next year), the price of those RECs could exceed the ACP that has been set for the next year, thus dis-incentivizing LSEs from purchasing the banked Tier 1 RECs instead of paying the ACP. While the Phase 3 Implementation Plan provided a means for NYSERDA to adjust the price to match lower-priced vintages, such an adjustment may still fall short to clear NYSERDA's Tier 1 REC inventory in the face of falling ACPs or readily available spot market Tier 1 RECs at lower prices. This is not an issue with other states which allow Tier 1 RECs procured under long-term contract to be resold at market prices.
- **Price Visibility.** New York's practice of setting the ACP one year at a time provides LSEs with no visibility of the future cap on the cost of RES Tier 1 compliance. New York is alone in that respect. All other states in the region provide long-term visibility for ACP, allowing LSEs to make rational decisions on banking RECs for future use to insure against future ACP exposure. The Phase 2 and Phase 3 Implementation Plans suggest that the Commission did not envision annual ACP level setting as a permanent feature of the RES, stating that "*LSEs benefit from long-term visibility of the ACP level, which allows them to make rational retail pricing, REC procurement and REC banking or withdrawal decisions.*" By deferring the establishment of such visibility from the outset, these plans asserted that other RES features needed to be fully developed prior to establishing a long-term trajectory for the ACP.[230]

[230] Phase 2 Implementation Plan

- **Regional Consistency.** As echoed in the Phase 2 and Phase 3 Implementation Plans, "the CES August 2016 Order established an overarching objective for regional consistency in ACP requirements, given that the alignment or divergence of ACP requirements can materially affect the cost of compliance and that regional markets enabled through consistency of state requirements can contribute to reducing the cost of achieving the RES goal."[231] New York's approach to setting the ACP is not consistent with any other state in the northeast, with respect to magnitude and visibility. New York is an outlier in terms of having the lowest ACP, by far, among other comparable portfolio standard programs in the region. New York's providing long-term visibility has been articulated by the Commission as a worthy objective; however, doing so would necessarily alter the current basis for establishing the ACP level. This analysis has shown that there are competing tensions between rationales for ACP price setting. For instance, the current approach using a low margin above expected costs keeps compliance costs low, but mutes the development of clear shortage market price signals relied upon in other states to signal investment in the development pipeline. Achieving precise regional consistency in the ACP level would be challenging in practice without coordination with other states, as (i) the ACPs vary materially between other northeastern states, and (ii) several states (Connecticut, Maine and Massachusetts) have recently modified their ACPs downward, albeit to different levels still well above New York's ACP.
- **Default Risk Exposure.** A limited number of LSEs defaulted on ACP obligation in 2018. Other states in the region (MA, CT) are considering changes to the compliance frequency, among other changes, to reduce the likelihood of such issues and mitigate their impact. New York might benefit from considering similar measures. If the intent to have NYSERDA procure the majority of supply needed to meet the RES Tier 1 obligation targets continues and is fulfilled, the actual ratepayer exposure to this risk is materially mitigated.

231 Ibid

13 Use of Banking and Assessment of Banking Rules

13.1 New York's Current Tier 1 REC Banking

The Commission's August 2016 Order[232] identified banking of RECs as a mechanism that can provide flexibility and cost control to obligated LSEs in meeting their Tier 1 RES obligations and the Phase 1 Implementation Plan established most of the rules pertaining to New York's current Tier 1 banking approach.[233] The Phase 2 and Phase 3 Implementation Plans extended the same approach with some slight modifications.[234,235]

Current banking rules allow both NYSERDA and obligated LSEs to bank Tier 1 RECs from the year of production for two subsequent compliance periods. The banked Tier 1 RECs have two-year shelf life, after which they expire if not used. NYSERDA may bank Tier 1 RECs in unlimited quantities. LSE banking is subject to a series of conditions, including:

- LSEs must have complied with the RES in all past compliance years in order to be eligible to bank at all;
    - Only obligated LSEs may bank excess certificates for future compliance;
- Banked Tier 1 RECs must be in excess of the NYGATS certificates required for compliance in their year of generation;
- RECs cannot have been sold or claimed as part of electricity sales for any other purpose or by any other party, in NYISO or any other jurisdiction;
- Banked Tier 1 RECs may only be used by the banking entity (i.e., they are non-transferable); and

232 CES Order

233 Phase 1 Implementation Plan

234 Phase 2 Implementation Plan

235 Phase 3 Implementation Plan

- LSEs may only bank excess RECs up to 60% of the compliance obligation in each compliance year, except that IOUs may bank an unlimited quantity of VDER RECs for compliance years 2018-2022.[236] The Phase 3 Implementation Plan[237] indicated that the 60% banking limit may be revised in future compliance years, with long-term banking rules considered as part of the triennial review process. Citing the initial proposal to cap REC banking at 30% of the certificates needed by LSEs for current year compliance,[238] it articulated that as Tier 1 LSE obligation targets increase, the percentage banking limit "*may be reduced to ensure continued demand for current vintage Tier 1 RECs.*"

Unlike the approach commonly used in New England states, and resembling the approach typical of PJM states (as further discussed below), banking is effectuated through NYGATS. NYGATS Operating Rules allow certificates to be banked indefinitely, however, the ability to use banked certificates for RES compliance is limited by program, holder type, and certificate vintage, in accordance with Commission Orders. Not all certificates created in NYGATS are transferrable (tradable, sellable, or monetizable) from one user to another. VDER RECs purchased by IOUs[239] and RECs purchased from NYSERDA are not transferable, while market Tier 1 RECs from other sources are transferable.

13.2 Banking Usage

Table 61 summarizes the bank balances for each type of entity at the end of the trading period for each of the 2017 and 2018 compliance years. The data allows for the following observations:

- **LSEs**: Despite RECs being in short supply compared to demand, a subset of LSEs still banked non-VDER Tier 1 RECs against future requirements.
- **IOUs**. IOUs did not bank any VDER RECs, indicative that the total of such RECs created was well below the IOU's own obligations as LSEs.
- **NYSERDA**. Despite the quantity of NYSERDA-procured RECs available for resale being below the level of LSE obligations, NYSERDA has had a small quantity of RECs that were not sold in the year generated that were carried forward.

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236 This waiver was predicated on a December 18, 2017 filing of a petition for clarification in Case 15-E-0302 by the Joint Utilities (JU), arguing that their expected volume of Tier 1 VDER RECs would greatly exceed their own compliance requirements, and that the banking caps and limits on REC transferability would result in forfeiture of a large quantity of Tier 1 RECs, at increased cost to ratepayers. On July 16, 2018 the Commission issued an Order directing that the IOUs would be permitted unlimited Tier 1 VDER banking for compliance years 2018-2022. Subsequent data has revealed that the JU's December 2017 forecast of a large VDER RECs surplus has not materialized, and the 60% annual limitation in retrospect would not have been close to a binding constraint.

237 Phase 3 Implementation Plan

238 CES Order

239 IOUs must take all Tier 1 VDER RECs from value stack and CDG projects that default to the Interconnecting-LSE-Option. Phase One VDER Order

Table 60. New York Tier 1 RES Bank Balance Statistics, 2017-2018[240]

Entity	2017 Bank Balances 6/30/2018	2018 Bank Balances 6/30/2019
Indicated Year's Tier 1 LSR Certificates Banked by all LSEs	36,010 (all 2017 RECs)	110,348 (17,585 2017 RECs) (92,763 2018 RECs)
Indicated Year's Tier 1 VDER Certificates Banked by IOUs	0	0
Indicated Year's Tier 1 LSR Certificates Banked by NYSERDA	14,088 (all 2017 RECs)	2,382

13.3 Key Findings

New York's approach to banking of RES Tier 1 RECs by competitive LSEs (ESCOs), IOUs, and NYSERDA has provided LSEs with a degree of compliance flexibility and NYSERDA with a means to dispose of purchased RECs that it is unable to resell in the same year as produced.

Key findings regarding the impact of the current REC banking rules, and their implications on Tier 1 REC market dynamics, Tier 1 REC prices, compliance costs, and the risks faces by LSEs and NYSERDA, include:

- To date, some LSEs have availed themselves of the ability to bank Tier 1 RECs towards future use, even in the presence of supply shortfalls. This trend suggests that some LSEs are using banking for compliance flexibility to manage their exposure.
- However, LSEs may be banking Tier 1 RECs less than they otherwise might because REC prices are effectively prevented from increasing materially above their cost by a relatively low ACP., The potential savings in ACP avoidance is low, particularly considering the opportunity cost of buying Tier 1 RECs well ahead of associated revenue.
- It is premature to conclude whether Tier 1 REC price fluctuations have been dampened through the use of banking, as the spot Tier 1 REC market is still immature (neither deep nor liquid), influenced by the limited duration in which there has been a material demand and the dampening impact of restricting Tier 1 REC transferability.

[240] 2017 CES Progress Report, Table 6 and 2018 CES Progress Report, Table 6.

- The impact of a 60% of current year obligation cap on banking by competitive ESCOs has not been a constraint due to the overall shortage of Tier 1 RECs to date. The 60% limit was envisioned as temporary and justified based on the possibility that a tighter cap in the presence of small initial demand targets could lead to the wastage of Tier 1 RECs. The significant increase in targets in 2020 through 2022, current supply lagging demand, and the ability for LSEs to roll bank balances forward indicate that there is not likely to be the degree of excess supply to cause wastage of RECs. If Tier 1 VDER RECs or Tier 1 RECs resold by NYSERDA we made transferable, banking would be utilized even less.
- Due to much slower deployment of VDER projects than anticipated, the surplus of VDER Tier 1 RECs which stimulated the waiver of the 60% cap for VDER Tier 1 RECs held by IOUs never materialized. The surplus capacity to bank above 60% has never been used, and has never been in danger of being needed, as IOUs have not banked any Tier 1 RECs to date. Allowing IOUs to transfer VDER Tier 1 RECs (even if just among themselves) would also obviate the need for such a waiver.

As noted in Sections 11 and 12, NYSERDA is exposed to some risk of bank balances that cannot be resold before expiring. While the risk has not led to any problems to date, this risk could be mitigated through a range of approaches. Examples include:

- allowing NYSERDA more flexibility in adjusting the price of Tier 1 RECs offered to match market prices (if market prices fall below resale price);
- ACP increases (increasing the value proposition for LSEs to purchase from NYSERDA);
- relaxing transferability or allowing other market participants to purchase Tier 1 RECs from NYSERDA after obligated LSEs pass on a right of first offer; or
- allowing NYSERDA to bank for a longer period than other parties.

14 Other Factors Likely to Influence the CES Program's Success

In addition to the topics addressed in prior sections of this report, the Phase 3 Implementation Plan identified other issues to assess in the Triennial Review that may influence the CES program's success. This section addresses a series of additional issues and their potential impact on CES success

14.1 Interactions Between the CES and New York's Energy Storage Policies

In its Order Establishing Energy Storage Goal and Deployment Policy, issued December 31, 2018, the Commission established a statewide goal of deploying up to 3,000 MW of energy storage by 2030, with an interim objective of 1,500 MW of energy storage by 2025.[241] To achieve those goals, New York has initiated a number of programs and regulatory actions to incentivize and remove barriers to the installation of energy storage systems. These policies have resulted in a total of 706 MW of energy storage deployed, awarded, or contracted as of the end of 2019,[242] and include:

- NYSERDA's Market Acceleration Bridge Incentives for retail and bulk system storage;
- Utility procurements for bulk system storage dispatch rights;
- Inclusion of energy storage in evaluation criteria for NYSERDA Tier 1 REC procurements;
- NYISO's implementation of its Energy Storage Resource participation model, Distributed Energy Resources (DER) Aggregation rules, and the development of a hybrid generation-plus-storage participation model;
- VDER Value Stack tariff design and applicability to stand-alone storage and paired storage with renewable generation systems under 5 MW; and
- The establishment of the Market Design and Integration Working Group (MDIWG) to establish market coordination between utilities, DER operators, and the NYISO and recommend improvements to ensure DER and energy storage participation in wholesale and retail markets.

241 (New York State Public Service Commission, 2018)

242 (New York State Department of Public Service, 2020)

As New York strives to meet the CES and CLCPA renewable energy penetration goals, the deployment of energy storage becomes even more important due to the dominant role of intermittent resources. The CES has, in part, recognized and addressed this dynamic through the inclusion of energy storage in NYSERDA's Tier 1 REC procurements. Storage facilities selected to date were summarized in Section 2.1.

Existing market rules are limiting for energy storage – for example, NYISO does not currently have a participation model for co-located renewable energy and energy storage systems behind a single meter, but expects to have a proposal ready for stakeholder vote by the end of 2020.[243] Once it is established, that may open up additional options for how NYSERDA might incorporate energy storage resources more directly into RES procurements. As the energy storage market and market rules mature, NYSERDA may receive an increased number of competitive proposals including energy storage. In addition, the policies and programs to support the state's energy storage goal will continue to incentivize storage development, supporting the growth of a complimentary technology to meeting the state's renewable energy goals.

Finally, the less diverse the technologies (i.e., if procurements become increasing dominated by utility-scale solar, which is suggested by interconnection queue trends), and more intermittent the portfolio of renewables procured to meet the RES and CES, the more that New York's energy storage policies may need to focus on energy storage resources with longer storage durations.

14.2 Impact of New Technologies on CES Program Success

While no new categories of eligible technologies have been introduced since adoption of the CES, technological advancement has impacted the outlook for the CES's success. In particular, offshore wind and utility-scale solar have evolved materially since the time of the CES Order.

In its July 12, 2018 Order Establishing Offshore Wind Standard and Framework for Phase 1 Procurement,[244] the Commission adopted a statewide offshore wind energy development goal of 2.4 GW by 2030. Subsequently, the CLCPA expanded this goal to 9 GW by 2035. Through

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243 New York State Department of Public Service. (2020, April 1). Case 18-E-0130, Proceeding in the Matter of Energy Storage Deployment, State of Storage in New York: Annual Energy Storage Deployment Report Pursuant to Public Service Law 74. Retrieved April 13, 2020

244 New York State Public Service Commission. (2018, July 12). Case 18-E-0032, In the Matter of Offshore Wind Energy, Order Establishing Offshore Wind Standard and Framework for Phase 1 Procurement. *("Phase 1 Offshore Wind Order")*.

market maturation and economies of scale, offshore wind cost expectations have fallen dramatically since adoption of the CES. As a result, compared to projections at the time of the 2016 CES Cost Study, offshore wind can contribute to a significantly larger share of the incremental new generation needed to achieve the state's CES and CLCPA goals. Structured as a carveout, OREC procurement also effectively reduces Tier 1 RES targets, relieving the pressure of siting and permitting challenges associated with widespread land-based technology deployment. Further, as offshore wind cost continues to decline while cost reductions experienced by more commercially mature land-based wind and solar slow, offshore wind may be able to compete effectively with other technologies in the Tier 1 LSR procurements, as has been the experience in a recent Connecticut procurement that was open to a broader range of renewable technologies.

Tracking technology has long been a design choice for solar. Design options include fixed-tilt, single-axis tracking, and dual-axis tracking. Choosing which technology to deploy is a tradeoff between cost and production.[245] In the past several years, both the capital and operations and maintenance costs, as well as the performance and reliability of single-axis tracker technology, have improved. This advance is evidenced by the material presence of single-axis tracker bids in all three NYSERDA RES Tier 1 solicitations.

Bifacial solar technology, which can capture light hitting the back side of panels and thereby increase production, has emerged as a new solar technology option. Responses to NYSERDA's two most recent RES Tier 1 solicitations included a diverse mix of mono-facial and bifacial solar technology, both for fixed-tilt and single-axis tracker projects.[246] At the time of this Report, bifacial solar projects have slightly higher capital cost than mono-facial solar projects, and the benefit of the higher energy production of bifacial solar technology is widely expected

245 Scale economies versus land costs impacting density and shading parameters; reliability loss due to moving parts that can break or ice-up in climates like New York's and higher capital and operations and maintenance cost versus increased production for trackers, etc.

246 Based on bid data provided by NYSERDA

to outweigh its cost premium in the near future.[247] In particular, this technology may be beneficial in locations with winter snow cover, where increased surface reflectivity could improve winter production. Together, advancement in single-axis tracking technology and the emergence of bifacial solar technology are key drivers to solar being a much bigger and more cost-competitive contributor to the CES (and CLCPA) than envisioned just a few years ago.

14.3 Interaction of Carbon Policy with RGGI and RES Procurements

14.3.1 Interactions with RGGI

The Regional Greenhouse Gas Initiative (RGGI) is the regional cap and trade program that requires fossil fuel-powered generators over 25 MW to purchase allowances equal to their CO_2 emissions. The costs of purchasing RGGI allowances impacts wholesale electricity prices when the plants that must incorporate such costs into energy bids are on the margin. As LBMPs move up and down, the gap between a renewable generator's levelized cost of energy and the actual revenues it earns through wholesale market participation moves in the reverse direction. Under a Fixed-Price REC structure, a renewable generator bears the risk in setting their bids of LBMP changes driven by RGGI allowances or other factors. Once a project is brought to commercial operation, if RGGI prices fell relative to the outlook at the time of bid, project returns will suffer. Like other drivers of market revenues, a similar drop in RGGI price outlook before a project reaches its financial investment decision could result in termination, as the reduced revenue outlook could make a project unfinanceable. Under an Index REC structure, the price paid per REC is inversely related to LBMPs, and the generator is generally neutral to LBMP changes driven by RGGI allowances.

14.3.2 NYISO Carbon Price Proposal Overview and Impact on Procurements

In December 2018, NYISO released its Carbon Pricing Proposal[248] resulting the Integrating Public Policy Task Force effort to better align wholesale market operations with state public policy. NYISO's proposal would incorporate the social cost of carbon (determined by DPS Staff)

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247 Based on a literature review by author. For example, Sol Systems notes a current cost premium of 5¢ per Watt for bifacial solar, and a potential increase in annual energy production of 2.8 to 5.2%. Glazer, B., & Mayer, K. (2019, April 19). Bifacial or Bust? Engineering Solar Financings of the Future. *Greentech Media*. Retrieved from https://www.greentechmedia.com/articles/read/bifacial-or-bust-engineering-solar-financings-for-the-future

248 (New York Independent System Operator, 2018)

net of RGGI allocations into wholesale energy markets as a carbon price in dollars per ton of CO_2 emissions. Carbon prices would be charged to emitting generators and incorporated in their energy price bids. NYISO would charge imports for emissions and credit exports for the carbon price associated with their emissions.[249] Renewable generators would benefit from receiving the increased energy prices without having to pay the $LBMP_C$ carbon charge. NYISO has proposed implementing the proposal starting in 2022, although there has been limited forward motion.

NYISO's carbon price proposal was announced, but not implemented, during the period during which bidders were preparing bids in response to RESRFP18-1 and RESRFP19-1. For awarded contracts whose bidders assumed minimal or no carbon pricing impact in crafting their bids, the ultimate availability of carbon prices would increase expected revenues and increase the likelihood of projects coming to fruition. If the Carbon Pricing Proposal is not adopted, awarded bids that relied on the expected availability of higher energy revenue due to carbon pricing may experience impacts to financial viability. In that case, NYSERDA could observe a higher than expected attrition rate that could result in a temporary Tier 1 supply deficit and the need for more procurement in later years.

If the NYISO Carbon Pricing Proposal is adopted, the availability of additional carbon revenues could be effectively captured under a Fixed-Price REC structure in future REC procurements by lowering the revenue gap and hence, Fixed-Price REC bids for renewable energy resources within New York. Under an Index REC structure, the availability of NYISO carbon prices would not influence a bidders' Strike Price. Instead, it would increase the Reference Energy Prices, all else equal, and reduce NYSERDA's monthly REC payments to generators.

14.4 Commission's Proceeding on Resource Adequacy

In August 2019, the Commission issued an Order Instituting Proceeding and Soliciting Comments[250] to consider ways to harmonize conflicts between New York's resource adequacy programs and its renewable energy development and carbon emissions reduction public policy

[249] NYISO's intent of its proposed treatment of imports and exports is to prevent the carbon charges on internal generation from causing emissions leakage and costly distortions across seems with other regions. However, refunding the carbon charge to all exports and applying the carbon charges to all imports could create an unintended incentive to export renewable energy from New York and a disincentive to importing renewable energy into New York.

[250] New York State Public Service Commission. (2019, August 8). Case 19-E-0530, Proceeding on Motion of the Commission to Consider Resource Adequacy Matters, Order Instituting Proceeding and Soliciting Comments.

goals. The Commission specifically raised concerns about Buyer-Side Mitigation (BSM) rules within NYISO's ICAP market. BSM rules set competitive offer price floors in the ICAP market for NYISO zones G, H, I, and J. As markets often clear below these price floors, BSM creates a barrier for renewable resources to compete in the market. The Commission is in the process of gathering stakeholder feedback about ways to align resource adequacy with public policy goals. On May 19th, NYSERDA and DPS Staff filed "Qualitative Analysis of Resource Adequacy Structures for New York[251]," which assesses alternative structures that the state could use to meet resource adequacy requirements in public policy objectives.

In February 2020, the Federal Energy Regulatory Commission (FERC) issued an Order[252] sustaining the mitigation of renewable resources. While NYISO is establishing limited provisions to some renewables from BSM under limited circumstances and quantities, is likely to significantly impair capacity market participation of renewable resources located in New York City and the Hudson Valley.

If renewable resources contributing to the CES are unable to receive wholesale capacity market revenues, RECs will have a larger revenue gap to fill. For projects already holding NYSERDA Fixed-Price REC contracts that have reached commercial operation, if they had counted on access to ICAP revenues in determining their REC Bid Price, their returns on investment may suffer if they have not yet accessed the capacity market. For projects that have not yet reached their financial investment decision, inability to access ICAP market revenues, if such revenues were assumed in arriving at their contracted Bid Price, may undermine the project's financial viability. Further, if renewable resources are not able to participate in the capacity market, they will not count towards minimum capacity requirements set to meet reliability needs, causing the market to procure capacity resources above actual capacity installed in the market, creating market inefficiencies.

251 The Brattle Group. (2020, May 19). Qualitative Analysis of Resource Adequacy Structures for New York.

252 United States Federal Energy Regulatory Commission. (2020, February 20). Docket ER16-1404-000, Order on Compliance.

14.5 Participation of Aggregated and Co-located Facilities in NYSERDA's REC procurements

Currently, NYSERDA's Tier 1 REC procurements are open to stand-alone renewable energy generators that meet the Tier 1 RES eligibility requirements. NYSERDA currently does not consider bids from aggregated facilities of the same technology and approximate vintage at different locations, or from co-located facilities of different eligible technologies. The Phase 1 and Phase 2 Implementation Plans noted that the RES procurement eligibility criteria may evolve over time to consider bids from aggregated or co-located facilities, and thus the Phase 3 Implementation Plan again considered whether it was appropriate to make such bid types eligible for future procurements. NYSERDA and DPS Staff concluded that extending eligibility at that time would not be appropriate. Their rationale was that most categories of DER (which would take advantage of aggregation) are currently ineligible to participate in RES Tier 1 Solicitations, and Tier 1 eligible co-located facilities may submit separate and distinct bids in NYSERDA's Tier 1 REC procurements. The Phase 3 Implementation Plan noted that NYSERDA would monitor any changes to market rules that would allow aggregated facilities to participate in a future RES Tier 1 solicitation and incorporate those processes and criteria in a subsequent implementation plan as deemed appropriate.

14.6 Need for CES Market Monitor

In any market, participants can have or acquire market power, the ability to manipulate the price of an item in the marketplace by manipulating the level of supply, demand or both. Historically, electric utilities were closely regulated monopolies under a regulatory structure that guaranteed a regulated rate of return. In such structures, there was little opportunity or incentive to manipulate price. That changed when the electric industry restructured to introduce competitive wholesale power markets. The primary tool for maintaining just and reasonable rates in such restructured markets is competition among the generators providing energy, capacity and ancillary services to the markets. However, in many wholesale markets, there are incumbent buyers and sellers that may already have market power (in terms of market concentration). In addition, experience shows that once market rules are written, competitors will seek out advantage (market power) in every weakness and ambiguity found in the market rules.

Accordingly, ISO/RTOs that administer wholesale power markets have established Market Monitoring Units (MMUs) to oversee their wholesale energy, capacity and ancillary services

markets. The primary function of MMUs is to monitor the markets for any sign of potential or actual market power (which could result in abuse) and if appropriate, take corrective action.

In New York, NYISO's Market Mitigation and Analysis Department (MMA) is "responsible for the implementation of the [NYISO] Market Power Mitigation Measures" (Market Services Tariff, Attachment H) and "working collaboratively with the external Market Monitoring Unit" (Potomac Economics) and other NYISO departments to assist the NYISO's efforts to "carry out its Tariff responsibilities, including the ISO's obligation to provide adequate data and support to its Market Monitoring Unit." Notably, this includes overseeing the BSM rules and the various exemptions to the BSM rules.[253]

Greenhouse gas cap and trade programs, notably RGGI and the Western Climate Initiative (WCI), also have Market Monitors. However, to the authors' knowledge, beyond the government agencies that oversee the programs, no state or region has adopted an MMU to oversee Renewable Portfolio Standard, Renewable Energy Standard or Clean Energy Standard programs.

There are two issues some have raised as potentially justifying the need for an MMU to govern CES/RES programs. These are:

- Utilities as sellers and buyers: In markets (such as some New England state compliance markets) where utilities can function as both major buyers and sellers of RECs in the CES/RES markets, some stakeholders have voiced concerns that they may have ability to time their purchases and sales to manipulate the price of RECs.
- Banking RECs: In addition, as participants are allowed to "bank" RECs for compliance in a future delivery year, some stakeholders have voiced concerns that such banking could be used as a form of withholding or hoarding to manipulate REC supply and price. New England states designed their policies to mitigate this risk, as only LSEs can bank, and what they can bank is not RECs but non-transferable excess RPS compliance for their own future use. In PJM, generators, intermediaries and LSEs can bank RECs for several years in the PJM GATS system, and surpluses can and have been held back from the market, resulting in higher REC prices than suggested by the supply-demand balance. Whether this practice presents a concern worthy of market monitoring is a question not addressed to date.

[253] For more information on NYISO's Market Monitoring function, see https://www.nyiso.com/market-monitoring.

In the New York CES context, these are unlikely to be material issues for three reasons:

- Most RECs are non-transferrable. Only a small portion of the market would be subject to potential market power, making manipulation less likely and less damaging in the event it nonetheless happened.
- NYSERDA's central role in REC procurement and resales mitigates material threats that would warrant mitigation. In particular, NYSERDA reselling RECs 'at cost' in a shortage market expressly mitigates NYSERDA's ability to withhold RECs and increase REC prices.
- New York's relatively low Tier 1 ACP limits the potential impact of any exercise of market power.

There is little apparent need to institute a market monitory function for the CES/RES at this time. The Commission should continue to observe and monitor the markets and reconsidering the need for an MMU if justified as changes to the CES and RES programs are adopted.

14.7 Impact of Other Solicitations on the RES and Progress Towards CES Goals

NYSERDA LSR Tier 1 REC procurements and OREC procurements do not exist in in a vacuum. When other parties issue concurrent solicitations for renewable energy and/or seek supply from the same pool of potential bidders, it can impact supply and pricing available to NYSERDA. The relative attractiveness of competing offtake opportunities, in terms of either revenue or risk profile, may dictate the impact on the RES result and achievement of CES and CLCPA goals when soliciting parties issue contemporaneous procurements.

If NYPA, LIPA, and NYSERDA all procure from the same development pipeline, they could collectively work their way up the supply curve to higher cost resources. Whether they coordinate or compete can influence whether they all benefit (by collectively unlocking greater scale economies), or whether they simply drive up prices. Large institutional buyers might also play a role in this 'coordinate or compete' dynamic. If NYPA, LIPA, or large institutions contract with supply that that is not the highest cost and that might otherwise go to NYSERDA for the RES, then the RES procurement may cost more but overall costs of meeting the CES may be neutral.

In a regional power market, competition between New York's solicitation activities and solicitations by other states could be more impactful. For instance, New England states have in the recent past selected projects in the New York control area, resulting in several long-term

contracts to export energy and RECs, as noted in Section 8.6. These procurements effectively removed resources from the supply pipeline available to New York. If New England states authorize additional solicitations not dedicated to offshore wind, this result could be repeated.

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