

NY Green Bank Financial Market Transformation Study

Executive Summary

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1. NY GREEN BANK DESCRIPTION.

NY Green Bank (“**NYGB**”) is a \$1.0 billion investment fund designed to accelerate clean energy deployment in New York State. Since its formation, NYGB has worked to increase the size, volume and breadth of clean energy investment in New York State (the “**State**” or “**NYS**”), expand the base of investors in clean energy deployment in the State, and increase market participants’ access to capital on commercial terms.

To achieve these objectives, NYGB collaborates with the private sector to develop transaction structures and methodologies that address barriers to clean energy investment. Through its work with counterparties (clean energy project developers, other firms delivering clean energy solutions, and financial institutions) NYGB has identified many financial market barriers that impede the flow of capital to potentially attractive opportunities. Among the most common are:

- Lack of transaction standardization;
- Insufficient scale and volume relative to the business objectives and practices of large investors; and
- Inadequate data on project sponsors and counterparty credits; underlying debt (or equity) investments; technology performance; and underdeveloped or nonexistent capital markets for clean energy projects.

To address these barriers, NYGB’s investment strategy focuses on identifying and developing opportunities that create attractive precedents, standardized practices and roadmaps that capital providers can readily replicate and scale. As funders “crowd in” to a particular area within the clean energy landscape, NYGB moves on to other areas that have received less investor interest.

NYGB initiated financing operations in 2014 and closed its first financing transactions in 2015. As of December 31, 2018, NYGB had closed \$637.6 million in overall investments to support between \$1.51 and \$1.75 billion of total clean energy project deployment. In the process, NYGB has worked with 55 counterparties.

NYGB is a division of the New York State Energy Research and Development Authority (“**NYSERDA**”). NYSERDA commissioned this first independent NY Green Bank Financial Market Transformation Study (the “**Study**”) of the effect that NYGB’s activities have had on clean energy financing markets in NYS. This report (the “**Report**”) summarizes the results of the first phase of the Study, which was conducted between September 2018 and February 2019. NYSERDA plans to conduct subsequent updates to measure change over time in NYGB’s impact on these markets.

2. SUMMARY OF STUDY OBJECTIVES AND METHODS.

Working with NYGB, NYSERDA staff developed a study approach designed to assess the influence of NYGB's early activities on the following characteristics of the clean energy finance markets in NYS:

1. Knowledge of and confidence in clean energy investments among financial institutions;
2. Number and type of financial institutions active in clean energy markets;
3. Availability of favorable terms in financing offered to clean energy projects and companies;
4. Pace of clean energy project deployment; and
5. Volume of clean energy project financing.

DNV GL divided the Study into two work streams.

Baseline Assessment. DNV GL appraised the state of the market during the period 2015 – 2018 (“the **Study Period**”), representing conditions before NYGB financing activity began in earnest and as it ramped up, using a set of market indicators specified by NYSERDA and NYGB as part of the Study plan. The baseline assessment (“**Baseline Assessment**”) drew primarily on the results of surveys of developers and financiers conducted for the Study, supplemented by review of internal NYGB documents and an array of secondary sources. The Baseline Assessment was intended to provide a structured snapshot of market conditions that can be replicated in subsequent updates of the Study designed to gauge market progress over time.

Attribution Analysis. The attribution analysis (“**Attribution Analysis**”) addressed the questions: How and to what extent did NYGB's activities contribute to changes observed in the clean energy finance market during the Study Period? The key challenge in answering these questions was to appropriately characterize and weigh factors *other than NYGB's activities* that shaped and influenced the business practices of participants in those markets. Many factors influenced the activities of clean energy project developers: changes in costs, energy prices, energy market regulation, tax law and general economic policy. Financiers were influenced by a similar set of factors, as well as by trends in the costs of capital, financial market regulation, and developments in industries and regions that offered alternate investment opportunities.

The Study team integrated the results of the Baseline Assessment and Attribution Analysis to assess the strength of evidence for market effects of NYGB activities across each of the market indicators.

3. OVERVIEW OF FINDINGS

NYGB has made a strong start in achieving its goals. Five years after its formation, and with \$637.6 million in overall investments as of December 31, 2018, NYGB has become a more established investment and asset management platform. However, some of NYGB's investments are still in their

early stages while the portfolio continues to mature. NYGB's transactions typically involve agreements among multiple parties and often require months to close. In sectors such as community and commercial/industrial solar, for example, the underlying projects typically take 18 – 24 months to plan and complete. The Study Period encompasses the earliest stages of NYGB's financing operations and the market response to those activities.

Given the timeframe of the Study Period and the range of other influences on clean energy finance markets, the DNV GL study team expected to find, at best, modest evidence of NYGB's influence. However, DNV GL identified credible evidence of NYGB's influence on many of the market indicators. The following summarizes the Study's major findings.

The success of the Mosaic transaction demonstrates the efficacy of NYGB's strategy. In 2014, Mosaic, Inc. launched a novel business model for financing residential solar systems that reduced the high customer acquisition and financing costs that had begun to inhibit growth in the solar PV industry. By mid-2015, Mosaic needed a pool of capital from which it could make thousands of loans to homeowners through a nationwide network of participating dealers. In early 2016, NYGB joined one other bank and committed \$50 million in two stages to the credit facility which grew to \$270 million with the participation of two other financial institutions. Mosaic used the credit and operating experience gained with the warehouse credit facility to support the development of a credit-rated securitization, through which it could access significant sums from large investors on favorable interest terms. Over the next 20 months, Mosaic issued four additional securitizations, raising over \$1.1 billion from more than 30 banks and investor groups. After only four years in the market, the Mosaic Solar Loan program commanded 14% of the market for residential solar project financing nationally. DNV GL identified links between NYGB activities and positive developments in four of the five market characteristics identified above and concluded that NYGB had influenced the speed and scale of Mosaic's growth.

DNV GL identified changes in many of the evaluated market indicators that were directionally consistent with hypotheses concerning the market effects of NYGB activities. DNV GL also found evidence of NYGB influence on most of these observed changes. However, the evidence was generally not significant enough to support a definitive judgment of a causal relationship between NYGB activities and the market changes observed. As discussed earlier, DNV GL anticipated this pattern in the findings given that the Study Period covers only the earliest stages of NYGB operation.

The Study found evidence of NYGB's impact on the following market changes:

- Increase in the number of and average size of project financings and their total dollar volume in markets NYGB entered, particularly in residential, community, and commercial/industrial solar.

- Increase in the number and type of financial institutions active in the clean energy finance markets.
- In the residential solar financing market, the Study team found evidence of decreases in costs of capital for transactions that fund loans or leases to customers, the growth of secondary markets, and replication in the structure of transactions in which NYGB played an early role.

Most of the clear evidence on NYBG influence came from the Mosaic case study. NYGB's key role in financing Mosaic's first major credit facility, the importance of the operating information generated by that facility in supporting access to lower-cost securitized financing, the company's rapid growth *within the three-year Study Period*, and the small number of significant competitors in the market support a strong case for NYGB's impact.

It is too early to infer a strong influence of NYGB's activities and the transformation of other markets in which it operates, such as community solar, commercial industrial solar, and commercial sector energy efficiency. Exogenous factors such as government regulation and industry fragmentation across both developers and financiers, coupled with limited data on market activity made it difficult for the Baseline Assessment and Attribution Analysis to isolate the impact of NYGB. In other cases, the scale of business activity by NYGB's counterparties remained too small during the Study Period to support a plausible argument related to effects on the broader market. It is expected that future studies will identify further evidence of market change and of NYGB's impact.

DNV GL identified little consistent evidence of NYGB's influence on one of the key market indicators: financial institution knowledge and confidence in clean energy investments. This indicator was originally anticipated to show change over a short (1-3 year) time frame. In several cases, NYGB's counterparties were first movers willing to make new kinds of investments. Thus, NYGB's investments generated new operating and credit experience that could serve as a guide to structuring similar future transactions. However, the volume of such experience remains too small for NYGB to aggregate across transaction types and disseminate anonymized data to the market more broadly. Hence, it is too early to detect a strong observable effect of NYGB's activities on financier and developer knowledge and confidence in clean energy investments. Future impact studies may detect a stronger influence of NYGB on this market indicator.

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TABLE OF CONTENTS

1.	INTRODUCTION	1
1.1.	NY Green Bank Description	1
1.2.	Summary of Study Objectives and Methods.....	2
1.3.	Summary of Findings.....	4
2.	MARKET CHARACTERIZATION AND ASSESSMENT RESULTS	8
2.1.	Study Methods	8
2.1.1.	Overview of Market Transformation Concepts and Assessment Approach	8
2.1.2.	Research and Analysis Activities.....	13
2.1.3.	Approach to Indicator Scoring.....	15
2.2.	Summary of Market Transformation Findings	17
2.3.	Detailed Market Indicator Findings	18
2.3.1.	Availability of Informative Data on Clean Energy Project Financial Performance (Short-Term Market Indicator)	18
2.3.2.	Availability of Informative Data on Clean Energy Project Technical Performance (Short-Term Market Indicator)	20
2.3.3.	Increased Awareness in Financial Community of Clean Energy Investment Opportunities (Short/Mid-Term Market Indicator).....	22
2.3.4.	Increase in Clean Energy Transactions with Risk/Return Profiles Acceptable to Financiers (Mid-Term Market Indicator).....	23
2.3.5.	Increase in the Scale of Individual Clean Energy Project Financing Transactions (Mid-Term Market Indicator)	25
2.3.6.	Increase in the Number of Clean Energy Financings (Mid-Term/Long-Term Market Indicator)	27
2.3.7.	Increase in the Number of Financiers Offering Products Supported by NYGB (Mid-Term/Long-Term Market Indicator).....	29
2.3.8.	Replication by Developers of NYGB Financing Approaches – Residential/Commercial (Mid-Term/Long-Term Market Indicator)	31
2.3.9.	Total Volume of Clean Energy Project Financings (Long-Term Market Indicator).....	34
2.3.10.	Increase in the Volume of Clean Energy Projects (Long-Term Market Indicator).....	35
2.3.11.	Emergence of Secondary Markets (Long-Term Market Indicator).....	41
2.3.12.	Reduction in Financing Costs (Long-Term Market Indicator)	44
2.3.13.	Reduced Elapsed Time to Complete Transactions (Long-Term Market Indicator).....	46
2.3.14.	Reduction in Clean Energy Technology Costs (Long-Term Market Indicator)	47
3.	FINDINGS AND CONCLUSIONS	48
3.1.	Conclusions and Summary of Findings	48
3.2.	Recommendations	50

TABLE OF EXHIBITS

Figure 1. Timeline of NYGB Activities	10
Figure 2. Change in Availability of Financial Performance Data Since First Year of Investing in Clean Energy, Non-Participant Financial Respondents	19
Figure 3. Availability of Technology Performance Data as a Market Barrier, First Year Investing and 2018	21
Figure 4. Change in Clean Energy Investments (\$) from First Year of Investment to 2018.....	26
Figure 5. Difficulty in Securing Financing: First Year of Clean Energy Investment Compared to the Last 12 Months (Participating Developers).....	28
Figure 6. Indexed Annual Volume of Residential Solar PV Installed: New York, U.S., and other Leading States (2013 = 1.0)	36
Figure 7. Incentives Paid by the Residential NY-Sun Megawatt Block Program and Cumulative Volume of MW for Supported Projects.....	37
Figure 8. Nameplate MW of Megawatt Block Community Solar Applications and Projects Completed by Year Application Received	39
Figure 9. Annual Residential Solar Securitizations by Number, Volume, and Asset Type	42

Table 1. Market Indicator Definitions, Time Frames and Data Sources	11
Table 2: Population Counts, Targeted Sample Sizes, and Number of Completed Market Actor Surveys by Market Actor Group	13
Table 3. Secondary Sources Used in the Market Transformation Study.....	14
Table 4: Market Indicator Scoring Rubric.....	16
Table 5: Robustness of Evidence Scoring Rubric	16
Table 6. Summary of Findings on Market Indicators.....	17
Table 7. Market Indicator Assessment: Availability of Informative Data on Clean Energy Project Financial Performance.....	18
Table 8. Market Indicator Assessment: Availability of Informative Data on Clean Energy Project Technical Performance	20
Table 9. Market Indicator Assessment: Increased Awareness in the Financial Community of Clean Energy Investment Opportunities	22
Table 10. Market Indicator Assessment: Increase in Clean Energy Transactions with Risk/Return Profiles Acceptable to Financiers.....	23
Table 11. Market Indicator Assessment: Increase in the Scale of Individual Clean Energy Project Financing Transactions.....	25
Table 12. Market Indicator Assessment: Increase in the Number of Clean Energy Financings ...	27
Table 13. Market Indicator Assessment: Increase in the Number of Financiers Offering Products Supported by NYGB	29
Table 14. Market Indicator Assessment: Replication of Financial Model by Developers	31
Table 15. Market Indicator Assessment: Increased Total Volume (\$) of Clean Energy Financing Transactions.....	34
Table 16. Market Indicator Assessment: Increased Total Volume of Project Financings	35
As Table 17 shows, NYGB has been very active in the NYS community and commercial/industrial solar markets. Projects undertaken by NYGB counterparties in those market segments account for one-third of the capacity registered as completed or in the pipeline in the NY-Sun project database.	40
Table 18: Share of Nameplate Capacity of Community and Commercial/Industrial Solar Projects: 2016 - 2018.....	40
Table 19. Market Indicator Assessment: Emergence of Secondary Markets.....	41
Table 20: Market Indicator Assessment: Reduction in Financing Costs.....	44
Table 21. Market Indicator Assessment: Timeframe for Transaction Execution.....	46

1. INTRODUCTION

1.1. NY Green Bank Description

NY Green Bank (“**NYGB**”) is a \$1.0 billion investment fund designed to accelerate clean energy deployment in New York State. Since its formation, NYGB has worked to increase the size, volume and breadth of clean energy investment in New York State (the “**State**” or “**NYS**”), expand the base of investors in clean energy deployment in the State and increase market participants’ access to capital on commercial terms.

To achieve these objectives, NYGB collaborates with the private sector to develop transaction structures and methodologies that address barriers to clean energy investment. Through its work with counterparties (clean energy project developers, other firms delivering clean energy solutions, and financial institutions), NYGB has identified many financial market barriers that impede the flow of capital to potentially attractive opportunities. Among the most common are:

- Lack of transaction standardization;
- Insufficient scale and volume relative to the business objectives and practices of large investors; and
- Inadequate data on project sponsors and counterparty credits; underlying debt (or equity) investments; technology performance; and underdeveloped or nonexistent capital markets for clean energy projects.

To address these barriers, NYGB’s investment strategy focuses on identifying and developing opportunities that create attractive precedents, standardized practices, and roadmaps that capital providers can readily replicate and scale. As funders “crowd in” to a particular area within the clean energy landscape, NYGB moves on to other areas that have received less investor interest.

NYGB follows certain important operating principles to increase private capital participation in clean energy markets:

- Focusing on wholesale capital markets (that is, providing structured financial products to developers and specific projects that result in clean energy benefits for all New Yorkers at scale – rather than funding consumers/homeowners directly);
- Structuring financial products to foster replicable investments;
- Pricing financial products consistently with commercial approaches to credit quality and risk, earning a return on investment to preserve and grow NYGB’s capital base;

- Collaborating with, rather than competing against, market participants that: (i) can engage, or (ii) are already engaging the financial markets, but where that engagement or progress is constrained by a lack of available financing; and
- Recycling its capital into new clean energy projects when income is generated and as investments mature or are realized, maximizing the impact of its capital across multiple deployments.

NYGB initiated financing operations in 2014 and closed its first financing transactions in 2015. As of December 31, 2018, NYGB had closed \$637.6 million in overall investments to support between \$1.51 and \$1.75 billion of total clean energy project deployment. In the process, NYGB has worked with 55 counterparties.

NYGB is a division of the New York State Energy Research and Development Authority (“NYSERDA”). NYSERDA commissioned this first independent NY Green Bank Financial Market Transformation Study (the “Study”) of the effect that NYGB’s activities have had on clean energy financing markets in NYS. This report (the “Report”) summarizes the results of the first phase of the Study, which was conducted between September 2018 and February 2019. NYSERDA plans to conduct subsequent updates to measure change over time in NYGB’s impact on these markets.

1.2. Summary of Study Objectives and Methods

Working with NYGB, NYSERDA staff developed a study approach designed to assess the influence of NYGB’s early activities on the following characteristics of the clean energy finance markets in NYS:

1. Knowledge of and confidence in clean energy investments among financial institutions;
2. Number and type of financial institutions active in clean energy markets;
3. Availability of favorable terms in financing offered to clean energy projects and companies;
4. Pace of clean energy project deployment; and
5. Volume of clean energy project financing.

NYSERDA and NYGB developed a set of hypotheses on how NYGB’s activities would affect these market characteristics over time. NYSERDA and NYGB also specified a set of market indicators (i.e., quantitative or qualitative measures of market conditions one would expect to observe if NYGB was influencing the market as hypothesized). The Study focused on gathering

and assessing the strength of evidence of changes in the NYS clean energy financing markets and NYGB’s influence on those changes, using the hypotheses and market indicators as a framework.

DNV GL divided the Study into two complementary work streams.

Baseline Assessment. DNV GL appraised the state of the market during the period 2015 – 2018 (“the **Study Period**”), representing conditions before NYGB financing activity began in earnest and as it ramped up, using the set of market indicators specified by NYSERDA and NYGB as part of the Study plan. The baseline assessment (“**Baseline Assessment**”) drew primarily on the results of surveys of developers and financiers conducted for the Study, supplemented by review of internal NYGB documents and an array of secondary sources. The Baseline Assessment was intended to provide a structured snapshot of market conditions that can be replicated in subsequent updates of the Study designed to gauge market progress over time.

Attribution Analysis. The attribution analysis (“**Attribution Analysis**”) addressed the questions: How and to what extent did NYGB’s activities contribute to changes observed in the clean energy finance market during the Study Period? The key challenge in answering these questions was to appropriately characterize and weigh factors *other than NYGB’s activities* that shaped and influenced the business practices of participants in those markets. Many factors influenced the activities of clean energy project developers: changes in costs, energy prices, energy market regulation, tax, and general economic policy. Financiers were influenced by a similar set of factors, as well as by trends in the costs of capital, financial market regulation, and developments in industries and regions that offered alternate investment opportunities.

To capture these interactions, DNV GL prepared case studies of NYGB transactions involving counterparties in the residential solar, community solar, commercial/industrial solar, and commercial energy efficiency industries.¹ These case studies placed NYGB’s transactions in the context of the markets they were designed to influence. This approach provided a framework to present evidence of change in the market indicators, to identify the potential influences on those changes, and to assess the relative importance of NYGB’s activities among those influences. The case studies drew on the sources used for the Baseline Assessment, supplemented by analysis of market statistics, review of internal NYGB transaction documents, annual reports, Form 10-Ks

¹ In this study, the term “community solar” refers to solar PV projects in the category defined by the New York Public Service Commission’s “Community Distributed Generation” designation. These are installations up to 10 MW in capacity that serve multiple end-use customers through various retail aggregation approaches. “Commercial/Industrial Solar” refers to solar PV projects in the same size category that serve a single end-use customer or “off-taker” under a long-term contract. In other states and in the energy industry press and literature, these two groups of projects are frequently grouped together under the rubric of “community solar”.

filed with the Securities and Exchange Commission and other reports for public companies in NYGB's portfolios, and a wide range of industry, government, and academic publications.²

In the body of this report, the results of the Baseline Assessment and Attribution Analysis are integrated into an assessment of the strength of evidence of NYGB's influence on the indicators of market progress formulated by NYSERDA and NYGB.

1.3. Summary of Findings

NYGB has made a strong start in achieving its goals. Five years after its formation, and with \$637.6 million in overall investments as of December 31, 2018, NYGB has become a more established investment and asset management platform. However, some of NYGB's investments are still in their early stages while the portfolio continues to mature. NYGB's transactions typically involve agreements among multiple parties and often require months to close. In sectors such as community and commercial/industrial solar, for example, the underlying projects typically take 18 – 24 months to plan and complete. The Study Period encompasses the earliest stages of NYGB's financing operations and the market response to those activities.

Given the timeframe of the Study Period and the range of other influences on clean energy finance markets, the DNV GL study team expected to find, at best, modest evidence of NYGB's influence. However, DNV GL identified credible evidence of NYGB's influence on many of the market indicators. The following summarizes the Study's major findings.

The success of the Mosaic transaction demonstrates the efficacy of NYGB's strategy. DNV GL's case study of NYGB's investment in Mosaic, Inc., a specialty financing company focused on the residential solar market, found that the transaction influenced investor knowledge and confidence in aggregation of consumer loans for solar PV systems, attracted new investors to the field, increased the volume of investment in a range of aggregation approaches to financing residential solar PV, and resulted in improved financing terms for Mosaic. The following box summarizes NYGB's investment in a warehouse credit facility for Mosaic.³ In 2014, Mosaic launched a novel business model that greatly reduced the high customer acquisition and financing costs that had begun to inhibit growth in the solar PV industry. By mid-2015, Mosaic needed larger sources of capital from which it could make thousands of loans to homeowners through a nationwide network of participating dealers. The credit risk of the portfolio was unknown because the performance history of the underlying loans was unknown. In early 2016, after extensive due

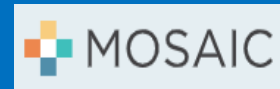
² See Appendix I for a full list of sources.

³ Warehouse credit facilities are a line of credit given to a loan originator, such as Mosaic, to fund loans for specific purposes, such as the purchase of a solar PV system. The life of the loan generally extends from its origination to the time it is sold into a secondary market, either directly or through securitization.

diligence and credit underwriting activities to assess the viability of Mosaic’s approach, NYGB joined one other bank and committed \$50 million in two stages to a warehouse credit facility to support Mosaic’s national operations.

Mosaic used the credit and operating experience gained with the warehouse credit facility to support the development of a credit-rated securitization, which was immediately oversubscribed.⁴ Based on successful execution of the business model and the rated securitization, two other lenders entered the facility and increased its overall size to \$270 million. Mosaic issued four additional securitizations over the next 20 months with progressively more favorable borrowing terms, raising over \$1.1 billion from more than 30 banks and investor groups. After only four years in the market, the Mosaic Solar Loan program commanded 14% (based on installed capacity) of the national market for residential solar project financing.⁵

DNV GL identified changes in many of the evaluated market indicators that were directionally consistent with hypotheses concerning the market effects of NYGB activities. DNV GL also found evidence of NYGB influence on most of these observed changes. However, the evidence was generally not significant enough to support a definitive judgment of a causal relationship between NYGB activities and the market changes observed. As discussed earlier, DNV GL anticipated this pattern in the findings given that the Study Period covers only the earliest stages of NYGB operation.



WAREHOUSE CREDIT FACILITY CASE STUDY

2015: NYGB participates with one other bank in first, major unrated credit warehouse to support innovative residential solar loan product: \$50 million for NY State projects.

2017: Mosaic uses the initial credit facility to demonstrate success of its business model and achieve an A rated term securitization. This transaction was oversubscribed by institutional investors, refinancing the warehouse to be used for further project loan aggregation.

2017 – 2019: Financial institutions respond favorably to subsequent opportunities. Mosaic issues five rated securitizations in 2017 – 2019 totaling over \$1.1 billion to support lending volumes of \$40 - \$50 million/month.

Over 30 financial institutions participate in Mosaic securitized financings.

In 2018, Mosaic assumes national lead in volume of residential solar installations financed, with a 14% market share.

⁴ That is, the lead financier received more requests for participation than could be accommodated.

⁵ John Weaver, “Cash is king in residential solar, long live the lease”, PV Magazine, November 14, 2018, <https://pv-magazine-usa.com/2018/11/14/cash-is-king-in-residential-solar-long-live-the-lease/>.

The Study found evidence of NYGB's impact on the following market changes:

- Increase in the number of and average size of project financings and their total dollar volume in markets NYGB entered, particularly in residential and community solar;
- Increase in the number and type of financial institutions active in the clean energy finance markets; and
- In the residential solar financing market, the Study team found evidence of decreases in costs of capital for transactions that fund loans or leases to customers, the growth of secondary markets, and replication in the structure of transactions in which NYGB played an early role.

Most of the clear evidence on NYGB influence came from the Mosaic case study. NYGB's key role in financing Mosaic's first major credit facility, the importance of the operating information generated by that facility in supporting access to lower-cost securitized financing, the company's rapid growth *within the three-year Study Period*, and the small number of significant competitors in the market support a strong case for NYGB's impact.

It is too early to infer a strong influence of NYGB's activities and the transformation of other markets in which it operates, such as community solar, commercial/industrial solar, and commercial sector energy efficiency. Exogenous factors such as government regulation and industry fragmentation across both developers and financiers, coupled with limited data on market activity, made it difficult for the Baseline Assessment and Attribution Analysis to isolate the impact of NYGB. In other cases, the scale of business activity by NYGB's counterparties remained too small during the Study Period to support a plausible argument related to effects on the broader market. It is expected that future studies will identify further evidence of market change and of NYGB influence as the NYGB portfolio matures and continues to grow.

DNV GL identified little consistent evidence of NYGB's influence on one of the key market indicators: financial institution knowledge and confidence in clean energy investments. This indicator was originally anticipated to show change over a short (1-3 year) time frame. In several cases, NYGB's counterparties were first movers willing to make new kinds of investments or take new approaches to the deployment of clean energy assets. Thus, NYGB's investments generated new operating and credit experience that could serve as a guide to structuring similar future transactions. However, the volume of such experience remains too small for NYGB to aggregate across transaction types and disseminate anonymized data to the market more broadly. Hence, it is too early to detect a strong observable effect of NYGB's activities on financier and

developer knowledge and confidence in clean energy investments. Future impact studies may detect a stronger influence of NYGB on this market indicator.

2. MARKET CHARACTERIZATION AND ASSESSMENT RESULTS

2.1. Study Methods

2.1.1. Overview of Market Transformation Concepts and Assessment Approach

For the NYGB Financial Market Transformation Study, DNV GL used an approach that social scientists and evaluators have applied over the past several decades to assess the market effects of individual programs and market interventions.⁶ The approach comprised the following steps:

1. Develop program logic models. Logic models posit a hypothetical causal chain between a program's activities and the responses of targeted market actors, using observations from staff, market actors, and others with direct experience of the program to map the chain. Logic models provide guidance on the types of data that should be collected and analysed to assess the influence of the program on the markets it is designed to affect. NYSERDA worked with NYGB staff to develop logic models to describe how NYGB's activities would affect clean energy finance markets in NYS. These models also specified the time frames in which NYSERDA and NYGB expected the developments to occur.
2. Derive indicators from the logic models. Specify indicators (and the expected time frames for their appearance) that derive from the logic model and should be observable if the hypothesized effects occur.
3. Develop data to measure the indicators. Collect quantitative data and qualitative information on the specified indicators from various sources, including stakeholder interviews, program data, and secondary sources.
4. Assess the strength of support for hypotheses in the logic model. In this Study, DNV GL divided the assessment of the strength of each indicator into the following three components.
 - Current Condition/Direction of Change. This component assessed available evidence to determine whether observed market conditions during the Study Period or changes in those conditions corresponded to the relevant hypotheses in the logic model.
 - NYGB Influence. The second component assessed the strength of evidence that NYGB – as opposed to other exogenous forces –influenced the observed changes in a market indicator. Such evidence comes from interviews of market actors,

⁶ These methods have been reviewed and adopted by the State of New York Public Service Commission. See Metrics, Tracking, and Performance Assessment Working Group, 2018. *Market Transformation Metrics*.

examination of the sequence of events to establish precedence, comparison of market activity in states without a special purpose green bank to activity in NYS, and assessment of the relative importance of other potential influences on the market indicator.

- Robustness Assessment. This component assessed the quantity and quality of the data used to validate the hypothesis. For example, information from annual surveys with well-documented samples and methods were weighted more heavily than occasional research efforts that report the opinions of a few market actors.

The adjacent box provides an example of the application of this assessment approach.

EXAMPLE OF INDICATOR SCORING

Increase in the number of financiers offering financial products similar to those offered by NYGB

Current Conditions/Direction of Change

- Survey respondents report increase in number of financial institutions in clean energy markets
- Number of investors participating in Mosaic transactions increases from 2 to 29 from 2016 – 2018
- Number of investors in community and commercial/industrial projects in NYS increases from 2017 – 2018.

SCORE: INTERMEDIATE

NYGB Influence

- NYGB participated in first securitization of solar loans - 2016. Many other financial firms followed.
- NYGB was an early investor in community and commercial/industrial solar, but many other financiers were in the market.

SCORE: INTERMEDIATE

Robustness Assessment: evidence available from the following sources:

- Market actor surveys
- Industry Press
- Government & industry project databases

SCORE: INTERMEDIATE

NYSERDA and NYGB staff developed logic models of how each of NYGB’s major financial products would affect clean energy project developers and financial services firms.⁷ From those models, NYSERDA and NYGB derived 15 market indicators and identified the time frames in which they expected that changes in the indicators might be observed: short-term (1 – 3 years); mid-term (3 – 5 years); and long-term (5+ years). With NYGB closing its first transactions in late 2015, this Report covers the “short-term” period. Figure 1 displays a timeline of NYGB activities which were the focus of the Study. The vertical markers beginning in 2015 represent a subset of individual NYGB transactions that were covered by the Study, with the case study subjects called out.

Figure 1. Timeline of NYGB Activities

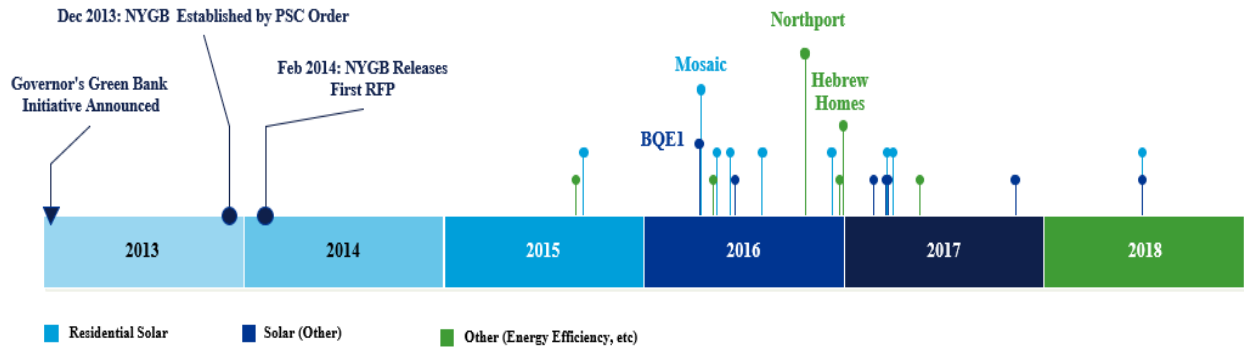


Table 1 lists the market indicators, the associated time frames assigned by NYSERDA and NYGB, the definitions used to formulate survey questions and assess information from secondary sources, and the sources of information used to assign values to the indicators. Some indicators show two timeframes because NYSERDA and NYGB assigned different timeframes for each financial product NYGB offered during the Study Period. DNV GL assessed thirteen of these indicators.

⁷ These financial products were as follows: Asset Loan & Investment – Term Loans, Bridge Loans, Subordinated Capital, Refinance. Construction Finance and Term Loans, Revolver – Construction Finance, Warehousing Aggregation

Table 1. Market Indicator Definitions, Time Frames and Data Sources

Indicator	Definition	Timeframe*	Financiers Interviews / Surveys	Developers Interviews / Surveys	Press	Industry Sources	Government Reports & Statistics
Availability of informative data on clean energy project financial performance	Availability of validated information on the financial performance of actual clean energy projects: e.g. rating agency pre-sale documents.	Short	●		○	○	
Availability of informative data on clean energy project technical performance	Availability of validated data on the field performance of clean energy technologies: e.g. M&V reports and cost-benefit analyses.	Short				○	●
Increased awareness in financial community of clean energy investment opportunities	Increase over time in the proportion of financiers who report being aware of clean energy investment opportunities.	Short / Medium	●	●		●	
Increase in clean energy transactions with risk/return profiles acceptable to financiers	Increase over time in the number of clean energy projects or businesses that meet financiers' criteria for funding.	Medium	●	○	●	●	
Increase in the scale of individual clean energy project financing transactions	Increase over time in the average size or characteristic range of sizes for clean energy projects or financial transactions of a given type.	Medium	○	●	●	●	○
Increase in number of clean energy project financings	Increase over time in the number of clean energy project financings of a given type.	Medium / Long	●	○	●	●	○
Increase in the number of financiers offering products supported by NYGB	Increase over time in the number and type of financiers offering financial products similar to those offered by NYGB.	Medium / Long	●	●	●	●	○
Increase in the number of third-party owners	Increase in the number of financiers participating as third-party asset owners through leases or Power Purchase Agreements (PPAs). Not assessed; deleted from study plan.	Medium / Long	●	○	●	●	●
Replication by developers of NYGB financing approaches – Residential/Commercial	Reports of financing approaches that are the same or similar to those used by NYGB.	Medium / Long	○	○	●	●	○
Increase in the total volume of clean energy project financings	Increase over time in number of clean energy project financings of a given type	Long	○	○	●	●	○
Increase in the volume of clean energy projects	Increase in the number, capacity or dollar volume of clean energy projects of a given type in a given market	Long	●	○	●	●	●
Emergence of secondary markets	Increase in the volume over time of sales of loan or lease receivables to secondary markets, either directly or through securitization.	Long	●	○	●	●	●
Reduction in financing costs: interest rate, transaction costs, equity requirements, etc.	Reduction over time in financing costs, primarily interest rates and equity requirements (advance rates).	Long	●	●	○	●	○
Reduced elapsed time to complete transactions	Reduction in time interval between application for financing and transaction closing.	Long	●	●			
Reduction in clean energy technology costs	Reduction over time in the unit installed cost of a given market. Not assessed in this phase.	Long	○	○	○	●	●
○ = Sources Used; ● = Productive Sources Used * Short = 0-3 years from start of operations; Medium = 3-5 years from start of operation; Long >5 years from start of operation							

In consultation with NYSERDA, DNV GL excluded the following two indicators in the study:

- Reduction in clean technology costs. DNV GL and NYSERDA agreed that it was very unlikely that NYGB activity would result in reductions in clean technology costs during the short time-frame of the Study Period. This indicator will be addressed in subsequent rounds of the Study.
- Increase in the number of third-party owners. In clean energy finance markets, third-party ownership refers to transactions in which the long-term owner of a project is neither the party that benefits directly from it (e.g. the owner of a facility that installs energy efficiency retrofits or a solar PV system), nor the party that developed it. Third-party transactions that are common in clean energy projects include equipment leases and power purchase agreements, in which investors independent of the project developer are assigned ownership of the project assets. That ownership status enables investors to claim various tax credits and deductions, as well as a share of project cash flows.

The use of third-party approaches for a given set of transactions depends on many factors: the nature of the asset and the financial needs and interests of the site owners, project developers, and investors. In some situations, such as Mosaic’s development of residential solar loans, significant segments of developers (solar PV system dealers) and site-owners (homeowners) find that their interests are better served if the customer retains ownership of the physical asset. Thus, the share of residential solar systems owned by third-party owners has declined in recent years, but the volume of installations and the variety of project financing options available to homeowners and dealers have increased.

Based on these considerations, DNV GL and NYSERDA agreed that increase in the number of third-party owners was not an appropriate indicator for assessing NYGB’s market effects. Moreover, DNV GL believes that the underlying objective of increasing the number and variety of investors active in clean energy projects is more explicitly captured in other indicators, such as “Emergence of secondary markets.” and “Increase in the number of financiers offering products supported by NYGB.” For these reasons, DNV GL did not include analysis of the increase in third-party owners in this Report.

2.1.2. Research and Analysis Activities

DNV GL carried out the following research and analysis activities in support of the Study.

Market Actor Surveys. DNV GL developed and implemented surveys of clean energy project financiers and developers to assess the current state of the clean energy finance market and stakeholders’ perceptions of NYGB. The Study team attempted to contact representatives of all counterparties that had participated in NYGB transactions (“**Participants**”), either as borrowers or financing partners. The team also attempted to interview representatives of clean energy firms and financiers active in NYS that had not participated in NYGB transactions (“**Non-Participants**”). The Study team built sample lists for the Non-Participants from databases supplied by InfoUSA, as well as from lists of engineering due diligence customers in the renewable energy industry served by other divisions of DNV GL.⁸ Table 2 displays the number of entities in the sample lists, the targeted number of completed surveys, and the number of surveys actually completed.

Table 2: Population Counts, Targeted Sample Sizes, and Number of Completed Market Actor Surveys by Market Actor Group⁹

	Participants		Non-Participants	
	Developers	Financial Institutions	Developers	Financial Institutions
Population Count (Sample Frame)	23	22	551	1,240
Target for Completed Surveys (Sample Size)	9	18	67	67
Surveys Completed	6	6	56	46
Response Rate	26%	27%	10%	4%
Target %	67%	33%	84%	67%

Despite the use of multiple survey delivery modes (web and phone) and multiple contacts, DNV GL completed surveys with only 12 Participants: six financiers and six developers. The number of completed surveys also fell somewhat below the target of 67 for Non-Participant developers

⁸ DNV GL has a business unit that provides engineering due diligence services to investors in the renewable technology market.

⁹ Response rate = the number of respondents who completed the survey/population count (sample list). Target percentage = the number of respondents who completed the survey/target for completed surveys (sample size)

and financial institutions. Moreover, many respondents elected not to answer all questions on the survey. Thus, for some indicators, DNV GL collected too few responses to draw meaningful conclusions. The low response rate may have been related to the project schedule, survey design, increasing survey fatigue in the marketplace, and other factors.

Where relevant, the sections below discuss the limitations in applying the survey data.

NYGB Documents. NYGB publishes information about its strategy, activities, performance, and impact.¹⁰ Materials available on its website include: regulatory authorization and planning documents, annual business plans, annual and quarterly operating and financial metrics reports, annual audited financial statements, and detailed profiles for each closed transaction.

Secondary Research. The Study team reviewed a wide range of secondary resources to support the Study’s findings. These materials were particularly useful in providing background and context for development of the case studies. Table 3 summarizes the type and number of sources used in this Report. Many more sources were reviewed for background; a full listing can be found in Appendix I.

Table 3. Secondary Sources Used in the Market Transformation Study

Type of Secondary Source and Examples	Number Used in Report
Industry Reports: reports by industry associations such as the Solar Energy Industry Association & American Wind Energy Association	9
Industry Databases: Databases of projects and technologies maintained by industry associations, such as SEIA’s state-level solar project data	3
Government Reports: Reports from state and local governments on clean energy technology and markets: e.g. NREL series	9
Government Databases: Federal and NY State databases of clean energy projects, energy prices, technology price and performance	4
Corporate Materials: Information from individual companies, including Securities and Exchange Commission filings, annual reports	13
Press Reports: General and specialized industry press reports, mostly accessed on-line	7
Academic and Professional Literature. Reports and conference papers from private research institutes, advocacy organizations, corporations	6

¹⁰ All materials mentioned are available at <https://greenbank.ny.gov/>.

2.1.3. Approach to Indicator Scoring

As is typical of market transformation evaluation, DNV GL drew from a wide variety of sources to characterize current market conditions and NYGB's influence on those conditions. Analyses of project databases and survey results provided quantitative support for the Report's conclusions. Other sources provided qualitative support. As expected, few sources covered exactly the same time period and geography. Therefore, the Study team developed a scoring system for the indicators to account for the disparate nature of data contained in some sources, while providing consistency across indicators and comparability across time. The following describes the scoring system applied to the market indicators.

Current Conditions/Direction of Change. This score captures DNV GL's assessment of the strength of evidence that market conditions or changes in market conditions observed during the Study Period correspond to conditions posited by the logic models. For example, if the logic model hypothesized that financiers working in a given market segment would seek to replicate a successful project financing approach demonstrated by NYGB or its counterparties, research should identify an increase in the number or percent of projects using that approach over time.

NYGB Influence. This score captures DNV GL's assessment of the strength of evidence that NYGB influenced the observed changes in a market indicator. Such evidence comes from interviews of market actors, examination of the sequence of events to establish precedence, comparison of market activity in states without a special purpose green bank to activity in NYS, and assessment of the relative importance of other potential influences on financing volume.

Table 4 summarizes the detailed criteria used to score the strength of the market indicators.

Table 4: Market Indicator Scoring Rubric

Rating	Criteria
Strong	<p><u>Current Conditions/Change</u>. Consistent evidence from multiple sources that conditions for clean energy finance were strong or changed as hypothesized in the program logic model and definition of the indicator (see Table 1).</p> <p><u>NYGB Influence</u>. Consistent evidence from three or more sources of NYGB influence on observed changes in clean energy markets. This included strength of support for a plausible causal narrative of NYGB influence on observed changes.</p>
Inter-mediate	<p><u>Current Conditions/Change</u>. Evidence of favorable conditions or change in hypothesized direction was mixed, but a majority support the hypothesis.</p> <p><u>NYGB Influence</u>. Evidence of NYGB influence was available from at least two credible sources.</p>
Minimal	<p><u>Current Conditions/Change</u>. Evidence of favorable conditions or change in hypothesized direction is mixed, but majority <i>does not support</i> the hypothesis.</p> <p><u>NYGB Influence</u>. Evidence of NYGB influence was supported by one credible source.</p>
Needs Further Research	<p><u>Current Conditions/Change</u>. Too few credible sources identified to support scoring.</p> <p><u>NYGB Influence</u>. No sources available to validate or contradict assertion of NYGB influence.</p>

Robustness Designations. DNV GL assigned a “robustness” rating to capture the quality of data supporting the strength of evidence rating.

Table 5: Robustness of Evidence Scoring Rubric

Rating	Criteria
Strong	<p>All key data sources meet stringent quality standards. Such sources include:</p> <ul style="list-style-type: none"> • Databases maintained over time by one organization using consistent data collection and quality control processes; • Peer reviewed government or professional reports; • Reports from reputable journals or longstanding on-line publications; • Corporate regulatory filings; • Regulatory documents; and • Interviews conducted by the DNV GL Study team.
Intermediate	<p>The majority of sources meet stringent quality standards as described above, for Strong.</p>
Minimal	<p>Few sources meeting stringent quality standards as described above were available.</p>

2.2. Summary of Market Transformation Findings

Table 6 presents the Study team’s scoring of the market indicators on strength and robustness. Section 2.3 presents detailed findings that support these ratings.

Table 6. Summary of Findings on Market Indicators

Indicator	Timeframe*	Evidence of Changes as Hypothesized by Logic Model	Evidence of NYGB Influence	Robustness of Evidence
Availability of informative data on clean energy project financial performance	Short	Minimal	Minimal	Intermediate
Availability of informative data on clean energy project technical performance	Short	Minimal	Minimal	Intermediate
Increased awareness in financial community of clean energy investment opportunities	Short / Medium	Intermediate	Minimal	Minimal
Increase in clean energy transactions with risk/return profiles acceptable to financiers	Medium	Intermediate	Intermediate	Strong
Increase in the scale of individual clean energy project financing transactions	Medium	Strong	Strong	Strong
Increase in number of clean energy project financings	Medium / Long	Intermediate	Intermediate	Intermediate
Increase in the number of financiers offering products supported by NYGB	Medium / Long	Intermediate	Intermediate	Intermediate
Replication by developers of NYGB financing approaches – Residential/Commercial	Medium / Long	Intermediate (Resi) Minimal (Com)	Intermediate (Resi) Minimal (Com)	Intermediate (Resi) Minimal (Com)
Increase in the Total Volume of Clean Energy Project Financings	Long	Intermediate	Intermediate	Intermediate
Increase in the volume of Clean Energy Projects	Long	Intermediate	Intermediate (Resi) Minimal (Com)	Strong (Resi) Intermediate (Com)
Emergence of secondary markets	Long	Intermediate	Intermediate	Intermediate
Reduction in financing costs: interest rate, transaction costs, equity requirements, etc.	Long	Intermediate	Intermediate	Intermediate
Reduced elapsed time to complete transactions	Long	Intermediate	Minimal	Intermediate
Reduction in clean energy technology costs	Long	<i>Not Researched*</i>		
* Short = 0-3 years from start of operations; Medium = 3-5 years from start of operation; Long >5 years from start of operation				

2.3. Detailed Market Indicator Findings

This section describes the rationale for and presents supporting evidence behind each market indicator’s strength and robustness rating as shown in Table 6.

2.3.1. Availability of Informative Data on Clean Energy Project Financial Performance (Short-Term Market Indicator)

Definition: Availability of validated information on the financial performance of completed clean energy projects: e.g., through rating agency pre-sale reports outlining deal structure and terms.

Table 7. Market Indicator Assessment: Availability of Informative Data on Clean Energy Project Financial Performance

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

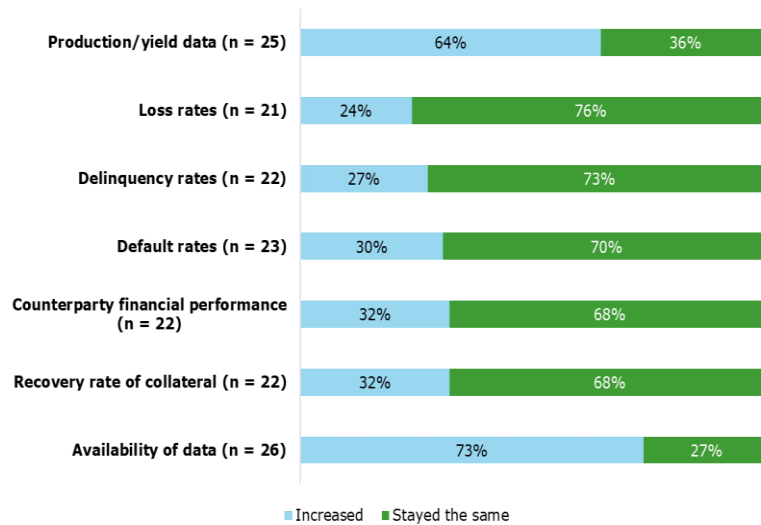
S = Strong I = Intermediate M = Minimal

Evidence of Current Condition/Direction of Change.

- Both Participants and Non-Participants who responded to the surveys conducted for the Study reported that the availability of industry-level financial data was a less significant barrier to investing in clean energy projects in 2018 than it had been in the first year they started investing in or developing such projects. Of the respondents who reported an increase of the availability of broad-level financial data, 70% had been active in the clean energy market prior to 2014.
- Roughly one-quarter of Non-Participant financial respondents also indicated that various types of financial performance data were more available over the same time frame. Over 60% of respondents who were active in the clean energy market prior to 2013 reported an increase in the availability of production/yield data (Figure 2).¹¹

¹¹ Production/yield data refers to the electricity production (kWh) from a renewable resource such as solar or wind units.

Figure 2. Change in Availability of Financial Performance Data Since First Year of Investing in Clean Energy, Non-Participant Financial Respondents



- DNV GL conducted in-depth case study interviews with four developers who observed an increase in the availability of market-level financial data but no material change in the amount of publicly available project-level data between 2015 and 2018.

Evidence of NYGB Influence.

- Project level financial performance data has historically been confidential and not publicly disclosed. In order to carry out its investment activities, NYGB observes standard commercial practices regarding disclosure of financial information about its counterparties. However, as NYGB closes and completes more transactions, it may be able to aggregate, anonymize, and disclose some data that will be helpful to developers and investors in structuring projects and financial transactions.

Robustness Assessment.

Direction	Intermediate
<ul style="list-style-type: none"> • Participant and Non-Participant Finance and Developer Surveys • Mosaic, BQ Energy (“BQE”) and Bank of America Merrill Lynch (“BofA Merrill”) Case Study Interviews 	
Influence	
<ul style="list-style-type: none"> • Participant and Non-Participant Surveys • Mosaic, BQE and BofA Merrill Case Study Interviews 	

2.3.2. Availability of Informative Data on Clean Energy Project Technical Performance (Short-Term Market Indicator)

Definition: Availability of validated data on the field performance of clean energy technologies: e.g. M&V reports and cost-benefit analyses.

Table 8. Market Indicator Assessment: Availability of Informative Data on Clean Energy Project Technical Performance

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

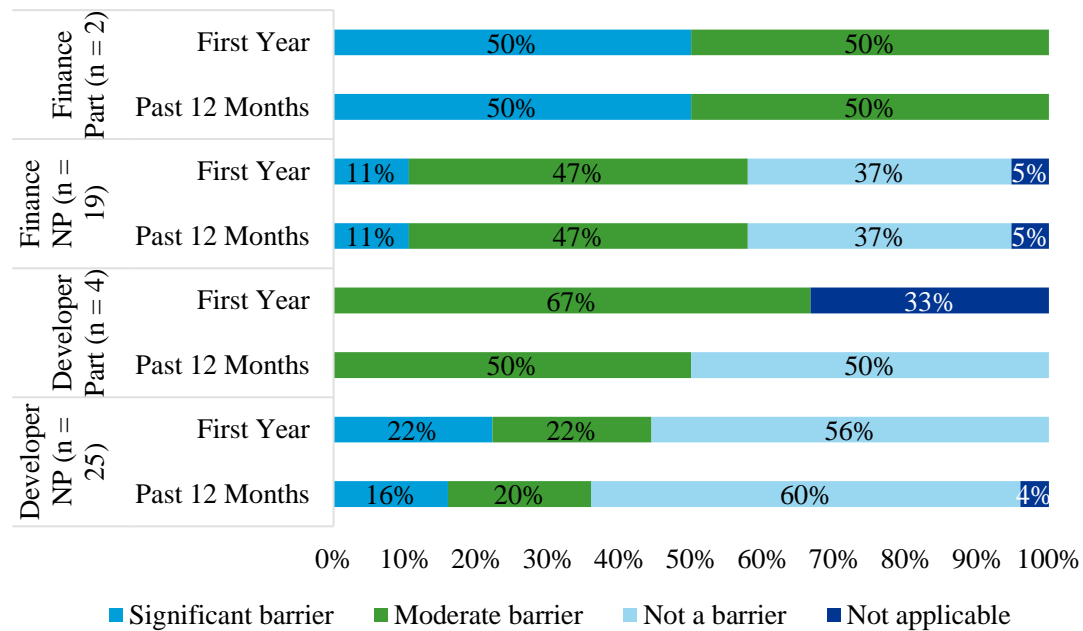
S = Strong I = Intermediate M = Minimal

Evidence of Current Condition/Direction of Change.

- More than half of all financiers surveyed – Participants and Non-Participants – identified lack of informative data on the performance of clean energy technologies as a barrier to investment in 2018. The same percentage of respondents identified lack of any or sufficiently credible data as a barrier to investment when they first started investing in clean energy projects.
- Approximately 38% of developers – Participants and Non-Participants – reported that their ability to obtain financing within the past 12 months was negatively impacted by a lack of any or sufficient credible data to help financiers evaluate the performance of clean energy technologies. Over half identified this barrier when referring to the time of their earliest attempts to secure clean energy technology financing.

The difference between periods in the fraction of market actors who reported difficulties in obtaining data on clean energy technologies was too small to support conclusions regarding actual changes in the market.

Figure 3. Availability of Technology Performance Data as a Market Barrier, First Year Investing and 2018¹²



Evidence of NYGB Influence.

- NYSERDA has a comparatively longer track record of implementing and evaluating its clean energy programs and has published technology performance data amassed over the years on platforms such as Open NY¹³ and other publicly-accessible channels. In fact, anonymized data on solar PV projects that are part of NYSERDA’s NY-Sun program includes some projects also supported by the NYGB portfolio. However, survey respondents’ awareness (both Participants and Non-Participants) of this data was limited.

Robustness Assessment.

Direction	Intermediate
<ul style="list-style-type: none"> • Participant and Non-Participant Finance Surveys • Participant and Non-Participant Developer Surveys • Open NY: https://www.ny.gov/programs/open-ny 	
Influence	
<ul style="list-style-type: none"> • Open NY: https://www.ny.gov/programs/open-ny 	

¹² For all figures and tables, NP denotes non-participant and Part refers to participant.

¹³ Open NY: <https://www.ny.gov/programs/open-ny>.

2.3.3. Increased Awareness in Financial Community of Clean Energy Investment Opportunities (Short/Mid-Term Market Indicator)

Definition: Increase over time in the proportion of financiers who report being aware of clean energy investment opportunities.

Table 9. Market Indicator Assessment: Increased Awareness in the Financial Community of Clean Energy Investment Opportunities

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

S = Strong I = Intermediate M = Minimal

Evidence of Current Condition/Direction of Change.

- Surveys of Participant developers provided inconclusive results. Developer respondents were asked whether they believed NYGB had influenced a change in the financial community’s awareness of the economic benefits of investing in clean energy projects. Two of four developers responded that NYGB was “very influential” and the remaining two responded that NYGB had “some influence” or “no influence.”
- The number and variety of financial institutions active in the residential and community solar industries grew steadily over the Study period, indicating an increase in firms’ awareness and participation in the clean energy market. See Section 2.3.7 for further analysis.

Evidence of NYGB Influence.

- NYSERDA and NYGB hypothesized that, over the short/mid-term, the financial community would become increasingly aware of clean energy investment opportunities. While this indicator is moving in the hypothesized direction, DNV GL identified insufficient evidence that the trend was related to NYGB activity during the Study Period.

Robustness Assessment.

Direction	Minimal
• Participant Developer Surveys	
Influence	
• Participant Developer Surveys	

2.3.4. Increase in Clean Energy Transactions with Risk/Return Profiles Acceptable to Financiers (Mid-Term Market Indicator)

Definition: Increase over time in the number of clean energy projects or businesses that meet financiers’ criteria for funding.

Table 10. Market Indicator Assessment: Increase in Clean Energy Transactions with Risk/Return Profiles Acceptable to Financiers

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

S = Strong I = Intermediate M = Minimal

Evidence of Current Condition/Direction of Change.

- Evidence from the market actor surveys. A large share (41-50%) of both developer and financial respondents stated that the number of clean energy transactions acceptable to investors increased during the Study Period and noted improved return on investment as a major reason. Approximately 50% of all respondents identified increased access to long-term debt in smaller amounts as a driver of these trends.
- Evidence from the Mosaic Case Study. Mosaic’s Director of Capital Markets attributed the company’s ability to attract additional investors in later transactions to NYGB’s involvement in Mosaic’s early warehouse credit facility.
- Evidence from the BOE Case Study. The BOE case study supports the hypothesis that the number of projects meeting lender criteria increased during the Study Period.
Specifically:
 - In its fourth and fifth project financings, BQE was able to attract the participation of a commercial bank to provide permanent financing through a sale/leaseback arrangement.

- A Principal of BQE interviewed for the case study reported that NYGB’s due diligence and work with the company to structure its transactions helped BQE meet private lender requirements. By contrast, other developers cited banker and investor education on the technical, regulatory, and financial aspects of community and commercial/industrial solar as a major barrier to financing their projects. In the absence of such education, investors perceived a heightened level of risk resulting in reduced availability and/or higher cost of available funding.
- Evidence from the Bank of America Merrill Lynch Case Study. NYGB supplemented equipment leases from Bank of America Merrill Lynch (“**BofA Merrill**”) to a non-profit nursing home and a public-school district to support long-term loans for energy efficiency projects. The transaction enabled BofA Merrill to extend the term of the lease beyond limits set by its internal policies while maintaining an acceptable risk/return profile. The extended term reduces annual lease repayments and aligns the borrowers’ repayment schedules with the anticipated timing of energy cost savings. The lower annual costs and added flexibility enable the borrowers to undertake deeper and more extensive energy efficiency retrofits than would have been possible in the absence of NYGB’s participation.
- Community solar project developers participating in conferences in 2017 and 2018 reported that it was becoming easier to find banks and equity investor interested in providing financial support for their projects.¹⁴

Evidence of NYGB Influence.

- The market actor surveys and the BQE and BofA Merrill Case Studies provide evidence that NYGB contributed to greater understanding among decision makers in financial institutions of the risk/return profiles for clean energy projects. After three successful projects, BQE was able to attract the participation of a commercial bank in the long-term financing of two subsequent projects. This development demonstrates increased comfort on the part of commercial lenders with the risk/return profile presented by BQE’s commercial/industrial solar projects.

¹⁴ Keith Martin, Moderator, Current Issues in Community Solar, Infocast Community Solar 2.0, New Orleans, November 2018. <https://projectfinance.law/publications/current-issues-in-community-solar-projects>. Please note these remarks refer to the community solar market nation-wide, not necessarily to conditions in New York.

Robustness Assessment.

Direction	Strong
<ul style="list-style-type: none"> Participant and Non-Participant Finance and Developer Surveys Mosaic, BQ Energy and Bank of America Case Studies 	
Influence	
<ul style="list-style-type: none"> Participant and Non-Participant Finance and Developer Surveys Bank of America Case Study 	

2.3.5. Increase in the Scale of Individual Clean Energy Project Financing Transactions (Mid-Term Market Indicator)

Definition: Increase over time in the average size or characteristic range of sizes for clean energy projects or financial transactions of a given type.

Table 11. Market Indicator Assessment: Increase in the Scale of Individual Clean Energy Project Financing Transactions

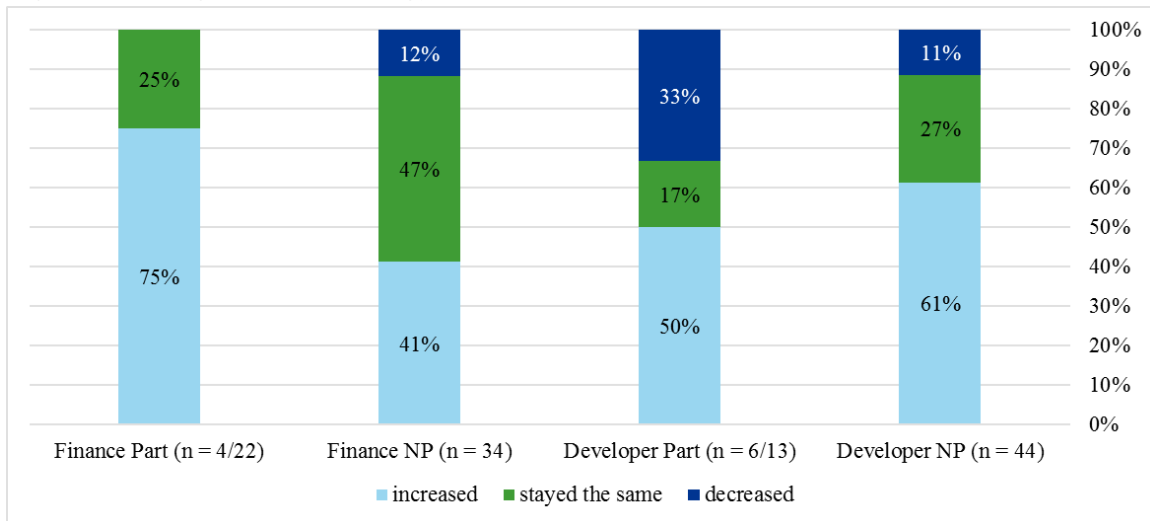
Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

S = Strong I = Intermediate M = Minimal

Evidence of Current Condition/Direction of Change.

- Survey respondents from all sample groups reported an increase in the dollar volume of their clean energy investments relative to their first year participating in the sector as developers or financiers (Figure 4). Three of the four financial counterparties reported an increased level of investment in clean energy projects versus 41% of financial Non-Participants. Among financial Participants, the respondents reporting no change in clean energy investments had only been in the market one year. Of the respondents who said their clean energy investments decreased, two entered the market in 2013, one in 2015 and one in 2017. As discussed in Section 2.3.11, the volume of clean energy project activity has fluctuated markedly in the past four years, so it is reasonable that some respondents reported reduced levels of activity.
- Most developers reported an increase in clean energy project investments over the same period. The pattern of developer responses did not vary by the length of time they had been active in the market.

Figure 4. Change in Clean Energy Investments (\$) from First Year of Investment to 2018



- The Mosaic case study exemplifies the role of NYGB in influencing the scale of clean energy financing transactions. In April 2016, Guggenheim Partners approached NYGB to participate in a credit facility for Mosaic that was undersubscribed by traditional capital sources. In August 2016, NYGB increased its commitment. By February 2017, Mosaic closed its first credit-rated securitization for \$140 million. Mosaic issued four additional securitizations for \$310 million, \$235 million, \$315 million, and \$260 million between October 2017 and January 2019. These issues have attracted the participation of over 30 investors.¹⁵

Evidence of NYGB Influence.

- DNV GL’s primary and secondary research and case study analysis support the conclusion that NYGB’s activities have increased the scale of individual clean energy project financing transactions in NYS.

¹⁵ Mond, Allison. 2017. ‘Solar securitizations expected to pass \$1 billion in 2017’. *Greentech Media*. November 2017 <https://www.greentechmedia.com/articles/read/solar-securitizations-expected-to-pass-1-billion-in-2017#gs.QLp8fINu>.

Robustness Assessment.

Direction	Strong
<ul style="list-style-type: none"> Participant and Non-Participant Finance and Developer Surveys Mosaic Case Study Mond, Allison. 2017. "Solar securitizations expected to pass \$1 billion in 2017". <i>Greentech Media</i>. November 2017 https://www.greentechmedia.com/articles/read/solar-securitizations-expected-to-pass-1-billion-in-2017#gs.QLp8fINu 	
Influence	
<ul style="list-style-type: none"> Participant and Non-Participant Finance and Developer Surveys Mosaic Case Study Mond, Allison. 2017. "Solar securitizations expected to pass \$1 billion in 2017". <i>Greentech Media</i>. November 2017 https://www.greentechmedia.com/articles/read/solar-securitizations-expected-to-pass-1-billion-in-2017#gs.QLp8fINu 	

2.3.6. Increase in the Number of Clean Energy Financings (Mid-Term/Long-Term Market Indicator)

Definition: Increase over time in the number of clean energy project financings of a given type of financial product.

Table 12. Market Indicator Assessment: Increase in the Number of Clean Energy Financings

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

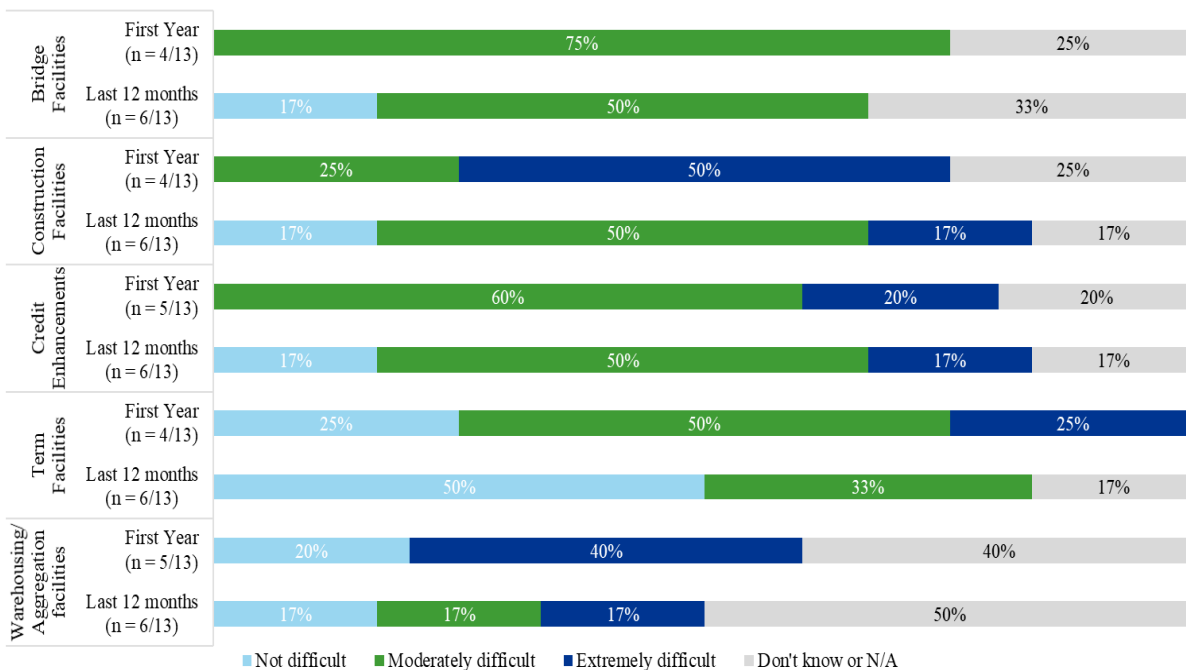
S = Strong I = Intermediate M = Minimal

Evidence of Current Condition/Direction of Change.

- Experienced developers active in the market before 2016 reported in the DNV GL survey that obtaining financing for their projects had not constituted a major problem in recent years. Participant developers reported their ability to secure different types of financing increased across all financial product types since the first year they entered the clean energy market (see Figure 5). Non-Participant developers said that they had experienced little to moderate difficulty securing financing during 2018. The questions on which these results were based were not structured to support analysis of disaggregation of results to specific geographic markets such as states or regions. Therefore, DNV GL cannot be certain that survey participant responses describe their ability to secure financing for clean energy projects in NYS.

- The number of residential solar securitizations issued per year on a national basis increased from two in 2015 to eight in 2018.¹⁶ NYGB had participated in earlier stage aggregation facilities for five of the ten top issuers of rated solar securitizations during this period.
- The annual number of community solar projects with applications to the Megawatt Block program increased from five in 2015 to 197 in 2017. The number of applications dropped to 57 in 2018, most likely due to the filling up of the early blocks and uncertainties over proposed changes in net metering regulations in NYS. Net metering regulations address the project eligibility, pricing, and mechanism through which owners of distributed energy resources such as solar are compensated for excess electricity their PV systems produce beyond the needs of the host facilities.

Figure 5. Difficulty in Securing Financing: First Year of Clean Energy Investment Compared to the Last 12 Months (Participating Developers)



Evidence of NYGB Influence.

- NYSERDA and NYGB hypothesized that, over the mid/long term, the number of clean energy project financings would increase as a result of NYGB activity. The Study Period covers only the short-term period. Nonetheless, NYGB activities during the period had a demonstrable impact on the increase in residential solar securitizations.

¹⁶ PV Magazine, Greentech Media.

Robustness Assessment.

Direction	Intermediate
<ul style="list-style-type: none"> • Participant and Non-Participant Developer Surveys • PV Magazine, Greentech Media. 	
Influence	
<ul style="list-style-type: none"> • Participant and Non-Participant Developer Surveys • PV Magazine, Greentech Media. 	

2.3.7. Increase in the Number of Financiers Offering Products Supported by NYGB (Mid-Term/Long-Term Market Indicator)¹⁷

Definition: Increase over time in the number and type of financiers offering financial products similar to those offered by NYGB.

Table 13. Market Indicator Assessment: Increase in the Number of Financiers Offering Products Supported by NYGB

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

S=Strong I=Intermediate M = Minimal

Evidence of Current Condition/Direction of Change.

- Both the Mosaic case study and secondary research provided evidence that the number of financial institutions offering products similar to those offered by NYGB increased during the Study Period. Four residential solar financing providers other than Mosaic are now offering solar loans financed through loan aggregation facilities similar to those supported by NYGB.¹⁸ Furthermore, a panel of renewable energy project finance executives reported an increase in the number of companies active in the renewable project finance market from 2017 to 2018 with the number of tax equity investors expanding from 25 to 35.¹⁹

¹⁷ DNV GL interpreted this indicator as the number of financiers offering products similar to those in which NYGB participated - not as the number of financial counterparties or partners working with or participating in financial transactions with NYGB.

¹⁸ Weaver, op. cit.

¹⁹ Bloomberg New Energy Finance, “Clean Energy Investment Trends”, 2017, <https://data.bloomberglp.com/bnef/sites/14/2018/01/BNEF-Clean-Energy-Investment-Trends-2017.pdf?elqTrackId=2e6e6b2aa1f946bca67cd74d9e20babb&elq=b4bc4a4f1fe649c89f85ec1318feb73f&elqaid=10316&elqat=1&elqCampaignId=>

- Data collected from the survey was less conclusive. Financial Participants were asked if their firms offered services and products for clean energy transactions that were similar to those offered by NYGB. The responses were equally distributed between “yes” and “no.” The distribution of responses was similar for Participant developers who were asked if other financing entities offered products similar to NYGB’s offerings.
- Community solar developers have reported an increase in the number and variety of financial institutions and investors active in the sector. Early in the development of community solar projects (i.e., 2015), capital was provided primarily by small, unregulated investors. As of the end of 2018, the range of institutions and investors active in community and commercial/industrial solar projects financed by NYGB and the market at large has expanded even though this asset class is still in early stages of development. Investors now include commercial banks, insurance companies, specialty lenders, and syndicates of financial institutions as lenders and tax equity investors²⁰
- Not all evidence gathered pointed to increasing number of financiers in clean energy markets. For example, Vivint Solar stated in its 2019 Form 10-K that investment funds are limited and there is significant competition for investment capital among clean energy developers.²¹

Evidence of NYGB Influence.

- DNV GL’s research identified evidence to support an increase in the number and type of clean energy financiers in NYS offering financial products similar to those offered by NYGB. However, more time is needed to demonstrate a causal effect of NYGB’s activities on the market indicator.

²⁰ Solar Energy Industries Association, Major Solar Projects Directory, 2018, <http://www.seia.org/research-resources/major-solar-projects-list>.

Also, Keith Martin, Moderator, Current Issues in Community Solar, Infocast Community Solar 2.0, New Orleans, November 2018. <https://projectfinance.law/publications/current-issues-in-community-solar-projects>. Please note these remarks refer to the community solar market nation-wide, not necessarily to conditions in New York.

²¹ Vivint Solar, op cit.

Robustness Assessment.

Direction	Intermediate
<ul style="list-style-type: none"> • Mosaic and BQE Case Studies • Bloomberg New Energy Finance, “Clean Energy Investment Trends”, 2017 • Solar Energy Industry Association Projects Directory • Vivint 2019 Form 10-K 	
Influence	
<ul style="list-style-type: none"> • Mosaic Case Study • Bloomberg New Energy Finance, “Clean Energy Investment Trends”, 2017 	

2.3.8. Replication by Developers of NYGB Financing Approaches – Residential/Commercial (Mid-Term/Long-Term Market Indicator)

Definition: Increase in reported of use of financing approaches that are the same or similar to those used in NYGB transactions.

Table 14. Market Indicator Assessment: Replication of Financial Model by Developers

Residential Market.

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

Commercial Market.

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

S = Strong I = Intermediate M = Minimal

DNV GL presents separate findings for NYGB activities targeted to the residential and commercial sectors because the strength and quality of the evidence on NYGB influence differ between the two.

Residential Sector: Evidence of Current Conditions/Direction of Change.

- Growth in securitization of residential solar loans. As shown later in Figure 9, the volume of residential solar loan, lease, and PPA securitizations grew rapidly during the Study Period.
- Increase in number of firms issuing residential solar loan securitizations. At least nine companies now offer residential solar loan products. Of those, DNV GL identified securitizations issued by five companies: Mosaic, Sunlight Solar, Sunnova Solar Energy, Dividend Solar Finance, and Tesla/Solar City.²²

Residential Sector: Evidence of NYGB Influence.

Mosaic was the first to develop the solar loan business model and the first to issue a sizeable securitization of residential solar loans. The rapid adoption of similar business and finance models by at least four other firms attests to Mosaic’s influence on the market. NYGB participated in the first warehouse credit facility, which provided the operating experience needed to support the rating of the first securitization. The structure of the securitization became known in the market and led to adoption by other developers and financiers.

Given consistent evidence that developers and financiers have replicated Mosaic’s approach and that NYGB contributed materially to the development of that approach, this indicator is rated as “Strong”.

Commercial Sector: Evidence of Current Conditions/Direction of Change.

DNV GL reviewed documentation of all NYGB projects located on or sponsored by commercial facilities, as well as the Non-Participant survey results and industry press to search for evidence of replication of financing models or the use of NYGB experience as a reference project for assessing pricing and risk. This effort yielded little evidence of replication of NYGB approaches within or outside the portfolio. One exception was the use of bridge lending to finance interconnection construction for five community solar developers in the NYGB portfolio. DNV GL was unable to identify similar types of financing employed by other developers.

²² Beryl Ajwang, “Securitization of Solar Finance Continues to Grow”, May 15, 2018, *Clean Energy Finance Forum*. <https://cleanenergyfinanceforum.com/2018/05/15/securitization-of-solar-finance-continues-to-grow>.

Commercial Sector: Evidence of NYGB Influence.

DNV GL found little evidence of NYGB influence on adoption of similar financing approaches by commercial sector facilities or the commercial sector energy services providers.

Robustness Assessment.

Residential.

Direction	Intermediate
<ul style="list-style-type: none"> • Julia Pyper, “Solar Loans Emerge as Dominant Residential Financing Product”, Greentech Media, November 14, 2018. https://www.greentechmedia.com/articles/read/solar-loans-are-now-the-dominant-financing-product#gs.22pnrf • Christian Roselund, “Solar loans overtake third-party as dominant residential solar model”, July 11, 2018, https://pv-magazine-usa.com/2018/07/11/solar-loans-overtake-third-party-ownership-as-dominant-residential-solar-model/ • Beryl Ajwang, “Securitization of Solar Finance Continues to Grow”, May 15, 2018, Clean Energy Finance Forum. https://cleanenergyfinanceforum.com/2018/05/15/securitization-of-solar-finance-continues-to-grow 	
Influence	
<ul style="list-style-type: none"> • Case Studies 	

Commercial.

Direction	Minimal
<ul style="list-style-type: none"> • Market Actor Surveys • NYGB Internal documents. 	
Influence	
<ul style="list-style-type: none"> • Case Studies 	

2.3.9. Total Volume of Clean Energy Project Financings (Long-Term Market Indicator)

Definition: Increase over time in the dollar volume of clean energy project financings of a given type.

Table 15. Market Indicator Assessment: Increased Total Volume (\$) of Clean Energy Financing Transactions

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

S = Strong I = Intermediate M = Minimal

Evidence of Current Condition/Direction of Change.

- Survey respondents reported an increase in the ability to secure financing as well as an increase in the scale of projects, which can be indicative of an increase in the overall volume of clean energy financing transactions.
- The Mosaic case study and secondary data provided strong evidence for the increase in volume in the clean energy market (see Figure 9 below for more information) with the volume of residential solar aggregation financings increased significantly in the period under review.

Evidence of NYGB Influence.

- DNV GL’s research identified intermediate evidence that NYGB investment activities and product offerings resulted in an increase in the dollar volume of clean energy financings in NYS. More time is needed for the market to mature to fully determine NYGB’s influence on the volume of clean energy transactions.

Robustness Assessment.

Direction	Intermediate
<ul style="list-style-type: none"> • Participant and Non-participant Finance and Developer Surveys • Mosaic Case Study 	
Influence	
<ul style="list-style-type: none"> • Participant and Non-participant Finance and Developer Surveys • Mosaic Case Study 	

2.3.10. Increase in the Volume of Clean Energy Projects (Long-Term Market Indicator)

Definition: Increase in the number, capacity, or dollar volume of clean energy projects of a given type in a given market segment in New York State

Table 16. Market Indicator Assessment: Increased Total Volume of Project Financings

Residential Market

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

Commercial Market

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

S = Strong I = Intermediate M = Minimal

The Study presents separate findings for NYGB activities targeted to the residential and commercial sectors because these represent distinct segments of the clean energy market and the strength and quality of the evidence on NYGB influence differ between the two.

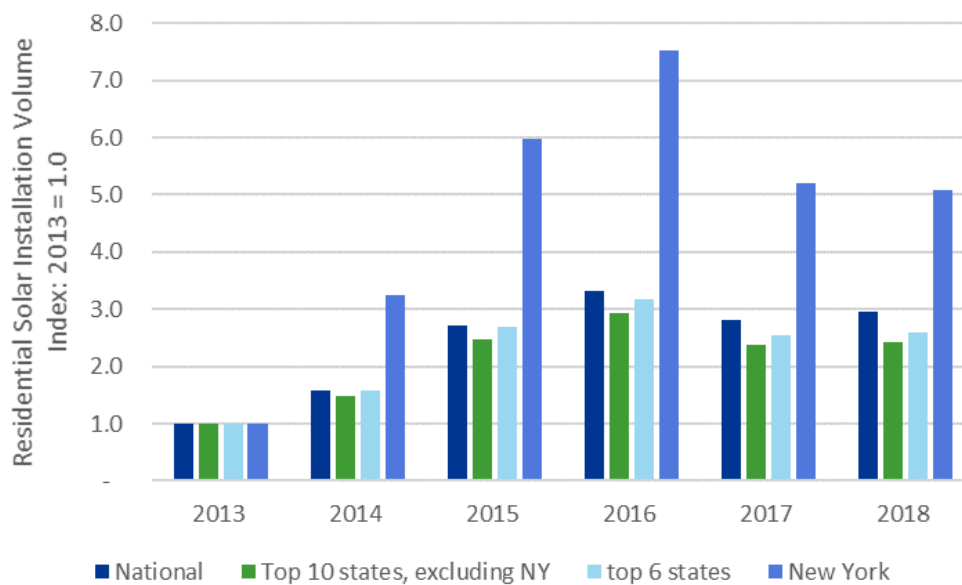
Residential Sector: Evidence of Current Conditions/Direction of Change.

- NYGB invested heavily in the residential solar finance sector in NYS. Between early 2016 and May 2017, NYGB participated in six warehousing/aggregation transactions backed by loans, leases, or power purchase agreements for residential solar projects. The lending supported by these transactions supported roughly 38% of total residential solar PV capacity installed in NYS in the years 2016 through 2018.²³
- The volume of residential solar installations declined between 2016 and 2018 in NYS as it did in other states with high volumes of residential solar PV installations, but to a lesser extent. If

²³DNV GL analysis based on NYGB records and data on solar installations from Wood Mackenzie.

NYGB’s support for residential solar project financing had stimulated the consumer market, it is expected that solar installations in NYS would be higher than they are in states that also experienced high levels of solar installations in 2013 and that have also moved beyond the “early adopter” stage. As Figure 6 shows the change in the volume of solar installations in NYS followed a similar trend as installations in other states with high levels of residential solar PV sales. However, installations in NYS, compared to 2013 installation levels, remained farther above comparable installations in these states.

Figure 6. Indexed Annual Volume of Residential Solar PV Installed: New York, U.S., and other Leading States (2013 = 1.0)



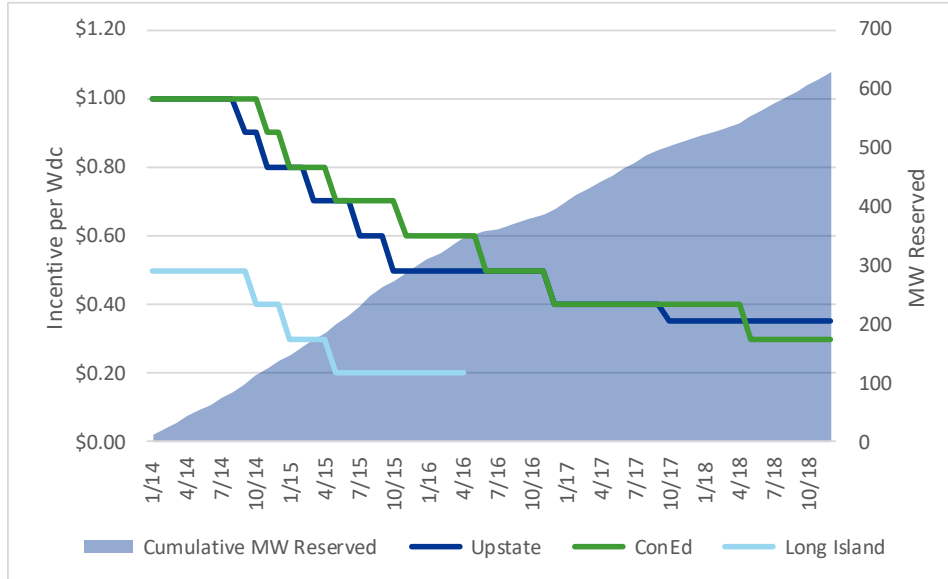
Source: Wood, Mackenzie Power & Renewables

Residential Sector: Evidence of NYGB Influence.

There were many other economic influences at work on the residential solar market in New York during the period under review.

- NYS launched a cash incentive program for residential solar PV in the two years prior to NYGB’s investments. Beginning in January 2014, the NY-Sun Megawatt Block program made cash incentives available to homeowners who installed rooftop solar PV. The incentives were structured in tranches by three regions, with declining values over time. Figure 7 displays the level of incentives per Watt_{dc} installed through the program, along with the cumulative nameplate capacity of the projects receiving incentives. Despite reductions in the level of the incentives, the volume of installations supported by the program remained stable through the period under review.

Figure 7. Incentives Paid by the Residential NY-Sun Megawatt Block Program and Cumulative Volume of MW for Supported Projects²⁴



Measures of the Megawatt Block program’s intervention into the NYS residential solar market include the following:

- NY-Sun paid out \$152 million in incentives for residential projects during the Study Period v. \$282 million in investments in residential solar financing vehicles from NYGB. Not all of these investments were deployed in NYS.
- The value of residential projects that received NY Sun incentives during the study period was \$1.75 billion v. \$566 million for NYGB investments.
- NY-Sun incentives are limited and decrease in terms of \$/watt over time, providing customers with some urgency to act.
- Between 2014 and 2018, the Megawatt Block program paid incentives for 85% of the total residential capacity installed in NYS.
- Uncertainty over net metering regime. Through a process initiated in 2015, the New York Public Service Commission (“PSC”) significantly revised the State’s net metering rules and pricing. These changes were summarized in a decision dated March 2017 and implemented in an order dated September 2017.²⁵ Most residential customers will remain eligible for net metering through 2020. However, the uncertainty over the outcome of the proceeding may have deterred some potential customers from installing solar PV systems

²⁴ DNV GL analysis based on NYSEDA, Solar Electric Programs Dataset, 2000 – 2018.

²⁵ State of New York Public Service Commission. Order on Phase One Value of Distributed Energy Resources Implementation Proposals, Cost Mitigation Issues, and Related Matters. Case 15E-0751 – In the Matter of the Value of Distributed Energy Resources. September 14, 2017.

on their homes. Also, given that the pay-back periods of rooftop solar systems are more than just a few years, uncertainty around the post-2020 economic situation would also be expected to have a chilling effect until the succeeding principles of the Value of Distributed Energy Resources (“**VDER**”) are well-understood in NYS.

The evidence of NYGB’s influence on the volume of residential solar PV installed in New York during the Study Period was mixed. Applying the scoring rubric discussed in Section 2.1, this indicator is characterized as Intermediate at this stage. Subsequent studies will continue to monitor project volumes as Megawatt Block incentives are exhausted.

Commercial Sector: Evidence of Current Conditions/Direction of Change.

Most of the evidence on NYGB’s effect on the volume of clean energy projects completed in the commercial sector comes from an assessment of the community and commercial/industrial solar markets conducted as part of a case study for this Report.

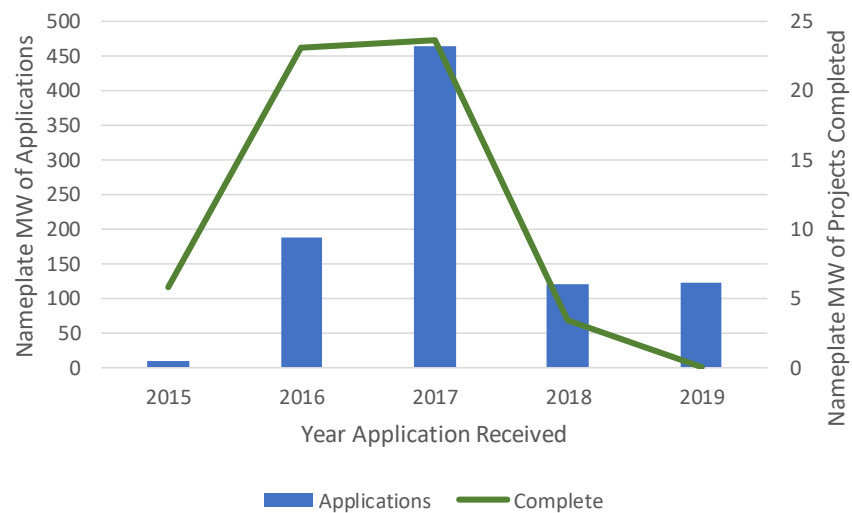
NYGB concentrated considerable resources on the community and commercial/industrial solar market. It worked with seven project developers and committed \$183 million to a wide range of financial products to meet counterparty needs. These include:

- Bridge Loans for Interconnection Costs. NYGB created bridge loan facilities for three developers to finance interconnection advance payments and therefore allow for a more efficient use of sponsor and development equity.
- Construction Lending. NYGB provided construction loans to five of the seven developers to expedite and finance completion of their projects, taking on construction risk and providing a bridge to commercial operations. The volume of market participants willing and able to invest in operational energy assets is generally larger than that for assets in development or under construction.
- Term Loans and Refinancing. NYGB provided term loans to finance new projects and to refinance existing projects so that the developer’s capital could be freed up for additional projects.

Most of the community and commercial/industrial solar transactions in NYGB’s portfolio provide two or more of the products discussed above to facilitate the progress of projects from one phase to the next. Since the resolution of uncertainties around net metering and the adoption of VDER, developers consistently identify NYS as an attractive state in which to pursue community solar opportunities due to an established revenue and metering regime and presence of community

choice aggregation.²⁶ Figure 8 displays the total MW of community solar projects for which the Megawatt Block program received applications and the capacity of projects designated as complete by the year the application was received. Given the relative simplicity of applying for Megawatt Block support, the NY-Sun database likely reflects a mostly complete inventory of projects under development in the State.

Figure 8. Nameplate MW of Megawatt Block Community Solar Applications and Projects Completed by Year Application Received



The volume of applications increased rapidly from 8.6 MW in 2015 to 465.8 MW in 2017. It then decreased to 120.2 MW in 2018. During this period, the installed capacity of community solar nationwide increased by 33%.²⁷ The pace of Megawatt Block applications for community solar projects picked up considerably in the first two months of 2019, already equalling 2018 applications. The volume of projects completed during the 2015-2018 period follows a similar trajectory as the applications. The market constriction observed in 2018 most likely reflects the effects of uncertainty over the outcome of the PSC’s proceeding to revise regulations on net metering. It may also reflect investor uncertainty over the outcome of federal corporate tax reform. Proposed reductions in corporate tax rates would have reduced the value of investments for tax equity investors. In June 2018, NYSERDA announced a redesign of NY-Sun’s Megawatt Block Program for non-residential and large commercial and industrial solar projects. The redesign, made in response to a rapidly-changing market, includes expanding incentives,

²⁶ See, for example, Keith Martin, Moderator, Current Issues in Community Solar, Infocast Community Solar 2.0, New Orleans, November 2018. <https://projectfinance.law/publications/current-issues-in-community-solar-projects>.

²⁷ GTM/Wood Mackenzie, cited in Solstice, “What’s behind the explosive growth in the Community Solar Market.” <https://solstice.us/solstice-blog/explosive-growth-in-the-community-solar-market/>.

supporting larger solar projects and encouraging development in a greater variety of locations, including brownfields, landfills, and at affordable housing locations.

Commercial Sector: Evidence of NYGB Influence

As Table 17 shows, NYGB has been very active in the NYS community and commercial/industrial solar markets. Projects undertaken by NYGB counterparties in those market segments account for one-third of the capacity registered as completed or in the pipeline in the NY-Sun project database.

Table 18: Share of Nameplate Capacity of Community and Commercial/Industrial Solar Projects: 2016 - 2018

	Project Status		
	Complete	Pipeline	Total
NY Green Bank Counterparties	32%	34%	34%
Other Projects	68%	66%	66%
Total	100%	100%	100%

Source: NY-Sun Project Database

Despite this high level of involvement, the Study team views the evidence on the effect of NYGB incentives on commercial project volume as minimal. The increase in volume of community solar projects completed nationwide was steady from 2016 through 2018.²⁸ In contrast, community and commercial/industrial project volume in NYS decreased precipitously in 2018, most likely due to uncertainty over regulatory policies towards net metering. It is too early to assess installation in trends in 2019 and the extent of NYGB influence on those trends.

Robustness Assessment.

Residential Market.

Direction	Strong
<ul style="list-style-type: none"> • DNV GL analysis based on NYGB records and data on solar installations from Wood Mackenzie. 	
Influence	
<ul style="list-style-type: none"> • DNV GL analysis based on NYSERDA, Solar Electric Programs Dataset, 2000 – 2018 	

²⁸ GTM/Wood Mackenzie, op. cit.

Commercial Market.

Direction	Intermediate
<ul style="list-style-type: none"> Keith Martin, Moderator. Current Issues in Community Solar, Infocast Community Solar 2.0, New Orleans, November 2018. https://projectfinance.law/publications/current-issues-in-community-solar-projects Megawatt Block Program NY-Sun Database 	
Influence	
<ul style="list-style-type: none"> GTM/Wood Mackenzie, cited in Solstice, “What’s behind the explosive growth in the Community Solar Market. https://solstice.us/solstice-blog/explosive-growth-in-the-community-solar-market Megawatt Block Program 	

2.3.11. Emergence of Secondary Markets (Long-Term Market Indicator)

Definition: Increase over time in the volume of sales of loan or lease cash flows into secondary markets, either directly or through securitization.

Table 19. Market Indicator Assessment: Emergence of Secondary Markets

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

S = Strong I = Intermediate M = Minimal

Evidence of Current Conditions/Direction of Change.

The pace of growth of secondary markets varies by clean energy market and technology segment.

- Residential solar market. In 2018, 74% of all residential solar installations, measured by installed capacity, were financed as opposed to purchased for cash. Approximately 42% percent of the capacity installed was financed through leases and PPAs, all of which were sold into the secondary market. Thirty-three percent of the capacity was financed through loans.²⁹

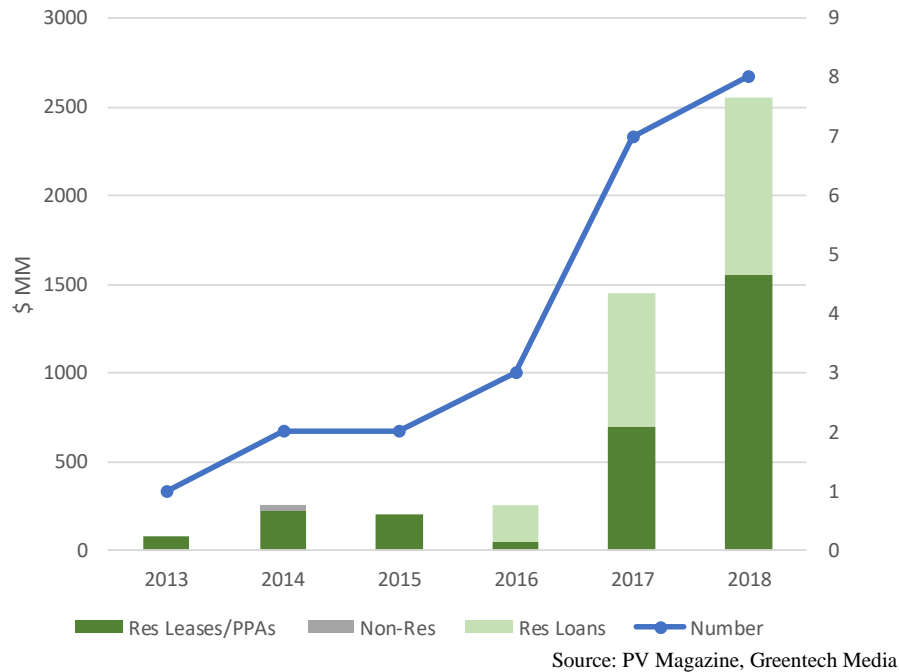
As Figure 9 shows, total annual solar PV securitizations in the U.S. grew steadily from \$250 million in 2016 to \$2.6 billion in 2018, with Mosaic accounting for nearly 40% of the volume of national residential solar securitizations in 2017 and 2018.³⁰ Mosaic

²⁹ Weaver. op. cit.

³⁰ PV Magazine, Greentech Media.

stakeholders attributed investor uptake of securitizations to NYGB’s support of Mosaic’s initial credit facility.

Figure 9. Annual Residential Solar Securitizations by Number, Volume, and Asset Type



- **Community Solar Market.** To date, DNV GL has found no evidence of the sale of loans to finance community solar into a secondary market. Developers in the industry voice the opinion that community and commercial industrial solar portfolios are too small and heterogeneous at the moment for securitizations, reflecting the less developed nature of this growing asset class as compared with residential solar.³¹
- **Energy Efficiency.** To date, DNV GL has found no evidence of a secondary market for streams of interest and principal or energy performance contract payments derived from energy efficiency projects. Nearly 80% of these contracts are with government or non-profit agencies that have access to tax-exempt financing, often at low interest rates.³² These entities are generally able to obtain municipal leases to finance assets. Therefore, it is unclear whether there is yet a strong case for undertaking the work needed to structure secondary markets for these leases and loans, although this may be expected to develop in the future as this asset class also reaches critical volumes.

³¹ Keith Martin. Proceedings of the 2017 Wall Street Renewable Energy Finance Forum, Norton Rose Fullbright LLP.

³² Ameresco, Inc. 2017 Annual Report.

http://www.annualreports.com/HostedData/AnnualReports/PDF/NYSE_AMRC_2017.pdf

Based on these findings from the residential solar market, where secondary markets have begun to emerge, DNV GL scores the Direction of Change as Intermediate.

Evidence of NYGB Influence.

As discussed earlier, financing from NYGB was instrumental in enabling Mosaic to scale its operations, which in turn helped the company arrange its first term securitization. Mosaic's activities account for a significant portion of total residential solar loan securitizations nationally. Participants in the community and commercial/industrial solar markets believe that portfolios of projects in that industry are not sufficiently large to support the development of secondary markets for project debt, although they believe that such markets may develop in the future.³³⁻³⁴

Experience during the Study Period provides additional examples of private investors paying down NYGB's investment positions. These include:

- Private term lending to retire construction loans that NYGB made to the New York City Housing Authority (“NYCHA”) for energy efficiency projects.
- Private investment in community solar projects initiated by Distributed Sun, LLC and its affiliate SUNEIGHT that paid down NYGB bridge loans used to finance advance payments for utility interconnection construction.
- Early retirement of NYGB loans to Motivate International, Inc., a bike share system operator, upon the firm's acquisition by Lyft.

These transactions provide evidence of private investor interest in transactions initiated by NYGB. The NYCHA and Distributed Sun transactions suggest the potential for aggregation associated with secondary markets. Future phases of the NY Green Bank Market Transformation Study will continue to monitor clean energy industries for development of secondary markets.

³³ Martin, 2017. *op. cit.*

³⁴ Secondary Market: A secondary market in finance is a market where securities such as stocks and bonds are traded among investors. In this case, the securities would entitle their owner to a share of the principal and interest payments on loans issued to finance community or commercial/industrial solar projects.

Robustness Assessment.

Direction	Intermediate
<ul style="list-style-type: none"> • Case Studies • John Weaver, “Cash is king in residential solar, long live the lease!” PV Magazine, November 14, 2018. https://pv-magazine-usa.com/2018/11/14/cash-is-king-in-residential-solar-long-live-the-lease/ • PV Magazine, Greentech Media. • Keith Martin. Proceedings of the 2017 Wall Street Renewable Energy Finance Forum, Norton Rose Fulbright LLP • Ameresco, Inc. 2017 Annual Report. http://www.annualreports.com/HostedData/AnnualReports/PDF/NYSE_AMRC_2017.pdf 	
Influence	
<ul style="list-style-type: none"> • Case Studies 	

2.3.12. Reduction in Financing Costs (Long-Term Market Indicator)

Definition: Reduction in costs of financing a given type of transaction, including interest rates, advance rates (sponsor equity requirements), and fees.

Table 20: Market Indicator Assessment: Reduction in Financing Costs

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

S = Strong I = Intermediate M = Minimal

Evidence of Current Conditions/Direction of Change.

Evidence collected for this Study suggests that costs of financing differ between clean technology market sectors.

- Mosaic’s borrowing costs (as measured by the spread above a London Inter-bank Offered Rate (“LIBOR”) benchmark) decreased over significantly in successive securitizations. The reduction in Mosaic’s borrowing costs reflects the results of the high credit rating that Mosaic’s term securitizations received, based in part on credit experience gained through the warehouse credit facility that NYGB financed.
- Interest rates on aggregations and securitizations of residential solar leases and PPAs in which NYGB participated decreased during the Study Period.

- Developers and financiers participating in a 2017 panel on residential solar financing reported that interest rates were decreasing at a pace consistent with Mosaic’s experience.³⁵
- The average advance rate on credit facilities for solar loans increased from 62% in 2013 to 80% in 2018. The advance rate is the share of project financing provided by investors, as a proportion of a defined “borrowing base” which broadly reflects the value of projects being financed. Project developers and sponsors benefit from increased advance rates in several ways. First, a higher advance rate shifts a larger share of total project risk to the investors. Second, it reduces the amount of sponsor or outside equity needed to fund a given quantity of project costs, and thus reduces the total cost of financing.³⁶
- Within NYGB’s portfolio, interest rates for community and commercial/industrial solar transactions have not decreased over the 2015-2018 Study Period. For example, interest rates (spread above the LIBOR benchmark) and fees for the five BQE transactions remained constant. This experience was consistent with remarks by community solar developers at a 2018 seminar and reflective of the continued development of these asset classes.³⁷

Based on these findings, DNV GL scores the Direction of Change of this indicator as Intermediate.

Evidence of NYGB Influence. NYGB’s participation in the first, large-scale credit warehouse facility helped Mosaic accumulate the credit experience it needed to obtain an “A” credit rating for a term securitization. That credit rating enabled Mosaic to obtain a lower interest rate than it had previously paid for debt to be used in financing customer projects. Mosaic, and other residential solar companies, have been able to increase the advance rates in credit aggregation transactions over time. This development reduces the overall costs of capital by reducing requirements for equity from outside investors, which is usually more expensive than debt for the project sponsor. DNV GL did not find similar trends in the community solar, commercial/industrial solar, or commercial energy efficiency markets examined in the case studies. Given these findings, DNV GL assigned an Intermediate scoring to this indicator.

³⁵Martin, Keith, Moderator, “Current Issues in Community”, Solar, Infocast Community Solar 2.0, New Orleans, November 2018, <https://projectfinance.law/publications/current-issues-in-community-solar-projects>.

³⁶ Feldman, David and Paul Schwabe. 2018. *Terms, Trends, and Insights on PV Project Finance in the United States*. 2018 National Renewable Energy Laboratory. November 2018.

³⁷ Martin, 2018, op. cit.

Robustness Assessment.

Direction	Intermediate
<ul style="list-style-type: none"> • Case Studies • Martin, Keith, Moderator, “Current Issues in Community”, Solar, Infocast Community Solar 2.0, New Orleans, November 2018, https://projectfinance.law/publications/current-issues-in-community-solar-projects. • Feldman, David and Paul Schwabe. 2018. Terms, Trends, and Insights on PV Project Finance in the United States. 2018 National Renewable Energy Laboratory. November 2018. • U.S. Securities and Exchange Commission, Plug Power, 10-K for fiscal year ending 12/31/2018, US Securities Exchange Commission, 2019. • U.S. Securities and Exchange Commission, Vivint Solar, 10-K for fiscal year ending 12/31/2018, US Securities Exchange Commission, 2019. 	
Influence	
<ul style="list-style-type: none"> • Case Studies 	

2.3.13. Reduced Elapsed Time to Complete Transactions (Long-Term Market Indicator)

Definition: Change in the amount of time needed between initial application for financing and closing the financial transaction, for a given financial product or type of transaction.

Table 21. Market Indicator Assessment: Timeframe for Transaction Execution

Evidence of Change as Hypothesized by Logic Model	S	I	M
Evidence of NYGB Influence	S	I	M

S = Strong I = Intermediate M = Minimal

Evidence of Current Conditions/Direction of Change.

Evidence on trends in the elapsed time required to complete transactions and the effects of working with NYGB on transaction process and closing times is mixed.

- Evidence from the market actor surveys. All respondent groups reported that the average time needed to complete financial transactions had decreased in the past year and over the period since the respondent first became involved in the clean energy finance markets. Non-participants reported an average decrease in time to close a transaction of 15% compared to 10% reported by NYGB counterparties. This difference is not significant given the small sample sizes for the survey and may reflect the fact that in operating at

“the near frontier” of clean energy financings, many of NYGB’s transactions are first-of-their kind requiring time and effort to create a path to successful closing.

- Evidence from the Mosaic case study. Mosaic greatly accelerated the pace of securitizations after working with NYGB on its first unrated credit facility. The NYGB transaction took five months to close once the application had been initiated. In the 15 months between October 2017 and January 2019, Mosaic completed four securitizations totaling more than \$1.1 billion.

Evidence of NYGB Influence.

Evidence gathered to support an assessment of this market indicator suggests that the time to close a transaction has decreased for both Non-Participants and NYGB counterparties. The change has been slightly less pronounced for NYGB counterparties. As transaction closing periods have decreased for both parties, it is difficult to discern whether NYGB has influenced the broader market effects implied in the definition at this time. The Study team therefore assigns a scoring of Minimum to this indicator.

Robustness Assessment.

Direction	Intermediate
<ul style="list-style-type: none"> • Market Actor Surveys • Case Studies • Megawatt Block incentive database 	
Influence	
<ul style="list-style-type: none"> • Market Actor Surveys • Case Studies • Megawatt Block incentive database 	

2.3.14. Reduction in Clean Energy Technology Costs (Long-Term Market Indicator)

This Study did not address the NYGB’s impact on changes in technology costs. Technology costs are primarily driven at a global level and are not influenced by financing services and activities within a region or state. NYSERDA, NYGB and DNV GL agreed to research this indicator in subsequent studies when more data may be available to facilitate an assessment of NYGB’s influence on this indicator.

3. FINDINGS AND CONCLUSIONS

3.1. Conclusions and Summary of Findings

NYGB has made a strong start in achieving its goals. Five years after its formation, and with \$637.6 million in overall investments as of December 31, 2018, NYGB has become a more established investment and asset management platform. However, some of NYGB's investments are still in their early stages while the portfolio continues to mature. NYGB's transactions typically involve agreements among multiple parties and often require months to close. In sectors such as community and commercial/industrial solar, for example, the underlying projects typically take 18 – 24 months to plan and complete. The Study Period encompasses the earliest stages of NYGB's financing operations and the market response to those activities.

Given the timeframe of the Study Period and the range of other influences on clean energy finance markets, the DNV GL study team expected to find, at best, modest evidence of NYGB's influence. However, DNV GL identified credible evidence of NYGB's influence on many of the market indicators. The following summarizes the Study's major findings.

The success of the Mosaic transaction demonstrates the efficacy of NYGB's strategy. In 2014, Mosaic, Inc. launched a novel business model for financing residential solar systems that reduced the high customer acquisition and financing costs that had begun to inhibit growth in the solar PV industry. By mid-2015, Mosaic needed a large fund from which it could make thousands of loans to homeowners through a nationwide network of participating dealers. In early 2016, NYGB joined one other bank and committed \$50 million in two stages to the credit facility which grew to \$270 million with the participation of two other financial institutions. Mosaic used the credit and operating experience gained with the warehouse credit facility to support the development of a credit-rated securitization, through which it could access significant sums from large investors on favorable interest terms. Over the next 20 months, Mosaic issued four additional securitizations, raising over \$1.1 billion from more than 30 banks and investor groups. After only four years in the market, the Mosaic Solar Loan program commanded 14% of the market for residential solar project financing. Due to the speed and scale of this growth, DNV GL was able to identify links between NYGB activities and positive developments in four of the five market indicator groups.

DNV GL identified changes in many of the evaluated market indicators that were directionally consistent with hypotheses concerning the market effects of NYGB activities. DNV GL also found evidence of NYGB influence on most of these observed changes. However, the evidence was generally not significant enough to support a definitive judgment of a causal relationship

between NYGB activities and the market changes observed. As discussed earlier, DNV GL anticipated this pattern in the findings given that the Study Period covers only the earliest stages of NYGB operation.

The Study found evidence of NYGB's impact on the following market changes:

- Increase in the number of and average size of project financings and their total dollar volume in markets NYGB entered, particularly in residential and community solar.
- Increase in the number and type of financial institutions active in the clean energy finance markets.
- In the residential solar financing market, the Study team found evidence of decreases in costs of capital for transactions that fund loans or leases to customers, the growth of secondary markets, and replication in the structure of transactions in which NYGB played an early role.

Most of the clear evidence on NYGB influence came from the Mosaic case study. NYGB's key role in financing Mosaic's first major credit facility, the importance of the operating information generated by that facility in supporting access to lower-cost securitized financing, the company's rapid growth *within the three-year Study Period*, and the small number of significant competitors in the market support a strong case for NYGB's impact.

It is too early to infer a strong influence of NYGB's activities and the transformation of other markets in which it operates, such as community solar, commercial/industrial solar, and commercial sector energy efficiency. Exogenous factors such as government regulation and industry fragmentation across both developers and financiers, coupled with limited data on market activity made it difficult for the Baseline Assessment and Attribution Analysis to isolate the impact of NYGB. In other cases, the scale of business activity by NYGB's counterparties remained too small during the Study Period to support a plausible argument related to effects on the broader market. It is expected that future studies will identify further evidence of market change and of NYGB influence.

DNV GL identified little consistent evidence of NYGB's influence on one of the key market indicators: financial institution knowledge and confidence in clean energy investments. This indicator was originally anticipated to show change over a short (1-3 year) time frame. In several cases, NYGB's counterparties were first movers willing to make new kinds of investments. Thus, NYGB's investments generated new operating and credit experience that could serve as a guide to structuring similar future transactions. However, the volume of such experience remains too

small for NYGB to aggregate across transaction types and disseminate anonymized data to the market more broadly. Hence, it is too early to detect a strong observable effect of NYGB's activities on financier and developer knowledge and confidence in clean energy investments. Future impact studies may detect a stronger influence of NYGB on this market indicator.

3.2. Recommendations

DNV GL recommends that future phases of the financial market transformation study consider:

1. Developing more case studies. This approach enables analysts to place “indicator” data in the context of a narrative of market development, which makes them easier to understand and interpret. The case studies completed for this evaluation provided an abundance of detailed information regarding NYGB transactions, as well as stakeholder views of the clean energy market and their experience working with NYGB and other entities. This information provided valuable insights into the NYS clean energy market and the market for specific technologies. Furthermore, it is information that goes beyond the data that can be collected via a typical survey or the standard transaction documents.
2. Modifying the primary data collection approach to include more in-depth interviews with the financing community and developers.
3. Collecting data with a significantly longer lead time before results are due. The data collection for this Study occurred in November and December 2018, which coincided with participants' end-of-year transaction closings and regulatory filings. Response rates in future studies would likely improve if data collection occurs well before or after year end.
4. Re-examine and consolidate the indicators. Indicators such as changes in the number of clean energy finance transactions, their average size, and their dollar volume all seek to measure the same phenomenon and could potentially be combined. Since the NYGB portfolio was progressively built and indicators were identified as each transaction was developed, it would be appropriate to examine the full set of indicators at this time for their relevance across the portfolio, including their definitions and timeframes. Reducing the number of indicators will lend greater efficiency to future market evaluation studies.

NYGB
Financial Market Transformation Study
Appendices
Final

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TABLE OF CONTENTS

APPENDIX A. METHODS	5
APPENDIX B. GLOSSARY OF TERMS	10
APPENDIX C. MARKET INDICATORS AND OUTCOMES BY PRODUCT TYPE	12
APPENDIX D. FINANCIAL PARTICIPANT SURVEY	13
APPENDIX E. FINANCIAL NON-PARTICIPANT SURVEY	38
APPENDIX F. DEVELOPER PARTICIPANT SURVEY	57
APPENDIX G. DEVELOPER NON-PARTICIPANT SURVEY	80
APPENDIX H. CASE STUDY INTERVIEW GUIDE	101
APPENDIX I. SECONDARY DATA REFERENCES	102

APPENDIX A. METHODS

Overview of Approach

NYSERDA commissioned this first independent NY Green Bank Financial Market Transformation Study (the “**Study**”) of the effect that NYGB’s activities have had on clean energy financing markets in NYS. This report (the “**Report**”) summarizes the results of the first phase of the Study, which was conducted between September 2018 and February 2019. NYSERDA plans to conduct subsequent updates to measure change over time of NYGB’s impact on these markets.

Working with NYGB, NYSERDA staff developed a study approach designed to assess the influence of NYGB’s early activities on the following characteristics of the clean energy finance markets in New York State (NYS):

1. Knowledge of and confidence in clean energy investments among financial institutions;
2. Number and type of financial institutions active in clean energy markets;
3. Availability of favorable terms in financing offered to clean energy projects and companies;
4. Pace of clean energy project deployment; and
5. Volume of clean energy project financing.

NYSERDA and NYGB developed a set of hypotheses on how NYGB’s activities would affect these market characteristics over time. NYSERDA and NYGB also specified a set of market impact indicators (i.e., quantitative or qualitative measures of market conditions one would expect to observe if NYGB was influencing the market as hypothesized). The Study focused on gathering and assessing the strength of evidence of changes in the NYS clean energy financing markets and NYGB’s influence on those changes, using the hypotheses and market indicators as a framework.

DNV GL divided the Study into two complementary work streams.

Baseline Assessment. DNV GL appraised the state of the market during the period 2015 – 2018 (“the **Study Period**”), representing conditions before NYGB financing activity began in earnest and as it ramped up, using the set of 14 indicators specified by NYSERDA and NYGB as part of the Study plan. The baseline assessment (“**Baseline Assessment**”) drew primarily on the results of surveys of developers and financiers conducted for the Study, supplemented by review of

internal NYGB documents and an array of secondary sources. The Baseline Assessment was intended to provide a structured snapshot of market conditions that can be replicated in subsequent updates of the Study designed to gauge market progress over time.

Attribution Analysis. The attribution analysis (“**Attribution Analysis**”) addressed the questions: How and to what extent did NYGB’s activities contribute to changes observed in the clean energy finance market during the Study Period? The key challenge in answering these questions was to appropriately characterize and weigh factors *other than NYGB’s activities* that shaped and influenced the business practices of participants in those markets. Many factors influenced the activities of clean energy project developers: changes in costs, energy prices, energy market regulation, tax and general economic policy. Financiers were influenced by a similar set of factors, as well as by trends in the costs of capital, financial market regulation, and developments in industries and regions that offered alternate investment opportunities.

To capture these interactions, DNV GL prepared case studies of NYGB transactions involving counterparties in the residential solar, small-scale utility solar, and commercial energy efficiency industries.¹ These case studies placed NYGB’s transactions in the context of the markets they were designed to influence. This approach provided a framework to present evidence of change in the market indicators, to identify the potential influences on those changes, and to assess the relative importance of NYGB’s activities among those influences. The case studies drew on the sources used for the Baseline Assessment, supplemented by analysis of market statistics, review of internal NYGB transaction documents, annual reports, Form 10-Ks filed with the Securities and Exchange Commission and other reports for public companies in NYGB’s portfolios, and a wide range of industry, government, and academic publications.²

The main report of this study presents the results of the Baseline Assessment and Attribution Analysis are integrated into an assessment of the strength of evidence of NYGB’s influence on 14 indicators of market progress formulated by NYSERDA and NYGB.

¹ In this study, the term “community solar” refers to solar PV projects in the category defined by the New York Public Service Commission’s “Community Distributed Generation” designation. These are installations up to 10 MW in capacity that serve multiple end-use customers through various retail aggregation approaches.





“Commercial/Industrial Solar” refers to solar PV projects in the same size category that serve a single end-use customer or “off-taker” under a long-term contract. In other states and in the energy industry press and literature, these two groups of projects are frequently grouped together under the rubric of “community solar”.

² See Appendix I for a full list of sources.

Data Collection

Figure A-1 summarizes the data collection activities conducted by DNV GL.

Figure A-1. Summary of Data Collection Activities

			
Review of NY Green Bank Transaction Files	Web Surveys	Secondary Research	Case Studies
<p>Data Reviewed:</p> <ul style="list-style-type: none"> • NY Green Bank Transaction Documents • Transaction Profiles • Transaction Approval Memos • Green Light Memos 	<p>Sample Data Sources:</p> <ul style="list-style-type: none"> • NY Green Bank Contacts • DNV GL/CESI Contacts • INFOGroup <p>Surveys Completed</p> <ul style="list-style-type: none"> • Finance Participants: 6 • Finance Non-Participants: 46 • Developer Participants: 6 • Developer Non-Participants: 56 	<p>Data Reviewed:</p> <ul style="list-style-type: none"> • DNV GL Databases • US DOE/EIA Reports • LBNL/ NREL Studies • Bloomberg New Energy Industry and Industry Journals • NY Green Bank and NYSERDA Studies 	<p>Case Studies Completed:</p> <ul style="list-style-type: none"> • Energy Efficiency: Northport and HHAR • Solar: BQ-Energy and Mosaic <p>Data Collected:</p> <ul style="list-style-type: none"> • Interviews with NY Green Bank senior management and counterparty participants • Secondary Research to supplement interviews

DNV GL collected data from four principal sources.

1. **Transaction Profiles.** Transaction profiles provided the basis for characterizing NYGB's portfolio and understanding the details of each transaction.
2. **Web Surveys.** Web surveys were conducted with members of the financing community active in the clean energy market and developers of clean energy projects. The surveys included both Participants in NYGB transactions and Non-Participants. DNV GL used Form.com to administer the surveys. Table A-1 shows the population, sample sizes and number of completes for each survey.

Table A-1: Population and Sample Sizes for Surveys³⁴

	Participants		Non-Participants	
	Developers	Financial Institutions	Developers	Financial Institutions
Population Count (Sample List)	23	22	551	1,240
Target for Completed Surveys (Sample Size)	9	18	67	67
Surveys Completed	6	6	56	46
Response Rate	26%	27%	10%	4%
Target %	67%	33%	84%	67%

Table A-2 shows the types of projects completed or invested in by the respondents and the distribution of financing products utilized by respondents.

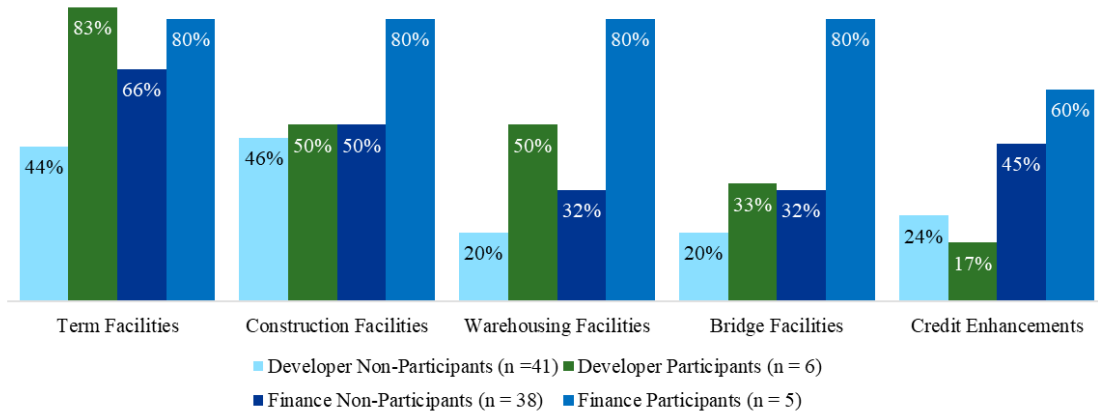
Table A-2: Types of Projects Completed or Invested in by Respondents

Project Type	Developer Non-Participant	Developer Participant	Finance Non-Participant	Finance Participant
Bioenergy	5	0	6	2
CHP	6	0	10	3
Electric Vehicle	8	2	5	0
Energy Efficiency	15	2	17	3
Energy Storage	15	4	8	2
Microgrids	6	0	5	0
PV-CI	23	1	24	4
PV-Community	12	1	15	3
PV-Residential	7	1	18	4
PV-Utility	18	3	18	4
Wind-Offshore	2	0	5	3
Wind-Onshore Small	3	0	5	3
Wind-Onshore Utility	11	2	13	4
Other	0	0	7	0
None	1	0	1	0

³ Response rate = the number of respondents who completed the survey/population count (sample list)

⁴ Target percentage = the number of respondents who completed the survey/target for completed surveys (sample size)

Figure A-2: Percent of Respondents Utilizing Financial Products



3. Secondary Research. DNV GL reviewed a wide range of secondary resources to support the market transformation Study. These materials were particularly useful in providing background and context to support the development of the case studies. Additional sources were reviewed for background; a full listing can be found in Appendix I.
4. Case Studies. In-depth case studies were conducted for four NYGB transactions: two Bank of America transactions (Northport/East Northport Central School District and Hebrew Homes and Riverdale) and two solar transactions (Mosaic and BQ Energy (“BQE”). The case studies provided an in-depth analysis of the specific transactions and included interviews with key stakeholders.

APPENDIX B. GLOSSARY OF TERMS⁵

Bridge Loan: A short-term loan used until a company secures permanent financing for a project. It allows the borrower to meet current obligations by providing immediate cash flow. Bridge loans are generally short term, up to one year, have relatively high interest rates and are usually backed by some form of collateral.

Construction Loans: Short term financing designed to cover the cost of project construction, disbursed as needed or according to a prescribed schedule based on achievement of project milestones. Construction loans are paid off from the proceeds of permanent project financing.

Credit Enhancement: A technique to reduce the credit risk or default risk of a borrower by providing a third-party guarantee, additional collateral or insurance to a lender.

Power Purchase Agreement: A contract between two parties, one which generates electricity (the seller) and one which is looking to purchase electricity (the buyer). The PPA defines all of the commercial terms for the sale of electricity between the two parties, including when the project will begin commercial operation, schedule for delivery of electricity, penalties for under delivery, payment terms, and termination. A PPA is the principal agreement that defines the revenue and credit quality of a generating project and is thus a key instrument of project finance.

Secondary Market: A market where an investor purchases securities from another investor rather than the initial seller or issuer of the securities.

Securities: Certificates or other financial instruments that have monetary value and can be traded. Securities are generally classified as either equity securities, such as stocks and debt securities, such as bonds.

Securitization: The practice of pooling various types of contractual debt and selling their related cash flows to third party investors as securities. Investors are repaid from the principal and interest cash flows collected from the underlying debt and redistributed through the capital structure of the new financing. Securities backed by mortgage receivables are called mortgage-backed securities (MBS), while those backed by other types of receivables are asset-backed securities (ABS).

Term Loan: A loan for a specific amount that has a specified repayment schedule and either a fixed or variable interest rate.

Third-party Ownership: A contractual arrangement under which a facility owner can obtain the services of generation or energy efficiency technologies installed on the owner's premises without undertaking the expense or debt associated with purchasing those assets. A party other than the facility owner or equipment installer (a third party) retains ownership of the equipment and recovers the cost of purchasing and installing the equipment through one of several commercial arrangements, including: power purchase agreements, equipment leases, or energy performance contracts.

⁵ Sources: Investopedia and Wikipedia.

Warehouse Credit Facility: A line of credit given to a loan originator to pay fund loans to multiple borrowers for a specified purpose or type of asset. The loan is repaid using the interest and principal payments from the multiple borrowers or through sale of the loans into the secondary market, either directly or through securitization.

APPENDIX C. MARKET INDICATORS AND OUTCOMES BY PRODUCT TYPE

Product Type	NYGB Investment		Size of Developments		Status of Projects		Estimated Lifetime Impact (high)	
	Number of Financings	Committed Capital	Number of Projects/Measures	Estimated Dollar Value of Development	Projects Completed	Pending Projects	Clean Energy Generated (MWh)	Clean Energy Generation Capacity (MW)
Letter of Credit	44	\$ 5,500,000	559	\$ 75,000,000	24,516	9,144	616,000	35.00
Term Loan		\$ 403,085,000	11,851	\$ 1,067,610,718			12,887,178	436.57
Other Equity Instrument		\$ 20,000,000	265	\$ 2,383,991			192	0.02
Revolver		\$ 209,000,000	20,985	\$ 604,661,169			4,758,490	160.80
Total	44	\$ 637,585,000	33,660	\$ 1,749,655,878	24,516	9,144	18,261,860	632.4

Source: Data provided by NYGB on March 29, 2019.

APPENDIX D. FINANCIAL PARTICIPANT SURVEY

NYGB
Financial Participant Survey
November 2018

Market Indicator	Question
Screening Questions	
Participant screeners.	SC1-SC5
Awareness of Clean Energy Projects and NYGB and Reasons for Participation	
Awareness of NYGB.	A1
How learned about NYGB and prior familiarity with clean energy benefits.	A2-A3
What features of NYGB led to your participation?	A4
Awareness of other NYGB offerings. Offering of similar services in other transactions.	A5-A6
Would you participate in NYGB again? Would you recommend NYGB to others?	A7-A8
Description of Financial Stakeholder	
How long has stakeholder's firm been in this market?	DP1
What type of technologies/projects considered/completed for investing? Type of products used in clean energy investing.	DP2-DP4
Number of transactions in 2018 and in 2013 (or first year of investment).	DP5
Average amount of investment for clean energy projects in 2013 (or first year of investment) and 2018. How has deal flow changed?	DP6-DP7
Expectation of change in the share of clean energy technologies in portfolio? Why?	DP8-DP9
Availability of financial performance data.	DP10-DP11
Types of Investment Products	
What financing structures are they currently using and 2013 (or first year of investing)?	TY1
How have the composition changed between 2013 (or first year of investing) and 2018?	TY2
Investment Process	
State of project development cycle the stakeholder enters 2013 versus 2018.	P1-P2
Reason for difference.	P3
Market Barriers	
Significance of barrier or market influence 2013 (or first year of investment) versus 2018.	MB1-MB2
Unaware Participants (A1=2)	
Module with non-participant focused questions for the categories listed above.	

Screening Questions

For this survey, we are contacting members of the financial community who are aware of and have experience with the financing of clean energy projects. Clean energy transactions refer to financial transactions or investment agreements or arrangements associated with the deployment of renewable energy technologies, (e.g., wind, solar, bioenergy), energy efficiency measures, microgrids, sustainable transportation, and energy storage projects.

When responding, if you want to return to the previous questions, please use the back arrow within the survey and not the browser command. By clicking the save button, you will be able to return to the survey if you are unable to complete it in your first attempt.

Please enter the 4-digit survey identification number as referenced in NYSERDA's email. If you are unable to find the number, please call DNV GL at (707) 820-4400 or email: nygreenbank@dnvgl.com

Enter 4-digit survey ID here:

- SC1. Are you aware of or do you have experience with financing of clean energy projects related to one or more of the types of clean energy technology categories listed below
- Renewable energy technologies, (e.g., bioenergy, solar PV, wind)
 - Energy efficiency
 - Electric vehicle infrastructure
 - Microgrids
 - Energy storage projects

	Response	Survey logic
1	Yes	Go to SC3
2	No	Go to SC2
3	Don't know	END SURVEY
4	Prefer not to answer	

- SC2. Can you please provide the contact information for the person at your firm who is aware of or has experience with financing clean energy projects?

	Response	Survey logic
1	Yes [Please provide the contact information for the person at your firm] [TEXT BOX FOR NAME, TELEPHONE, EMAIL ADDRESS]	END SURVEY
2	No	
3	Don't know	
4	Prefer not to answer	

SC3. Are you involved in financing clean energy projects?

	Response	Survey logic
1	Yes	Go to SC5
2	No	Go to SC4
3	Don't know	END SURVEY
4	Prefer not to answer	

SC4. Can you please provide the contact information for the person at your firm who is involved with financing clean energy projects?

	Response	Survey logic
1	Yes SC4a. Can you please provide an alternate point of contact: [TEXT BOX FOR NAME, TELEPHONE, EMAIL ADDRESS]	END SURVEY
2	No	

SC5. Does your firm finance clean energy projects in states other than New York State?

	Response	Survey logic
1	Yes	Go to A1
2	No	
3	Don't know	
4	Prefer not to answer	

Awareness of Clean Energy Finance and NYGB

[Programming Note]

A1 will identify the respondents who participated in NYGB transactions but were unaware of NYGB and/or the role played by NYGB. Respondents where A1=2 will skip to the UP branch of the survey.

A1. Are you aware of NYGB and its activities in the market place?

	Response	Survey logic
1	[Yes]	Go to A2
2	[No]	Go to DP1

A2. How did you first learn of NYGB? [pick one with other option]

	Response	Survey logic
1	NYSERDA [Checkbox]	Go to A3
2	NYGB's website, or other information provided by NYGB (e.g., RFI, RFP, etc.) [Checkbox]	
3	Events that NYGB hosted or participated in. [Checkbox]	
4	Colleagues within my firm [Checkbox]	
5	Lender and/or investor outside of my firm [Checkbox]	
6	Project developer, ESCO, technology vendor [Checkbox]	
7	General media (social media, articles, interviews) [Checkbox]	
8	Industry trade group [Checkbox]	
9	NYS Governor's Office, NYSERDA, or NYGB announcements [Checkbox]	
10	Don't recall [Checkbox]	
11	Other, specify: [Textbox]	

A3. Before working with NYGB, how familiar was your firm with NYGB's services and financing products?

	Response	Survey logic
1	Familiar	A4
2	Somewhat familiar	
3	Not familiar	Go to DP1
4	Don't know	
5	Prefer not to answer	

A4. What features of NYGB’s services and products led to your firm’s engagement with NYGB?

	Response	Survey logic
1	Construction facilities [Checkbox]	Go to A5
2	Bridge facilities [Checkbox]	
3	Term facilities [Checkbox]	
4	Warehousing/aggregation facilities [Checkbox]	
5	Credit enhancements [Checkbox]	
6	Not familiar with specific services or products	Go to A6
7	Other [Textbox]	Go to A5

A5. Are you aware of NYGB product offerings beyond those utilized by your firm?

	Response	Survey logic
1	[Yes]	Go to A6
2	[No]	
3	Don’t know	
4	Prefer not to answer	

A6. Because of your firm’s experience with NYGB, has your firm offered similar financing services and products for other transactions not involving NYGB?

	Response	Survey logic
1	[Yes]	Go to A7
2	[No]	
3	Don’t know	
4	Prefer not to answer	

A7. How likely is your firm to engage with NYGB to finance additional clean energy projects in the future?

	Response	Survey logic
1	Not at all likely	Go to A8 if A7 ≠ 4,5 else Go to A9
2	Somewhat likely	
3	Extremely likely	
4	Don’t know	
5	Prefer not to answer	

A8. Please explain.

	Response	Survey logic
1	[Textbox]	Go to A9

A9. How likely is your firm to recommend NYGB to others in the financial community who are considering investing in the clean energy market?

	Response	Survey logic
1	Not at all likely	Go to DP1
2	Somewhat likely	
3	Extremely likely	
4	Don't know	
5	Prefer not to answer	

Description of Financial Stakeholder and Investment Portfolio

DP1. Select the earliest year, from the options presented below, that best represents when your firm first became active in the following two activities:

		Year first active
DP1.A1.C1	Infrastructure or energy financing, generally	2013, 2014, 2015, 2016 2017, 2018
		Prior to 2013
DP1.A1.C2	Clean energy asset financing or investing, specifically	2013, 2014, 2015, 2016 2017, 2018
		Prior to 2013

[Programming Note]

DP1.A1 AND DP1.A2 WILL BE PIPPED INTO QUESTIONS THAT PREVIOUS USED YEAR “SINCE 2013”.

If respondent’s firm has been in industry less than 5 years, future questions referring to 2013 will be asked of 2018 - response to DP1.

For DP3, include text box for each instance where DP2 (considered).

DP2. What types of clean energy technologies and projects has your firm considered investing in and what types of technologies and projects has your firm completed a transaction since [DP1.A1.C2]?

DP3. Why did your firm not complete the transaction?

		<PICK ONE> Considered / completed transaction (DP2)	<If considered then ask> Why did your firm not complete the transaction? (DP3)
1	Bioenergy	[list option]	
2	Combined Heat & Power	[list option]	
3	Electric Vehicle Infrastructure	[list option]	
4	Energy Efficiency	[list option]	
5	Energy Storage	[list option]	
6	Microgrids	[list option]	
	Solar PV		
7	Commercial & Industrial	[list option]	
8	Community Distributed Generation	[list option]	
9	Residential	[list option]	
10	Utility-scale	[list option]	
	Wind	[list option]	
11	Offshore	[list option]	
12	Small-scale Onshore	[list option]	
13	Utility-scale Onshore	[list option]	
14	Other	[Textbox]	
15	None of these	[list option]	

DP4. For each type of clean energy technology or project your firm has invested in since [DP1.A2.C2], did your firm utilize any of the following products? Check all that apply.

	Response
1	Construction facilities [Checkbox]
2	Bridge facilities [Checkbox]
3	Term facilities [Checkbox]
4	Warehousing/aggregation facilities [Checkbox]
5	Credit enhancements [Checkbox]
6	Not familiar with specific services or products [exclusive]
7	Other [Textbox]
8	Don't know

DP5. In the past 12 months, approximately how many transactions did your firm close, by category? [Ranges are acceptable]

	Total number of transactions (#)	Past 12 months
1	All infrastructure or energy financing, generally	
2	All infrastructure or energy financing in New York State, generally	
3	All clean energy asset financing or investing, specifically	
4	All clean energy asset financing or investing in New York State, specifically	

DP6. What was the approximate average dollar value of those transactions?

	Average dollar value of transactions (\$)	Past 12 months
1	All infrastructure or energy financing, generally	\$
2	All infrastructure or energy financing in New York State, generally	\$
3	All clean energy asset financing or investing, specifically	\$
4	All clean energy asset financing or investing in New York State, specifically	\$

DP7. How has your firm’s annual deal flow changed in aggregate dollar value, from [DP1.A1.C1] to 2018? For example, your firm’s project finance transactions have increased in value by 20% in the period with the value of clean energy transactions increasing by 35% in the same period.

	Transaction type	% Change
1	All infrastructure or energy financing , generally	[Dropdown list increased by/decreased by/stayed the same]
2	All infrastructure or energy financing in New York State , generally	[Dropdown list increased by/decreased by/stayed the same]
3	All clean energy asset financing or investing, specifically	[Dropdown list increased by/decreased by/stayed the same]
4	All clean energy asset financing or investing in New York State , specifically	[Dropdown list increased by/decreased by/stayed the same]

[Programming Note]

If D7 .4 = increase then “increased” in DP7a and DP7b.
 If DP7.4 = stay the same, then skip DP7a and DP7b.
 If DP7.4 = decrease then “decreased” in DP7a and DP7b.

DP7a. What was the main reason why the aggregate value of clean energy-related transactions in your firm’s annual deal flow in New York State [increased / decreased] between [DP1.A1.C1] and 2018? [Pick one]

	Reason(s)	Main reason (DP7a) – limited to one response
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other, specify	[Textbox]
11	No reason	[Checkbox]
12	Don’t know	[Checkbox]
13	Prefer not to answer	[Checkbox]

DP7b. What are some of the other reasons why the aggregate share of clean energy-related transactions in your firm’s annual deal flow in New York State [increased / decreased] between [DP1.A1.C1] and 2018?

	Reason(s)	Other reason (b)
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other	[Textbox]
11	No other reason	[Checkbox]
12	Don’t know	[Checkbox]
13	Prefer not to answer	[Checkbox]

DP8. Looking forward to 2019, how do you expect the share of clean energy projects in your firm's New York State deal flow to change in the future?

For example, if your firm's New York State clean energy investments in 2018 is 10% of your total portfolio and is expected to increase to 15%, select "Increase by 1-10%". If it is expected to be 5% in 2019, select "Decrease by 1-10%".

	Transaction type	% Change
1	All infrastructure or energy financing, generally	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]
2	All infrastructure or energy financing in New York State, generally	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]
3	All clean energy asset financing or investing, specifically	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]
4	All clean energy asset financing or investing in New York State, specifically	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]

[Programming Note]

If DP8 > 0% then [increase] in DP9a.
 If DP8 = 0% then [stay the same] in DP9a.
 If DP8 < 0% then [decrease] in DP9a.
 If DP8 = Don't know, then skip to DP10.

DP9a. What do you think is the main reason that the aggregate value of New York State clean energy-related investments in your firm’s annual deal flow will [increase/decrease] in the future?

	Reason(s)	Main reason (a) – limited to one response
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other	[Textbox]
11	No reason	[Checkbox]
12	Don’t know	[Checkbox]
13	Prefer not to answer	[Checkbox]

DP9b. Are there other reasons why the share of New York State clean energy-related investments in your firm's annual deal flow will [increase/decrease] in the future?

	Reason(s)	Other reason (b)
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other	[Textbox]
11	No other reason	[Checkbox]
12	Don't know	[Checkbox]
13	Prefer not to answer	[Checkbox]

DP10. Thinking about the financial performance data your firm uses to make clean energy investment decisions, how do you think the availability of data regarding the following metrics have changed between [DP1.A1.C1] and 2018?

	Category	Metric	Result
1	Technology	Availability data	Increase/decrease/stayed the same/ NA
2		Production/yield data	Increase/decrease/stayed the same/ NA
3	Credit & Underwriting	Default rates	Increase/decrease/stayed the same/ NA
4		Delinquency rates	Increase/decrease/stayed the same/ NA
5		Loss rates	Increase/decrease/stayed the same/ NA
6		Recovery rate of collateral	Increase/decrease/stayed the same/ NA
7		Counterparty financial performance	Increase/decrease/stayed the same/ NA
8		Other	[Textbox]

[Programming Note]

If DP10 = 8, then ask DP10a else skip. are all Stayed the Same, Don't Know, N/A skip to TY1a.

DP10A. Please specify the "Other" type of financial performance data that is used to make decisions

	Response	Survey logic
1	[Textbox]	Go to DP11

[Programming Note]

If DP10 1-4 are all Stayed the Same, Don't Know, N/A skip to TY1.

DP11. Do you think NYGB influenced any of the change you have observed in the availability of these financial performance data?

DP11a. If so, how or why? How?

	Response	Survey logic
1	[Textbox]	Go to TY1

Type of Investments

TY1.

		Check all used in <u>past 12 months</u> (check all that apply)?	Check 3 <u>most commonly used</u> in past 12 months.	Check all used in [DP1.A1.C2]	Check 3 <u>most commonly used</u> in [DP1.A1.C2]
1	Construction facilities	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
2	Bridge facilities	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
3	Term facilities	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
4	Warehousing/aggregation facilities	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
5	Credit enhancements	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
6	Other	[Textbox]	[Textbox]	[Textbox]	[Textbox]
7	None	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]

TY2. Approximately what share (as a percentage) of your firm's clean energy investments used the following investment products? (Note: Answers may sum to over 100% if the transactions used more than one product.)

		In the past 12 months (a)	In the DP1.A1.C2 (b)
1	Construction facilities	[% dropdown list]	[% dropdown list]
2	Bridge facilities	[% dropdown list]	[% dropdown list]
3	Term facilities	[% dropdown list]	[% dropdown list]
4	Warehousing/aggregation facilities	[% dropdown list]	[% dropdown list]
5	Credit enhancements	[% dropdown list]	[% dropdown list]
6	Other	[% dropdown list]	[% dropdown list]
7	None	[% dropdown list]	[% dropdown list]

[Programming Note]

If TY2=6 (“Other”), ask TY2a, otherwise skip.

TY2a. Please specify the other types of investment products you indicated in the previous question.

	Response	Survey logic
1	[Textbox]	Go to P1a

Investment Process

P1a. Let's consider "lead origination" as the point in time a potential clean energy investment is identified and the "transaction execution" as the point in time a clean energy investment is closed ("wet" or "dry").

Based on your firm's experience, please estimate the typical amount of time, in months, between lead origination and transaction execution for clean energy projects in the following years:

		Response	Survey logic
1	In the past 12 months	[Number box]	Go to P1b
2	[DP1.A1.C2]	[Number box]	

P1b. At what stage in a project's or asset's lifecycle did/does your firm prefer to invest capital?

		Response	Survey logic
1	In the past 12 months	[List option]	Go to P1c if response=other else Go to P2 if P1a1 ≠ P1a2 else Go to MB1a
2	[DP1.A1.C2]	[List option]	

Project Stage- List option

Early-stage development
 Mid-stage development
 Construction stage
 Initial operation
 Operating facility (asset)
 Expansion of existing project
 No preference
 Other
 Don't know

P1c. Please describe what "other" phase your firm prefers to invest capital?

		Response	Survey logic
1	In the past 12 months	[If Other - Textbox]	Go to P2 if P1a1 ≠ P1a2 else Go to MB1a
2	[DP1.A1.C2]	[If Other - Textbox]	

[Programming note]

If all 2013: past 12 months pairs do not match, Go to P2.

If all pairs *do* match, Go to MB1

P2. What caused your investment capital preferences to change since [DP1.A1.C2] and the last 12 months?

	Response	Survey logic
1	[Textbox]	Go to MB1

Market Barriers

MB1. Which of the following barriers have prevented your firm from investing in more clean energy projects in the past 12 months?

		Level of barrier
1	Lack of economically viable clean energy projects, in general	<p>LIST OPTIONS</p> <ul style="list-style-type: none"> • Not a barrier • Moderate barrier • Significant barrier • Don't know • Not applicable
2	Lack of economically viable clean energy projects of sufficient size/scale	
3	Unfavorable tenor/maturity needs from project sponsor	
4	Limited market liquidity for this asset class	
5	Insufficient private sponsor equity	
6	Limited availability of tax equity investors	
7	Limited availability of financial hedging	
8	Less experienced project sponsors	
9	Creditworthiness of project sponsors	
10	Limited financial performance data	
11	Limited technology performance data	
12	Unattractive risk/return profile	

MB2. Which of the following barriers have prevented your firm from investing in more clean energy projects in [DP1.A1.C1]?

		Level of barrier
1	Lack of economically viable clean energy projects, in general	LIST OPTIONS <ul style="list-style-type: none"> • Not a barrier • Moderate barrier • Significant barrier • Don't know • Not applicable
2	Lack of economically viable clean energy projects of sufficient size/scale	
3	Unfavorable tenor/maturity needs from project sponsor	
4	Limited market liquidity for this asset class	
5	Insufficient private sponsor equity	
6	Limited availability of tax equity investors	
7	Limited availability of financial hedging	
8	Less experienced project sponsors	
9	Creditworthiness of project sponsors	
10	Limited financial performance data	
11	Limited technology performance data	
12	Unattractive risk/return profile	

Likert cues	
1	Not a barrier
2	Moderate barrier
3	Significant barrier
4	Don't know
5	Not applicable

MB3. Did your firm's engagement with NYGB help to overcome that market barrier?

Response	
1	Yes [Textbox]
2	No
3	Don't know

[Programming Note]

If any instance of MB3 = yes, ask MB4.

MB4. Which investment products helped your firm overcome or reduce that barrier? [Check all that apply]

	Investment Product
1	Construction facilities [Checkbox]
2	Bridge facilities [Checkbox]
3	Term facilities [Checkbox]
4	Warehousing/aggregation facilities [Checkbox]
5	Credit enhancements [Checkbox]
6	Other [Textbox]
7	None of these
8	Don't know

MB5. What, if any, additional market barriers or challenges has your firm encountered in the clean energy financing market that you believe NYGB could help overcome?

	Response
1	[Textbox]

[Programming note]

If MB5 = 2 ask MB6.

MB6. Finally, how could NYGB help overcome those additional clean energy financing market barriers?

	Response	Survey logic
1	[Textbox]	End Survey

Thank you for your participation in this survey.

THIS SECTION IS ONLY APPLIED TO RESPONDENTS WITH A1=2

Unaware Participants

UPMB3. Finally, what, if any, market barriers or challenges has your firm encountered in the clean energy financing market that you believe NYGB could help overcome?

NYGB is a State-sponsored, specialized financial entity working with the private sector to increase investments into New York's clean energy markets. NYGB works with clients and counterparties to address investment barriers in the current clean energy capital markets by providing a variety of approaches and transaction structures.

	Response
1	[Textbox]

UMPB3A Finally, how could NYGB help overcome the clean energy financing market barriers?

	Response
1	[Textbox]

Thank you for your participation in this survey.

APPENDIX E. FINANCIAL NON-PARTICIPANT SURVEY

NYGB Financial Non-Participant Survey November 2018	
Market Indicator	Question
Screening Questions	
Non-Participant screeners	SC1-SC5
Awareness of Clean Energy Projects and NYGB	
Non-Participants: When the firm begin financing clean energy projects?	A1
Non-Participants: Awareness of NYGB. If yes, how did they hear about it? How familiar (Scale of 0-3?).	A2-A3
Non-Participants: Knowledgeable of NYGB products and services (Scale of 0-3).	A4-A5
Non-Participants aware of NYGB: Has your firm considered participating with NYGB? What would encourage your firm to participate or consider participating in NYGB funded projects?	A6-A7
Description of Financial Stakeholder	
How long has respondent's firm been in this market?	DP1
What type of technologies/projects consider for investing?	DP2
Types of financing product used.	DP3
Number of financing transactions completed in last 12 months.	DP4
Average value of transactions completed in last 12 months, if deal flow changed from the first-year firm began investing in clean energy transactions and reasons deal flow changed.	DP5-DP6
Expectation of increase share of clean energy technologies in portfolio? Why?	DP7-DP8
Availability of financial performance data.	DP9
Types of Investment Products	
What financing structures are they currently using?	TY1
Share of financing structures in portfolio?	TY2
Investment Process	
State of project development cycle the stakeholder enters 2013 versus 2018.	P1
Reason for difference.	P2
Market Barriers	
Identify barriers encountered in last 12 months (all non-participants) and if NYGB helped to overcome barriers (only for non-participants aware of NYGB).	MB1-MB2
Significance of barriers in 2013 or first year firm began investing in clean energy projects.	MB3

Screening Questions

For this survey, we are contacting members of the financial community who are aware of and have experience with the financing of clean energy projects. Clean energy transactions refer to financial transactions, or investment agreements, or arrangements associated with renewable energy technologies, (e.g., bioenergy, solar, wind, energy efficiency, electric vehicle infrastructure, microgrids, sustainable transportation, and energy storage projects).

When responding, if you want to return to the previous questions, please use the back arrow within the survey. By clicking the save button, you will be able to return to the survey if you are unable to complete it in your first attempt.

Please enter the 6-digit survey identification number as referenced in NYSERDA's email. If you are unable to find the number, please call DNV GL at (707) 820-4400 or email: nygreenbank@dnvgl.com

Enter 6-digit survey ID here:

SC1. Are you aware of or have experience with financing of clean energy projects related to one or more of the types of clean energy technology categories listed above?

	Response	Survey logic
1	Yes	Go to SC3
2	No	Go to SC2
3	Don't know	END SURVEY
4	Prefer not to answer	

SC2. Can you please provide the contact information for the person at your firm who is aware of or has experience with financing clean energy projects?

	Response	Survey logic
1	Yes [Please provide the contact information for the person at your firm: TEXT BOX FOR NAME, TELEPHONE, EMAIL ADDRESS]	END SURVEY
2	No	
3	Don't know	
4	Prefer not to answer	

SC3. Are you involved in financing clean energy projects?

	Response	Survey logic
1	Yes	Go to SC5
2	No	Go to SC4
3	Don't know	END SURVEY
4	Prefer not to answer	

SC4. Can you please provide the contact information for the person at your firm who is involved with financing clean energy projects?

	Response	Survey logic
1	Yes SC4a. Can you please provide an alternate point of contact: [TEXT BOX FOR NAME, TELEPHONE, EMAIL ADDRESS]	END SURVEY
2	No	

SC5. Does your firm finance clean energy projects in states other than New York State?

	Response	Survey logic
1	Yes	Go to A1
2	No	
3	Don't know	
4	Prefer not to answer	

Awareness of Clean Energy Finance and NYGB

A1. Are you aware of NYGB and its activities in the market place?

	Response	Survey logic
1	[Yes]	Go to A2
2	[No]	Go to DP1

A2. How did you first learn of NYGB? [pick one with other]

	Response	Survey logic
1	NYSERDA [Checkbox]	Go to A3
2	NYGB's website, or other information provided by NYGB (e.g., RFI, RFP, etc.) [Checkbox]	
3	Events that NYGB hosted or participated in. [Checkbox]	
4	Colleagues within my firm [Checkbox]	
5	Lender and/or investor outside of my firm [Checkbox]	
6	Project developer, ESCO, technology vendor [Checkbox]	
7	General media (social media, articles, interviews) [Checkbox]	
8	Industry trade group [Checkbox]	
9	NYS Governor's Office, NYSERDA, or NYGB announcements [Checkbox]	
10	Don't recall [Checkbox]	
11	Other, specify: [Textbox]	

A3. How familiar are you with NYGB's services and financing products?

	Response	Survey logic
1	Familiar	Go to A4
2	Somewhat familiar	Go to A4
3	Not Familiar	Go to DP1
4	Don't know	Go to DP1
5	Prefer not to answer	Go to DP1

A4. Which NYGB services and financing products you are familiar with? Check all that apply.

	Response(s)	Survey logic
1	Construction facilities [Checkbox]	Go to A5
2	Bridge facilities [Checkbox]	
3	Term facilities [Checkbox]	
4	Warehousing/aggregation facilities [Checkbox]	
5	Credit enhancements [Checkbox]	
6	Not familiar with specific services or products [Checkbox]	
7	Prefer not to answer [Checkbox]	
8	Other	[Textbox]

A5. Has your firm considered working with NYGB?

	Response	Survey logic
1	[Yes]	Go to DP1
2	[No]	Go to A6
3	Don't know	Go to A6
4	Prefer not to answer	Go to A6

A6. What would make it more likely for your firm to consider working with NYGB?

	Response	Survey logic
1	[Textbox]	Go to DP1

Description of Financial Stakeholder and Investment Portfolio

DP1. Select the earliest year, from the options presented below, that best represents when your firm first become active in the following two activities:

		Year first active	Survey logic
DP1.A1.C1	Infrastructure or energy financing, generally	No activity	END SURVEY
		2013, 2014, 2015, 2016, 2017, 2018	Go to DP2
		Prior to 2013	Go to DP2
DP1.A1.C2	Clean energy asset financing or investing, specifically	No activity	END SURVEY IF SAME AS DP1.A1.C1
		2013, 2014, 2015, 2016, 2017, 2018	Go to DP2
		Prior to 2013	Go to DP2

[Programming Note]

DP1.A1 AND DP1.A2 WILL BE PIPPED INTO QUESTIONS THAT PREVIOUS USED YEAR "SINCE 2013".

If respondent's firm has been in industry less than 5 years, future questions referring to 2013 will be asked of 2018 - response to DP1.2.

DP2. What types of clean energy technologies and projects has your firm considered investing in and in what types of technologies and projects has your firm completed a transaction since [DP1.A1.C2]?

		<PICK ONE> Considered/ completed transaction	(If considered but not completed) Why did your firm not complete the transaction?
1	Bioenergy	[list option]	
2	Combined Heat & Power	[list option]	
3	Electric Vehicle Infrastructure	[list option]	
4	Energy Efficiency	[list option]	
5	Energy Storage	[list option]	
6	Microgrids	[list option]	
	Solar PV		
7	Commercial & Industrial	[list option]	
8	Community Distributed Generation	[list option]	
9	Residential	[list option]	
10	Utility-scale	[list option]	
	Wind		
11	Offshore	[list option]	
12	Small-scale Onshore	[list option]	
13	Utility-scale Onshore	[list option]	
14	Other:	[Textbox]	
15	None of these	[list option]	

[Programming Note]

If DP2 (1) does not equal DP2 (2) and DP2 (2) not checked, then Go to DP3 else Go to DP5.
For DP2, include text box for each instance where DP2 (1) does not equal DP2 (2).

[Programming Note]

Where DP2 (2) is checked, ask DP3.

DP3. For each type of clean energy technology or project your firm has invested in since [DP1.A2.C2], did you use any of the following products:

	Product Type	Survey logic
1	Construction facilities [Checkbox]	Go to DP4
2	Bridge facilities [Checkbox]	
3	Term facilities [Checkbox]	
4	Warehousing/aggregation facilities [Checkbox]	
5	Credit enhancements [Checkbox]	
6	Other [Textbox]	
7	Not familiar with specific services or products	
8	Don't know	

DP4. In the past 12 months, approximately how many transactions did your firm close, by category? [Ranges are acceptable]

	Total number of transactions (#)	Past 12 months
1	All infrastructure or energy financing, generally	
2	All infrastructure or energy financing in New York State, generally	
3	All clean energy asset financing or investing, specifically	
4	All clean energy asset financing or investing in New York State, specifically	

DP5. What was the approximate average dollar value of those transactions?

	Average dollar value of transactions (\$)	Past 12 months
1	All infrastructure or energy financing, generally	\$
2	All infrastructure or energy financing in New York State, generally	\$
3	All clean energy asset financing or investing, specifically	\$
4	All clean energy asset financing or investing in New York State, specifically	\$

DP6. How has your firm’s annual deal flow changed in aggregate dollar value, from [DP1.A1.C1] to 2018? For example, your firm’s project finance transactions have increased in value by 20% in the period with the value of clean energy transactions increasing by 35% in the same period.

	Transaction type	
1	All infrastructure or energy financing, generally	
2	All infrastructure or energy financing in New York State, generally	
3	All clean energy asset financing or investing, specifically	
4	All clean energy asset financing or investing in New York State, specifically	

[Programming Note]

If D6 .4 = increase then “increased” in DP6a and DP6b.
 If DP6.4 = stay the same, then skip DP6a and DP6b.
 If DP6.4 = decrease then “decreased” in DP6a and DB6b.

DP6a. What was the main reason why ~~did~~ the aggregate value of clean energy-related transactions in your firm’s annual deal flow in New York State [increased / decreased] between [DP1.A1.C1] and 2018? [Pick one]

	Reason(s)	Main reason (a) – limited to one response
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other	[Textbox]
11	No reason	[Checkbox]

DP6b. What are some of the other reasons why the aggregate value of clean energy-related transactions in your firm’s annual deal flow in New York State [increased / decreased] between [DP1.A1.C1] and 2018?

	Reason(s)	Other reason (b)
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	No other reason(s)	[Checkbox]
11	Don’t know	[Checkbox]
12	Prefer not to answer	[Checkbox]
13	Other, specify	[Textbox]

[Programming Note]

Remaining questions in this section are asked of respondents DP2=1 or 2. This battery captures participants, non-participants currently involved in clean energy projects and non-participants not currently involved in clean energy projects.

DP7. Looking forward to 2019, how do you expect the share of clean energy projects in your firm’s New York State deal flow to change in the future?

For example, if your firm’s New York State clean energy investments in 2018 is 10% of your total portfolio and is expected to increase to 15%, select "Increase by 1-10%". If it is expected to be 5% in 2019, select "Decrease by 1-10%".

	Transaction type	% Change
1	All infrastructure or energy financing, generally	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]
2	All infrastructure or energy financing in New York State, generally	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]
3	All clean energy asset financing or investing, specifically	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]
4	All clean energy asset financing or investing in New York State, specifically	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]

[Programming Note]

If D7 .4 = increase then “increase” in DP8a and DP8b.
 If DP7.4 = stay the same then skip DP8.a and DP8b.
 If DP7.4 = decrease then “decrease” in DP8.a, DB8b.

DP8a. What is the main reason why the share of New York State clean energy-related investments in your firm's annual deal flow will [increase/decrease] in the future?

	Reason(s)	Main reason (DP8a)
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	No reason(s)	[Checkbox]
11	Don't know	[Checkbox]
12	Prefer not to answer	[Checkbox]
13	Other	[Textbox]

DP8b. Are there other reasons why the share of New York State clean energy-related investments in your firm's annual deal flow will [increase/decrease] in the future?

	Reason(s)	Other reason (b)
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other	[Textbox]
11	No reason	[Checkbox]

DP9. Thinking about the financial performance data your firm uses to make clean energy investment decisions, how do you think the availability of data regarding the following metrics have changed between [DP1.A1.C1] and 2018?

	Category	Metric	Result
1	Technology	Availability of data	Increase/decrease/stayed the same/ NA
2		Production/yield data	Increase/decrease/stayed the same/ NA
3	Credit & Underwriting	Default rates	Increase/decrease/stayed the same/ NA
4		Delinquency rates	Increase/decrease/stayed the same/ NA
5		Loss rates	Increase/decrease/stayed the same/ NA
6		Recovery rate of collateral	Increase/decrease/stayed the same/ NA
7		Counterparty financial performance	Increase/decrease/stayed the same/ NA
8		Other	[Textbox]

[Programming Note]

[Show if DP9 = Other, then ask] As indicated in your previous response, please specify the "other" type of financial performance data is used to make decisions: IF DP1.A1.C2 = no activity (they have not invested in clean energy projects), SKIP TO MB1.

Type of Investments

TY1.

		Check all the investment products your firm used to finance clean energy projects in past 12 months.	Check three most commonly used in past 12 months.	Check all used in [DP1.A1.C2].	Check 3 most commonly used in [DP1.A1.C2].
1	Construction facilities	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
2	Bridge facilities	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
3	Term facilities	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
4	Warehousing/aggregation facilities	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
5	Credit enhancements	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
6	Not familiar with specific services or products	[Textbox]	[Textbox]	[Textbox]	[Textbox]
7	Other, specify	[Textbox]	[Textbox]	[Checkbox]	[Checkbox]

TY2. Approximately what share (as a percentage) of your firm’s clean energy investments used the following investment products? (Note: Answers may sum to over 100% if the transactions used more than one product.)

		In the past 12 months (a)	In the DP1.A1.C2 (b)
1	Construction facilities	[% dropdown list]	[% dropdown list]
2	Bridge facilities	[% dropdown list]	[% dropdown list]
3	Term facilities	[% dropdown list]	[% dropdown list]
4	Warehousing/aggregation facilities	[% dropdown list]	[% dropdown list]
5	Credit enhancements	[% dropdown list]	[% dropdown list]
6	Not familiar with specific services or products	[% dropdown list]	[% dropdown list]
7	Other	[% dropdown list]	[% dropdown list]

[Programming Note]
 IF D1.A1.C2 = no activity (they have not invested in clean energy projects), SKIP TO MB1.

Investment Process

P1a. Let's consider "lead origination" as the point in time a potential clean energy investment is identified and the "transaction execution" as the point in time a clean energy investment is closed ("wet" or "dry").

Based on your firm's experience, please estimate the typical amount of time, in months, between lead origination and transaction execution for clean energy projects in the following years:

		Response	Survey logic
1	In the past 12 months	[Months Number box]	Go to P1b
2	[DP1.A1.C2]	[Months Number box]	

P1b. At what stage in a project's or asset's lifecycle did/does your firm prefer to invest capital?

		Response	Survey logic
1	In the past 12 months	[List option]	Go to P1b
2	[DP1.A1.C2]	[List option]	

Project Stage- List option

Early-stage development
 Mid-stage development
 Construction stage
 Initial operation
 Operating facility (asset)
 Expansion of existing project
 No preference
 Other
 Don't know

P1c. Please describe what "other" phase your firm prefers to invest capital?

		Response	Survey logic
1	In the past 12 months	[If Other - Textbox]	Go to P2 if P1a.1 \neq P1a.2 else Go to MB1a
2	[DP1.A1.C2]	[If Other - Textbox]	

[Programming Note]

If all 2013: past 12 months pairs do not match, Go to P2.
 If all pairs *do* match, Go to MB1.

P2. What caused your investment capital preferences to change since [DP1.A1.C2] and the last 12 months?

	Response	Survey logic
1	[Textbox]	Go to MB1

Market Barriers

MB1. Which of the following barriers have prevented your firm from investing in more clean energy projects in the past 12 months?

		Level of barrier
1	Lack of economically viable clean energy projects, in general	<p>LIST OPTIONS</p> <ul style="list-style-type: none"> • Not a barrier • Moderate barrier • Significant barrier • Don't know • Not applicable
2	Lack of economically viable clean energy projects of sufficient size/scale	
3	Unfavorable tenor/maturity needs from project sponsor	
4	Limited market liquidity for this asset class	
5	Insufficient private sponsor equity	
6	Limited availability of tax equity investors	
7	Limited availability of financial hedging	
8	Less experienced project sponsors	
9	Creditworthiness of project sponsors	
10	Limited financial performance data	
11	Limited technology performance data	
12	Unattractive risk/return profile	

MB2. Which of the following barriers have prevented your firm from investing in more clean energy projects in [DP1.A1.C1]?

		Level of barrier
1	Lack of economically viable clean energy projects, in general	LIST OPTIONS <ul style="list-style-type: none"> • Not a barrier • Moderate barrier • Significant barrier • Don't know • Not applicable
2	Lack of economically viable clean energy projects of sufficient size/scale	
3	Unfavorable tenor/maturity needs from project sponsor	
4	Limited market liquidity for this asset class	
5	Insufficient private sponsor equity	
6	Limited availability of tax equity investors	
7	Limited availability of financial hedging	
8	Less experienced project sponsors	
9	Creditworthiness of project sponsors	
10	Limited financial performance data	
11	Limited technology performance data	
12	Unattractive risk/return profile	

Likert cues	
1	Not a barrier
2	Moderate barrier
3	Significant barrier
4	Don't know
5	Not applicable

MB3. Finally, what, if any, market barriers or challenges has your firm encountered in the clean energy financing market that you believe NYGB could help overcome?

NYGB is a State-sponsored, specialized financial entity working with the private sector to increase investments into New York's clean energy markets. NYGB works with clients and counterparties to address investment barriers in the current clean energy capital markets by providing a variety of approaches and transaction structures.

Response	
1	[Textbox]

MB4. How could NYGB help overcome the clean energy financing market barriers?

Response	
1	[Textbox]

Thank you for your participation in this survey.

APPENDIX F. DEVELOPER PARTICIPANT SURVEY

NYGB
Developer Participant Survey
November 2018

Market Indicator	Question
Screening Questions	
Participant screeners.	SC1-SC4
Geography	
Geographies targeted and differences between states	G section
Awareness of Clean Energy Projects and NYGB and Reasons for Participation	
What features of NYGB led to your firm's participation?	A3
Aware of additional offerings.	A4-A5
Future clean projects and Green Bank participation.	A8-A10
Description of Stakeholder	
How long has respondent' firm been in this market?	DP1
What type of technologies/projects consider for investing?	DP2
Average number of clean energy transactions funded in NYS per year in past 12 months and in 2013.	DP4, DP6
Average amount of investment for clean energy projects in 2013 and past 12 months.	DP5, DP7
Has the stakeholder's portfolio changed since 2013? What is % of clean energy projects in 2013, % in 2018?	D7-DP7a
Percentage of portfolio comprised of NYGB projects.	DP4-DP7
Reasons why or why not portfolio changed? Impact of NYGB?	DP8-DP10
Expectation of increase share of clean energy technologies in portfolio? Why?	DP8-DP8.b
Change in third party ownership over time.	DP9
Influence on project selection.	DP12
Financing Motivations	
Reasons for financing, when to use, difficulty in securing.	IR section
Types of Investment Products	
What financing structures are they currently using?	TY1
How have the composition changed between 2013 and 2018?	TY2a-TY2b
Investment Process	
State of project development cycle the stakeholder enters 2013 versus 2018.	P1a-P1c
Reason for difference.	P2
Market Barriers	
Significance of barrier or market influence 2013 versus 2018.	MB1-MB2
Importance of the various roles and services provided by NYGB.	MB3
Other barriers NYGB could address.	MB4-MB5

Screening Questions

For this survey, we are contacting developers who are aware of and have experience developing clean energy projects. Clean energy projects refer to the deployment of renewable energy technologies, (e.g., wind, solar, bioenergy), energy efficiency measures, microgrids, sustainable transportation, and energy storage projects.

When responding, if you want to return to the previous questions, please use the back arrow within the survey and NOT the browser command. By clicking the save button, you will be able to return to the survey if you are unable to complete it in your first attempt.

Enter the 4-digit survey identification number as referenced in NYSERDA's email. If you are unable to locate the number, please call DNV GL at (707) 820-4400 or email: nygreenbank@dnvgl.com

Enter 4-digit survey ID here:

SC1. Are you aware of or have experience with developing clean energy projects related to one or more of the types of clean energy technology categories listed below?

Are you aware of or do you have experience with financing of clean energy projects related to one or more of the types of clean energy technology categories listed below?

- Renewable energy technologies (e.g., bioenergy, solar PV, wind)
- Energy efficiency
- Electric vehicle infrastructure
- Microgrids
- Energy storage projects

	Response	Survey logic
1	Yes	Go to SC3
2	No	Go to SC2
3	Don't know	END SURVEY
4	Prefer not to answer	

SC2. Can you please provide the contact information for the person at your firm who is aware of or has experience with developing clean energy projects?

	Response	Survey logic
1	Yes [TEXT BOX FOR NAME, TELEPHONE, EMAIL ADDRESS]	END SURVEY
2	No	
3	Don't know	
4	Prefer not to answer	

SC3. Are you involved in developing clean energy projects?

	Response	Survey logic
1	Yes	Go to G1
2	No	Go to SC4
3	Don't know	END SURVEY
4	Prefer not to answer	

SC4. Can you please provide the contact information for the person at your firm who is involved with developing clean energy projects?

	Response	Survey logic
1	Yes [TEXT BOX FOR NAME, TELEPHONE, EMAIL ADDRESS]	END SURVEY
2	No	
3	Don't know	
4	Prefer not to answer	

Geography

We would like to understand where your firm focuses its activities.

G1. Does your firm develop clean energy projects in states other than New York State?

	Response	Survey logic
1	Yes	Go to G2
2	No	Go to A1
3	Don't know	Go to A1

G2. What states do you target for developing clean energy projects?

	Response	Survey logic
1	[Textbox]	Go to G3

[Programming Note]

If more states selected than New York, go to G3.
If only New York selected, go to A1.

G3. Do you develop different types of clean energy projects in New York State than you do in other states?

	Response	Survey logic
1	Yes	Go to G3a.
2	No	Go to A1
3	Don't know	
4	Prefer not to say	

G3a. How do your projects differ in the various states?

	Response	Survey logic
1	[Textbox]	Go to A1

Awareness of Clean Energy Finance and NYGB

A1. How did you first learn of NYGB?

	Response(s)	Survey logic
1	NYSERDA [Checkbox]	Go to A2
2	NYGB's website, or other information provided by NYGB (e.g., RFI, RFP, etc.) [Checkbox]	
3	Events that NYGB hosted or participated in. [Checkbox]	
4	Colleagues within my firm [Checkbox]	
5	Lender and/or investor outside of my firm [Checkbox]	
6	Project developer, ESCO, technology vendor [Checkbox]	
7	General media (social media, articles, interviews) [Checkbox]	
8	Industry trade group [Checkbox]	
9	NYS Governor's Office, NYSERDA, or NYGB announcements [Checkbox]	
10	Other [Textbox]	
11	Don't know [Checkbox]	

A2. Before working with NYGB, how familiar was your firm with the economic benefits of clean energy projects?

	Response	Survey logic
1	Familiar	Go to A3
2	Somewhat familiar	Go to A3
3	Not Familiar	Go to DP1
4	Don't know	Go to DP1

A4. Are you aware of NYGB product offerings beyond those utilized by your firm?

	Response	Survey logic
1	[Yes]	Go to A5 if Yes, else Go to A6
2	[No]	
3	Don't know	
4	Prefer not to answer	

A5. What features of NYGB's services and products led to your firm's engagement with NYGB?? Check all that apply.

	Response(s)	Survey logic
1	Construction facilities [Checkbox]	Go to A6
2	Bridge facilities [Checkbox]	
3	Term facilities [Checkbox]	
4	Warehousing/aggregation facilities [Checkbox]	
5	Credit enhancements [Checkbox]	
6	Not familiar with specific services or products [Checkbox]	
7	Other [Textbox]	
8	Don't know	

A6. To what extent do you believe NYGB has increased the financial community's awareness of the economic benefits of developing clean energy projects? Select a statement that best aligns with your opinion:

	Response	Survey logic
1	The financial community was already fully aware of the economic benefits of clean energy projects (NYGB did not change awareness)	Go to A7
2	NYGB had some influence on the financial community's awareness of the economic benefits of clean energy projects	
3	NYGB's demonstrated capability had complete influence on the financial community's perceptions of the economic benefits of financing clean energy projects	
4	[Don't Know]	

A7. After your firm's experience with NYGB, have you developed clean energy projects similar to those you utilized NYGB for, without needing financing solutions from NYGB?

	Response	Survey logic
1	[Yes]	Go to A8
2	[No]	
3	[Don't Know]	
4	Prefer not to answer	

A8. How likely is your firm to engage with NYGB to finance clean energy projects in the future?

	Response	Survey logic
1	Not at all likely	Go to A9 if A8 ≠ 4,5 else Go to A10
2	Somewhat likely	
3	Extremely likely	
4	Don't know	
5	Prefer not to answer	

A9. Please explain:

	Response	Survey logic
1	[Textbox]	Go to A10

A10. How likely is your firm to recommend NYGB to others in the project development community who are considering developing projects in the clean energy market?

	Response	Survey logic
1	Not at all likely	Go to DP1
2	Somewhat likely	
3	Extremely likely	
4	Don't know	
5	Prefer not to answer	

Description of Developer and Project Portfolio

DP1. Select the earliest year, from the options presented below, that best represents when your firm first became active in the following two activities:

		Year first active	Survey logic
DP1.A1.C1	Infrastructure or Energy Project Development, generally	No Activity/ Don't Know/ Refused	END SURVEY
		2013, 2014, 2015, 2016 2017, 2018	Go to DP1.A1.C2
		Prior to 2013	Go to DP1.A1.C2
DP1.A1.C2	Clean Energy Project Development, specifically	No Activity/ Don't Know/ Refused	END SURVEY
		2013, 2014, 2015, 2016 2017, 2018	Go to DP2
		Prior to 2013	Go to DP2

[Programming Note]

DP1.A1 AND DP1.A2 WILL BE PIPPED INTO QUESTIONS THAT PREVIOUS USED YEAR "SINCE 2013".

If respondent's firm has been in industry less than 5 years, future questions referring to 2013 will be asked of response to DP1.2.

DP2. What types of clean energy technologies and projects has your firm considered developing in and what types of technologies and projects has your firm completed a transaction since [DP1.A1.C2]?

		<PICK ONE> Considered/ completed transaction (DP2)	<If considered then ask> Why did your firm not complete the transaction? (DP3)
1	Bioenergy	[list option]	
2	Combined Heat and Power (CHP)	[list option]	
3	Electric Vehicle Infrastructure	[list option]	
4	Energy Efficiency	[list option]	
5	Energy Storage	[list option]	
6	Microgrids	[list option]	
	Solar PV		
7	Commercial & Industrial	[list option]	
8	Community Distributed Generation	[list option]	
9	Residential	[list option]	
10	Utility-scale	[list option]	
	Wind	[list option]	
11	Offshore	[list option]	
12	Small-scale Onshore	[list option]	
13	Utility-scale Onshore	[list option]	
14	Other	[Textbox]	
15	None of these	[list option]	

DP2_OTR. What "other" clean energy technologies and projects has your firm considered?

	Response	Survey logic
1	[Textbox]	Go to A10

[Programming Note]

For DP3, include text box for each instance where DP2 (considered).

DP4. For each type of clean energy technology or project your firm has developed since [DP1.A1.C2], did your firm use any of the following financial products? Check all that apply.

	Response(s)	Survey logic
1	Construction facilities [Checkbox]	Go to DP5
2	Bridge facilities [Checkbox]	
3	Term facilities [Checkbox]	
4	Warehousing/aggregation facilities [Checkbox]	
5	Credit enhancements [Checkbox]	
6	Not familiar with specific services or products [Checkbox]	
7	Other [Textbox]	

DP5. In the past 12 months, approximately how many projects did your firm complete, by category? [Ranges are acceptable]

	Total number of transactions (#)	Past 12 months
1	All infrastructure or energy projects, generally	
2	All infrastructure or energy projects in New York State, generally	
3	All clean energy developments, specifically	
4	All clean energy developments in New York State, specifically	

DP6. What was the approximate average dollar value of those projects?

	Average dollar value of transactions (\$)	Past 12 months
1	All infrastructure or energy projects, generally	\$
2	All infrastructure or energy projects in New York State, generally	\$
3	All clean energy developments, specifically	\$
4	All clean energy developments in New York State, specifically	\$

DP7. How has your firm’s pipeline of clean energy projects changed in aggregate dollar value, from [DP1.A1.C1] to 2018? For example, your firm’s pipeline of infrastructure or energy projects has increased in value by 20% in the period with the value of clean energy projects increasing by 35% in the same period.

	Transaction type	% Change
1	All infrastructure or energy projects, generally	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]
2	All infrastructure or energy projects in New York State, generally	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]
3	All clean energy developments, specifically	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]
4	All clean energy developments in New York State, specifically	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]

[Programming Note]

If D7 > 0% then [increase] in DP7a.
 If DP7 = 0% then [stay the same] in DP7a.
 If DP7 <0% then [decrease] in DP7a.
 If DP7 = Don’t know, then skip to DP8.

DP7a. What was the main reason why the aggregate value of clean energy projects in your firm’s pipeline in New York State [increased/decreased/stayed the same] between [DP1.A1.C1] and 2018? [Pick one]

	Reason(s)	Main reason (DP7a) – limited to one response
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other	[Textbox]
11	No reason	Go to DP8
12	Prefer not to answer	Go to DP8
13	Don’t know	Go to DP8

DP7b. What are some of the other reasons why the aggregate value of clean energy-related projects in your firm’s pipeline in New York State [DP7.A4 - increased/decreased/stayed the same] between [DP1.A1.C1] and 2018?

	Reason(s)	Other reason (b)
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other	[Textbox]
11	No other reason	[Checkbox]

DP8. Looking forward to 2019, how do you expect the share of clean energy projects in your firm's New York State pipeline, to change in the future, by aggregate value?

For example, you expect your firm's overall pipeline to increase in value by 20% in 2019 with the value of clean energy projects increasing by 35% in the same period.

	Transaction type	% Change
1	Clean energy developments in New York State will increase	Go to DP8.1
2	Clean energy developments in New York State will decrease	Go to DP8.1
3	Clean energy developments in New York State will stay the same	Go to DP9
4	Not investing in 2019 or Don't know	Go to DP9

DP8.1 You mentioned your firm's pipeline of clean energy projects may change by what percent do you expect it will increase or decrease?

	Response	Survey logic
1	[Textbox]	Go to DP8a

[Programming Note]

If DP8 > 0% then [increase] in DP8a.
 If DP8 = 0% then [stay the same] in DP8a.
 If DP8 < 0% then [decrease] in DP8a.

DP8a. What is the main reason why the aggregate value of New York State clean energy projects in your firm’s annual pipeline will [increase/decrease] in the future?

	Reason(s)	Other reason (b)
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other	[Textbox]
11	No other reason	[Checkbox]
12	Don't know	[Checkbox]
13	Prefer not to answer	[Checkbox]

DP8b. Are there other reasons why the share of New York State clean energy projects in your firm's annual pipeline will [increase/decrease/stay the same] in the future? Check all that apply.

	Reason(s)	Other reason (b)
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other	[Textbox]
11	No other reason	[Checkbox]

DP9. Thinking about clean energy asset ownership, what proportion of your end use customers opted for ownership of the asset versus entering into a lease or PPA contract in [DP1.A1.C2] and 2018?

		% of asset ownership	If none or other
1	[DP1.A1.C2]	[Enter %]	None/ Do not work with third party owners/DK/N/A
2	2018	[Enter %]	None/ Do not work with third party owners/DK/N/A

DP10. How important are the following project drivers in developing clean energy projects or to your clean energy project portfolio, generally?

	Project drivers	Influence on projects or portfolio
1	Energy efficiency programs or demand response programs offered by utilities	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
2	Other services or assistance offered by utilities	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
3	Changing regulatory requirements for energy efficiency and/or demand response	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
4	Availability of on-bill financing offered by utilities	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
5	Availability of PACE programs offer financing for renewable and energy efficiency projects	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
6	Interconnection requirements specified by regulators and/or utilities	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
7	Environmental and building permitting regulations	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
8	Overall regulatory environment	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
9	Other	[Textbox]

DP10a. [If DP10 is other] What "other" project drivers are important in developing clean energy projects?

	Response	Survey logic
1	[Textbox]	Go to IR1

Financing Motivations

This section focuses on the underlying reasons project developers need access to capital from lenders.

IR1. What are the reasons that you look for financing for clean energy projects?

	Reason	Main Reason (a)
1	Inadequate capital for balance-sheet construction	[Checkbox]
2	Lack of tax appetite to monetize incentives	[Checkbox]
3	Desire to fully leverage capital to facilitate other developments	[Checkbox]
4	Leveraged returns for project sponsor	[Checkbox]
5	None	[Checkbox]
6	Other	[Textbox]
7	Don't know	[Checkbox]

IR2. Under what circumstances will you search out financing instead of using corporate financing?

	Response	Survey logic
1	[Textbox]	IR3a

IR3. Thinking back to the past 12 months and in {FYF} how difficult has it been to secure the following forms of financing for clean energy projects?

		Past 12 months	First year financing
1	Construction facilities	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
2	Bridge facilities	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
3	Term facilities	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
4	Warehousing/aggregation facilities	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
5	Credit enhancements	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
6	Other	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA

Type of Financing

TY1. Please check the financing products your firm uses or has used to finance clean energy projects.

		Please check all the financing products your firm used to finance clean energy projects in the past 12 months.	Check the three most commonly used in the past 12 months.	Check all the financing tools your firm used to finance clean energy projects in [DP1.A1.C2]	Check the three most commonly used financing tools your firm used to finance clean energy projects in [DP1.A1.C2]
1	Construction facilities	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
2	Bridge facilities	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
3	Term facilities	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
4	Warehousing/aggregation facilities	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
5	Credit enhancements	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
6	Other	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
7	Not familiar with specific services or products	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]
8	None	[Checkbox]	[Checkbox]	[Checkbox]	[Checkbox]

TY2. In the past 12 months, approximately what share (as a percentage) of your firm’s clean energy project developments were financed using the following financing products?

(Note: Answers may sum to over 100% if the transactions used more than one product.)

		Past 12 months	First year financing
1	Construction facilities	0-100% in ranges of 10%	0-100% in ranges of 10%
2	Bridge facilities	0-100% in ranges of 10%	0-100% in ranges of 10%
3	Term facilities	0-100% in ranges of 10%	0-100% in ranges of 10%
4	Warehousing/aggregation facilities	0-100% in ranges of 10%	0-100% in ranges of 10%
5	Credit enhancements	0-100% in ranges of 10%	0-100% in ranges of 10%
6	Other	0-100% in ranges of 10%	0-100% in ranges of 10%
7	Not familiar with specific services or products	0-100% in ranges of 10%	0-100% in ranges of 10%
8	None	0-100% in ranges of 10%	0-100% in ranges of 10%

TY2a. As indicated in your previous response, please specify the "other" type of investment products that are used.

	Response	Survey logic
1	[Textbox]	TY2b

TY2b. In [DP1.A1.C2], approximately what share (as a percentage) of your firm's clean energy developments were financed using the following financing tools?

[Programming Note]

If projects use multiple products, totals may sum to more than 100%. For example, if the most common products are each used on 75% of all clean energy projects, please indicate 75% for each.

		Past 12 months (TY2a)	In DP1.A1.C2 (TY2b)
1	Construction facilities	[% dropdown list]	[% dropdown list]
2	Bridge facilities	[% dropdown list]	[% dropdown list]
3	Term facilities	[% dropdown list]	[% dropdown list]
4	Warehousing/aggregation facilities	[% dropdown list]	[% dropdown list]
5	Credit enhancements	[% dropdown list]	[% dropdown list]
6	Other	[% dropdown list]	[% dropdown list]
7	None	[% dropdown list]	[% dropdown list]

Investment Process

P1a. Let's consider "application" as the point in time an proposal is submitted to a financial institution to seek financing and the "transaction execution" as the point in time financing is executed ("wet" or "dry").

Based on your firm's experience, please estimate the typical amount of time, in months, between application and transaction execution in the following years:

		Response	Survey logic
1	In the past 12 months	[Number box]	Go to P1b
2	[DP1.A1.C2]	[Number box]	

P1b. At what stage in a clean energy project's or asset's lifecycle did/does your firm prefer to seek financing?

		Response	Survey logic
1	In the past 12 months	[List option]	Go to P1c if response=other else Go to P2 if P1a1 ≠ P1a2 else Go to MB1a
2	[DP1.A1.C2]	[List option]	

Project Stage
Early-stage development
Mid-stage development
Construction stage
Initial operation
Operating facility (asset)
Expansion of existing project
No preference
Other
Don't know

P1c. Please describe what "other" phase your firm prefers to seek financing?

		Response	Survey logic
1	In the past 12 months	[If Other - Textbox]	Go to P2 if P1a1 ≠ P1a2 else Go to MB1a
2	[DP1.A1.C2]	[If Other - Textbox]	

P2. What caused your firm to change when they prefer to seek financing between [DP1.A1.C2] and the last 12 months?

	Response	Survey logic
1	[Textbox]	Go to MB1

Market Barriers

MB1. Which of the following market barriers have prevented your firm from developing more clean energy projects in the past 12 months?

		Level of barrier
1	Lack of economically viable clean energy projects, in general	LIST OPTIONS • Not a barrier • Moderate barrier • Significant barrier • Don't know • Not applicable
2	Lack of economically viable clean energy projects of sufficient size/scale	
3	Unfavorable tenor/maturity needs from project sponsor	
4	Limited market liquidity for this asset class	
5	Insufficient private sponsor equity	
6	Limited availability of tax equity investors	
7	Limited availability of financial hedging	
8	Less experienced project sponsors	
9	Creditworthiness of project sponsors	
10	Limited financial performance data	
11	Limited technology performance data	
12	Unattractive risk/return profile	

MB2. Which of the following barriers prevented your firm from developing more clean energy projects in [DP1.A1.C1]?

		Level of barrier
1	Lack of economically viable clean energy projects, in general	LIST OPTIONS • Not a barrier • Moderate barrier • Significant barrier • Don't know • Not applicable
2	Lack of economically viable clean energy projects of sufficient size/scale	
3	Unfavorable tenor/maturity needs from project sponsor	
4	Limited market liquidity for this asset class	
5	Insufficient private sponsor equity	
6	Limited availability of tax equity investors	
7	Limited availability of financial hedging	
8	Less experienced project sponsors	
9	Creditworthiness of project sponsors	
10	Limited financial performance data	
11	Limited technology performance data	
12	Unattractive risk/return profile	

[Programming Note]

If any instance of MB2 = significant or moderate barrier, ask MB3.

MB3. Did your firm’s engagement with NYGB help to overcome that market barrier?

	Response	Survey logic
1	Yes	Go to MB3a
2	No	Go to MB4
3	Don’t know	Go to MB4

MB3a. Which financial products helped your firm overcome or reduce that barrier? Check all that apply

		Response	Survey logic
1	Construction facilities	[Checkbox]	Go to-MB4
2	Bridge facilities	[Checkbox]	
3	Term facilities	[Checkbox]	
4	Warehousing/aggregation facilities	[Checkbox]	
5	Credit enhancements	[Checkbox]	
6	Other	[Textbox]	
7	NYGB did not help my firm overcome the barrier	[Checkbox]	
8	Don’t know	[Checkbox]	

MB4. Finally, what, if any, additional market barriers or challenges has your firm encountered in the clean energy development market that you believe NYGB could help overcome?

	Response	Survey logic
1	There are some barriers NYGB could help my firm overcome	MB5
2	There are no additional barriers NYGB could help my firm overcome	End Survey
3	Don’t Know	
4	Refused	

MB5. NYGB is a State-sponsored, specialized financial entity working with the private sector to increase investments into New York’s clean energy markets. NYGB works with clients and counterparties to address investment barriers in the current clean energy capital markets by providing a variety of approaches and transaction structures.

How could NYGB help overcome those barriers?

	Response	Survey logic
1	[Textbox]	End Survey

Thank you for your participation in this survey.

APPENDIX G. DEVELOPER NON-PARTICIPANT SURVEY

NYGB
Developer Non-Participant Survey
November 2018

Market Indicator	Question
Screening Questions	
Non-Participant screeners	SC1-SC4
Geography	
Geographies targeted and differences between states	G section
Awareness of Clean Energy Projects and NYGB	
Awareness of NYGB. If yes, how did they hear about it? How familiar?	A1-A2
Knowledgeable of NYGB products and services.	A3-A4
Has your firm considered participating with NYGB? What would encourage your firm to participate or consider participating in NYGB funded projects?	A5-A6
Description of Stakeholder	
How long has respondent's firm been in this market?	DP1
What type of technologies/projects consider for developing?	DP2
Types of financing products used.	DP3
Number of financing transactions completed in last 12 months.	DP4
Average value of transactions completed in last 12 months, if deal flow changed from the first-year firm began investing in clean energy transactions and reasons deal flow changed.	DP5-DP6
Expectation of increase share of clean energy technologies in portfolio? Why?	DP7-DP8
Financing Motivations	
Reasons seeking financing.	IR1-IR2
Ease of obtaining financing.	IR3
Types of Investment Products	
What financing structures are they currently using?	TY1
Share of financing structures in portfolio?	TY2
Investment Process	
State of project development cycle the stakeholder enters 2013 versus 2018.	P1
Reason for difference.	P2
Market Barriers	
Identify barriers encountered in last 12 months (all non-participants) and in first year firm began developing clean energy projects.	MB1-MB2
Opportunities for NYGB to overcome market barriers.	MB3-MB4

Screening Questions

For this survey, we are contacting developers who are aware of and have experience developing clean energy projects. Clean energy projects refer to the deployment of renewable energy technologies, (e.g., wind, solar, bioenergy), energy efficiency measures, microgrids, sustainable transportation, and energy storage projects.

When responding, if you want to return to the previous questions, please use the back arrow within the survey and NOT the browser command. By clicking the save button, you will be able to return to the survey if you are unable to complete it in your first attempt.

Enter the 6-digit survey identification number as referenced in NYSERDA's email. If you are unable to locate the number, please call DNV GL at (707) 820-4400 or email: nygreenbank@dnvgl.com

Enter 6-digit survey ID here:

SC1. Are you aware of or have experience developing clean energy projects related to one or more of the types of clean energy technology categories listed below?

- Renewable energy technologies (e.g., bioenergy, solar PV, wind)
- Energy efficiency
- Electric vehicle infrastructure
- Microgrids
- Energy storage projects

	Response	Survey logic
1	Yes	Go to SC3
2	No	Go to SC2
3	Don't know	END SURVEY
4	Prefer not to answer	

SC2. Can you please provide the contact information for the person at your firm who is aware of or has experience with developing clean energy projects?

	Response	Survey logic
1	Yes [TEXT BOX FOR NAME, TELEPHONE, EMAIL ADDRESS]	END SURVEY
2	No	
3	Don't know	
4	Prefer not to answer	

SC3. Are you involved in developing clean energy projects?

	Response	Survey logic
1	Yes	Go to G1
2	No	Go to SC4
3	Don't know	END SURVEY
4	Prefer not to answer	

SC4. Can you please provide the contact information for the person at your firm who is involved with developing clean energy projects?

	Response	Survey logic
1	Yes [TEXT BOX FOR NAME, TELEPHONE, EMAIL ADDRESS]	END SURVEY
2	No	

Geography

G1. Does your firm develop clean energy projects in states other than New York State?

	Response	Survey logic
1	Yes	Go to G2
2	No	Go to A1
3	Don't know	Go to A1

G2. What states do you target for developing clean energy projects?

	Response	Survey logic
1	[Textbox]	Go to G3

[Programming Note]

If more states selected than New York, Go to G3.
If only New York selected, Go to A1.

G3. Do you develop different types of clean energy projects in New York State than you do in other states?

	Response	Survey logic
1	Yes	Go to G3a
2	No	Go to A1
3	Don't know	
4	Prefer not to say	

G3a. How do your projects differ in the various states?

	Response	Survey logic
1	[Textbox]	Go to A1

Awareness of Clean Energy Finance and NYGB

A1. Are you aware of NYGB and its activities in the market place?

	Response	Survey logic
1	[Yes]	Go to A2
2	[No]	Go to DP1

A2. How did you first learn of NYGB? [pick one with other option]

	Response(s)	Survey logic
1	NYSERDA [Checkbox]	Go to A3
2	NYGB's website, or other information provided by NYGB (e.g., RFI, RFP, etc.) [Checkbox]	
3	Events that NYGB hosted or participated in. [Checkbox]	
4	Colleagues within my firm [Checkbox]	
5	Lender and/or investor outside of my firm [Checkbox]	
6	Project developer, ESCO, technology vendor [Checkbox]	
7	General media (social media, articles, interviews) [Checkbox]	
8	Industry trade group [Checkbox]	
9	NYS Governor's Office, NYSERDA, or NYGB announcements [Checkbox]	
10	Don't recall [Checkbox]	
11	Other, specify [Textbox]	

A3. How familiar are you with NYGB's services and financing products?

	Response	Survey logic
1	Familiar	Go to A4
2	Somewhat familiar	Go to A4
3	Not Familiar	Go to DP1
4	Don't know	Go to DP1
5	Prefer not to answer	Go to DP1

A4. Which NYGB services and financing products are you familiar with? Check all that apply.

	Response(s)	Survey logic
1	Construction facilities [Checkbox]	Go to A5
2	Bridge facilities [Checkbox]	
3	Term facilities [Checkbox]	
4	Warehousing/aggregation facilities [Checkbox]	
5	Credit enhancements [Checkbox]	
6	Not familiar with specific services or products [Checkbox]	
7	Prefer not to answer [Checkbox]	
8	Other [TEXTBOX]	

A5. Has your firm considered working with NYGB?

	Response	Survey logic
1	[Yes]	Go to DP1
2	[No]	Go to A6
3	Don't know	Go to A6
4	Prefer not to answer	Go to A6

A6. What would make it more likely for your firm to consider working with NYGB?

	Response	Survey logic
1	[Textbox]	Go to DP1

Description of Developer and Project Portfolio

DP1. Select the earliest year, from the options presented below, that best represents when your firm first became active in the following two activities:

		Year first active	Survey logic
DP1.A1.C1	Infrastructure or energy development, generally	No activity	END SURVEY
		2013, 2014, 2015, 2016, 2017, 2018	Go to DP2
		Prior to 2013	Go to DP2
DP1.A1.C2	Clean energy asset development, specifically	No activity	END SURVEY IF SAME AS DP1.A1.C1
		2013, 2014, 2015, 2016, 2017, 2018	Go to DP2
		Prior to 2013	Go to DP2

DP2. What types of clean energy technologies and projects has your firm considered developing and what types of technologies and projects has your firm completed a transaction since [DP1.A1.C2]?

DP2a. Why did your firm not complete the transaction?

		<PICK ONE> Considered/ completed transaction (DP2)	<If DP2 = considered then ask> Why did your firm not complete the transaction? (DP2a)
1	Bioenergy	[list option]	
2	Combined Heat and Power (CHP)	[list option]	
3	Electric Vehicle Infrastructure	[list option]	
4	Energy Efficiency	[list option]	
5	Energy Storage	[list option]	
6	Microgrids	[list option]	
	Solar PV		
7	Commercial & Industrial	[list option]	
8	Community Distributed Generation	[list option]	
9	Residential	[list option]	
10	Utility-scale	[list option]	
	Wind	[list option]	
11	Offshore	[list option]	
12	Small-scale Onshore	[list option]	
13	Utility-scale Onshore	[list option]	
14	Other	[Textbox]	
15	None of these	[list option]	

DP2b. [IF DP2A=Other] What "other" clean energy technologies and projects has your firm considered?

	Response	Survey logic
1	[Textbox]	Go to DP3

DP3. For each type of clean energy technology or project your firm has developed since [DP1.A1.C2], did your firm use any of the following financial products? Check all that apply.

	Response(s)	Survey logic
1	Construction facilities [Checkbox]	Go to DP4
2	Bridge facilities [Checkbox]	
3	Term facilities [Checkbox]	
4	Warehousing/aggregation facilities [Checkbox]	
5	Credit enhancements [Checkbox]	
6	Not familiar with specific services or products [Checkbox]	
7	Other [Textbox]	

DP4. In the past 12 months, approximately how many projects did your firm complete, by category? [Ranges are acceptable]

	Total number of transactions (#)	Past 12 months
1	All infrastructure or energy projects, generally	
2	All infrastructure or energy projects in New York State, generally	
3	All clean energy developments, specifically	
4	All clean energy developments in New York State, specifically	

DP5. What was the approximate average dollar value of those projects?

	Average dollar value of transactions (\$)	Past 12 months
1	All infrastructure or energy projects, generally	\$
2	All infrastructure or energy projects in New York State, generally	\$
3	All clean energy developments, specifically	\$
4	All clean energy developments in New York State, specifically	\$

DP6. How has your firm’s pipeline of clean energy projects changed in aggregate dollar value, from [DP1.A1.C1] to 2018? For example, your firm’s pipeline of infrastructure or energy projects has increased in value by 20% in the period with the value of clean energy projects increasing by 35% in the same period.

	Transaction type	% Change
1	All infrastructure or energy projects, generally	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]
2	All infrastructure or energy projects in New York State, generally	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]
3	All clean energy developments, specifically	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]
4	All clean energy developments in New York State, specifically	[Dropdown list increased by/decreased by/stayed the same/% Changed (Absolute)]

[Programming Note]

If D6 > 0% then [increase] in DP6a.
 If DP6 = 0% then [stay the same] in DP6a.
 If DP6 <.0% then [decrease] in DP6a.
 If DP6 = Don’t know, then skip to DP7.

DP6a. What was the main reason why the aggregate value of clean energy projects in your firm’s pipeline in New York State [increased/decreased/stayed the same] between [DP1.A1.C1] and 2018? [Pick one]

	Reason(s)	Main reason (DP6a) – limited to one response
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other	[Textbox]
11	No reason	[Exclusive]
12	Prefer not to answer	[Exclusive]

DP6b. What are some of the other reasons why the aggregate value of clean energy-related projects in your firm’s pipeline in New York State [increased/decreased/stayed the same] between [DP1.A1.C1] and 2018?

	Reason(s)	Other reason (b)
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other	[Textbox]
11	No other reason	[Checkbox]

DP7. Looking forward to 2019, how do you expect the share of clean energy projects in your firm’s New York State pipeline to change in the future, by aggregate value?

For example, you expect your firm’s overall pipeline to increase in value by 20% in 2019 with the value of clean energy projects increasing by 35% in the same period.
[Pick one]

	Response	Survey logic
1	Clean energy developments in New York State will increase	Go to DP7a
2	Clean energy developments in New York State will decrease	Go to DP7a
3	Clean energy developments in New York State will stay the same	Go to DP8
4	Not investing in 2019 [Checkbox]	Go to DP9
5	Don’t know [Checkbox]	Go to DP9

DP7a. You mentioned your firm’s pipeline of clean energy projects may change. By what percent do you expect it will increase or decrease?

		Response	Survey logic
1	Clean energy developments in New York State will increase	% Changed (Absolute)]	Go to DP8
2	Clean energy developments in New York State will decrease	[% Changed (Absolute)]	Go to DP8

[Programming Note]

If DP7 > 0% then [increase] in DP7a.
 If DP7 = 0% then [stay the same] in DP7a.
 If DP7 < 0% then [decrease] in DP7a.

DP8a. What is the main reason why the aggregate value of New York State clean energy projects in your firm’s annual pipeline will [increase/decrease/stay the same] in the future?

	Reason(s)	Main reason
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	Other	[Textbox]
11	No other reason	[Checkbox]

DP8b. Are there other reasons why the share of New York State clean energy projects in your firm's annual pipeline will [increase/decrease/stay the same] in the future? Check all that apply.

	Reason(s)	Other reason (b)
1	Increased availability of economically viable projects	[Checkbox]
2	Increase in credit-worthy project sponsors	[Checkbox]
3	Improvements in ROI	[Checkbox]
4	Improved performance data (counterparty, technology, asset class)	[Checkbox]
5	Improved standardized terms and practices	[Checkbox]
6	Favorable regulatory frameworks	[Checkbox]
7	Maturity/efficiency of technology	[Checkbox]
8	Decreased project/equipment costs	[Checkbox]
9	Increased focus on impact/social investing	[Checkbox]
10	No other reason(s)	[Checkbox]
11	Don't know	[Checkbox]
12	Prefer not to answer	[Checkbox]
13	Other	[Textbox]

[Programming Note]

[IF DP1.A1.C2 = NO ACTIVITY, SKIP TO DP10.].

DP9. Thinking about clean energy asset ownership, what proportion of your end use customers opted for ownership of the asset versus entering into a lease or PPA contract?

		% of asset ownership	If none or other
1	In [DP1.A1.C2]	[Enter %]	None/Do not work with third party owners/DK/NA
2	In 2018	[Enter %]	None/Do not work with third party owners/DK/NA

DP10. How important are the following project drivers in developing clean energy projects or to your clean energy project portfolio, generally?

	Project drivers	Influence on projects or portfolio
1	Energy efficiency programs or demand response programs offered by utilities	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
2	Other services or assistance offered by utilities	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
3	Changing regulatory requirements for energy efficiency and/or demand response	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
4	Availability of on-bill financing offered by utilities	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
5	Availability of PACE programs offer financing for renewable and energy efficiency projects	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
6	Interconnection requirements specified by regulators and/or utilities	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
7	Environmental and building permitting regulations	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
8	Overall regulatory environment	No influence/ Is moderately influential/ Is extremely influential / N/A / DK
9	Other	[Textbox] DP10a

DP10a. [If DP10 is other] What "other" project drivers are important in developing clean energy?

	Response	Survey logic
1	[Textbox]	Go to IR1

Financing Motivations

This section focuses on the underlying reasons project developers need access to capital from lenders.

IR1. Please describe some of the reasons why your firm seeks financing for clean energy projects.

1	Reason	Response
2	Inadequate capital for balance-sheet construction	[Checkbox]
3	Lack of tax appetite to monetize incentives	[Checkbox]
4	Desire to fully leverage capital to facilitate other developments	[Checkbox]
5	Leveraged returns for project sponsor	[Checkbox]
6	None	[Checkbox]
7	Other	[Textbox]
8	Don't know	[Checkbox]

IR2. Under what circumstances would your firm opt for project financing instead of corporate financing?

	Response	Survey logic
1	[Textbox]	IR3a

IR3. Thinking back to the past 12 months, how difficult has it been to secure the following forms of financing for clean energy projects?

		Past 12 months
1	Construction facilities	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
2	Bridge facilities	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
3	Term facilities	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
4	Warehousing/aggregation facilities	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
5	Credit enhancements	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA

IR3b. [SKIP IF DP1.A1.C2 = 2018] Thinking back to [DP1.A1.C2], how difficult was it to secure the following forms of financing for clean energy projects?

		[DP1.A1.C2]
1	Construction facilities	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
2	Bridge facilities	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
3	Term facilities	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
4	Warehousing/aggregation facilities	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA
5	Credit enhancements	Not difficult / Moderately difficult/ Extremely influential difficult/ Don't know or NA

Type of Financing

TY1 Please check the financing products your firm uses or has used to finance clean energy projects.

		Please check <u>all</u> the financing products your firm used to finance clean energy projects <u>in the past 12 months</u> .	Check <u>all</u> the financing products your firm used to finance clean energy projects in [DP1.A1.C2]
1	Construction facilities	[Checkbox]	[Checkbox]
2	Bridge facilities	[Checkbox]	[Checkbox]
3	Term facilities	[Checkbox]	[Checkbox]
4	Warehousing/aggregation facilities	[Checkbox]	[Checkbox]
5	Credit enhancements	[Checkbox]	[Checkbox]
6	Other	[Checkbox]	[Checkbox]
7	Not familiar with specific services or products	[Checkbox]	[Checkbox]
8	None	[Checkbox]	[Checkbox]

TY2. Approximately what share (as a percentage) of your firm's clean energy project developments were financed using the following financing products?
(Note: Answers may sum to over 100% if the transactions used more than one financing product.)

		Past 12 months	[DP1.A1.C2]
1	Construction facilities	0-100% (10% increments)	0-100% (10% increments)
2	Bridge facilities	0-100% (10% increments)	0-100% (10% increments)
3	Term facilities	0-100% (10% increments)	0-100% (10% increments)
4	Warehousing/aggregation facilities	0-100% (10% increments)	0-100% (10% increments)
5	Credit enhancements	0-100% (10% increments)	0-100% (10% increments)
6	Not familiar with specific services or products	0-100% (10% increments)	0-100% (10% increments)
7	None	0-100% (10% increments)	0-100% (10% increments)
8	Other	0-100% (10% increments)	0-100% (10% increments)

TY2a. [If TY2= other] As indicated in your previous response, please specify the "other" type of investment products that are used

		Response	Survey logic
1	In the past 12 months	[Number box]	Go to IR1
2	[DP1.A1.C2]	[Number box]	

Investment Process

P1a. Let's consider "application" as the point in time a proposal is submitted to a financial institution to seek financing and the "transaction execution" as the point in time financing is executed ("wet" or "dry").

Based on your firm's experience, please estimate the typical amount of time, in months, between application and transaction execution in the following years:

		Response	Survey logic
1	In the past 12 months	[Number box]	Go to P1b
2	[DP1.A1.C2]	[Number box]	

P1b. At what stage in a clean energy project's or asset's lifecycle did/does your firm prefer to seek financing?

		Response	Survey logic
1	In the past 12 months	[List option]	Go to P1c if response = other
2	[DP1.A1.C2]	[List option]	

Project stage
Early-stage development
Mid-stage development
Construction stage
Initial operation
Operating facility (asset)
Expansion of existing project
No preference
Other
Don't know

P1c. Please describe what "other" phase your firm prefers to seek financing?

		Response	Survey logic
1	In the past 12 months	[If Other – Textbox]	Go to P2 if P1b1 ≠ P1b2 else Go to MB1a
2	[DP1.A1.C2]	[If Other – Textbox]	

[Programming note]

If all 2013: past 12 months pairs do not match, Go to P2.
If all pairs *do* match, Go to MB1.

P2. What caused your firm to change when they prefer to seek financing between
[DP1.A1.C2] and the last 12 months?

	Response	Survey logic
1	[Textbox]	Go to MB1

Market Barriers

MB1. Which of the following market barriers have prevented your firm from developing more clean energy projects in the past 12 months?

		Level of barrier
1	Lack of economically viable clean energy projects, in general	LIST OPTIONS • Not a barrier • Moderate barrier • Significant barrier • Don't know • Not applicable
2	Lack of economically viable clean energy projects of sufficient size/scale	
3	Unfavorable tenor/maturity needs from project sponsor	
4	Limited market liquidity for this asset class	
5	Insufficient private sponsor equity	
6	Limited availability of tax equity investors	
7	Limited availability of financial hedging	
8	Less experienced project sponsors	
9	Creditworthiness of project sponsors	
10	Limited financial performance data	
11	Limited technology performance data	
12	Unattractive risk/return profile	

MB2. Which of the following barriers prevented your firm from developing more clean energy projects in [DP1.A1.C1]?

		Level of barrier
1	Lack of economically viable clean energy projects, in general	LIST OPTIONS • Not a barrier • Moderate barrier • Significant barrier • Don't know • Not applicable
2	Lack of economically viable clean energy projects of sufficient size/scale	
3	Unfavorable tenor/maturity needs from project sponsor	
4	Limited market liquidity for this asset class	
5	Insufficient private sponsor equity	
6	Limited availability of tax equity investors	
7	Limited availability of financial hedging	
8	Less experienced project sponsors	
9	Creditworthiness of project sponsors	
10	Limited financial performance data	
11	Limited technology performance data	
12	Unattractive risk/return profile	

NYGB is a State-sponsored, specialized financial entity working with the private sector to increase investments into New York's clean energy markets. NYGB works with clients and counterparties to address investment barriers in the current clean energy capital markets by providing a variety of approaches and transaction structures.

MB3. What, if any, additional market barriers or challenges has your firm encountered in the clean energy financing market that you believe NYGB could help overcome? Select a statement that best aligns with your opinion:

	Response	Survey logic
1	There are some barriers NYGB could help my firm overcome	Go to MB4
2	There are no additional barriers NYGB could help my firm overcome	End Survey
3	Don't Know	
4	Refused	

MB4. Finally, how could NYGB help overcome those barriers?

	Response	Survey logic
1	[Textbox]	End Survey

Thank you for your participation in this survey.

APPENDIX H. CASE STUDY INTERVIEW GUIDE

EE AND Solar Client Interviews

- Why did your project need third party financing?
- Your financing involved a conventional lender and a partnership with NYGB. Was it your lender's idea to engage NYGB? If not your idea or some other stakeholder?
- Were there other financing partners under consideration? Why did you decide to go with NYGB?
- What were you able to accomplish in your project because of NYGB involvement? Was there no deal forthcoming otherwise, or just a smaller one?
- Have you generally been satisfied with the overall project financing and the role of NYGB?
- If you had to do the financing again now, is there anything you would do differently? If so, why?
- Would you work with NYGB again, should the opportunity avail itself?

Lender Partner Interviews

- Smaller scale solar developers three or four years ago faced challenges securing both construction and long-term financing. How difficult, if at all, was that barrier in your entering into a transaction?
- Three or four years ago there was limited private capital provider interest in supporting distributed energy projects, given very little history and financing track records. How much of a barrier was that for you?
- Were there other financing partners under consideration? Why did you decide to go with NYGB?
- To what degree did partnering with NYGB help you overcome these barriers?
- In the fall of 2018, how formidable are these barriers today? Due to the developing track record in NYS? Other factors?
- In what specific ways did your engagement with NYGB help make this transaction work or work better?
- Does (or would) a secondary market for your portfolio of loans make a difference in your likely volume? Has NYGB's participation in securitization affected your marketing?
- Tell us how NYGB staff facilitated this project to make it better or faster?
- If you had to do the financing again now, is there anything you would do differently? If so, why?
- Would you work with NYGB again, should the opportunity avail itself?

APPENDIX I. SECONDARY DATA REFERENCES

NY Green Bank Documents

Quarterly Metrics Reports, Q3 2016 – Q4 2018.

Business Plan 2014-2018.

Metrics, Reporting, and Evaluation Plan Version 3.0, June 2016.

Transaction documents for portfolio including Green Light Memos, Transaction Profiles and Transaction Approval Memos.

Government and Trade Association Sources

America Wind Energy Association, AWEA WindIQ Database, 2018.

National Renewable Energy Laboratory, Annual Technology Baseline, 2018, <http://atb.nrel.gov/electricity/2018/index.html>.

New York Department of Environmental Conservation, Environmental Site Database, Accessed 2019, <http://www.dec.ny.gov/chemical/8663.html>.

New York Independent System Operator, Transmission Service Charges, <http://www.dec.ny.gov/chemical/8663.html>.

NYSERDA, Solar Electric Programs Dataset, 2000 – 2018, <https://data.ny.gov/Energy-Environment/Solar-Electric-Programs-Reported-by-NYSERDA-Beginn/3x8r-34rs>.

NYSERDA, 2018 New York Clean Energy Industry Report, 2018, <https://www.nyserdera.ny.gov/About/Publications/New-York-Clean-Energy-Industry-Report>.

NYSERDA, DER Performance Data, <https://der.nyserdera.ny.gov/data/>.

NYSERDA, Value of Distributed Energy Resources, <http://www.dec.ny.gov/chemical/8663.html>.

Solar Energy Industries Association, Major Solar Projects Directory, 2018, <http://www.seia.org/research-resources/major-solar-projects-list>.

Solar Energy Industries Association, National Solar Database, 2018, <http://www.seia.org/research-resources/national-solar-database>.

Solar Energy Industries Association, NY Solar Summary, March 2019, <https://www.seia.org/state-solar-policy/new-york-solar>.

Solar Energy Industries Association, US Solar Market Insight Report, March 2018, <http://www.seia.org/research-resources/us-solar-market-insight>.

Solar Energy Industries Association/Wood Mackenzie, U. S. Solar Market Insight, Q3 2018, Year-end 2017.

U.S. Energy Information Administration Electric Power, Electric Power Monthly, December 2018, <http://www.eia.gov/electricity/monthly/#generation>.

U.S. Energy Information Administration Electric Power, Primary Energy Consumption Estimates, 1960-2016, https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_use/total/use_tot_NYcb.html&sid=NY.

U.S. Energy Information Administration Electric Power, U.S. Battery Storage Market Trends, May 2018, <https://www.eia.gov/analysis/studies/electricity/batterystorage/>.

U.S. Securities Exchange Commission, Plug Power, 10-K for fiscal year ending 12/31/2018, US Securities Exchange Commission, 2019.

U.S. Securities Exchange Commission, Vivint Solar, 10-K for fiscal year ending 12/31/2018, US Securities Exchange Commission, 2019.

U.S. Securities Exchange Commission, Sunrun, 10-K for fiscal year ending 12/31/2018, US Securities Exchange Commission, 2019.

U.S. Securities Exchange Commission, Bank of America, 10-K for fiscal year ending 12/31/2018, US Securities Exchange Commission, 2019.

U.S. Securities Exchange Commission, NRG Renew, 10-K for fiscal year ending 12/31/2018, US Securities Exchange Commission, 2019.

U.S. Securities Exchange Commission, Merrill Lynch, 10-K for fiscal year ending 12/31,2018 US Securities Exchange Commission, 2019.

Research Reports

Barbose, Galen and Naim Darghouth, “Tracking the Sun – Installed Price Trends for Distributed Photovoltaic Systems in the U.S. – 2018”, Berkley Labs, September 2018, <https://emp.lbl.gov/tracking-the-sun>.

Bloomberg New Energy Finance, “Clean Energy Investment Trends”, 2017, <https://data.bloomberglp.com/bnef/sites/14/2018/01/BNEF-Clean-Energy-Investment-Investment-Trends-2017.pdf?elqTrackId=2e6e6b2aa1f946bca67cd74d9e20babb&elq=b4bc4a4f1fe649c89f85ec1318feb73f&elqaid=10316&elqat=1&elqCampaignId=>.

Coleman, Kieran et al., “Financing Community-Scale Solar: How the Solar Financing Industry Can Meet \$16 Billion in Investment Demand by 2020”, Rocky Mountain Institute, 2017.

DNV GL, “Battery Energy Storage Study for the 2017 IRP”, 2016.

DNV GL, “United States Wind Capital Cost Benchmarking,” 2018.

Feldman, David and Paul Schwabe, “Terms Trends and Insights on PV Project Finance in the United States”, National Renewable Energy Laboratory, 2018.

Fitzgerald, Garrett, James Mandel, Jesse Morris, Herve Touati; “How Multi-Use, Customer-Sited Batteries Deliver the Most Services and Value to Customers and the Grid”, Rocky Mountain Institute, October 2016, <https://rmi.org/wp-content/uploads/2017/03/RMI-TheEconomicsOfBatteryEnergyStorage-FullReport-FINAL.pdf>.

Hart, David and Alfred Sarkissian; “Deployment of Grid-Scale Batteries in the United States”, George Mason University, June 2015, <https://www.energy.gov/sites/prod/files/2017/01/f34/Deployment%20of%20Grid-Scale%20Batteries%20in%20the%20United%20States.pdf>

Lazard, “Lazard's Levelized Cost of Energy Analysis - Version 11.0”, November 2017, <https://www.lazard.com/media/450337/lazard-levelized-cost-of-energy-version-110.pdf>.

Marathon Capital, “The Solar Securitization Opportunity”, March 2016, <https://www.marathoncapital.com/news/the-solar-securitization-opportunity>.

Margolis, R. and D. Feldman, and D. Boff, Q4 2016/Q1 2017 Solar Market Update, National Renewable Energy Laboratory, 2017, <https://www.nrel.gov/docs/fy17osti/68425.pdf>

Martin, Keith, Moderator, “Current Issues in Community”, Solar, Infocast Community Solar 2.0, New Orleans, November 2018, <https://projectfinance.law/publications/current-issues-in-community-solar-projects>

Mazzucato, Mariana and Gregor Semieniuk, Technological Forecasting and Social Change, Volume 127, “Financing Renewable Energy: Who is Financing What and Why it Matters”, February 2018, <https://www.sciencedirect.com/science/article/pii/S0040162517306820#bb0065>.

Mond, Allison, “Beyond SolarCity, Vivint Solar and Sunrun: Who Is Actually Growing in the Residential Solar Market?” GTM Research, January 10, 2018, <https://www.greentechmedia.com/articles/read/beyond-solarcity-vivint-solar-and-sunrun-residential-solar-market-long-tail#gs.AVYaD=E>.

Mond, Allison, “Solar securitizations expected to pass \$1 billion in 2017”, GTM Research, November 2017, <https://www.greentechmedia.com/articles/read/solar-securitizations-expected-to-pass-1-billion-in-2017#gs.QLp8fINu>.

Norton Rose Fulbright LLP, .Infocast Community Solar 2.0 Conference, November 2018, <https://projectfinance.law/publications/current-issues-in-community-solar-projects>.

Norton Rose Fulbright LLP, Proceedings of the 2017 Wall Street Renewable Energy Finance Forum, 2017.

Rosenberg, Mitchell and Gomathi Sadhasivan, “Here Comes the Sun, Maybe”, Proceedings of the ACEEE Summer Study on Energy Efficiency in Buildings, 2018.

Schwabe, Paul and David Feldman, National Renewable Energy Laboratory, “Solar Lending Practices by Community and Regional Financial Institutions”, June 2018, <https://www.nrel.gov/docs/fy18osti/71753.pdf>.

Solichamba, Cedric Brehaut, Omnidian, “The Code to Closing Today's Residential Solar Deals”, GTM Research, March 2018, http://www2.greentechmedia.com/1/264512/2018-03-06/5kf77?utm_source=Website&_ga=2.129657739.662327630.1539711446-1430265389.1539711446.

Solichamba, Cedric Brehaut, GTM Research, “Global Solar PV O&M 2017-2022”, December 2017, https://groups.dnvgl.com/sites/APAC_Solar/KnowledgeBase/Greentech%20Media%20Research%20Reports/2017-12%20Global%20Solar%20PV%20OM%20Landscape%202017-2022/Global%20Solar%20PV%20OM%202017%20-%20Report.pdf.

Weaver, John, “Cash is king in residential solar, long live the lease!” PV Magazine, November 14, 2018, <https://pv-magazine-usa.com/2018/11/14/cash-is-king-in-residential-solar-long-live-the-lease/>.

Wood Mackenzie, Power and Renewables: Energy Storage, Global Wind Markets and Global Solar Markets Databases, 2018.

Company Website Sources

Bank of America, “How We Deploy Capital for Clean Energy”, Bloomberg Interview with Bank of America Vice Chairman Anne Finucane, April 30, 2018, <https://about.bankofamerica.com/en-us/partnering-locally/bnef-finucane.html#fbid=PJ9PIVRNOv6>.

Bank of America, “Bank of America Announces Industry-leading \$125 Billion Environmental Business Initiative”, July 27, 2015, <https://newsroom.bankofamerica.com/press-releases/environment/bank-america-announces-industry-leading-125-billion-environmental>.

Bank of America, “Bank of America Issues Fourth and Largest Corporate Green Bond for \$2.25 Billion”, May 17, 2018, <https://about.bankofamerica.com/en-us/green-bond-overview.html#fbid=PJ9PIVRNOv6>.

Clean Edge, Inc., “Index Overview”, 2019, <https://cleanedge.com/>.

LA Times, “Lyft Buys Motivate, the Nation’s Biggest Bike Share Business”, July 2, 2018, <https://www.latimes.com/business/technology/la-fi-tn-lyft-bikes-motivate-20180702-story.html>.