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NY Green Bank
Market Transformation Study

BQ Energy Case Study
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Prepared by

DNV·GL

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1 NY GREEN BANK – BQ ENERGY TERM LOANS: CASE STUDY OVERVIEW

NY Green Bank. NY Green Bank ("**NYGB**") is a $1.0 billion investment fund designed to accelerate clean energy deployment in NYS and is globally recognized as a leading sustainable infrastructure investor. NYGB's participation in a growing number of transactions spurs clean energy development in NYS ("**NYS**" or the "**State**"), with benefits for New York residents and more broadly. NYGB is a division of the NYS Energy Research and Development Authority ("**NYSERDA**").

Since its formation, NYGB has worked to increase the size, volume and breadth of sustainable infrastructure investment activity throughout the State, expand the base of investors focused on NYS clean energy 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 overcome typical clean energy investment barriers. These barriers include challenges in evaluating risk and addressing the needs of distributed energy and efficiency projects where underwriting may be oriented toward larger opportunities and/or toward groups of somewhat homogeneous investments that make up larger portfolios.

NYGB invests where there are limited precedents, less familiar asset structures and/or deal structuring complexities that require specialized skillsets. NYGB applies project and structured finance transaction approaches that isolate project assets, allocate and protect against downside risks to the greatest possible extent and monetize low volatility project-generated cash flows to generate appropriate risk-adjusted returns.

NYGB focuses on 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 sustainable infrastructure landscape, NYGB moves on to other areas that have received less investor interest.

① NY Green Bank
A Division of NYSERDA

- Initiated Operations: 2014
- First Financing Transaction: 2015
- Financings through 2018: 44
- Number of Counterparties: 55
- Capital Committed: $637.6 million
- Cost of Projects Financed: $1.51 – $1.75 billion

② **BQ ENERGY (BQE) CONSTRUCTION-TO-TERM LOAN CASE STUDY**

2015: NY Green Bank agrees to provide construction and long-term lending for up to 8 community solar projects built on municipal and industrial brownfield sites.

2016: NY Green Bank and BQE close first project financing.

2017 – 2019: NY Green Bank and BQE close 4 additional projects. Others are in development.

Total portfolio financed to date:

- Capital Committed: $23.1 million
- Project Costs: $31.9 million
- Capacity Installed: 18.0 MW

Projects have performed financially as planned.

One bank has participated in financings to date. Two others are assessing participation.

BQ Energy Case Study. DNV GL developed this case study of NYGB's financing of BQ Energy ("**BQE**") projects as one aspect of the first independent study of NYGB's impact, conducted as part of customary and ongoing evaluations commissioned by NYSERDA with respect to its programs

and divisions. The purpose of this and other case studies is to provide a more detailed narrative of NYGB's involvement in individual transactions and to identify the impact of those transactions on the State's clean energy sector and participants more broadly, including project developers and the financiers that support their activities.

In the BQE transaction, NYGB provided a construction and term loan facility for a portfolio of commercial/industrial solar photovoltaic projects to be built on municipal and industrial brownfield sites. The portfolio had attracted insufficient interest from traditional institutional capital due primarily to its small size and the complexity of its underlying projects. NYGB was able to commit financing to support BQE's portfolio of small (< 10.0 MW) solar projects by promoting a standardized approach – including uniform contracts, identical equipment, and standardized underwriting. NYGB and BQE closed the construction-to-term loan agreement for the first project in 2016 and have since completed four additional financings. Three new projects in the portfolio are under active development. Through the transactions with BQE, NYGB has demonstrated the feasibility and financial viability of financing solar projects on brownfield sites, of which there are thousands in New York State.

Market Effects Assessment. BQE operates in a market consisting of small (< 10 MW) solar PV generation plants that convey the economic value of their electricity output directly to end-users located off-site through bilateral contracts. The end use customers, often referred to as **off-takers**, pay for a contractually-specified amount of the plant's output at a rate that the plant's operator sets, which is usually below the corresponding rate from the local distribution utility. The off-takers receive a credit against their utility electric bill for the value of the amount of electricity for which they have contracted. This arrangement enables the owners and operators of small distributed generation plants to sell their output without undertaking the risk and expense of participation in the wholesale electricity market.

There are two distinct segments of this market In New York State, defined largely by the number of off-takers.

- Community Distributed Generation ("**CDG**") refers to projects that serve at least 10 and usually more off-takers, organized by CDG sponsors. Sponsors may include municipalities, civic groups, and Community Choice Aggregation groups. This last category refers to groups of cities and towns that join together to create a pool of customers for a CDG project and negotiate on their behalf with a distributed generation project owner. This report refers to CDG projects as 'community solar.'
- Commercial/Industrial Solar refers projects sponsored by commercial or industrial energy customers, whereby they designate net metering credits from equipment located on property they own or lease to another meter within the same utility territory and load zone. Generally, these arrangements involve only one off-taker (potentially with more than one facility). This is the approach used by BQE. This report refers to such projects as commercial/industrial solar.

Despite important differences between these two categories in terms of business model and regulation, policy makers, developers, financiers, and the industry press tend to group them together under the rubric "community solar."

New York State's legal and regulatory framework for community and commercial/industrial solar projects has evolved rapidly over the past decade. Key recent milestones in this process include:

- Enactment of legislation to authorize remote net metering (2011);
- Issue of regulations defining CDG processes and the role of utilities in those processes (2015);
- Reworking of net metering rules, caps on capacity, and compensation systems in the Value of Distributed Energy Resources case (2015 – present); and
- Establishment of authorization and procedures for community choice aggregation (2015).[1]

While there is some evidence of the effect of NYGB's activities on the development of community and commercial/industrial solar market it is difficult to demonstrate broader influence at this early stage of the market's evolution. Given the scope of NYGB's activities supporting community and commercial/industrial solar projects, DNV GL anticipates evidence of NYGB's influence will become stronger in subsequent phases of the evaluation. Table 2. summarizes evidence collected to date of NYGB's influence on the evolution of the market for community and commercial solar project finance.

Table 1. Evidence of Market Development: Financing for Community and Commercial/Industrial Solar Projects

Market Indicators	Evidence
Knowledge of and confidence in clean energy investments among financial institutions.	• The Principal of BQE interviewed for this case study expressed confidence that the company's project experience would influence banks to lend to similar solar projects. • Developers not participating with NYGB also reported increased interest in community and commercial/industrial solar projects among investors and financial institutions.
Increase in the volume of clean energy project financing	• Developers reported in several conference proceedings that investor and lender interest in smaller community and commercial/industrial solar projects had increased to the point that access to capital constituted less of a market barrier than regulatory and business model factors.

[1] See Section 2.1 for a description of each of these regulatory developments, discussion of their implications for the community and commercial/industrial solar markets, and references.

Table 1 (continued). Evidence of Market Development: Financing for Community and Commercial/Industrial Solar Projects

Increase in the number and type of investors and financial institutions in the market	• Developers reported consistent expansion in the number and type of equity investors and lenders participating in community and commercial/industrial solar project financing between 2015 and 2018. • This trend was also observed in NYGB's portfolio of community solar projects.
Availability of favorable financing terms	• Developers report that interest rates and rates of return for equity investments have remained high for community and commercial/industrial solar projects, versus downward trends observed in (more mature) securitized residential project financing markets. • Interest rates offered to BQE (measured as the increment over the LIBOR benchmark) did not decrease over the past 3 years. • According to developers, this trend reflects financiers' perception of risk in community and commercial/industrial projects and project portfolios.

The remainder of this case study describes NYGB's involvement with BQE and discusses the indicators of NYGB's impact on BQE's success and the development of the market for community and commercial/industrial project solar financing more broadly.

2 CASE STUDY: BQ ENERGY BROWNFIELD SOLAR PROJECTS

BQE is a NYS-headquartered developer of renewable energy facilities on closed landfills and other "brownfields" owned by municipalities or commercial/industrial entities. In 2015, the principals of BQE approached NYGB to participate in the financing of a pipeline of eight solar PV plants that were in various stages of development on municipal landfill and brownfield industrial sites across the state. BQE had completed a 1 MW solar PV installation on a remediated landfill owned by the Town of Patterson, NY in 2014. The first project in the new series was to be located at the same facility. Its output was to be purchased via a Remote Net Metering Credit Agreement ("**RNMCA**") by a non-profit institution located in New York's Hudson Valley. NYGB provided the construction and term loans needed to complete the project and agreed to work with BQE on subsequent projects, each of which would be treated as a separate transaction. BQE and NYGB have streamlined project development and underwriting processes by standardizing component agreements, documents, and procedures to incorporate lessons learned from the preceding transactions.

Between March 2016 and August 2018, BQE completed financial transactions for five brownfield solar projects with a combined capacity of 18.04 MW. In three cases, the

municipalities where the facilities were located served as the off-takers. The off-takers for the other two transactions were not-for-profit organizations with extensive campuses. NYGB provided the construction loans for all five projects and term lending for three of them. The remaining two facilities obtained long-term project financing through a sale/leaseback arrangement negotiated with a commercial bank.[2]

This case study characterizes the market for community and commercial/industrial solar (Section 2.1), describes NYGB's participation in the BQE projects and the ways NYGB enabled the growth of BQE's portfolio (Section 2.2) and assesses the evidence of the effect of NYGB's lending activity on the growth and financing of these types of solar facilities in New York (Section 2.3).

2.1 Market Characterization and Barriers

Definition of the Market. As used in this report, the terms "community solar" and "commercial/industrial solar" denote a broad range of solar PV plants that are connected directly to the utility grid and share the following characteristics:

- Sized 400 kW to 10 MW; and
- Sell or convey the value of their output to nearby customers under long-term contracts.

Beyond these similarities, this asset class encompasses diverse ownership structures and capital funding schemes. Off-takers include individual public and private sector facility owners, municipal utilities and electric coops, and aggregation groups that in turn serve individual customers or subscribers.

Advocates identify several advantages that the approach holds over customer-sited (behind-the-meter) projects on the one hand, and utility scale projects on the other. These include:[3]

- **Cost-effectiveness**. The installed cost per kW for projects in this size class is nearly 40% lower than behind-the-meter projects. These projects connect directly to the distribution system, thus avoiding transmission costs. These costs vary monthly and by location. In February 2019, they varied from $2.19 to $5.25 per MWh across NYS.[4]
- **Flexible siting and grid benefits.** Community-scale solar plants require relatively little land. The principals of BQE estimate that there are over 3,500 municipal sites in NYS that could accommodate community solar plants – including sites in areas with constrained transmission capacity.[5]

Size of the market. Community and commercial/industrial solar constitute a relatively new asset class. The Solar Energy Industry Association's annual US Solar Market Insight Report first

[2] Sale leaseback is a form of transaction by which a project developer purchases an asset, sells it to an investor, and enters into a lease for use of the asset. This approach conveys tax incentives associated with ownership to the investor and provides flexibility for financing additional projects to the developer.

[3] Kieran Coleman, et al., *Financing Community-Scale Solar: How the Solar Financing Industry Can Meet $16 Billion in Investment Demand by 2020* (Basalt, CO: Rocky Mountain Institute, 2017).

[4] New York Independent System Operator, Transmission Service Charges, https://www.nyiso.com/billing-rates.

[5] It is difficult to corroborate this estimate from independent sources. The New York Department of Environmental Conservation lists 5,104 brownfield sites in various stages of remediation. http://www.dec.ny.gov/chemical/8663.html.

reported on community solar projects in 2013. The report for Q3 2018 estimated that community solar plants total 1,294 MW, or about 2.2 percent of the total installed PV capacity nationwide. In 2017, community solar facilities accounted for roughly 400 MW or 3.8 % of the total capacity installed in the US that year.[6]

NY-Sun maintains a public database of PV projects that have received support from NYS agencies since 2000. The record for each project contains information on the market sector of the project owner (residential, non-residential, commercial), the nameplate capacity of the system, status (complete, in pipeline), project cost, name of developer, indicators of whether the project was part of a CDG transaction and/or sold its output through a RMNCA, the date of the application, and the date of completion. The database records were not complete in all cases. DNV GL found, for example, that the records for most projects in the NYGB portfolio did not contain information on whether they fell in the CDG category or sold their output through a RMNCA.

Review of the database yielded the following observations on the development of the community and commercial/industrial solar market in New York State. Table 2 displays the number of projects in various categories for which NY-Sun incentive applications were submitted by year and status. All projects described in Table 2 fall in the 400 kW – 10 MW capacity range.

- Number of projects in the size category. This section of Table 2 displays the number of projects in the 400 kW – 10 MW size range without regard designation as CDG or remote net metering. The database recorded the first project in the Community Solar size range in 2012. Through December 2018, the database recorded 575 projects. Of those, 261 were designated as CDG and 56 as having RNMCAs. The remaining 258 project records contained no information on the number or type of off-takers or whether the facility participated in the wholesale market. Thus, it is not possible to determine whether those records represent community or commercial/industrial solar projects. DNV GL found that all projects in the NYGB portfolio that received NY-Sun incentives were represented in the database. However, none of the projects with remote net metering were designated as such, and only one of CDG projects was so designated. Thus, the numbers in Table 2 for CDG and commercial/industrial projects are likely to be understated.[7]

- Number of CDG projects. The database recorded the first, small (99 kW) project identified as CDG in December 2014. No projects were recorded in 2015. Development activity began in earnest in 2016, when developers submitted incentive applications for 69 projects. Through December 2018, 368 projects identified as CDG were recorded in the NY-Sun database, of which 54 were designated as complete. Many of the early projects were relatively small – 200 kW or less.

- Number of Commercial/Industrial projects. The database recorded the first application for a commercial/industrial project with remote net metering and capacity $\geq$ 500 kW in 2015. Between 2011 and 2014, the database records 191 other projects with remote net metering. However, these were small projects (average size 65 kW), most likely

[6] SEIA/Wood Mackenzie. U. S. Solar Market Insight. Q3 2018, Year-end 2017.
[7] DNV GL counted the projects in the NYGB portfolio as CDG or commercial/industrial in compiling Table 2.

commercial roof-top installations that conveyed net metering credits to neighboring facilities owned by the owner of the building with the solar installation. Through December 2018, 481 remote net metering projects were recorded in the NY-Sun database, of which 436 were designated as complete. However, only 56 of these facilities were in the 400 kW to 10 MW size range.

- Trends in volume of applications. The pace of project development activity, as measured by the number of applications submitted each year dropped rapidly in 2018. As discussed in Section 2.3, this is likely due to decreases in the level of NY-Sun incentives and uncertainty over the outcome of regulatory proceedings on net metering and the value of distributed energy resources.

Table 2. Summary of Community and Commercial/Industrial Solar Project Development Activity in NY State: June 2015 – February 2019[8]

Project type	Prior to 2015	2015	2016	2017	2018	Total
All 400 kW to 10 MW capacity						
Complete	104	38	84	33	8	267
Pipeline	3	5	71	179	50	308
Total	107	43	155	212	58	575
CDG (Community) Solar						
Complete			8	11	1	20
Pipeline			52	160	29	241
Total			60	171	30	261
Commercial/Industrial Solar with Remote Net Metering						
Complete		4	7	1	2	14
Pipeline		1	41			42
Total		5	48	1	2	56

Source: NY-Sun Project Database

Other observations developed through analysis of the NY-Sun database include the following.

- Developers active in the market. Through 2018, 110 developers had submitted NY-Sun incentive applications for projects in the 400 kW – 10 MW size range. Of those 40 had submitted applications for multiple projects. Ten developers had submitted applications

[8] Projects reflected in Table 1 include those identified as "Community Distributed Generation" in the database, plus projects with remote net metering credit agreements *and* installed capacity >400 kW.

for commercial/industrial projects in the size category, and 42 developers had submitted applications for CDG projects.

- Rate of Project Completion. Among all projects in the 400 kw – 10 MW size range for which NY-Sun incentives were submitted since January 2016, 29% were designated as complete. Among community solar projects initiated in the same time frame, only 8% are designated as complete. For commercial/industrial projects, the completion rate is 15%. These results suggest that community and commercial/industrial solar projects face stronger barriers to development and completion than other projects in the same size category. Developers with applications for community and commercial/industrial solar projects in the NY-Sun database have completed projects representing roughly one-third of total capacity in those applications. This finding reflects the generally larger size of these projects compared to behind-the-meter commercial and industrial projects.

NYS Programs and Policies Affecting Community and Commercial/Industrial Solar Development. The NYS legislature, New York State Public Service Commission ("**PSC**"), and New York's Governor, represented primarily by NYSERDA, have worked over the past two decades to foster the development of small-scale distributed electricity generation. The following summarizes the major components of those efforts that affect community and commercial/industrial solar development:

- Compensation of Distributed Energy Resources: Net Metering and the VDER Framework. The legislature and the PSC first established net metering rules for distributed energy projects in 1997. Net metering authorizes and establishes technical requirements and pricing for the delivery to the grid of electricity produced by distributed generators but not used by the host site (net excess generation or "**NEG**"). Through a process initiated in 2015, the PSC significantly revised the methods by which NEG is priced, to better reflect its value to the electricity system. These changes were summarized in a decision dated March 2017 and implemented in a decision dated September 2017.[9] One general effect of these changes was to reduce somewhat the compensation to the host site for NEG for projects that had not signed interconnection agreements with their local utilities by July 2017. The 2017 rules also limited access for facilities with net metering to monetize benefits through the Renewable Energy Credit system.[10]

- Remote Net Metering. Remote net metering for renewable energy systems enables the owner of a distributed energy resource to credit the value of electricity it generates to multiple utility accounts. Pursuant to 2011 state legislation, utilities must allow farm and non-residential customers the ability to apply any excess net metering credits they earn to other accounts they own. The account to which the renewable energy system is connected is called the Host Account. The account or accounts that will receive the

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

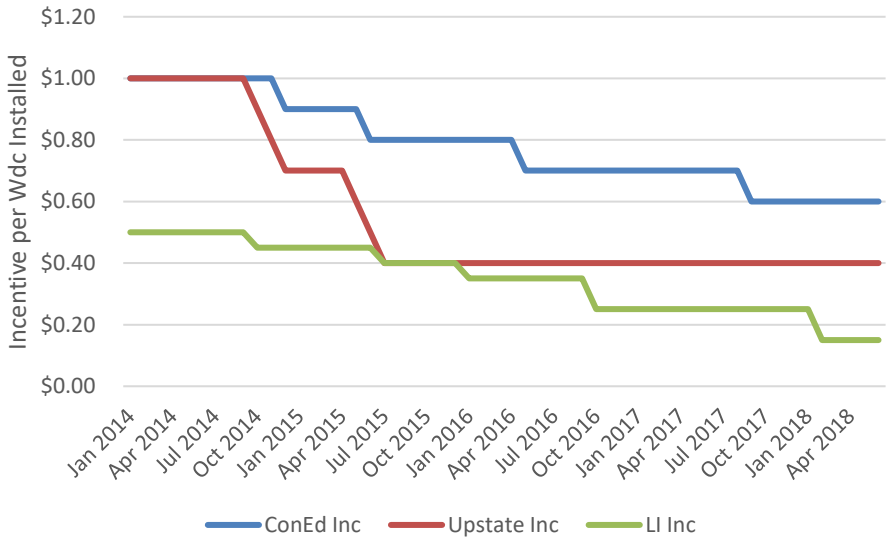
[10] The net metering and Value of Distributed Energy Resources proceedings yielded a complex set of rules with important consequences for the development of community and small-scale commercial solar projects. See the summary presentation on NYSERDA's VDER webpage for an overview. https://www.nyserda.ny.gov/All-Programs/Programs/NY-Sun/Contractors/Value-of-Distributed-Energy-Resources.

excess net metering credits are called the Satellite Account(s). All Satellite Accounts must be in the same name as the Host Account, from the same service utility, and must be located reasonably close to each other. BQE used the remote net metering framework to establish agreements with off-takers to receive bill credit for the electricity produced at BQE's brownfield projects.

- Community Distributed Generation Program and Practices. In September 2015, after extensive hearings and workshops, the PSC issued an order defining acceptable practices for developing CDG projects as well as the roles and responsibilities of the various parties in those efforts.[11]

- Megawatt Block Incentive Program. The Megawatt Block program offers capital incentives for qualifying solar PV projects. The incentives are offered in tranches that decline in value as successive "blocks" are committed. The amount and unit value of the blocks vary by region (Long Island, where non-residential block incentives expired in February 2019, Con Edison territory, and upstate NY) to reflect regional differences in construction costs and the value of distributed energy resources. Figure 1 displays the value of the Megawatt Block incentives per Watt installed for the three regions from inception of the program through June 2018. The Megawatt Block program committed $252.1 million to community and commercial/industrial solar projects through February 2019, of which $16.5 million was associated with completed projects.

Figure 1. Megawatt Block Incentives for Non-Residential Projects by Region and Month



- Market Development Programs. NYSERDA offers several other programs and support activities aimed at developing the market for community solar. These include qualification of contractors to participate in the Megawatt Block program, preparation of

[11] State of New York Public Service Commission. CASE 15-E-0082 - Proceeding on Motion of the Commission as to the Policies, Requirements and Conditions for Implementing a Community Net Metering Program. Order Establishing a Community Distributed Generation Program and Making Other Findings. July 17, 2015.

guidebooks for customers and contractors, and provision of technical support to municipalities interested in supporting the organization of community solar projects.

- Community Choice Aggregation. The PSC authorized Community Choice Aggregation ("**CCA**") in March 2016. CCA enables local governments to procure energy supply services and distributed energy resources for eligible energy customers in their cities and towns. Customers may opt out of the procurement to receive service from their local utility or another retail provider, while retaining transmission and distribution service from the utility. As of the end of 2018, four CCAs had been established in New York, serving roughly 55 municipalities.[12] CCAs may purchase electricity from community solar facilities and market it to their members. The "opt-out" provision has the potential to reduce the costs of customer acquisition, especially for community solar developers who target residential end users.

Barriers to growth in financing for Community and Commercial/Industrial Solar Projects. Despite the public support for community and commercial/industrial solar projects described above, market participants and industry reports cite small transaction sizes, project complexity and high perceived risk as continuing barriers to financing of community solar by traditional lenders.[13] For example, the number of contracts that must be agreed and executed between community solar developers and their counterparties illustrates the issue of project complexity:

- RNMCA with the off-taker.
- Equipment lease with the off-taker to ensure qualification for remote net metering credits.
- Ground lease with the municipality for use of the land.
- Construction contract with the electrical construction company.
- Coordinated Electric System Interconnection Review approved by the distribution utility.
- Construction contract with the distribution utility for interconnection facilities. The cost of these facilities average $150,000 - $350,000 and can vary greatly by project.[14]

At a recent conference on community solar development and finance, developers active in NYS identified the following two major risk factors to successful project completion:[15]

- Remote Net Metering Credit Agreements. The RNMCA carries considerable risk. Given the typical size of community and commercial/industrial solar projects, even relatively small deviations from planned revenue realization or costs can sharply affect cash flows available to pay back investors. These risks can be particularly difficult to mitigate in projects targeting residential customers. Developers report that they must offer discounts

[12] State of New York Public Service Commission. PSC Approves 4th Community Choice Aggregation Plan for Upstate New York, Expanding Options for Clean, Affordable Energy. March 15, 2018.
[13] Coleman, op. cit.
[14] National Renewable Energy Laboratory and Borrego Solar, Estimating Interconnection Cost for Distribution-Scale Photovoltaic Systems. https://www.nrel.gov/solar/assets/pdfs/dg-workshop-banton.pdf.
[15] 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.

of at least 10% below standard utility rates to attract customers.[16] To contain customer acquisition costs, developers and aggregators have found that they must forego credit checks and allow customers to terminate contracts after a relatively short period, such as a year. These marketing requirements shift risk to developers and their financiers. Developers have identified risk mitigation strategies, such as over-enrollment of capacity, so that qualified customers can be substituted quickly for customers who terminate their contracts. Projects with residential end customers also face the risk of delays in collecting payments, because residential customers generally pay the utility, which remits the payment due to the developer. These risks are less pronounced for commercial customers, such as those served by BQE, which are generally willing to accept longer contract periods. As part of its transactions with NYGB, BQE has standardized many of its customer agreements and worked out acceptable risk mitigation approaches with NYGB, including identifying alternative off-takers.

- Interconnection Facility Construction. Community and commercial/industrial solar developers in NYS report that it has been difficult to schedule interconnection construction due to long queues for service from utility distributed generation and engineering staff. This has complicated the sequencing of steps required to put project components in place in a timely fashion thereby containing development costs.

These challenges help explain the relatively low rate of completion for community and commercial/industrial solar projects discussed above.

Financing for Community and Commercial/Industrial Solar Projects. The project financing resources available to community and commercial/industrial solar developers have evolved rapidly since the emergence of this asset class in 2013. At first, these installations were financed primarily by small, unregulated financial institutions, including family funds and private partnerships. Larger companies and financial institutions entered the market soon thereafter. NRG, one of the largest developers of wind and solar projects, entered the market in 2015 with several small projects in Massachusetts. In November 2017, NRG's treasurer reported at a conference that the company was expanding its project pipeline in the community solar segment and had attracted the participation of two banks, at least one of which was interested in syndicating the debt to other banks. The moderator of the session reported personal knowledge of five tax equity transactions for small community solar projects.[17] At a conference held in November 2018, representatives of developers and aggregators on a panel addressing "Current Issues in Community Solar" identified a broader range of investors in their projects, including regional commercial banks, investment bank specialty lending departments, and tax equity partnerships.[18]

All the panellists agreed that there was no shortage of investors interested in the community and commercial/industrial solar markets. However, the regulatory and business model barriers mentioned above continued to slow development. As one developer remarked, "Capital is plentiful. The challenge is, we have a job to do to educate the various sources of capital so they become familiar with how community solar works."

[16]Martin, 2018. Op. cit.
[17] Proceedings of the 2017 Wall Street Renewable Energy Finance Forum, Norton Rose Fulbright LLP.
[18] Martin, op. cit.

The panellists also agreed that projects needed to be packaged into portfolios of 15 – 20 to support the transaction costs required to engage outside investors. They also noted that investors were becoming sufficiently comfortable with community solar transactions to accept smaller portfolios than they had in the past. They expressed the opinion that community solar projects were too small and varied to support securitization. These observations were echoed by Paul Curran, a principal of BQE whom DNV GL interviewed for this case study.

The pattern of broader participation of financial institutions in community and commercial/industrial solar project financing is also visible in NYGB's portfolio. A commercial bank participated in the most recent BQE project financing through a sale/leaseback arrangement for the solar installation. Two other term loan transactions completed in 2017 and 2018 included a bank and an insurance company as tax equity investors. In a third, NYGB joined a lending syndicate that included two commercial banks. BQE has initiated discussions with several lenders to explore refinancing the term loans issued by NYGB.

NYGB Activity in Community and Commercial/Industrial Solar. Since beginning financing operations in 2015, NYGB has dedicated considerable organizational and financial resources to the community and commercial/industrial solar market. NYGB has provided a range of financial products to meet the specific needs of seven project developer counterparties. These include:

- Bridge Loans for Interconnection Costs. NYGB created bridge loan facilities for three developers to finance interconnection advance payments due to utilities under the Standardized Interconnection Requirements ("**SIR**"). The SIR requires advance deposits by interconnection applicants of 25% of estimated interconnection upgrade expenses. Interconnection applicants have 120 business days to deposit the remaining 75% of interconnection upgrade expense to the utility. NYGB provides bridge loans to finance the initial 25% deposit, which facilitates project development to the point that construction lending can be underwritten. In the absence of a bridge loan, a developer would need to use equity for the deposits, which would slow the overall pace of project development and tie up expensive financial resources.
- Construction Lending. NYGB provided construction loans to five of the seven developers of community and commercial/industrial solar projects in its portfolio to expedite and finance completion of their projects.
- Term Loans and Refinancing. NYGB provided term loans to finance new projects and to refinance existing projects so that developer capital could be freed up for additional projects.

Between April 2016 and December 2018, NYGB committed $143.6 million to community and commercial/industrial solar projects with a total capacity of 108 MW. NYGB provided two or more of the financial products discussed above to most of these projects. Table 3 displays the share of nameplate capacity associated with NYGB counterparties for all community and commercial/industrial projects in the NY-Sun database by completion status. Clearly NYGB has established a significant presence in this market.

Table 3. 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

2.2 Case Study: NYGB and BQ Energy

Case Summary

Developer/Owner: BQ Energy	**Financial Product:** Asset Loan and Investment
Other Financial Institutions: M&T Bank – Sale & Leaseback lessor for one project	**Product Sub-Type:** Construction-to-Term Loan **Amount Financed:** $23.1 million
Projects Financed: Five commercial/industrial solar PV installations on closed landfills and other brownfields owned by municipalities or commercial entities. Off-takers for power generated include the host local governments and one non-profit institution. **Total Project Costs:** $31.9 million	**NYGB Participation:** NYGB provided construction lending services, with conversion to term loans upon completion of construction. Terms of the loan are structured to encourage refinancing – presumably by traditional capital providers.
Annual energy savings and other benefits. Capacity installed: 18.0 MW Estimated Generation: 19,340 – 22,240 MWh/Year Emissions Reduced: 9,629 – 12,671 MTce/Year	**Market Barriers Addressed** Limited private capital interest in relatively small community and commercial/industrial solar projects High perceived risk among traditional lenders High transaction costs for non-standard projects
Impact of NYGB Participation *"Some banks are comfortable with …small loans but not with construction financing, which made NYGB help indispensable."* Paul Curran, Principal, BQ Energy	

Project Developer. BQE is a NY State-headquartered developer of solar installations on closed landfills and other "brownfields" owned by municipalities or commercial/industrial entities. From its founding in 2002 through 2015, BQE had completed 13 wind and solar projects with total capacity of 324 MW, primarily in North America. BQE maintains a small staff with energy project development and financial expertise. The company also provides ongoing operating and maintenance services for the plants it develops.

Project Description. NYGB worked closely with BQE to develop a standardized, repeatable approach to developing community and commercial/industrial solar PV installations on

brownfield properties. Despite their relatively modest size and costs, these projects involve a complex set of sub-agreements and counterparty relationships, which add to project cost and risk. These include the following:

- **Sale of remote net metering credits.** Project revenue comes from the sale of long-term (20 to 25-year) contracts to sell remote net metering credits to third parties who can use the credits to offset electricity purchases for facilities located in the same utility service area and load zone as the distributed generation project. The off-takers in the RNMCAs are small municipalities and two non-profit organizations, some with unrated credit.
- **Utility interconnection.** Developers must pay well in advance of project construction for heavy electrical construction required to connect the project to the grid. These services are provided by the local distribution utility and may result in delay and added costs.
- **Other Public Support.** All the projects covered in this case study applied for incentives through the NY-Sun program. Incentives anticipated or actually received amounted to roughly 20% of the total cost of the projects and figured in the assessment of their financial viability.

Table 4 summarizes the key features of the five projects.

Table 4. Summary of Projects covered by this Case Study

Project Name (site type)	Year	Total Cost	Amount of NYGB Loan	MW	Off-taker
Pattersun (Landfill)	2016	$2.8 million	$1.5 million	1.37	Non-profit Institution
Esopus (Landfill)	2017	$1.6 million	$1.1 million	0.87	Town of Esopus
Beacon (Landfill)	2017	$5.0 million	$3.1 million	2.80	City of Beacon
Olean - Construction (Industrial Brownfield)	2018	$7.8 million	$4.9 million	4.10	City of Olean
Steel Sun – Construction (Industrial Brownfield)	2018	$14.7 million	$12.5 million	8.90	Canisius College

NYGB Participation. NYGB provided construction lending for each project with conversion to term loans on the commercial operation date (COD) for three of them. Long-term financing was provided to the Olean and Steel Sun projects through sale/leaseback arrangements with MT Bank The three term loans each had terms of 10 years, with amortization schedules sculpted to enable adequate debt coverage. Initial interest rates increase annually beginning in year six to encourage refinancing. The interest rate for the loans, measured as the spread above the LIBOR benchmark, remained nearly constant across the four transactions.

Impact of NYGB Participation. The following narrative of the impact of NYGB participation on BQE's operations and project portfolio is based on an in-depth interview with Paul Curran, a Principal of BQE with extensive energy project development experience at several companies, including Chevron, Axio Power, and SunEdison.

According to Mr. Curran, BQE faced the following finance-related barriers to realizing the kinds of solar projects described above:

- Mismatch of project and portfolio scale to lender preferences and practices.
- Lender understanding and acceptance of risk.
- Lack of standardization of deal structures and components leading to higher transaction costs and risks borne by the developer, which eventually affect deal viability.

Mr. Curran's described NYGB's participation as helping BQE to overcome several financing barriers, including:

Scale. Mr. Curran described the lender community's general appetite for financing projects as "portfolio" in nature, with $100 million as the minimum portfolio size in which they are interested. According to Mr Curran, "BQ in NYS has not amassed $100 million, and it would take 20 to 30 projects [of the type described above] to reach that threshold. Smaller projects are attractive to aggregate only when they are standardized."

Risk. Mr. Curran identified several risks associated with project in his portfolio which he claimed deterred lenders from extending credit. The principal risk was the impact of changing regulations on project revenue streams, both among different states, and over time within a state, including New York. Mr. Curran observed that the regulatory framework in NYS has changed three times, most recently changing from net metering to a value of distributed energy resources system. He noted that every change requires educating banks, and it is difficult to make banks comfortable with "ever changing regulations."

Mr. Curran strongly believed that NYGB's lending to BQE's projects would help address commercial banks' discomfort with regulatory risk both through the example the projects provide and through the level of due diligence to which NYGB subjected the projects. He noted:

> *They (NYGB) provide a strong and credible due diligence effort before financing; having been in the banking business, they speak the language and are seen by commercial banks as a kind of independent expert. Municipalities and other off-takers also take comfort in NYGB participation, aiding our marketing. Also, their involvement, especially their strong due diligence protocols, makes it more likely additional lenders will entertain us.*

Mr. Curran believed that NYGB involvement would impact more than just the projects it directly financed. As he noted, "this [the brownfield project financing experience] also facilitates construction and term loan availability to small renewable-energy project developers and contractors in NYS, via commercial lenders whose familiarity and confidence is enhanced by NYGB's demonstration of competitive risk-return profiles."

Standardization and cost reduction. By executing several similar projects in one state, BQE was able to develop standard approaches and trusted partners for many aspects of the projects, including:

- Formation of the remote net metering credit agreements;
- Basic technology selection and installation design;
- Contractor and equipment selection;
- Host site descriptions and arrangements for permitting; and
- Cash flow format and underwriting process.

This standardization has greatly reduced BQE's costs of customer acquisition, site selection and approval, underwriting, vendor procurement, permitting, legal and contracting support. This cost reduction in turn reduces financial risk and increases the viability of the deals.

Assessment of Experience with NYGB. Mr. Curran's assessment of NYGB's work with BQ Energy and its effect on the viability of his projects was overwhelmingly positive. As he noted:

> *NYGB has a mission and passion to finance energy efficiency and renewable projects, especially smaller ones, and has been willing to work with us, listen to our problems, and seek solutions in structuring financing for each project.*

Mr. Curran reported that BQE had no prior relationship with NYGB or any of its employees. Despite this lack of familiarity, NYGB responded quickly to the opportunities advanced by BQE, even when confronted with initial challenges. For example, the first project involved a non-profit organization with an ambiguous credit situation as the RNMCA off-taker. But, according to Mr. Curran, "NYGB saw merit in the project and jumped in. We would love to get NYGB involved in other states, including RI and CT where there are already green banks."

As to recommendations for change at NYGB, Mr. Curran reported, "We wish there were fewer lawyers, lower closing costs, less time consumed, less bureaucracy – but those exist everywhere, and NYGB is no worse than others. Working with them is a little cumbersome, but worth the effort. Generally speaking, NYGB helps banks understand [our] reality. They are a "can do" organization."

2.3 Assessment of Market Effects

As described above, this case study is part of a larger study of the impact of NYGB's activities, measured in terms of changes in indicators that capture the following five aspects of clean energy market development:

- Knowledge of and confidence in clean energy investments among financial institutions
- Pace of clean energy project development
- Volume of clean energy project financing
- Number and type of financial institutions active in clean energy markets
- Availability of favorable terms in financing offered to clean energy projects and developers

It is difficult to characterize the influence that NYGB has had on the community and commercial/industrial solar market in New York as of early 2019 for several reasons. First, the

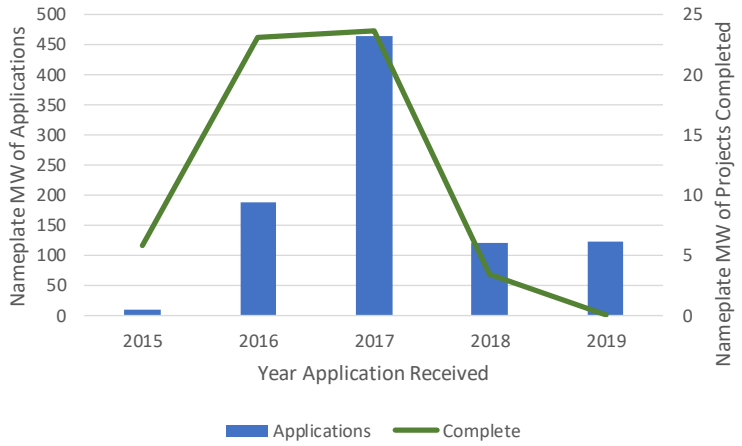
formulation of the regulatory structure, commercial concepts, and practical approaches for developing community and commercial/industrial solar are all very recent. Second, in the short time span between the authorization of remote net metering in 2011 and February 2019, many other policies and programs have been launched that affect the feasibility and potential financial returns for community and commercial/industrial solar projects in New York. These include changes in net metering and remote net metering rules and pricing approach, as well as the availability of cash incentives from NY-Sun's Megawatt Block program. Third, the complexity of community and commercial/industrial solar projects results in long lead times between the application for financing and incentives on the one hand and project completion on the other.

The paragraphs below summarize DNV GL's findings on market effects of NYGB's activities in support of community and commercial/industrial solar to date. These observations can best be understood as a baseline against which to compare market conditions in later phases of the evaluation.

Knowledge of and confidence in clean energy investments among financial institutions. As discussed above, a Principal of BQE interviewed for the case study reported that NYGB's due diligence and work with the company to structure its transactions had 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. While acknowledging that investors were becoming more informed about and interested in their projects, developers noted that many investors were still concerned about perceived risks involving creditworthiness of residential customers, risk of customer attrition, and the effect of changing regulatory regimes on the viability of community and commercial/industrial solar projects. Investor perception of heightened risk results in limitations on available funding and higher funding cost.

Pace of clean energy project development. Figure 2 displays the total MW of community and commercial/industrial 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.

Figure 2. Nameplate MW of Megawatt Block Community and Commercial/Industrial 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 the period from 2016 to 2018 the MW installed of community solar nationwide increased by 33%.[19] The pace of Megawatt Block applications for community solar projects has picked up considerably in the first two months of 2019. The volume of projects completed follows a similar trajectory.

This pattern 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 reduce the value of investments for tax equity providers.

Volume of clean energy project financing. DNV GL could not identify a definitive source of information on the flow of financing for community and commercial/industrial solar projects in NYS. As discussed above, community solar developers reported that investor interest in community solar increased over the past four years to the point that they perceive that access to capital represents less of a barrier to development than other factors such as uncertainty over regulation and customer acquisition costs. NYGB has committed a significant sum to projects still under development. The effects of these commitments on investments by private institutions and investors may become discernible over the next few years.

Number and type of financial institutions active in clean energy markets. Community and commercial/industrial solar project developers have reported an increase in the number and variety of financial institutions and investors active in the field. Early in the development of community solar approaches (2015), capital was provided primarily by small, unregulated

[19] 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.

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 to include commercial banks, insurance companies, specialty lenders, and syndicates of financial institutions as lenders and tax equity investors. This development suggests that at least a few representative organizations from each of the major groups of large financial institutions has become familiar with community and commercial/industrial solar investments. This opens a pathway for future expansion of financing in the community and commercial/industrial solar market segment. Again, it is too early to assess the effects of NYGB activity on this trend.

Availability of favorable terms in financing offered to clean energy projects and companies. Evidence gathered so far suggests that equity and debt finance remain relatively expensive to developers of community and commercial/industrial solar projects, due primarily to the complexity of the underlying project structure and risks associated with that complexity. Evidence supporting this conclusion includes:

- NYGB did not change its interest rate (spread above the LIBOR benchmark) on the BQE term loans for transactions concluded over a period of three years. In contrast, interest rates charged to aggregators of residential solar loans have declined over this period.[20]
- Developers taking part in a 2018 panel noted that interest rates on term and construction loans, as well as returns sought by tax equity investors, remained high relative to costs of capital for other types of projects. However, some investors reported that investors were becoming more willing to take on risks associated with business models that reduced burdens on end-customers to obtain credit ratings or accept contract termination fees.

Conclusion. NYGB's commitment of capital for construction and term loans has enabled BQE to execute and streamline a project model that has proven financially sound and offers potential for significant scaling. The Principal of BQE believes strongly that NYGB's due diligence and support through the financing process will increase his firm's ability to attract additional capital and will provide other developers and financiers with an example of how to develop smaller community and commercial/industrial solar projects.

Given the recent emergence of community and commercial/industrial solar projects as an asset class, the extreme fluctuation in the annual volume of project development, and the extensive recent changes in policy and regulatory rulings that affect project feasibility, it is too soon to assess the influence NYGB has had on the evolution of the community and commercial/industrial solar market in NYS. Through its financial transactions, however, NYGB has facilitated activities that are important to the development of community and commercial/industrial solar, including bridge loans for interconnection facilities, construction lending, and term lending. NYGB has worked with a broad range of financial institutions in these activities. With this approach, DNV GL anticipates that subsequent phases of the Market Transformation Study will identify a growing body of credible evidence of NYGB's influence on the community and commercial/industrial solar market in New York State.

[20] 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.

APPENDIX: TABLE OF MARKET INDICATORS

This table summarizes the market indicators developed by NYSERDA to assess the effects of NYGB on clean energy finance markets in New York State. It displays the working definition of the indicator used to guide data collection and analysis, as well as the principal sources used to generate those data.

Indicator	Definition	Timeframe*	Finnanciers 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