

INNOVATION THROUGH

AGGREGATION

A CASE STUDY OF PARTNERSHIP TO

PURCHASE RENEWABLE ENERGY



ACKNOWLEDGMENTS

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Finally, A Better City would like to thank former employee Garrett Sprague for his effort to envision, design, and spearhead this initiative from the outset during his time as a staff member.



A Better City is a diverse group of business leaders united around a common goal—to enhance Boston and the region’s economic health, competitiveness, vibrancy, sustainability and quality of life. By amplifying the voice of the business community through collaboration and consensus across a broad range of stakeholders, A Better City develops solutions and influences policy in three critical areas central to the Boston region’s economic competitiveness and growth: transportation and infrastructure, land use and development, and energy and environment.

To view a hyperlinked version of this report online, go to http://www.abettercity.org/docs-new/Innovation_Through_Aggregation.pdf

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INNOVATION THROUGH AGGREGATION

EXECUTIVE SUMMARY

Corporate and institutional electricity buyers in the United States are increasingly purchasing renewable energy directly from solar or wind farms. These organizations recognize the environmental and economic value of diversifying their energy portfolios. Cities across the country are fostering the expansion of renewable energy, including in Boston. At scale, renewable energy is cost-competitive with market electricity rates, particularly given the high electricity prices in New England.

In June 2015, to further reduce emissions from electricity consumption and spur renewable energy development, A Better City presented the opportunity of collaboratively purchasing renewable energy to its members. Using an aggregation model, A Better City facilitated the formation of a team among three of its members—the Massachusetts Institute of Technology, the Boston Medical Center, and the Post Office Square Redevelopment Corporation (the “partners”)—to purchase the output of a large-scale renewable energy facility. A Better City and the partners worked with technical advisor

CustomerFirst Renewables (CFR) to solicit and identify competitive proposals from developers, negotiate the PPA (with counsel from legal advisor Nixon Peabody LLP (NP)), and develop a strategy to incorporate the PPA into the partners’ existing electricity procurement processes. In September 2016, the partners entered into a 60 megawatt (MW) power purchase agreement (PPA) with the Summit Farms solar farm located in North Carolina. Still emerging in the market, successful collaborative projects may come in many forms. This aggregation was unique in the diversity of the partners, the scale of the project, and the mutual benefit to all parties involved.

This case provides lessons learned for organizations interested in aggregating the purchase of renewable energy including:

- The benefits of renewable energy beyond environmental impact;

“IT IS EXCITING TO JOIN FORCES WITH TWO INDUSTRY LEADERS, ALLOWING US TO MITIGATE 100 PERCENT OF OUR ELECTRICITY FOOTPRINT—A MILESTONE WE COULDN’T ACHIEVE ALONE EXCEPT AT HIGHER COST.”

— PAMELA MESSENGER, GENERAL MANAGER, FRIENDS OF POST OFFICE SQUARE



- The value of partnerships and collaboration to yield results;
- The organizational flexibility gained through renewable energy purchasing; and
- The necessity for ongoing recruitment and anchor partners.

Aggregation is emerging as a crucial vehicle to accelerate new renewable generation capacity, as organizations of all sizes look to capture the benefits of clean energy. The A Better City joint power purchase agreement is a unique and replicable model to drive new renewable energy development across the United States to decarbonize energy supply. By reviewing the evolution of this project, the lessons learned may streamline and catalyze future aggregate procurement initiatives to help cities, states, companies, and institutions meet and exceed ambitious greenhouse gas reduction goals.

For detailed profiles of all participants in this project, see Appendix I.

EXPLORATION AND TIMELINE

In 2009, A Better City created the [Challenge for Sustainability](#) program (now known as the Sustainable Buildings Initiative) to help members in commercial real estate operate more efficiently by reducing energy and water consumption and waste production.

By 2015, 15 participants in the program achieved or exceeded the City of Boston's 2020 goal of 25% greenhouse gas reduction compared to baseline measurements.¹

To further offset GHG emissions and help reach the City's 80% by 2050 reduction goal,² A Better City sought avenues for Challenge participants to substantially incorporate renewable energy into their energy supply portfolios. For facilities in downtown Boston, two challenges were immediately apparent:

1. There was minimal suitable surface area for onsite renewable generation.
2. State policies constrained scale and siting of local offsite generation options.

With these obstacles in mind, as well as the approaching expiration of the federal Solar Investment Tax Credit (ITC),³ A Better City turned to the Boston Green Ribbon Commission's (BGRC's) recently established Renewable Energy Purchasing Network (REPN) to learn about various approaches to renewable procurement. At a REPN workshop, A Better City met CustomerFirst Renewables and the project began to develop. Concurrently, REPN and the BGRC announced the Renewable Energy Leadership Prize (the "Prize") in early July 2015, providing the initiative with a goal against which to build momentum. See below for detailed timeline of the PPA development planning and execution.

STEPPING STONES TO COLLABORATIVE RENEWABLE ENERGY PROCUREMENT



JUNE 2015

The Challenge for Sustainability Renewable Energy Meeting inspires adoption of aggregation model for A Better City members.

JULY 2015

The Boston Green Ribbon Commission Renewable Energy Leadership Prize generated citywide interest in renewable energy procurement.

JULY 2015

A Better City gauged interest in aggregated renewable energy among members and identified a group of interested organizations.

AUGUST 2015

Interested members attended a CFR workshop to learn about large-scale renewable energy purchasing and the aggregated model the advisor pioneered with George Washington University, George Washington University Hospital, and American University in 2014.

AUGUST 2015

With legal counsel Nixon Peabody LLP, A Better City and interested members distributed a request for qualifications (RFQ) for a technical advisor. See Appendix II for RFQ details.



PROJECT SELECTION AND PREPARATION

The partners issued a Request for Proposal (RFP) in December 2015 for shovel-ready renewable energy projects from across the country. Summit Farms was selected out of 41 distinct proposals, including both wind and solar projects, eleven of which were based in New England. CFR's expertise in energy markets helped the partners understand the full value and risks of each bid. Beyond the price, CFR analyzed the value of energy in wholesale markets and additional revenue streams, comparative environmental impacts, market and project-specific risks, as well as the strength and track-record of the counterparties. With a comprehensive range of deterministic, probabilistic, and fundamental analyses and due diligence, the partners were able to winnow the field of projects to three finalists.

Although one of the final projects was in New England, the group chose a project in the mid-Atlantic PJM grid because it had the lowest risk profile and was forecast to provide robust energy cost savings, making it the leading economic opportunity. The partners rigorously reviewed the PPA along with their technical and legal advisors, CFR and NP.

In preparation for the PPA execution in September 2016, CFR worked with internal legal and other teams at each partner. This included advising the respective finance departments about how to

“THIS PURCHASE IS EQUIVALENT TO 100 PERCENT OF BMC’S PROJECTED ELECTRIC CONSUMPTION, MAKING US THE GREENEST HOSPITAL IN BOSTON AND ON PACE TO BECOME THE FIRST CARBON-NEUTRAL HOSPITAL IN NEW ENGLAND. THIS IS THE RIGHT THING TO DO FOR THE HEALTH OF OUR PATIENTS AND OUR PLANET.”

— ROBERT BIGGIO, VICE PRESIDENT OF FACILITIES AND SUPPORT SERVICES, BOSTON MEDICAL CENTER

process new invoices and payments and enabling the sustainability teams to manage renewable energy certificates (RECs) and make accurate energy use claims. Processes to measure the performance of the solution over time were developed and then put into place within each participating organization.

SEPTEMBER 2015

RFQ responses were reviewed by A Better City and interested members. CFR was selected to provide advisory services. Each organization signed individual agreements with legal and technical advisors.

SEPTEMBER–NOVEMBER 2015

CFR informed the interested members about various deal structure options and the current market landscape, giving each member qualitative and quantitative information to generate organizational buy-in.

DECEMBER 2015

The final group of members issued a request for proposals (RFP) for shovel-ready renewable energy projects from developers across the country.

APRIL 2015

Summit Farms was selected as the finalist project.

APRIL–AUGUST 2016

CFR led bi-weekly meetings with participants and coordinated PPA negotiations with counsel from NP.

SEPTEMBER 2016

The PPA was executed.

FEBRUARY 2017

Summit Farms Solar reached full operation.

CLAIMING THE BENEFITS OF THE NEW SOLAR POWER

The partners will not directly consume the power produced through the Summit Farms project, but that does not inhibit their ability to make the emission reduction claims associated with adding new renewable capacity to the PJM grid.

Electric grids operate like lakes, where power generators are like tributaries feeding water into a lake, but instead the power plants deliver electricity to the grid. Much like water molecules commingling in a lake, it is impossible to tell the origin of the electron in the grid as electrons cannot be directed to a particular point, nor can the journey of a specific electron be tracked. These fundamentals make claiming the use of electrons from a given power plant impossible, unless there is a direct line of interconnection between the end user and the generator. This fact is what has given rise to renewable energy certificates (RECs),⁴ as they allow the holder of the certificate to claim the environmental attributes of renewable generation, even though they can't assert their use of a specific electron.

Possessing one REC is proof that 1 megawatt-hour (MWh) of electricity was generated from a renewable source. When the partners buy the output of Summit Farms, the buyers have no control or knowledge where the specific electrons are actually consumed, but they can claim the renewable attributes of that generation by retaining the RECs associated with that generation. The Summit Farms PPA allowed the partners to make the claim of deep carbon emission reductions despite the new renewable power being produced and used in a different grid.

Through this PPA, Post Office Square and the Boston Medical Center mitigated 100% of their Scope II electricity emissions and MIT offset 17%. The expected production of 146 gigawatt-hours of emissions-free power will result in a cumulative abatement of 119,500 metric tons of carbon dioxide emissions, equivalent to taking 25,250 cars off the road every year. Additionally, North Carolina has a substantially higher greenhouse gas emission profile due to a greater concentration of coal-fired power plants. This means that more emissions will be displaced for a given amount of solar power than for a similar facility in New England's comparatively cleaner grid.

BEST PRACTICES AND LESSONS LEARNED

THE BENEFITS OF RENEWABLE ENERGY BEYOND ENVIRONMENTAL IMPACT

Almost every organization has a need for energy on a timescale long beyond what is secured in their retail contracts (which are typically from one to three years). Hedging against future price increase with an economically attractive project, a fixed price 25-year PPA can realize significant long-term benefits in an uncertain energy market. Additionally, the benefit of cost predictability serves to mitigate daily and short-term volatility in energy markets. The partners in this solution expect to realize meaningful savings over the next 25 years.

CFR rigorously weighed the risks each proposed solution presented—looking at price volatility in the projects' markets, historical congestion and negative pricing, and the outlook for capacity revenues. **With CFR and NP's guidance, the partners negotiated PPA terms that reduced the buyers' risk exposure by sharing some of the risk with the asset owner.**

Depending on where a renewable project is located, it can also receive capacity revenue, which is paid to electricity generators as a way to ensure future grid demand can be adequately met.

If contractually arranged, an off-taker can receive and monetize the capacity value of the project. This stream of revenue can then help offset demand charges and hedge capacity charges on electric bills immediately and in the future. In the event that carbon pricing is implemented in the U.S., organizations could save considerably on compliance costs by switching all or some of their electric load to a renewable source before that shift.

PARTNERSHIPS AND COLLABORATION YIELD RESULTS

Renewable energy projects benefit significantly from economies of scale, with projects at the largest scale competing economically with conventional generation. Through aggregation, **A Better City helped their smaller members access the benefits of large-scale renewable energy.** Post Office Square, a member with a small electricity load, accessed the otherwise unattainable benefits of large-scale renewable energy by joining an agreement with larger institutions with significantly larger loads.

Signing this PPA gives the partners authority to make strong renewable energy claims—that they

HOW THE AGGREGATED SOLAR POWER PURCHASE WORKS



ORGANIZATIONS

STEPS

CustomerFirst Renewables
 ► TECHNICAL ADVISOR

NIXON PEABODY
 ► LEGAL ADVISOR

Dominion
 ► DEVELOPER AND OWNER OF SUMMIT FARMS SOLAR

pjm
 ► MID-ATLANTIC WHOLESALE ELECTRICITY MARKET/GRID

Customized Energy Solutions
 Analyze · Simplify · Implement
 ► AGENT THAT SELLS THE POWER ON THE WHOLESALE MARKET

MIT
BOSTON MEDICAL CENTER
FRIENDS OF POST OFFICE SQUARE
 ► OFFTAKERS

1 A BETTER CITY CONVENEED ITS MEMBERS TO EXPLORE AGGREGATED RENEWABLE ENERGY PROCUREMENT.

CustomerFirst Renewables advised the offtakers on strategy development and project selection.

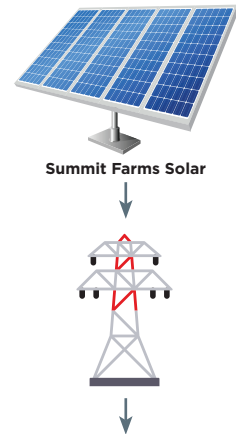
2 EACH OFFTAKER ENTERED INTO AGREEMENT WITH DEVELOPER.

With legal advising from Nixon Peabody, the offtakers contracted a fixed price for the output of the solar farm, which conveys both the power and the Renewable Energy Certificates (RECs).



3 POWER IS SOLD ON THE MID-ATLANTIC WHOLESALE ELECTRICITY MARKET.

Offtakers take the rights to power produced by the project at the point where it is delivered to the grid, and use an agent, Customized Energy Solutions, to manage delivery of that power and sell it immediately into the wholesale market.



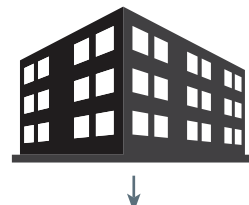
4 EACH OFFTAKER RETAINS PROPORTIONAL NUMBER OF RECS.

With the RECs, each offtaker can make the environmental claims associated with the new renewable capacity.



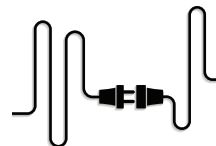
5 EACH OFFTAKER RECEIVES PROPORTIONAL REVENUE FROM THE SALE OF POWER.

The proceeds from the sale of the power in the wholesale market are netted with the fixed cost of the PPA and the difference is credited (if positive) or debited (if negative) to the offtakers.



6 OFFTAKERS PAY THEIR LOCAL ELECTRIC UTILITY FOR SERVICE.

The buyer still receives physical delivery of power from their utility as they have historically.



have contributed to putting new renewable energy on the grid, that all or a portion of their brown grid-supplied power has been mitigated, and that they are innovating the nation's energy use.

The partners were able to share more than just renewable energy claims. **Cost, risk, and resource sharing benefitted all of the participants, regardless of size.** The partners supported and educated each other, assuring alignment in contracts and negotiations and giving the partners strengthened leverage in negotiations. With the facilitation of A Better City and advice of CFR, the partners were in constant communication, and maintained a transparent process for decision-making among the group.

Given the diverse size of the partners' electricity loads, by acting in concert, the group found more success in attracting the large-scale projects that would capture these benefits and meet internal objectives.

FLEXIBILITY IN TRANSITIONING ENERGY PURCHASING

Large-scale Renewable Energy (LSRE) solutions present a marked departure from how most organizations have historically purchased energy; transitioning from one- to three-year fixed or variable retail supply contracts, to 10- to 25-year fixed price wholesale contract.

As the initiative moved forward, the group remained flexible on contract terms, start date, price escalation, and the treatment of renewable energy certificates (RECs), leaving freedom to make trade-offs later in the process once equipped with firm project bids.

By keeping the aperture open, including to projects outside of the immediate geographic region, the partners were able to pursue the most economically and environmentally attractive projects.

This included reviewing both wind and solar projects in Regional Transmission Organizations across the country, including ISO-NE (New England), PJM (mid-Atlantic), NYISO (New York), ERCOT (Texas), and the Southwest Power Pool (south-central United States).

ONGOING RECRUITMENT AND ANCHOR PARTNERS

Some A Better City members pursued the initiative from genesis through execution, some participated in the scoping process but decided at some point not to join in the final procurement, while others joined midstream. Aggregation projects often have an evolving participant list, particularly when working with diverse organizations. A continual recruitment and retention effort will bring committed and assured parties into the group and ensure the aggregation moves forward.

As the objective convener, A Better City's role was essential to ensuring this project continued to progress toward a truly collaborative, mutually-beneficial outcome.

A strong anchor partner also moves the project forward. In the Summit Farms PPA, Post Office Square was the first interested party, creating critical momentum, despite being the smallest partner.

With the commitment of the anchor party, A Better City continued to recruit members for this landmark project, serving as a trusted convener with objective insight. With the end goal in mind, **A Better City ensured all partners stayed on the path to a successful outcome.**

CONCLUSION

The A Better City joint power purchase agreement is a transformative initiative that went beyond convention to achieve ambitious goals. Collaboration is key to addressing climate change in the immediate term as it allows all parties, regardless of size, to make a significant impact. Each of the partners and advisors, as well as A Better City, takes pride in establishing a precedent for a successful shared initiative, across scales and sectors. We hope others draw inspiration from this project, driving further aggregation initiatives. We see replication as a key step to expanding access to the large-scale renewable energy market, mitigating the progression of climate change.

“MANY THOUSANDS OF ORGANIZATIONS AROUND THE COUNTRY THAT ARE TOO SMALL TO INITIATE THEIR OWN POWER PURCHASE AGREEMENTS COULD POTENTIALLY FOLLOW THIS COOPERATIVE MODEL.”

— JULIE NEWMAN, DIRECTOR OF SUSTAINABILITY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY

APPENDIX I

PARTICIPANT PROFILES

A BETTER CITY

A Better City is a Boston, Massachusetts-based non-profit business membership organization that seeks to improve Boston and the region's economic health, access, sustainability, and quality of life through planning, applied research, targeted services and advocacy. A Better City's membership is made up of over 130 of the New England region's largest employers. Affiliation with A Better City is the most significant linkage between participating organizations in this initiative. A Better City had a financial interest in the project in that participants agreed the potential \$100,000 Renewable Energy Leadership Prize winnings would be allocated to the A Better City Initiative to fund future collaborative procurement efforts if their submission won the Prize. In the end, A Better City negotiated that a specified percentage of CFR's transaction revenue would be allocated to the A Better City Initiative as a fee for serving as the convener. Aside from these two funding opportunities, A Better City had no fiduciary responsibility to nor influence on the outcome of the project, and maintained that its sole responsibility was to the participants. A Better City remained objective and deferred all decision making to the participants while serving as an intermediary and facilitator between their members and the external advisory firms.

POST OFFICE SQUARE REDEVELOPMENT CORPORATION

The Friends of Post Office Square is the developer and manager of the Garage at Post Office Square and the Norman B. Leventhal Park above it in the heart of Boston's financial district. Under the leadership of the General Manager the garage prioritized sustainability and conservation and has undertaken a number of exemplary initiatives. The 1,400 space garage has allocated seven spaces for car sharing, eliminated over 550 gallons of cleaning chemicals from use each year, and overhauled the park's irrigation system to reduce water use by 30%. The garage has also launched Boston's first groundwater reclamation project to reduce water consumption further. Prior to the aggregation, the General Manager had not purchased renewable energy in any form nor established organizational goals to purchase it in the future. They have pursued purchasing RECs in the past but did not have success finding a broker, presumably due to their small load. Aggregating with others represents the only possibility for the garage to participate in large-scale renewable energy. They represent the smallest PPA signator to date.

Team members review the project process and lessons learned at the initiative launch event (November 2016).



BOSTON MEDICAL CENTER (BMC)

BMC is New England's largest safety-net hospital with 860,000 outpatient visits per year and over 5,000 employees. They are incorporating almost all of its campus buildings in the project. Energy efficiency and sustainability are of the highest priority for the hospital, which is reflected in their ambitious goal of 50% greenhouse gas emissions reduction by 2020. They are currently developing a combined heat and power (CHP) system that is anticipated to reduce electricity load to the grid by over 16 million kWh. They have received recognition for their sustainability efforts, including the 2015 Practice GreenHealth Environmental Excellence Awards and the 2015 Circles of Excellence Climate Award, both of which recognized their work to increase recycling rates, divert food waste through a bio-digester, increase access to electric charging stations in garages, optimize chiller plant operation, and a myriad of other initiatives. They have been recognized as an environmental leader, receiving A Better City's annual Normal B. Leventhal Excellence in City Building Award for the Environment.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY (MIT)

MIT is one of the most recognized technological institutions in the world. The Institute announced a Plan for Action on Climate Change in October 2015, which included a pledge of 32 percent reduction in carbon emissions by 2030 from 2014 levels. The PPA's impact on MIT's carbon footprint is equivalent to more than half of the total emissions reductions that MIT committed to in that pledge. Additional initiatives to reduce emissions revolving around improvements in building efficiency are anticipated to achieve an additional 8-12 percent reduction in emissions, which are supplemented by an effort to improve the efficiency of MIT's existing cogeneration plant. MIT recognizes that the challenges of sustainability expand beyond their campus locally and globally and therefore require deep collaboration. In September 2016, the Institute hosted the World Symposium on Sustainable Development at Universities, which featured approximately 200 participants from over 25 countries, further emphasizing MIT's perspective on the importance of collaboration. MIT achieved [7% emissions reduction](#) in Fiscal Year 2016.



The project team at the initiative launch event (November 2016). Left to Right: Robert Biggio (BMC), Gary Farha (CFR), Rick Dimino (A Better City), Joe Higgins (MIT), Pam Messenger (Friends Post Office Square), Emil Avram (Dominion Resources).

CUSTOMERFIRST RENEWABLES LLC (CFR)

Headquartered in Washington, DC, CFR is a renewable energy advisory services firm founded in 2010 by two former McKinsey & Company energy practice partners. They were selected to provide A Better City Members end-to-end services ranging from initial strategy development to project execution and integration. They have deep renewables and traditional energy development, transactional, and consulting experience. A Better City and the PPA participants selected CFR after a competitive RFQ process. A Better City issued the request for proposals (RFP) on behalf of PPA participants and helped each organization evaluate the opportunity collectively while helping to align the group's objectives.

NIXON PEABODY LLP (NP)

[Nixon Peabody](#) is a leading Boston-based law firm with significant experience assisting organizations with renewable energy procurement and PPA negotiations. They served as pro-bono legal counsel for A Better City throughout the joint PPA effort. NP signed service agreements with each individual participant to draft and negotiate a PPA document that met the needs of the group. They coordinated with the internal or external legal representation for each group to help the participants proceed as a collective in the PPA negotiation. Their involvement simplified the PPA negotiation and they continue to be a trusted advisor to many organizations in Boston.

APPENDIX II

REQUEST FOR QUALIFICATIONS: WHAT A BETTER CITY SOUGHT IN A TECHNICAL ADVISOR

The RFQ emphasized the criteria of the BGRC Prize, A Better City's role as the Convener, and the goals and objectives of the initiative. It identified the following tasks for the technical assistance provider:

- Facilitate an in-depth workshop to help stakeholders understand the large-scale renewable energy project opportunity along with periodic follow-up conversations with participating organizations;
- Help achieve A Better City member buy-in to obtain project approval at each participating organization;
- Develop and execute an RFP for renewable energy projects and coordinate with A Better City to develop and apply clearly defined scoring criteria;
- Perform technical due diligence, financial analysis, risk assessment, and tradeoff analysis on prospective bidders, and provide recommendations on the most attractive projects; and
- Negotiate with third parties e.g. project developers and electric service providers

To evaluate responses, A Better City prepared a matrix with key evaluation criteria and tasked each member with filling out their own. A Better City aggregated each matrix and in early September 2015, the partners selected CustomerFirst Renewables (CFR) to provide advisory services. CFR was selected based on their previous work aggregating offtakers, their analytical, fact-driven approach, and their confidence to help the group collectively and individually educate stakeholders about the opportunity.

ENDNOTES

- 1 https://www.cityofboston.gov/eeos/pdfs/Greenovate%20Boston%202014%20CAP%20Update_Full.pdf
- 2 As of December 2016 the City of Boston has increased the CAP goal to 100% by 2050.
- 3 Scheduled to expire December 2015. The ITC has since been extended in its current form through 2019.
- 4 Find more information on Renewable Energy Certificates here: <https://www.epa.gov/greenpower/renewable-energy-certificates-recs>
- 5 For more information on GHG accounting for electricity related emissions according to the Greenhouse Gas protocol, please visit: http://www.ghgprotocol.org/scope_2_guidance

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