

GOTHAM GREENS FARMS, LLC
SUSTAINABLE URBAN CEA

Final Report

Prepared for

THE NEW YORK STATE
ENERGY RESEARCH AND DEVELOPMENT AUTHORITY
Albany, NY

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ABSTRACT

This is the nation's first rooftop hydroponic, commercial farm using Controlled Environment Agriculture (CEA) in an urban setting. The project's mission is to design, build and operate an environmentally sustainable, urban CEA facility with the goal of producing agricultural products with less energy use, environmental impact and carbon emissions as compared to similar crops grown in open field conditions using conventional methods and seasonal production. Gotham Greens Farms will grow over 100 tons of pesticide-free, premium-quality lettuce, salad greens and herbs in a greenhouse that optimizes energy efficiency and uses less land and water compared with conventional agriculture.

KEY WORDS

Controlled Environment Agriculture, urban agriculture, urban farming, agriculture, greenhouse, local food production, food miles, energy

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SUMMARY

Gotham Greens Farms LLC (Gotham Greens) designed, built, financed, and currently operates the nation's first commercial hydroponic rooftop farm. The 15,000 ft² facility, installed on the roof of a two-story building in Brooklyn, NY, will grow over 100 tons of premium-quality fruit and vegetables each year for the New York City retail and restaurant market. The farm combines technically sophisticated, commercially proven Controlled Environment Agriculture (CEA) techniques with energy saving innovations unique to this project. Gotham Greens completed construction of its rooftop greenhouse facility in April 2011.

This commercialization project is a response both to the increasing energy burden in New York and to increasing energy price risk, which is particularly hard felt in the state's agricultural sector, including CEA. The project also addresses ecological and public health concerns surrounding conventional agriculture, including high resource consumption, long distance food transport, and food safety.

In New York State, winter-time heating accounts for the majority of energy demand and CO₂ emissions from the CEA industry. When compared with a conventional, slab-mounted greenhouse, rooftop integration of this project will yield direct energy savings by eliminating heating losses through the building roof and the greenhouse floor. Special greenhouse design features, including double glazing and a thermal blanket, will result in substantial additional reductions in heating demand. Locating the project in a dense urban area, where temperatures are warmer due to the urban heat island effect, also plays an important role in reducing heat demand.

The average food item in today's supermarket travels several thousand miles from farm to table. This project's proximity to the retail market will sharply reduce transportation fuel consumption and associated air emissions, while improving product quality.

The electrical needs of this urban CEA facility are met, in part, by on-site solar photovoltaics. Electrical load will be minimized by using natural ventilation and high-efficiency pumps and fans. As a result of these energy saving innovations, Gotham Greens may produce vegetables with a lower total energy input, per kg of delivered product, than either conventional CEA or conventional field agriculture, and with a much lower carbon emissions profile. The environmental benefits are rounded out by land and water savings, and the elimination of fertilizer and pesticide runoff. Efficient, high-yield, year round vegetable production in a premium urban marketplace adds up to a financially attractive, sustainable business opportunity for New York State. As an added benefit, sustainable CEA can deliver much needed 'green collar' jobs to urban areas.

Section 1

PHASE I – DEVELOPMENT

SYSTEM DESIGN AND PROCEDURE DEVELOPMENT

Gotham Greens worked in close collaboration with its retained architects, engineers, commercial greenhouse manufacturer, utility providers, and construction management firm to complete CEA facility design, as well as, all architectural drawings, including composite, demolition, structural, mechanical, electrical, plumbing, sprinkler plans. The overall System Design was guided by the business plan (Appendix A).

Due to site constraints, waste heat capture is not feasible at the site. The building has a relatively small space forced air heating system considering the size of the building i.e. 80,000 ft². Common areas of the building are rarely heated during regular work hours and the building is never heated on weekends and evenings when the building is not usually occupied. There are no hot water boilers in the building. Despite not being able to capture waste heat, Gotham Greens is employing various design features to improve overall energy performance, including heat curtains and increased insulation.

CONSTRUCTION APPROVALS, PERMITTING AND EXPEDITING

Gotham Greens spent over two years interacting with the New York City Department of Building (DOB) and other city agencies to receive construction approvals. The original project site located in Jamaica, Queens, where after a lengthy lease negotiation, construction drawings were completed and approvals sought. After a protracted communication process with the DOB, as well as officials at other city and borough agencies, the contractor finally obtained conditional construction approvals. The approvals were contingent upon the contractor modifying the existing building in several ways as well as constructing the greenhouse in a certain manner which would have proved to be costly. These stipulations included installing fire rated walls (opaque, insulated walls not glass or polycarbonate) on two sides of the greenhouse) and setting the greenhouse back from the building edge quite significantly which had structural engineering implications. This layout would have substantially reduced the crop production areas within the space hence reducing revenue projections and the economic viability of the project.

Gotham Greens made the decision to switch project sites to one of its potential future locations in Greenpoint, Brooklyn. After securing zoning approval, the contractor proceeded to the design phase. After six months of design, architecture, and engineering, final construction drawings were submitted in June 2010. The contractor eventually received DOB approvals in July 2010.

Gotham Greens learned immensely from this two-year process and has become more adept at determining the feasibility of a given building for an urban CEA retrofit project (assuming the rules and regulations remain unchanged). Due to the increased interest in urban agriculture including rooftop greenhouse, the DOB has released step-by-step procedures for applying for permits and approvals for a wide variety of green roof, rooftop farm, and rooftop greenhouse projects.

Gotham Greens has participated in a number of hearings, workshops and meetings with various committees, city agencies and elected officials to help draft legislation and building code to accommodate urban CEA. This participation seemed to have helped as the New York City Council recently passed a bill, Intro 0338-2010, which removes height and bulk zoning restrictions in the NYC building code for small rooftop greenhouses. While this bill benefits small greenhouses and is unlikely to help commercial scale operations, it is, nonetheless, a promising start to promote urban CEA. The New York City Department of City Planning (DCP) is also working on policy to reduce zoning barriers for rooftop greenhouses in the NYC zoning code, such as providing relief from bulk and height regulations. DCP has sought the advice and input of Gotham Greens during this process.

ARCHITECTURE, ENGINEERING, SITE PREPARATION

The contractor worked closely with its architects, engineers and construction management team for this aspect of the project. Gotham Greens sub-contracted an independent structural engineering firm to investigate all structural issues to fully ascertain existing structural loads and how to minimize structural reinforcement. A collaborative process amongst the team which included a steel contractor, structural engineer and construction manager took place. Following the investigation, which yielded positive findings, the team worked together to establish the footprint of the greenhouse.

Gotham Greens worked together with electrical and mechanical engineers to coordinate circuit drawings, electrical panel schedules, riser diagrams and load letters to provide to the DOB and the utility providers. The architectural plans including plumbing, electrical, sprinkler, and HVAC systems. The final architectural drawings were supplied to sub-contractors as construction drawings for competitive bid.

The site preparation phase included setting up site protection, scaffolding and a worksite trailer. Preparatory work also included some demolition work. Structural work commenced in conjunction with the rest of the greenhouse construction, hence, was not part a of the site-preparation phase.

FINANCING AND FINANCIAL ANALYSIS

Gotham Greens completed all financing for the construction and commissioning of the urban CEA facility in September 2010. The contractor successfully raised private investor equity. The total financing, including the New York State Energy Research Development Authority (NYSERDA) Award, was over \$2mm.

The resource efficiency of Gotham Greens' system will contain operating costs, while the proximity to a high value, retail market will generate strong revenue, providing an attractive return on investment. The Company anticipates gross profit margins greater than 35% and EBITDA¹ greater than 15% for the project.

¹ Earnings before interest, taxes, depreciation and amortization

Section 2

PHASE II – CONSTRUCTION

MATERIAL PROCUREMENT

Gotham Greens began issuing purchase orders for equipment and supplies in October 2010. The delivery of materials to the contractor's site in Brooklyn began in November 2010.

The contractor researched the marketplace for renewable energy-powered and alternative fuel vehicles as possible options for the contractor's delivery vehicle. The contractor sought pricing on various alternative fuel vehicles. The contractor researched various government incentive programs, including those offered by NYSERDA. Ultimately, the contractor decided to use a traditional fuel vehicle, at least for its first year of operations.

CONSTRUCTION

Gotham Greens worked with its construction management firm to competitively bid the construction of the facility, which included the installation of the greenhouse and its accompanying systems, to a variety of subcontractors.

The contractor issued purchase orders and entered contracts with sub-contractors in October 2010. Site preparation work commenced in October. This included site surveying, site protection, roof demolition work, removal of existing solar panels, and relocation of existing HVAC duct systems.

The greenhouse steel, glazing and other greenhouse related systems were delivered and hoisted up to the roof, by crane, in November. Installation of the greenhouse commenced in November. Concurrently, plumbing, electric, masonry, carpentry, welding work began as well. By the end of the December, the greenhouse frame had been erected, the new staircase to the roof had been completed, and mechanical, electric and plumbing work was fully underway.

Late December 2010/early January 2011 saw record snowfall in New York City. The contractor faced some unexpected delays that resulted in snow removal. Those delays were made up for, however, and the project was completed on schedule. In February, the contractor completed construction of a greenhouse support

area that houses an office, post-harvest handling room and storage. Substantial plumbing, sprinkler and electrical work were completed by mid-April. In April, the contractor completed setting up the hydroponic crop production systems and commenced greenhouse commissioning

RENEWABLE ENERGY SYSTEM INSTALLATION

Gotham Greens sub-contacted a local, Brooklyn-based solar photovoltaic installer with considerable experience in grid-tied photo-voltaic (PV) installation and government incentive programs including those offered by NYSERDA. The sub-contractor successfully installed 55kW of grid-tied solar panels on the rooftop, both to the north and the south of the greenhouse. The total system size is 55.575 kWp dc (48.0 kWp ac) and consists of 247 PV modules at a 10 degree tilt, covering approximately 6,000 ft². The array is projected to produce 64,858 kWh/year of clean electricity. The installation took approximately one month and the commissioning also took one month.

Section 3

PHASE III – COMMISSIONING

GREENHOUSE COMMISSIONING

In March 2011, upon completion of substantial construction of the greenhouse facility, Gotham Greens began the assembly and installation of greenhouse production systems and climate control systems. The contractor installed Nutrient Film Technique (NFT) hydroponic production systems. The system was designed and installed to capture all irrigation water for re-use. Gotham Greens staff installed the hydroponic systems including all plumbing and nutrient injection controls. The re-circulating irrigation water hydroponic system utilizes ten times less water and twenty times less land than conventional agriculture.

Gotham Greens' electrical sub-contractors assisted with the installation of the greenhouse's computer climate control system. The controller helps maintain and monitor the greenhouse environment, irrigation and nutrition systems. Gotham Greens programmed, tested and calibrated the computer system based on desired greenhouse performance and operational processes. Climate, equipment performance, energy use and crop data will be collected throughout the year with the goal of continuously improving energy performance and crop productivity. Gotham Greens also implemented an Integrated Pest Management (IPM) program which includes pest scouting and monitoring as well as the introduction of beneficial predator insects.

Gotham Greens created crop schedules for plant propagation and harvesting. The contractor designed and implemented its post-harvest handling techniques and operational practices. The contractor designed and implemented its food safety program that included identifying critical control points. Gotham Greens' food safety plan has been developed according to Hazard Analysis Critical Control Points (HACCP) and Good Agricultural Practices (GAP) guidelines to ensure product safety and eliminate potential for product contamination. Gotham Greens plans and procedures adhere to high food safety standards. The contractor's facility and food safety plan was reviewed and audited by a third party food safety expert.

Gotham Greens is producing premium quality, pesticide-free lettuce, salad greens and culinary herbs. Fact sheets and samples of press coverage were prepared for marketing and

informational purposes. Photographs of the construction process to the production and packaging of product are found in Appendix E. Gotham Greens hosted a number of tours (Appendix F) to share information on the successful demonstration of this environmentally sustainable urban CEA facility.

PACKAGING AND DISTRIBUTION

Gotham Greens experimented with various types of produce packaging to find a solution that would support product quality freshness and be cost effective. Gotham Greens selected recyclable packaging that was cost-effective, visually attractive and that protected the quality of the produce.

Gotham Greens' food safety plan has been developed according to Hazard Analysis Critical Control Points (HACCP) and Good Agricultural Practices (GAP) guidelines to ensure product safety and eliminate potential for product contamination. Gotham Greens has set exceedingly high food safety standards and are routinely third party audited.

SALES, MARKETING, AND BRANDING

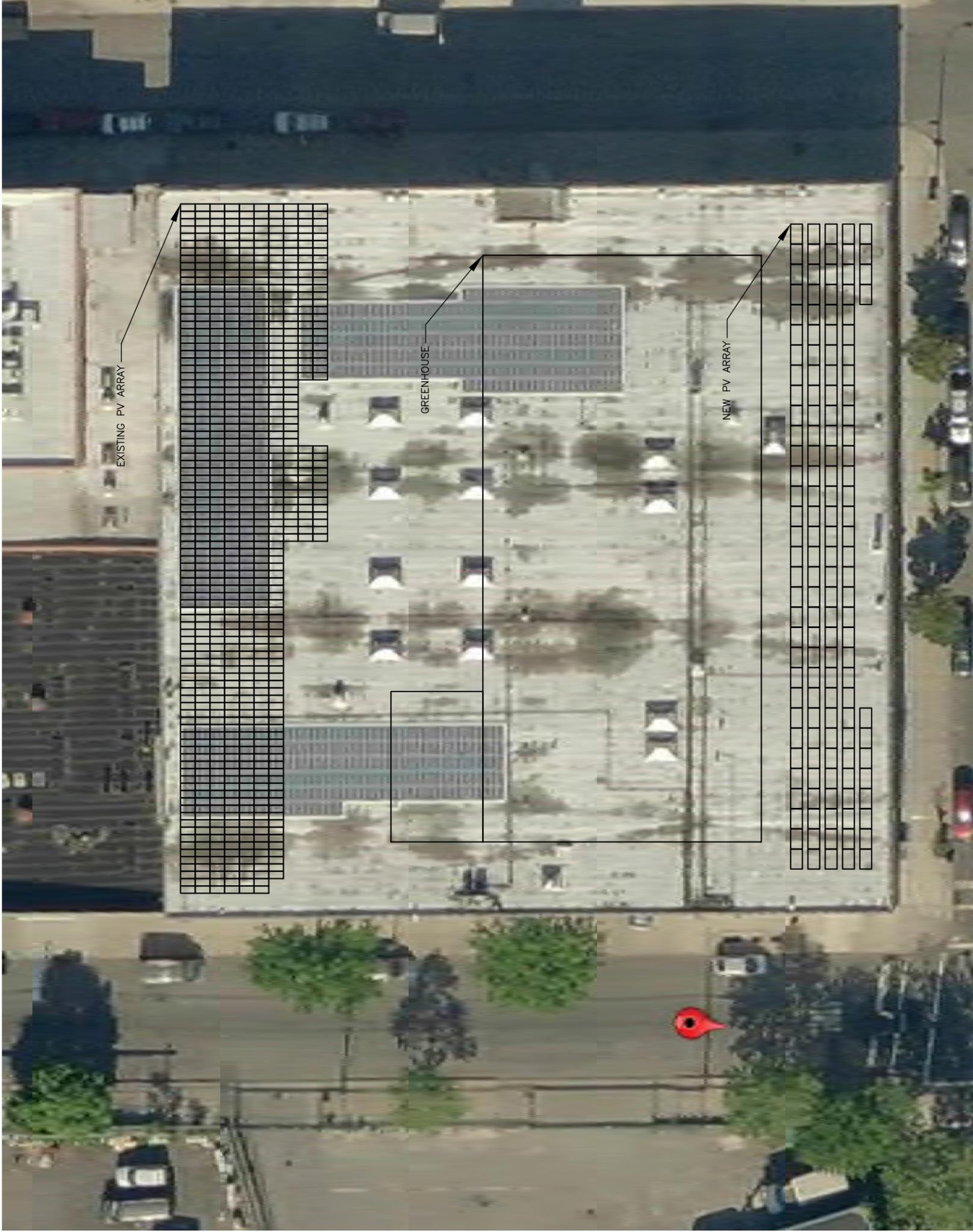
Gotham Greens began contacting supermarkets and restaurants in 2010. The contractor established early relationships with Whole Foods Market, a national retailer and industry leader in organic, natural and sustainably produced food. Gotham Greens' mission is line with that of Whole Foods Market: promoting local, fresh, healthy, and sustainably produced food, so it seemed to be a logical partnership. Whole Foods Market is one of the contractor's biggest customers. Whole Foods Market has assisted with in-store marketing of Gotham Greens products.

Sales have increased week over week and Gotham Greens currently has 28 retail and restaurant accounts including D'Agostino's, Fresh Direct, Union Market, and Gramercy Tavern. Gotham Greens intends to branch into direct customer sales, either through the e-commerce or through on-premises sales or community supported agriculture (CSA) models.

The facility will grow over 100 tons of premium-quality, pesticide-free lettuce, salad greens and culinary herbs each year.

APPENDIX A

SYSTEM DESIGN AND PLAN



NEW PV ARRAY:
 SYSTEM SIZE: 32.2 kW
 MODULES: 140 TRINA 230 WATT
 NUMBER OF MODULES PER STRING; 14
 NUMBER OF STRINGS: 10
 TILT: 10 DEGREES
 AZIMUTH: 170 DEGREES
 ESTIMATED FIRST YEAR PRODUCTION: 37,127 kWh

1 ROOF PLAN
 E-1 SCALE: 1" = 30'-0"

DATE	BY	DESCRIPTION
-	-	-
DATE	BY	DESCRIPTION

REVISIONS	
DATE	DESCRIPTION
07/30/2010	
REVISION	A
DRAWING NUMBER	E-1

PROJECT	GOTHAM GREENS LLC		
DRAWING TITLE	CRYSTALLINE PV LAYOUT		
PROJECT	810 HUMBOLDT STREET, BROOKLYN, NY 11222		
DRAWN	D.B.	DATE	07/30/2010
CHECKED	R.I.	REVISION	A
SCALE	AS SHOWN		
<small> PfisterEnergy renewable energy systems 80 EAST FIFTH ST T: (973) 653-9880 PATERSON, NJ 07524 F: (973) 653-9863 </small>			

APPENDIX B

OPERATING PROCEDURES AND ENERGY MONITORING PLAN

Gotham Greens' Urban CEA facility will collect data throughout the year. The outline below identifies the type of data collected, collection methods, monthly reporting and considerations for data analysis. The goal of the energy monitoring plan is to improve the overall energy performance of the facility by: reducing total energy demand; conservation; and utilizing alternative sources of energy. The collection and analysis of performance metrics over time will guide future urban greenhouse management strategies.

GOALS OF DATA COLLECTION

1. Facility improvements
2. Increase crop yield and quality
3. Reduce energy use
4. Reduce operational costs
5. Identify major trends in seasonal variation
6. Identify novelties of urban production – in terms of yield, quality, demand, varieties, greenhouse performance, NYC climate, distribution, benefits/disadvantages of rooftop integrations, climate benefits of urban heat island or rooftop slab
7. Develop new climate control strategies
8. Determine optimal solar installation size
9. Determine total power and water needs of facility for future greenhouses
10. Determine best targets for equipment upgrades
11. Determine potential trials to improve yields, energy or costs – cultivar trials, nutrition trials, climate setpoints/strategies, pump cycling options, CO₂ injection
12. Cost/Benefit analysis of various facility upgrades/additions

DATA COLLECTION METHODS/SOURCES

- I. Greenhouse Environmental Control System
 - a. Climate Data
 - b. Equipment Duty Cycles
 - c. Energy Production
- II. Metered Monthly Utility Bills
 - a. Electricity (kWh)
 - b. Natural Gas (Therms)
- III. Manual Record Keeping
 - a. Crop Yield
 - b. Quality Metrics

DATA COLLECTED

I. Climate

- a. Outdoor Weather Station
 - i. Solar Radiation
 - ii. Air Temperature
 - iii. Relative Humidity
 - iv. Wind Speed
 - v. Wind Direction
- b. Greenhouse Microclimate
 - i. Single Zone
 - ii. Air Temperature
 - iii. Relative Humidity
 - iv. PAR
 - v. Nutrient EC, pH

II. Equipment

- a. Manual Equipment Survey
 - i. Inventory of all installed equipment and the energy demand of each component.
 - ii. Equipment Duty Cycles:

Equipment cycling will be logged by the greenhouse computer control system. Initial duty cycles projections were made to estimate utility costs during business plan development. The actual duty cycles will be collected and compared to projections. Additionally, methods to reduce cycling and make future equipment improvements will be reviewed to increase crop productivity and quality, reduce wear on equipment, and reduce total energy use. Equipment without automated logging capability will be logged manually.
 - iii. Equipment Repairs and Replacements:

Regularly scheduled maintenance and repairs will be manually recorded to understand when these repairs and replacements have affected overall efficiency of certain systems, particularly lighting.

III. Energy

- a. Energy Use
 - i. Metered kWh
 - ii. Metered Therms
- b. Energy Production
 - i. Solar Panel Output
- c. Transportation/Distribution
 - i. Fuel Use per Month
 - ii. Miles Traveled per Month

(Only recorded for product leaving, not entering, the facility)
- d. Embodied Energy

Embodied energy of the facility and annual supplies will not be calculated at this time.

CROP DATA

Crop Inputs

Total annual greenhouse supplies, including substrate and fertilizer, will be manually recorded for future use as needed.

Crop Registration

- a. Yield – by cultivar, month, zone, pound, unit area
- b. Quality
- c. Pest/Pathogen Outbreaks
- d. Nutrient Solution – EC, pH, lab analyses

SAMPLE

MONTHLY INTERNAL ENERGY MONITORING DATASHEET

DATE:

MONTH TO REPORT:

PREPARED BY:

I. MONTHLY CLIMATE SUMMARY

**Graph*

II. MONTHLY GREENHOUSE MICROCLIMATE SUMMARY

**Graph*

III. CLIMATE CONTROL STRATEGY

**List setpoints/strategies/overrides and any changes from previous report*

IV. CROP PRODUCTION SUMMARY

Crop Variety	Zone	Total [lbs]	Total [heads]
Crop 1	1		
Crop 2	2		
Crop 3	3		
Crop 4	4		
Crop 5	5		

V. QUALITY

Metrics TBD

VI. METERED UTILITIES

ELECTRIC				
Equipment	Units [#]	kW	kWh	% of Total
<i>Irrigation</i>				
<i>Ventilation</i>				
<i>Lighting</i>				
<i>Heating</i>				

NATURAL GAS			
Equipment	Units [#]	Therms	% of Total
<i>Heating</i>			

VII. ONSITE ENERGY PRODUCTION

Format TBD.

VIII. TRANSPORTATION LOG

of Deliveries

of Locations

Miles

Fuel Gallons

IX. CONCLUSIONS and NOTES

**Improvements – strategy changes, equipment changes*

APPENDIX C

FACT SHEET AND MEDIA KIT



GOTHAM GREENS

LOCAL PRODUCE

CONTENTS:

2011

Media Kit

More Info: GothamGreens.com 



Gotham Greens is a New York City based company dedicated to growing the highest quality vegetables and culinary herbs for local restaurants and retailers. Gotham Greens' premium quality, pesticide-free vegetables and herbs are grown in state-of-the-art rooftop greenhouses using clean, renewable energy. Gotham Greens products are found in local retail and dining establishments that are committed to providing their customers with the freshest and finest foods available.

The nation's first commercial urban rooftop greenhouse, Gotham Greens, produces the highest quality, best tasting vegetables, year round, in a way that maximizes sustainability and minimizes waste. Gotham Greens operates using turnkey solutions that were all designed, financed, built, and operated in house.



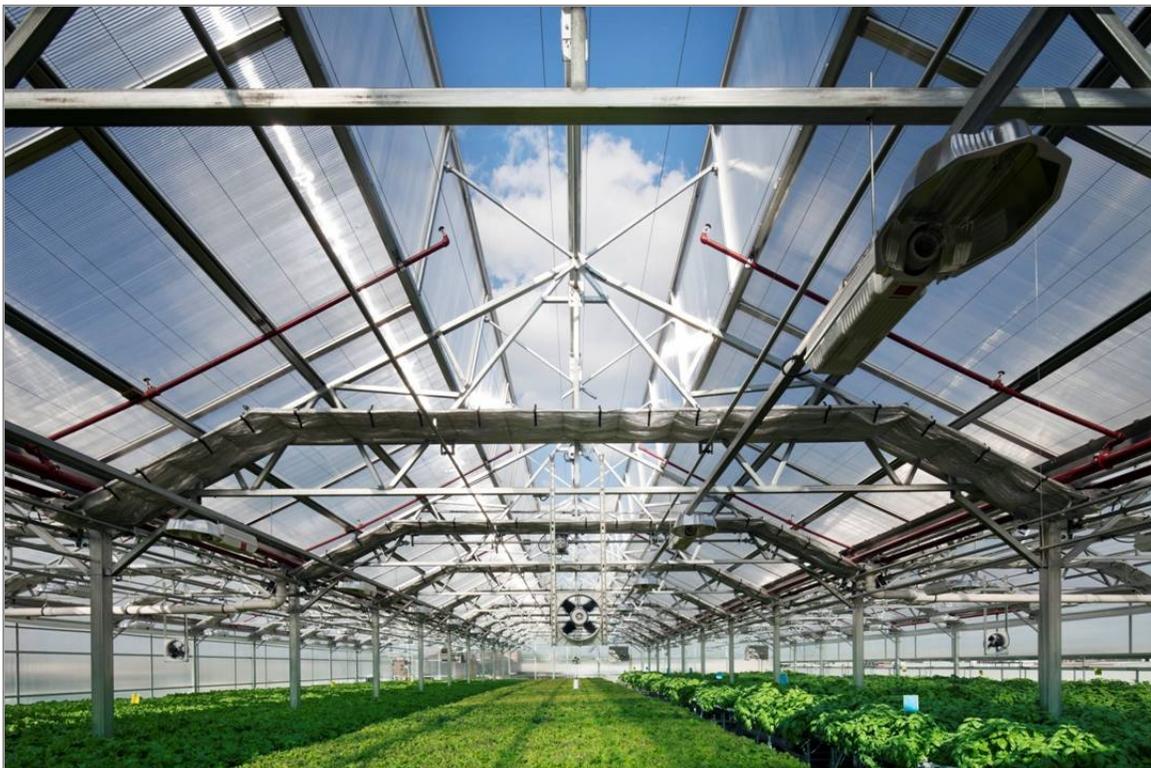


Philosophy

Gotham Greens is committed to the highest quality standards. Our growers are passionate about producing the *finest quality, freshest, best tasting, and most nutritious culinary ingredients available in New York City*. They care about our customers just as much as they care about the every need of our plants, from seed to harvest.

Our products are harvested before breakfast so they can be on your plate by lunch. We don't just blindly talk about being "local" "sustainable" and "natural". While our business is about those things, we care about what those things stand for: flavor and nutrition, preserving water and soil resources, biodiversity, reducing harmful chemical use in food production, fair treatment of workers, and spending our dollars closer to home.

Our farm is unconventional. But so is our commitment to quality, taste and sustainability.





History

Gotham Greens was founded in 2008 by Viraj Puri and Eric Haley who had a *vision for a local farm that would offer New York chefs and retailers the freshest and highest quality culinary ingredients, year-round, at competitive prices.* Jenn Nelkin, a nationally renowned greenhouse expert, joined Gotham Greens as a partner in 2009 to head all greenhouse operations.

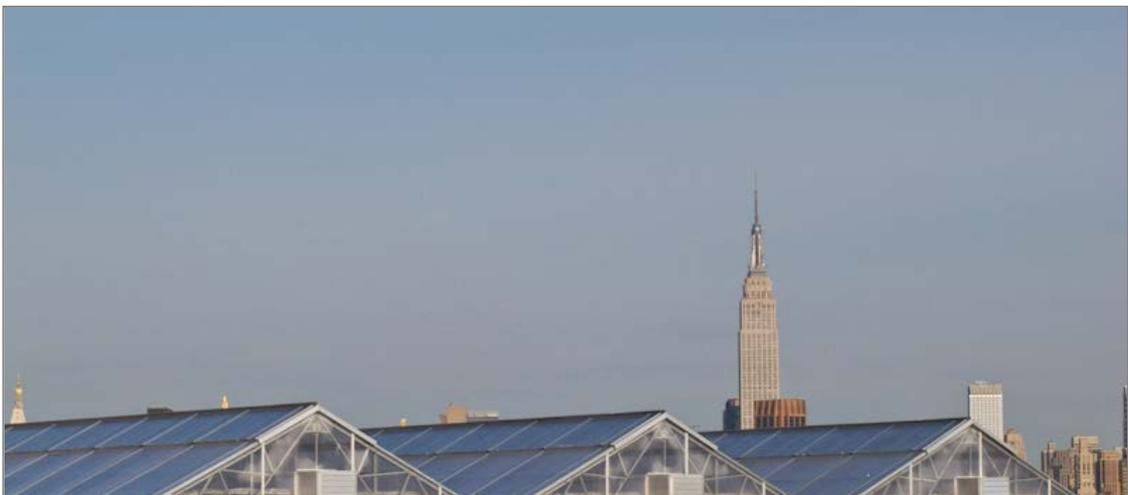
Gotham Greens' *first greenhouse facility, in Greenpoint, Brooklyn,* began producing crops in May 2011. The greenhouse will annually produce over 80 tons of premium quality produce, year-round, that will be available at select retailers, markets and restaurants across the city. In 2012, Gotham Greens plans to expand operations to grow an even more diverse range of premium quality leaf and vine crops.





Farm

Gotham Greens' first greenhouse facility, located on a rooftop in Greenpoint, Brooklyn. The building is owned by GMDC – a nonprofit industrial developer. The **state of the art rooftop greenhouses** combine advanced horticultural and engineering techniques to **optimize crop production, crop quality, and production efficiency**. The climate controlled facility grows premium quality produce, year-round.





Quality

Gotham Greens is committed to producing products that meet the highest standards of food quality, security, and safety. Our expert growers manage every detail of the growing process to provide our customers with the freshest product available on the market.

Premium Quality Our growers expertly manage the growing process from seed to harvest with unmatched care and commitment to quality. Gotham Greens uses no chemical insecticides or herbicides. We employ integrated pest management solutions, including biological controls such as using beneficial insects to prey on harmful pests.

Freshness and Health Crops are grown, cared for, and harvested to achieve optimum taste and nutrition. Our products are harvested just a few hours before they reach a restaurant plate or supermarket shelf, ensuring absolute freshness and nutrition. Our proximity to our customers ensures that the extended shelf life is passed onto the customer and not the food delivery chain.

Food Safety Gotham Greens' food safety plan has been developed according to **Good Agricultural Practices (GAP)** guidelines and includes a specially designed **Hazard Analysis Critical Control Point program (HACCP)** to ensure product safety and to eliminate potential product contamination. Gotham Greens has set exceedingly high food safety standards. **Our sterile greenhouses minimize the risk of food-borne diseases such as E. coli and Salmonella.**





Sustainability

There are many ways to farm responsibly and sustainably. Our approach is tailored to our unique geographic location. Our methods conserve precious natural resources. Our proximity to the market reduces transportation. We continually strive to make improvements to make our operations even more sustainable.

Land Gotham Greens' methods farming yields 20-30 times more product per acre than field production while eliminating any use of arable land. Our approach has no negative impacts on precious soil resources. We essentially use less space to grow more while protecting soil resources and biodiversity. Gotham Greens never uses genetically modified seeds.

Water Agriculture is the largest consumer of fresh water on the planet. Re-circulating hydroponics is the most water-efficient form of agriculture in the world. Gotham Greens' advanced irrigation system uses 20 times less water than conventional agriculture while eliminating all agricultural runoff. Runoff is the one of the leading causes of global water pollution.

Energy In order to efficiently operate our greenhouse year-round, Gotham Greens has carefully designed its facility to reduce energy demand. The electrical needs of the greenhouse facility will be met, in part, by a 56 kW on-site solar PV system that will annually produce 70,000 kWh of electricity. A sophisticated computer control system ensures that climate control equipment operates efficiently to reduce resource consumption. Gotham Greens has incorporated several advanced thermal design features that will result in substantial reductions in heating demand, reducing fossil fuel use. Our greenhouse acts similarly to vegetated 'green roofs' by helping to mitigate the urban heat island effect and insulate the building below.

Food Miles Gotham Greens' proximity to its customers eliminates the need for long-distance, refrigerated food transportation. We sharply reduce transportation fuel consumption and the associated carbon emissions and air pollution while improving product quality.

Integrated Pest Management Gotham Greens products are free of any harmful chemical pesticides, insecticides or herbicides. We employ integrated pest management solutions, including biological controls such as using beneficial insects to prey on harmful pests.

Community and Workers Gotham Greens is committed to providing year-round jobs in a safe, healthy and enjoyable working environment. Our team members are residents from the nearby community. Gotham Greens provides produce to City Harvest



People

Our team has unmatched expertise in technologically sophisticated, controlled environment agriculture (CEA), hydroponics, business development, marketing, sales, and environmental design.

Viraj Puri, Co-Founder and CEO

Viraj co-founded Gotham Greens in 2008. He has developed and managed start-up enterprises in New York City, Ladakh, India and Malawi, Africa focusing on green building, renewable energy, and environmental design. Prior to founding Gotham Greens, Viraj worked at New York Sun Works, an environmental engineering firm. His written work has appeared in several books and publications including, “100% Renewable – Energy Autonomy in Action” and the UN Academic Journal. He has received fellowships from the TED conference and the Wild Gift, where he currently serves on the board of directors. While he is a passionate New Yorker, Viraj is equally at home in the mountains and in wild, remote corners of the world. Viraj is a LEED® Accredited Professional and received a B.A. from Colgate University.

Eric Haley, Co-Founder

Eric co-founded Gotham Greens in 2008. Eric brings considerable business acumen to Gotham Greens together with a keen sensibility of food and fine dining. He currently works for Corporate Fuel Partners, a Manhattan-based investment bank and private equity fund. Prior to joining Corporate Fuel, he spent three years at JP Morgan Chase. Eric earned his M.B.A. from the University of Notre Dame and a B.S. University of Wyoming where he played Division I football. When Eric isn't seeking the next great restaurant or hunting for the finest ingredients for his own kitchen, he can be found skiing in the Colorado Rockies or with Viraj at Dyker Beach Golf Course in Brooklyn.

Jennifer Nelkin, Greenhouse Director

Jenn joined Gotham Greens in 2009 to head greenhouse operations. She combines her knowledge in plant physiology with a sophisticated and discerning palate. She developed her expertise in greenhouse systems and management at the Controlled Environment Agriculture Center (CEAC) at the University of Arizona. Her expertise encompasses greenhouse system design, plant nutrition, crop and pest management, sensors and controls, and staff training. Jenn has managed greenhouses in Antarctica, at both McMurdo and South Pole Stations, providing fresh vegetables for U.S. research scientists. Jenn also worked at the greenhouse at the Cuisinart Resort and Spa in Anguilla. Prior to joining Gotham Greens, Jenn worked at New York Sun Works, where she designed and directed operations of the Science Barge greenhouse. Jenn simply loves food and farming and is active at her home garden, community garden and neighborhood food co-op. She received her M.S. from the University of Arizona (plant sciences) and B.S. from Arizona State (plant biology).



Contact

Gotham Greens Farms LLC
Viraj Puri, Co-Founder & CEO

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Customer and Product Feedback: feedback@gothamgreens.com
Press/Media Inquiries media@gothamgreens.com
Employment Opportunities: jobs@gothamgreens.com





Fact Sheet

WHAT	Gotham Greens is a New York City based company dedicated to growing the highest quality vegetables and culinary herbs for local restaurants and retailers. Gotham Greens products can be found in local retail and dining establishments that are committed to providing their customers with the freshest and finest foods available.
LOCATION	Gotham Greens first greenhouse facility is located on a rooftop in Greenpoint, Brooklyn. The building is owned by GMDC, a nonprofit industrial developer.
PRODUCTS	Gotham Greens' premium quality, pesticide-free vegetables and herbs currently include several lettuce varieties, salad greens, and culinary herbs
FACILITY	<ul style="list-style-type: none">- 15,000 ft² state of the art climate-controlled greenhouse facility- Year-round crop production- 56 kW on-site solar photovoltaic renewable energy system- Innovative energy-efficient design- Re-circulating irrigation water hydroponic system uses 10 times less water than conventional agriculture and 20 times less land- Comprehensive food safety program according to GAP and HACCP
FOUNDERS	Gotham Greens was founded in 2008 by Viraj Puri and Eric Haley. Jennifer Nelkin joined as managing partner in 2009.
EMPLOYEES	Gotham Greens employs 25 NYC residents and created an additional 50 jobs during the construction of its first greenhouse facility.
WEBSITE	www.gothamgreens.com
CONTACT	Viraj Puri, Co-Founder and CEO



APPENDIX D

PRESS RELEASE

FOR IMMEDIATE RELEASE:

Contact: Mark Ballard
Channel V Media
212.680.0179
Mark@channelvmedia.com

Farm in the Sky: Gotham Greens First Harvest Rolls Into Local Grocery Stores - Nation's First Commercial Urban Rooftop Greenhouse -

Brooklyn, NY (June 27, 2011)—Situating on the rooftop of an industrial building in Greenpoint, Brooklyn, Gotham Greens' state-of-the-art greenhouse has yielded its first harvest of what will ultimately be 100 annual tons of premium quality, pesticide-free vegetables and herbs. Gotham Greens' produce is now available at all area Whole Foods Markets, D'Agostino's, Fresh Direct and Mario Batali's Eataly, among others.

When compared to conventional agriculture, Gotham Greens' re-circulating hydroponic methods use 10 times less land and 20 times less water. Pesticide use and fertilizer runoff – one of the leading causes of global water pollution - are eliminated. Furthermore, the company's sterile greenhouses and comprehensive food safety program minimizes the risk of food borne pathogens including E coli and Salmonella.

"Gotham Greens addresses many of the growing ecological and public health concerns surrounding conventional agriculture, including high resource consumption, long distance food transportation, and food safety, while providing New Yorkers with premium quality local produce, year round," explained Gotham Greens founder Viraj Puri. "However, there are many ways to farm responsibly and sustainably; our methods are based on our unique geographical context."

In a letter to the company, New York City Mayor Mike Bloomberg wrote, "Gotham Greens embraces New York's entrepreneurial tradition at its best—and demonstrates that going green is a smart business strategy." This sustainable initiative has also created meaningful economic development. Construction of the facility produced over 50 construction jobs, and the greenhouse operations created an additional 25 full-time jobs.

For interviews, product samples or a tour of the greenhouse please call: 212-680-0179

About Gotham Greens

The nation's first commercial urban rooftop greenhouse, Gotham Greens produces the highest quality, best tasting vegetables, year round, in a way that maximizes sustainability and minimizes waste. The company was founded in 2008 by Viraj Puri and Eric Haley and operates using turnkey solutions that were all designed, financed, built and operated in house. Jenn Nelkin, a nationally renowned greenhouse expert, joined Gotham Green as a partner in 2009 to head all greenhouse operations. Investment partners include the SBA, NYBDC, GMDC and based on the project's scientific merit and research potential, the prestigious New York State Energy Research and Development Authority (NYSERDA). For more information, please go to: www.gothamgreens.com

APPENDIX E
PHOTOGRAPHS

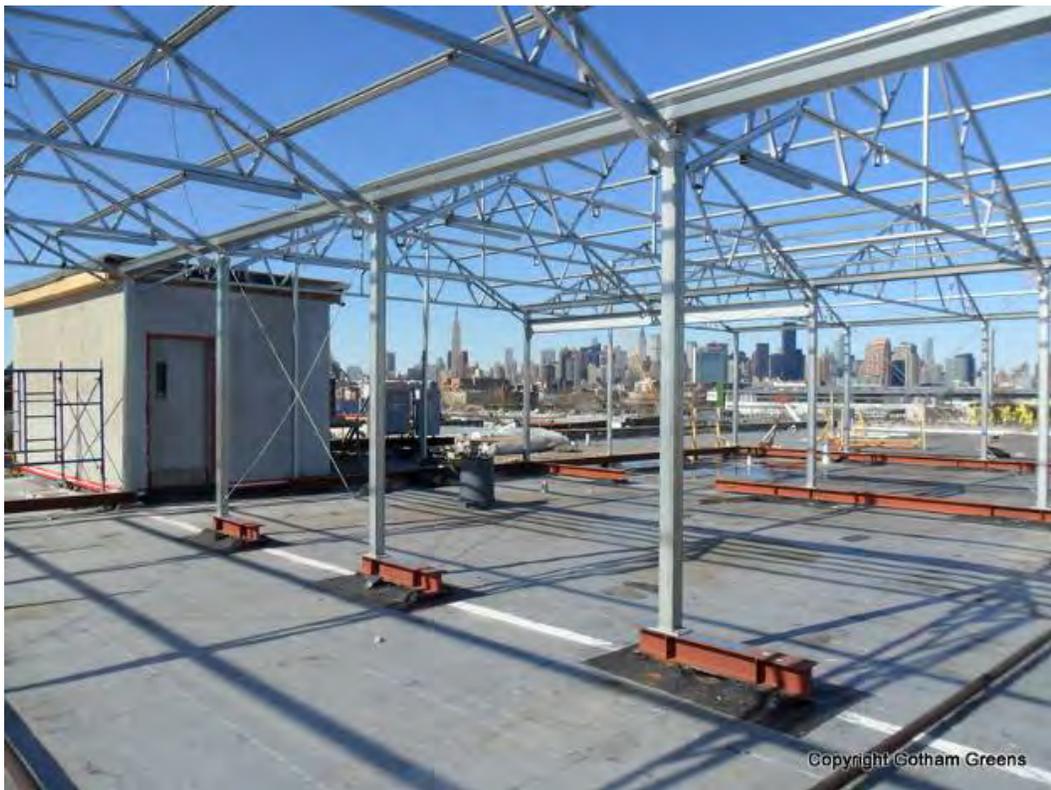
November 2010



December 2010



January 2011

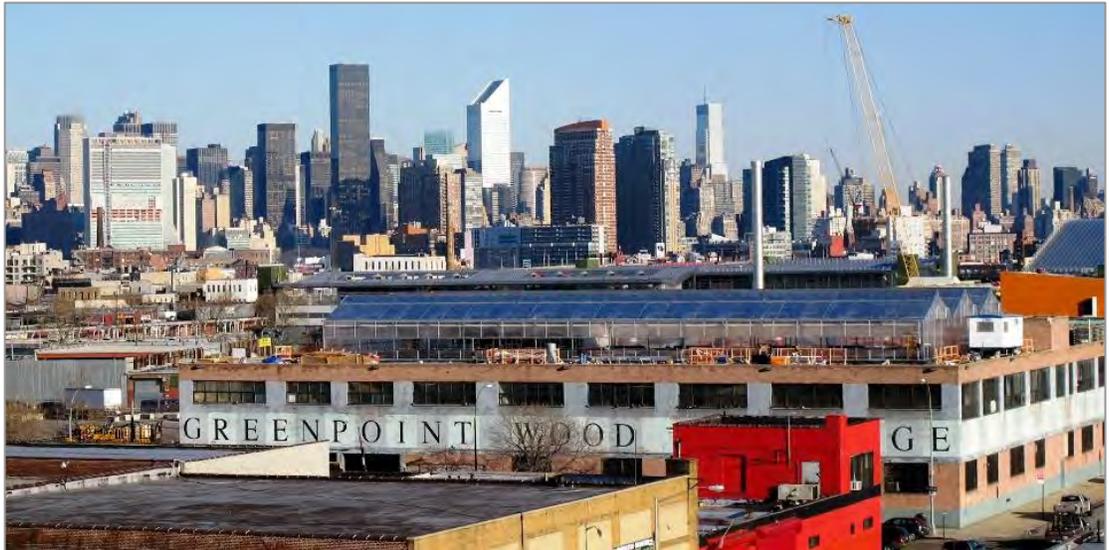


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February 2011



March 2011



April 2011



May 2011



June 2011



July 2011



APPENDIX F

LIST OF TOUR VISITORS

February 2011

- Philips Lighting: research and development in energy efficient horticultural lighting.
- HortAmericas: leading supplier and distributor of innovative horticultural solutions including urban agriculture

March 2011

- Whole Foods Market: leading organic and natural foods retailer increasingly focused on local produce

April 2011

- Common Ground: Nonprofit real estate developer working on innovative programs that transform people, buildings and communities
- FreshDirect: leading NYC retailer increasingly focused on local produce

May 2011

- Growing Cities – nonprofit film and research group focused on urban agriculture nationwide

June 2011

- Office of the Manhattan Borough President Scott Stringer

July 2011

- Office of Mayor of New York, Michael Bloomberg