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## SUSTAINABILITY REPORT 2015

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BOSTON • NEW YORK • SAN FRANCISCO • WASHINGTON, DC



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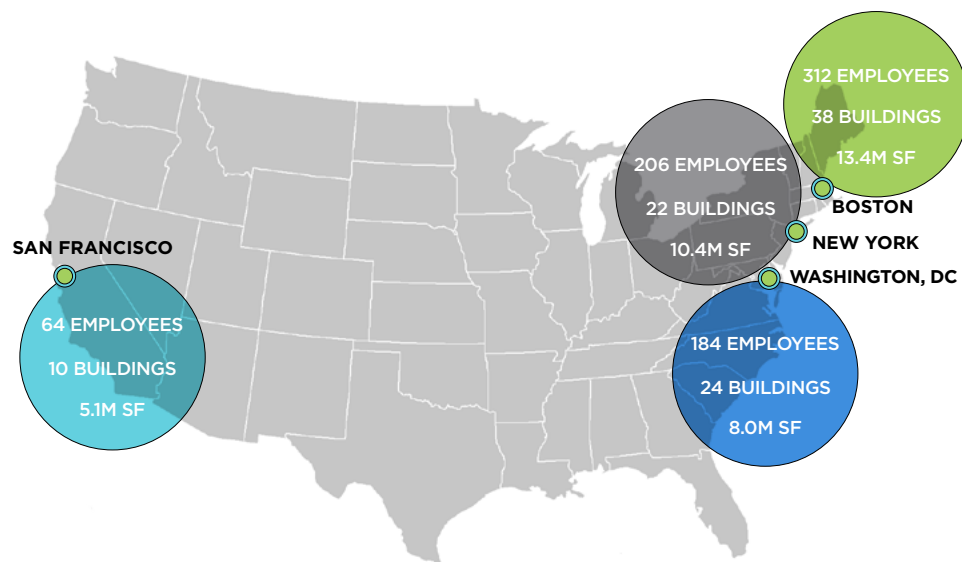
<sup>1</sup> This report contains Standard Disclosures from the Global Reporting Initiative (GRI) Sustainability Reporting Guidelines. See page 23-25 for a complete context index.

# STRATEGY

As one of the largest owners and developers of office properties in the United States, Boston Properties actively works to promote our growth and operations in a sustainable and responsible manner across our four regions. Our sustainability strategy is broadly focused on the economic, social, and environmental aspects of our activities, which include the design and construction of our new developments and the operation of our existing buildings.

Boston Properties is a real estate company with a strategy of long-term ownership. By understanding the externalities of our business, we aim to make a positive impact and reduce risk. This report highlights the execution of our sustainability strategy, and is organized into three themes: Environmental Impact, Health & Wellness, and Community Involvement.

Through our efforts we demonstrate that operating and developing commercial real estate can be conducted with a conscious regard for the environment and wider society while mutually benefiting our tenants, investors, employees, and the communities we serve.

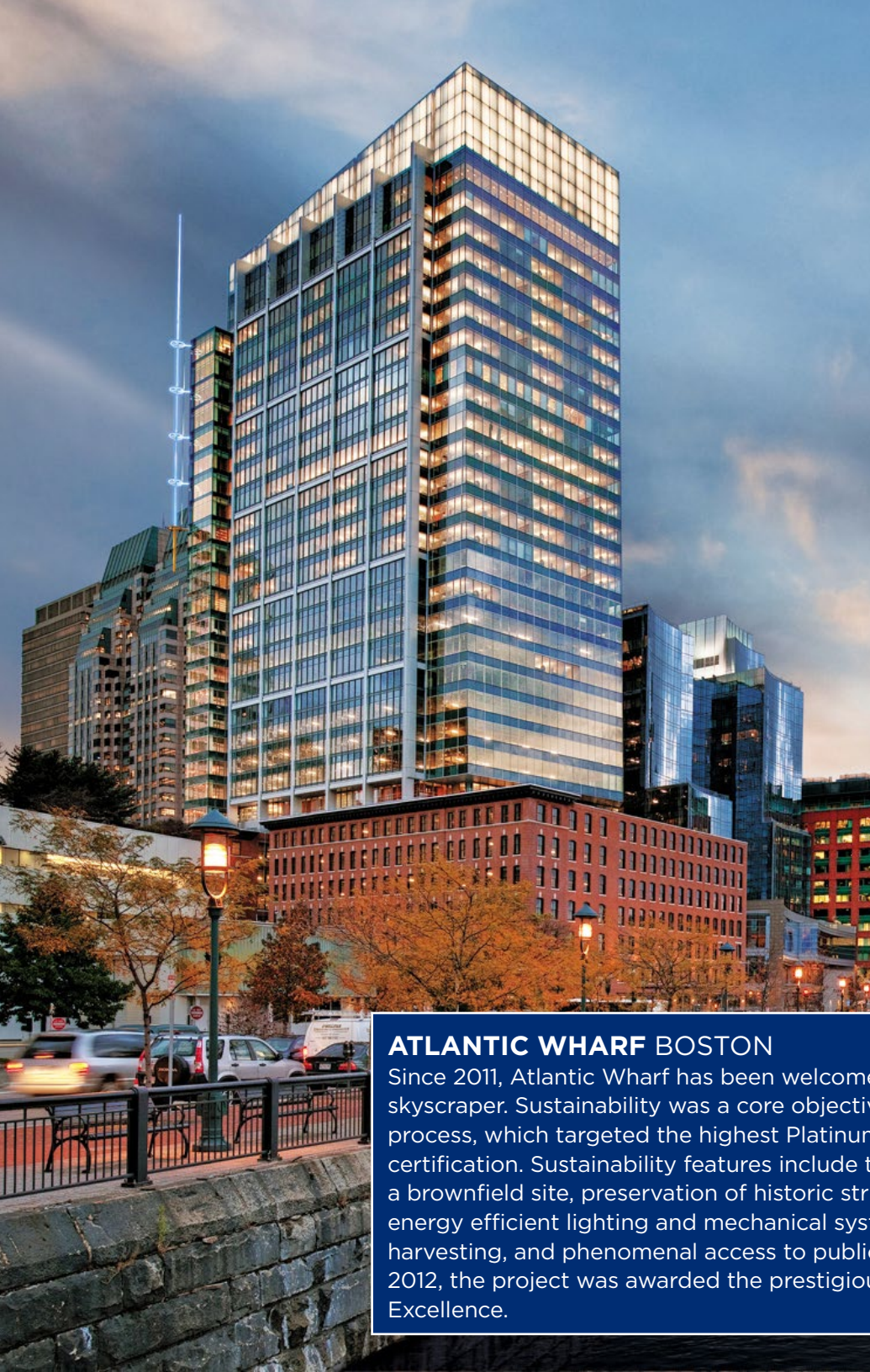


REPORTING BOUNDARY, OCCUPIED AND ACTIVELY MANAGED PORTFOLIO

## REPORTING METHODOLOGY

This report is focused on the aggregate performance of our occupied and actively managed office building portfolio. Occupied buildings have less than 50% vacancy. Actively managed buildings are buildings where we have operational control.

Our 94 occupied and actively managed office buildings represent 85% of our portfolio gross square footage (SF). By concentrating on similarly situated buildings we are able to meaningfully benchmark performance and measure the efficacy of our sustainability measures. Unless otherwise noted, data presented in this report relate to these types of office buildings. Over time we will continue to assess available data and determine when to expand this report to address other property types and information.



# STAKEHOLDER ENGAGEMENT



We develop our understanding of the views and priorities of our stakeholders by engaging our supply chain, tenants, employees, communities, and joint venture partners throughout the life-cycle of our activities. We work closely with our tenants, vendors, and service providers to gather knowledge, plan, and implement design solutions, technologies, and programs that drive key performance indicator improvement. We regularly convene public forums during the development process to seek community input, and use green building rating system criteria to manage our supply chain.

The operation of our properties is heavily dependent on the behavior of our tenants. Our goals cannot be achieved without effective engagement of our building occupants. We have integrated sustainability into property management practices, tenant improvement guidelines, and our routine meetings with existing and prospective tenants. We believe that by developing green buildings we maximize the likelihood of sustainable performance, and that through effective stakeholder engagement we can assure operational success.

# MATERIALITY



Boston Properties has conducted a materiality assessment to identify the significant economic, social and environmental issues that impact our business and are important to our stakeholders. The results of the materiality assessment have been used to establish and confirm sustainability-related performance indicators for our organization,

prioritize resources, and to determine the contents of this report. Material aspects that matter most to our business and stakeholders include economic performance, resource use, energy, greenhouse gas emissions, water, waste, customer satisfaction, public transportation, climate change mitigation and adaptation, green building, local community impact, and the health, safety, and wellness of our customers and employees.

## ATLANTIC WHARF BOSTON

Since 2011, Atlantic Wharf has been welcomed as Boston's first green skyscraper. Sustainability was a core objective of the design process, which targeted the highest Platinum Level LEED certification. Sustainability features include the redevelopment of a brownfield site, preservation of historic structures and facades, energy efficient lighting and mechanical systems, rainwater harvesting, and phenomenal access to public transportation. In 2012, the project was awarded the prestigious ULI Global Award for Excellence.

# RECOGNITION



2015 & 2014  
LEADER IN THE LIGHT AWARD



2015 GRESB GREEN STAR  
FOURTH CONSECUTIVE YEAR



2015 GREEN LEASE LEADER



ENERGY STAR®  
CERTIFICATION NATION  
EXECUTIVE MEMBER



# GOALS



## 15x20 Energy Use Reduction Goal

Reduce energy use intensity, targets a 15% reduction by 2020. Units are kBtu/SF.



## 20x20 Greenhouse Gas Reduction Goal

Reduce Scope 1 and Scope 2 greenhouse gas emissions intensity, targets a 20% reduction by 2020. Units are kg-CO<sub>2</sub>e/SF.



## 20x20 Water Use Reduction Goal

Reduce water use intensity, targets a 20% reduction by 2020. Units are gallons/SF.



## 65x20 Waste Diversion Goal

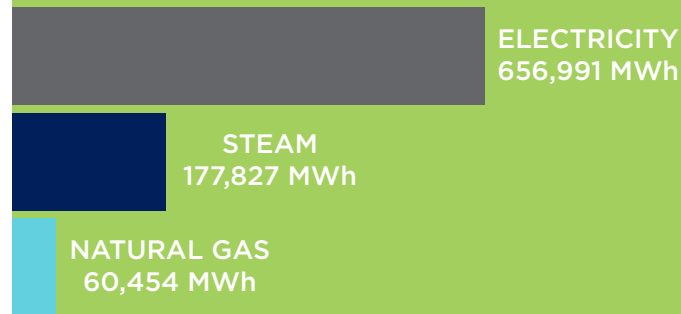
Increase waste diverted from landfill, targets a 65% diversion rate by 2020. Units are % diverted.



## 2015 KEY PERFORMANCE INDICATORS



### ENERGY ABSOLUTE



### ENERGY LIKE-FOR-LIKE

↓ 1.5%

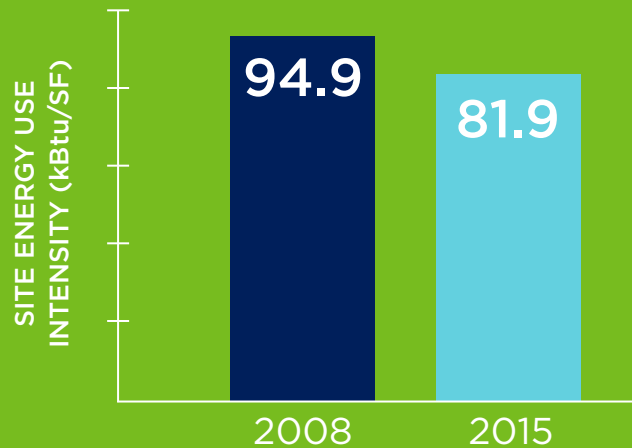
2014 MWh = 906,583  
2015 MWh = 892,729

### AVERAGE ENERGY STAR SCORE

77.4

### SITE ENERGY USE INTENSITY

81.9 kBtu/SF



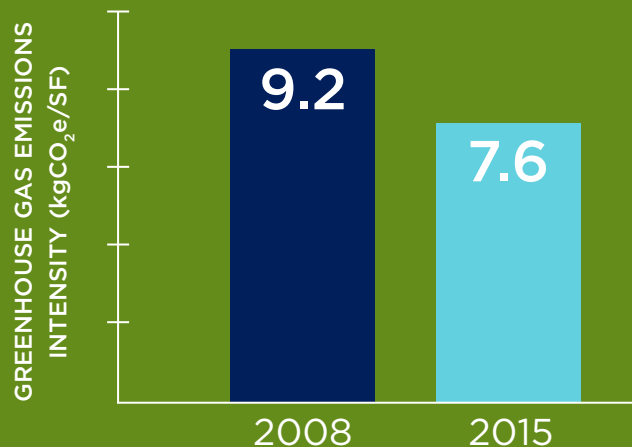
### HISTORICAL ENERGY INTENSITY

### EMISSIONS ABSOLUTE

275,200

MTCO<sub>2</sub>e

Scope 1 = 10,881 MTCO<sub>2</sub>e  
Scope 2 = 264,319 MTCO<sub>2</sub>e



### HISTORICAL EMISSIONS INTENSITY



## WATER ABSOLUTE

**580,600**  
kgal



## WATER LIKE-FOR-LIKE

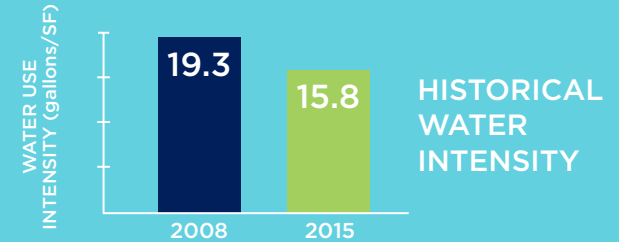
**↑1.2%**

2014 = 572,431 kgal  
2015 = 579,551 kgal



## WATER USE INTENSITY

**15.8** gallons/SF



## WASTE ABSOLUTE

**31,225**  
Tons



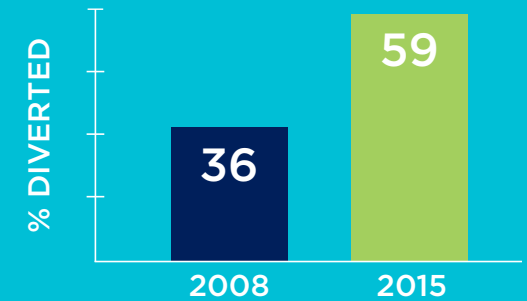
**RECYCLED**  
**18,425 TONS**  
**59% DIVERSION**

LANDFILL  
9,712 TONS

INCINERATED  
3,088 TONS



## HISTORICAL WASTE DIVERSION RATE



## LEED® CERTIFIED FLOOR AREA

**15.8** Million Square Feet Certified

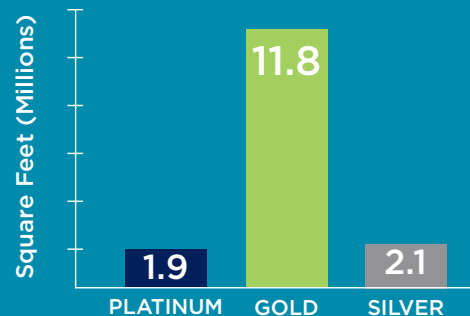
**43%** Eligible Floor Area

**72** LEED Accredited Professionals (LEED-APs) and Green Associates

**46** Green Professionals (G-PROs)



## LEED® CERTIFICATION LEVELS



## ENERGY STAR® BUILDINGS

**52** Properties Certified

**20.6** Million Square Feet ENERGY STAR Certified

**56%** of Eligible Floor Area



# GREEN BUILDING



Boston Properties is a corporate member of the U.S. Green Building Council® (USGBC) and has a long history of owning, developing, and operating properties that are certified under USGBC's Leadership in Energy and Environmental Design™ (LEED®) rating system. The LEED green building rating system is a voluntary, consensus-based national standard of design guidelines for high performance and sustainable buildings. Since 2008, Boston Properties has certified over 15 million square feet of our portfolio, of which 80% is certified at the highest Gold and Platinum levels.

## LEED FOR BUILDING DESIGN AND CONSTRUCTION

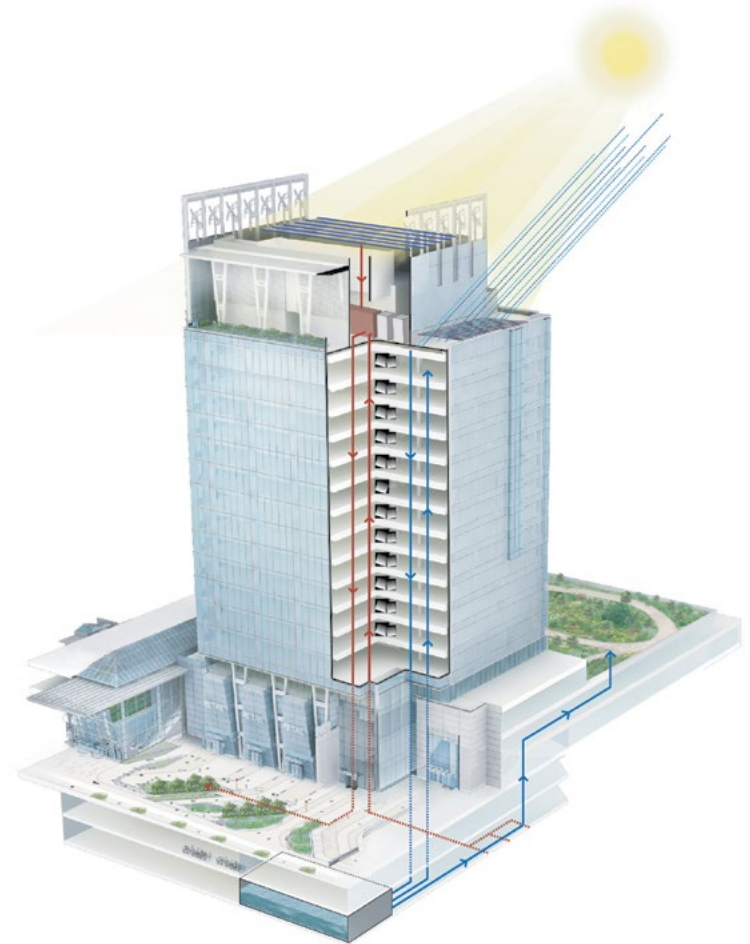
We target LEED Silver certification or better on all developments. Between 2008 and 2015, we completed 14 LEED certified new development projects totaling 6 million square feet. The entire 4.5 million square feet of new development pipeline is pursuing LEED certification.

## LEED FOR EXISTING BUILDINGS (LEED-EB)

Green building certification of our existing properties is an important component of our strategy to achieve operational sustainability. Boston Properties continues to actively explore the LEED-EB certification across our portfolio and has a company-wide task force dedicated to sharing best practices. Currently, we have certified 14 of our actively managed properties totaling 9.7 million square feet.

## EDUCATION

Maintaining and strengthening Boston Properties' internal green design, construction, operations capabilities, and knowledge base is a key aspect of the Company's overall environmental strategy. Ongoing training and education of our employees is essential to sustainable operations and growth. We have made a concerted effort to train and accredit our managers and staff in green design, construction, and operations. 72 managers across our development, construction and property management departments were LEED Accredited Professionals or Green Associates representing 63% of employees in these departments. 47 building engineers have received Green Professional (G-PRO) Operations & Maintenance building skills training, a program which is endorsed by the USGBC. Our trained property management professionals are equipped to effectively engage tenants to promote more sustainable tenant behavior and discovery of opportunities.



## 888 BOYLSTON STREET BOSTON

When completed in 2016, the 17-story tower at the Prudential Center will be among the most sustainable green buildings in the United States. 888 Boylston has been designed to optimize energy efficiency, and is expected to operate 47% more efficiently than buildings of the same type in a similar climate zone. Sustainability features include a dedicated outside air system with active chilled beams, heat recovery, LED lighting, and rainwater harvesting. The roof and crown of the building accommodate solar photovoltaic panels and fourteen vertical axis wind turbines, which together produce enough power for 15 homes.



# BUILDING MATERIALS

As part of our commitment to developing LEED projects, sustainability criteria informs the building material selection process. These criteria, aligned with the LEED rating system, support sustainable construction material procurement, green building delivery, conservation of natural resources, waste reduction, and occupant health. Project teams review vendor disclosures and aim to cost-effectively procure building materials that are:

- Extracted, harvested, recovered, and manufactured within 500 miles of the project site;
- Composed of the maximum possible recycled content;
- Third-party validated sustainably harvested wood products; and
- Non-toxic and support healthy, productive indoor environments containing no volatile organic compounds (VOCs), urea-formaldehydes, and/or other chemicals of concern.

# GREEN LEASING

We strive to limit our energy and natural resource consumption through active management at our properties and leasing activity. In order to align our sustainability efforts with our tenants, our Master Lease form includes: cost recovery for capital expenditures made to reduce operating expenses, cost recovery for certifications (including LEED and ENERGY STAR), sub-metering of high intensity tenant equipment, and required tenant energy disclosure (benchmarking). Our internal legal counsel and leasing team actively negotiates our leases

with the intent of preserving green lease clauses without alterations or exceptions. The vast majority of our executed leases today are written without any changes to our model green master lease.

## 535 MISSION STREET SAN FRANCISCO

In April 2015, the 27-story tower was the first in San Francisco to earn LEED Platinum certification under the LEED Core and Shell rating system. Sustainability features include advanced mechanical systems, thermal envelope, fan wall air handlers, high efficiency low emissions heating boiler, high efficiency chillers, a state of the art energy management system, regenerative drive elevators, water efficient fixtures, and rainwater harvesting system. The high-performance façade glazing integrates with indoor controls for exceptional energy and light transmission performance. Taken together, these features promote occupant health, comfort, and productivity while simultaneously mitigating environmental impact.



# ENERGY & EMISSIONS



## ENERGY MANAGEMENT

Managing energy consumption and implementing energy conservation measures aligns with our objective to provide the greatest benefit to our tenants and investors. We continually measure and manage the usage of electricity, gas, and steam using Energy Intelligence Software (EIS), EPA's ENERGY STAR Portfolio Manager® and energy audits. Our regional managers and heads of property management have annual performance goals with energy, emissions, water, and waste targets. These goals are formulated at the asset level and roll up to regional and company-wide targets.

## ENERGY INTELLIGENCE SOFTWARE

Since 2011, Boston Properties has strategically partnered with EnerNOC to deploy EIS and real time energy monitoring infrastructure across our actively managed office portfolio. As active managers, Boston Properties leverages EIS, interval data, and increased energy use awareness to optimize facility operations by adjusting Building Management System (BMS) programming, verifying nighttime shutdowns/setbacks, holiday scheduling, peak load shedding, optimizing equipment runtime, and executing strategic demand response events. Using interval data to optimize energy performance yields approximately \$785,000 in savings per year. Interval data is also used to execute demand response events. Revenue from demand response program enrollments has exceeded \$1.8 million over five years.

### 100 FEDERAL STREET BOSTON

Since acquiring 100 Federal Street in March of 2012, Boston Properties has actively managed the 37-story tower and improved all major sustainability indicators, including: energy use intensity, carbon emissions, water consumption, waste diversion, ENERGY STAR rating, and LEED certification level. The building was rated LEED Silver in 2011 under the LEED-EB rating system, and is on track to improve to a LEED Gold certification under the LEED Dynamic Plaque (LEED-DP) rating system in 2016.







### ENERGY CONSERVATION MEASURES (ECMs)

We are committed to identifying and implementing ECMs and capital improvements that reduce energy use. ECMs are reviewed and the projects that meet certain investment criteria are implemented. Since 2011, energy projects have cut annual use by 15,500 MWh, saving approximately \$2.3 million per year. ECMs include lighting retrofits, HVAC upgrades, and building management systems and controls improvements.

### RENEWABLE ENERGY

In 2015, Boston Properties generated more than 1 million kWh renewably on-site. At specific sites, distributed generation technologies, like solar photovoltaics, are capable of producing energy more cost-effectively than traditional technologies. We are pursuing renewable energy projects where these utility cost discounts are evident. We are actively researching and pursuing the adoption of alternative and renewable energy technology at our existing buildings and new developments. Over half of our new development projects are either studying or implementing alternative and renewable energy installations, including solar photovoltaics, vertical axis wind turbines, and/or cogeneration systems.

### HIGH PERFORMANCE TENANT IMPROVEMENTS

Tenant Improvement guidelines have been developed by Boston Properties to support sustainable design and construction of fit-ups and to strengthen a more sustainable Tenant-Landlord relationship. By following these guidelines during the design and construction process, we share common goals of creating workspaces that reduce environmental impact, improve indoor environmental quality, and promote occupant health, wellness, and productivity.

#### **SALESFORCE TOWER SAN FRANCISCO**

At 1,070 feet tall, the 60-story Salesforce Tower will be the tallest building in San Francisco. The tower connects directly to the Transbay Transit Center, providing direct access to 11 Bay Area transit systems and a 5.4-acre public park. Sustainability features include integrated metal sunshades, high performance (low-emissivity) glazing, rainwater harvesting, and an underfloor air system served by high efficiency on-floor air handlers which draw fresh air from outside air louvers on every floor.



# WATER



We recognize the growing importance of water conservation. Over the past five years, Boston Properties has upgraded plumbing fixtures across more than 33% of our portfolio. Since 2008, Boston Properties has reduced water use intensity (gallons/SF) by 16%. We use ENERGY STAR Portfolio Manager to monitor and benchmark water usage in buildings where we have access to water meter data. Over the last five years we have been focused on implementing smart irrigation and water efficient landscaping practices at existing buildings and new developments. We prioritize the oldest, least efficient fixtures for improvement, and focus our efforts on some of our largest properties to ensure that we are maximizing our conservation efforts. Implemented improvements include smart controllers, low flow sprinkler heads, rain sensors, and infrastructure improvements. In addition to retrofitting existing irrigation systems, Boston Properties is landscaping with drought-tolerant plants and using captured rainwater for irrigation systems when irrigation is required.

# CLIMATE PREPAREDNESS



We are preparing for environmental impacts, including increased flooding, severe storms, and water scarcity. We are adapting by implementing measures to improve the resilience of our existing properties and new developments. Across our portfolio we are assessing vulnerability, modeling future sea level rise scenarios, and developing infrastructure improvements and emergency response plans. We understand the importance of climate preparedness and are working proactively to protect our investments by improving resilience.

## PROTECTING COMMUNITIES, ECOSYSTEMS AND WATER QUALITY

At Boston Properties University (BPU) this year, the Boston Region made a pledge to the Waterkeeper Alliance to continue to responsibly execute water quality protection practices, including storm water runoff control, treatment, and mitigation.







# WASTE

In partnership with our vendors and tenants, Boston Properties has implemented best waste management practices, including single stream recycling, composting, and e-waste programs for tenant solid waste in all of our regions. As a result, 59% of office waste by weight is recycled across our portfolio, which is a 23% increase since 2008. We also work closely with our vendors and tenants to promote responsible waste management practices, including haul trip optimization and composting at cafés and restaurants.

## SINGLE-STREAM RECYCLING

We have worked across our portfolio with our tenants and waste haulers to transition to single-stream recycling programs. Single-stream simplifies recycling. Commingled materials are collected in one container and sorted off-site at a material recovery facility. The advantages of single-stream recycling include increased customer participation and potentially higher waste diversion rates.

## COMPOSTING

Our integrated composting program diverts roughly 2,000 tons of organic material from landfills. We work with our tenants to ensure that they have signage and receptacles, and our buildings have designated central compost bins with frequently scheduled pickup. Composting produces valuable nutrient-rich soil and reduces the frequency of waste hauls required, saving an estimated \$180,000 in hauling fees annually.

### **601 MASSACHUSETTS AVENUE WASHINGTON, DC**

Located in the Mount Vernon Triangle neighborhood, 601 Massachusetts Avenue provides excellent commuter access and proximity to the Verizon Center, Convention Center, and a wide array of retail, restaurants, residential, and office buildings. The LEED Gold certified design is energy efficient, reducing costs 30% below an energy code compliant baseline. Potable water is also conserved. The building will use 37% less water than code requires with low flow fixtures, rainwater harvesting, and no permanent irrigation systems.



# TRANSPORTATION

More than 77% of the square footage of our properties is located in central business districts with ready access to public transportation. The following options and amenities are available within 0.25 miles of our buildings to support non-single occupancy vehicle transportation:

Transportation Options	Number of Options
Bike Spaces	1,880
Bike Sharing Program Spaces	666
Bus Stops	188
Subway Stations	71
Commuter Rail Stations	34
Car Share Spaces	41
Hybrid Spaces	127
Van Pool Spaces	160
Shuttle Services to Transit Stations	42
Electric Car Charging Stations	49

Boston Properties promotes the use of mass transit by its tenants through on-site events for tenant employees, newsletters, and one-on-one meetings with tenant contacts. Our employees support alternative transportation programs by working with local transportation management authorities and supporting the use of car pooling. We encourage our employees to use alternatives to single occupancy vehicles by subsidizing the purchase of transit passes and enabling employees to fund many of their additional commuting expenses, such as vanpools and parking at public transportation stations, by using pre-tax dollars through our Commuter Benefits Program.

## TIMES SQUARE TOWER NEW YORK

Developed in 2004 by Boston Properties, the 47-story Times Square Tower is an iconic Manhattan property. The transit oriented development straddles the 42<sup>nd</sup> Street Station at the "Crossroads of the World."





# HEALTH & WELLNESS

## INDOOR ENVIRONMENTAL QUALITY

Thermal comfort and air quality are fundamental to healthy and productive workplaces. Boston Properties assures thermal comfort by continuously monitoring space temperature set points across the portfolio with advanced building management systems. Air quality is routinely and proactively tested for volatile organic compounds, mold, and carbon dioxide concentration. We understand that the creation of great space requires careful consideration of the lives inside our buildings. We strive to create these great places by incorporating principles like biophilic design, connecting occupants with the natural environment, and developing supporting restaurant, retail, and service amenities that nourish and delight our customers.

## GREEN CLEANING

All regions have formalized a Green Cleaning requirement with cleaning vendors to minimize the impact of cleaning products on the environment. Aspects of this requirement include using Green Seal Certified cleaning products, High Efficiency Particulate Air (HEPA) vacuums, dry cleaning for carpets, and restroom supply products made from recycled materials. Our Green Cleaning program benefits both the janitorial workers within our buildings and our tenants because the cleaning methods and products used do not include toxic chemicals that can cause respiratory and dermatological problems. Indoor air quality has also improved as a result of the use of HEPA vacuums. The cleanliness of our properties is maintained by over 1,000 janitors and porters who are trained in green practices and use Green Seal Certified products.

## EMPLOYEE HEALTH AND WELLNESS PROGRAM

Our financial performance depends on healthy and productive employees. Our employee benefit programs are designed to meet the needs of our diverse workforce and support our employees and their families by offering comprehensive programs that provide flexibility and choice in coverage. Our Employee Wellness Program, established to encourage employees to improve their health and well-being, offers wellness activities facilitated through an engaging and personalized approach. Incentives for enrollment include a health care coverage premium credit and smart fitness gadgets.







The Boston Properties benefits program is designed to offer valuable resources to protect and enhance financial security and to help balance work and personal life. Some of the benefits that we offer our employees include health and dental insurance, a 401(k) plan with a generous matching contribution and an employee stock purchase plan, health care and dependent care reimbursement accounts, income protection through our sick pay, salary continuation and long term disability policies, a scholarship program for the children of employees, a commuter subsidy to support the use of public transportation, tuition reimbursement, and paid vacation, holiday, and personal days to balance work and personal life.

### QUALITY WORKPLACE

Maintaining a quality workplace is central to demonstrating our commitment to each of our employees. As an Affirmative Action and Equal Opportunity Employer, Boston Properties is committed to fair and impartial treatment of all employees and maintains a respectful workplace free from all types of discriminatory harassment. Employees undergo regular training to understand our policy against harassment and their responsibilities under our Code of Business Conduct and Ethics with respect to conflicts of interest, fraud, financial reporting, and dealing fairly in our business relationships. Our quality workplace ensures that employees have the opportunity to make their maximum contribution to Boston Properties and to their own career goals, while simultaneously serving the requirements of society, the law, sound business practices, and individual dignity.

By providing a quality workplace and comprehensive benefit programs, we recognize the commitment of our employees to bring their talent, energy and experience to Boston Properties, which allows us to lead the industry in every facet of our operations. Our continued success is attributable to their expertise and dedication. The success of our efforts in the workplace is demonstrated by the long tenure of our employees and union workers, over 40% of whom have worked at Boston Properties for more than 10 years.

# COMMUNITY INVOLVEMENT



We are a leading property owner and developer in all four of the major markets we serve. As a result, our local teams are very engaged in their local communities, not only seeking entitlements, but also determining how our projects can enhance neighborhood amenities and quality of life. Our community involvement was strengthened in 2015 by our ongoing commitment to volunteerism and philanthropy. Throughout the year we donated 4,300 service hours to over 100 community events and charitable activities.



## 31 Nights of Light

Since 2009, 31 Nights of Light has become a Boston holiday tradition. Each night of December, the top of the Prudential Tower is lit with a different color in support of that night's partner, using a state-of-the-art LED lighting system on the 51<sup>st</sup> floor. 2015 saw the highest number of applications to date, with 57 nonprofits vying for the available spots, which shows the success of the event for the organizations that are able to participate.



## United Way of Massachusetts Bay and Merrimack Valley

A longtime supporter of the United Way, Boston Properties sponsors annual fundraising campaigns across our offices, and participates in United Way Community Care Days. In 2015, over 40 employees contributed 300 hours to a childhood intervention center that serves the Mystic Valley and a community art center in Cambridge, Massachusetts.



## United Playaz

United Playaz (UP) is a multi-generational and multicultural violence prevention organization serving young people across San Francisco. UP is committed to improving the lives of youth surviving in vulnerable environments. The United Playaz Clubhouse is situated in the heart of the South of Market (SoMa) neighborhood, where the majority of our new development is occurring. Boston Properties has partnered with Clark Construction Group, Hathaway Dinwiddie, GCI General Contractors and Peacock Construction to remodel the United Playaz Clubhouse and provide new furnishings.



## The Salvadori Center Charrette

The Salvadori Annual Student Design Charrette brings together 100 students from schools across New York City to participate in an all-day design challenge. Students are encouraged to express their creativity. At the conclusion of the charrette, design solutions are presented and tested.



## Spanish Education Development Center (SED)

Since 2006 we have contributed to the construction and operation of this child development center which provides free child care and development services for approximately 160 disadvantaged children in the Petworth neighborhood of Washington, DC.



# GREENING AN ARCHITECTURAL LANDMARK

200 Clarendon Street, formerly known as John Hancock Tower, is a 62-story Class A office building located in the heart of Boston's Back Bay neighborhood at Copley Square. Designed by Henry Cobb and I. M. Pei, 200 Clarendon Street was completed in 1976. As New England's tallest building, the 790-foot iconic tower is a celebrated architectural landmark. In late 2012, Boston Properties purchased 200 Clarendon Street. While the image and architectural beauty of the building remains timeless, the mechanical systems, original equipment installed in the late 70's and almost 40 years old, were in dire need of modernization. Boston Properties spent the next year developing a multi-year capital improvement plan to replace the building mechanical systems and controls, with a goal of reducing energy consumption, elevating thermal comfort and sustainability performance, and maximizing the potential for tenant retention. The modernization program consists of complete retro-commissioning of mechanical systems and four primary projects: Chiller Plant Reconstruction, Heat Exchanger Addition, Condenser Water Loop Optimization and Energy Management System (EMS) Enhancement.

## CHILLER PLANT RECONSTRUCTION

The existing 2,750-ton plant included three inefficient 1970's-era chillers equipped with constant speed pumps and manual controls. Reconstruction of the chiller plant included: replacement of the existing chillers with new high efficiency York centrifugal chillers, the addition of variable speed drives (VSDs), new high efficiency chilled water and condenser water pumps with VSDs, and new programming and controls allowing chilled water and condenser water temperature resets.

## HEAT EXCHANGER ADDITION

The fully-glazed southern façade of the building creates challenging solar heat gain exposure during the winter months when the northern zones require heating while the southern zones simultaneously require cooling to overcome radiant heat from the sun. It was common to operate a constant speed 1,000-ton chiller to provide cooling to the perimeter induction units during the heating season. Large plate-and-frame heat exchangers were added on the 7<sup>th</sup> and 62<sup>nd</sup> floors to allow



*"Our objective is to invest in the systems of 200 Clarendon Street in ways which enhance the building's sustainability, efficiency, and comfort. We want the experience inside the building to be commensurate with the expectations you have when you see it from the outside."*

Doug Linde  
President  
Boston Properties

*"Before the improvements, it was like we were trying to fly with a submarine."*

Jack Shea  
Regional Engineer  
Boston Properties



the building to enter an 'economize' mode, utilizing free cooling when the outside air temperature is below 55°F.

### **CONDENSER WATER LOOP OPTIMIZATION**

The existing condenser water loop system allowed unrestricted constant-volume condenser water flow for tenant and building supplemental cooling systems. Optimization of the system included the addition of two-way valves to regulate flow and a cooling tower retrofit that resulted in a Delta-T increase, meaning less water is needed to pump through the system at any given time. As a result of these optimizations, the amount of cooling capacity available for tenant and building systems has doubled with the same flow and cooling tower equipment, all while reducing energy consumption and operating cost.

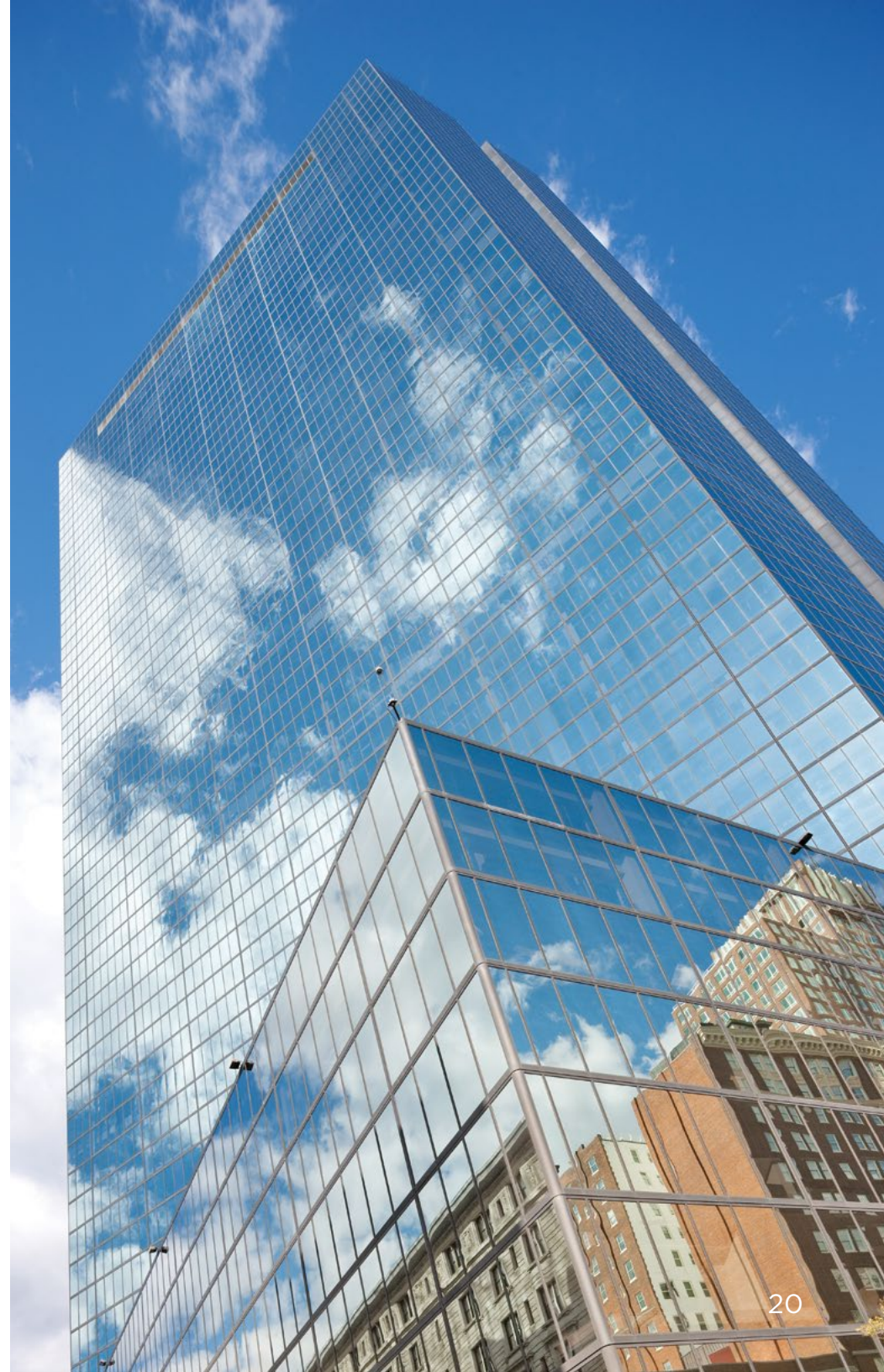
### **EMS ENHANCEMENT**

Over the years, the EMS had been randomly programmed and manually adjusted to troubleshoot heating and cooling system deficiencies. Many of the sensors had never been replaced, and the equipment had drifted out of calibration. EMS improvements include programming of a universal sequence of operations, retro-commissioning, inspection and calibration of all equipment and sensors, installation of new air flow monitoring stations, and carbon dioxide sensors to modulate the intake of outside air to meet demand and complete modernization of the system user interface graphics.

### **IMPROVED PERFORMANCE OUTCOMES**

The development and implementation of a long term capital improvement strategy that aligns financial and sustainability goals is paying off. In 2014, energy consumption in the building was down 7.5%, resulting in an energy cost savings of \$665,000.

With the implemented energy conservation measures and retro-commissioning fully stabilized, the project will improve thermal comfort and yield a combined annual energy savings of 3.3 million kWh per year, over 9% of the building's electrical consumption. This is enough energy to power 438 homes in Massachusetts, or to offset the carbon dioxide emissions produced by the combustion of 256,000 gallons of gasoline. A much greener architectural landmark is on track to earn the ENERGY STAR label and LEED-EB certification for the 2016 performance period.





# URBAN BEEKEEPING

In 2013 Boston Properties partnered with Best Bees, a Boston-based full-service beekeeping operation. Hives have been installed at six rooftop locations: Atlantic Wharf, Prudential Center, 100 Federal Street, Kendall Center, Reservoir Place, and Bay Colony. These rooftops provide ideal habitats for bees, which prefer ecologically diverse, open space with sunshine and minimal tree cover.

Across the country, honeybee populations are suffering severe population reduction caused by disease, loss of habitat, and the use of pesticides. The most recent threat to bees is an outbreak of Colony Collapse Disorder (CCD), which can cause sudden and catastrophic die-offs of bee colonies.

Preservation of honeybees is tremendously important to the natural environment and the economy. Bees pollinate more than 100 fruit and vegetable crops that contribute more than \$15 billion annually to the economy of the United States. Urban apiculture is especially important in the fight to save the honeybee because bees in cities have a higher overwinter survival rate and as a result are able to produce more honey than their suburban or rural counterparts. This is due to the urban heat island effect and the comparatively low rate of pesticide use in urban ecosystems.

Bees also play an important health role for city dwellers. They support food sovereignty by facilitating the pollination of urban agriculture and help to improve access to nutritious local food in areas that are often inhabited by low-income or at-risk communities. Eating local honey has an added benefit for allergy sufferers. Small amounts of pollen ingested from local honey can reduce irritation during allergy season.

The sweetest benefit of all is homemade organic honey. In partnership with Best Bees, Boston Properties is producing over 100 liquid pounds per year.



*"One tactic for integrating healthy and productive workspaces into the urban environment is to convert barren zones of commercial rooftops into platforms for agriculture and renewable energy generation. With the beekeeping project, we're going beyond environmental impact mitigation to regenerate and improve urban ecosystems."*

Ben Myers  
Sustainability Manager  
Boston Properties

# HOME GROWN CLEAN ENERGY

In August of 2014, Boston Properties, Healthy Planet Partners and Solaire Generation “flipped the switch” on the largest garage-mounted solar canopy in the Northeastern United States. Located at Bay Colony in Waltham, Massachusetts, the 842 kW solar canopy covers 60,000 SF (1.4 acres) atop the 950 Winter Street parking garage.

## DECARBONIZING WITH RENEWABLES

Annually, the system will produce one million kWh of electricity, the energy equivalent to twenty percent of Bay Colony Building 950’s total consumption; or, enough energy to power 130 Massachusetts homes and offset 340 metric tons of carbon dioxide emissions.

In addition to generating clean energy, the proprietary Solaire Long Span R5™ canopy shelter and water management infrastructure will provide covered parking that protects tenants, customers, and visitors at 950 Winter Street from the elements.

Boston Properties partnered with Solaire Generation and Healthy Planet Partners under a Power Purchase Agreement (PPA) to deliver the system. As the Net Metering Credit (NMC) buyer, Boston Properties agreed to host the array and to purchase NMCs generated by the system. The transaction reduces energy emissions and the total utility cost for the tenants at Bay Colony. By implementing a PPA strategy, Boston Properties and their customers benefit from renewable energy for the next 20+ years without any initial and/or ongoing operating costs.

Delivery of the system was complicated by the logistics of building on an occupied parking garage. Over the course of an eight week schedule, 300 tons of steel and 2,850 solar photovoltaic panels were installed. The construction tasks required careful coordination to meet the parking needs of tenants, customers, and visitors, and to guarantee a safe and successful renewable energy project.



*“With the commissioning of this solar canopy, our properties now host 950 kW of solar installations. We are pleased to be doing our part to reach the State’s aggressive goal of achieving 1,600 MW of installed solar power by 2020.”*

Bryan Koop  
Executive Vice President  
Boston Properties

*“This project is an amenity and cost savings measure that signals the advancement of a regional transition to a low carbon future. It proves that solar power is not only viable, it’s advantageous.”*

Ben Myers  
Sustainability Manager  
Boston Properties

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