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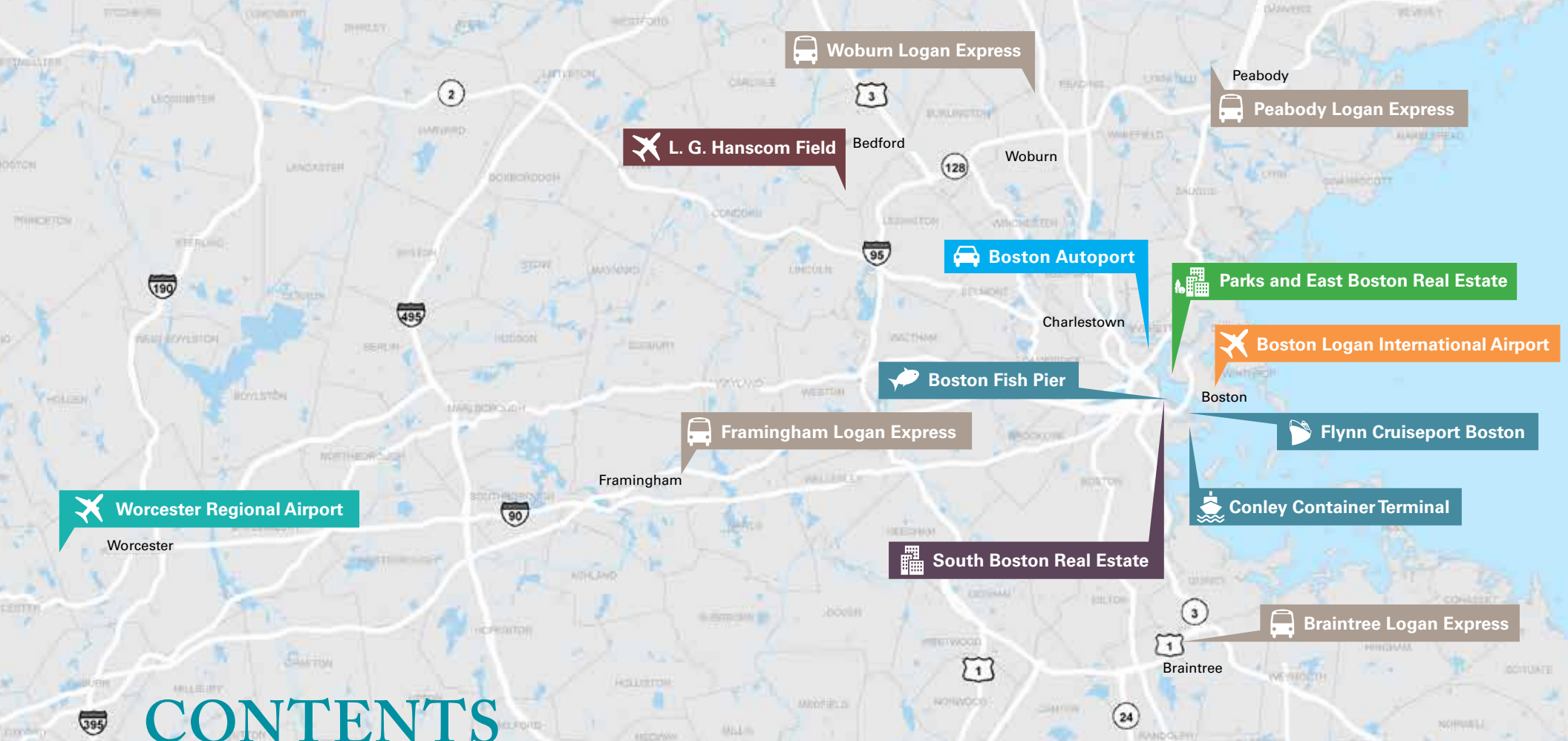


# SUSTAINABLE MASSPORT



EARTH DAY 2018

ANNUAL SUSTAINABILITY & RESILIENCY REPORT



# CONTENTS

INTRODUCTION .....	1	WORCESTER REGIONAL AIRPORT .....	35
MASSPORT SUSTAINABILITY MILESTONES (2015-2017) .....	5	LAWRENCE G. HANSCOM FIELD .....	37
BOSTON LOGAN INTERNATIONAL AIRPORT .....	7	REAL ESTATE HOLDINGS IN SOUTH BOSTON SEAPORT, EAST BOSTON, AND CHARLESTOWN .....	39
MASSPORT MARITIME .....	31		
PARKS AND OPEN SPACE .....	33		

# TO MEMBERS OF THE COMMUNITY



OUR SUSTAINABILITY AND  
RESILIENCY EFFORTS ARE  
ACHIEVING MEASURABLE  
RESULTS FOR OUR PASSENGERS,  
CUSTOMERS, AND OUR  
COMMUNITY.

In 2015, with funding from the Federal Aviation Administration (FAA), Boston Logan International Airport became one of the first airports in the country to incorporate climate change into a sustainability plan. *The New York Times* highlighted the decision, writing that Massport had a “plan to make the airport, which is almost surrounded by water, more environmentally sustainable and resilient in the face of climate change.”

As you will see from this report, our environmental efforts are achieving measurable results for our passengers, customers, and our community. In some areas, we have already reached or surpassed the ambitious goals we set for 2020 at Boston Logan International Airport:

- › Energy use per passenger is down 26% (2004 baseline; above goal of 25%)
- › Energy use per square foot is down 25% (2004 baseline; met goal of 25%)
- › Greenhouse gas emissions per passenger have been reduced 46% (2002 baseline; above goal of 40%)
- › Some 60% of critical assets (electrical power, diesel fuel pumping stations, telecommunications systems, and public safety, including police and fire stations) have been protected from storm surge flooding (above goal of 25%)
- › Nearly 100% of construction and demolition waste is recycled or reused

During the past three years, Massport has made a significant effort – and investment – to expand our sustainability commitments beyond Boston Logan International Airport to include operations in the Port of Boston, Worcester Regional Airport, and L.G. Hanscom Field.

From practicing sustainable building design to creating parks and green space, Massport has embraced our important role as an environmental steward. We recognize there is still much to be done, including improving water conservation and expanding our recycling efforts, and urgent challenges to address including improving our resiliency to rising sea levels. We recognize that climate change is happening, and we look forward to working in collaboration with elected officials and our community to increase sustainability and resiliency for the future.

Sincerely,



**Thomas P. Glynn, Ph.D.**

CEO and Executive Director,  
Massachusetts Port Authority



# INTRODUCTION

This Sustainability and Resiliency Report highlights the Massachusetts Port Authority's (Massport) progress towards improving sustainability and enhancing resiliency at its facilities. Massport has expanded the scope of this year's report to include all its facilities including Boston Logan International Airport, Lawrence G. Hanscom Field, Worcester Regional Airport, Massport Maritime operations, Massport owned or operated parks and open space, and Massport real estate holdings in Charlestown, South Boston Seaport District, and East Boston. For consistency, this report primarily focuses on five resource areas identified in the 2015 Boston Logan International Airport Sustainability Management Plan (SMP) (marked with \* below) for all Massport properties. The remaining five resource areas

are well-reported in the annual Boston Logan International Airport Environmental Data Reports and the L.G. Hanscom Field Environmental Status and Planning Reports. More information on Massport's environmental work can be found at <http://massport.com/massport/about-massport/project-environmental-filings>.

Since the publication of the Boston Logan International Airport Annual Sustainability Report in 2016, Massport has continued expanding its sustainability initiatives, with an increased focus on implementing resiliency measures to protect Maritime and Boston Logan International Airport's operations, critical infrastructure, and workforce. Massport intends to expand the information provided on other properties in future reports.

MASSPORT RECOGNIZES THE THREATS PRESENTED BY CLIMATE CHANGE AND SEA LEVEL RISE. TO IMPROVE TRANSPARENCY AND INCREASE OUR UNDERSTANDING OF VULNERABILITIES, MASSPORT HAS EXPANDED THE SCOPE OF THIS REPORT TO BE MORE INCLUSIVE OF ITS RESILIENCY GOALS AND TO INCLUDE ALL MASSPORT PROPERTIES.

## SUSTAINABILITY GOALS



### ENERGY AND GREENHOUSE GAS (GHG) EMISSIONS\*

Reduce energy intensity and GHG emissions while increasing the portion of Massport's energy generated from renewable sources.



### WATER CONSERVATION\*

Conserve regional water resources through reduced potable water consumption.



### COMMUNITY, EMPLOYEE, AND PASSENGER WELL-BEING\*

Promote economically prosperous, equitable, and healthy communities and passenger and employee well-being.



### MATERIALS, WASTE MANAGEMENT, AND RECYCLING\*

Reduce waste generation, increase the recycling rate, and utilize environmentally sound materials.



### RESILIENCY\*

Become an innovative and national model for resiliency planning and implementation among port authorities.



### NOISE ABATEMENT

Minimize noise impacts from Boston Logan International Airport operations.



### AIR QUALITY

Decrease emissions of air quality criteria pollutants from Massport sources.



### GROUND ACCESS AND CONNECTIVITY

Provide superior ground access to Boston Logan International Airport through alternative and high-occupancy vehicle (HOV) travel modes.



### WATER QUALITY/STORMWATER

Protect water quality and minimize pollutant discharges.



### NATURAL RESOURCES

Protect and restore natural resources near Massport facilities.



# A VISION FOR A SUSTAINABLE AND RESILIENT MASSPORT

## MASSPORT SUSTAINABILITY VISION

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MASSPORT WILL MAINTAIN ITS ROLE AS AN INNOVATIVE INDUSTRY LEADER THROUGH CONTINUOUS IMPROVEMENT IN OPERATIONAL EFFICIENCY, FACILITY DESIGN AND CONSTRUCTION, AND ENVIRONMENTAL STEWARDSHIP WHILE ENGAGING PASSENGERS, EMPLOYEES, AND THE COMMUNITY IN A SUSTAINABLE MANNER.

## MASSPORT RESILIENCY GOALS

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Massport's Resiliency Program strives to make resiliency principles, planning, and implementation an integrated part of Massport's business strategy and operations. The Resiliency Program operates under the guidance of the following goals:

- › Improve resiliency for overall infrastructure and operations.
- › Restore operations during and after disruptive events in a safe and economically viable time frame.
- › Create robust feedback loops that allow new solutions as conditions change.
- › Inform operations and policy, and implement design/build decisions, through the application of sound scientific research principles that consider threats, vulnerabilities, and cost-benefit calculations.
- › Become a knowledge-sharing exemplar of a forward-thinking, resilient port authority.
- › Work with key influencers and decision makers to strengthen understanding of the human, national, and economic security implications of extreme weather, changing climate, and man-made threats to Massport's facilities and the region.

## MASSPORT ORGANIZATIONAL GOALS

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The economic viability, operational efficiency, natural resource conservation, and social responsibility goals outlined in the Boston Logan International Airport SMP directly support Massport's Public Service Goals.

1. Maintain and enhance safety and security.
2. Provide high quality customer service.
3. Maintain high employee morale.
4. Revitalize Worcester Regional Airport.
5. Serve as a strong economic engine for the region.
6. Invest to enhance maritime capacity.
7. Act as a good neighbor to the surrounding community.
8. Uphold environmental and community responsibilities at L.G. Hanscom Field.
9. Build and maintain Massport transportation facilities.
10. Improve Massport's financial health.

# DEFINING SUSTAINABILITY AND RESILIENCY



**SUSTAINABILITY:** CONSISTENT WITH AIRPORTS COUNCIL INTERNATIONAL – NORTH AMERICA’S DEFINITION OF SUSTAINABILITY, MASSPORT IS FOCUSED ON A HOLISTIC APPROACH TO MANAGING BOSTON LOGAN INTERNATIONAL AIRPORT AND OTHER MASSPORT FACILITIES TO ENSURE **ECONOMIC VIABILITY, OPERATIONAL EFFICIENCY, NATURAL RESOURCE CONSERVATION, AND SOCIAL RESPONSIBILITY (EONS)**. FOLLOWING THE EONS FRAMEWORK, MASSPORT HAS MANY SUSTAINABILITY ACCOMPLISHMENTS AT ITS FACILITIES.

**RESILIENCY:** THE ABILITY OF A SYSTEM TO PREPARE FOR DISRUPTIVE EVENTS, RECOVER WITHIN A REASONABLE TIMEFRAME WITH MINIMAL DAMAGE, AND SOMETIMES EMERGE EVEN STRONGER.





# MASSPORT SUSTAINABILITY MILESTONES (2015-2017)

2017

- Leadership in Energy and Environmental Design (LEED) Gold certified Terminal E New Large Aircraft Wing opened at Boston Logan International Airport.
- Massport wins American Council of Engineering Companies (ACEC) Gold Award for the Coastal Flooding Resiliency Plan.
- Massport received a Project Achievement Award from Construction Management Association of America (CMAA) for its Coastal Flooding Resiliency Project.
- Thomas J. Butler Freight Corridor and Memorial Park opened in South Boston which installed a sound insulation barrier and redirects truck traffic away from residential streets. The 4.5-acre park includes paths, green space, and a dog park.
- Boston Fish Pier and Flynn Cruiseport Boston adopted an environmental management system and achieved International Organization for Standardization (ISO) 14001 certification, joining the Paul W. Conley Container Terminal.
- First Massport electric vehicle Ride and Drive event was held.
- The LEED-certifiable Jet Aviation hangar and fixed-base operator (FBO) facility were constructed at L.G. Hanscom Field.
- Massport CEO Tom Glynn received the Finest Kind award from Fishing Partnership Support Service.



Thomas J. Butler Memorial Park in South Boston

## 2016

- Massport received ACEC Bronze Award for the Boston Logan International Airport SMP and the Logan Express Garage in Framingham.
- Liquid Collection stations installed at all Boston Logan International Airport terminal security checkpoints.
- LEED-certifiable Terminal C to E Connector opened at Boston Logan International Airport, improving passenger walkability.
- Rumney Marsh restoration in Saugus completed.
- Massport received Sustainability in Engineering Award from Boston Society of Civil Engineers Section for Boston Logan International Airport Rental Car Center.
- Boston Logan International Airport Annual Sustainability Report released.
- East First Street Dog Park in South Boston opened.
- Boston Logan International Airport Central Garage light emitting diode (LED) lighting retrofit completed.
- Narrow-Gauge Connector greenspace in East Boston completed.
- Massport funded an approximate \$6 million mid-life rebuild of eight Silver Line 1 (SL1) buses, extending the useful life of each vehicle by approximately eight years.

## 2015

- First Annual Sustainable Massport Calendar distributed.
- A 1,100-car parking facility opened in Framingham to serve Logan Express customers; the parking facility was built to high environmental standards including energy-efficient LED lighting, water-saving fixtures, bike racks, and priority parking for alternative fuel vehicles.
- Massport acquired the Braintree Logan Express property, furthering its commitment to providing high-occupancy vehicle (HOV) access to Boston Logan International Airport from key regional nodes.
- First Boston Logan International Airport Sustainability Management Plan (SMP) released.
- Massport received Environmental Business Council award for Boston Logan International Airport SMP.
- Bremen Street Dog Park in East Boston opened.
- First test deployment of temporary flood barriers at Boston Logan International Airport and the Boston Fish Pier.
- Conley Container Terminal received Breathe Easy award for its Clean Truck Program.
- Massport received Airports Going Green award for conservation mooring eelgrass mitigation program.
- Maverick Street Mothers Dedication at Southwest Service Area Airport Edge Buffer in East Boston.
- Boston Logan International Airport Rental Car Center received LEED Gold certification.
- Four new compressed natural gas buses put into service at Boston Logan International Airport – increasing the compressed natural gas bus fleet total to 22.
- Composting Pilot Program began at the Logan Office Center and Fire Rescue Headquarters.
- Diesel Emissions Reduction Act (DERA) grant received for re-powering Conley Container Terminal rubber tire gantry cranes in 2015.
- East Boston Community Greenway enhancements, including lighting improvements, completed.
- Seaport East and West Office buildings achieved LEED Gold certification for operations and maintenance.
- Neptune Road Airport Edge Buffer in East Boston opened.



Above: Rumney Marsh at the beginning of restoration efforts in Saugus  
Below: Rumney Marsh vegetation growth as of 2017





BOSTON LOGAN  
INTERNATIONAL AIRPORT



# SUSTAINABILITY TARGETS ACHIEVED

## ENERGY AND GHG EMISSIONS



Energy use (kBTU) per square foot



Reached goal of 25% reduction by 2020 (FY2004 baseline)

Energy use (kBTU) per passenger



Surpassed goal of 25% reduction by 2020 (FY2004 baseline)

GHG emissions per passenger



Surpassed goal of 40% reduction by 2020 (FY2002 baseline)

## COMMUNITY, EMPLOYEE, AND PASSENGER WELL-BEING



Number of full-time equivalent jobs through design and construction expenditure in FY2017



Surpassed goal of sustaining 800 full-time equivalent jobs

Economic impact to the community



Continued contribution to regional economy<sup>1</sup>

## MATERIALS, WASTE MANAGEMENT, AND RECYCLING



Percentage of construction and demolition waste recycled/reused



Maintained construction and demolition waste diverted from landfill close to 100%

## RESILIENCY



Number of capital projects that address resiliency at Boston Logan International Airport facilities



Surpassed goal of enhancing 25% of critical assets by 2020

<sup>1</sup>Source: Massachusetts Department of Transportation Statewide Airport Economic Impact Study Update

kBTU = thousand British Thermal Units | FY = fiscal year | GHG = greenhouse gas

# BOSTON LOGAN INTERNATIONAL AIRPORT BY THE NUMBERS

**FOUNDED**  
**SEP 8, 1923**

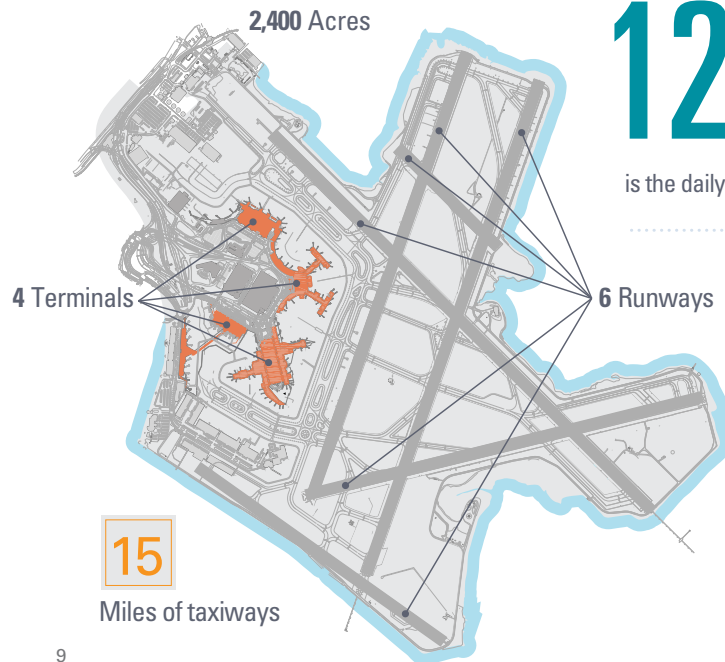


395,880 Aircraft operations in FY2017

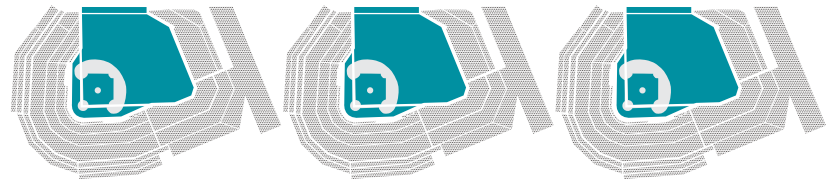


**RANK**  
**17**

in terms of busiest  
U.S. Airports in 2016  
(Passengers)  
*Source: ACI-NA*



**120,000**



is the daily population at Boston Logan International Airport (employees and passengers), enough to fill Fenway Park over three times

**\$13.4b**

Annual contribution to the regional economy  
*Source: Massachusetts Department of Transportation Statewide Airport Economic Impact Study Update*



of cargo in 2016

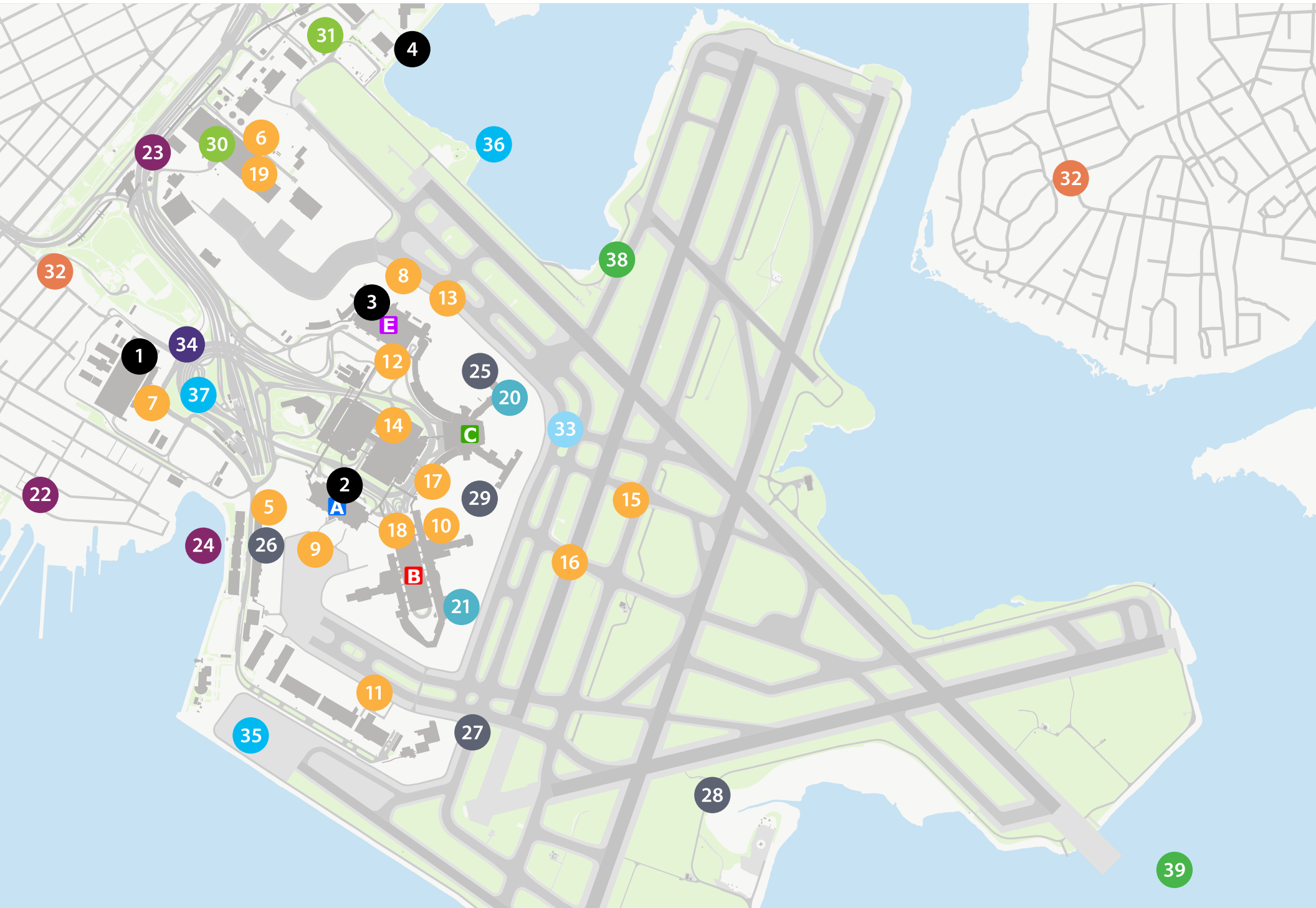


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airlink

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# BOSTON LOGAN INTERNATIONAL AIRPORT SUSTAINABILITY INITIATIVES



## **CROSS-CUTTING**

### **LEED Certified Facilities**

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- 1 Rental Car Center
- 2 Terminal A
- 3 Terminal E (New Large Aircraft Wing)
- 4 Green Bus Depot

## **ENERGY AND GHG EMISSIONS**

### **Renewable Energy Installations**

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- 5 Logan Office Center – Micro Wind Turbines
- 6 Economy Garage – Solar Panels
- 7 Rental Car Center – Solar Panels
- 8 Terminal E – Solar Hot Water
- 9 Terminal A – Solar Panels
- 10 Terminal B Garage – Solar Panels

### **Energy-Efficient Heating, Ventilation, and Air Conditioning System Upgrades**

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- 11 South Cargo Area buildings
- 12 Central Heating Plant

### **LED Lighting**

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- 13 Terminal E
- 14 Central and West Garages
- 15 Runway 4L–22R centerlines
- 16 Taxiways A and B

### **Electric Vehicle Charging Stations**

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- 17 Central Garage and Terminal B

### **Electric Ground Service Equipment**

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- 18 Terminal A and B (airside)

### **Alternative Fueling Stations**

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- 19 Compressed natural gas station near State Police Station

## **WATER CONSERVATION**

### **Water Saving Measures**

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- 20 Restrooms in Terminals A, B, C, and E
- 21 Terminal B rainwater collection tanks

## **COMMUNITY, EMPLOYEE, AND PASSENGER WELL-BEING**

### **Parks and Open Space**

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- 22 Piers Park
- 23 Bremen Street Park and Dog Park
- 24 Navy Fuel Pier Airport Edge Buffer

## **MATERIALS, WASTE MANAGEMENT, AND RECYCLING**

### **Single-Stream Recycling Program**

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- 25 Terminals A, B, C, and E, and all other Boston Logan International Airport facilities

### **Composting**

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- 26 Logan Office Center
- 27 Fire Rescue Headquarters

### **Soil Reuse**

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- 28 Boston Logan International Airport airfield

### **Water Bottle Hydration Stations**

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- 29 Terminals B, C, E, and Logan Office Center

## **RESILIENCY**

### **Floodproofing Critical Infrastructure**

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- 30 State Police Headquarters
- 31 Electrical substations, pumping stations, and emergency generators

## **NOISE ABATEMENT**

### **Residential Sound Insulation Area**

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- 32 East Boston, Winthrop, Revere, Chelsea, and South Boston neighborhoods

## **AIR QUALITY**

### **Pre-conditioned Air and Ground Power Systems**

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- 33 Available at the majority of aircraft gates

## **GROUND ACCESS AND CONNECTIVITY**

### **Airport Bus Ground Operations Efficiency**

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- 34 Ground Transportation Operations Center

## **WATER QUALITY/STORMWATER**

### **Stormwater Pollution Control**

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- 35 West Outfall
- 36 North Outfall
- 37 Bioswale by the Rental Car Center

## **NATURAL RESOURCES**

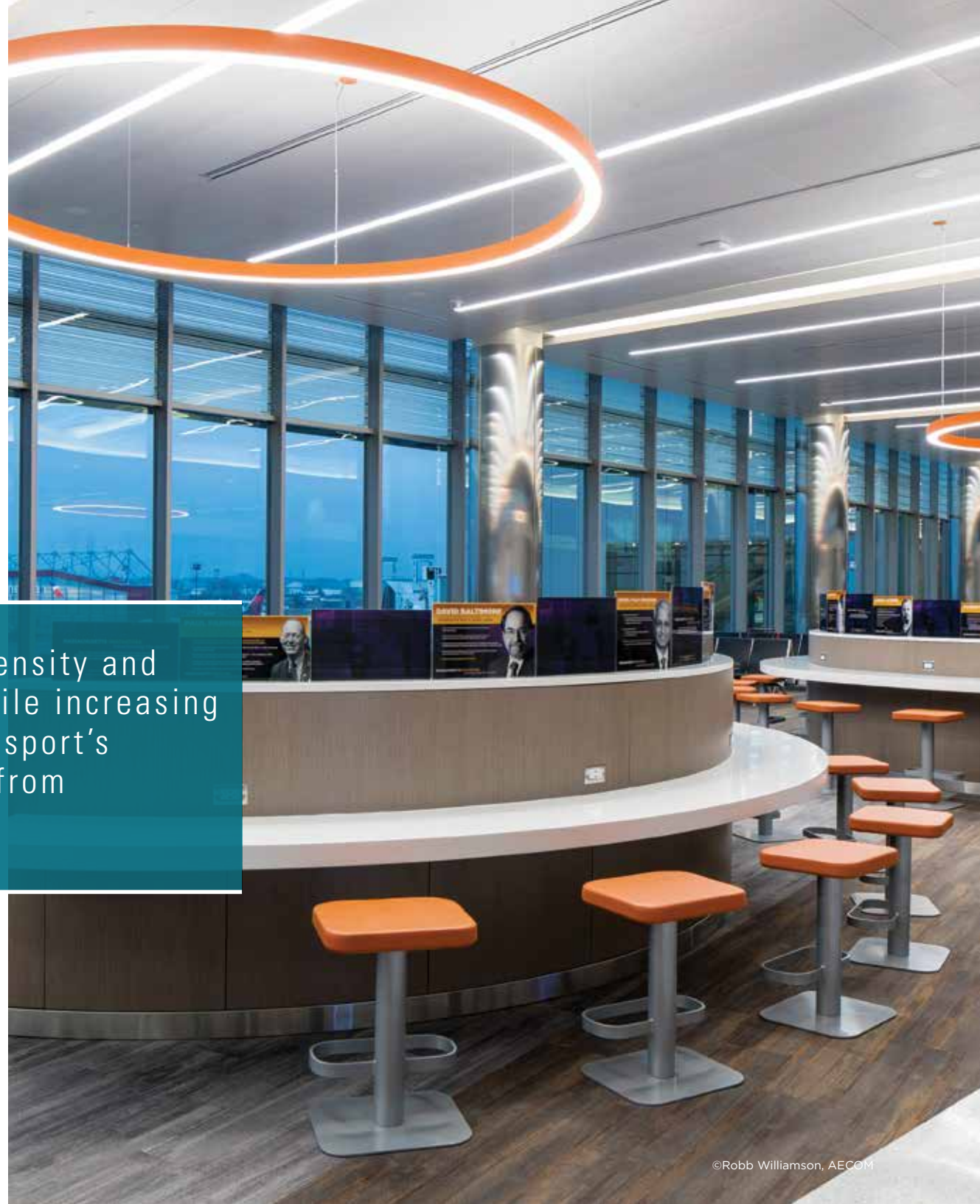
### **Natural Resources Protection**

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- 38 Snowy Owl Relocation Program
- 39 Shellfish enhancement at the end of Runway 33L

# Energy and GHG Emissions

**GOAL** Reduce energy intensity and GHG emissions while increasing the portion of Massport's energy generated from renewable sources







## Objectives

- › Reduce energy consumption
- › Increase the portion of Massport’s energy generated from renewable sources
- › Reduce overall GHG emissions associated with energy consumed in Massport-operated facilities at Boston Logan International Airport
- › Reduce GHG emissions from Massport-operated mobile sources

Key Performance Indicator (KPI)	Target	Trend
KBTU PER PASSENGER	25% reduction by 2020 (FY2004 baseline)	TARGET ACHIEVED <b>26%</b> ↓ since FY2004
KBTU PER SQUARE FOOT	25% reduction by 2020 (FY2004 baseline)	TARGET ACHIEVED <b>25%</b> ↓ since FY2004
GHG EMISSIONS PER PASSENGER	40% reduction by 2020, 80% reduction by 2050 (FY2002 baseline)	TARGET ACHIEVED <b>46%</b> ↓ since FY2002
TOTAL MMBTU	N/A	Total energy use varies based on the annual number of passengers

## PROGRESS SUMMARY

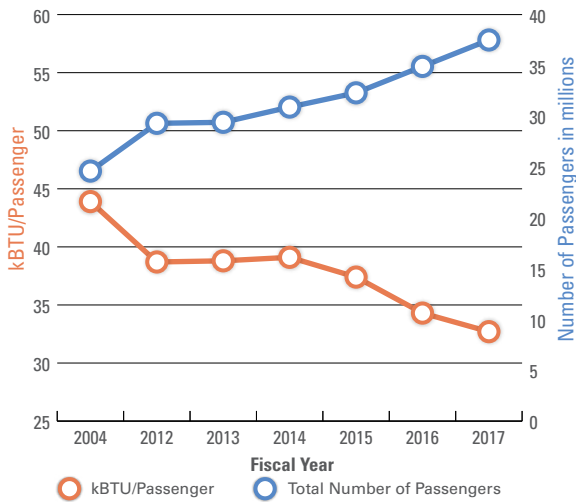
To reach energy and GHG emissions reduction goals and targets, Massport has developed policies and implemented initiatives including:

- › Pursuing LEED accreditation for new projects
- › Upgrading to energy-efficient heating, ventilation, and air conditioning (HVAC) systems, including:
  - Air handling units in Terminals B and C
  - New distribution system as part of the Terminal B Gates 37 and 38 project, which allows variable speed drives to maximize efficiencies
  - HVAC system in the Terminal E New Large Aircraft Wing
- › Generating renewable energy from rooftop solar panels
- › Installing LED lighting on Runway 4L–22R and Taxiways A and B
- › Installing infrastructure for powering 100+ electric ground service equipment vehicles
- › Committing to expanding access to electric vehicle infrastructure for passengers, employees, and airlines
- › Installing new chillers in the Central Heating and Cooling Plant
- › Expanding the clean fuel natural gas and diesel/ electric hybrid bus fleet, shuttling passengers around the Airport

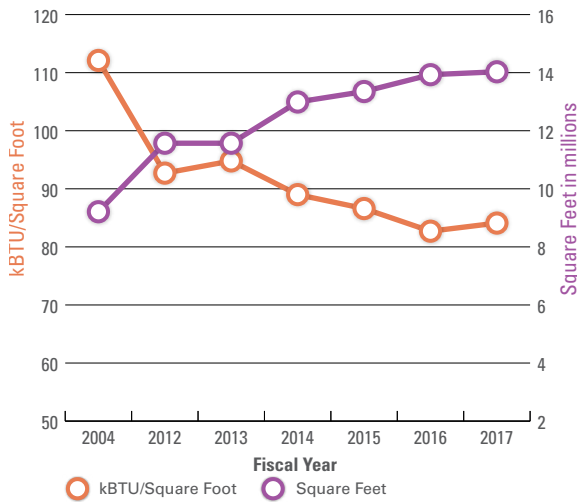


Installation of energy-efficient LED lighting at Boston Logan International Airport

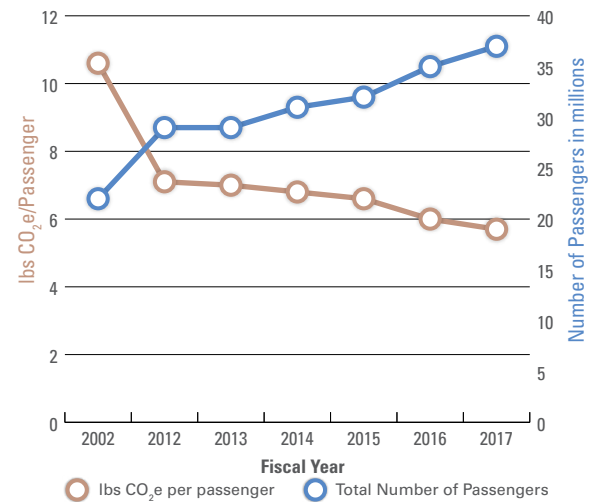
Energy Use per Passenger



Energy Use Intensity



Greenhouse Gas Emissions per Passenger



Note: Includes energy use and CO<sub>2</sub> emissions from all Boston Logan International Airport buildings and Massport-operated vehicles. Does not include energy use and CO<sub>2</sub> emissions associated with aircraft, passenger travel to/from Boston Logan International Airport, or tenant vehicles.



The New Large Aircraft wing at Terminal E earned LEED Gold certification

Since FY2002, Boston Logan International Airport has nearly doubled the number of passengers it serves (a 44.8% increase since FY2002). Despite a record increase in passenger levels, Massport has successfully reduced both energy use per passenger and GHG emissions per passenger. This achievement can largely be attributed to the implementation of energy-efficiency projects, energy-efficient building design, and the expansion of renewable energy sources at Boston Logan International Airport.

CO<sub>2</sub> emissions per passenger decreased 5% from FY2016. As of FY2017, Massport has achieved a 46% reduction in GHG emissions per passenger, exceeding its 2020 target by 6%.

Massport has already exceeded its energy use per passenger intensity target – a 25% reduction by 2020 – reporting a 26% decrease in kBTU per passenger since FY2004. Despite a slight increase in FY2017, energy use intensity shows a long-term downward trend, decreasing 11% over the last five fiscal years.

Since FY2004, 50% of Massport owned buildings and facilities at Boston Logan International Airport have been constructed, renovated, or retrofitted to improve energy conservation. Four Massport owned buildings have achieved various levels of LEED accreditation. The incorporation of energy efficiency into building design and planning has helped spur the reduction of energy use per square foot of building space.



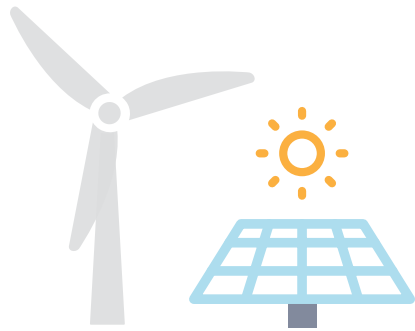
LEED-Gold certified Rental Car Center at Boston Logan International Airport

ON AVERAGE, MASSPORT'S LEED CERTIFIED BUILDINGS ARE 28% MORE ENERGY-EFFICIENT THAN CONVENTIONAL BUILDINGS OF THE SAME TYPE AND PERFORM 9% BETTER THAN DESIGNED. AS MUCH AS 7% OF ELECTRICITY CONSUMED IN THESE BUILDINGS IS GENERATED BY ON-SITE SOLAR.



**BOSTON LOGAN INTERNATIONAL AIRPORT LEED FACILITIES**

- › Green Bus Depot › Terminal A › Rental Car Center › Terminal E New Large Aircraft Wing



**1,038 MWh**

Approximate amount of renewable energy generated in FY2017 by Boston Logan International Airport buildings and facilities; enough energy to power 140 typical Massachusetts homes for one year.

MWh – Megawatt hours

LEED®, and its related logo, is a trademark owned by the U.S. Green Building Council® and is used with permission. LEED® is the preeminent program for the design, construction, maintenance, and operations of high-performance green buildings.



**SOUTH CARGO BOILER REPLACEMENT**

In 2014, Massport partnered with National Grid to extend natural gas infrastructure to the South Cargo Area. Over the past two years, Massport has systematically replaced fourteen oil-fired heating systems in seven South Cargo Area buildings with high-efficiency natural gas systems. These improvements are expected to result in an annual reduction of over 542,000 lbs of GHG emissions representing a 40% reduction from the old oil-fired heating systems.



# Resiliency

**GOAL** Become an innovative and national model for resiliency planning and implementation among port authorities





## Objectives

- › Incorporate a scientifically sound understanding of climate change impacts and vulnerabilities into the management of Massport’s assets and operations
- › Enhance the resiliency of Massport’s critical assets and operations at Boston Logan International Airport to withstand the potential effects of climate change
- › Educate staff at Boston Logan International Airport on the potential effects of climate change and Massport’s efforts to improve organizational and operational resiliency
- › Collaborate with Massport’s internal and external partners to prepare for the potential effects of climate change



Flood barriers help protect from storm surge at Boston Logan International Airport

### KPI

**PERCENTAGE OF CAPITAL PROJECTS THAT ADDRESS RESILIENCY OF MASSPORT FACILITIES AT BOSTON LOGAN INTERNATIONAL AIRPORT**

### Target

**25%** of critical assets and/or key resources enhanced by 2020; **100%** of critical assets and key resources enhanced with resiliency measures by 2025

### Trend



Note: Critical assets include: electrical power, diesel fuel pumping stations, telecommunications systems, and public safety including police and fire

## PROGRESS REPORT

Recognizing the potential impacts of climate change on Boston Logan International Airport, Massport has committed to protecting and enhancing critical infrastructure, operational assets, and the community through various climate resilience initiatives.

Massport has already achieved the 2020 resiliency target, and is on track to meet the 2025 target. To date, Massport has flood-proofed 10 out of the 20 originally identified Tier-1 critical infrastructure locations.

Floodproofing measures include:

- › Purchasing temporary flood barriers for facilities at Boston Logan International Airport and at Maritime facilities
- › Raising electrical and mechanical equipment above forecasted flood levels
- › Sealing and waterproofing openings and conduits;
- › Installing water sensors and pumps
- › Installing anchoring systems for the deployment of temporary flood fencing and flood barriers in the event of an emergency

In 2017, Massport conducted a series of workshops with key stakeholders to review and continuously improve its Flood Operations Plans. In addition, many educational and training opportunities have been provided to staff and emergency responders to increase operational preparedness for flood events.

Massport is also focusing on identifying and assessing “next level” priorities and opportunities. This includes improving understanding of flood risks posed to Boston Logan International Airport’s infrastructure and hazardous materials. Massport continues to inventory critical assets and identify potential hazards. A comprehensive review of switching stations, transformers, generators, and above-ground storage tanks is being conducted and assets will be prioritized for resiliency enhancements based on their risk of flooding. Massport has also incorporated sustainable design and resiliency planning requirements into requests for proposals for relevant work at Boston Logan International Airport.





## SATELLITE ARFF RESILIENCY UPGRADES

In 2018, construction will begin on resiliency measures at the Boston Logan International Airport Satellite Aircraft Rescue and Fire Fighting (ARFF) facility. Air intakes and HVAC equipment are being elevated off the ground, above potential flood levels. This simple measure will help protect valuable equipment in the event of a flood, keeping the ARFF facility operating smoothly.



Flood barriers protect critical infrastructure at Boston Logan International Airport

The integration of resiliency planning at Boston Logan International Airport with the City of Boston and the neighborhood of East Boston has been another important climate resilience initiative. Massport continues to play a role in several regional and local resiliency efforts, which include research collaborations and sharing best practices. In recent years, Massport has been actively involved in the following City-led initiatives:

- › Climate Ready Boston's East Boston and Charlestown Steering Committee
- › Climate Ready Boston's South Boston Steering Committee
- › East Boston Climate CARES Adaptation Planning Working Group

Through robust planning and regional collaboration, Massport strives to continue its leadership role in resiliency planning among port authorities, the airport industry, and the Boston region. The continuation of Massport's resiliency success is essential to the future long-term operation of Boston Logan International Airport.



Electrical generators are elevated above flood levels at the State Police headquarters



BOSTON LOGAN  
INTERNATIONAL AIRPORT

# Materials, Waste Management, and Recycling

**GOAL** Reduce waste generation,  
increase the recycling rate,  
and utilize environmentally  
sound materials





## Objectives

- › Reduce the total amount of waste generated at Boston Logan International Airport
- › Increase the amount of (non-construction) material recycled
- › Continue to have a high amount of construction waste recycled and reused
- › Procure local, ecologically friendly, non-toxic products and materials whenever possible
- › Encourage tenant composting of organic material and develop capacity for composting or recovering energy from food scraps and other compostable waste

KPI	Target	Trend
<b>DIVERSION RATE</b>	Increase recycling rate to <b>20%</b> by 2016, <b>40%</b> by 2018, and <b>60%</b> by 2020	Boston Logan International Airport's diversion rate has continued to increase annually. The FY2017 diversion rate is <b>16%</b> .
<b>PERCENTAGE OF CONSTRUCTION AND DEMOLITION WASTE RECYCLED/REUSED</b>	Maintain percentage of construction and demolition waste diverted close to <b>100%</b>	<b>TARGET ACHIEVED</b> Nearly <b>100%</b> construction and demolition waste recycled/reused
<b>PERCENTAGE OF WASTE STREAM ORGANIC MATERIAL COMPOSTED</b>	<b>20%</b> of organic materials composted by 2016	Less than <b>1%</b> of the Boston Logan International Airport waste stream was composted in FY2017

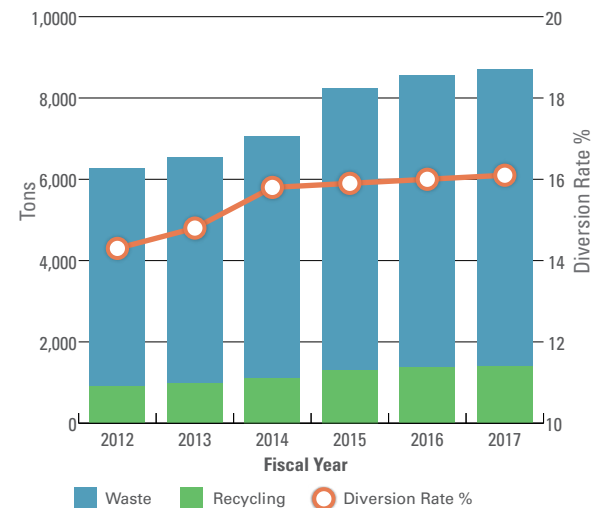
## PROGRESS SUMMARY

To encourage waste reduction and recycling, Massport has implemented a wide variety of recycling initiatives. Massport continues to recycle nearly 100% of construction and demolition waste from Boston Logan International Airport. Between FY2012 and FY2017, Massport's recycling rate increased by 1.8%. While continually expanding recycling opportunities for tenants, employees, and passengers, Massport is also working on solutions to improve recycling diversion rates despite recent industry-wide barriers. In addition to traditional paper, metal, and plastic recycling, Massport strives to recycle as many materials as possible. In FY2017, Massport expanded their battery recycling program to all Massport facilities, collecting 1,250 lbs of batteries in FY2017. Boston Logan International Airport collects and recycles used vegetable oil produced by concessionaires and restaurants at Boston Logan International Airport.

In 2017 alone, Massport recycled over 40,000 gallons of used vegetable oil. Massport has implemented the following waste and recycling initiatives at Boston Logan International Airport:

- › Continued conversion of all Boston Logan International Airport facilities to single-stream recycling
- › Improved recycling tracking and data management
- › Provided liquid collection stations at all major security checkpoints
- › Provided 26 hydration stations throughout the Airport
- › Developed a pilot program for organics management at the Logan Office Center and Fire Rescue Headquarters

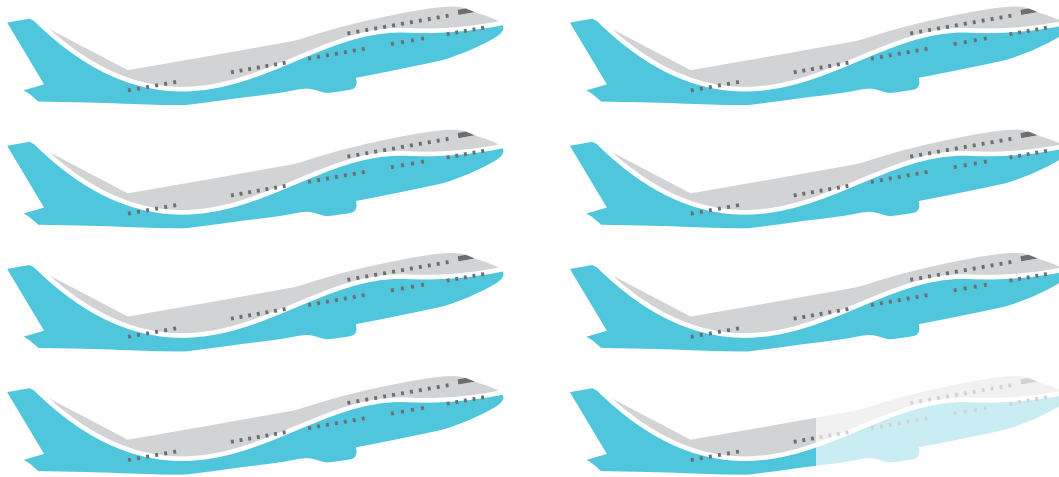
Waste, Recycling, and Diversion Rate



Note: Massport has improved its waste tracking and reporting. Past data have been revised to more accurately reflect conditions at Boston Logan International Airport.

KPI – Key Performance Indicator | FY – fiscal year

IN FY2017, MASSPORT COLLECTED 1,399 TONS OF RECYCLED MATERIAL AT BOSTON LOGAN INTERNATIONAL AIRPORT, THE WEIGHT OF SEVEN AND A HALF BOEING 777 JETS



RECYCLING NUMBERS FY2017

**965 tons**  
Single Stream Materials

**152 tons**  
Cooking Oil

**433 tons**  
Wooden Pallets

**1,250 lbs**  
Batteries

**8.7 tons**  
E-Waste



**E-WASTE RECYCLING PROGRAM**

Massport collects and recycles electronic waste. Since FY2012, Massport has recycled over 40 tons of e-waste. In FY2017 alone, Massport recycled nearly 9 tons of e-waste through this program.



# Water Conservation

**GOAL** Conserve regional water resources through reduced potable water consumption





## Objectives

- › Encourage efficient water use and reduce water waste
- › Reduce potable water used for landscaping
- › Increase water reclamation and reuse activities
- › Track and monitor water usage

### KPI

**ANNUAL GALLONS OF WATER PER PASSENGER**

### Target

**10%** reduction by FY2022 (FY2012 baseline)

### Trend

Prior to FY2016, water use per passenger was trending downward. Water use per passenger met Massport's target for FY2015 and FY2016. In FY2017, water use per passenger increased above the FY2012 baseline level. The spike in water use in FY2017 is primarily due to a large water-main break in February 2017 and an increase in landscaped areas.

## PROGRESS SUMMARY

Boston Logan International Airport's facilities and operations depend on water resources in many ways, such as heating and cooling and serving customers, tenants, and passengers in terminal facilities. Massport continues to explore innovative strategies and measures for more effective water use reduction at Boston Logan International Airport.

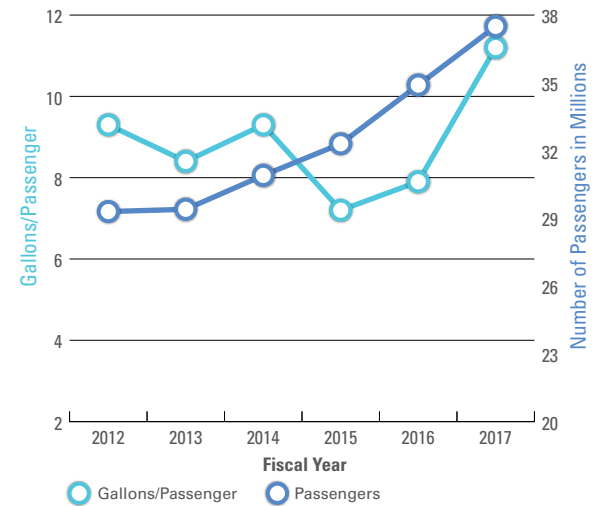
Massport has implemented a variety of activities across Boston Logan International Airport to reduce usage of potable water and conserve water resources, including:

- › Installed a rainwater harvesting system in the Terminal B Garage
- › Retrofitted 90% of terminal restrooms with low-flow water faucets and toilets
- › Using reclaimed water for power washing parking garages, roadways, and runways

- › Implemented system-wide water use data collection and reporting using geographic information systems (GIS) to track water use, establish trends, and identify potential leaks
- › Installed intake filters prior to the feed point into the cooling system to decrease cooling tower blow down

Water use per passenger increased from 7.9 gallons per passenger in FY2016 to 11.2 gallons per passenger in FY2017. This increase is primarily due to a significant water-main break in February 2017. This leak disrupted an overall downward trend in water use since FY2012. Massport continues its focus on water conservation strategies to continue the previous downward trend.

Water Use per Passenger



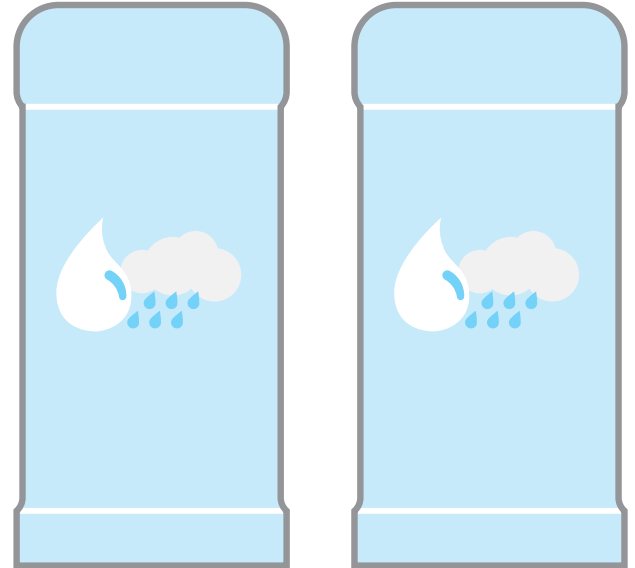
Note: The spike in water use is primarily due to a large water-main break in February 2017, and an increase in landscaped areas



### CYCLONE RUNWAY CLEANER

The Boston Logan International Airport Field Maintenance Team has begun using a high-pressure water blasting machine (the Cyclone) to clean rubber off Airport runways. This eliminates the use of caustic rubber removal chemicals. The Cyclone uses reclaimed water to clean runways, which helps contribute to Massport's water conservation measures.

MASSPORT'S TWO  
1,000-GALLON RAINWATER  
COLLECTION TANKS,  
WHEN FULL, COULD  
FILL APPROXIMATELY 25  
BATHTUBS. THIS WATER IS  
USED FOR POWERWASHING  
THE TERMINAL B PARKING  
GARAGE AND ROADWAYS.

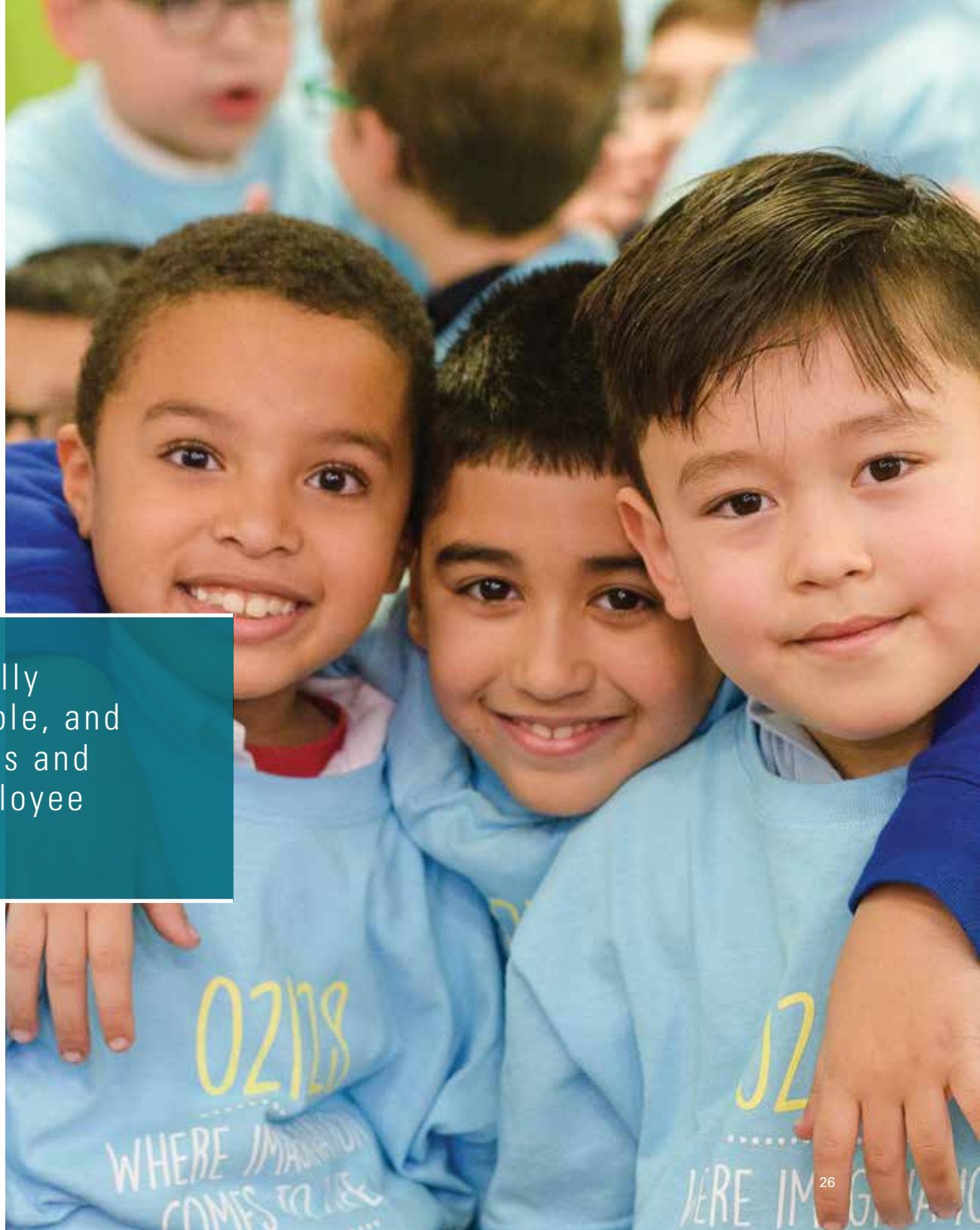




# Community, Employee, and Passenger Well-Being

## GOAL

Promote economically prosperous, equitable, and healthy communities and passenger and employee well-being





## Objectives

- › Continue to support the local and regional economy
- › Engage employees and community stakeholders in Boston Logan International Airport sustainability activities
- › Continue to support the provision and upkeep of community open space
- › Continue to support employee programs that promote health and professional development
- › Continue to provide opportunities for passengers to make sustainable transportation choices
- › Provide amenities throughout Boston Logan International Airport to enhance passenger experience
- › Encourage concessionaires to serve healthy, locally grown and/or produced food options
- › Continue to support workforce diversity at Massport



Massport employees collect back-to-school supplies for homeless children

### KPI

**NUMBER OF FULL-TIME EQUIVALENT JOBS THROUGH DESIGN AND CONSTRUCTION EXPENDITURE**

### Target

Sustain 800 full-time equivalent job opportunities through design and construction expenditure

### Trend

TARGET ACHIEVED

**8,665**

full time equivalent jobs sustained in FY2017

**AMOUNT OF ECONOMIC IMPACT TO THE COMMUNITY**

Continue to contribute to the regional economy each year

TARGET ACHIEVED

**\$13.4 billion**

contributed to the regional economy<sup>1</sup>

**PERCENTAGE OF HIRES IN EACH OF THE CATEGORIES OUTLINED BY THE DIVERSITY AND INCLUSION/COMPLIANCE DEPARTMENT**

Continue to recruit and retain a diverse group of employees

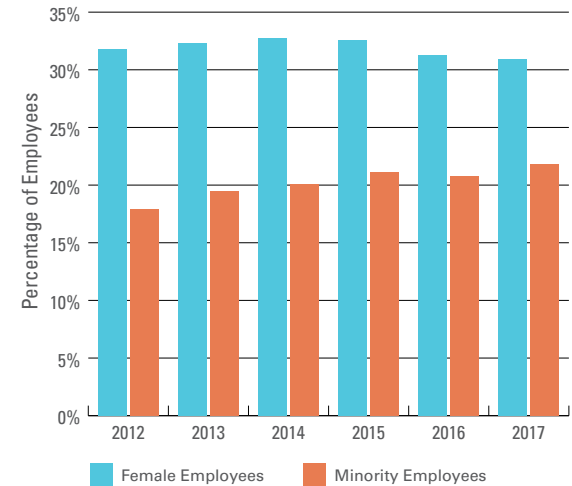
As of 2017, the Massport workforce consists of **31%** female and **21%** minority employees

## PROGRESS SUMMARY

Massport strives to ensure the well-being of all people who contribute to, or are impacted by, Boston Logan International Airport's operations, from employees and passengers to community members and neighborhoods. In addition to enhancing workforce diversity and promoting a work-life balance for employees, Massport has also been supporting improvements in surrounding communities such as development of public parks and green spaces, employee-organized volunteering, and charity donations. To date, Massport has implemented the following community and employee well-being initiatives:

- › Created an updated video, highlighting sustainability at Massport that plays in Boston Logan International Airport terminals
- › Continued annual back-to-school backpack drive for children in need
- › Continued annual scholarship program
- › Continued support of the Piers Park Sailing Center

### Massport Workforce Diversity



- › Continued organization of canned food drive for local food pantries
- › Continued to provide summer job opportunities for students in Massport's neighboring communities

KPI – Key Performance Indicator | FY – fiscal year | <sup>1</sup>Massachusetts Department of Transportation Airport Economic Impact Study Update





Massport employees enjoy a softball game

DURING MASSPORT'S 2017 SPRING AND FALL STEP CHALLENGES, EMPLOYEES LOGGED A COMBINED 124,061,297 STEPS, JUST OVER 58,000 MILES – MORE THAN TWO TIMES AROUND THE EARTH OR 2,213 BOSTON MARATHONS!



## DECONSTRUCTING STIGMA EXHIBIT

In December 2016, McLean Hospital opened the Deconstructing Stigma exhibit at Boston Logan International Airport. The 235-foot exhibit, located between Terminals B and C, highlights stories from people improving and managing their own mental health. In partnership with Massport, the Hospital created the exhibit as part of their overarching mental health awareness and anti-stigma campaign. Daryl McDaniels, of acclaimed hip-hop group Run-DMC, was on hand to share his own mental health story at the ribbon cutting event.



# BOSTON LOGAN INTERNATIONAL AIRPORT PROGRESS ON OTHER RESOURCE AREAS



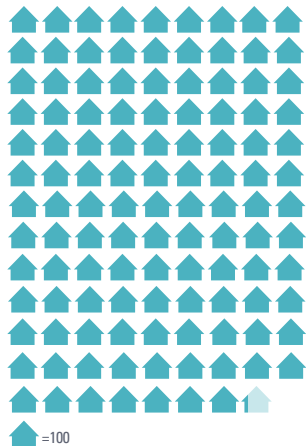
## NOISE ABATEMENT

Boston Logan International Airport has the first and one of the most comprehensive noise abatement programs in the nation. This program includes a dedicated Noise Abatement Office; a state-of-the-art Noise and Operations Monitoring system; residential and school sound insulation programs; limited time and runway restrictions for select aircraft with louder engines; ground run-up procedures; and flight tracks designed to optimize over water operations (especially during nighttime hours).<sup>1</sup> Massport's noise insulation program has been in place since 1986.

Nearly all residences exposed to noise levels greater than a day-night average sound level of 65 dB have been eligible to participate in Massport's residential sound insulation program.



**11,515 residences**  
have received sound  
insulation treatment



## AIR QUALITY IMPROVEMENT

In the past, aircraft parked at gates used auxiliary power units (APUs) on board the aircraft, or diesel generators, to heat or cool the cabin. Today, pre-conditioned air (PCA) systems allow inefficient APUs and generators to be shut down, reducing aircraft fuel usage associated with emissions and noise. PCA and ground power systems are installed at almost all gates at Boston Logan International Airport.



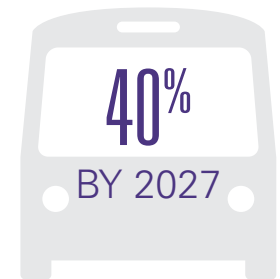
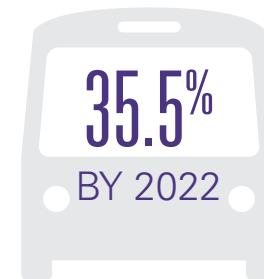
Jet connected to a PCA system



## GROUND ACCESS AND CONNECTIVITY

Massport's ground transportation strategy is designed to offer passengers with a broad range of high-occupancy vehicle (HOV), transit, and shared-ride options for travel to and from Boston Logan International Airport to minimize vehicle trips.<sup>2</sup> The strategy also aims to provide on-Airport parking for passengers choosing to drive or who have limited HOV options. Massport aims to limit impacts to the environment and community, while providing air passengers and employees with many options for convenient and reliable travel to and from Boston Logan International Airport.

### Boston Logan International Airport HOV Access Goals



<sup>1</sup>Nighttime hours are defined as 10:00 PM to 7:00 AM

<sup>2</sup>According to the 2016 Boston Logan International Airport Air Passenger Ground-Access Survey, 30.5% of air passengers accessing Boston Logan International Airport used HOV modes of travel



**WATER QUALITY/STORMWATER**



Spill kits used by Massport crews

Surrounded on three sides by Boston Harbor, Massport promotes environmental practices to improve water quality and protect the Harbor’s natural resources. Massport’s Stormwater Pollution Prevention Plan (SWPPP) addresses stormwater pollutants in general, de-icing and anti-icing chemicals, potential bacteria, fuel and oil, and other potential sources of stormwater pollutants. Stormwater samples are regularly taken from outfalls throughout Boston Logan International Airport property multiple times each month. In 2016, approximately 99% of stormwater samples were in compliance with national standards.

Massport also tracks airfield fuel spills. The total number of fuel spills (jet fuel, diesel, gasoline, hydraulic oil) at Boston Logan International Airport decreased by 24% from 2016 to 2017, with a 52% decrease in the total gallons of fuel spilled (1,158 gallons in 2016 compared to 551 gallons in 2017).<sup>1</sup> This is a significant improvement considering that the volume of jet fuel dispensed increased by 6% from 2016 to 2017.

<sup>1</sup>Spills greater than 10 gallons must be reported to the Massachusetts Department of Environmental Protection



**NATURAL RESOURCES**

Boston Logan International Airport encounters a wide variety of both terrestrial and marine natural resources because of its unique position in Boston Harbor.



Shellfish growth at the end of Runway 33L

**Shellfish habitat enhancement at the end of Runway 33L.** In 2012, Massport completed construction on an improved Runway Safety Area (RSA) at the end of Runway 33L. The safety improvements included the replacement of the existing light pier and the construction of a 460-foot long by 300-foot wide RSA deck that extends into Boston Harbor. Shellfish beds impacted by deck construction have re-grown and are currently healthier than pre-construction levels.

**Restoration of Rummey Marsh.** To offset unavoidable impacts to salt marsh associated with a runway safety project, Massport worked with state and federal resource protection agencies to restore a nearly five-acre area of Rummey Marsh in Saugus. After removing over 70,000 cubic yards of fill-sand, Massport’s new salt marsh included a creek and the planting of nearly 100,000 cordgrass plants. The restoration was completed in 2016 and Massport will continue to monitor the success of the project.



Norman Smith of Mass Audubon and his grandchildren release a Snowy Owl with a transmitter at Salisbury State Park

**Snowy Owl Relocation.** While migrating north and south, Snowy Owls will often stop at Boston Logan International Airport. To prevent owls from interfering with aircraft, Massport is collaborating with Mass Audubon to capture and release the birds. Since 1981, over 750 Snowy Owls have been captured and relocated from the airfield at Boston Logan International Airport. Satellite transmitters are placed on the healthiest owls by Mass Audubon, tracking them back to their Arctic tundra breeding grounds. Owls tagged at Boston Logan International Airport were the first wintering Snowy Owls to be tracked anywhere in the world.





# MASSPORT MARITIME

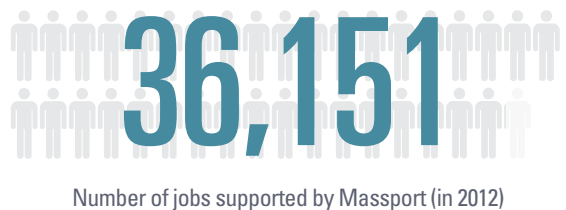
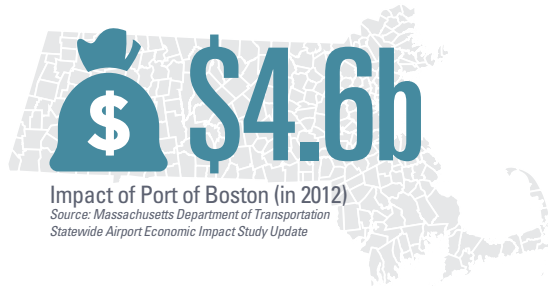


## MASSPORT MARITIME

Boston serves as the maritime gateway to New England. Massport operates Paul W. Conley Container Terminal, Raymond L. Flynn Cruiseport Boston at Black Falcon Terminal, and the Boston Fish Pier.

To improve resiliency at Maritime facilities, Massport has purchased temporary flood barriers to be deployed during potential flood events. Additionally, Massport has implemented a design guideline which calls for critical infrastructure, including generators, to be elevated above estimated flood levels.

### MASSPORT MARITIME BY THE NUMBERS



=1,000

Maritime Operations successfully completed ISO 14001 certification for their Environmental Management Systems (EMS); 2017 was the first year that the ISO 14001 was expanded to include the Flynn Cruiseport Boston and the Boston Fish Pier in addition to the Conley Container Terminal.

In the ongoing effort to reduce energy use and GHG emissions, Massport has implemented a variety of sustainability initiatives as described below:

#### FLYNN CRUISEPORT BOSTON

- › Rehabilitated the Flynn Cruiseport Boston in 2010, which incorporated sustainable design guidelines

#### CONLEY CONTAINER TERMINAL

- › Created the Forecast Mobile Lite App which has been available for container truck drivers since 2014: increasing operational efficiency by reducing unsuccessful truck trips to the Conley Container Terminal, engine idling times, and associated emissions
- › Received a Diesel Emissions Reduction Act grant for re-powering Conley Container Terminal rubber tire gantry cranes in 2015
- › Won a Breathe Easy award for air quality, from the Clean Truck Program implemented in 2015
- › Crane lighting replaced with LEDs in 2016

#### BOSTON FISH PIER

- › Shore to Ship power installed in 2011
- › LED lighting retrofits at Boston Fish Pier and surrounding roadways starting in 2015



## MARITIME FLOOD MITIGATION

In January 2018, Winter Storm Grayson caused exceptionally high tides leading to storm surge flooding at Massport Maritime facilities. Massport operational plans were adjusted to address shorter flood-forecast timelines. Two months later in March 2018, Massport deployed temporary flood barriers for the first time, before the arrival of Winter Storm Riley. The barriers were successful and Massport Maritime experienced no flooding. Massport will continue to work to better anticipate and prepare for severe weather impacts on its infrastructure and operations.





# PARKS AND OPEN SPACE



## PARKS AND OPEN SPACE

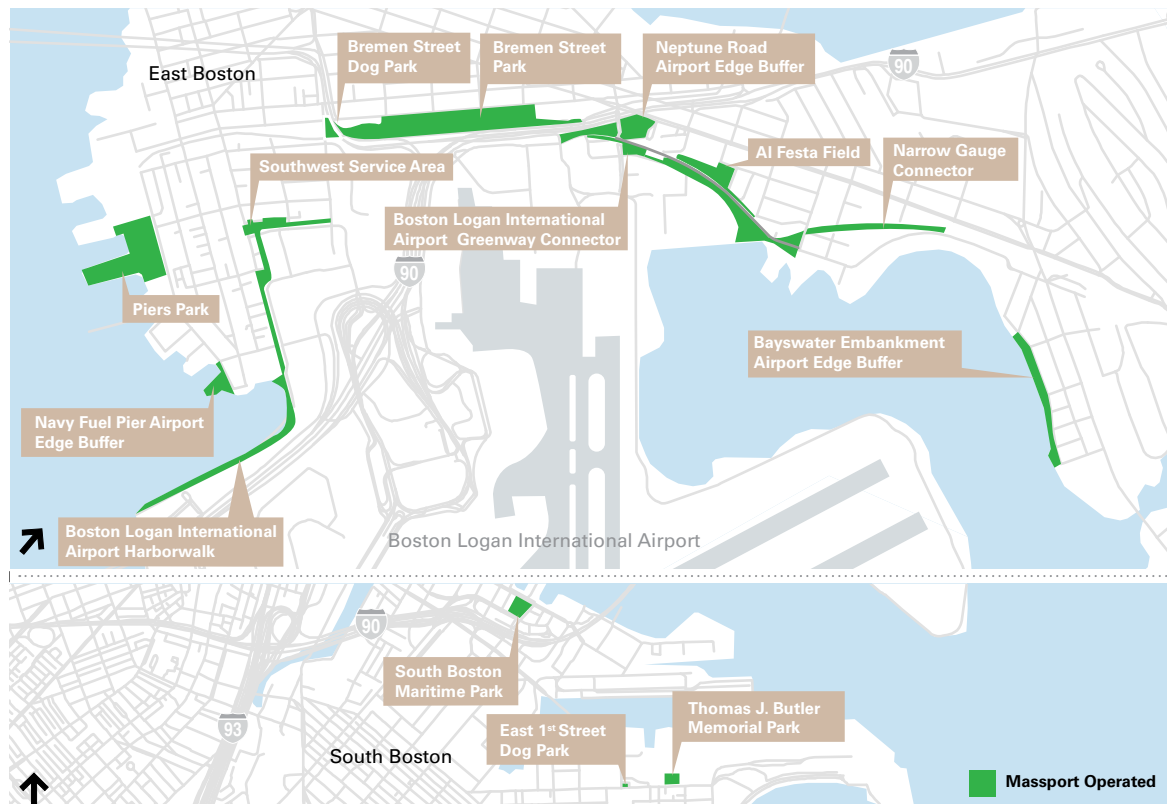
Passengers hurry through the Massport seaport and airports every day. Massport parks, in contrast, offer places for people to sit, relax, and escape the bustle of urban life. Parks bring people together. They are an important part of Massport's commitment to being a good neighbor. Massport works hand in hand with community leaders to create more open space, from the South Boston Maritime Park to the two-mile trail system at L.G. Hanscom Field. Massport has over 30 acres of parks available to the community in South and East Boston. In total, approximately 58,665 people live within a half mile of a Massport park.



The East Boston Greenway Connector provides a continuous pedestrian/bicycle path from Piers Park to Constitution Beach



### PARKS AND OPEN SPACE LOCATIONS



### THOMAS J. BUTLER MEMORIAL PARK

Massport constructed the 4.5-acre Thomas J. Butler Memorial Park, named after Massport's former Director of External Affairs. Built in Mr. Butler's native South Boston, the park was part of a project designed to replace the Conley Container Terminal truck traffic with paths, green space, and a dog park for the enjoyment of all.





# WORCESTER REGIONAL AIRPORT

# WORCESTER REGIONAL AIRPORT

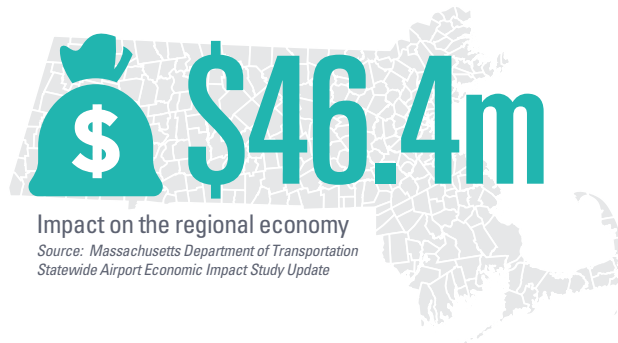
Worcester Regional Airport is a vital hub for the transportation network and economic development of Central Massachusetts. It is convenient and easy to navigate, with rental car counters in the terminal building, affordable parking, and bus service to downtown Worcester, a mere 3 miles away. Worcester Regional is the airport of choice for over 450,000 passengers flying JetBlue Airways to Orlando and Fort Lauderdale, and for general aviation.



An aircraft sits on the tarmac at Worcester Regional Airport



## WORCESTER BY THE NUMBERS



## LED LIGHTING IN TERMINALS

Starting in 2016, Worcester Regional Airport began replacing its lighting fixtures with energy-efficient LED replacements. The first project replaced 80 ceiling fixtures in the main airport terminal with LED lights. The 80-watt LED lamps resulted in a significant energy savings of 90,000 kWh/year or the equivalent of 30 tons of CO<sub>2</sub>.



**JETAVIATION**  
A GENERAL DYNAMICS COMPANY

17



**L.G. HANSCOM FIELD**



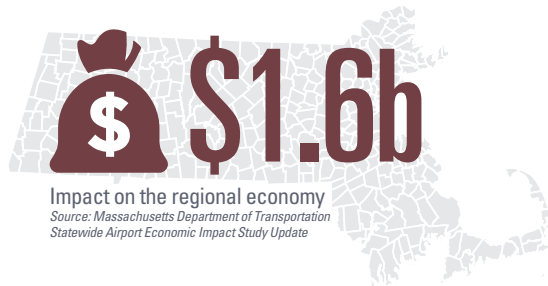
## L.G. HANSCOM FIELD

Just 20 miles northwest of Boston, L.G. Hanscom Field, in Bedford, is the region's largest general aviation airport and a vital link in the transportation infrastructure of New England. L.G. Hanscom Field, a popular choice for business executives who want easy access to Eastern Massachusetts, is home to private and corporate aircraft of all sizes, and offers limited commercial service.



Sunrise over L.G. Hanscom Field

### L.G. HANSCOM FIELD BY THE NUMBERS



**129,570** Aircraft operations in FY2016

To help reduce energy use and GHG emissions, Massport requires its tenants to build facilities in accordance with LEED standards. In 2017, Jet Aviation's hangar and fixed-base operator (FBO) facility at L.G. Hanscom Field was constructed to be LEED-certifiable, with energy saving and efficient design incorporated throughout the facility. Since 2003, L.G. Hanscom Field has maintained its EMS certification. EMS is a set of processes and practices that enable Massport to reduce its environmental impact and increase its operating efficiency.

Massport has also invested in the parks and open space near L.G. Hanscom Field. In 2011, Massport installed a series of trail markers on trails through Massport property that tie into an existing trail network at the Mary Putnam Webber Wildlife Preserve and the Dellovo and Vanderhoof conversation areas in the Town of Bedford. The area is located to the west of the Runway 11 end.

L.G. Hanscom Field experienced a severe weather event in 2017, highlighting the need to incorporate adaptation planning into the preparations for Massport's facilities and operations. A heavy precipitation event in 2017 caused flooding and damaged the first floor of the Civil Air Terminal building. These impacts have led Massport to further evaluate resiliency needs and propose design changes to enhance flood resiliency at L.G. Hanscom Field.



### SOLAR PANELS

In 2011, Massport installed 222 photovoltaic solar panels at the Civil Air Terminal building at L.G. Hanscom Field. The solar panels are mounted on the roof and south facing wall. The 51-kW capacity solar installation currently supplies 4% of the Civil Air Terminal building's annual energy needs.

A photograph of a modern, curved glass skyscraper. The building's facade is composed of many rectangular glass panels that reflect the sky and clouds. The building is set against a blue sky with scattered white clouds. In the foreground, there are some bare tree branches on the left side. The overall scene is brightly lit, suggesting a clear day.

**REAL ESTATE HOLDINGS IN  
SOUTH BOSTON SEAPORT, EAST BOSTON,  
AND CHARLESTOWN**



## REAL ESTATE HOLDINGS IN SOUTH BOSTON SEAPORT, EAST BOSTON, AND CHARLESTOWN

Massport owns more than 650 acres of land and water in Boston, not including Boston Logan International Airport, which are located in Charlestown, East Boston, and the South Boston Seaport District. These properties include both maritime uses, such as the Boston Fish Pier, and commercial uses such as office, hotel, residential, and restaurant/retail development.

### REAL ESTATE HOLDINGS BY THE NUMBERS

**22**

Properties

**6.26m**

Total building square feet

**243**

Total land acreage

**11,158**

Estimated number of employees working at Massport real estate holdings

 = 1,000



MassCEC Wind Technology Testing Center

Massport strives to support tenant sustainability initiatives. Massport-owned land in Charlestown is home to the Massachusetts Clean Energy Center's (MassCEC) Wind Technology Testing Center, which opened in 2011. Wind turbine blade testing is critical to maintain high levels of reliability and to evaluate innovative, cutting-edge technology.

#### LEED certifications for Massport Real Estate properties:

- › John Hancock Building: LEED Platinum
- › Waterside Place I: LEED Gold
- › Renaissance Boston Waterfront Hotel: LEED Certifiable
- › Roseland Building #5: LEED Certifiable
- › Liberty Wharf: LEED Certifiable

Additionally, the Seaport World Trade Center East and West Office Buildings have achieved LEED Gold certification for Operations and Maintenance.



### MANULIFE/JOHN HANCOCK BUILDING

The John Hancock Building is a prime example of Massport's initiative to integrate green building concepts into all third party real estate development projects. Built on Massport's South Boston land holdings, the building was LEED certified for new construction in 2006. The building received LEED Platinum certification for operations and maintenance in 2011. Sustainable features include a three-layer glass wall to reduce energy use and a green roof.





EARTH DAY 2018

# ANNUAL SUSTAINABILITY & RESILIENCY REPORT



PREPARED  
BY

6.6 GALLONS WATER SAVED. 0.4 POUNDS OF SOLID WASTE AVOIDED. 1.2 POUNDS OF EMISSIONS PREVENTED. CARBON NEUTRAL PRINTING.



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