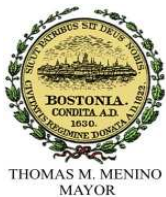


SOLAR BOSTON



Thinking BIG About Boston's Solar Energy Future
Wilson Rickerson
January 10th, 2008



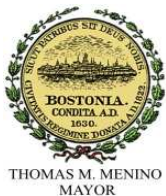
**The City of Boston's Solar City Partnership
with the US Department of Energy
Under the Solar America Initiative**



Mayor Thomas M. Menino

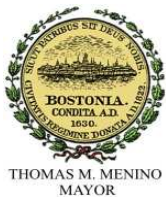
James W. Hunt, III

Chief of Environmental and Energy Services



Mayor Menino dedicates Boston Arts Academy PV system (2005)

Hosted by



Climate Action Plan

2000: Boston joins ICLEI—Cities for Climate Protection

2005: U.S. Mayors Climate Protection Agreement

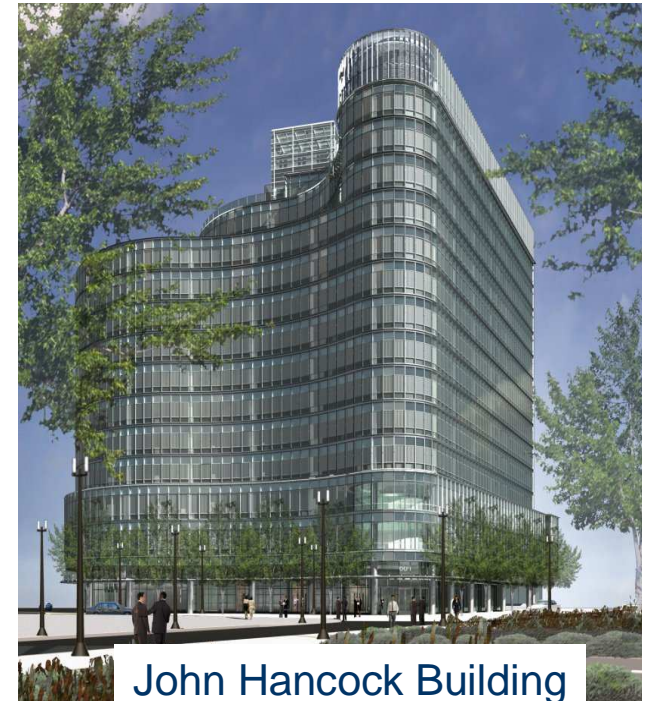
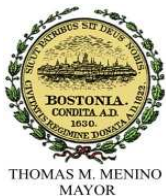
Kyoto Protocol targets

2007: **Executive Order Relative to Climate Action:**

- **Greenhouse Gas Emissions reduction goals:**
 - 7% below 1990 levels by 2012
 - 80% below 1990 levels by 2050
- **Creation of Boston Energy Alliance**
 - Non Profit Corporation
 - Citywide energy efficiency, renewable energy and demand-response implementation

Green Building Action Plan

- All private projects over 50,000 square feet must be LEED “Certifiable”
- All public projects must be LEED Silver certified
- *10 million* square feet of LEED construction is currently in the pipeline.



Solar City Partnership

US DOE Objective:

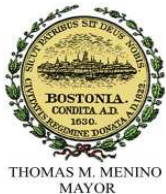
Partner with cities of 100,000+ committed to:

- Achieving a **sustainable solar infrastructure**
- Using a **comprehensive, city-wide approach**
- Facilitating **mainstream adoption** of solar that serves
- as a **model for other cities**



Solar Boston – A \$500,000 program:

- \$150,000 from US Department of Energy
- \$200,000 in technical assistance from the National Renewable Energy Laboratory and “Tiger Team” members
- \$50,000 from the Massachusetts Technology Collaborative, Renewable Energy Trust
- \$75,000 in kind and financial support from KeySpan Energy Delivery
- \$15,000 in in-kind services from NSTAR
- \$10,000 from an anonymous foundation



FY 2007 Solar America Cities

The 13 Solar America Cities selected in 2007 are:

- Ann Arbor, MI
- Austin, TX
- Berkeley, CA
- Boston, MA
- Madison, WI
- New Orleans, LA
- New York, NY
- Pittsburgh, PA
- Portland, OR
- Salt Lake City, UT
- San Diego, CA
- San Francisco, CA
- Tucson, AZ

Eight are among the largest 50 cities in the U.S.

Solar America Cities are located in 11 states.

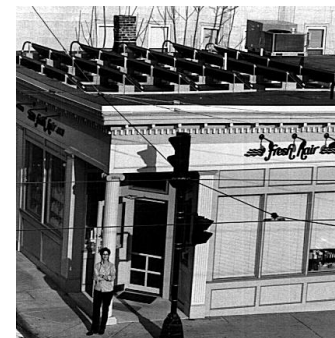
SOLAR BOSTON GOALS

THINK BIG!

- Build Market Baseline and Map the City
 - Where are existing installations?
 - What is our technical potential given the area network
- Evaluate barriers to market growth
- Identify top sites and create marketing strategy
- Facilitate private sector project development
- Bulk procurement
- Integrate work of Solar Boston with Boston Energy Alliance
- Live up to the “Solar City” title



Williams Building, 28 kW (NREL PIX 08466)



Fresh Hair, 144 sq. ft., Alternative Energy LLC



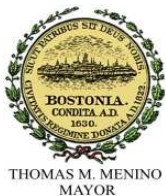
North Coast Seafood, 118 kW



Solar Cities...

International Models

- New York City: 2 MW RFP for public buildings; 5% new renewable requirement in BPCA
- Ann Arbor, MI: 5,000 SDHW by 2015
- Berkeley, CA: Property Tax Assessment financing
- Zurich, Switzerland: 3.1 MW from voluntary program
- Mountain Valley, CA: 119 systems in 1 year
- Aachen, Germany: 1993 solar feed-in tariff
- Barcelona, Spain: solar water heating requirement
- Boston, MA: 1st Private sector green building standard
- Boston, MA: Solar power: what is thinking **BIG**?



THOMAS M. MENINO
MAYOR



PV on Affordable Housing

- Department of Neighborhood Development
 - All buildings LEED Silver
 - All buildings ENERGY STAR or equivalent
 - All buildings solar ready
- Boston Housing Authority
 - Maverick Landing (37 kW)
 - Franklin Hill (28 kW)
 - Exploring performance contract that includes 115-120 kW of PV
- Boston Community Capital
 - 1.5 MW on affordable housing
 - Third-party ownership



Maverick Landing PV System



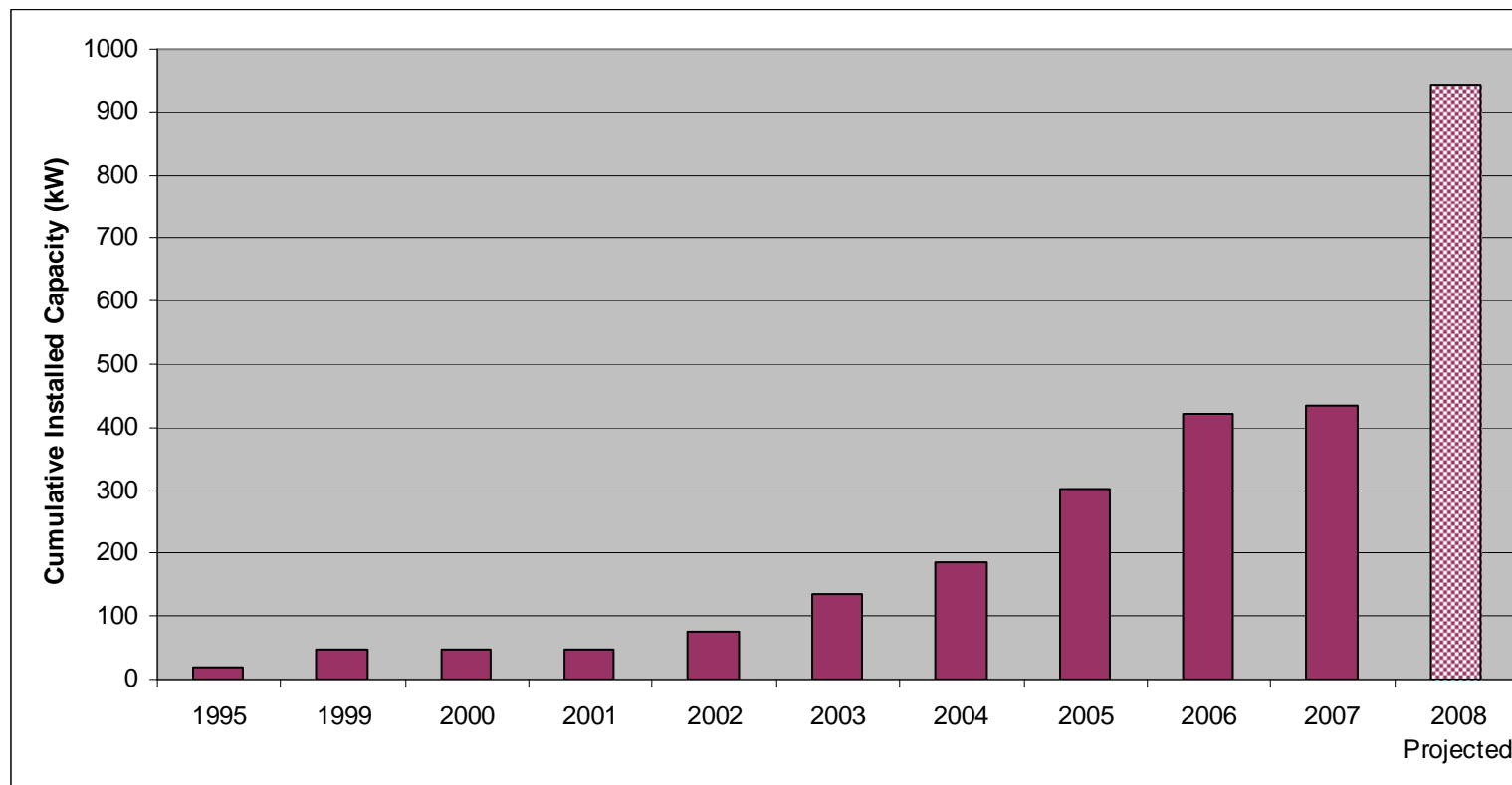
Blessed Sacrament Re-Development



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MAYOR



Projected Capacity (2008)

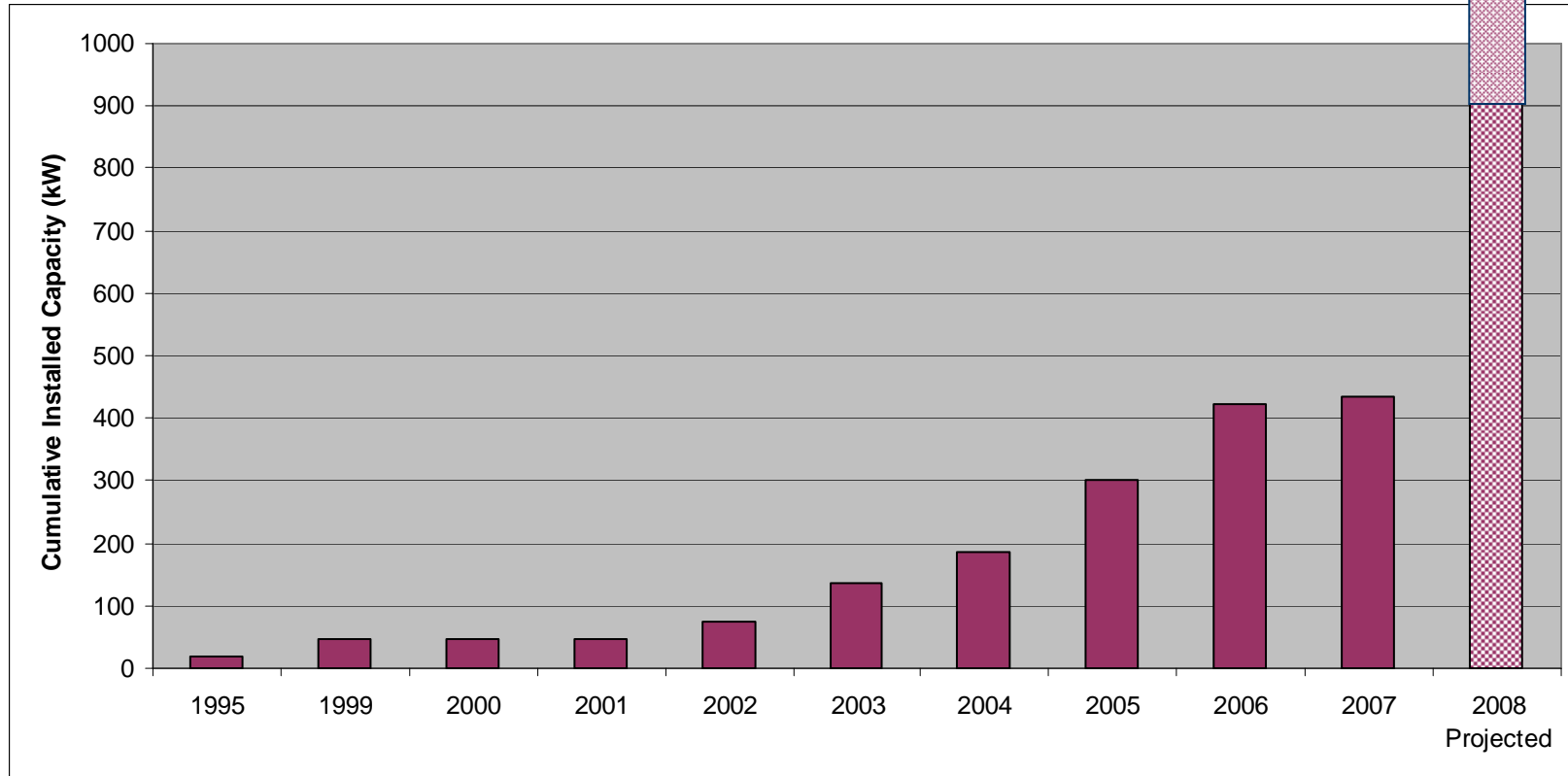


Source: MTC, Solar Boston survey, 2007

~943 kilowatts



Re-Projected Capacity (2008)



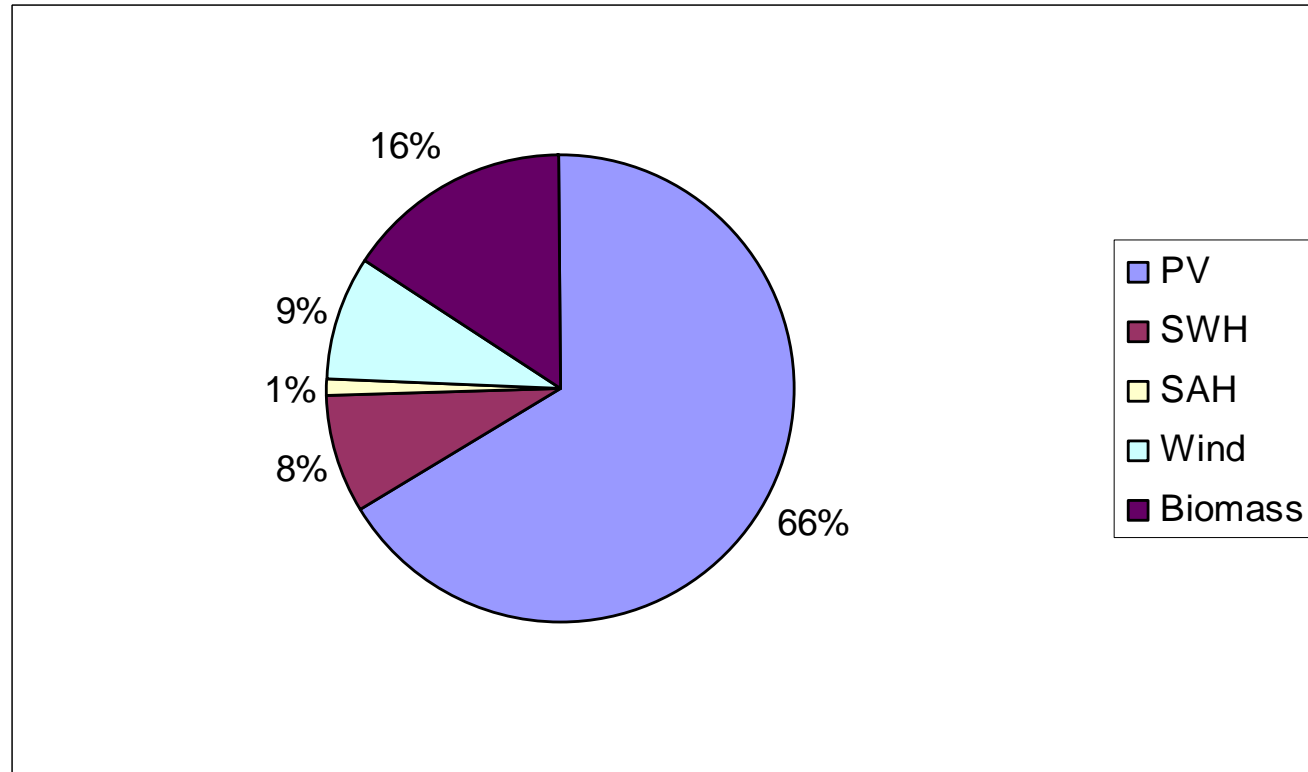
Source: MTC, Solar Boston survey, 2007

With Affordable Housing:
1,770 kilowatts

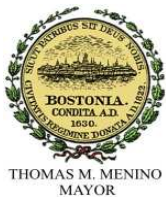


NSTAR Service Area Technical Potential

(Electricity Only)



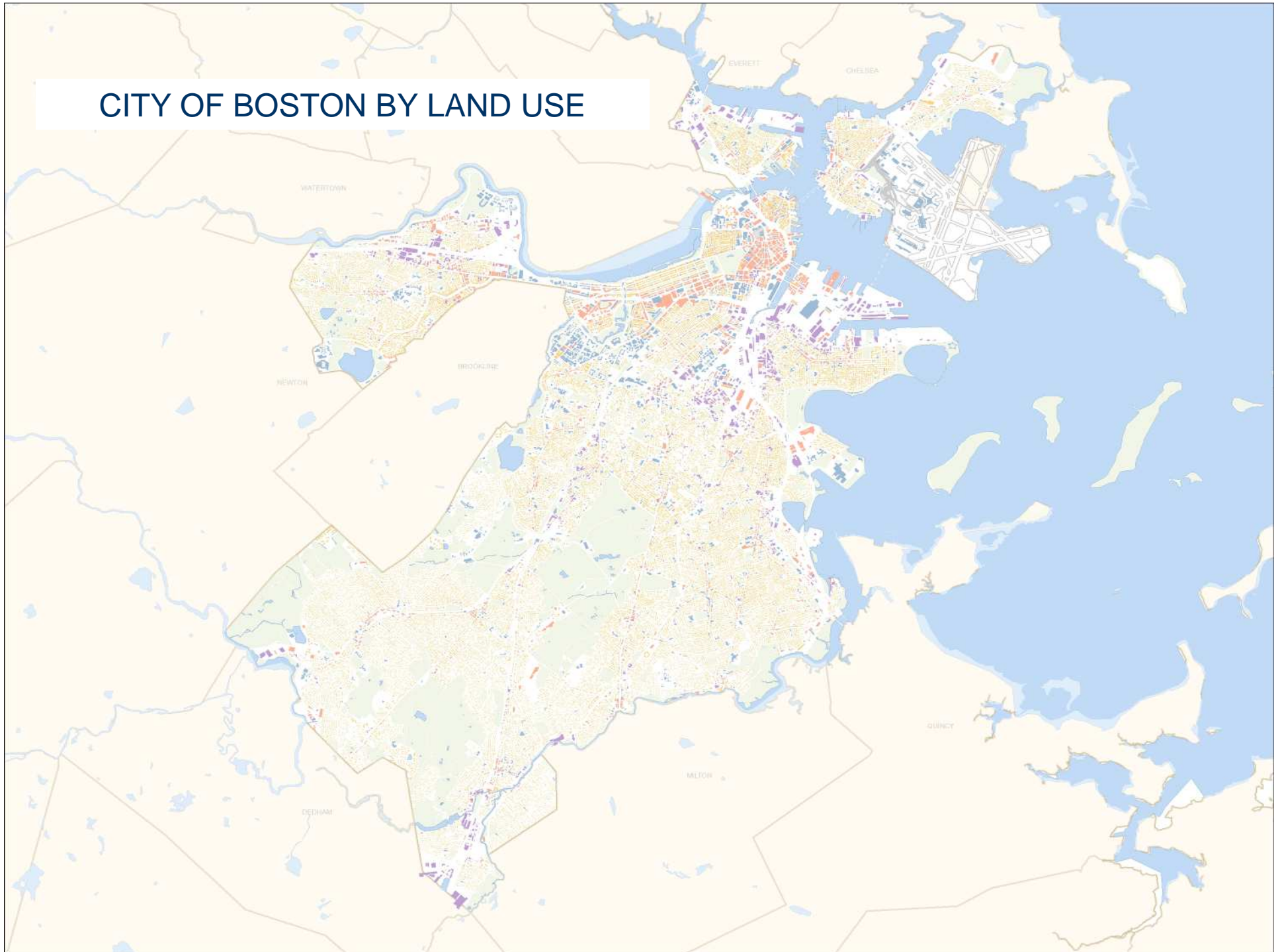
2,023 GWH total by 2013 (UCS, 1995)



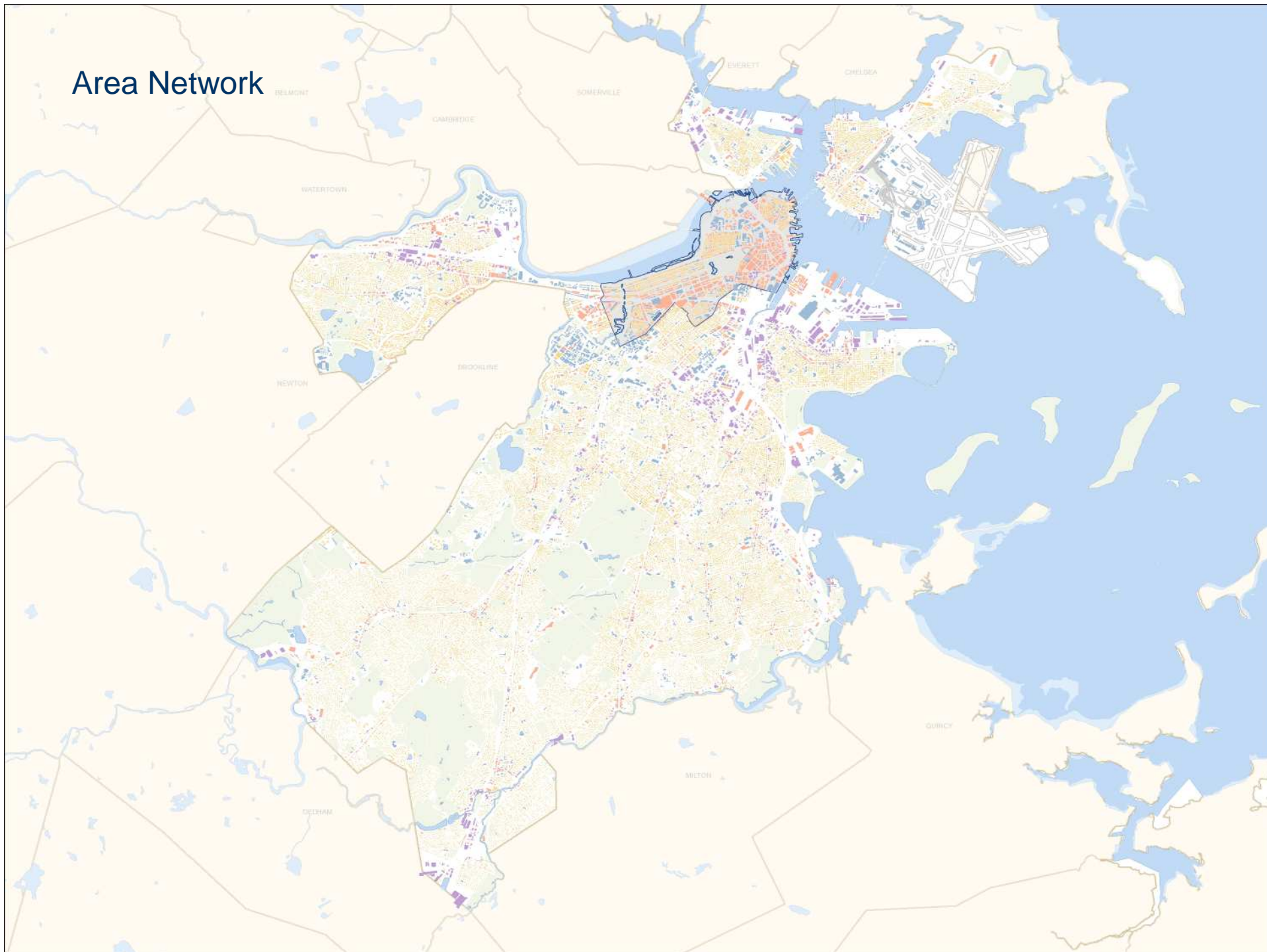
THOMAS M. MENINO
MAYOR



CITY OF BOSTON BY LAND USE



Area Network





4 Times Sq. (20 kW)



Millenium Towers (27 kW)



Verdesian (20.4 kW)



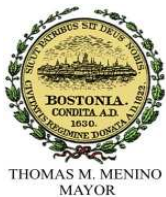
Solaire (33 kW)



Helena (17.1 kW)



TriBeCa Green (27.3 kW)



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MAYOR



BOSTON GREEN
BUILDING

SOLAR SKYSCRAPERS IN NYC

Photo Credits: NREL and altPOWER

The Answer? Solar Water Heating

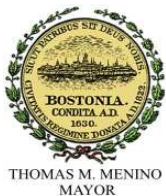
- No grid interaction
- Cheaper than PV
- Quicker payback than PV
- No-brainer for heated swimming pools



SWH in China



Credit: Paradigma

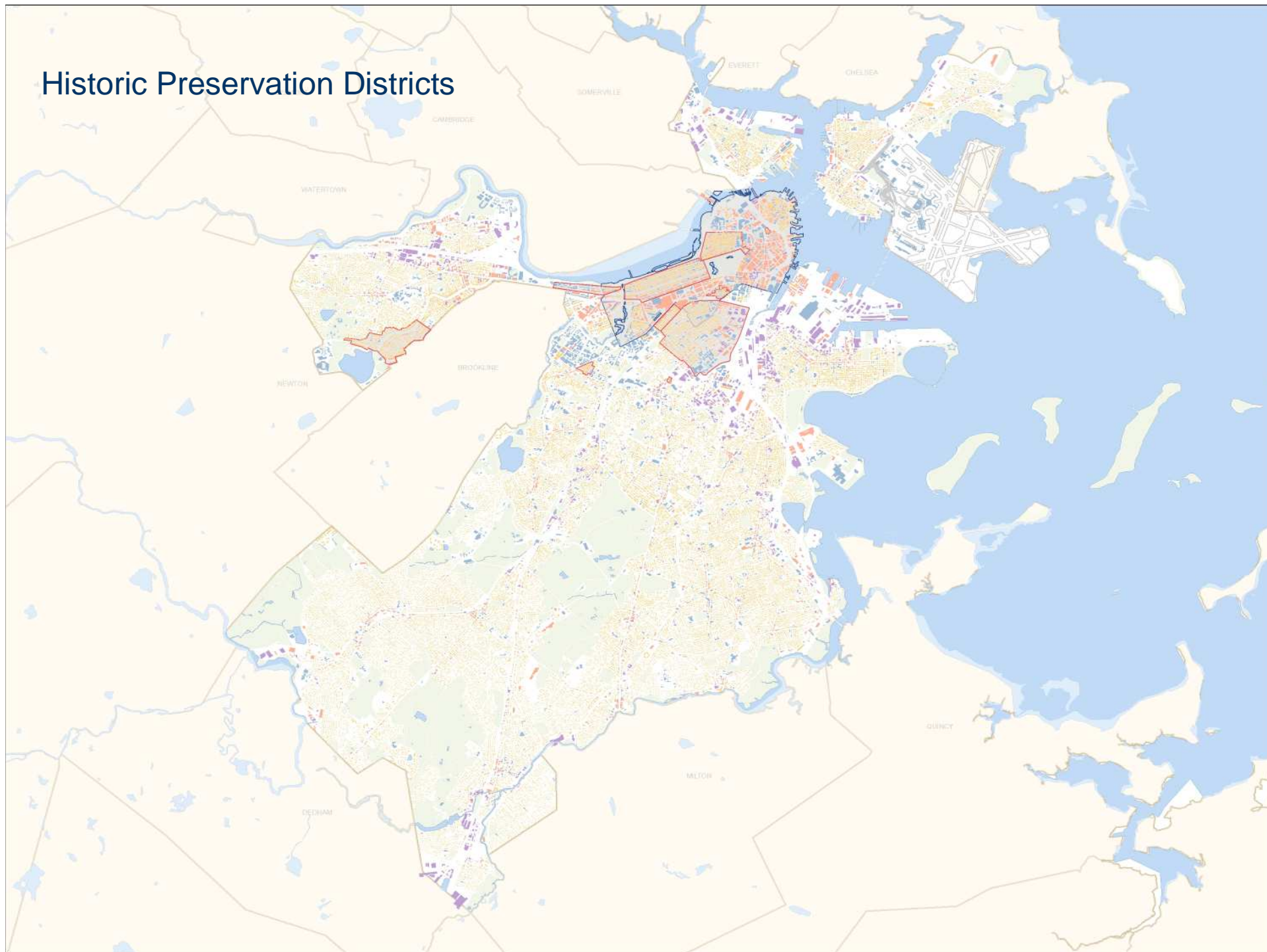


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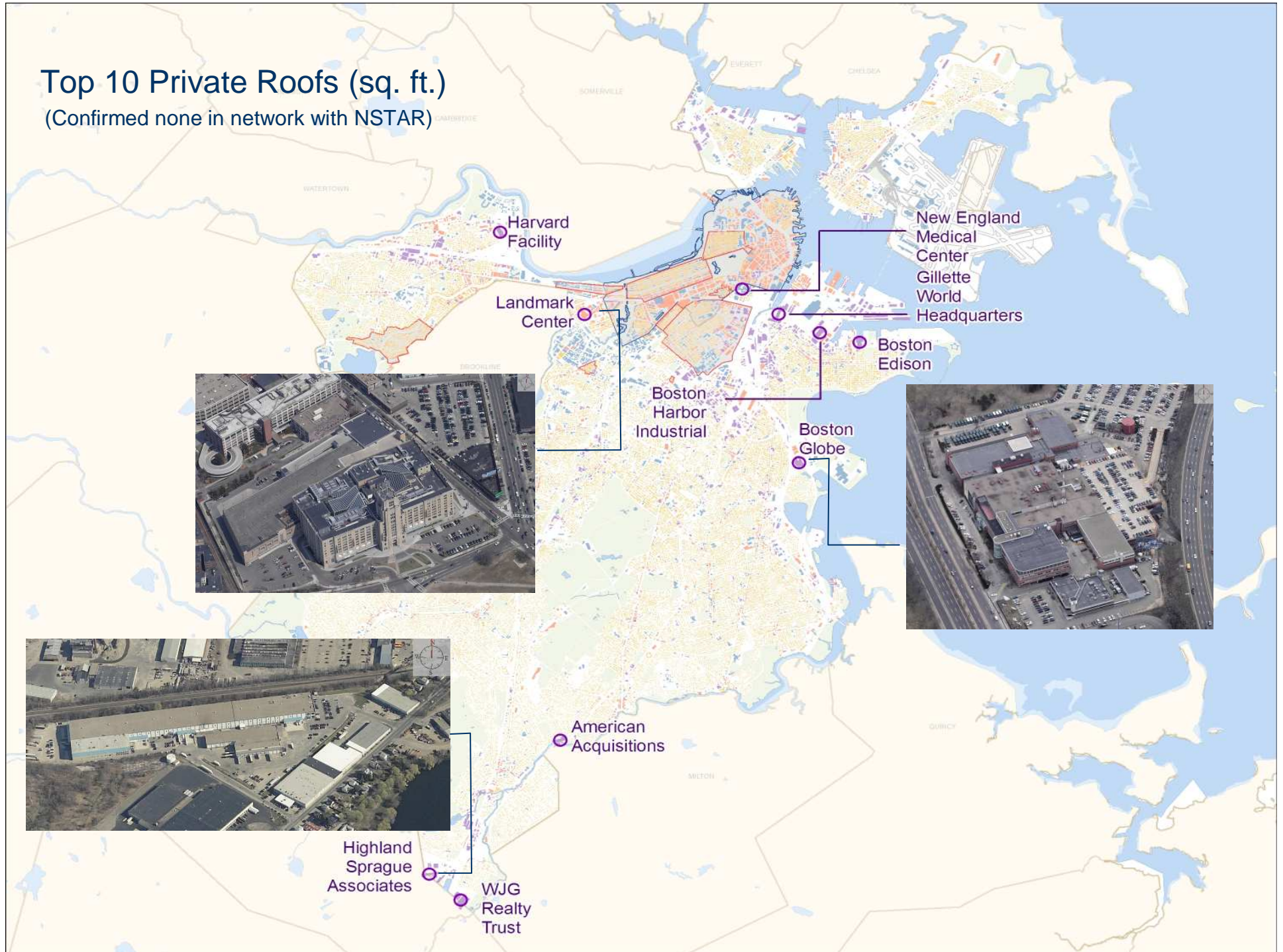
BOSTON GREEN
BUILDING

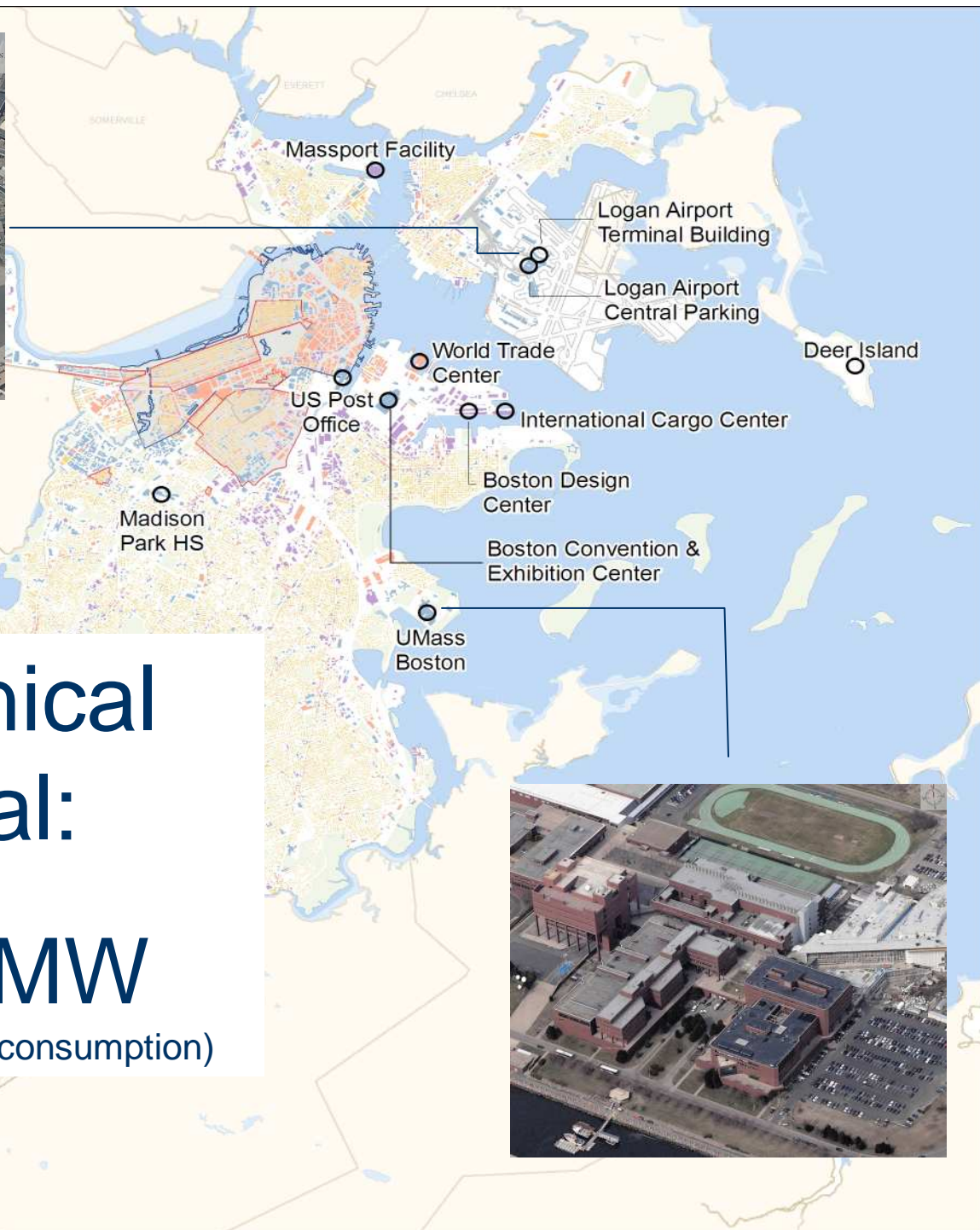
Historic Preservation Districts



Top 10 Private Roofs (sq. ft.)

(Confirmed none in network with NSTAR)





PV Technical Potential:

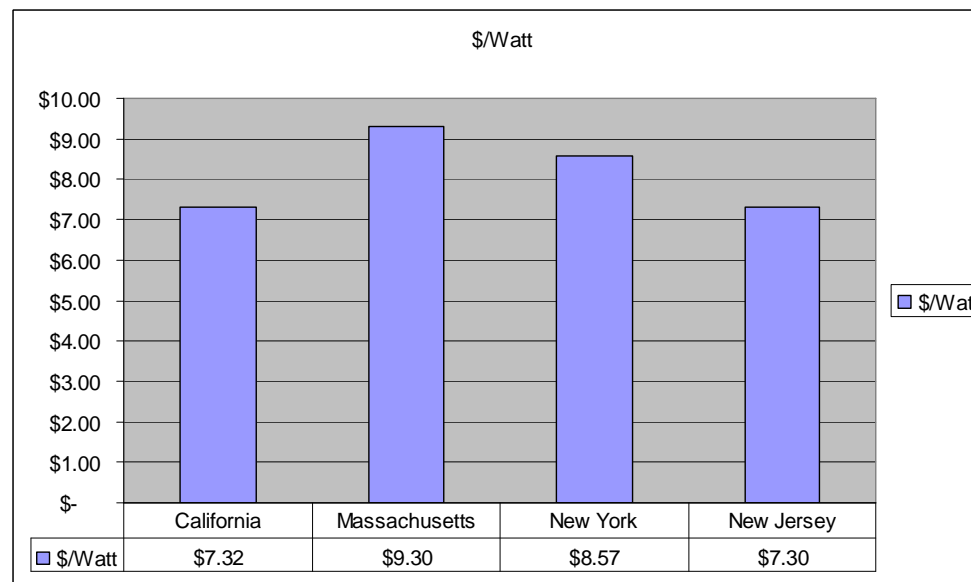
670-900 MW

(14%-19% 2006 electricity consumption)

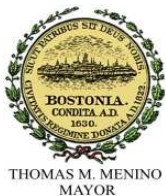


Boston PV Market Indicators

- Average 46% annual PV market growth in Boston since 2002
- Boston has 9% of MA population and 9% of MA PV capacity
- Share of annual MTC PV program funds declined steadily from 20% in 2003 to 1% in 2007*
- \$9.30/watt average in MA and in Boston
- Boston peak load: 1440 MW; City of Boston 56 MW (4%)



Source: MTC, 2007; CUNY PV Policy study, 20075



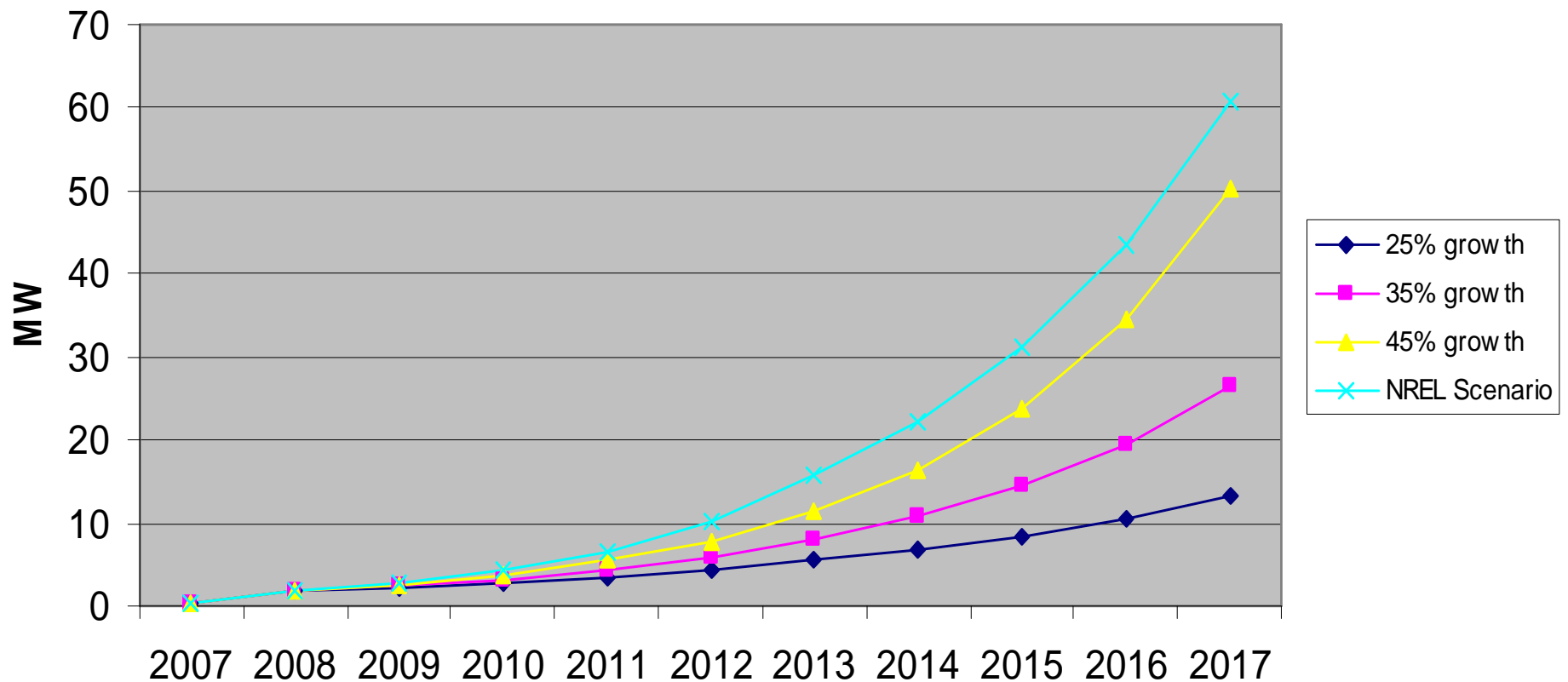
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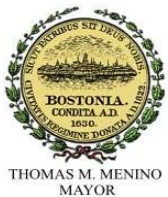
*Program funds include LORI and SRI grants, but do not include funding for special programs such as the Green Affordable Housing Program

Where to from here?

Boston PV Market Growth Scenarios



35% annual growth rate by 2017 = 25 MW

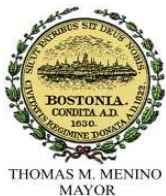


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Support for Market Growth

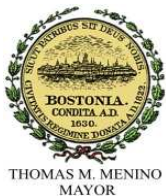
- KeySpan water heating rebates
- NSTAR partnership with Evergreen
- New energy legislation (?)
- Leading by Example... in Boston
- Commonwealth Solar (27 MW in 4 years)
- Cost-breakthrough scenario
- State target (250 MW by 2017)



More Rigorous Methodology

- Commonwealth goal = 250 MW by 2017
- Boston = ~10% of state population
- $10\% \times 250 \text{ MW} = 25 \text{ MW}$

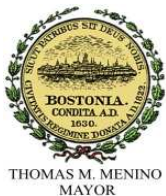
∴ Boston Goal = 25 MW by 2017



Tiger Team Assistance

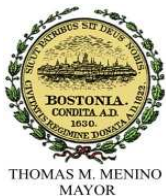


- Analysis of innovative financing mechanisms for public buildings
- Project facilitation for a large third-party owned solar system
- Support for bulk procurement or RFP
- Solar for emergency preparedness planning
- Training for City officials on federal energy savings performance contracting best practices
- Training support and infrastructure development
- Insurance and indemnification assistance (?)



Questions for the Group

- How can we work together?
- Who's working in the City already? Who's not and why not?
- Where are Boston's PV and SWH systems?
- What's in the pipeline?
- What are the barriers to market development?
- What are your job training and hiring needs?
- What can we do in the short-term with the tools we have? (codes, permitting, marketing, etc.)
- What do we need to do to prepare for the longer-term?
- What does thinking "big" mean anyway?



Questions and Contacts

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