



Renewable Energy Grants and Rebates

Massachusetts Technology Collaborative

Massachusetts Renewable Energy Trust

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Green Buildings



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PRESENTATION OVERVIEW

- What is the Renewable Energy Trust?
- Examples of Renewable Energy Projects
- Overview of Typical Project Paybacks
- How to Apply for Grants & Rebates @ MTC



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MTC AND THE TRUST

- Renewable Energy Trust was established in 1998 to:
 - increase the supply of & demand for electricity generated from clean sources, and
 - promote the development of a Massachusetts renewable technology industry cluster.
- Massachusetts Technology Collaborative (MTC) was selected to administer the Trust.
- MTC has supported over 700 projects, companies, and related activities with over \$200 million awarded.
- **Over 450 PV projects installed = 2.5 MW**
- Plus wind, small hydro, fuel cells, biomass, landfill gas



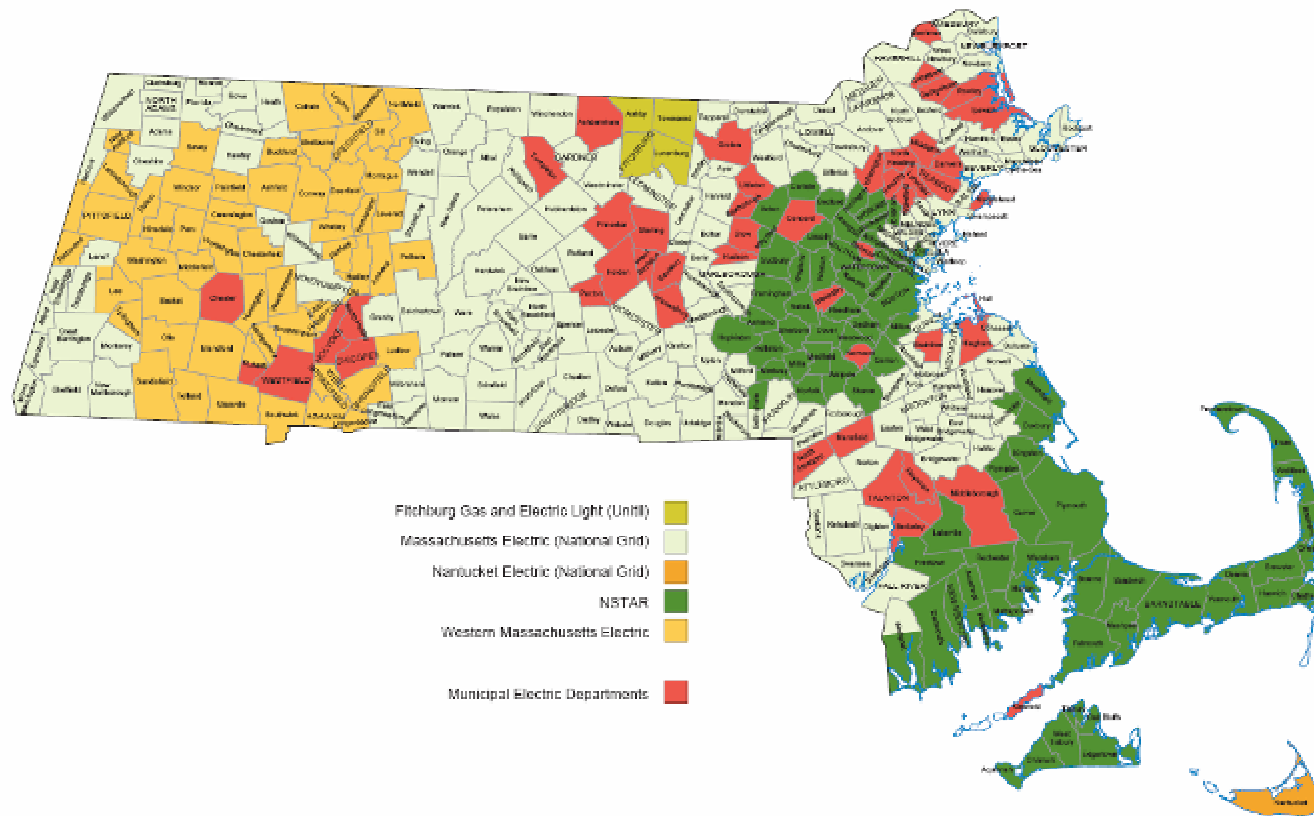
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Only IOU Territories are Eligible for Funding

- Renewable Energy Trust funding is derived from a systems benefit charge that is applied only to IOU customers.
- Approximately \$25 million is collected annually.



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ELIGIBLE RENEWABLE TECHNOLOGIES

- Established in enabling legislation
- Green Buildings initiatives support commercially available technologies:

- Solar PV
- Wind
- Biomass
- Fuel Cells
- Hydro



- **Must generate electricity**

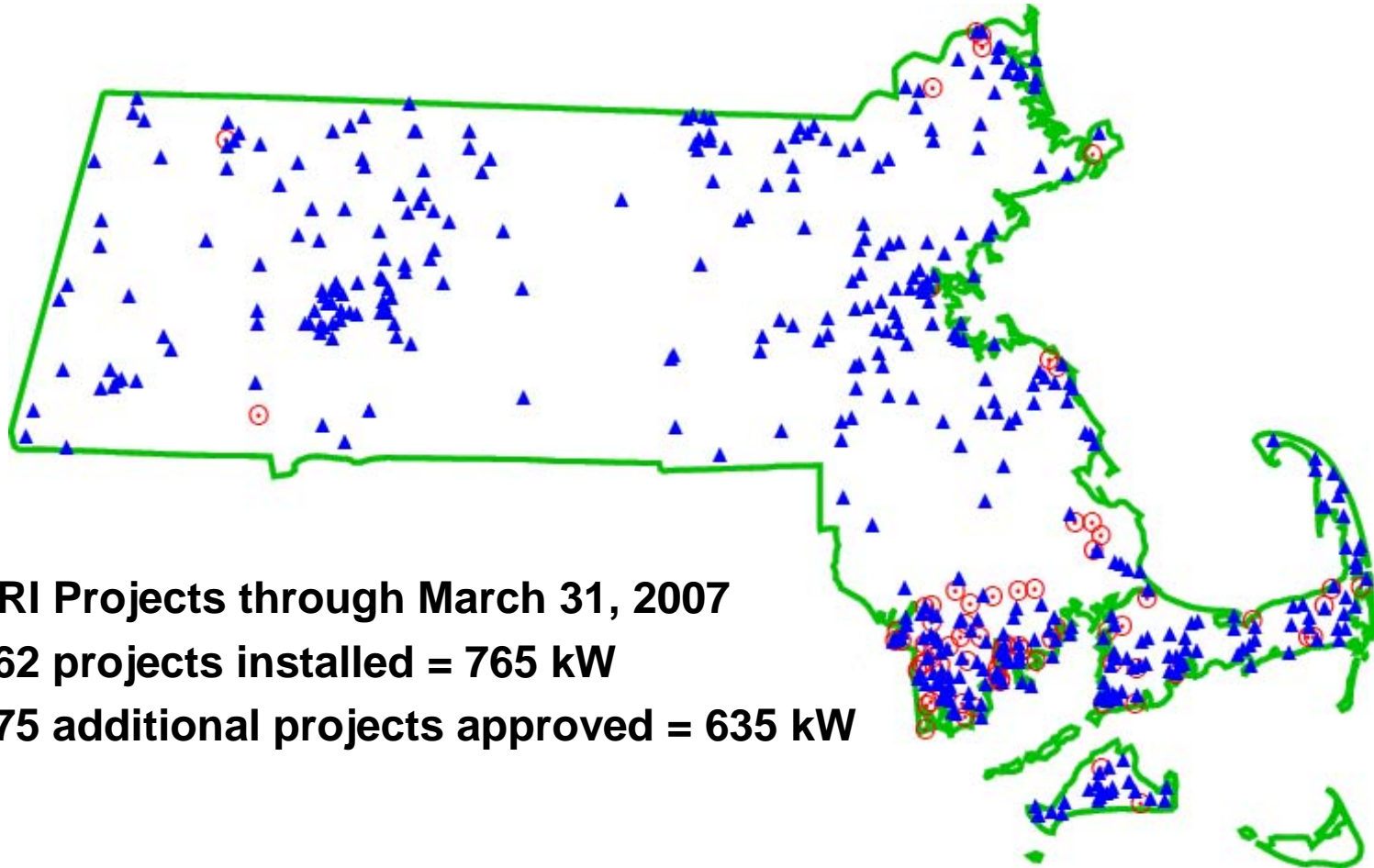


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Small Renewables Initiative (SRI)

Renewable system sizes of ≤ 10 kW



SRI Projects through March 31, 2007

262 projects installed = 765 kW

175 additional projects approved = 635 kW



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Large Onsite Renewables Initiative (LORI)

Renewable system sizes of > 10 kW



LORI Projects* through March 31, 2007

33 projects installed = 876 kW

28 additional projects approved = 8.6 MW

* Includes similar pre-LORI programs

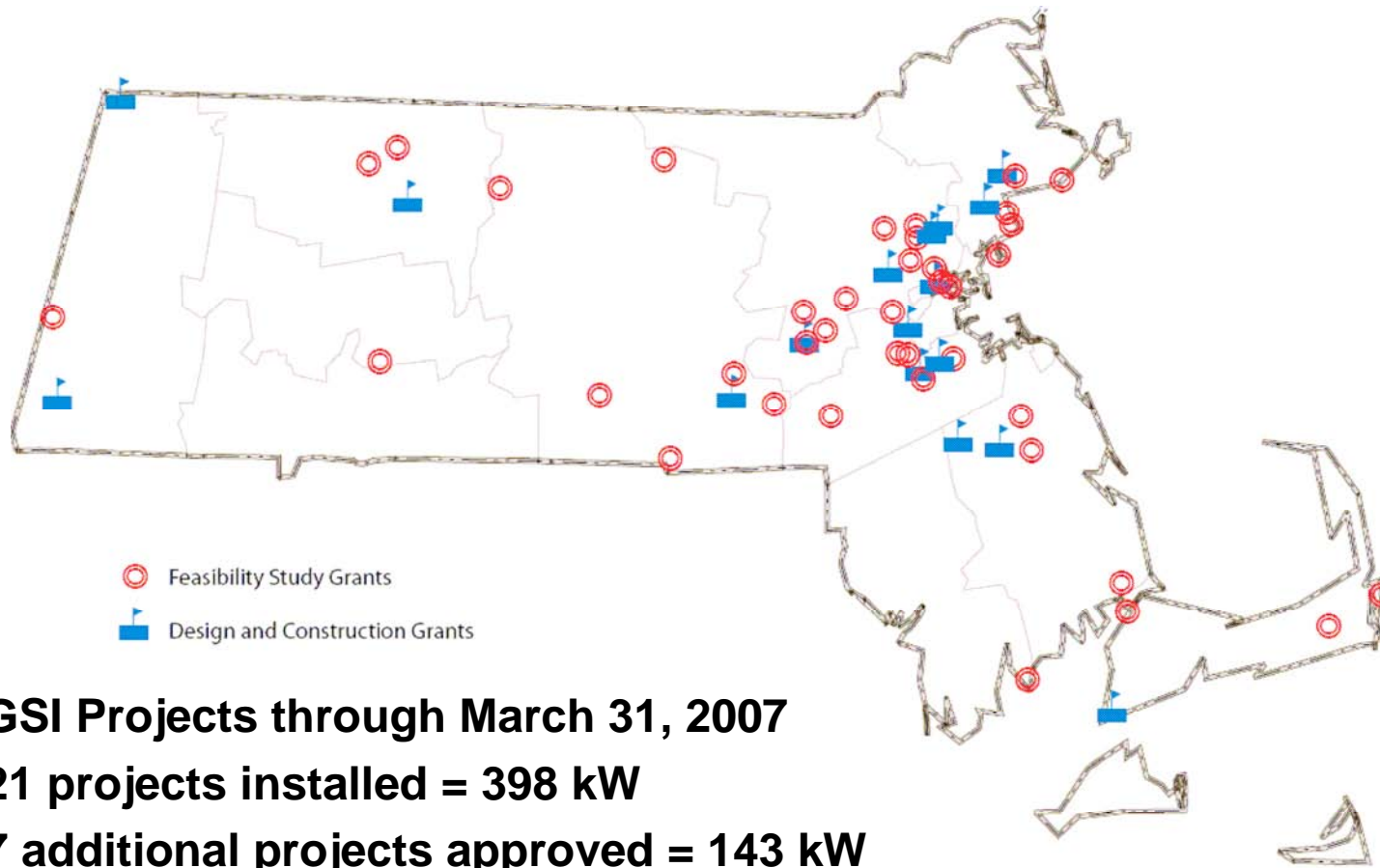


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Green Schools Initiative Pilot Phase 2001 - 2006



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Source: Kyocera, AstroPower

How Solar PV Works

- PV generates DC power
- Inverters create AC power
- AC provided to load center



Residential PV Installation – Boston
24 Evergreen Solar EC-100 modules

Small Renewables Initiative – 2.6 kW



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Residential Pitched Roof Mount



Small Renewables Initiative – 2.4 kW



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Residential Pitched Roof Mount



Green Affordable Housing Initiative – 1 kW



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Commercial Pitched Roof Mount



Green Schools Initiative – 21.6 kW



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Residential Flat Roof Mount

Small Renewables Initiative – 2.6 kW



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Commercial Flat Roof Mount



Large Onsite Renewables Initiative – 24.3 kW



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Commercial Flat Roof Mount



Small Renewables Initiative - 7.2 kW



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Flat Roof w/ Pitched Mounting



Large Onsite Renewables Initiative – 117 kW



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Flat Roof & Ground Mounted PV



Large Onsite Renewables Initiative – 147 kW



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Ground Mounted PV System



MassInnovation's PV trellises, as seen from below. Large Onsite Renewables Initiative



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Ground Mounted PV Systems



Small Renewables Initiative
approximately 1 kW each



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Ground Mounted PV Systems



Wendell, MA pole-mounted system installed by PV Squared August 2003



Small Renewables Initiative
approximately 2 kW each



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Ground Mounted Tracking Array



Small Renewables Initiative – 1.9 kW



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Brockton Brightfield



LARGEST PV PROJECT IN NEW ENGLAND - 425 kW



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Vertical & Awning Mounted Solar PV



Green Schools Initiative – 17.4 kW



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Awning Mounted Solar PV



Small Renewables Initiative – 2.4 kW



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Building Integrated PV



Large Onsite Renewables Initiative – 13.3 kW



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Building Integrated PV



Small Renewables Initiative – 3.7 kW



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PV PROJECT ECONOMICS

Scenario B: Taxable Rebate: Pro Forma Project Economics

INCOME STATEMENT

	\$	8,585 \$	8,798 \$	9,017 \$	9,241 \$	9,470 \$
Revenue	\$	3,096 \$	3,051 \$	3,035 \$	3,020 \$	- \$
Operating Expenses (Avoided Costs)	\$	11,651 \$	11,849 \$	12,052 \$	12,261 \$	9,470 \$
	\$	(500) \$	(515) \$	(530) \$	(546) \$	(563) \$
	\$	- \$	- \$	- \$	- \$	- \$
Operating Expenses	\$	(500) \$	(515) \$	(530) \$	(546) \$	(563) \$
EBITDA	\$	11,151 \$	11,334 \$	11,522 \$	11,715 \$	8,908 \$
	\$	(72,250) \$	(115,800) \$	(69,360) \$	(41,616) \$	(41,616) \$
EBIT	\$	(61,099) \$	(104,266) \$	(57,838) \$	(29,901) \$	(32,708) \$
	\$	- \$	- \$	- \$	- \$	- \$
EBT	\$	(61,099) \$	(104,266) \$	(57,838) \$	(29,901) \$	(32,708) \$
(Net of federal depreciation expense)	\$	21,736 \$	36,850 \$	20,606 \$	10,834 \$	11,728 \$
(Cost Rebate)	\$	(1,004) \$	(1,020) \$	(1,037) \$	(1,054) \$	(802) \$
Net Income	\$	(116,961) \$	(68,436) \$	(38,269) \$	(20,121) \$	(21,781) \$
	\$	(116,961) \$	(68,436) \$	(38,269) \$	(20,121) \$	(21,781) \$
Cash Flow From Operations	\$	(44,711) \$	47,164 \$	31,091 \$	21,495 \$	19,835 \$
Installed PV Cost	\$	(237,500) \$				
One Time State Solar Investment Tax Deduction (Actual Cash Value)	\$	38,250 \$				
One Time Federal Solar Investment Tax Credit	\$	127,500 \$				
Cash Flow From Investing	\$	(237,500) \$	165,750 \$	- \$	- \$	- \$
Cash From Financing	\$	- \$	- \$	- \$	- \$	- \$
Loan Disbursement	\$	- \$	- \$	- \$	- \$	- \$
Loan Repayment (Principle)	\$	- \$	- \$	- \$	- \$	- \$
Cash Flow From Financing	\$	- \$	- \$	- \$	- \$	- \$
Net Cash Flow	\$	(237,500) \$	121,039 \$	47,164 \$	31,091 \$	21,495 \$
Cumulative Cash Flow	\$	(237,500) \$	(116,461) \$	(69,297) \$	(38,206) \$	(16,711) \$

<http://www.masstech.org/cleanenergy/cando/howto.htm>



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NEW FEDERAL TAX INCENTIVE HIGHLIGHTS

- Solar Business Federal Tax Credit increased from 10% to 30% (plus accelerated depreciation)
- Solar Residential Federal Tax Credit set at 30% (\$2,000 cap)
- Fuel Cell Business Federal Tax Credit set at 30% (or \$1,000 per kW)
- Database of state renewable energy incentives:
 - <http://www.dsireusa.org>



PV PROJECT ECONOMICS

- Assumes the MTC SRI or LORI rebate/grant** plus adders for Economic Target Area and MA-manufactured.

Examples of Solar PV Project Simple Paybacks		
	Vanilla Building	Green Building
Not for Profit	20+ years	~16 years
Residential*	12+ years	~10 years
Public	15+ years	~12 years
Taxable Business*	~5 years	~4 years

- In addition, under reasonable long-term financing terms, many PV projects can be **cash flow positive from day 1** (energy savings + REC revenue exceeds debt payments plus O&M).
- *Assumes federal and state tax incentives
- ** Green Schools & Green Affordable Housing have a different (higher) grant payment structure than SRI and LORI



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Small Onsite Wind (≤ 10 kW)



Small Renewables Initiative
1 kW (left); 10 kW (right)



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Large Onsite Wind



Large Onsite Renewables Initiative – 100 kW



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Large Onsite Wind



Massachusetts
Maritime
Academy

DCAM Partnership
660 kW



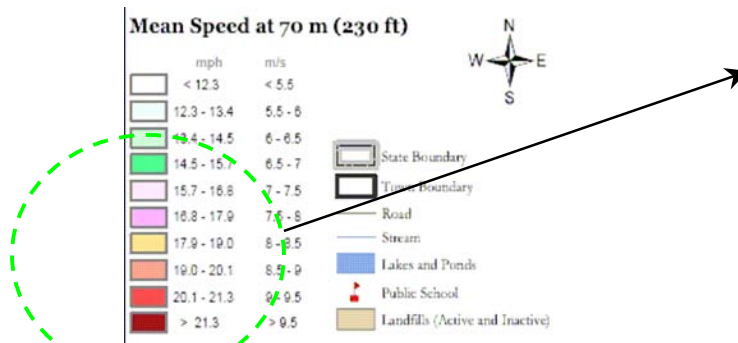
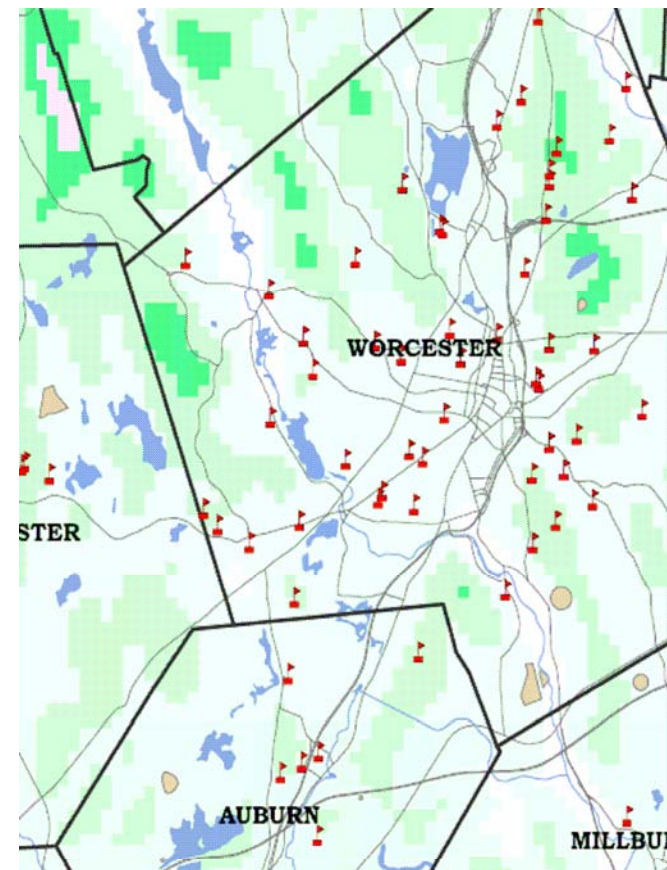
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WIND PROJECT ECONOMICS

- Basic wind project requirements:
 - Good wind resource
<http://truewind.teamcamelot.com/ne/>
 - Compatible site (e.g., suitable area for turbine, proximity of neighbors, etc.)
 - Compatible onsite electricity load (avoid full retail rate)
 - Empowered project champion
 - Good consultants

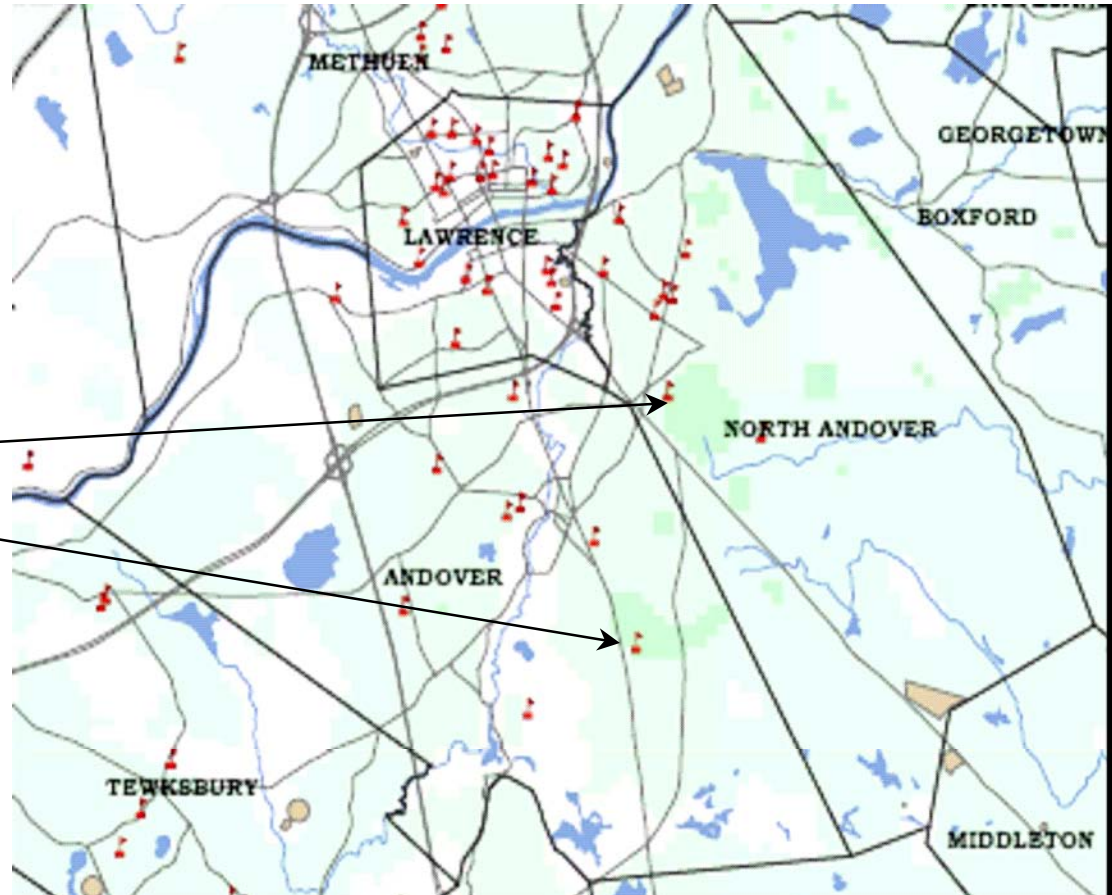
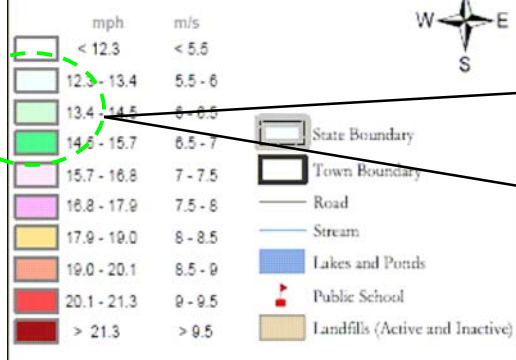




WIND PROJECT ECONOMICS

Andover and North Andover wind map

Mean Speed at 70 m (230 ft)



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Wind Speed and Turbine Performance

1.5 MW TURBINE

Wind Class	Ave. Wind Speed at Hub	Capacity Factor	MWh/yr. Generated	Revenue @\$65/MWh
Class 3	6.0 m/s	24%	3,150	\$204,750
Class 4	6.5 m/s	28%	3,720	\$241,800
Class 5	7.0 m/s	32%	4,270	\$277,550
Class 6	7.5 m/s	36%	4,790	\$311,350



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WIND PROJECT ECONOMICS

- Assumes grants and federal and state tax incentives

Rough Estimate of "Best Case" Simple Payback Period (Years) Based on Wind Resource (m/s at 70 meters)						
Turbine Capacity (kW)	100 kW	250 kW	600 kW	850 kW	1500 kW	2500 kW
Hub Height	35 m	42 m	50 m	60 m	70 m	80 m
5.5 m/s at 70 m	15	12	10	9	8	9
6.0 m/s	10	8	7	8	6	7
6.5 m/s	8	6	6	7	6	6
7.0 m/s	6	6	6	6	5	5
7.5 m/s	6	5	5	5	5	5

- In addition, under reasonable long-term financing terms, good wind projects can be **cash flow positive from day 1** (energy savings + REC revenue exceeds debt payments plus O&M).

Biodiesel Co-generation



Green Affordable Housing Initiative – 40 kW



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MTC GRANT AND REBATE PROGRAMS

- Large Onsite Renewables Initiative
 - Projects larger than 10 kW
 - Grants up to \$500,000
- Small Renewables Initiative
 - First come;first served - rolling application process
 - Funding through FY10 up to \$50,000 per award
- Green Schools Initiative
 - Support services: modeling; feasibility
 - Grants for certified High-performance Green Schools
- Green Affordable Housing Initiative
 - MTC selected seven development partners
 - Funding for green elements & renewables



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FOR MORE INFO... www.masstech.org

- Small Renewables Initiative
 - Kelly Dexter: (508) 870-0312 x 1602
 - smallrenewables@masstech.org
- Large Onsite Renewables Initiative
 - Jon Abe: (508) 870-0312 x 1216
 - abe@masstech.org
- Green Affordable Housing Initiative
 - Raphael HerzAbe: (508) 870-0312 x 1205
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- Green Schools Initiative / DCAM Partnership
 - Sam Nutter: (508) 870-0312 x 1277
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