

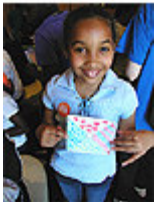
Cleaner Technology and Energy Efficiency: Structuring a Competitive Advantage Conference

Renewable Distributed Generation
Massachusetts Grants and Opportunities
April 5, 2007

Massachusetts Technology Collaborative
Jon Abe
Senior Project Manager

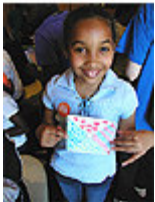


RENEWABLE ENERGY TRUST



PRESENTATION OVERVIEW

- Focus on Onsite/ Distributed Renewable Energy Projects For Agricultural Biz.
 - MTC RET
 - Renewable DG Funding Sources
 - Project Economics: Examples
 - How to Apply?
 - Project Pictures (time permitting)



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.
- Projects installed in 150+ communities.

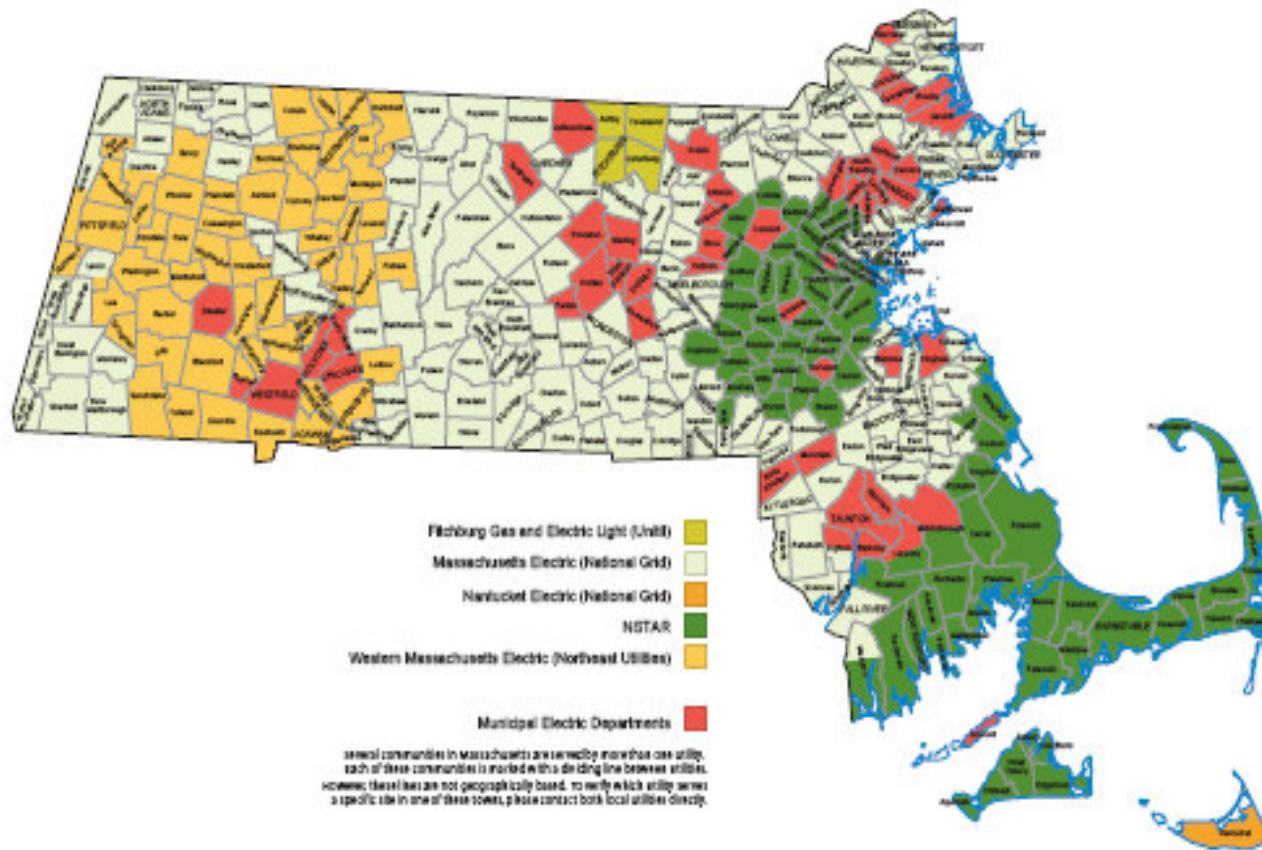


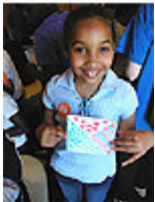
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AREAS ELIGIBLE FOR FUNDING

- Source of funds is a surcharge → \$25 million/yr
- Only customers in investor owned utility service territories:





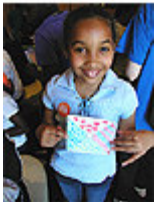
ELIGIBLE RENEWABLE TECHNOLOGIES

- Initiatives support commercially available technologies that use at least 25% of electricity onsite:

Small Renewables Initiative	Large Onsite Renewables Initiative	
Solar PV Wind Hydro	Solar PV Wind Hydro	Biomass Fuel Cells

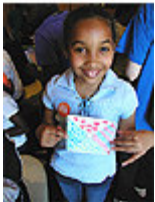


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SMALL RENEWABLES INITIATIVE (= <10 kW)

- ~\$3.6 million per year through FY2010.
- Grants of up to \$50,000 for design & construction.
- Customer sited renewable energy projects (50% must be used onsite).
- Awards made through a non-competitive application process (must meet minimum technical standards).
- Actual award is based on the rebate matrix.

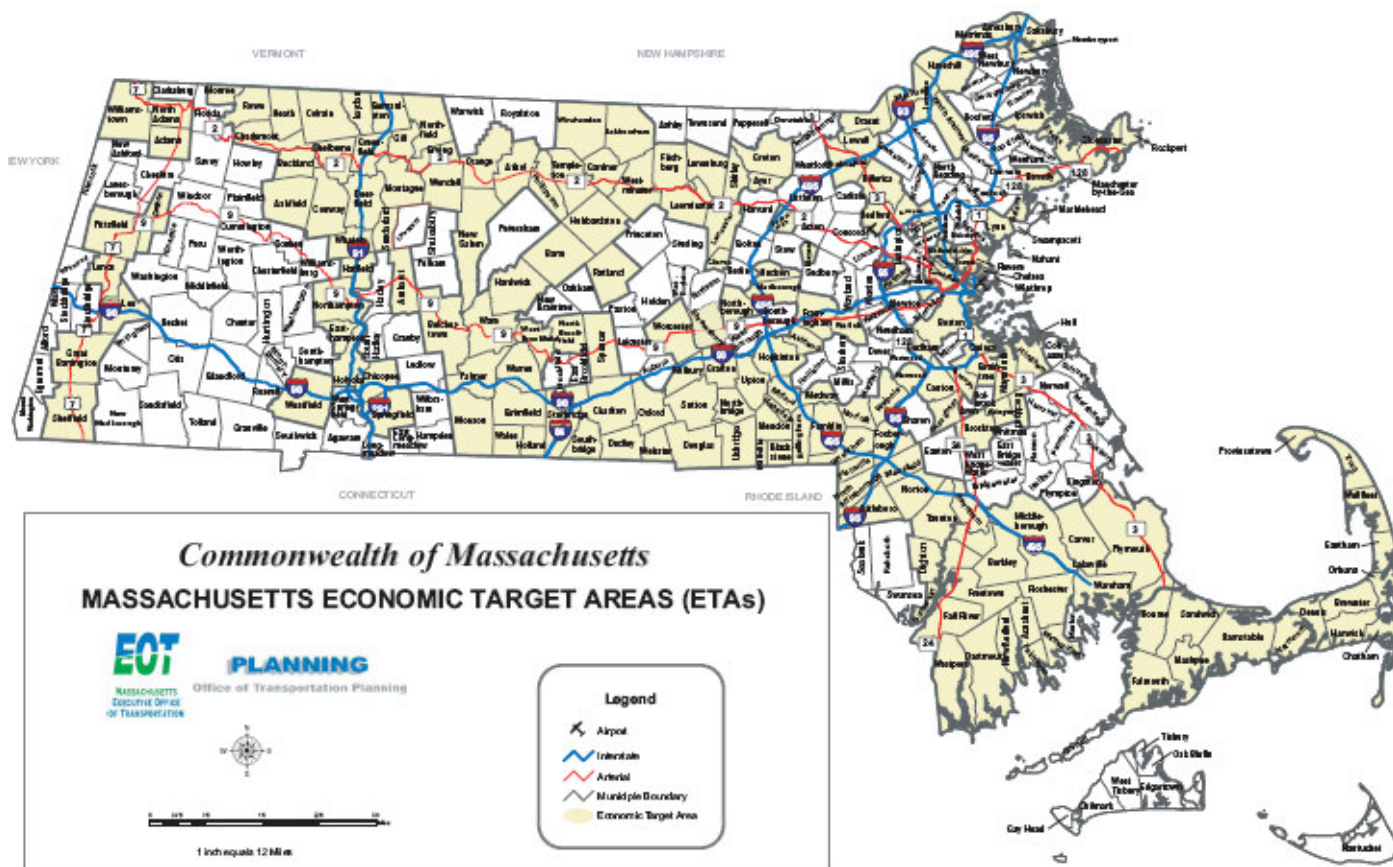


SMALL RENEWABLES INITIATIVE (= ≤ 10 kW)

SRI Rebate Matrix				
		Technology		
		PV	Wind	Hydro
		(\$/watt dc)	(\$/watt ac)	(\$/watt ac)
Distributed Generation				
	Base Incentive (\$/watt)	\$2.00	\$2.25	\$4.00
	PLUS: Additions to Base			
	MA-manufactured components	\$0.25	N/A	\$0.75
	Economic Target Area/ Moderate Home Value	\$1.25	\$1.25	\$1.00
	Public Buildings	\$1.50	\$1.00	\$2.00
	Building-Integrated PV	\$1.00	N/A	N/A
Affordable Housing				
	20% to less than 50% Low-income/ Affordable Housing (40-B), <i>or</i>	\$1.00	\$1.00	\$1.00
	50% or greater Low-income/ Affordable Housing (40-B)	\$2.50	\$2.50	\$2.50
High Performance Buildings (for New Construction/ Major Rehab Only)				
	Green Buildings (LEED/CHPS), <i>or</i>	\$1.00	\$1.00	\$1.00
	Advanced Buildings/ High Performance Homes (Energy Star)	\$0.25	\$0.25	\$0.25



SMALL RENEWABLES INITIATIVE (= ≤ 10 kW)





MTC SUPPORT FOR “PLAIN VANILLA” SOLAR PROJECT

Vanilla Solar Project Example	
Total PV Cost Per Watt	\$8.50
Project Size (Watts DC)	10,000
Initial Cost	\$85,000
MTC Rebate	
Base Incentive (\$2.00 per watt)	\$ 20,000
Economic Target Area (\$1.25 per watt)	\$ 12,500
MA Manufactured Components (\$.25 per watt)	\$ 2,500
Total (\$3.50 per watt)	\$ 35,000
Cost After MTC Rebate	\$ 50,000

~40% of PV cost covered by MTC Rebate



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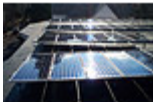
MTC SUPPORT FOR “NEW GREEN BUILDING” SOLAR PROJECT

Green Building Project Example	
Total PV Cost Per Watt	\$8.50
Project Size (Watts DC)	10,000
Initial Cost	\$85,000
MTC Rebate	
LEED Green Building Adder (\$1.00 per watt)	\$ 10,000
Base Incentive (\$2.00 per watt)	\$ 20,000
Economic Target Area (\$1.25 per watt)	\$ 12,500
MA Manufactured Components (\$.25 per watt)	\$ 2,500
Total (\$4.50 per watt)	\$ 45,000
Cost After MTC Rebate	\$ 40,000

~52% of PV cost covered by MTC Rebate



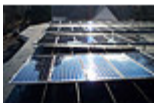
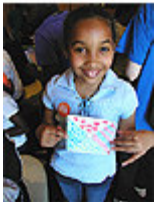
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LARGE ONSITE RENEWABLES INITIATIVE (LORI)

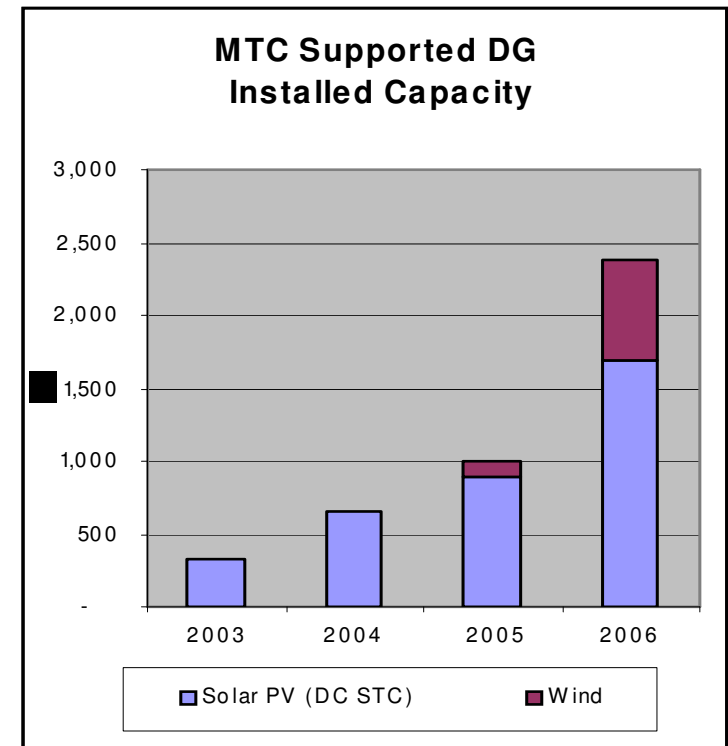
- ~\$7 million per year budget (pending approval).
- Competitive solicitation and evaluation process.
- **Next due date is August 2007.** Two deadlines per year.
- Public projects are eligible in addition to commercial, industrial, and institutional projects.

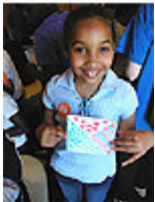
Project Type	Available Funding
Feasibility (no solar PV)	Capped at \$40,000 requiring 15% cost-share
Design and Construction	Design is capped at \$100,000 or 75% of actual costs; Construction is capped at up to \$400,000 or 75% of actual costs \$250,000 for solar design and construction D&C Award based on incentive matrix



MTC SUPPORTED DG INSTALLATIONS THROUGH 2006

MTC Supported DG Installed Capacity (kW)					
	2003	2004	2005	2006	Total
Solar PV (DC STC)	335	650	899	1,699	3,583
Wind	-	10	103	684	797
Biomass CHP	-	-	-	-	-
Hydro	-	-	-	-	-
Total Capacity	335	661	1,002	2,383	4,380





MTC SUPPORTED DG PIPELINE

Technology	Pipeline
Solar	<ul style="list-style-type: none"> 1,000+ kW of 10 kW or less in queue (2007) 1,000+ kW of greater than 10 kW in queue (2007) Launch of Green Schools and Green Affordable Housing Initiatives
Wind	<ul style="list-style-type: none"> 1.5 MW Jiminy Peak (Hancock), delivery for Summer 2007. Varian (Gloucester), Webb Research (Falmouth), and Holy Name H.S. (Worcester), etc. installed by 2008? Several Community Wind Projects will be DG 300+ kW of 10 kW or less in cue 25+ feasibility Studies in process (100 kW or larger)
Biomass CHP	<ul style="list-style-type: none"> Iggy's Bread of the World (Cambridge, 45 kW biodiesel CHP), Allston Brighton Community Development (Boston, 40 kW biodiesel CHP), Cooley Dickinson (245 KW, biomass CHP), and Pine Island (125 kW, digester gas CHP) by 2008 5+ feasibility studies in process (biodiesel, digester gas, and biomass CHP)
Hydro	<ul style="list-style-type: none"> Alternatives Unlimited (Whittinsville, 45 kW) in 2007 5+ in FERC permitting/ feasibility study stage 2 kW of 10 kW or less in cue (2007)



PV PROJECT ECONOMICS

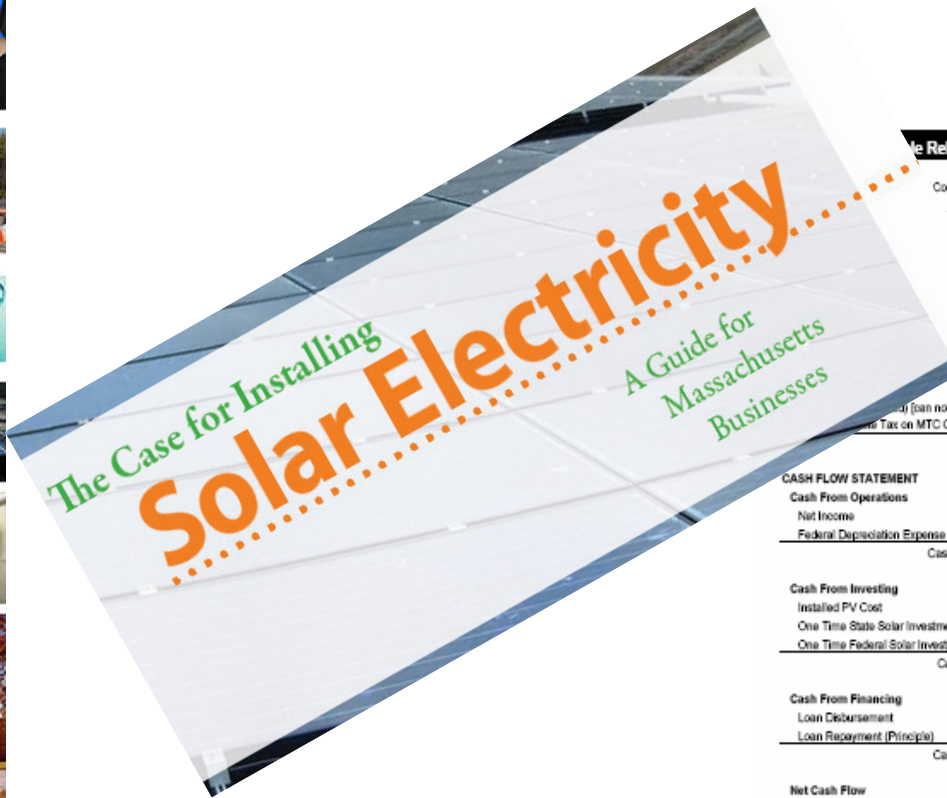
- Assumes MTC rebate and grant plus adders for Economic Target Area and MA-manufactured.

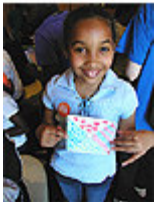
Examples of Solar PV Project Simple Paybacks		
	Vanilla Building	Green Building
Not for Profit	20+ years	~16 years
Residential*	12+ years	~10 years
Public	15+ years	~12 years
Taxable Business*	~5 years	~4 years

- 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 use of federal and state tax incentives



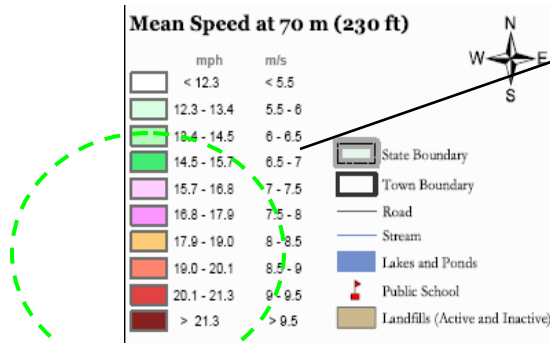
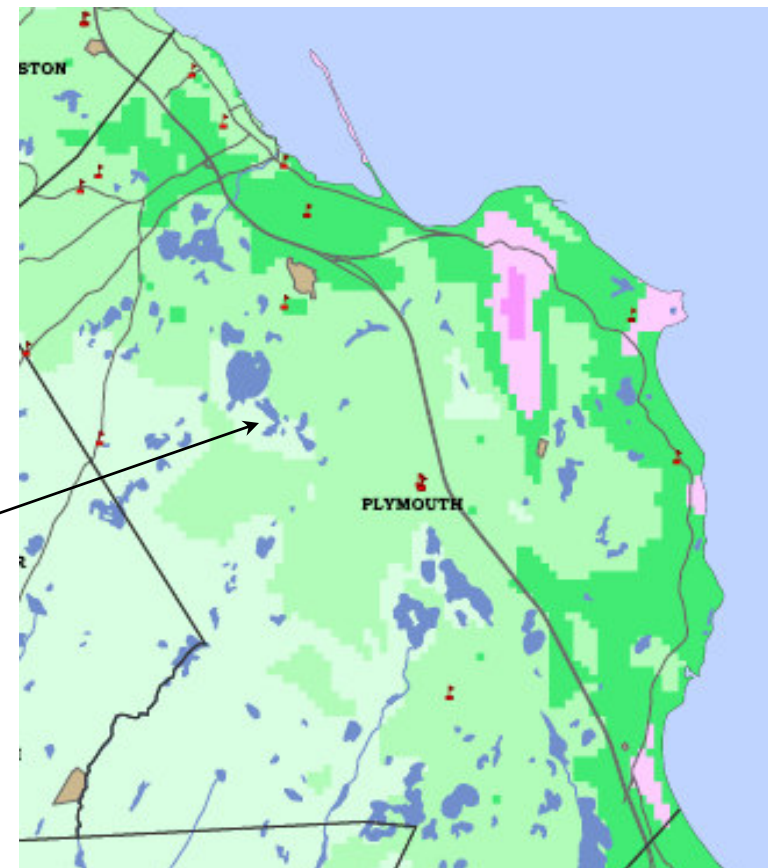
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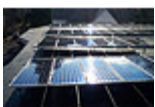
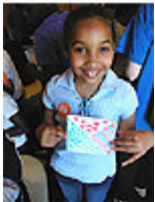


WIND PROJECT ECONOMICS

- 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 installer/ consultants



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DG WIND PROJECT ECONOMICS

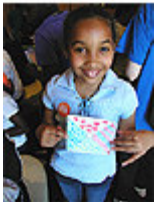
- Assumes MTC grants and federal and state tax incentives and 50% or more onsite usage:

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).



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LEVERAGE UTILITY ENERGY EFFICIENCY INCENTIVES

- Both the Small Renewables Initiative and Large Onsite Renewables Initiative have an energy efficiency requirement (**at a minimum get your home or business audited**):
 - Residential customers:
<http://www.masssave.com/>
 - Other customers (go to your utility site):
 - <http://www.nationalgridus.com/masselectric/business/>
 - http://www.nstaronline.com/your_business/
 - <http://www.gasnetworks.com/efficiency/applications.asp>



HOW TO APPLY?

- Small Renewables Initiative: www.masstech.org/rebates

Small Renewables Initiative

Rebates for Small Renewable Projects (10 kW or less)



Photo: Christi & Paul Kemprecos
2.0 kW solar array;
Dennis Port, MA

OVERVIEW
The Small Renewables Initiative (SRI) provides rebates for the installation of renewable energy projects that are up to 10 kilowatts and located at residential, commercial, industrial, institutional, and public facilities. The applicant (and project site) must be a customer of a Massachusetts investor-owned electric distribution utility. Rebates may be used to facilitate the installation of solar photovoltaic, wind, and small hydro renewable energy projects to receive a rebate from MTC.

HOW DO I LEARN MORE ABOUT RENEWABLE ENERGY AND APPLY FOR A REBATE?
There are a number of steps (see in the right column) associated with applying for a SRI rebate. If you decide to move forward with a renewable energy project, your installer or vendor is responsible for providing you with turnkey service and installation, including taking you through the SRI rebate process, securing required permits, and ensuring the installation of your renewable system.

TOTAL AVAILABLE SRI FUNDING
SRI involves the distribution of approximately \$3.6 million of rebates each year through



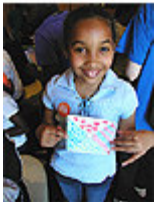
Navigate the Process

- Step 1. Determine Eligibility
- Step 2. Educate Yourself
- Step 3. Estimate Your Rebate
- Step 4. Find an Installer
- Step 5. Apply for Rebate
- Step 6. Install & Interconnect
- Step 7. Receive Rebate



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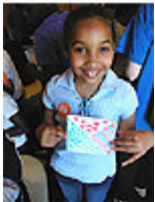


FOR MORE INFO...www.masstech.org

- 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 Herz: (508) 870-0312 x 1205
 - herz@masstech.org
- Green Schools Initiative
 - Sam Nutter: (508) 870-0312 x 1277
 - nutter@masstech.org



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Residential Pitched Roof Mount

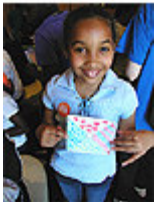


Small Renewables Initiative – 2.4 kW



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Commercial Pitched Roof Mount

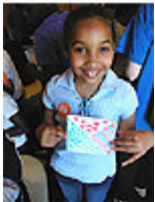


Green Schools Initiative – 21.6 kW



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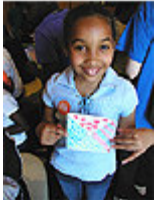
Residential Flat Roof Mount

Small Renewables Initiative – 2.6 kW



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Commercial Flat Roof Mount

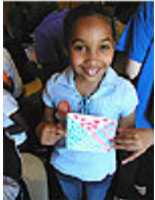


Large Onsite Renewables Initiative – 24.3 kW



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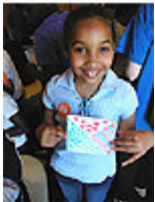
Flat Roof w/ Pitched Mounting



Large Onsite Renewables Initiative – 117 kW



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Flat Roof & Ground Mounted PV

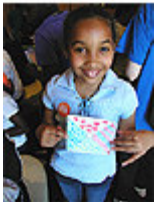


Large Onsite Renewables Initiative – 147 kW



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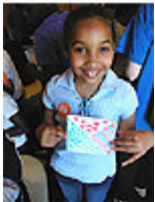
Ground Mounted PV System



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



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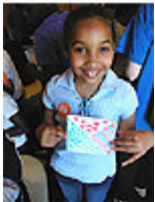
Ground Mounted PV Systems



Small Renewables Initiative
approximately 1 kW each



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Ground Mounted Tracking Array



Small Renewables Initiative – 1.9 kW



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Brockton Brightfield

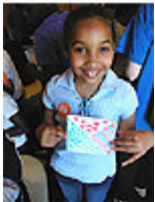


2nd LARGEST PV PROJECT IN NEW ENGLAND - 425 kW



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Vertical & Awning Mounted Solar PV



Green Schools Initiative – 17.4 kW



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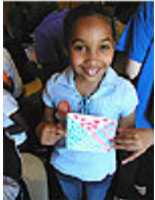
Awning Mounted Solar PV



Small Renewables Initiative – 2.4 kW



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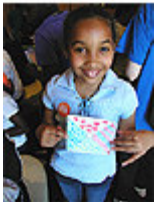
Building Integrated PV



Large Onsite Renewables Initiative – 13.3 kW



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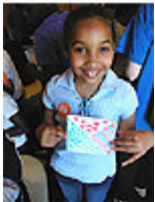
Small Onsite Wind (≤ 10 kW)



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



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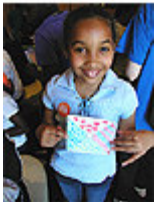


Small Onsite Wind (≤ 10 kW) - 10 kW at MVHS



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Large Onsite Wind



Massachusetts Maritime Academy

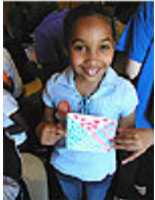
Vestas V47 660 kW

DCAM Partnership

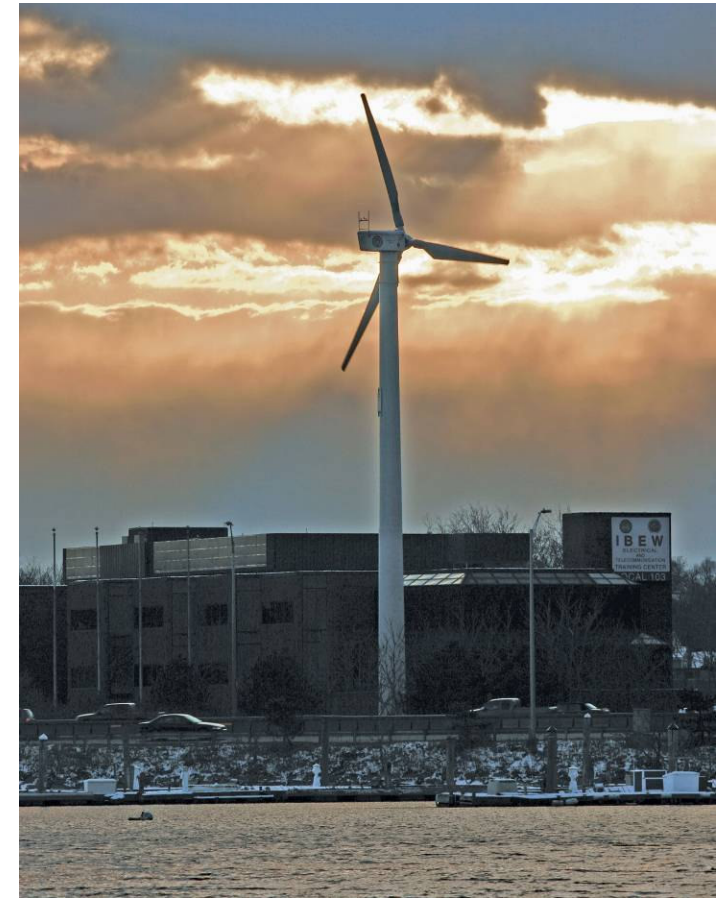


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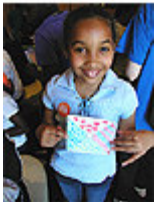
Large Onsite Wind



International Brotherhood of Electrical Workers – Local 103
Large Onsite Renewables Initiative – FL 100



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Large Onsite Wind

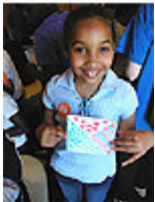
- Tower manufactured by Morrison Berkshire in MA:





NEAR-TERM DG MARKET OPPORTUNITIES/ DRIVERS

Tech.	Tech. Specific	General
Solar	<ul style="list-style-type: none"> ▪ Quick installation and easy integration ▪ 20+ year system design life, no moving parts ▪ Most universal technology ▪ MTC grant, Federal and State Tax Incentives = 4 to 7 year payback to biz 	<ul style="list-style-type: none"> ▪ Rising electricity prices ▪ Increasingly favorable Federal and State policy (could be better, e.g., net metering, etc.) ▪ More installed projects (places to kick the tires) ▪ Green Building New Construction Momentum <ul style="list-style-type: none"> ▪ Leverage, partner, and develop huge professional, development, construction, and financing infrastructure ▪ Realize economies of scale and cost efficiencies
Wind	<ul style="list-style-type: none"> ▪ Good wind, good load, and a good site = good DG wind project. How many are there in MA? 	
Biomass CHP	<ul style="list-style-type: none"> ▪ Potentially better ROI (based on design info) ▪ MA forest and lumber industry, agriculture sector eager to find new sources of revenue ▪ Growing biofuel infrastructure 	
Hydro	<ul style="list-style-type: none"> ▪ MA has 132 MW of undeveloped hydro capacity at 130 sites with existing dams, many with onsite loads (Idaho National Engineering Laboratory, U.S. DOE) 	

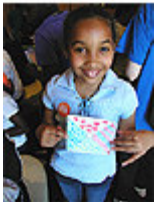


EXAMPLE: MTC INITIATIVES TO PROMOTE RENEWABLES AND GREEN BUILDINGS

- MTC provides an additional incentive to renewable projects that are part of new green buildings
- NEW 2007 MTC Initiatives include:
 - Green Affordable Housing
 - Green Schools



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FEDERAL 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)
- USDA Grants
- Database of state renewable energy incentives:
 - <http://www.dsireusa.org>



OTHER FEDERAL & STATE RENEWABLE ENERGY INCENTIVES

- <http://www.dsireusa.org/>

DSIRE
Database of State Incentives for Renewables & Efficiency

DSIRE is a comprehensive source of information on state, local, utility, and federal incentives that promote renewable energy and energy efficiency. Choose one or both databases to search:

☒ Renewable Energy ☒ Energy Efficiency

Federal Incentives

US Territory Incentives

Last Updated: 02/26/07



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