







Boston Solar

January 10, 2008

Commonwealth Solar
Preview

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MASSACHUSETTS TECHNOLOGY COLLABORATIVE

RENEWABLE ENERGY TRUST









PRESENTATION OVERVIEW

- MTC and the Renewable Energy Trust
- Commonwealth Solar Preview
- Solar Economics
- Overview of the Rebate Process
- 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 1,200 projects, companies, and related activities with over $250 million awarded.
- Projects installed in 175+ communities.

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Commonwealth Solar

January 2008

Pre-Launch Overview

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Overview

- Key Goals
- Funding Levels
- Funding Strategy
- Implementation
- Key Changes and Benefits
- Supporting Activities









Commonwealth Solar: Key Goals

- Put PV market on a trajectory (~40% annual growth rate) to achieve the Governor's 2017 goal of 250 MW (4 Year Interim Measure).
- Provide streamlined non-competitive rolling rebate application process for all solar projects, while maintaining quality control function.









Commonwealth Solar: Funding Levels

- $68 million over ~4 years
  - $40 million from the Renewable Energy Trust (only slight increase in annual budget already dedicated to PV)
  - $28 million from Alternative Compliance Payment Fund
- Minimum Reservations
  - $16 million for state and municipal buildings, including schools,
  - $8 million for residences, including low and moderate-income households.
- Installed Goal of 27 MW by end of 2011 (currently at 4.8 MW installed plus pipeline of 2.6 MW)









Commonwealth Solar: Funding Strategy

- Goal: Provide a predictable and steady incentive without interruption for the PV market through 2011.
- Challenge: There is uncertainty re: federal legislation and appropriate rebate levels.
- The first block is $8.5 million with $2 million reserved for public buildings $1 million reserved for residences.
- MTC and DOER, in consultation with other stakeholders, will make program adjustments to: 1) either slow or accelerate spending, and 2) address changes in the market and related policies.









Commonwealth Solar: Implementation

- 1/23/08









Commonwealth Solar:
Residential Changes and Benefits

- Benefits
  - Cover 20% to 60% of the cost of a typical residential photovoltaic system
  - Estimated payback ranging from 8 to 18 years and a return on investment of 4.3% to 13.7%
- Key Changes
  - Increase in the residential cap from 3.6 kW to 5.0 kW, and the addition of special incentives for moderate-income households









Commonwealth Solar:
Residential Changes and Benefits

- Initial Rebate Levels:

Residential Rebates ($ per watt (dc))	
Base Incentive	$ 2.00
Massachusetts-Manufactured Adder	$ 0.25
Moderate Home Value Adder	$ 1.25
Moderate Income Adder	
<=$91,552 (120% of MA median household income	$ 1.00
<= $76,296 (MA median household income)	$ 2.00









Commonwealth Solar: Non-Residential Changes and Benefits

- Benefits
  - Cover about 40% of the cost of a typical commercial photovoltaic system.
  - Provide business owners with an payback of ~5 to 6 years and a post tax return on investment of about 10%.
- Key Changes
  - Tiered rebate structure (larger projects that benefit from economies of scale require less rebate per watt).
  - Increase in the project caps to 500 kW.
  - Shift from competitive review process to a rolling rebate process with funding available on a first come first serve basis.









Commonwealth Solar:
Non-Residential Changes and Benefits

Residential Economic Benefits for Typical 2.5 kW solar installation (assumes an installed cost of $9 per watt)			
	% Cost (not including tax incentives)	**Simple Payback (estimated)**	**Post Tax Rate of Return (estimated)**
Base Incentive ($2.00 per watt)	22%	18 years	4.30%
Base Incentive + MA Manufactured ($2.25 per watt)	25%	17 years	4.70%
Base Incentive + MA Manufactured + Moderate Income Option A ($3.25 per watt)	36%	14 years	6.40%
Base Incentive + MA Manufactured + Moderate Home Value ($3.50 per watt)	39%	13 years	6.90%
Base Incentive + MA Manufactured + Moderate Income Option B ($4.25 per watt)	47%	11 years	8.80%
Base Incentive + MA Manufactured + Moderate Income Option A + Moderate Home Value ($4.50 per watt)	50%	10 years	9.50%
Base Incentive + MA Manufactured + Moderate Income Option B + Moderate Home Value ($5.50 per watt)	61%	8 years	13.70%

* Simple Payback and Post Tax Rate of Return estimates assume that owner can utilize federal and state tax incentives.

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Commonwealth Solar: Support Activities

- Customer Friendly Website
- Call Center
- Third party ownership market development support
- Updated Residential and Non-Residential Guidebooks and Financial Models
- Speakers Bureau
- Increased Public Awareness around installations.
- NABCEP Certified Training Program Pilot (Selected Community College to be announced in February)









Commonwealth Solar: More on Third Party

- CS will provide tools that will help public entities (and others) to host PV at no cost and to benefit from power purchase agreements that will help to stabilize and reduce their electricity costs.
- The PV projects would be owned by businesses that can benefit from tax incentives and pass through some of this benefit, in the form of electricity savings, to host entities.
- Some agreements may include a transfer of ownership from the owner to the host entity after a period of time, say 15 years. This would allow for the host to benefit from the generation of free clean electricity for the rest of the life of the photovoltaic system, which is designed to last 30 years.









OTHER MTC SOLAR PROGRAMS

- Green Schools (now accepting applications for design support):
  - http://masstech.org/grants_and_awards/GSI/application.html
- Green Affordable Housing:
  - http://www.masstech.org/RenewableEnergy/afford_housing.htm
- Utility DR, EE, and DG Bundling Pilots



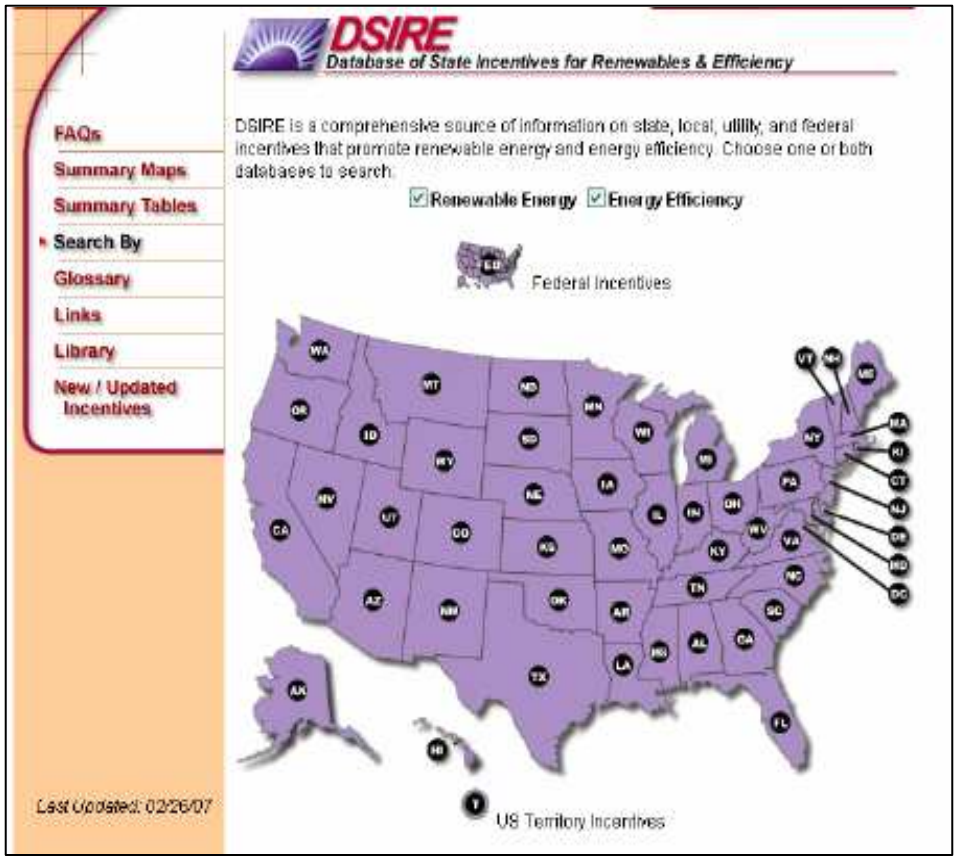






OTHER FEDERAL & STATE RENEWABLE ENERGY INCENTIVES

- http://www.dsireusa.org/











PV PROJECT ECONOMICS

- Assumes MTC rebate and grant plus adders.

Examples of Solar PV Project Simple Paybacks	
Not for Profit	20+ years
Residential*	6 to 12+ years
Public	15+ years
Taxable Business*	**~5 years**
***Assumes ability to use Federal and State Tax Incentives**	

- 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







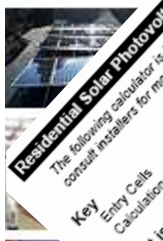


PV PROJECT ECONOMICS

…e Rebate; Pro Forma Project Economics

…Cost)	$ 8,585	$ 8,798	$ 9,017	$ 9,241	$ 9,470	$
	$ 3,066	$ 3,051	$ 3,035	$ 3,020	$ -	$
…venue (Avoided Costs)	$ 11,651	$ 11,849	$ 12,052	$ 12,261	$ 9,470	$
	$ (500)	$ (515)	$ (530)	$ (546)	$ (563)	$
	$ -	$ -	$ -	$ -	$ -	$
…rating Expenses	$ (500)	$ (515)	$ (530)	$ (546)	$ (563)	$
EBITDA	$ 11,151	$ 11,334	$ 11,522	$ 11,715	$ 8,908	$
	$ (72,250)	$ (115,600)	$ (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)	$
	$ 21,736	$ 36,850	$ 20,606	$ 10,834	$ 11,728	$
…[can not deduct federal depreciation expense]	$ (1,004)	$ (1,020)	$ (1,037)	$ (1,054)	$ (802)	$
…e Tax on MTC Capital Cost Rebate	$ (76,594)					
Net Income	**$ (116,961)**	**$ (68,436)**	**$ (38,269)**	**$ (20,121)**	**$ (21,781)**	**$**
CASH FLOW STATEMENT						
Cash From Operations						
Net Income	$ (116,961)	$ (68,436)	$ (38,269)	$ (20,121)	$ (21,781)	$
Federal Depreciation Expense	$ 72,250	$ 115,600	$ 69,360	$ 41,616	$ 41,616	$
Cash Flow From Operations	$ (44,711)	$ 47,164	$ 31,091	$ 21,495	$ 19,835	$
Cash From Investing						
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**	**$ 19,835**
Cumulative Cash Flow	**$ (237,500)**	**$ (116,461)**	**$ (69,297)**	**$ (38,206)**	**$ (16,711)**	**$ 3,124**

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



PV PROJECT ECONOMICS

Residential Solar Photovoltaic Calculator

The following calculator is intended to provide residential customers with only a rough estimate of solar photovoltaic system size and cost. Customers should consult installers for more information. Further disclaimer information is below.

Key
Entry Cells
Calculation Cells (Not for Entry)

What is your annual electricity use?

The average home in Massachusetts consumes about 8,000 kilowatt-hours per (kWh) year. You can determine your annual electricity use by looking at your electricity bill and totaling the kWh that you use each month for a year. Typically this information is located on the lower left corner of your electricity bill.

Enter your annual electricity usage (default is 8,000 kWh)? 8,000 kWh

How much will a typical solar system generate (assuming an optimal fixed south facing free from shading location)?

The following table estimates how much of your electricity use can be offset by solar systems of different sizes. It is important to note that while residential customers can apply for rebates for systems as large as they want, the maximum size that is used in the calculation of a residential rebate is 3.6 kilowatts (kW) or 3,600 watts (w).

System Size	Estimated Optimal Annual Generation (kWh)	Percent of your Annual Usage	Percent of Average Customer Annual Usage
1 kW (~100 sqft of panels)	1200	15%	15%
2 kW	2400	30%	30%
3 kW	3600	45%	45%
4 kW	4800	60%	60%
5 kW	6000	75%	75%

How much will a solar system cost?

Typical residential systems cost about $9,500 per kWh installed. Some systems cost less and others cost more depending upon equipment and installation variables. Customers should consult installers for more accurate cost estimates.

What size system are you interested in? (default is 2.5 kW) 2.5 kW

How much will your system cost $/kW (default is $9,260 per kW)? 2,500 watts (w)

Estimated total installed cost $9,260 per kW

$23,125

...r rebate and tax credits?

...20% and 50% of system costs depending on the characteristics of the project. At a minimum, all eligible ...watt. In addition, residential customers may be eligible for up to $3,000 in federal and state tax incentives. ...re accurate cost estimates and information on rebate adders. Customers may also consult the Section 3, ...or more information on eligiblity requirements for various rebate adders. For details on assumptions behind ...heet of this workbook.

...anufactured in Massachusetts?	No	extra $.25/watt
...erate Home Value Adder?	No	extra $1.25/watt
...Energy Star Adder?	No	extra $.25/watt
...or a LEED Adder (you can not qualify for both Energy Star and LEED)?	No	extra $1.00/watt
...Size basis is capped at 3.6 kW for residential customers)	$ 5,000.00	Total
	$ 2.00	per watt

Total Installed Cost	$ 23,125
Rebate	$ 5,000
Tax Incentives	$ 3,000
...ystem Cost after rebate and $3,000 in federal and state tax incentives	$15,125

How much do you think that the price of electricity will increase each year? (default is 5%)	5%	
Estimated Simple Payback (assuming optimal production)	18	Years
Estimated Rate of Return (assuming optimal production)	4.0%	

How else can I save energy at my home?

Check out www.masssave.com for more energy saving tips and rebates.

http://www.masstech.org/rebate

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FOR BEST RETURNS: COMPREHENSIVE APPROACH TO ENERGY SAVINGS

- All MTC DG Renewable Energy Programs have an energy efficiency requirement (**at a minimum get your home or facility audited**):
  - www.masssave.com
  - www.nstaronline.com/your_business/



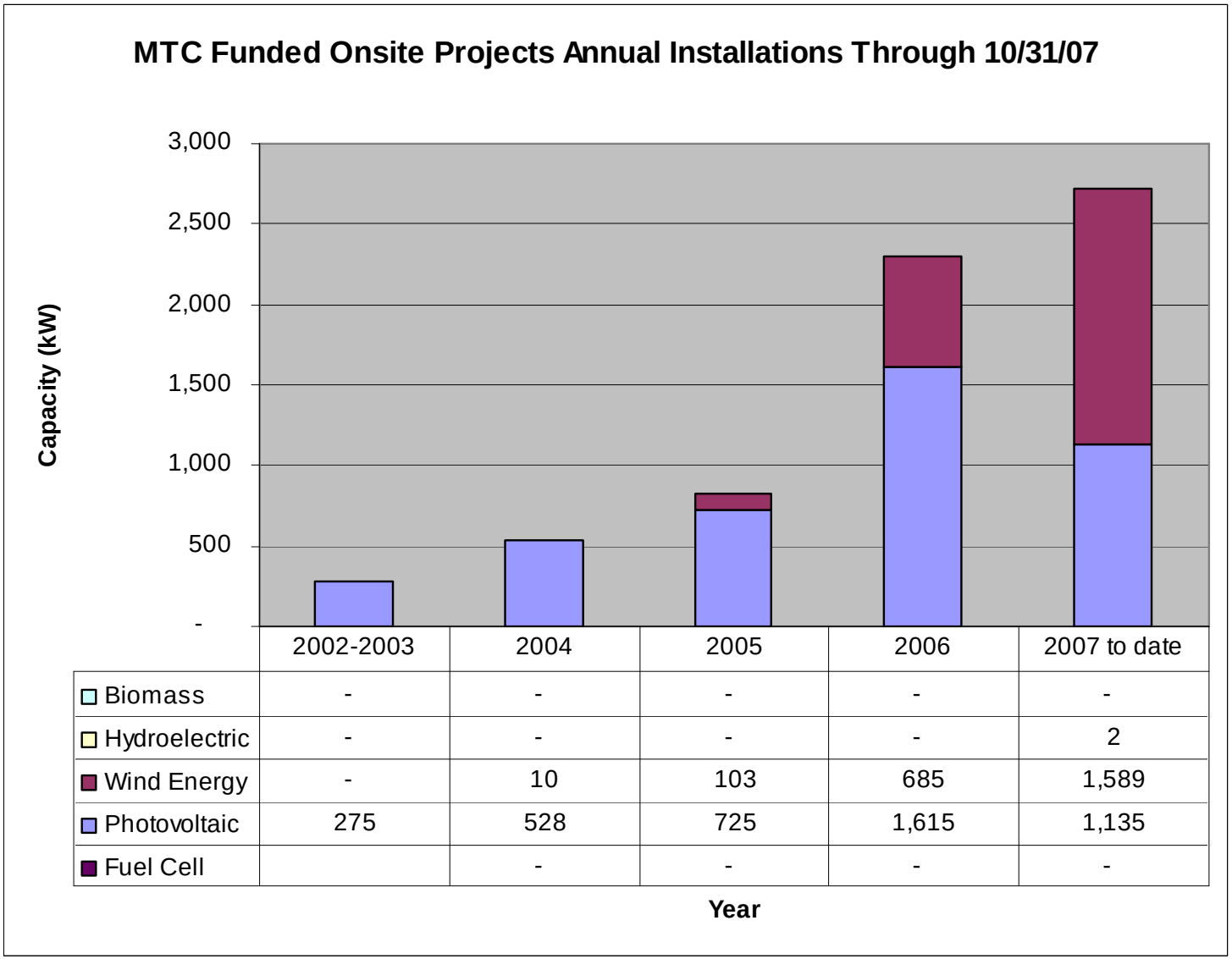






MTC SUPPORTED DG INSTALLATIONS*

*Does not include ~90 MW of MTC supported installed wholesale projects



	2002-2003	2004	2005	2006	2007 to date
Biomass	-	-	-	-	-
Hydroelectric	-	-	-	-	2
Wind Energy	-	10	103	685	1,589
Photovoltaic	275	528	725	1,615	1,135
Fuel Cell		-	-	-	-



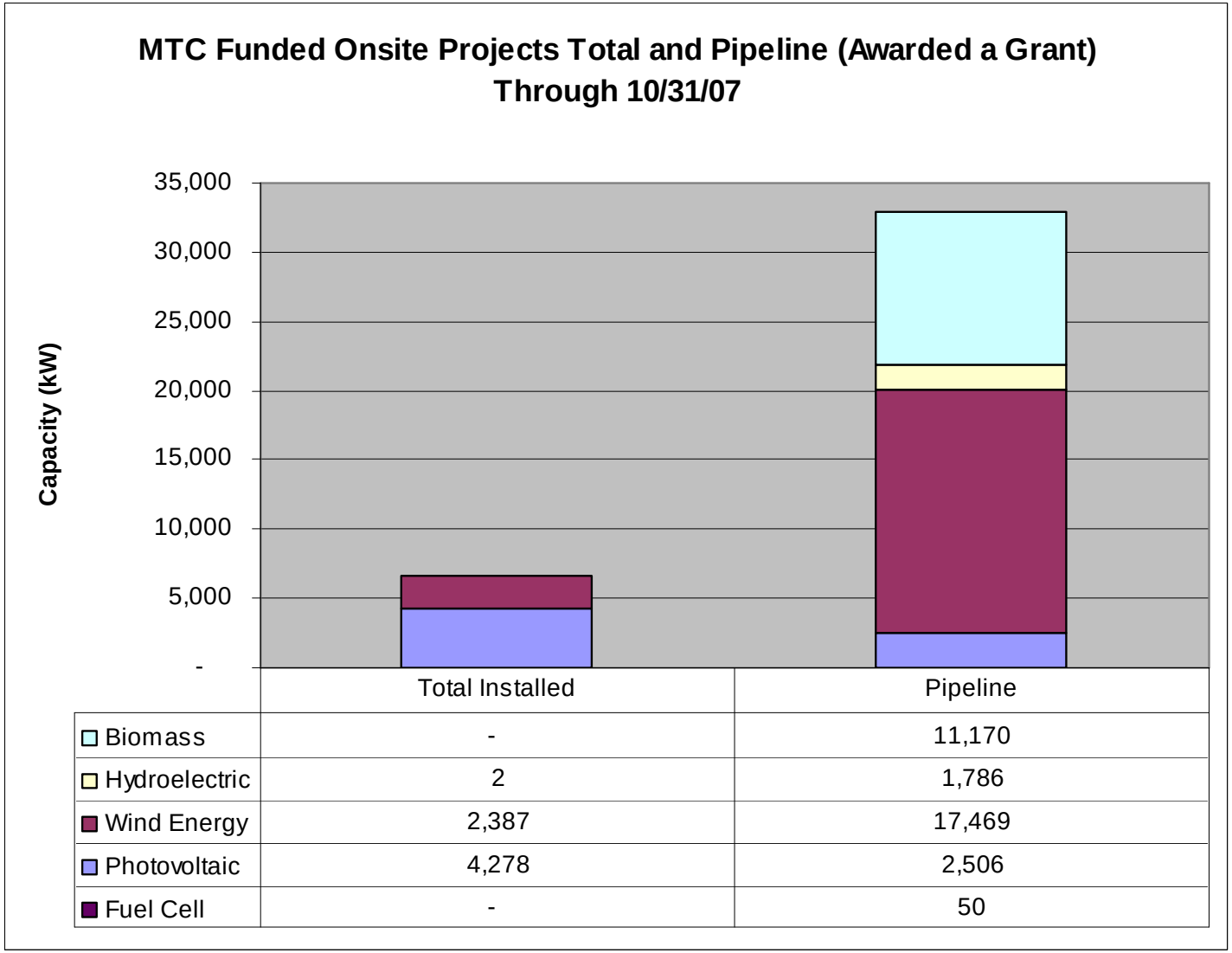






MTC SUPPORTED DG PIPELINE*

*Does not include ~800 MW of MTC supported wholesale projects under development



	Total Installed	Pipeline
Biomass	-	11,170
Hydroelectric	2	1,786
Wind Energy	2,387	17,469
Photovoltaic	4,278	2,506
Fuel Cell	-	50







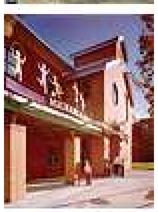
MTC SUPPORTED DG PIPELINE

Tech.	Pipeline (32+ MW)
Solar	▪ 1,000+ kW of residential projects in queue (2007) ▪ 1,500+ kW of greater than 10 kW in queue (2007) ▪ Launch of Green Schools and Green Affordable Housing Initiatives
Wind	▪ Varian (Gloucester), Webb Research (Falmouth), Forbes Park (Chelsea), Williams Stone (Otis), City of Hanover, J. Cashman (Quincy), and Holy Name H.S. (Worcester), Fairhaven, etc. installed by end of 2008? ▪ Heifer International (Rutland) and Bartlett Farms (Nantucket) developing 80 larger scale onsite wind projects ▪ 300+ kW of 10 kW or less in cue
Biomass CHP	▪ Iggy's Bread of the World (Cambridge, 45 kW biodiesel CHP), Allston Brighton Community Development (Boston, 40 kW biodiesel CHP), and Cooley Dickinson (245 KW, biomass CHP) by 2008 ▪ Berkshire Biodiesel developing larger scale Biodiesel CHP ▪ Several farms in development phase for digester gas projects, including Pine Island, Jordan Dairy Farms, and Mapleline Farms.
Hydro	▪ Alternatives Unlimited (Whittinsville, 45 kW) in 2007 ▪ Maynard Mills, Crane and Co, and Starett in permitting phase ▪ 2 kW of 10 kW or less in cue (2007)









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CASHMAN









COMMONWEALTH SOLAR: HOW TO APPLY?

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

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









HOW TO APPLY

- Step 1: Determine Eligibility
- Step 2: Educational Resources/ Self Assessment
- Step 3: Estimate Rebate
- Step 4: Find an Installer









HOW TO APPLY

- Step 5: Application
  - Administrative and Technical Components
  - Installers must meet MTC insurance requirements
  - Installer Takes the Lead on Application
  - Project must meet minimum performance standard (80% of optimal for solar, 10% capacity factor for wind)









HOW TO APPLY

- Step 6: Install and Interconnect
  - Install to MTC minimum technical standards:
    - http://www.masstech.org/rebates/
  - Interconnect through local utility
  - Notify MTC of completion
- Step 7: Receive Rebate
  - 100% paid upon interconnection and satisfaction of requirement