Creating A Cleaner Energy Future For the Commonwealth

Solar PV Financing Webinar for Massachusetts Financial Institutions

January 31, 2013

Thank you for joining us.
The webinar will start in a few minutes.

Agenda

- **Welcome and Introduction** *(Sarah Cassanego, DOER)*
- **Feedback from banker's survey** *(Lise Dondy, ICF)*
- **Commercial and Residential Cash Flows** *(Lise Dondy, ICF)*
- **Solar Project Costs — Introduction to Solar Systems** *(Matt Arner, Solar Flair)*
- **Solar Project Revenues— Tax Credits, SRECS and Incentives** *(Elizabeth Kennedy, MassCEC and Sarah Cassanego, DOER)*
- **Q&A**

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Goals for This Webinar

- Rooftop Solar Challenge goal to develop alternative financing options for solar PV
- Provide useful information to lenders about solar projects and their costs
- Provide details about solar project revenues; tax credits, SRECs and incentives

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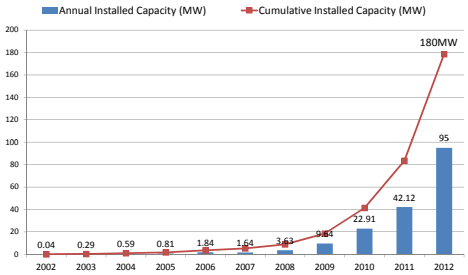
Installed Solar Capacity in MA (as of 11/28/12)



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MA Compared to Other States

- As of July 1, 2012 – 3rd in commercial installations and 5th in residential installations
- 2nd lowest weighted average commercial installation costs
- 340 of 351 municipalities have at least one state-supported solar installation
- Will likely move into top ten states with most installed capacity by the end of 2012
  - More capacity installed in 2012 than all previous years combined

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Contact Information

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Solar PV Financing Survey Findings

Solar PV Financing Webinar for Massachusetts Financial Institutions

Lise Dondy, ICF International

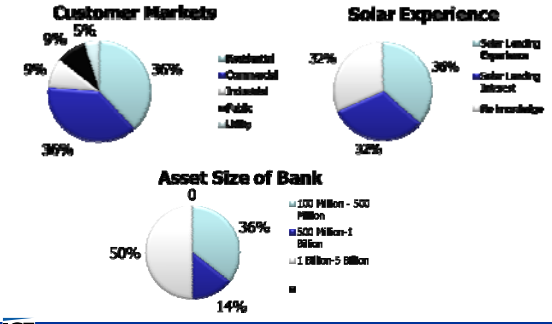
January 2013

Purpose of Solar PV Lending Survey

The questions were designed to:

- Gauge the experience level and interest
- Understand familiarity and confusion with policies and incentives
- Understand concerns about solar lending
- Receive suggestions on information and programs to increase solar lending

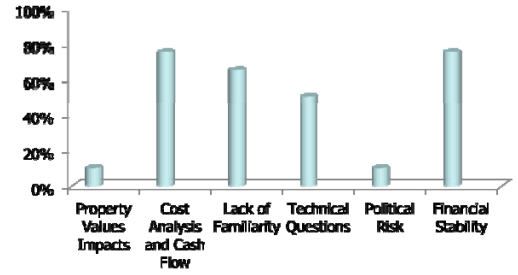
Interviewee Profiles: 22 Interviewees



Interviewees' Solar Loan Terms

- **Commercial Loan Terms**
  - Collateral –
    - Real Estate;
    - Solar System equipment;
    - Assignment of RECs and Net-metering;
    - Personal guarantees;
    - Cash flow of energy generation and sale
- **Residential Loan Terms – typically home equity loan**
- **Profitable Loan terms: Less than 10 years; Interest rates – 4-6 %**

Main Concerns and Barriers to Solar PV Lending



Main Concerns and Barriers to Solar PV Lending

- **Property Values (residential)**
  - Concern over resale value of the home with PV system.
- **Cost Analysis and Cash Flow**
  - Unclear collateral in solar system and energy generation.
  - Multiple layers of incentives .
  - Lack of case studies and documented experience on cash flow and timing.
  - Few borrowers can meet underwriting requirements.

Main Concerns and Barriers to Solar PV Lending

- **Lack of Familiarity**
  - Newness and unfamiliarity in bank community.
  - Lack of borrower knowledge about intricacies with permitting, interconnection, structural requirements, and underwriting criteria.
- **Technical Questions**
  - Life of the system and panels; technology, infrastructure components, warranties, and interconnection issues, etc.
- **Governmental Risk**
  - Federal and state incentives affected by changing policies.
- **Stability**
  - Programs and incentives are changing (i.e. SRECs and net metering)

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Commercial Cash Flow Analysis

- **Project Costs (blue)**
  - **Project Size**
  - **Project Cost**
- **Revenues (green)**
  - **Tax Credits**
  - **SREC Proceeds**
  - **Electricity Savings**

Owner Name				
Solar System Project	40	low system	Cost per KWT	
			4200	
Cost	$168,000			
Less tax credit	$50,400	30% of cost		
Net Cost	$117,600			Monthly Cost (Revenue)
		Loan Rate	loan term - months	
		4.25%	84	
Monthly Loan Pmnts	$1,621	Farm Credit East		$1,621
Total of payments	$136,165.69		45	
SREC Proceeds (yrs)		($12,825)	SREC*	
7	($89,775)	Min. $300/SREC)	annual	($1,069)
		$285	10 years total	
Net costs	$46,391		*SREC: Solar Renewable Energy Credit	
Less:				
Electricity savings		45,427	kwh production	
$6,360	($44,519)	0.14	price/kwh	($530)
(per year)		Solar System Production		
		3.12	kwh production/day-average	
Net costs	$1,872	124.8	total (x system kw)/day	
		45,427	kwh/year	
Deprec expense	($29,400)	25.00%	tax rate	
Net costs	($27,528)	($3,932.57)	per year cost	$22

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Solar Systems 101

SolarFlair Project in Westboro MA

Presented by:

Matt Arner

President

solarflair
CLEAN ENERGY SOLUTIONS

Solar panel technologies

- Photovoltaic (PV) or Solar Electric
  Produces only electricity

- Solar Hot Water
  Produces only solar hot water

Typical size of PV systems

- Residential:
  Turnkey cost $20,000
  System size 5 kW
- Small Commercial:
  Turnkey cost $1,000,000
  System size 300 kW
- Large Commercial:
  Turnkey cost $3,000,000
  System size 1000 kW or 1 MW

Typical Residential PV systems

Holden, MA

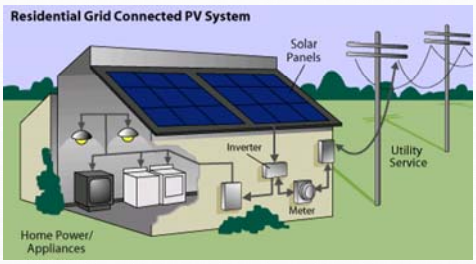
Typical Small Commercial System

Leominster, MA

Typical Large Commercial System

Charlton, MA

How do solar PV systems work?



Major Components

- Solar Panels

- Racking

Major Components

- Inverters

- Production Meter

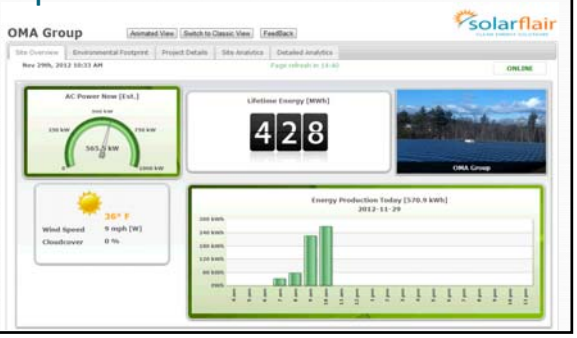
Warranties

- System Warranty:
  - Provided by solar installer
  - Typically 1-5 years
  - Covers parts and labor
- Manufacturer's Warranties:
  - Solar Panels: 25 years is industry standard
  - Inverters: 5-10 years with extended warranties available for a fee
  - Racking: Typically 25 years

Operations and Maintenance

- Panels automatically turn on and off
- Rain keeps the panels clean
- Panels have no moving parts and require little maintenance. One annual inspection by the installer is recommended.
- Remote monitoring allows easy verification of system performance

Operations and Maintenance



Certification of solar installers

- Solar PV systems must be installed by a licensed Massachusetts electrical contractor.
- Verifying NABCEP certification of individuals is an easy way to verify that a solar installer is qualified to design and install solar projects.

Permitting

Solar PV Systems must obtain the following permits:

- Municipal building permit
- Municipal electrical permit
- Utility Interconnection Agreement

Contact Information

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CLEAN ENERGY SOLUTIONS

Massachusetts Clean Energy Center

Elizabeth Kennedy
Director, Solar PV Programs

MASSACHUSETTS CLEAN ENERGY CENTER

Never Been a Better Time for Solar

High electricity prices + Reduced Solar PV Costs +
Numerous Incentives = Economical solar projects

Incentives
Low/No money down options
Tax Incentives
Rebates from MassCEC
SREC Sales
Net Metering

www.house-power.com/blog/wp-content/uploads/2009/12/iStock_000009001180XSmall.jpg

Ownership Models

- Outright purchase
- Power Purchase Agreement (PPA)
- Lease

Referred to as 3rd Party Ownership

Tax Incentives in Massachusetts

Tax Incentives	Value	Eligible Project Owners
Investment Tax Credit (ITC)	30% Installed Cost	Commercial Only
Accelerated Depreciation (MACRS)	5 year schedule with 50% bonus depreciation	Commercial Only
Equipment Sales Tax Exemption	100% Exemption	Commercial & Residential
Property Tax Exemption	100% Exemption for 20 years (if applicable)	Commercial & Residential
Residential Renewable Energy Tax Credit	30% Installed Cost	Residential Only
Income Tax Credit	15% Installed Cost up to $1,000	Residential Only

MassCEC Rebates

- Any eligible PV system ≤ 15kW, rebate paid on first 5kW
- Rebate ranges from $2,000 to $4,250 for 5kW system
- Average rebate covers ~7% of installed cost

Block 13 Rebate Levels ($ per watt (DC @ STC))	
Base Incentive	$0.40
PLUS:	
Massachusetts Company Component Adder	$0.05
Moderate Home Value Adder OR Moderate Income Adder ≤ 120% of MA median income (only residential projects eligible)	$0.40
Natural Disaster Relief Adder	$1.00

Go to www.MassCEC.com/solar to learn more.

MassCEC Rebates (cont.)

Moderate Home Value Adder Criteria

County	Property Value
Berkshire, Franklin, Hampden, and Hampshire	≤ $300,000
Bristol, Suffolk, Worcester	≤ $350,000
Barnstable, Duke, Essex, Middlesex, Nantucket, Norfolk, and Plymouth	≤ $400,000

Moderate Income Adder Criteria

Income Category	Income Levels
Individual Income	≤ $75,810*
Domestic Unit Income	≤ $95,420*

* 120% of median household income as determined by the US Census Bureau

MassCEC Rebates (cont.)

- Minimum Technical Requirements
  - Equipment must meet certain standards
  - Required warranties
    - Panels have 20 year warranties
    - Inverters have 10 year warranties
    - 5 year workmanship warranty
  - 80% of optimal system production
- Insurance
  - Incumbent on host customer to verify Installer insurance
- Tax Questions
  - MassCEC will issue 1099s to all System Owners
  - Consult tax advisor with any questions about rebate taxability or other incentives

Assumptions: Simple Solar Ownership Model

Assumptions	
Size:	5 kW (5,000 watts)
Panel Degradation:	1% Annually
Electricity Price:	$0.15/kWh
Electricity Price Escalator:	3% Annually
Life of System:	20 years
SREC Value:	$285.00
Timeline for SREC Sales:	10 years
Income Tax Rate:	28%
Discount Rate:	7.5%

* Assumes qualification for the base rebate incentive and is eligible for federal and state tax incentives.

Disclaimer: This financial analysis is only an estimate. Actual installed costs, savings, and revenues are subject to change and will be specific to individual projects.

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Simple Solar Ownership Model

	State Average Price	Final Solarize Price*
Dollar Per Watt Cost	$ 5.00	$ 3.91
Total Installation Cost	$ 25,000.00	$ 19,550.00
CSII Rebate (base of $0.40/watt)	$ (2,000.00)	$ (2,000.00)
Total Upfront Cost	**$ 23,000.00**	**$ 17,550.00**
Federal Tax Credit (30% of cost)	$ (6,900.00)	$ (5,265.00)
MA Tax Credit	$ (1,000.00)	$ (1,000.00)
Total After Tax Credits	**$ 15,100.00**	**$ 11,285.00**
NPV SREC Income (over 10 yrs)	$ (7,714.24)	$ (7,714.24)
NPV Electricity Savings (over 20 yrs)	$ (10,073.75)	$ (10,073.75)
Net Project Cost	**$ (2,687.99)**	**$ (6,502.99)**
Payback after rebate & tax credits	**7-8 years**	**5-6 years**

Disclaimer: This financial analysis is only an estimate. Actual installed costs, savings, and revenues are subject to change and will be specific to individual projects.
** Does not include price adders that may apply.*

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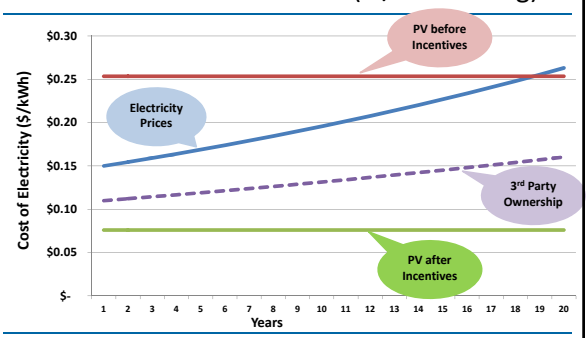
Levelized Cost of Solar PV (w/o Financing)



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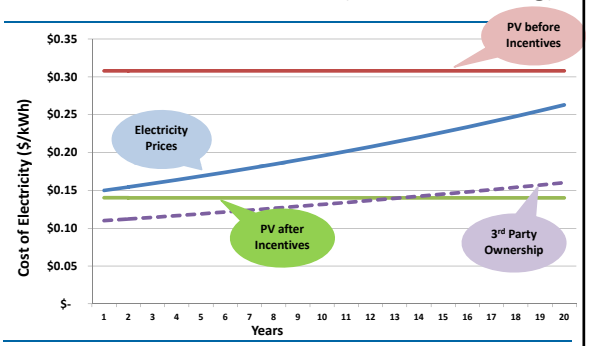
Levelized Cost of Solar PV (w/ 5% Financing)



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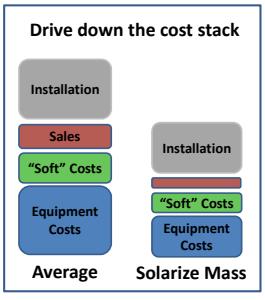
Goals of Solarize Mass

- Increase education through community outreach
- Introduce model to simplify process
- Reduce installation costs
- Reduce time to contract



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2012 Solarize Massachusetts Basics

- 17 Green Communities
- 8 Installers
- Tier Pricing (based on contracted capacity)

Tier 1	Tier 2	Tier 3	Tier 4	Tier 5
1 kW-25 kW	>25 kW-50 kW	>50 kW-150 kW	>150 kW-250 kW	250 kW+

- Limited time offer – Sign Ups through **Nov 4, 2012**

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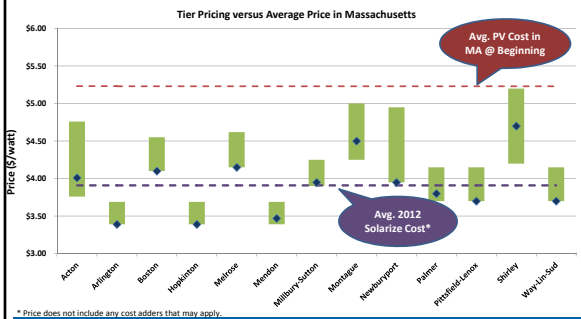
Solarize Mass Pricing



* Price does not include any cost adders that may apply.

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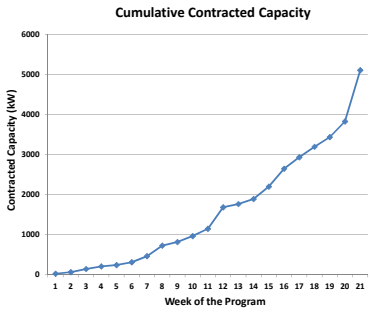
Solarize 2012 Final Metrics

Total Number Of:	
Leads Generated	5,405
Contracts Signed	803
Contracted Capacity (kW)	5,146
Communities at Tier 5 Pricing	10



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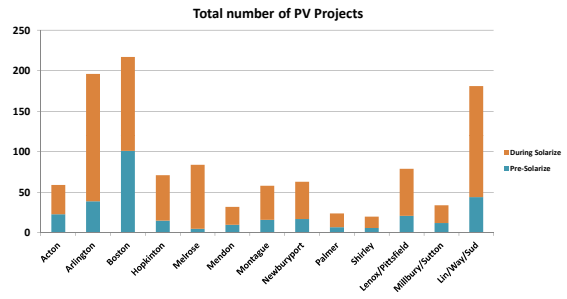
Total number of Projects more than DOUBLED



Thank you!

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DOER Massachusetts Department of Energy Resources

Solar Project Revenues

Net Metering
&
Solar Renewable Energy Certificates(SRECs)

Sarah Cassanego, *Solar Coordinator*

Solar Projects Earn Revenue By…

Generating electricity (net metering)

Generating environmental benefits (SRECs)

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Net Metering

Net Metering: Basic Concept

- Net metering is an incentive program to encourage customers to install distributed generation
  - Customers offset own electricity usage
  - Customers are compensated for any electricity they generate and don't use

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Net Metering: Basic Concept (Cont.)

- If consumption exceeds generation, customer pays for net kWh consumed
- If generation exceeds consumption, customer receives credit on bill for net excess generation

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Who offers net metering?

- Investor-owned utilities (NSTAR, National Grid, WMECO, Unitil) are required to offer net metering
- Municipal utilities are not required
- Need to know who the electricity provider is to your project

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Net Metering Example: Solar PV Facility on School

- PV System generates 60,000 kWh/month
- School months
  - Electricity usage = 80,000 kWh
  - School is charged for 20,000 kWh
- Summer months
  - Electricity usage = 10,000 kWh
  - School is credited for 50,000 kWh

= Excess Generation

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Key Question: How Much Net Metering in MA?

- Statute:
  - 3% cap on "private" projects
  - 3% cap on "public" projects

Increased as of 8/3/12

- Caps are based on the distribution company's peak demand
- Net metering queue now in place
- Small net metering systems are exempt from the net metering caps

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DOER Massachusetts Department of Energy Resources

Solar Renewable Energy Certificates (SRECs)

How does it work?

- MA program to pay renewable project owners for environmental benefits
- Renewable Portfolio Standard (RPS)
  - Electricity generators ("compliance entities") must obtain % of load from renewables
  - Meet this obligation by purchasing Renewable Energy Certificates (RECs)
  - Solar Carve-Out Program (2010) – part of obligation must come from solar (purchase of SRECs)

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Example: Typical Residential Project

- 5kW system generates 6,000 kWh per year
- 1 SREC = 1,000 kWh or 1MWH
- This project generates 6 SRECs every year
- System owner sells SRECs to compliance entities (often through an SREC aggregator)

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Solar Carve-Out Program: Basics

- Program is **market-based**, i.e. SREC price is not set by regulation
- **Alternative Compliance Payment (ACP)** amount = effective SREC ceiling price
- SRECs "good" for **one compliance year**
- Unsold SRECs can be placed into the **Auction** – if sold, seller receives price of $285

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The Auction: Clearing Up Misconceptions

- Takes place once a year
- $285 is the auction price – not a set floor price for the market
- If projects want quarterly revenue from SRECs, sell on the spot market, receive whatever price the market sets (higher or lower than $285)
- If projects wait until the end of the year, they can sell SRECs through auction at $285

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Review of Program Design Features

- **Adjustable Minimum Standard** - obligation amount for compliance entities adjusts each year
- **Alternative Compliance Payment** – effective "ceiling price", ten-year rate schedule
- **Auction**
  - Designed to clear unsold SRECs
  - Price of $285

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Other Solar Carve-Out Facts

- SRECs are minted on a quarterly basis
- Solar Carve-Out Program designed to incentivize up to 400MW of solar development
  - About 160 MW currently installed and qualified
  - Expect to reach 400 MW in 2-3 years = 6,000-7,000 projects, 80% residential and small commercial
- Fully expect industry to continue growing beyond 400 MW, hope to expand program

Questions?

DOER Solar Carve-out Website: www.mass.gov/energy/rps then click on "RPS Solar Carve-out"
Contact: DOER.SREC@state.ma.us
or 617-626-7300

DPU net metering FAQ: http://www.mass.gov/eea/grants-and-tech-assistance/guidance-technical-assistance/agencies-and-divisions/dpu/net-metering-faqs.html
Contact: Nathan Phelps, (617) 305-3707

Q & A

The webinar slides will be posted on DOER's Rooftop Solar Challenge website:
http://www.mass.gov/eea/energy-utilities-clean-tech/renewable-energy/solar/sunshot-rooftop-solar-challenge.html

Appendix

Addressing Common Myths and Questions

- What triggers the volatility in pricing of SREC?
- Is the SREC price guaranteed for 10 years?
- How long can you count on the SREC price?
- Is there a floor on the SREC price?
- How long do you have to wait for SREC payments once solar system is operational?

Key Question: What can a Host Customer do with Net Metering Credits?

- Option 1
  - Use the credit for the Host Customer's electric bill
- Option 2
  - Host Customer can allocate credits to different accounts (yours or other customers)
  - Thus, generation in one location can offset electricity costs in another location (a.k.a. virtual net metering)

SREC Adjustable Minimum Standard

- Yearly percentage obligation placed upon compliance entities
- Adjusted each August according to formula set in program regulation
- Formula for next year takes into account actual SREC volume from previous year and projected SREC volume for current year

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SREC Alternative Compliance Payment (ACP)

- Price RES's must pay for every MWh they are short of meeting their obligation
- 10-year forward rate schedule has been proposed to reduce market risk and uncertainty
- Will maintain current rate through 2013 before reducing by 5% annually

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SREC Opt-In Term

- Number of quarters a qualified project has the right to deposit SRECs into the Auction Account to be assured the floor price
- Term is currently 10 years but can be adjusted each July for subsequent qualified projects

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SREC Auction Mechanism

- Open every year from May 16th – June 15th
- Any unsold SRECs may be deposited
- Auction takes place no later than July 31st
- Deposited SRECs are re-minted as "extended life" SRECs (good for compliance in either of following two compliance years)
- SREC owners will be paid $285/MWh for each SREC sold through the auction

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Current SREC Program Statistics – 12/1/12

- Over 4,000 applications received
- Over 3,700 qualified units
- 155 MW qualified
- Nearly 138 MW of qualified projects installed
- 2,741 SRECs created in 2010
- 26,598 SRECs created in 2011
- More than 100,000 SRECs expected to be created in 2012

	Number of Systems	Capacity (MW)
Applications Received	4,086	164.4
Applications under Review	299	9.5
Applications Qualified	3,787	154.9
Qualified but Installation Incomplete	19	17.3
Qualified and Installed	3,768	137.6

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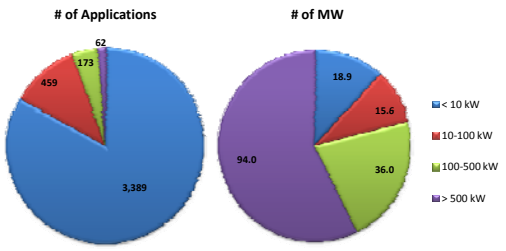
Current SREC Program Statistics – 12/1/12 Activity by System Size



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Frequently Asked Questions

- How long are SRECs good for?
  - SRECs must be sold by the end of the Compliance year. For example 2012 SRECs minted at NEPOOL GIS on either July 15, Oct 15, Jan 15 or April 15, 2013 must be sold by June 15, 2013, the end of the 2012 trading year at NEPOOL GIS.
  - Extended Life SRECs bought from the auction are valid for compliance for either two or three years, depending on the round of the auction in which they were bought.
- Why would someone buy at the Auction?
  - Purchasing SRECs in the auction gives a buyer flexibility to use the SRECs in one of the following two or three Compliance Years. Thus, it is a useful way to either hedge against or speculate on potential increases in SREC prices that may be seen in one of these years.
- What is the difference between MA market and the other SREC markets in the USA?
  - The Massachusetts market is unique from other markets because of the many design features that take into consideration market conditions and maintains a reasonable balance between supply and demand of SRECs. These features include the formula to appropriately adjust the minimum standard, the ability of projects owners to deposit unsold SRECs into the Auction and assurance of the auction price, the opt-in term and its ability to throttle project development, a 10 year forward ACP schedule, and the 400 MW program cap.

F.A.Q. continued…

- Why are SREC prices currently less than $285 on the spot market?
  - It appears the 2012 SREC market will be oversupplied; in an oversupplied market, prices will fall, in a short market, prices will tend towards the ACP rate. At the beginning of the 2012 trading season, some project owners may opt to sell their SRECs at prices being offered by buyers below the auction price, rather than waiting for the end of the trading season to have recourse of the auction and the auction price.
- How long will my project generate SRECs?
  - Your project will generate SRECs from the time it is qualified until the program ends.
- When does the program end?
  - After we have reached the program cap of 400 MW of qualified projects installed, DOER will determine and announce the remaining duration of the program, which will be equal to the longest remaining opt-in term. After this time, the qualified units will be merged with the RPS Class I program and thereby continue to generate Class I RECs.
- What happens after we reach 400 MW?
  - Newly built projects will not be eligible for the Solar Carve-out and qualified projects will continue to generate SRECs.