AGENDA

• Company Overview

• Program Overview
  • Benchmark Program Goals
  • Eligible Technologies
  • Key Metrics and Criteria

• SRECTrade Registration and Application Process

• Q&A
TRANSACTION & MANAGEMENT PLATFORM

• Since 2008
• 350+ MW under management
• 26,000+ facilities under management
• Largest 3rd Party SREC Aggregator in MA
• Brokerage model
Massachusetts RPS and APS Obligation (% of retail load)
<table>
<thead>
<tr>
<th>Compliance Year</th>
<th>APS Goal (% of retail electricity sales)</th>
<th>ACP Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>1.00%</td>
<td>$20.00</td>
</tr>
<tr>
<td>2010</td>
<td>1.50%</td>
<td>$20.00</td>
</tr>
<tr>
<td>2011</td>
<td>2.00%</td>
<td>$20.40</td>
</tr>
<tr>
<td>2012</td>
<td>2.50%</td>
<td>$21.02</td>
</tr>
<tr>
<td>2013</td>
<td>3.00%</td>
<td>$21.43</td>
</tr>
<tr>
<td>2014</td>
<td>3.50%</td>
<td>$21.72</td>
</tr>
<tr>
<td>2015</td>
<td>3.75%</td>
<td>$22.02</td>
</tr>
<tr>
<td>2016</td>
<td>4.50%</td>
<td>$22.00</td>
</tr>
<tr>
<td>2017</td>
<td>4.25%</td>
<td>$22.23</td>
</tr>
<tr>
<td>2018</td>
<td>4.50%</td>
<td>$22.64</td>
</tr>
<tr>
<td>2019</td>
<td>4.75%</td>
<td>TBD</td>
</tr>
<tr>
<td>2020</td>
<td>5.00%</td>
<td>TBD</td>
</tr>
</tbody>
</table>

*After 2020 Minimum Standard increases by 0.25% per Compliance Year*
APS PROGRAM OVERVIEW

1 MWh (3,412,000 BTU) = 1 Alternative Energy Credit (AEC)

Utilities purchase AECs to comply with APS Minimum Standard

**ACP rate caps the market**

Proceeds go to the facility owner
ELIGIBLE TECHNOLOGIES

- Renewable Thermal Generation Unit
  - Solar Thermal
  - Heat Pumps
  - Woody Biomass
  - Biogas
  - Liquid Biofuels
  - Compost Heat Exchange System
- Combined Heat and Power (CHP)
- Flywheel Storage Unit
- Fuel Cell
- Thermal Waste-To-Energy
ELIGIBILITY CRITERIA

- Generate useful thermal energy using sunlight, biomass, biogas, biofuel or naturally occurring temperature differences in ground, air or water
- Deliver a useful thermal load to a facility located in Massachusetts
- Have an operation date January 15th, 2015 or later
AEC MINTING PROCESS

Pre-minting
• All credits are minted upfront after first calendar quarter
• 10 years
• Only for small systems

Forward Minting
• Predetermined number of AECs minted on quarterly basis
• 10 years
• Only for small systems

Quarterly Minting
• AECs minted on a quarterly basis based on production metering (same as SREC program)
• Lifetime of system
• Intermediate/large systems

**If the APS market switches from being more than 25% undersupplied, to less than 25% undersupplied, pre-minting is replaced by forward minting**
## KEY METRICS AND CRITERIA: SYSTEM SIZE

<table>
<thead>
<tr>
<th>Size</th>
<th>Solar Thermal (Water)</th>
<th>Solar Thermal (Air)</th>
<th>Heat Pump (Ground &amp; Air)</th>
<th>Biomass</th>
<th>Biogas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>Collector surface &lt;=660 sq. ft.</td>
<td>N/A</td>
<td>Output capacity &lt;=134,000 Btu/hr</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Collector surface 660-4,000 sq. ft.</td>
<td>Collector surface &lt;=10,000 sq. ft.</td>
<td>Output capacity 134,000 – 1,000,000 Btu/hr</td>
<td>Output capacity &lt;=1,000,000 Btu/hr</td>
<td>Output capacity &lt;=1,000,000 Btu/hr</td>
</tr>
<tr>
<td>Large</td>
<td>Collector surface &gt;=4,000 sq. ft.</td>
<td>Collector surface &gt;10,000 sq. ft.</td>
<td>Output capacity &gt;1,000,000 Btu/hr</td>
<td>Output capacity &gt;1,000,000 Btu/hr</td>
<td>Output capacity &gt;1,000,000 Btu/hr</td>
</tr>
</tbody>
</table>

*Size bucket determines:* Minting process, metering requirements, AEC calculations, required documentation
HEAT PUMPS
HEAT PUMP ELIGIBILITY CRITERIA

Air Source

• **New construction** - Must supply 100% of a building’s total annual heat load
• **Existing construction** - Must supply at least 90% of building’s total annual heating and:
  • Be integrated to a heating distribution system,
  • Capable of distributing produced heat to all conditioned areas of the building
  • Have a heat-rate capacity at five degrees Fahrenheit that is at least 50% of the nameplate capacity of the existing heating source equipment

Ground Source

• All systems must supply 100% of a building’s total annual heat load

---

*Air Source: [All Eligibility Requirements](#); [APS Eligible Small Air Source Heat Pump Models](#)*
*Ground Source: [All Eligibility Requirements](#)*
<table>
<thead>
<tr>
<th>Building</th>
<th>Air-Source Heat Pump</th>
<th>Ground-Source Heat Pump</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building less than 1,500 sq. ft.</td>
<td>60 or 90 AECs (depends on heat load)</td>
<td>230 AECs</td>
</tr>
<tr>
<td>Building greater than 1,500 sq. ft.</td>
<td>3 + (2 * (Sq ft - 1,500/1,000)) * (multiplier)</td>
<td>(4.6 + (3.1 * (Sq ft - 1,500/1,000))) * 5</td>
</tr>
</tbody>
</table>

Source: [Guideline On Metering and Calculating Thermal Output for Small Systems](#)
Quarterly Minting

1 MWh = 1 AEC

**Deadline to receive retroactive credit is March 16th, 2018**

<table>
<thead>
<tr>
<th>Thermal Energy Production Period</th>
<th>Date AECs Issued</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1 (Jan to Mar)</td>
<td>July 15th</td>
</tr>
<tr>
<td>Q2 (Apr to Jun)</td>
<td>October 15th</td>
</tr>
<tr>
<td>Q3 (Jul to Sep)</td>
<td>January 15th</td>
</tr>
<tr>
<td>Q4 (Oct to Dec)</td>
<td>April 15th</td>
</tr>
</tbody>
</table>

Source: Guideline On Metering and Calculating Thermal Output for Intermediate/Large Systems
SOLAR THERMAL
**SOLAR THERMAL - SMALL SYSTEMS**

## Pre Minting

### Solar Thermal

<table>
<thead>
<tr>
<th>OG-100</th>
<th>( \frac{R}{1,000} \times C \times SOF \times S \times t )</th>
</tr>
</thead>
<tbody>
<tr>
<td>OG-300</td>
<td>( \frac{R}{1,000} \times SOF \times S \times t )</td>
</tr>
</tbody>
</table>

- **R** = Solar Collector Rating (kWh/panel/day or kWh/year)
- **C** = Number of solar thermal collectors
- **SOF** = Surface orientation factor
- **S** = Annual, average solar shading
- **T** = Time (3650 days or 10 years)

**Example:**
- **R** = 6.5 kWh/panel/day
- **C** = 4 panels
- **SOF** = 0.85
- **S** = 0.8
- **T** = 3650 days

\[
\frac{6.5}{1,000} \times 4 \times 0.85 \times 0.8 \times 3650 = 65 \text{ MWh} = 65 \text{ AECs}
\]
Quarterly Minting

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<tr>
<td>Q3 (Jul to Sep)</td>
<td>January 15th</td>
</tr>
<tr>
<td>Q4 (Oct to Dec)</td>
<td>April 15th</td>
</tr>
</tbody>
</table>

Source: Guideline On Metering and Calculating Thermal Output for Intermediate/Large Systems
BIOMASS AND BIOGAS
BIOGAS AND BIOMASS ELIGIBILITY CRITERIA

Emission performance standards
• “…emission performance standards that are protective of public health, including standards for eligible biomass, biogas and liquid biofuel technologies that limit eligibility only to best-in-class commercially feasible technologies, inclusive of energy conversion and emissions controls, with regard to reducing emissions of particulate matter sized 2.5 microns or less and carbon monoxide and other air pollutants;”

50% reduction in life-cycle GG emissions
• “a requirement of 50 per cent reduction in life-cycle greenhouse gas emissions compared to a high efficiency unit utilizing the fuel that is being displaced or, for a new load, a high-efficiency natural gas unit, if natural gas is available at reasonable cost to the site or otherwise the fuel that is most likely to be utilized;”

Fuel conversion efficiency performance
• “fuel conversion efficiency performance standards achievable by best-inclass commercially-feasible technologies;”

Sustainable forestry requirements
• “for forest-derived biomass, requirements that fuel shall be provided by means of sustainable forestry practices;”

Source: Guideline On Biomass, Biogas, and Biofuels for Eligible Renewable Thermal Generation Units
Quarterly Minting

<table>
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</tr>
<tr>
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<td>April 15th</td>
</tr>
</tbody>
</table>

1 MWh = 1 AEC

Source: Guideline On Metering and Calculating Thermal Output for Intermediate/Large Systems
SRECTRADING INVOLVEMENT

• DOER and NEPOOL Certification
  • Same timeline as SREC I and II (~2-3 months)
• Management Services
• Transaction and Settlement Services
## SRECTRADE FEES

<table>
<thead>
<tr>
<th>System Size (DC)</th>
<th>Client Fee</th>
<th>Partner Commission</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 kW – 50 kW</td>
<td>7.0%</td>
<td>3.0%</td>
</tr>
<tr>
<td>50 kW – 250 kW</td>
<td>4.5%</td>
<td>1.8%</td>
</tr>
<tr>
<td>250 kW – 500 kW</td>
<td>2.5%</td>
<td>0.9%</td>
</tr>
<tr>
<td>500 kW – 1 MW</td>
<td>1.5%</td>
<td>0.6%</td>
</tr>
<tr>
<td>1 MW+</td>
<td>1.0%</td>
<td>0.3%</td>
</tr>
</tbody>
</table>

**$2.50 minimum fee per AEC**
SRECTRADE APPLICATION - PAGE 2

Only for pre-certified systems
State Certification
Add/Review facility details for certification

Supporting Documentation

Required Paperwork

Registration Consent (MA) 
Choose File: No file chosen
This registration consent will allow SRECTrade to apply to the state and/or trading registry on your behalf. This must be signed by site owner.

AEC Service Agreement (MA) 
Choose File: No file chosen
Sign and download the AEC Service Agreement and then upload here.

MA APS Technical Worksheet (MA) 
Choose File: No file chosen
Please download, complete, and upload the template spreadsheet provided here.

Examples

Registration Consent (MA)
The registration consent will allow SRECTrade to apply to the state and/or trading registry on your behalf. This must be signed by site owner.

AEC Service Agreement (MA)
Sign and download the AEC Service Agreement and then upload here.

MA APS Technical Worksheet (MA)
Please download, complete, and upload the template spreadsheet provided here.
REQUIRED DOCUMENTATION

**Small Systems**
- Registration Consent
- AEC Services Agreement
- SRECTrade Technical Data Spreadsheet

**Intermediate/Large Systems**
- Registration Consent
- AEC Services Agreement
- Independent Verifier Request Form
- Process Flow Diagram with all APS Meters Shown
- One Line Electrical Diagram with all APS Meters Shown
- Metering Plan
- List of APS Meters
- System Information Data Sheet
- Equipment Arrangement Drawing
- General Site Plan
- Annotated Product Literature for all Major Equipment
- Annotated Product Literature for each APS Meter
- Annotated Product Literature for each DAS
- Description of System Controls and Sequence of Operations
- System Performance Workbook
- Certified Performance Data Construct
- MA APS Technical Worksheet
- SRECTrade MA APS Spreadsheet

**Residential biomass systems (intermediate) only need small system documentation + fuel supply plan**
**Instructions**

1. Fill out in order, from top to bottom
2. Use drop downs when available
3. Fill out ALL required fields
4. Make sure application status reads “Complete” before uploading
INDEPENDENT VERIFIER (IV)

- Essentially replaces PTS for the entity that reports to NEPOOL
- “The duty of the IV is to access/read the output of each meter of the unit, assure itself that the reading is reasonable, and accurately report the generation of the unit to the NEPOOL GIS (GIS) on a quarterly basis.”

**Required:** All intermediate and large Generation Units

**Not required:** Small systems and biomass systems <134 BTU/hr (intermediate biomass) use MassCEC as IV → IV field not required on app

- Independent Verifier Request Form
- List of Approved Independent Verifiers
Example Facility 2

**Net Sales**
$162,525.20

**SREC Information**

<table>
<thead>
<tr>
<th>Generation</th>
<th>Available</th>
<th>Markets</th>
<th>Min Price</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015/06</td>
<td>82 of 82</td>
<td>MA2015</td>
<td>$200.00</td>
<td>Available for sale</td>
</tr>
<tr>
<td>2015/05</td>
<td>92 of 92</td>
<td>MA2015</td>
<td>$200.00</td>
<td>Available for sale</td>
</tr>
<tr>
<td>2015/04</td>
<td>68 of 58</td>
<td>MA2015</td>
<td>$200.00</td>
<td>Available for sale</td>
</tr>
<tr>
<td>2014/05</td>
<td>31 of 51</td>
<td>MA2014</td>
<td>$200.00</td>
<td>Available for sale</td>
</tr>
</tbody>
</table>

**Future minimum SREC price**
$200.00

**SREC Options**

- **Managed Sales**: You are not enrolled. Enroll now.
- **Contracts**: You are not engaged in any forward SREC contracts.

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## Example Facility 3

### Transaction Summary

<table>
<thead>
<tr>
<th>Transaction Date</th>
<th>SREC</th>
<th>Quantity</th>
<th>Net Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mar 04, 2015</td>
<td>2015/01</td>
<td>1</td>
<td>$156.23</td>
</tr>
<tr>
<td>Jan 06, 2015</td>
<td>2014/11</td>
<td>1</td>
<td>$195.30</td>
</tr>
<tr>
<td>Nov 21, 2014</td>
<td>2014/09</td>
<td>1</td>
<td>$186.00</td>
</tr>
<tr>
<td>Nov 21, 2014</td>
<td>2014/08</td>
<td>1</td>
<td>$186.00</td>
</tr>
<tr>
<td>Nov 21, 2014</td>
<td>2014/07</td>
<td>1</td>
<td>$186.00</td>
</tr>
<tr>
<td>Nov 21, 2014</td>
<td>2014/06</td>
<td>1</td>
<td>$186.00</td>
</tr>
<tr>
<td>Nov 21, 2014</td>
<td>2014/05</td>
<td>2</td>
<td>$372.00</td>
</tr>
<tr>
<td>Sep 12, 2014</td>
<td>2014/04</td>
<td>1</td>
<td>$162.75</td>
</tr>
<tr>
<td>Aug 19, 2014</td>
<td>2014/02</td>
<td>1</td>
<td>$158.10</td>
</tr>
<tr>
<td>Aug 19, 2014</td>
<td>2013/12</td>
<td>1</td>
<td>$158.10</td>
</tr>
<tr>
<td>Aug 19, 2014</td>
<td>2013/10</td>
<td>1</td>
<td>$158.10</td>
</tr>
<tr>
<td>Aug 19, 2014</td>
<td>2013/05</td>
<td>1</td>
<td>$158.10</td>
</tr>
</tbody>
</table>

### Payment Preference

- **Bank Name**: Example Bank
- **Account Holder Name**: Example
- **Account Type**: Checking
- **Account Number**: ****000
- **Routing Number**: ****000

### Transaction Statements

View transaction statements for this facility

Show statements
QUESTIONS?

System Owners:
clientservices@srectrade.com
415-763-7732 ext. 1

Installers:
installers@srectrade.com
415-763-7732 ext. 2