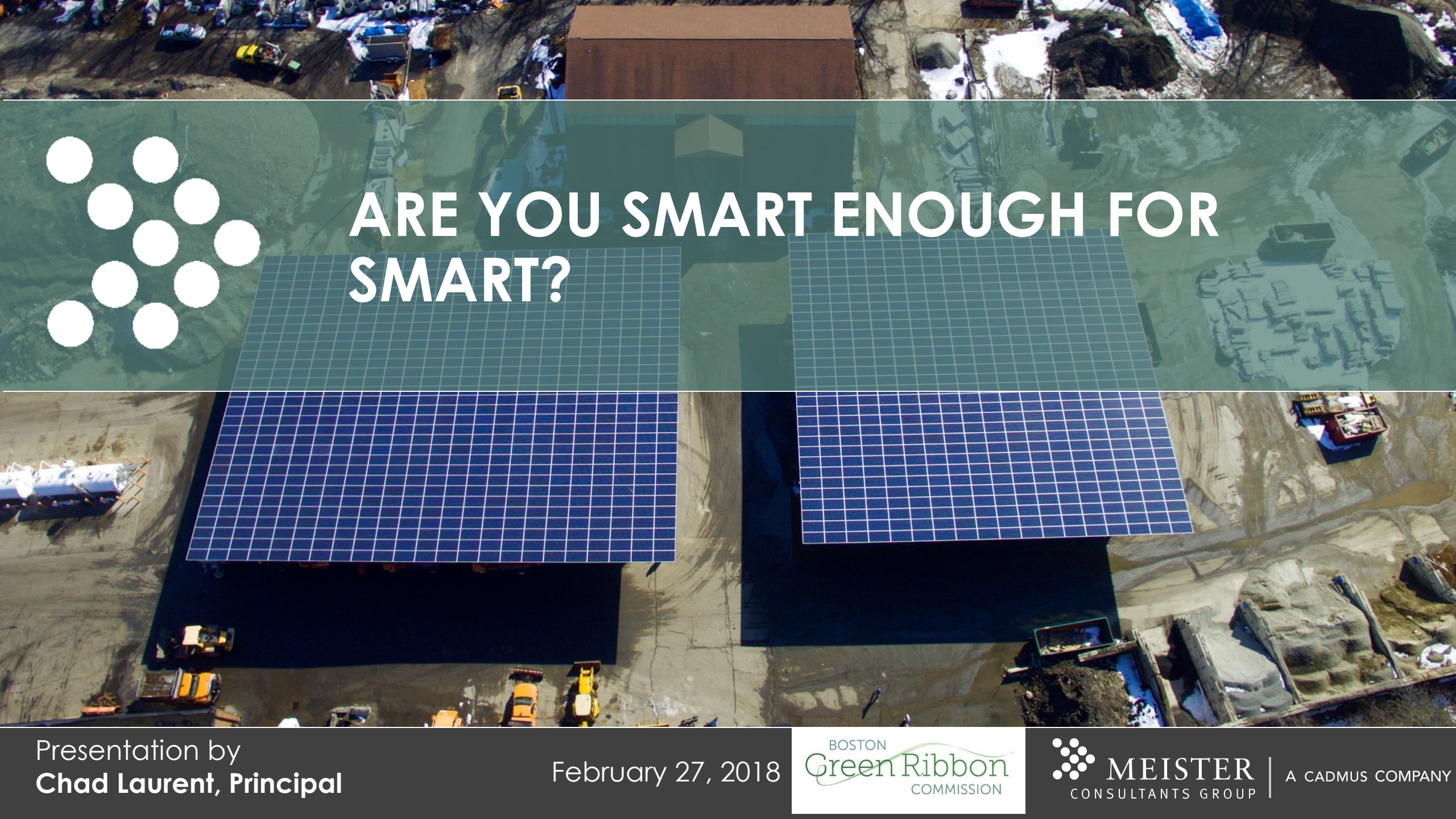

ARE YOU SMART ENOUGH FOR SMART?

Presentation by
Chad Laurent, Principal

February 27, 2018

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Overview - Solar Massachusetts Renewable Target (SMART) Program

- Summary: **Tariff-based incentive program** that replaces SREC II.
  - Designed to offer **long-term, stable incentive** rates.
  - Goal to provide incentives for the next 1,600 MW, **doubling to 3,200 MW.**
  - Focus on **rooftop and previously developed** sites.
- Price:
  - Competitive **auction** process **sets the base** price for each service territory.
  - Eligible for a **base price**, **plus the adders** of X cents/kWh (and subtractor for greenfield location).
- Other Program Terms:
  - **Fixed amount based on production**, similar to a feed-in tariff for standalone facilities.
  - **Agreement with investor-owned utilities** for 20-year term for large facilities (or 10-year term for small facilities).

SREC II vs SMART Program

» The two solar incentive programs **differ in the form, value, and term structure of incentive** received by a participant.

	SRECII	SMART
Form	Produces **tradeable commodity** ('SREC') that is sold to electricity suppliers outright or in an auction.	**Compensated at a rate that includes an incentive** in addition to energy value.
Value	SREC **value fluctuates based upon market conditions**, but has an auction floor price.	Behind-the-meter units receive **fixed incentive** rates; standalone units receive **fixed compensation** rates.
Term Structure	Systems produce **auction-eligible SRECs for 10 years**	Systems **above 25 kW** receive incentive payments for **20 years**. Systems **below 25kw** receive incentive payments **10 years.**

Sources: Massachusetts Department of Energy Resources. (2017). Solar Massachusetts Renewable Target (SMART) Final Program Design. http://www.mass.gov/eea/docs/doer/rps-aps/final-program-design-1-31-17.pdf
Energy Sage. Solar Massachusetts Renewable Target (SMART): Massachusetts' SREC II replacement program. 2017. https://news.energysage.com/solar-massachusetts-renewable-target-smart-massachusetts-srec-replacement-program/

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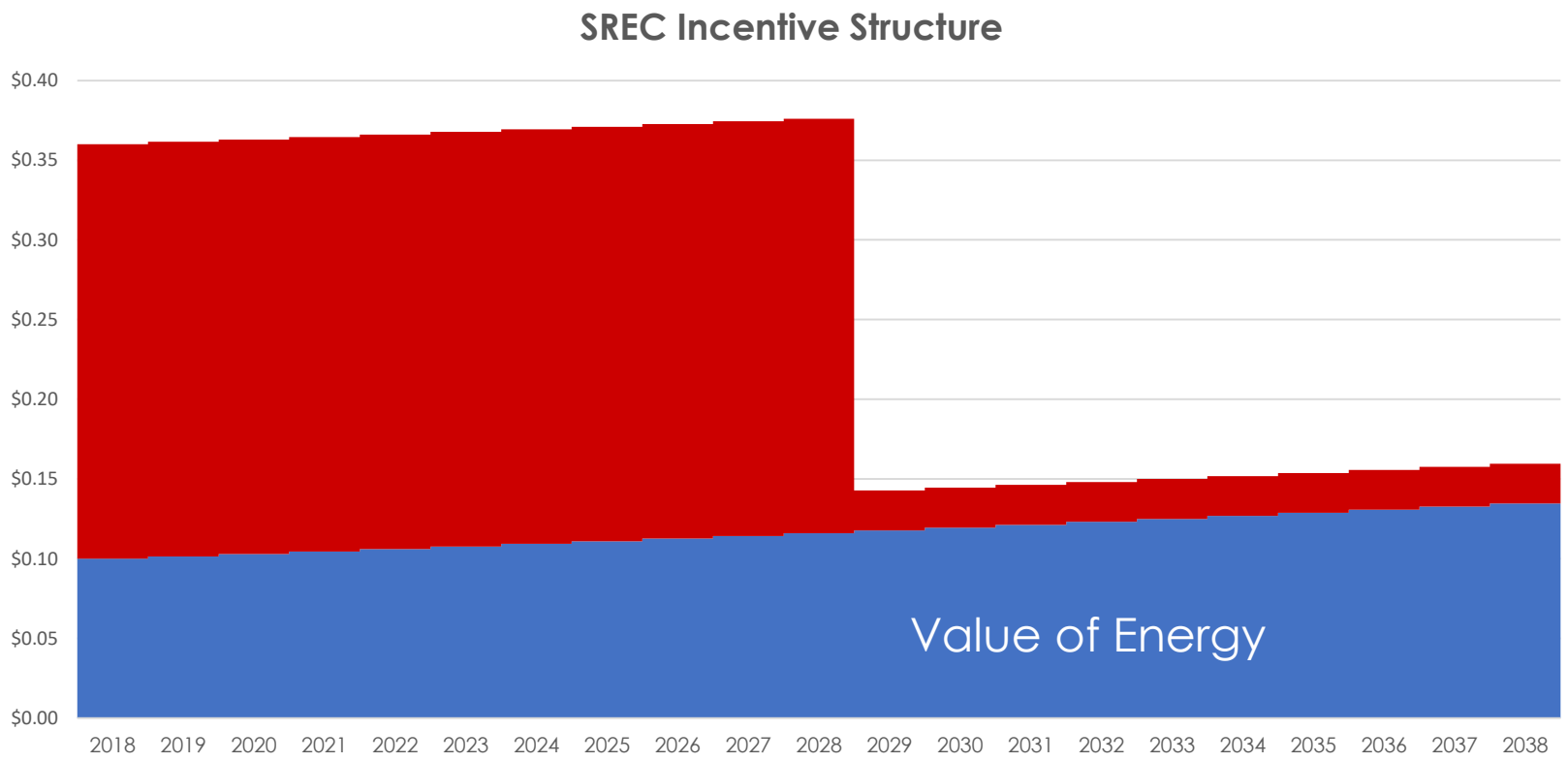
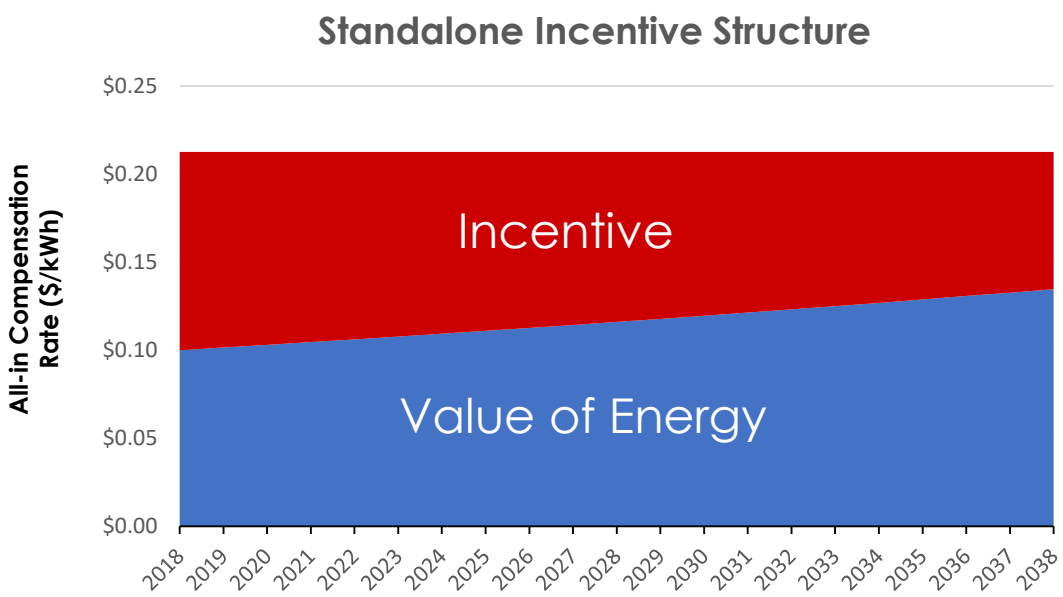
Incentives Over Time – SREC Structure



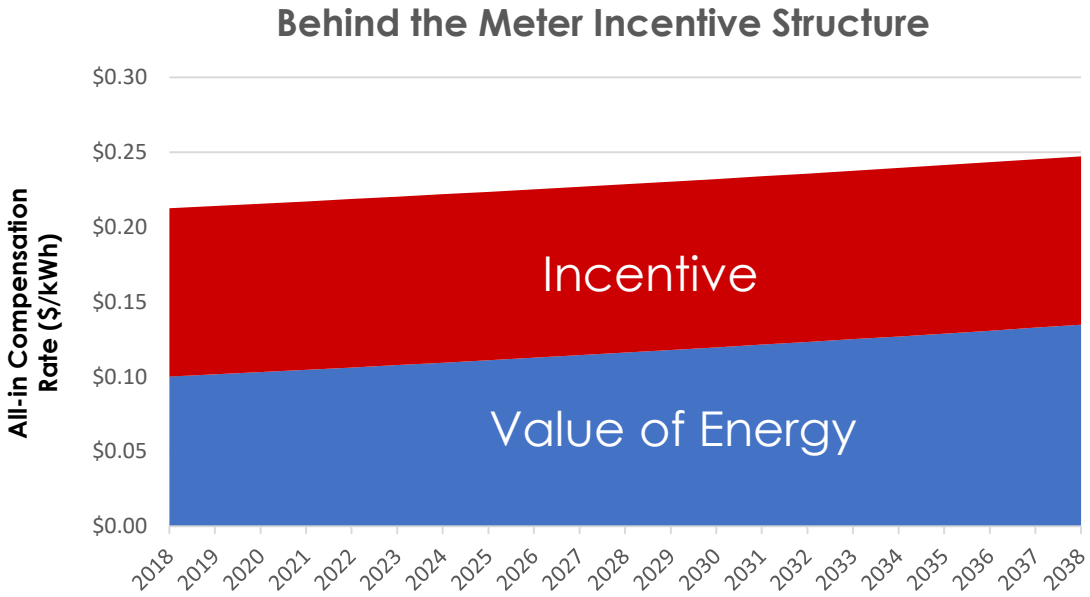
» The example illustrates an SREC at $0.26 /kWh for 10 years that then drops to a Class I REC of $0.025 cents/kWh for the next 10 years.

Incentives Over Time – SMART Structure

- The SMART incentive structure depends on whether the facility is a **Standalone or Behind the Meter.**
- Note: Graphs assume the lowest NSTAR rate at a 125% multiplier.



Standalone units **receive fixed all-in compensation rates**



Behind the Meters units **receive fixed incentive rates**

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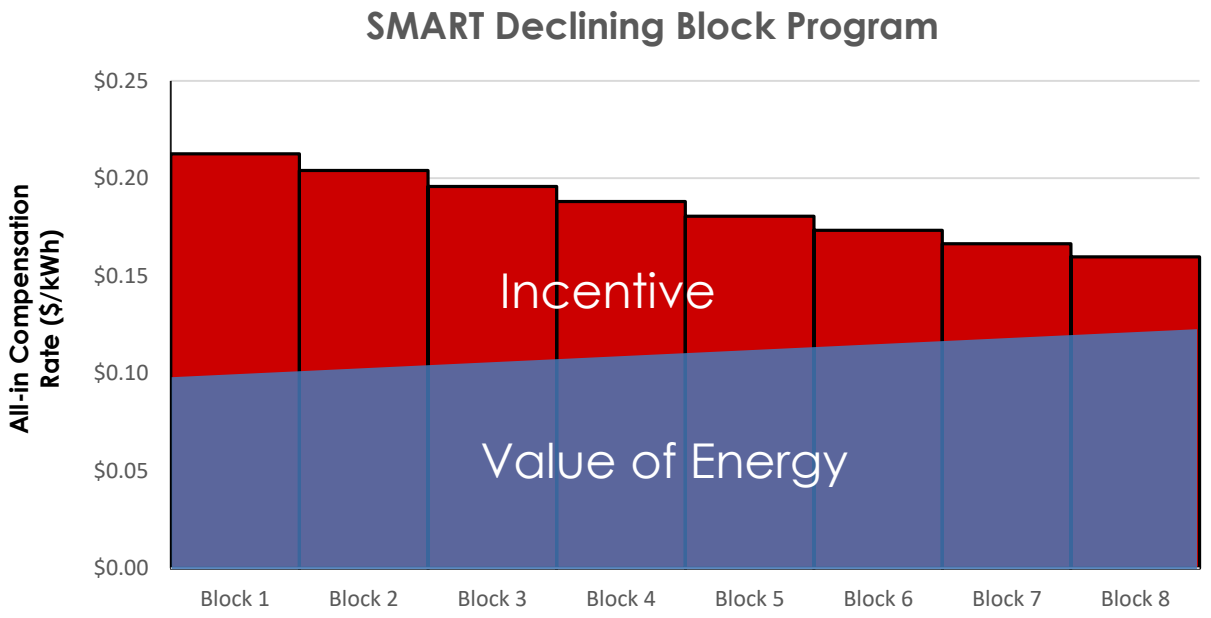
SMART: Declining Block Model

- Launch with a **competitive auction of 100 MW** of solar PV, which **will establish a base compensation rate** for the remainder of the program.
  - The base **compensation rate will vary by utility**; set at average price of winning competitive bids in each utility territory.
- SMART will be **administered as a declining block program** with the base compensation rate decreasing 4% as each capacity block is filled.



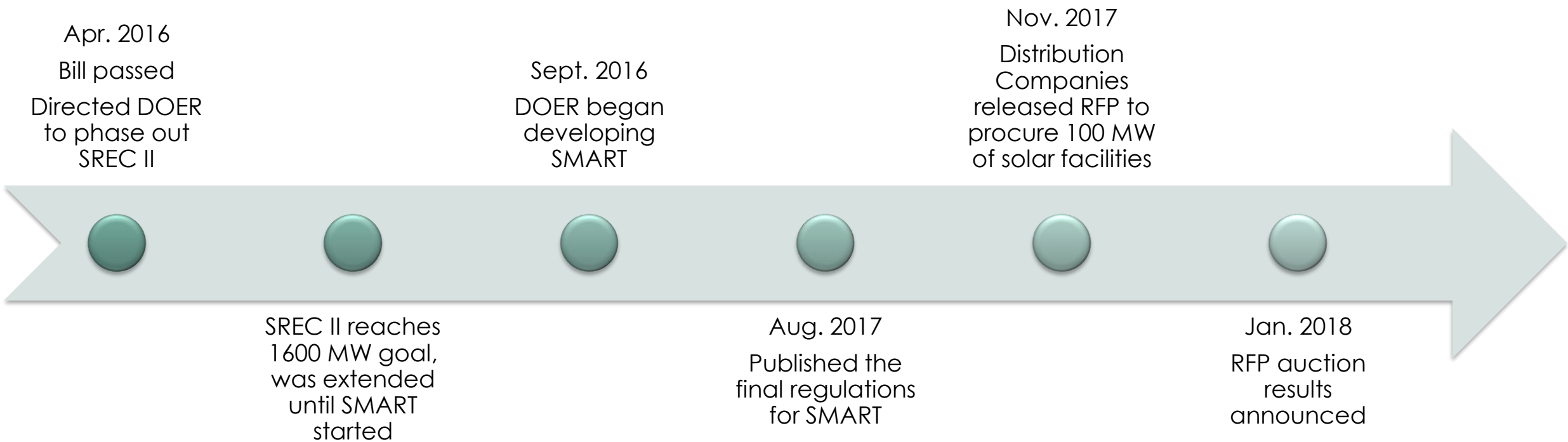
Source: Mass.gov. Capacity Block, Base Compensation Rate, And Compensation Rate Adder Guideline. https://www.mass.gov/doc/capacity-block-base-compensation-rate-and-compensation-rate-adder-guideline

1st Phase of SMART: Competitive Request for Proposals (RFP) Process

- **Competitive RFP (auction) for large solar PV projects (1 MW to 5 MW).**
- What happened:
  - **Electric Distribution Companies (EDCs) jointly issued RFP** for Solar Tariff Generation Units (STGUs)- RFP released - Nov. 13, 2018.
  - Bid **submissions from developers** accepted Nov. 27 – Dec. 5, 2018
  - Winning bids announced - Jan. 11, 2018 (see next slide)
- The **competitive costs from the RFP process used as the baseline for establishing the SMART Program** incentives going forward.

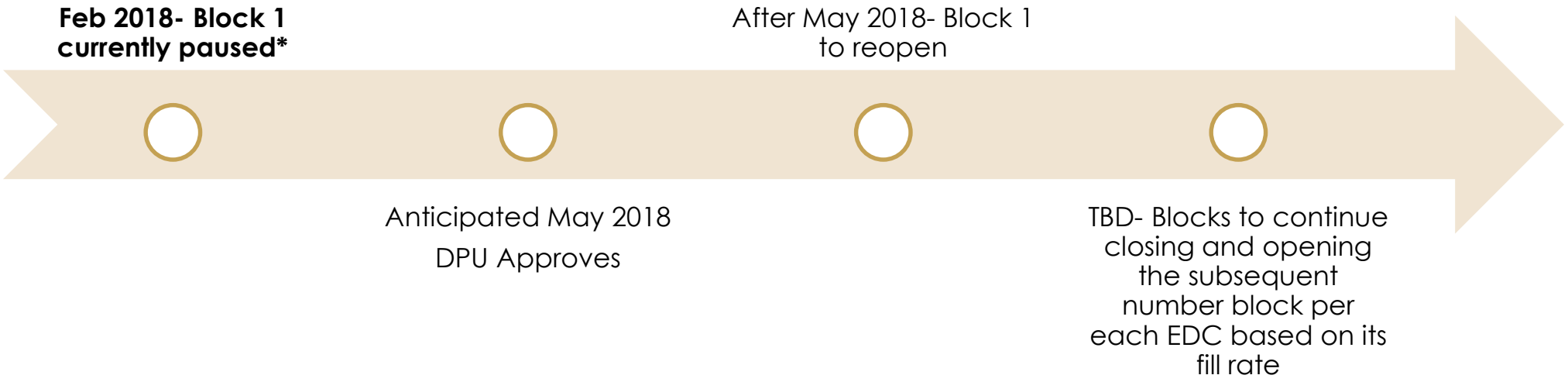
Source: REQUEST FOR PROPOSALS FOR THE 100 MEGAWATT COMPETITIVE PROCUREMENT UNDER THE SOLAR MASSACHUSETTS RENEWABLE TARGET ("SMART") PROGRAM. Issued November 13, 2017.
https://www.mass.gov/files/documents/2017/11/13/SMART%20100%20MW%20RFP%20%2811-13-2017%29%20final.pdf

Timeline of SMART Program Development



Estimated Timeline for SMART Implementation

- ISA must be signed by the utility before it is possible to apply for the SMART program block.
- **Block 1 currently paused** and cannot reopen until the SMART tariff proceeding with the Massachusetts Department of Public Utilities has been finalized, which will **not be before May 2018**.
- Note that the **timing of each subsequent block opening varies by Utility** and depends on how quickly their Block 1 fills.



Source: MA Solar http://masmartsolar.com/

Calculate your incentive

- SMART calculations vary significantly from the previous SREC calculation.
- SMART calculations are slightly different for standalone units and behind the meter units.

Previous SREC program calculation

- Net Metering Credit Rate
- + SREC of approx. 27 cents/kWh

SMART calculation: Standalone

- (Baseline Price Auction Price)
- x (Size Multiplier)
- + (Adders)
- – (Greenfield Subtractor)
- x (total kWh generated)
- – (Value of energy generated)

SMART calculation: Behind the Meter

- (Baseline Price Auction Price)
- x (Size Multiplier)
- + (Adders)
- –(Greenfield Subtractor)
- – (Value of energy generated)

SMART calculation sourced from 225 CMR 20.00: SOLAR MASSACHUSETTS RENEWABLE TARGET (SMART) PROGRAM: https://www.mass.gov/files/documents/2017/11/14/225-cmr-20-00-draft.pdf

Overview of Incentives Calculation Factors

- Size Multiplier - increases as system size decreases
- Adders
  - Four types
    - 1. Location,
    - 2. Off-taker
    - 3. Storage
    - 4. Tracking
  - >25kW can stack Adders, <25kW can only stack storage adder
- Subtractor: Greenfield

Incentives Calculation Factors: Size Multiplier

» **Size multiplier increases as system size decreases**

Generation Unit Capacity	Base Compensation Rate Factor
Low Income less than or equal to 25 kW	230%
Less than or equal to 25 kW	200%
Greater than 25 kW to 250 kW	150%
Greater than 250 kW to 500 kW	125%
Greater than 500 kW to 1,000 kW	110%
Greater than 1,000kW to 5,000kW	100%

Incentives Calculation Factors: Adder #1 - Location

» Provides incentives for development of solar in certain types of locations.

Location	
Unit Type	**Value ($/kWh)**
Building-Mounted	$0.02
Floating Solar	$0.03
Brownfield	$0.03
Eligible Landfill	$0.04
Canopy	$0.06
Agricultural	$0.06

Incentives Calculation Factors: Adder #2 – Off-Taker

- Provides incentives to support development for designated groups of off-takers.
- Specifically community-shared, low-income, and public entities.

Off-Taker	
Unit Type	**Value ($/kWh)**
Community Shared	$0.05
Low Income	$0.03
Community Shared and Low Income	$0.06
Public Entity	$0.02

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Incentives Calculation Factors: Adders #3 & 4 (Storage & Tracking) and Greenfield Subtractor

- The **storage adder varies depending on capacity and discharge duration** – equation detailed on the next slide.
- The **tracking adder** is a constant value to encourage development of solar tracking.
- The greenfield subtractor is a constant value that lowers incentive for projects developed on greenfields.

Storage*	
Unit Type	**Value ($/kWh)**
Energy Storage	$0.0247-$0.0763

*varies with capacity and discharge duration

Tracking	
Unit Type	**Value ($/kWh)**
Solar Tracking	$0.01

Greenfield Subtractor: $0.0005/kWh per acre occupied by solar development

Storage Adder Equation

- Ratio of **battery capacity to solar panel system capacity** (represented as "ESkW/PVkW", which is the nominal rated power capacity for Energy Storage System divided by the DC Rated Capacity of the solar PV system)
  - Range ¼ to 1
- Ratio of the battery's **useful energy at a given time to its battery capacity** (represented as "ESkWh/ESkW" which is nominal rated useful energy for Energy Storage System divided by the nominal rated power capacity for Energy Storage system)
  - Range 2 to 6
- The 'Base Adder' multiplier for the first block = $0.045/kWh
- Total Energy Storage Adder quantity range: $0.0247 to $0.0763 per kWh of electricity

Sources: Massachusetts Department of Energy Resources. (2017). Solar Massachusetts Renewable Target (SMART) Final Program Design. http://www.mass.gov/eea/docs/doer/rps-aps/final-program-design-1-31-17.pdf;
225 CMR 20.00: SOLAR MASSACHUSETTS RENEWABLE TARGET (SMART) PROGRAM https://www.mass.gov/files/documents/2017/11/14/225-cmr-20-00-draft.pdf
Wade, Adam. Energy & Cleantech Counsel. DOER Presents Final Program Design for Solar Massachusetts Renewable Target ("SMART") Anticipated for January 2018 and Extension of SREC II Program for Approximately One Year. 2017.
http://www.energycleantechcounsel.com/2017/02/01/doer-presents-final-program-design-for-solar-massachusetts-renewable-target-smart-anticipated-for-january-2018-and-extension-of-srec-ii-program-for-approximately-one-year/

Equation Alert!

$$Energy\ Storage\ Adder = \left[\frac{\left(\frac{ESkW}{PVkW}\right)}{\left(\left(\frac{ESkW}{PVkW}\right) + \exp\left(0.7 - \left(8 * \left(\frac{ESkW}{PVkW}\right)\right)\right)\right)}\right] * \left[0.8 + \left(0.5 * \ln\left(\frac{ESkWh}{ESkW}\right)\right)\right] * Base\ Adder$$

Calculator available here:
https://www.mass.gov/files/documents/2018/01/22/Energy%20Storage%20Guideline%20DRAFT%20%28012218%29.xlsx

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Example: Behind the Meter Carport + Storage

» Inputs: 1 MW size system (1000 kW DC solar PV capacity; 300 kW storage capacity), canopy, 2.7 hours of storage

Step	Description	Calculation	Running Total
1	Baseline	17 cents/kWh	17 cents
2	100% multiplier (due to size)	17 cents X 100%	17 cents
3	Adders • Canopy • Storage	+ 6 cents (canopy) + 3.6 cents (storage)	26.6 cents
4	Subtract Energy Value (given energy value generated of 10 cents)	- 10 cents	**16. 6 cents/kWh SMART Incentive**

Source: SunPower

Example: Municipal Canopy with Storage

» Inputs: Municipal – 460kW canopy, 250kW, 2hr storage

Step	Description	Calculation	Running Total
1	Baseline	17 cents/kWh	17 cents
2	125% multiplier (due to size)	17 cents X 125%	21.25 cents
3	Adders • Public • Canopy • Storage	+ 6 cents(canopy) + 2 cents (public) + 4 cents (storage)	33.25 cents
4	Subtract Energy Value (given energy value generated of 10 cents)	- 10 cents	**23.25 cents/ kWh SMART Incentive**

Source: SunPower

Third Party Ownership

- Alternative On-Bill Credit Generation Unit energy value = total kWh generated X energy compensation rate

- Allows Non-Profits a monetary benefit on their electric bills
- Can be credited to remote accounts
- Likely equal to basic service rate
- Approx. $0.10/kWh

Third Party Ownership Example

- Installer
  - SMART Incentives
  - Tax Credits
  - PPA for SMART Bill Credit Value
- University/Non-Profit/Municipality
  - SMART Bill Credit Value
- Utility
  - REC

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SMART Project Economics – Bill Credit Agreement/PPA

- For illustrative purposes:
  - 20% discount
  - 20-year contract
  - 500 kW system

	Non-Profit	Solar Developer
Revenue	Receives 100% of On-Bill Credit Value = $500,000	Receives 80% of On-Bill Credit Value to Solar Developer = $400,000 **+** SMART cash incentive + 30% ITC
Cost	Pays 80% of On-Bill Credit Value to Solar Developer = $400,000	Designs, builds, and operates PV system = $2,000,000
Net	20% of On-Bill Credit Value = $100,000	

NOTE: The on-bill credit rate will fluctuate over the 20-year period.

SMART Project Economics

SREC	SMART
37 cents for 10-years, net metering after	33 cents
38.5 cents for 10-years, net metering after	26.5 cents
15% discount off of 12-18 cents	20% discount off of 10 cents
45 cents for 10-years, net metering after	34 cents

Incentives: Standalone vs. Behind the Meter Facilities

Standalone: defined **as having no associated load other than parasitic or station load**

A **net metered** facility incentive:	**Non-net metered** facility incentive:	Thus, the **incentive value will vary** over time as energy value increases or decreases
subtract value of energy generated from the all-in compensation rate	**single payment from the utility equal to all-in compensation rate**, (bundled energy, capacity, and incentive)	

Behind-the-meter facilities: any facility that does not meet the definition of standalone

Fixed incentive payment value determined at the **time of interconnection**

Source: Massachusetts Department of Energy Resources. (2017). Solar Massachusetts Renewable Target (SMART) Final Program Design. Retrieved from http://www.mass.gov/eea/docs/doer/rps-aps/final-program-design-1-31-17.pdf

Net Metering – the basics

- Overview:
  - Customers **offset their own** electricity usage
  - Customers are **compensated** for excess electricity at retail rate for project <60 kW, ~60% of retail for 60kw-1MW, and less for 1-2MW projects and is applied as a bill credit
- How it works: facilities connect to a **meter, which measures net electricity used**
  - If **consumption > generation**, **customer pays** for net kWh consumed
  - If **consumption< generation, customer receives credit** on bill for net excess generation

Source: Mass.gov. Net Metering Guide. 2018. https://www.mass.gov/guides/net-metering-guide; and DOER. Net Metering 101 http://www.mass.gov/eea/docs/doer/green-communities/pubs-reports/net-metering-101-slides.pdf

Net Metering and SMART

» SMART is compatible with net metering, but does not raise net metering caps.

Net Metering Caps

- **Caps set by the legislature**, most private caps have been met.
- **Legislature and Governor must raise caps** for commercial projects to access net metering.
- Rates **determined by a formula**.

SMART Alternative On-Bill Credit

- **Do not have a cap.**
- Only **available to standalone** units.
- No formula; **accrue at Basic Service rate**.

Net Metering Limitations in Mass.

Massachusetts Net Metering Class Distinctions	
Class Number	**Size of Facility**
Class I Net Metering Facility	Less than 60 kW
Class II Net Metering Facility	60 kW to 1 MW
Class III Net Metering Facility	1 MW to 2 MW

1,727.25 MW can net metering in Mass. SMART goal is **3,200MW**…

Market Net Metering Rate for Commercial Customers = 60% of the value of the excess generation

Net Metering Caps

- Net metering caps have waitlists for both public and private categories overall, depending on the utility.
- Massachusetts System of Assurance Mass ACA website lists updated net metering caps
- **Eversource:**
  - **Private**
    - **104 MW available, 0 waitlist**
  - **Public**
    - **183 MW available, 0 waitlist**
- **NGRID**
  - **Private**
    - **0.5 MW available**
  - **Public**
    - **14 MW waitlist**

Source: Provisional Application Activity and Remaining Capacity, Massachusetts System of Assurance of Net Metering Eligibility. https://app.massaca.org/allocationreport/report.aspx

What happens with the RECs – Claims?

- SREC were sold to load serving entities that had RPS/Solar Carve-out requirements (utilities) via an SREC broker or SREC auction
- A couple of rare examples where someone retired the SREC to make the solar energy usage claim
- Under SMART the RECs automatically go to the load serving entity (utility) in order to get the SMART incentive
- No more SREC, just Class I REC
- Entities won't be able to claim that they are using solar power from Mass. other than the reported percentage on the utility disclosure label.
- **Not really any function change from SREC program.**

Key Program Implications

SMART is not available in towns served by municipally-owned electric utilities.

Includes adders relevant to municipalities, including incentives for public entity, landfill, low income, and community solar projects.

Total incentive amount for small projects may be lower for SMART than for SREC-II.

Renewable Energy Certificates (RECs) produced by solar units will be automatically owned by the distribution companies.

Smaller projects have higher compensation rates per kWh, but lower total incentive value.

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Thermal Program Alternative Energy Credits (AECs)

- MA has a parallel Alternative Portfolio Standard to the RPS
  - Functions similarly to the RPS, though has a separate compliance schedule (4.25% in 2017, increases by 0.25%/year) and Alternative Compliance Payment ($22.23/MWh in 2017)
  - Previously awarded almost entirely to high-efficiency combined heat and power (CHP)
  - In January 2018, DOER finalized regulations to include renewable thermal technologies, including **air- and ground-source heat pumps**, **solar thermal**, and **biomass fuels** (among others)
- Alternative Energy Certificates (AECs) are awarded based on the "useful renewable thermal energy" produced
  - i.e. renewable heat delivered to a building minus any non-renewable energy used to power the system (e.g. heat pump thermal energy provided minus electricity used to power system)
- AEC value TBD: no auctions have yet been held since renewable thermal was integrated

Source: 225 CMR 16.00: Alternative Portfolio Standard https://www.mass.gov/files/documents/2017/12/14/225%20CMR%2016%20APS%20Regulation%20121517%20FINAL.pdf

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QUESTIONS?

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