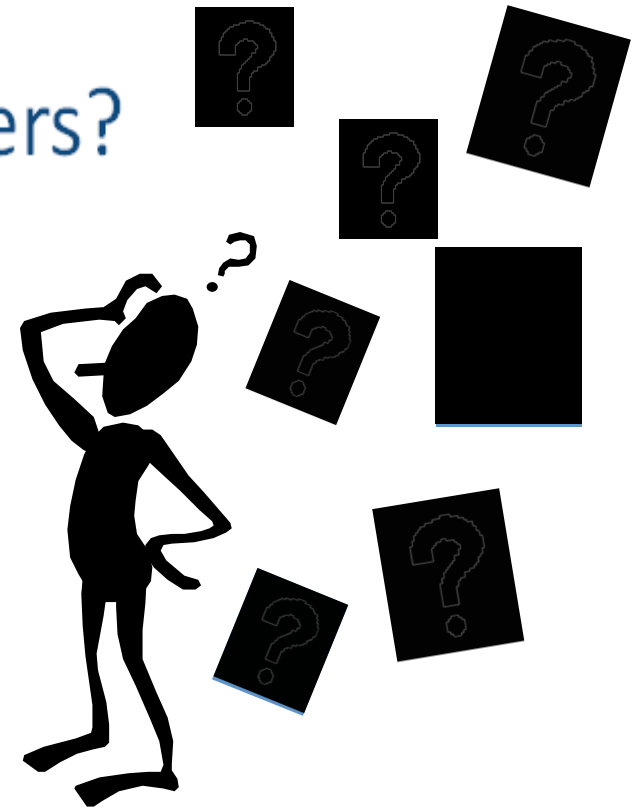

Before we start...one quick question:

What are these numbers?



- 138,448
- 106,321



Hint: *What gets measured, also gets managed.*



Massachusetts
Municipal
Association



Constellation
Energy®



MunEnergy

A Service of the Massachusetts Municipal Association



MMA Annual Meeting Workshop: Making Money While the Sun Shines



The way energy **works**.™

Rick Kilbourne ~ Senior Manager, Solar Business Development

Constellation Energy Key Facts

- **Fortune 500** company (#149 on 2010 list)
Listed as # 1 in Energy Industry
- **Deep roots in Massachusetts** – Constellation has offices in Boston, Lowell, and North Adams and serves retail electricity state wide
- **MunEnergy Program** – Over 1/3 of Massachusetts communities have switched to Constellation as the MunEnergy program power supplier
- **Experience in Massachusetts Solar** – Constellation has developed over 100MWs of solar across 7 states including Massachusetts
- **100% Internal Funding** – \$150 million CEG capital fund dedicated for 2011 solar projects and plan to add an additional 25-35MW/ yr over the next 3 years. SRECs monetized internally.
- ***100% of Constellation's solar projects have been completed on budget and on schedule***

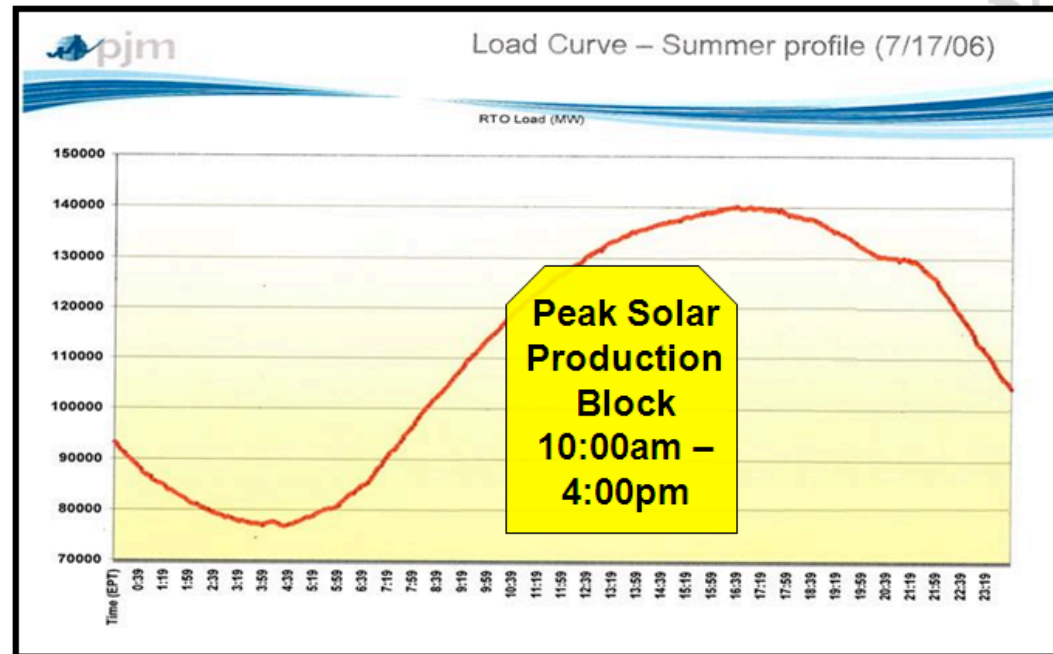


- **Revenues:** \$14.3 billion (2010)
- **Assets:** \$20.0 billion (2010)
- **Ticker symbol:** (NYSE) CEG

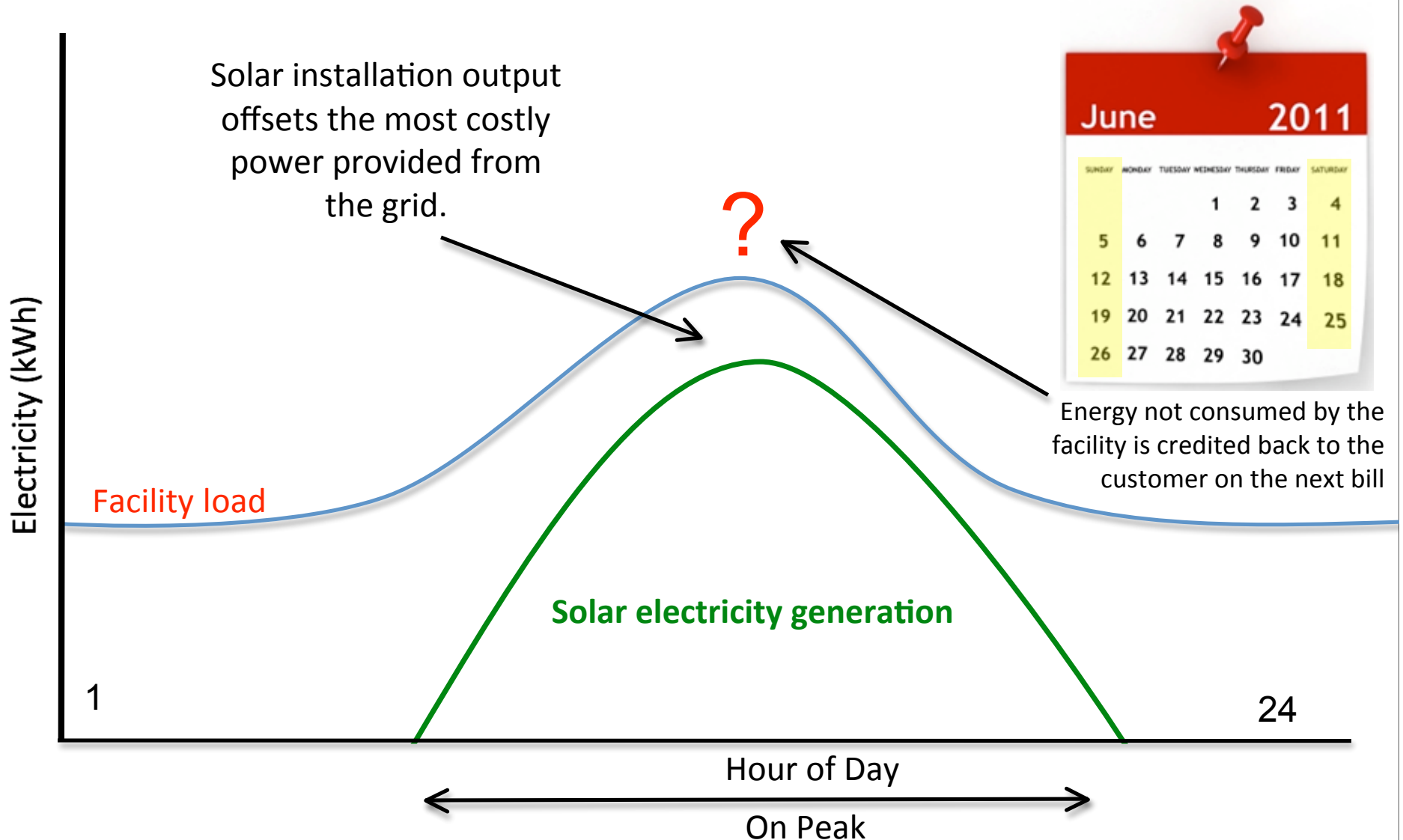
Solar: A Physical Solution to a Financial Problem

- ✓ No reason to believe that low electricity rates today won't return to 2008 levels and higher
- ✓ Price volatility will continue; with premiums for on-peak power
- ✓ Solar can provide a long-term hedge against future price risk
- ✓ Solar power offsets the most expensive brown power at the most costly time of the day

Hourly Demand Curve



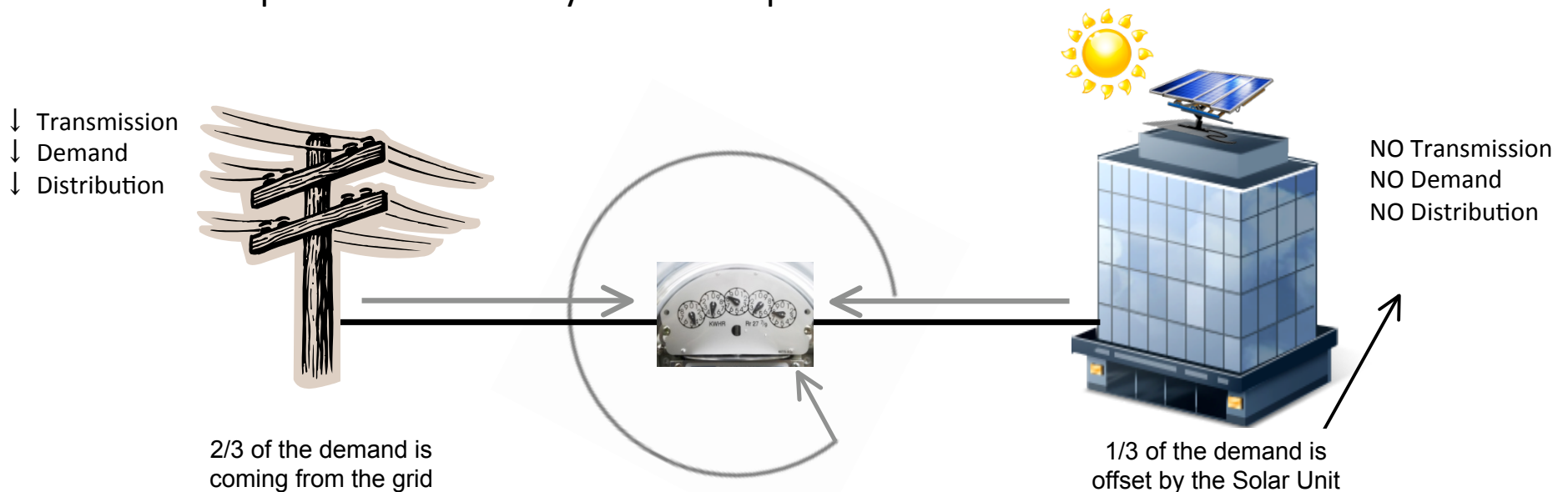
Supply vs. Demand – at a Customer Level



Net Metering

Due to **net metering**, customers **never** double-pay for energy:

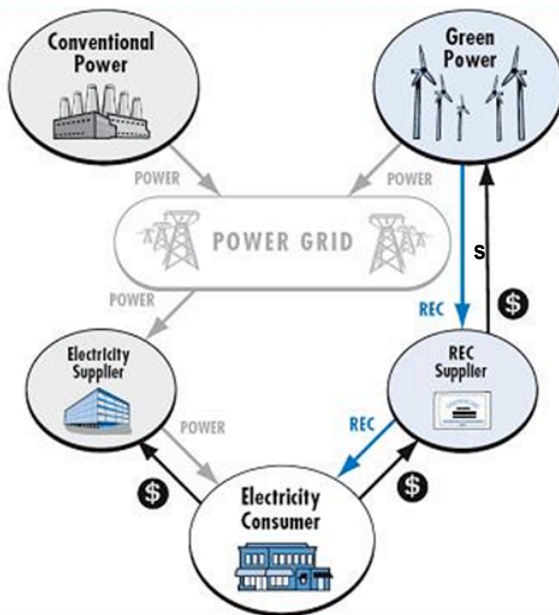
- Net metering (or net billing) is a policy where electric customers who generate their own electricity can “bank” electricity on the grid.
- The utility **credits you** if you produce power and don’t use it.
- So when your solar system generates electricity over the weekend and you’re not consuming any electricity, you don’t lose that – the utility takes your overall consumption and deducts your overall production.



Key Takeaway: Billing may be different depending on the state. Work with your technical sales rep to identify regionally specific nuances.

REC vs. Solar REC (SREC)

- ✓ A Renewable Energy Certificate represents the environmental attributes of one megawatt hour (MWh) of electricity generated from a renewable power facilities and delivered onto the power grid. Attributes represented by a REC include the fuel source, actual emissions from the facility, and vintage year.



1 MWh of energy from a Solar Facility = 1 SREC

FAST FACTS:

- The ownership of SRECS allow customers to publicize that they are buying “green” power.
- SRECs can be replaced with lower cost Green-e Certified RECS to meet corporate sustainable initiatives.
- SRECS are more expensive than RECs because:
 - SRECs are Mandatory in nature vs. Voluntary
 - Cost is based on market supply/demand fundamentals

 = \$2.50/MWh vs.
  = \$660.00/MWh*

Why Does Solar Work in MA?

Performance Based Incentives

- State mandated goal of 400 MW by 2020
- Solar Renewable Energy Credit clearing house helps enable a viable market for the sale of MA SRECs
- SREC market in MA has been among the strongest in the United States
- SREC values decline significantly over time as supply builds

Tax Incentives

- Solar energy systems are exempt from local property tax for 20 years if power is consumed by host
- Equipment for solar energy systems are exempt from state sales tax
- Federal ITC and Bonus Depreciation buy down project costs

Net Metering

- Utility Net-Metering insures all power produced by a behind the meter system is utilized by the host
- Net Excess Generation Credit allows excess power not consumed by a host to be monetized and used to reduce generation costs

Where Does Solar Work?

Roof Tops



Parking Lots



On Ground



Is Solar Right for Your Facility?

There are four main factors that determine if solar PV is a good fit for a facility:

1. **Available Incentives** – Are adequate solar incentives available?
2. **Facility Factor** – Do you have clear roof area of at least 100,000 sq. ft. or 6+ acres of available ground space? This can be an aggregate of multiple roofs on one campus.
3. **Electric Load** – Is your electric load large enough to justify a commercial-scale solar system? Is there a nearby utility interconnection point?
4. **Financial Factors** – Is the town positioned to enter into a 15 to 20 year energy supply contract and/ or Facility/ Land lease

Project Cost Breakdown

1 MW system ≈ \$5.5 million | 5 MW system ≈ \$25.0 million

- Solar systems cost approx. \$4,500 - \$6,500 per kW
- + All Future O & M
- Tax incentive credits
- Monetize SRECs
- Monetize any other incentives: Grants, Low Interest Financing, etc

Factor in historical usage and load factor

Calculate our corporate investment multiplied by our corp. rate of return over 20 years

= PRICE/KWH

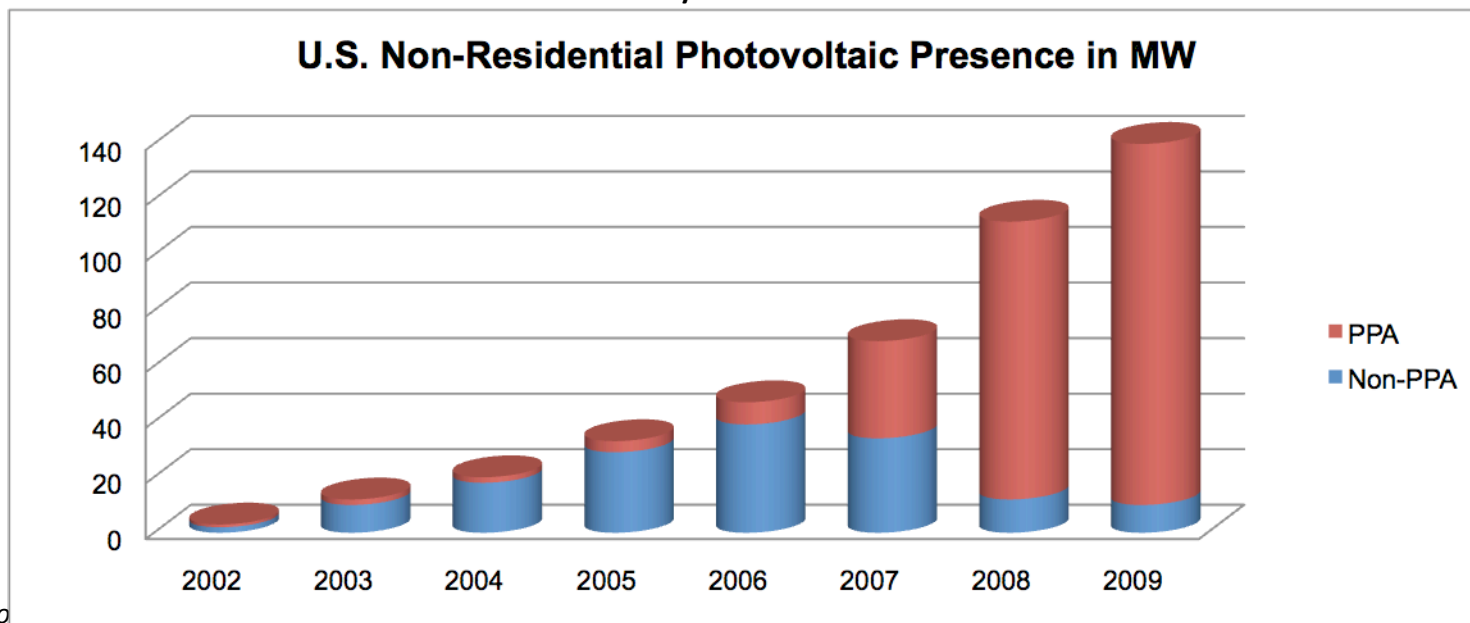
Key Customer Takeaway: The price/kWh of the solar asset avoids these costs and would subsequently reduce these cost components for the remainder of your brown power price/kWh.

Two Paths to Obtaining Solar Power

Turnkey Systems owned by customer		Power Purchase Agreement System owned by third-party	
<p><u>Pros</u></p> <ul style="list-style-type: none"> • System owned • Initial cost of power a function of internal modeling • Future power “free” 	<p><u>Cons</u></p> <ul style="list-style-type: none"> • Major capital expense • Some entities unable to take advantage of ITC • Responsibility to sell RECs • Maintenance responsibility 	<p><u>Pros</u></p> <ul style="list-style-type: none"> • No capital needed • Future power costs locked in • Allows all entities to take full advantage of ITC • Upfront monetization of SRECs • Maintenance provided by developer • Flexibility in pricing structure • Buy out or extension at end of term 	<p><u>Cons</u></p> <ul style="list-style-type: none"> • Commits space for 20+ year • Price pre-set for contract term

What is a PPA?

- A PPA is a long-term agreement of 15~20 years to buy the power generated by the solar installation
- PPAs allow solar deals to be structured with no up-front capital.
- The Developer sells the power generated by a solar array to host customer, while maintaining solar system ownership and operational responsibility
- Environmental attributes such as SRECs can be owned by the Developer or by customer
- **PPAs are a proven-effective way to structure solar deals** – this chart shows the increasing use of PPAs in the sale of commercial-scale solar systems



Adapted from: [Jobs and services-how-ppas-are-changing-the-pv-value-chain/](#)

power-

Project Qualification

- **Site Availability & Suitability**
 - Are the identified areas large enough?
 - Is the space in condition to handle a 20 year commitment?
 - Is there a convenient nearby interconnection point
- **Annual consumption vs. Project production**
 - Solar projects are typically sized to < 75% of total load
- **Turnkey or PPA?**
- **Permitting Obstacles**
 - Are there wetlands nearby? When were they delineated?
 - Has the landfill already received a Post closure permit?
- **Procurement process/ constraints**
 - Can the town execute a 20 year agreement?
 - M.G.L. Chapter 25 or 30b?
- **Vendor selection**
- **Approval Process**
 - Selectman? Town Administrator? Annual meeting approval?

Disclaimer

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