

# SOLAR 101

Merrimack Valley Planning Commission  
February 14, 2012



# SUNSHOT INITIATIVE



The U.S. Department of Energy SunShot Initiative is a collaborative national effort to reduce the cost of solar energy by about 75% before the end of the decade. To aggressively drive innovation and make large-scale solar energy systems cost-competitive with other forms of energy, the U.S. Department of Energy (DOE) is supporting efforts by private companies, academia, and national laboratories to reduce the cost of solar electricity to about \$0.06 per kilowatt-hour. Part of DOE's larger effort to make solar energy more accessible and affordable, the SunShot Initiative will enable solar-generated power to account for 15%–18% of America's electricity generation by 2030.





# INTRODUCTION TO SOLAR: TECHNOLOGY



Solar Photovoltaic (PV)

Electricity

Residential  
Commercial



Solar Hot Water

Hot Water  
Space Heating

Residential  
Commercial



Concentrated Solar Power

Electricity

Commercial

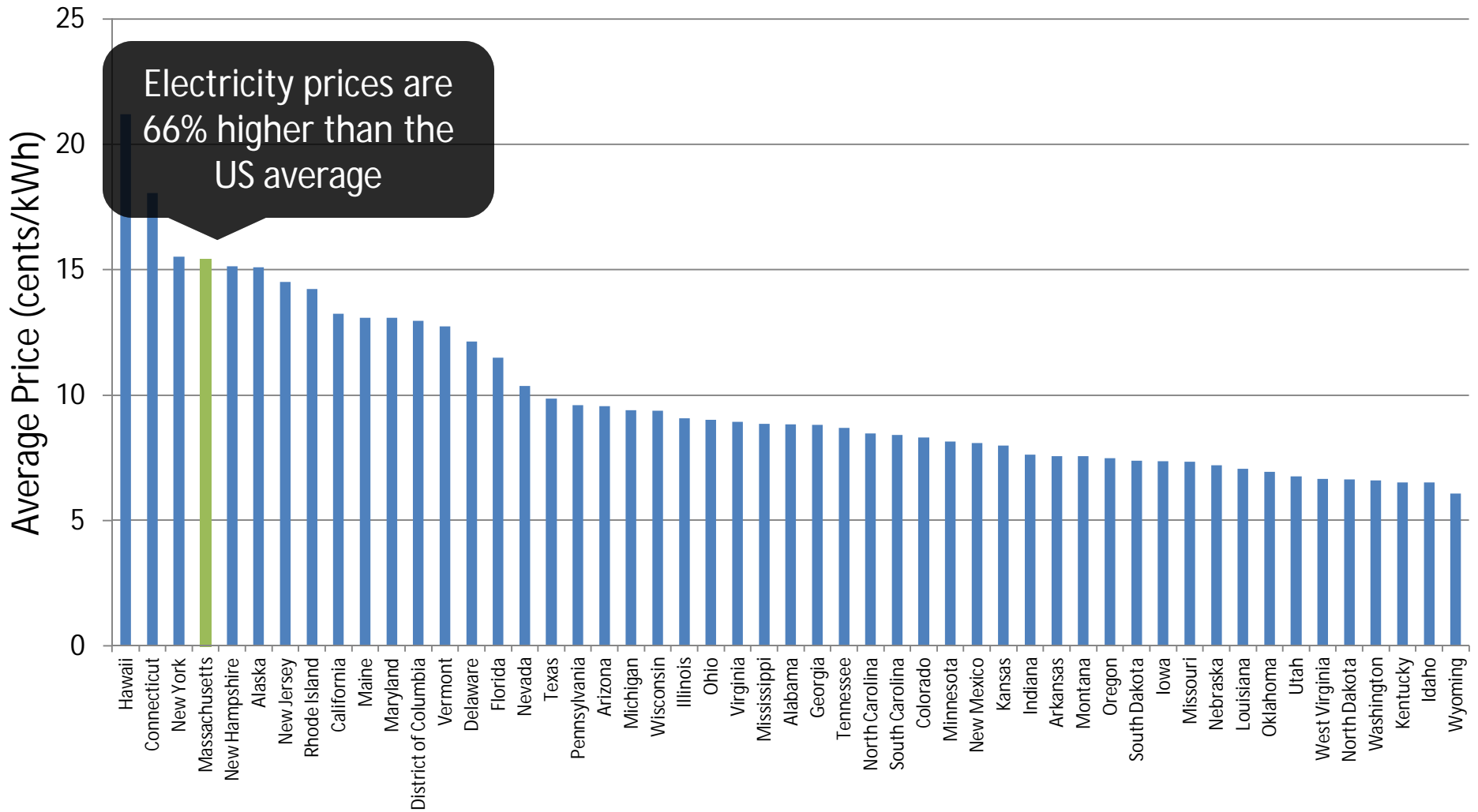


# WHY DOES SOLAR MAKE SENSE IN MASS.?

1. High Energy Prices
2. Falling Costs of Solar Technology
3. Favorable Regulations
4. Aggressive Incentives

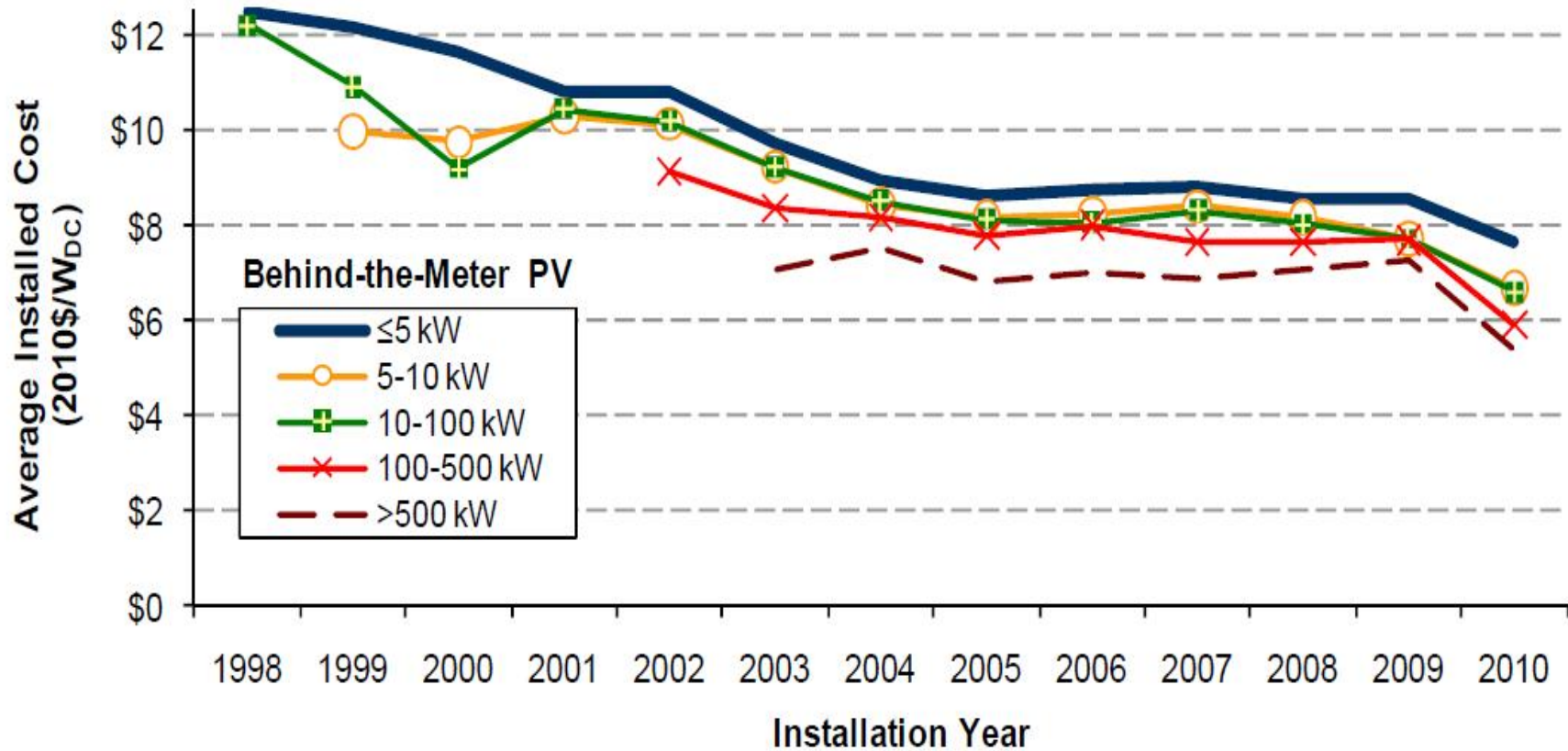


# 1. HIGH ENERGY PRICES IN MA





## 2. FALLING COST OF SOLAR



"Tracking the Sun IV: An Historical Summary of the Installed Cost of Photovoltaics in the United States from 1998 to 2010,"  
by Galen Barbose, Naim Darghouth, and Ryan Wiser: <http://eetd.lbl.gov/ea/emp/reports/lbnl-5047e.pdf>.



### 3. FAVORABLE REGULATIONS: NET METERING

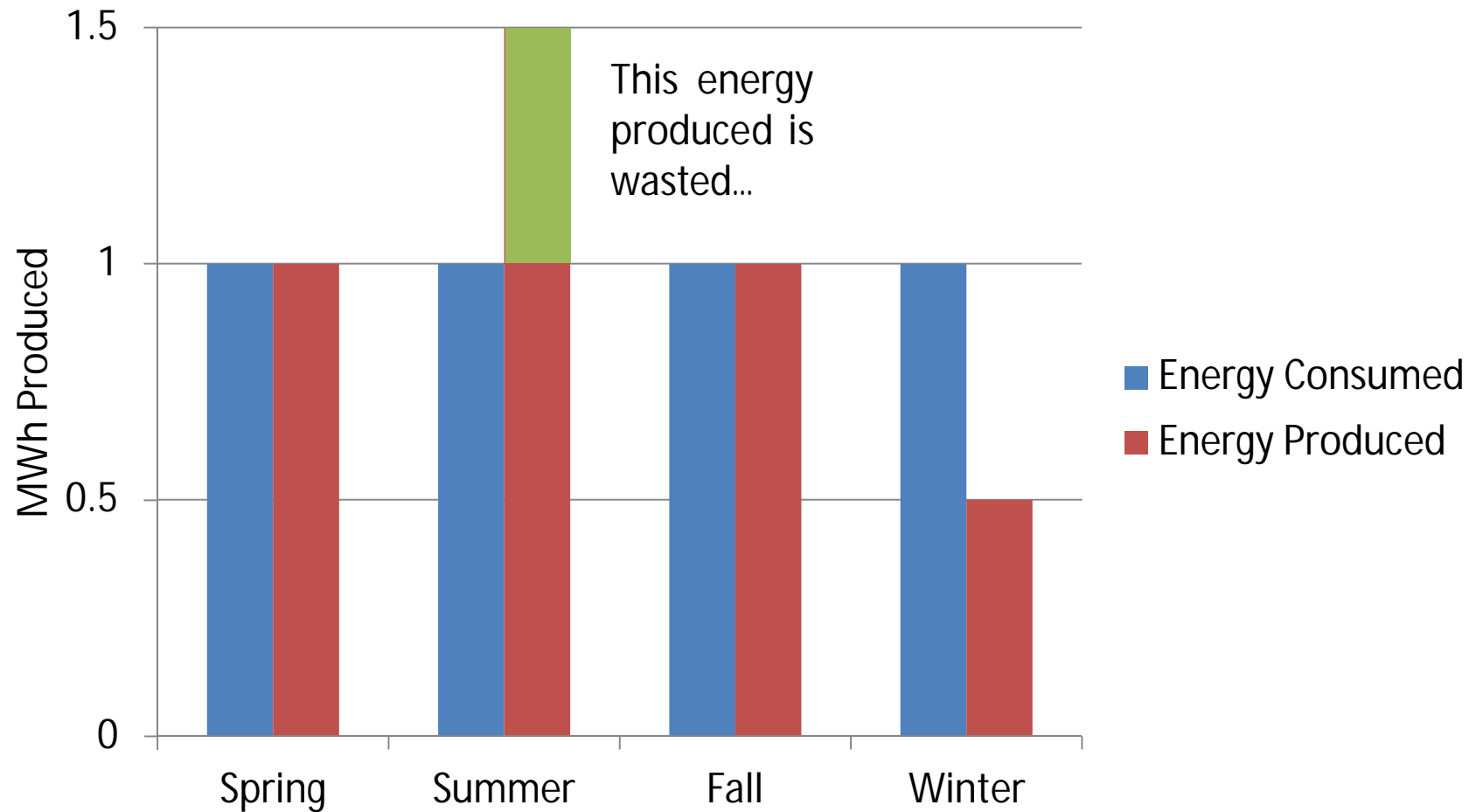
When your PV system's generation exceeds your use, excess electricity flows back to the grid, spinning your electricity meter backwards. You receive credit for this excess generation.





### 3. FAVORABLE REGULATIONS: NET METERING

Without Net Metering...

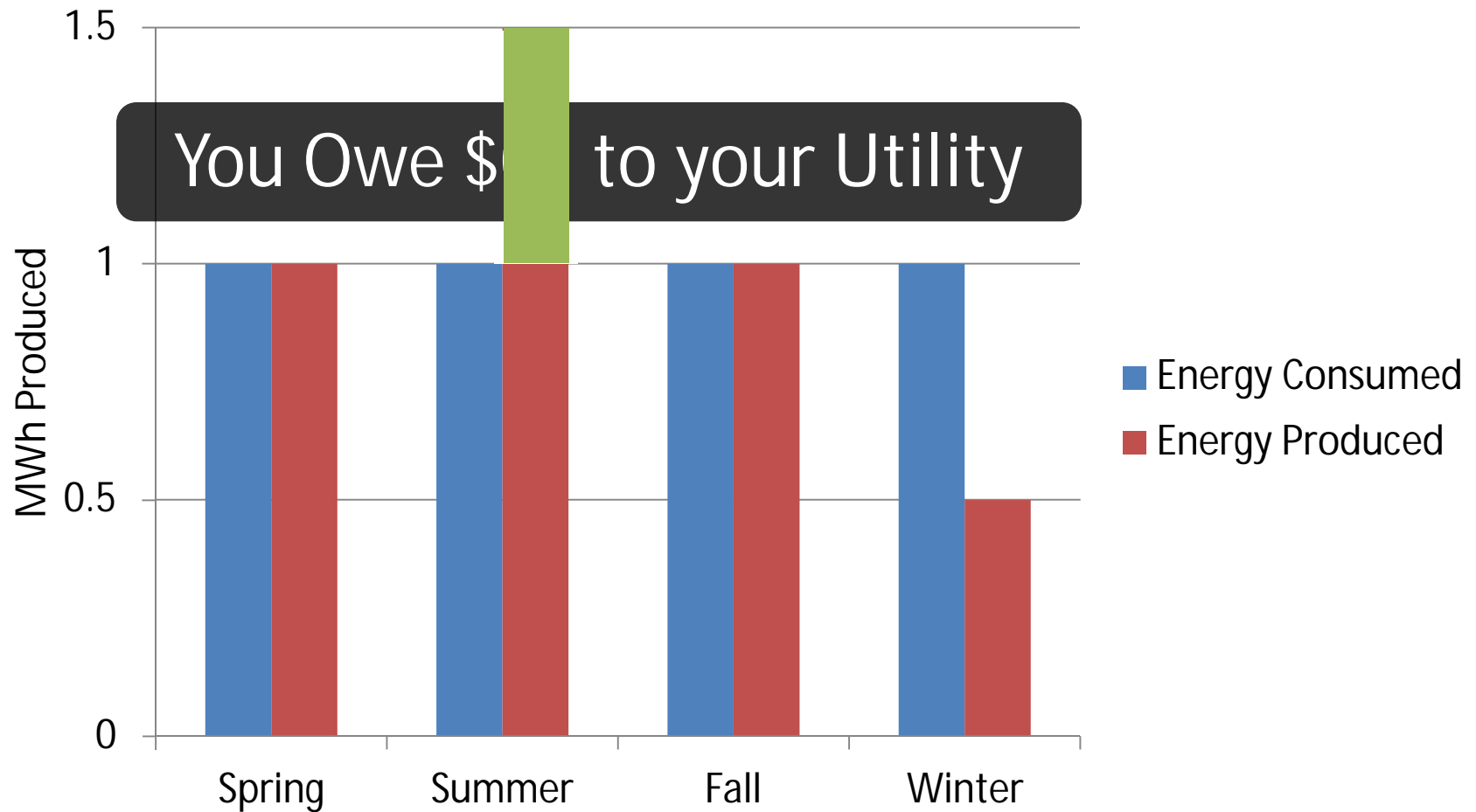




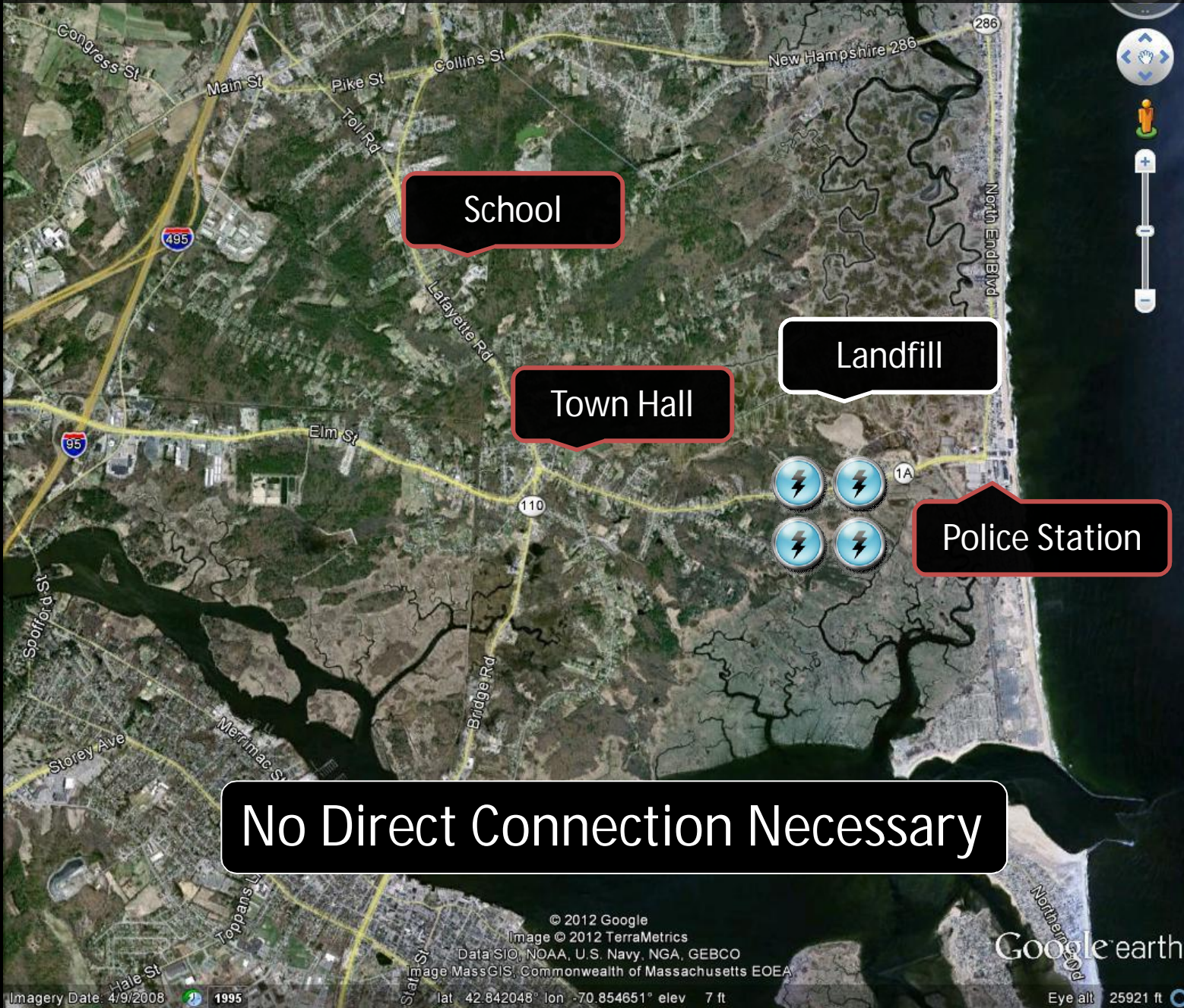


### 3. FAVORABLE REGULATIONS: NET METERING

With Net Metering...



# VIRTUAL NET METERING



School

Town Hall

Landfill

Police Station

No Direct Connection Necessary



Google earth

Imagery Date: 4/9/2008 1995

lat 42.842048° lon -70.854651° elev 7 ft

Eye alt 25921 ft

# SCHEDULE Z

Home Insert Page Layout References Mailings Review View

Print Layout Full Screen Reading Web Layout Outline Draft Document Views

Ruler Document Map Gridlines Thumbnails Message Bar Show/Hide

Zoom 100% One Page Two Pages Page Width Zoom

New Window Arrange All Split Window

View Side by Side Synchronous Scrolling Reset Window Position Window

Switch Windows Macros

Security Warning Macros have been disabled. Options...

Massachusetts Electric Company  
Nantucket Electric Company

M.D.P.U. No. 1176  
Canceling M.D.T.E. No. 1116-A

STANDARDS FOR INTERCONNECTING DISTRIBUTED GENERATION

Name: [Redacted]  
Billing Address: [Redacted]  
Account number: [Redacted]  
Amount of the Net Metering Credit: 0%

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Account number: [Redacted]  
Amount of the Net Metering Credit: 0%

Host Customer [Redacted] with account number [Redacted], MA

Initials: \_\_\_\_\_

Town Hall Meter Number

Police Station Meter Number

School Meter Number

Massachusetts Electric Company  
Nantucket Electric Company

M.D.P.U. No. 1176  
Canceling M.D.T.E. No. 1116-A

STANDARDS FOR INTERCONNECTING DISTRIBUTED GENERATION

...select to seek to obtain capacity payments from ISO-NE for the electricity generated by Class II and ties. The Company will notify the Host Customer within 30 days of the filing of Schedule Z whether it elects to seek those capacity payments. If the Company elects to assert title to those capacity payments, it will include any capacity payments received from ISO-NE in the Company's annual Net Metering reconciliation.

D) The terms of this Schedule Z shall remain in effect unless and until the Host Customer executes a revised Schedule Z and submits it to the Company. Unless otherwise required herein or mutually agreed to in writing by the Host Customer and the Company, Schedule Z shall not be submitted more than twice in any given calendar year.

...application shall constitute certification that (1) the Host Customer has read the application and knows the contents are true as stated, to the best knowledge and belief of the Host Customer; and (3) the Host Customer has the power and authority to sign the application.

Signature: \_\_\_\_\_

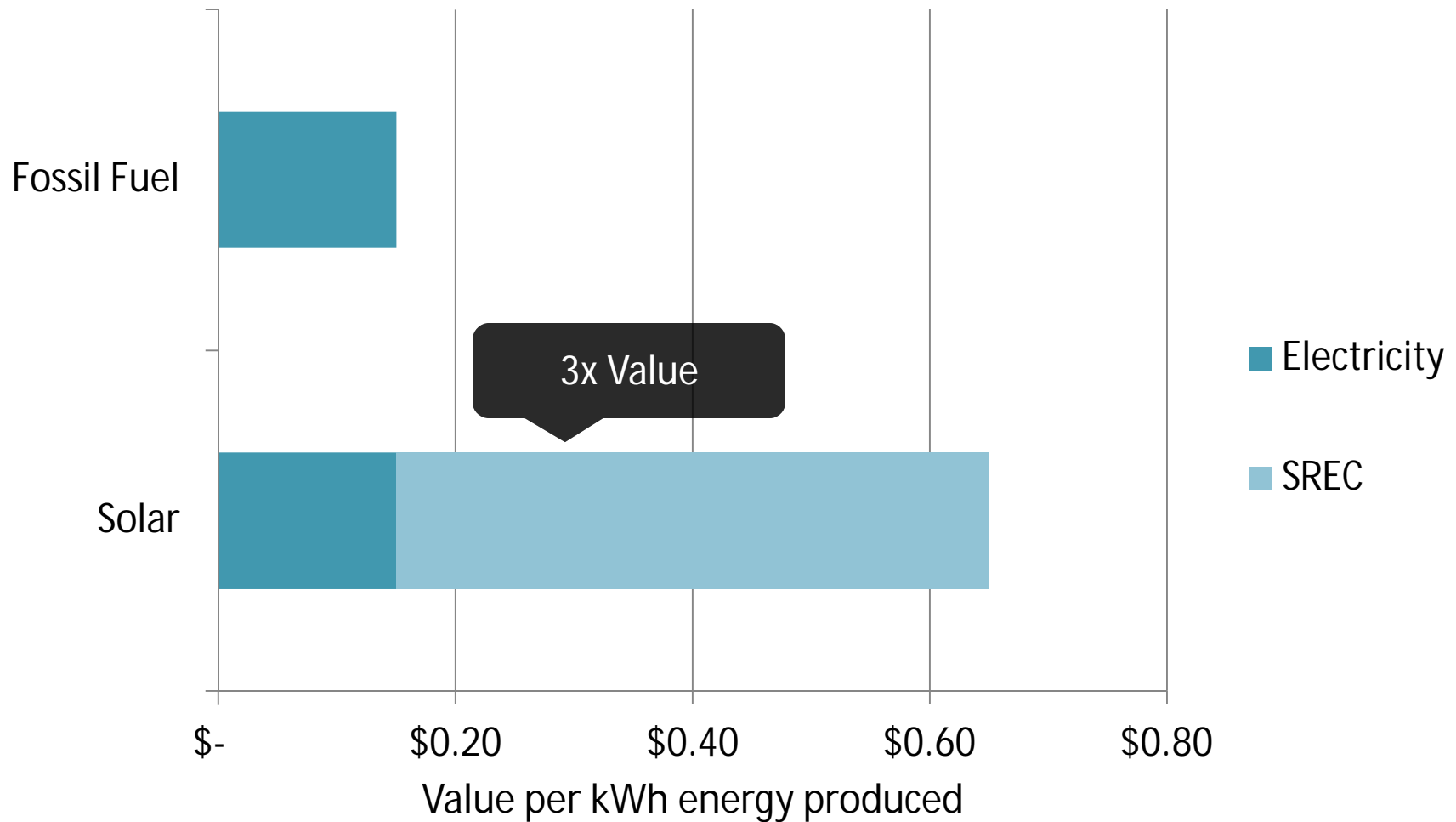
Date: Monday, February 13, 2012

Host Customer [Redacted] with account number [Redacted], MA

Initials: \_\_\_\_\_



## 4. PERFORMANCE INCENTIVES: SREC





# OPTION 1: DIRECT OWNERSHIP

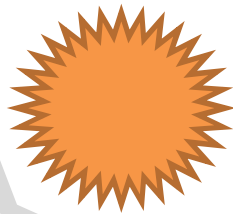
20 years of electricity  
+ some incentives





## OPTION 2: DIRECT OWNERSHIP WITH DEBT

20 years of electricity  
+ some incentives



Business

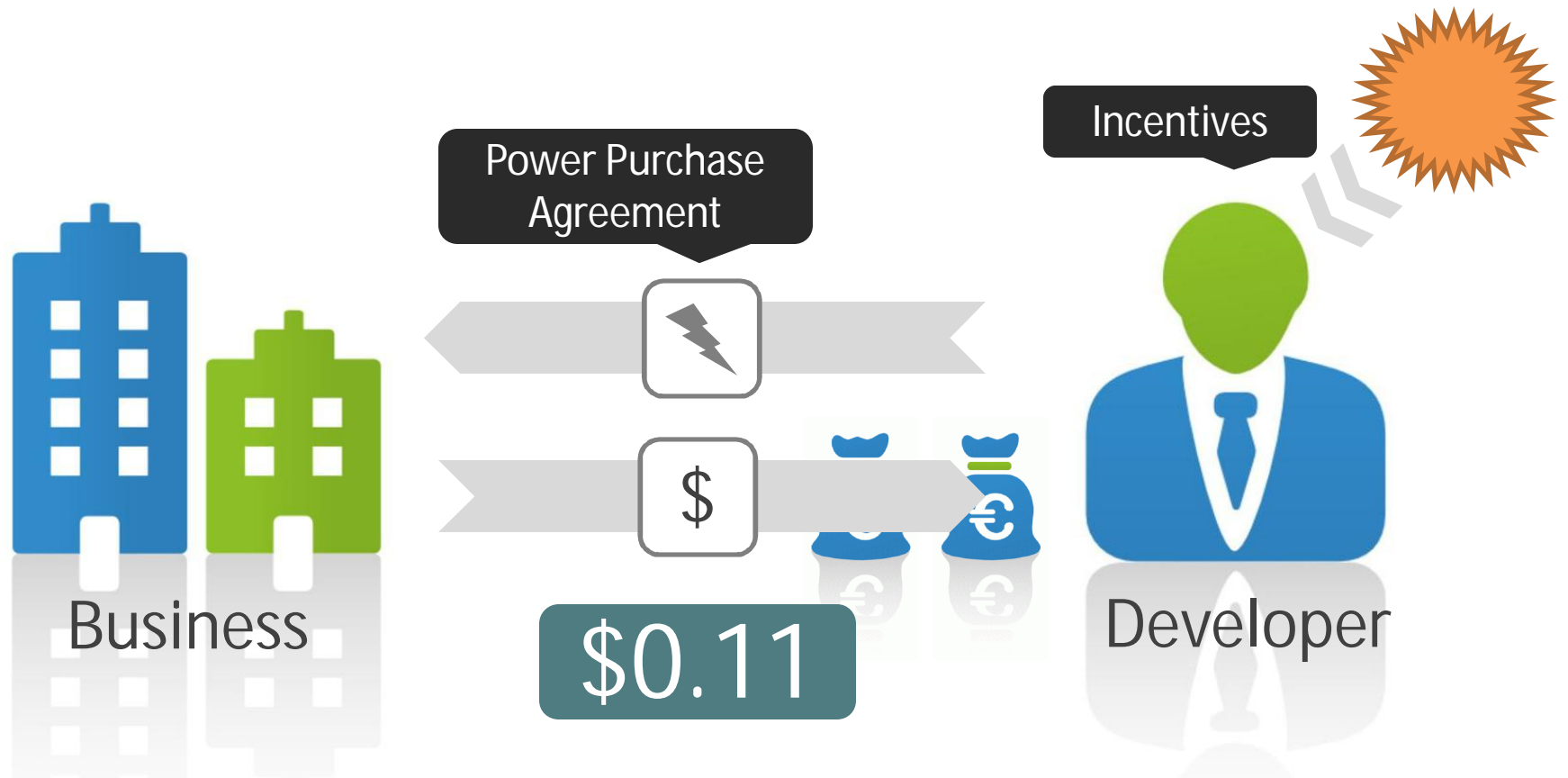
Debt Repayment



Bank



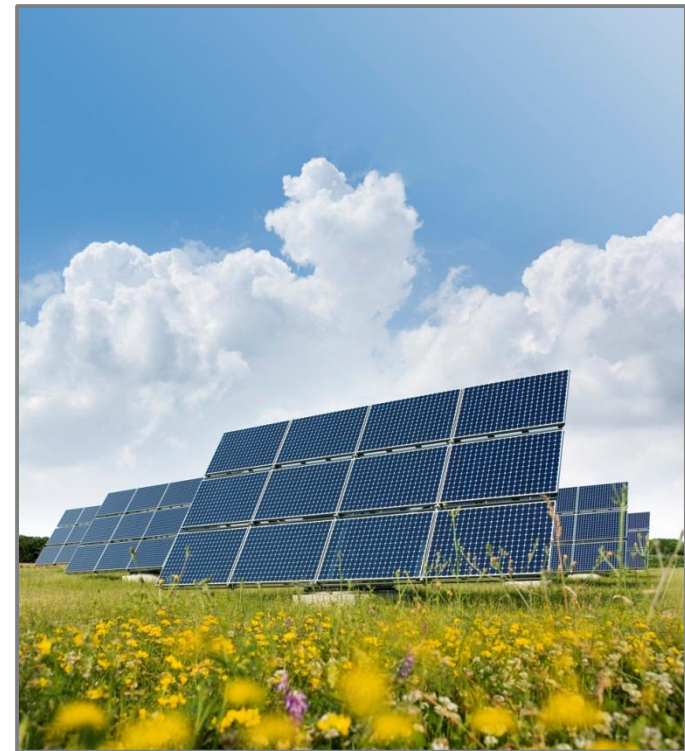
# OPTION 3: THIRD PARTY OWNERSHIP





# IF SOLAR IS SO GREAT WHY ISN'T IT ON MY ROOF?

- There are some key misperceptions and some real barriers to investing in solar.

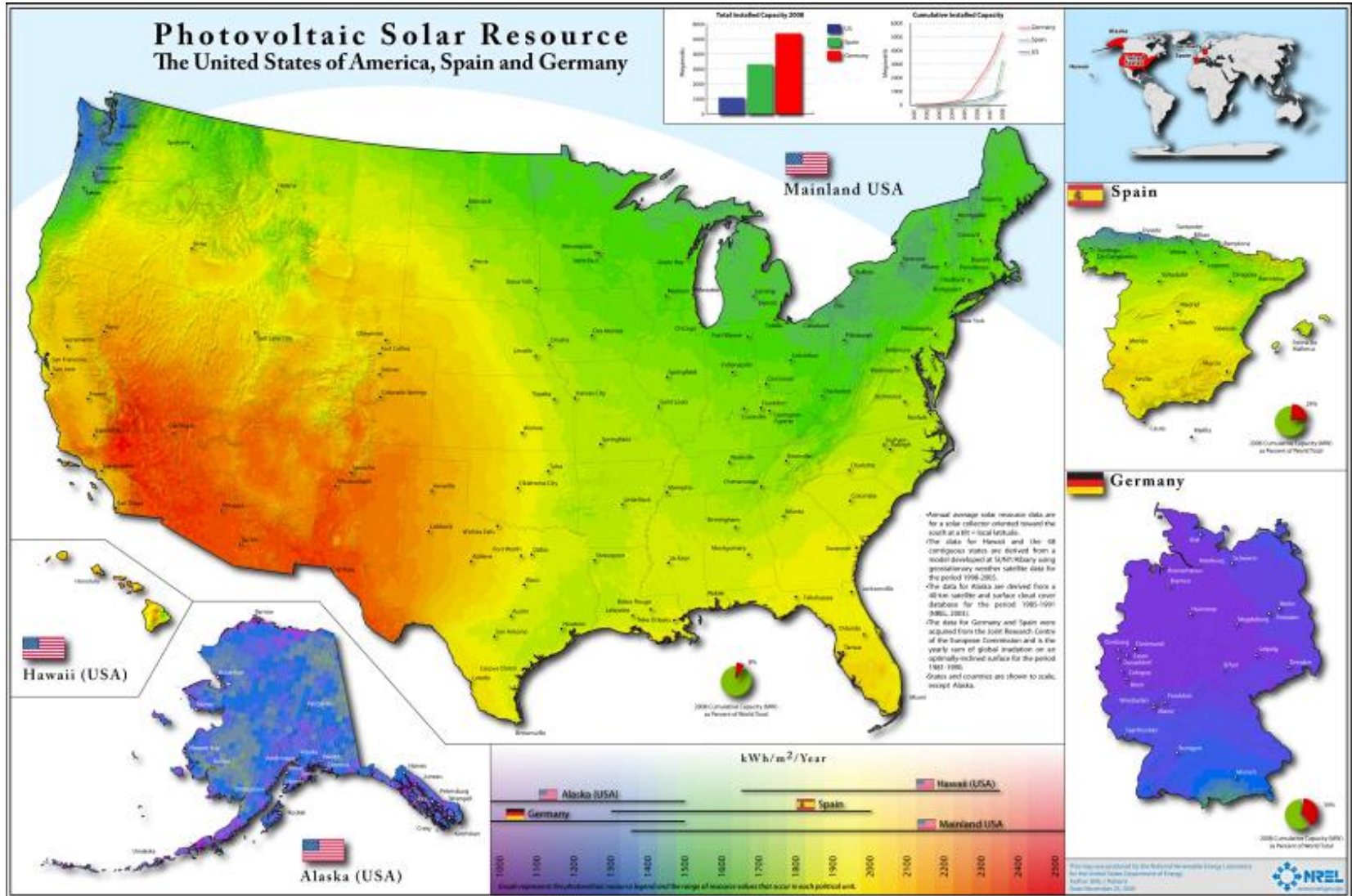






## MYTHS OR MISCONCEPTIONS

- It's not sunny enough in Massachusetts
- Solar takes up too much land
- I should wait because a better technology is around the corner
- Solar is an option only because of lavish subsidies





# Myths or Misconceptions

- It's not sunny enough where I live
- Solar takes up too much land
- I should wait because a better technology is around the corner
- Solar is an option only because of lavish subsidies

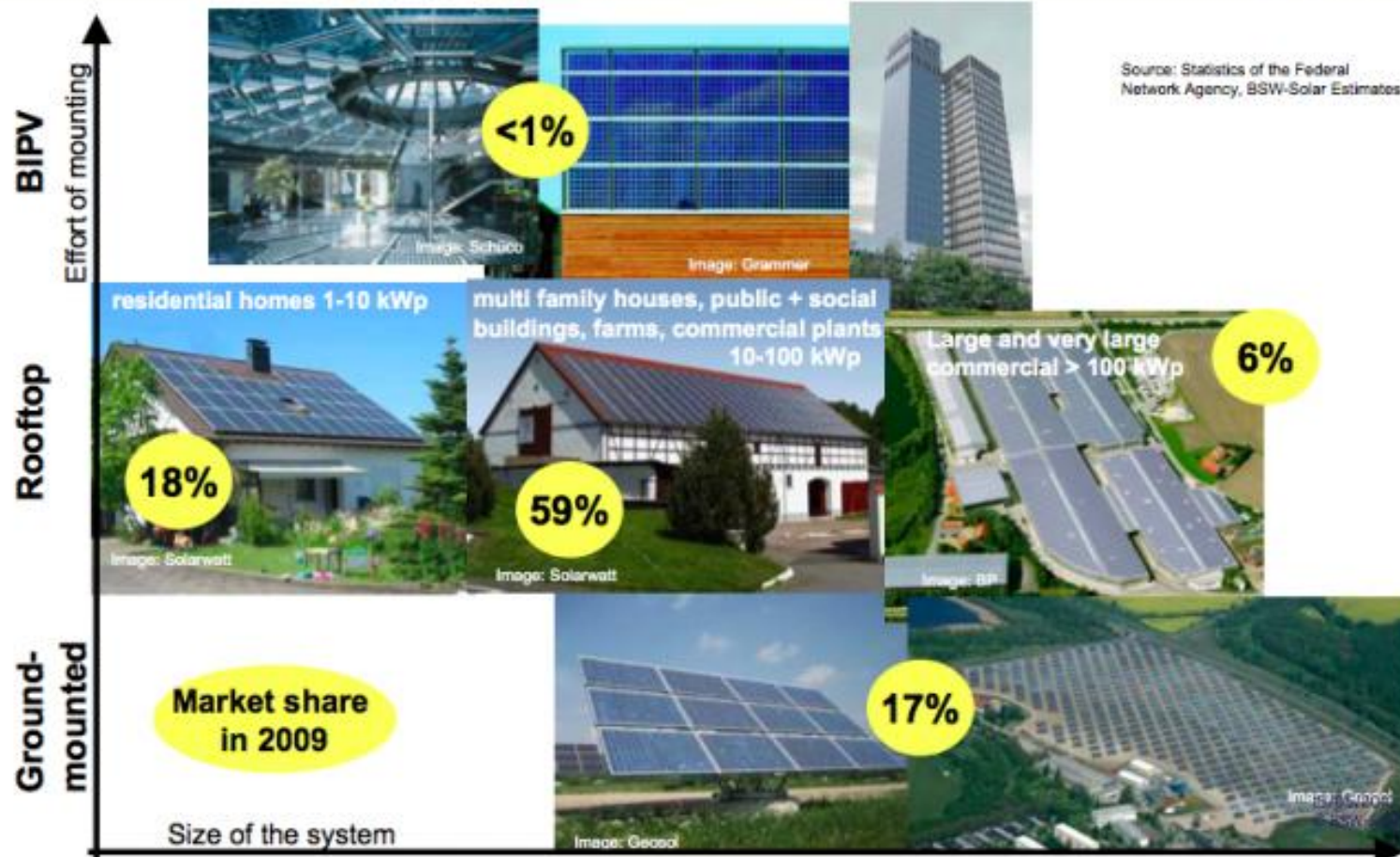


Photo: Walmart Stores seen on Flickr.  
Sam's Club in Chino California

[www.mc-group.com](http://www.mc-group.com)



# Market segments of on-grid PV systems





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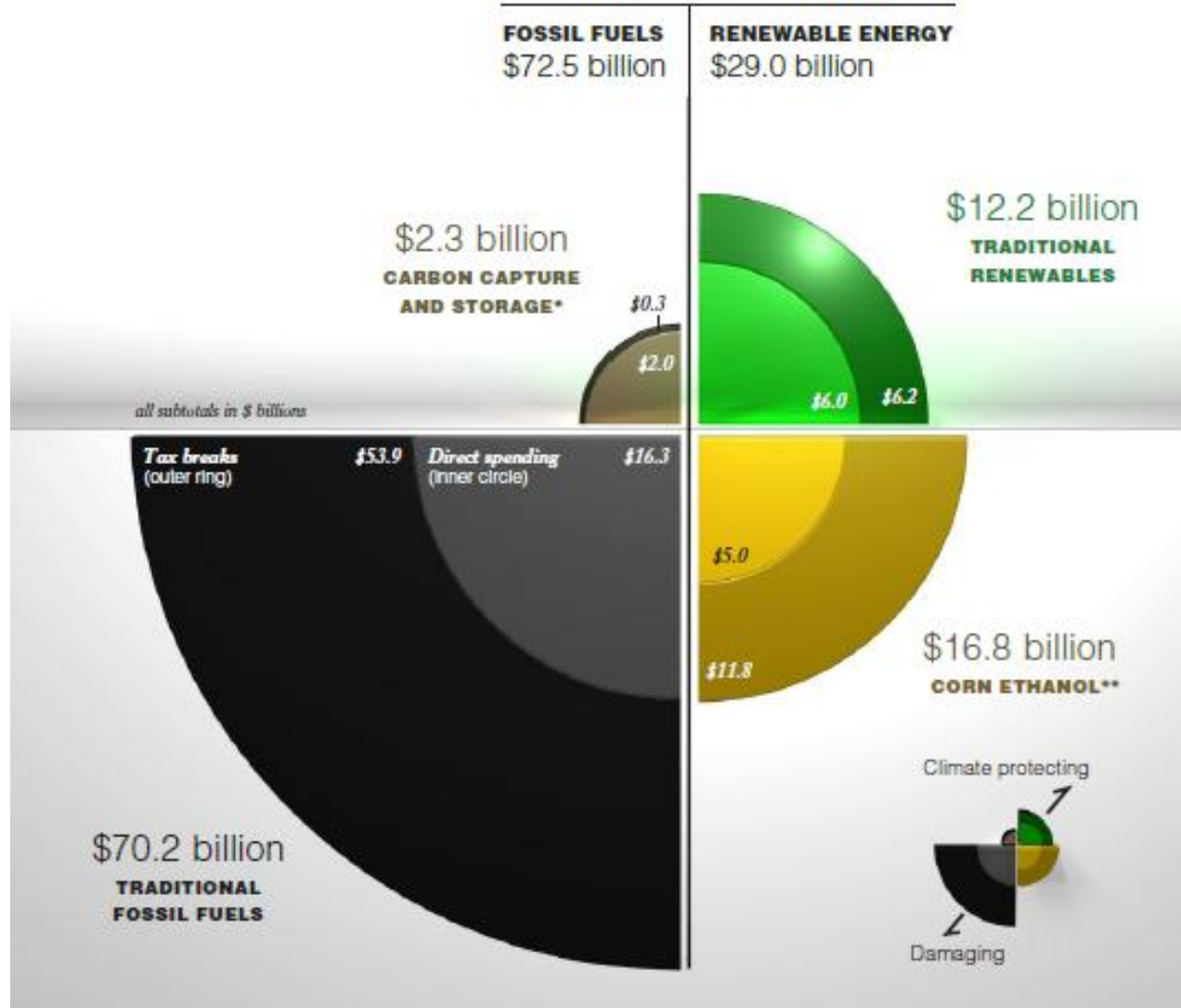
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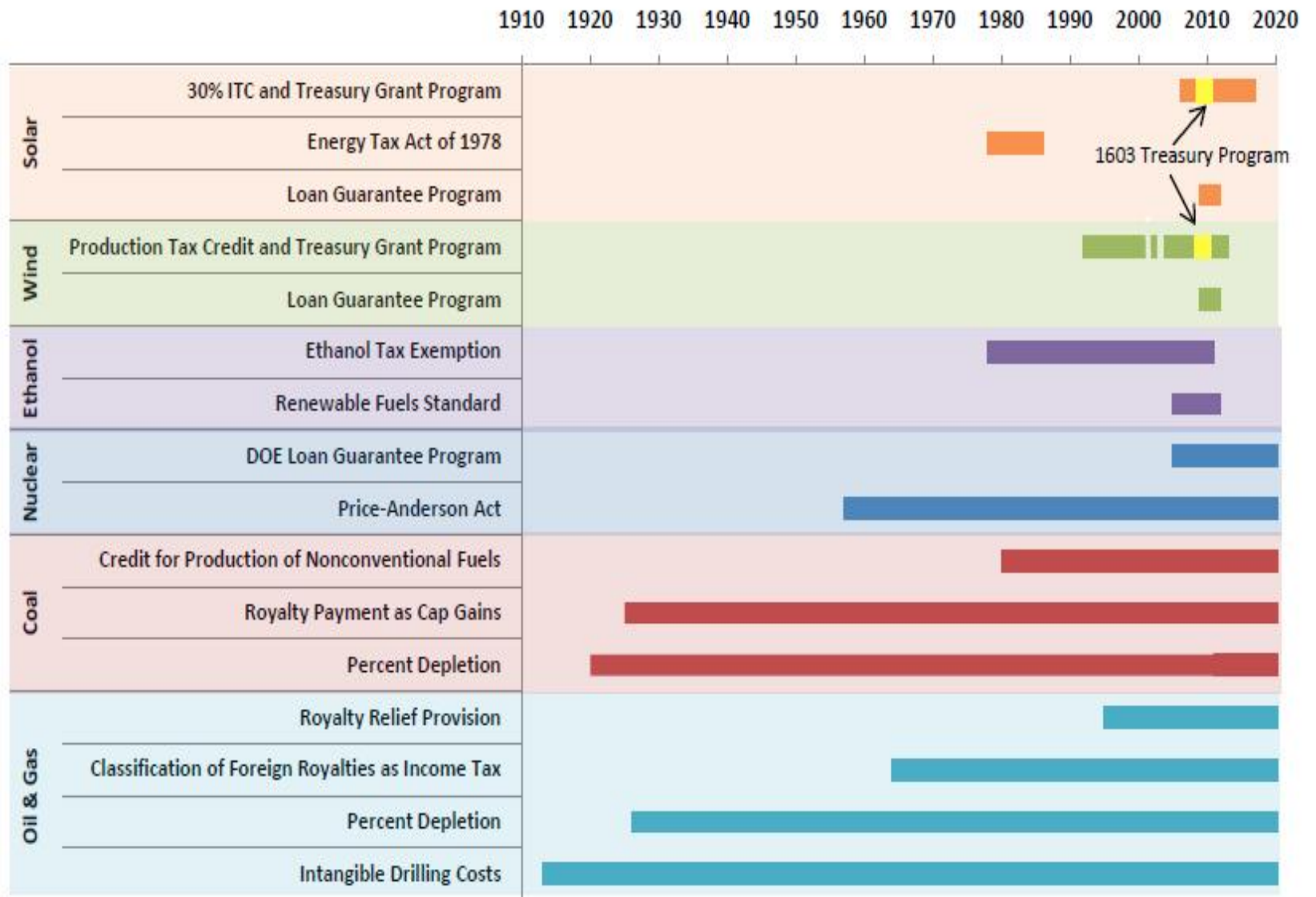




## Federal Subsidies (2002-08)



Source: Environmental Law Institute

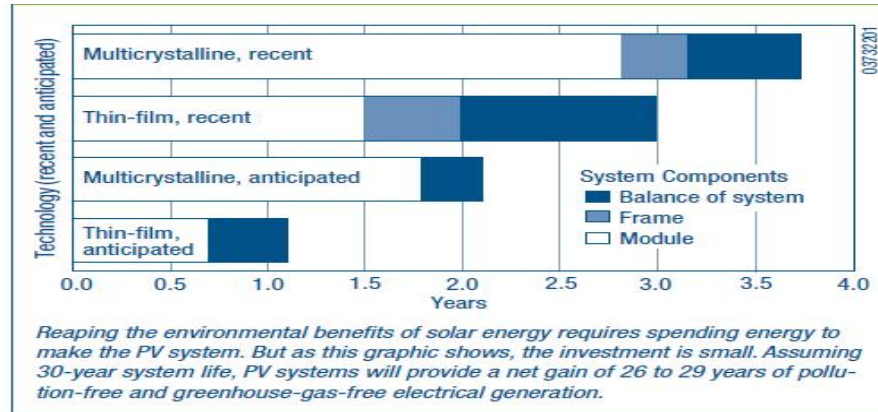


Source: SEIA, Federal Energy Incentives in the United States (2011), [http://www.seia.org/galleries/pdf/Federal\\_Energy\\_Incentives\\_in\\_the\\_United\\_States.pdf](http://www.seia.org/galleries/pdf/Federal_Energy_Incentives_in_the_United_States.pdf)



# OTHER MISCONCEPTIONS

- It takes more energy to make the panels than they produce.  $\longrightarrow$



Source: NREL

- Glare  $\searrow$



Boston Logan Airport

- It will wreck property values.  $\longrightarrow$



Source: Tracking the Sun IV, SunRun



## THERE ARE STILL REAL BARRIERS

- It's unusual to pay for 25 years of electricity up-front
- Up-front cost for small residential PV systems can be between \$5,000-\$15,000 after rebates and incentives.
- I might not stay in my home long enough for the system to payback. 6-10 year payback might be too long.



# CAN I EVEN PUT SOLAR ON MY ROOF?

- Expensive roof repairs?
- Electrical upgrade?
  - 60 amp service line from the street?
  - knob and tube wiring?
- Getting everything up-to-code?

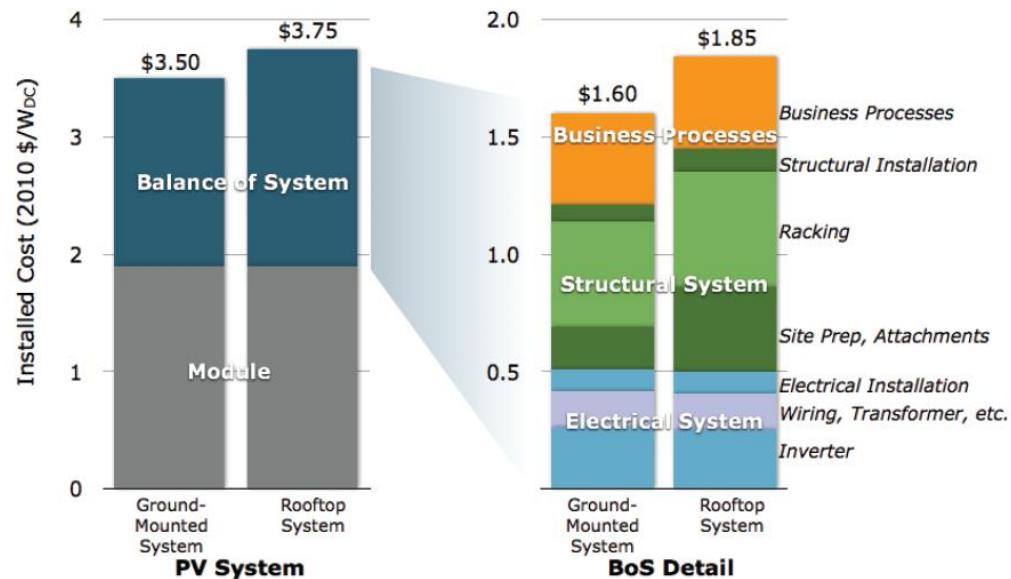


Panels on hurricane damaged roof in Florida. From One Block off the Grid:  
<http://1bog.org/yes-solar-panels-can-survive-a-hurricane/>



# LOCAL PERMITTING CHALLENGES

- Fire setbacks
- Multiple permits and inspections
- Permitting delays
- Local building officials unfamiliar with the technology or the local installer community





# MASSACHUSETTS MUNICIPAL SOLAR GOLD RUSH

- Third-party developers like municipalities because...
  - Large open spaces (landfills, brownfields, etc.)
  - Low credit risk
  - Significant aggregate electricity loads
  - Future net metering allocation
- Cities and towns that can deliver multi-megawatt projects have a strong bargaining position



# THIRD-PARTY SOLAR: THE REWARDS

## Project Owner

- Tax benefits (ITC, state tax deductions, depreciation)
- SRECs revenue
- Offtaker contract revenue

## Municipality

- Low-cost, long-term power contract
- Meet municipal renewable energy goals







# THIRD-PARTY SOLAR: THE RISKS

## Project Owner

- SREC market price and regulatory risk
- Municipal default risk
- Project performance risk

## Municipality

- Net-metering regulatory risk
- Market electricity price risk
- Technology and incentive timing risk





# MUNICIPAL PROCUREMENT PATHWAYS

Procurement pathways available to local governments

- 30B, 25A 11C or 25A 11I?

Lowest bidder/design-build good fit for some projects, but...

- May not be best for complex projects
- Uncertainty around geotech, interconnection and structural conditions can skew bids

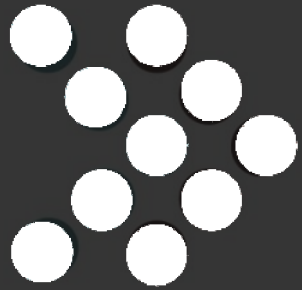
25A 11I RFQ with open-book negotiations

- Multi-site procurements (i.e. the “Hunting License” option)
- Negotiate pricing after project costs have been determined



## SOME THINGS TO CONSIDER

- Understand and be comfortable with the financing structure and all project partners
- Set realistic timelines based on regulatory requirements
- Community process is critical
- If it sounds too good to be true... you may still be able to get a better deal



THANK YOU FOR YOUR TIME  
QUESTIONS?

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