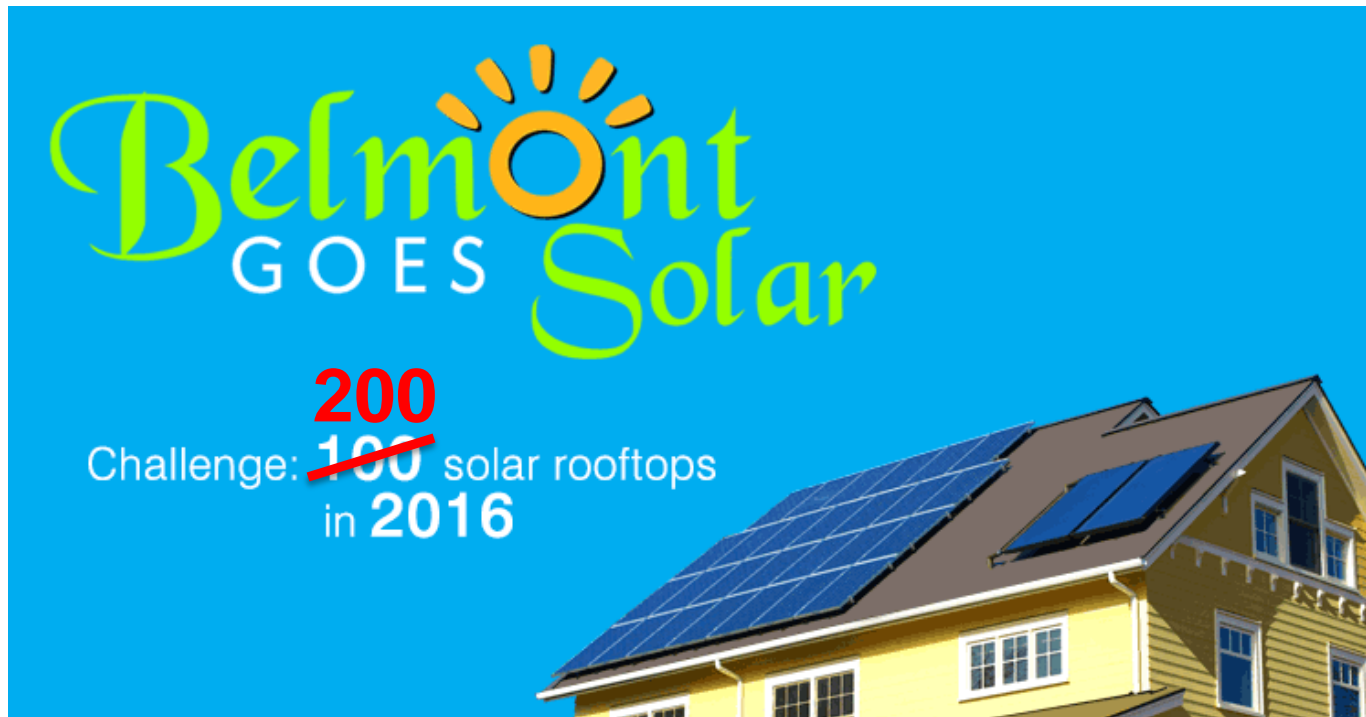


# Who is Belmont Goes Solar?



## **Group of environmentally conscious citizens that support solar in Belmont:**

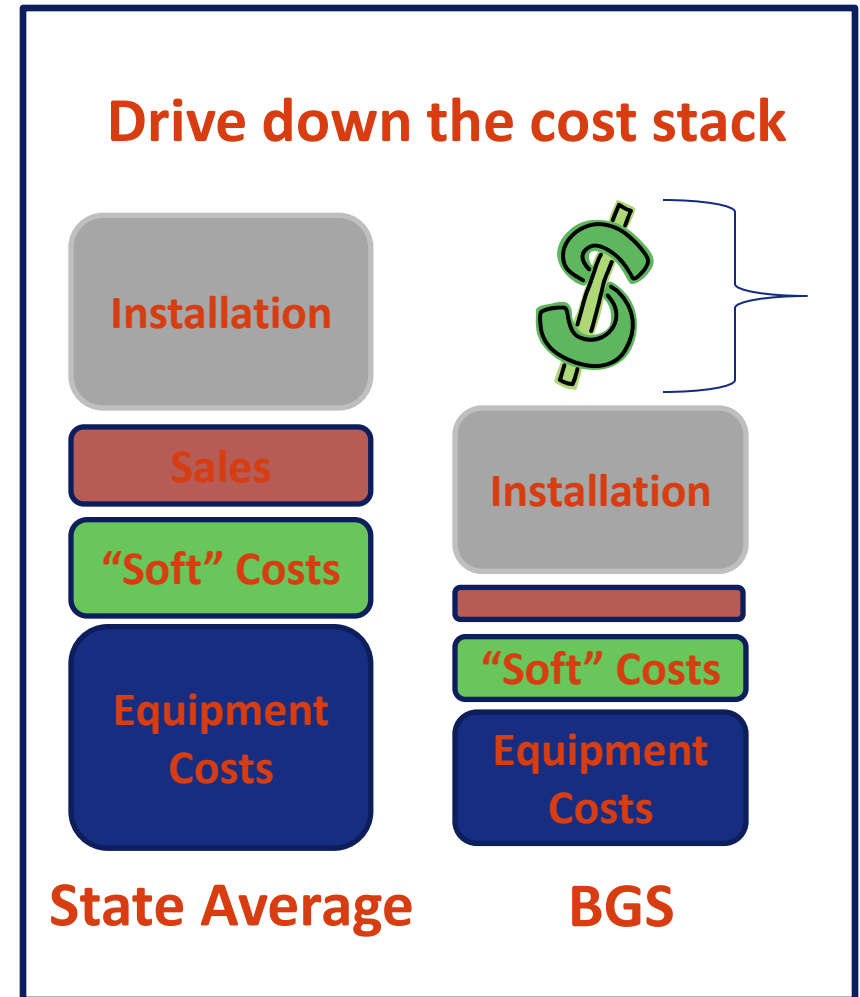
- Supported by the Board of Selectmen
- Belmont Energy Committee
- Mothers Out Front
- Sustainable Belmont
- Belmont Light.

It is not an agency, board or committee of the Town of Belmont.

# GOALS



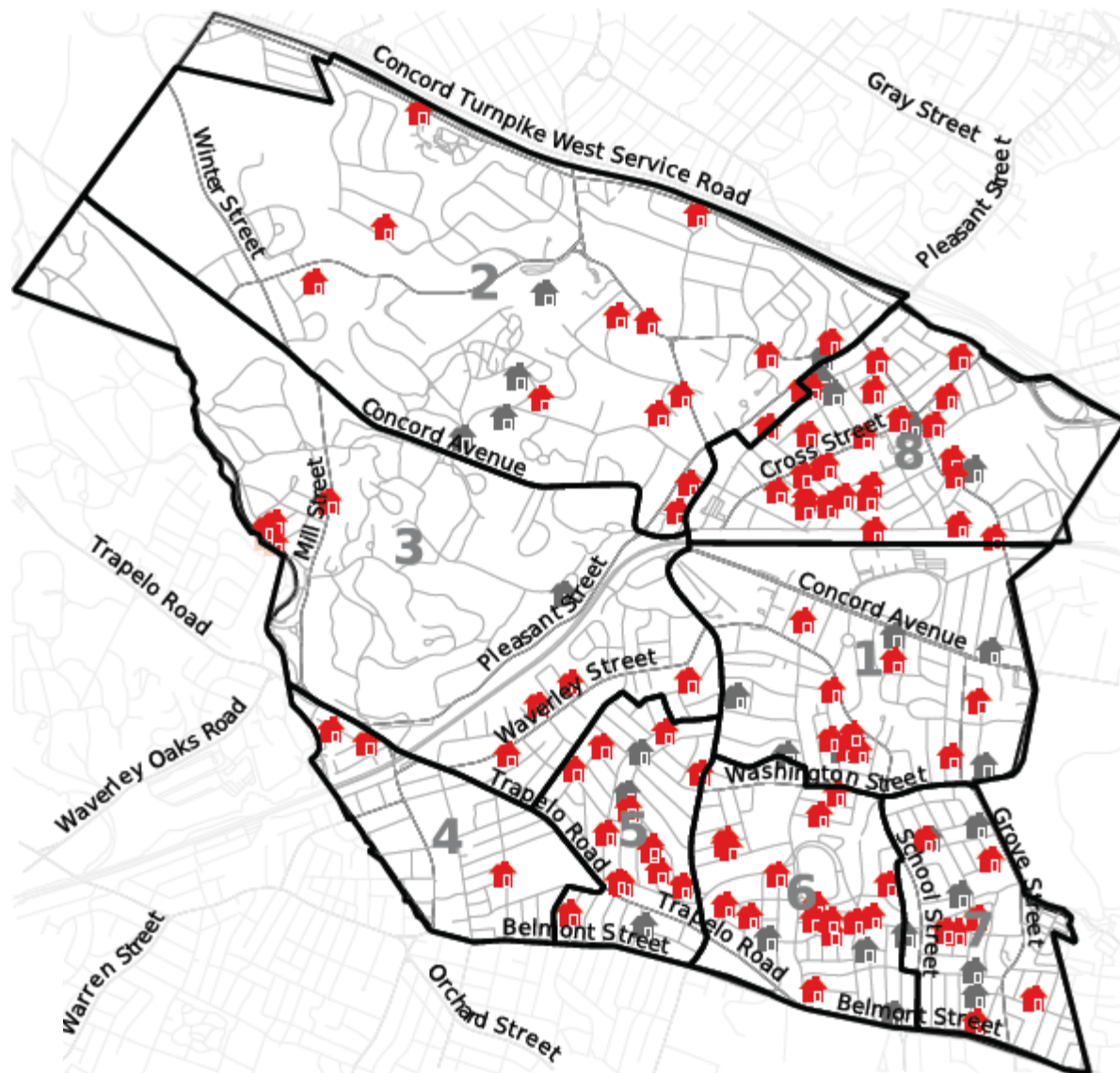
- Increase education through outreach
- Introduce model to simplify process
- Reduce time to contract
- Reduce installation costs
- Increase adoption



# Solar Installations in Belmont

Grey: Old (~20)

Red: New from BGS  
campaign (>125)



# Why Direct Energy Solar ?

---

- Excellent value and equipment
- Good and committed people
- Strong local presence (over 200 employees in MA in 3 locations)
- Owned by large national energy company to ensure long-term survival
- Big enough to get all Belmont installations done in a timely manner
- Experience from 15 MA solarize campaigns

**“DES will make it easy for customers”**





# **Solar Energy Revolution**

# World Energy Resources

World Energy Use  
19 TWy/year (2014)



RENEWABLE ENERGY  
RESERVES

TIDES <sup>1</sup>  
0.3 per year

0.3 – 2 per year  
Geothermal<sup>1,7</sup>

3 – 4 per year  
HYDRO <sup>1,6</sup>

2 – 6 per year  
Biomass <sup>1,5</sup>

3 – 11 per year  
OTEC<sup>1,4</sup>

25-70  
per year  
WIND<sup>1,2</sup>  
Waves<sup>1,3</sup>

FINITE ENERGY  
RESERVES

Natural Gas <sup>1,8</sup>

215  
total

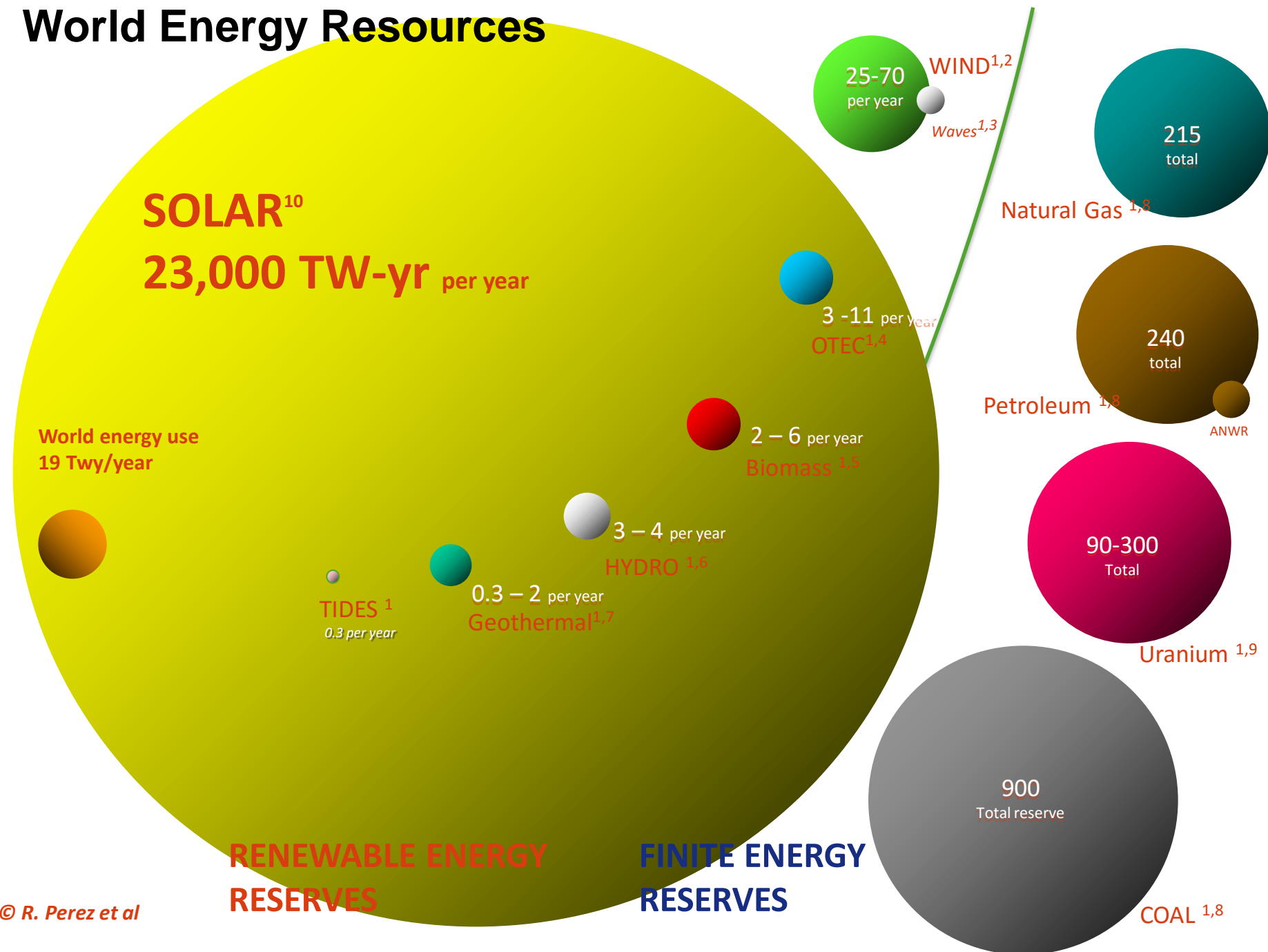
Petroleum <sup>1,8</sup>

240  
total  
ANWR

90-300  
Total  
Uranium <sup>1,9</sup>

900  
Total reserve  
COAL <sup>1,8</sup>

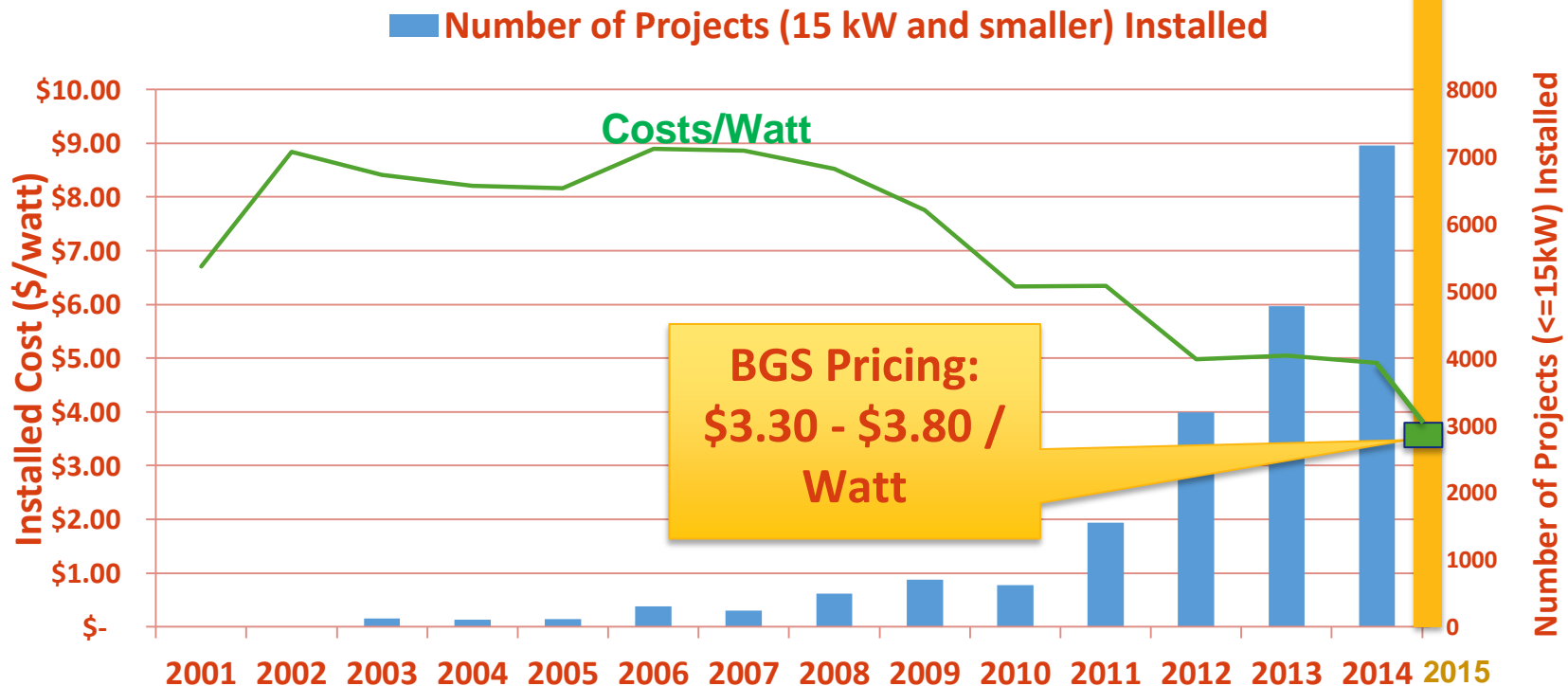
# World Energy Resources



# MA Residential Solar Projects

**2015:**  
**17,372 projects**

**~150% Increase**  
**from 2014**

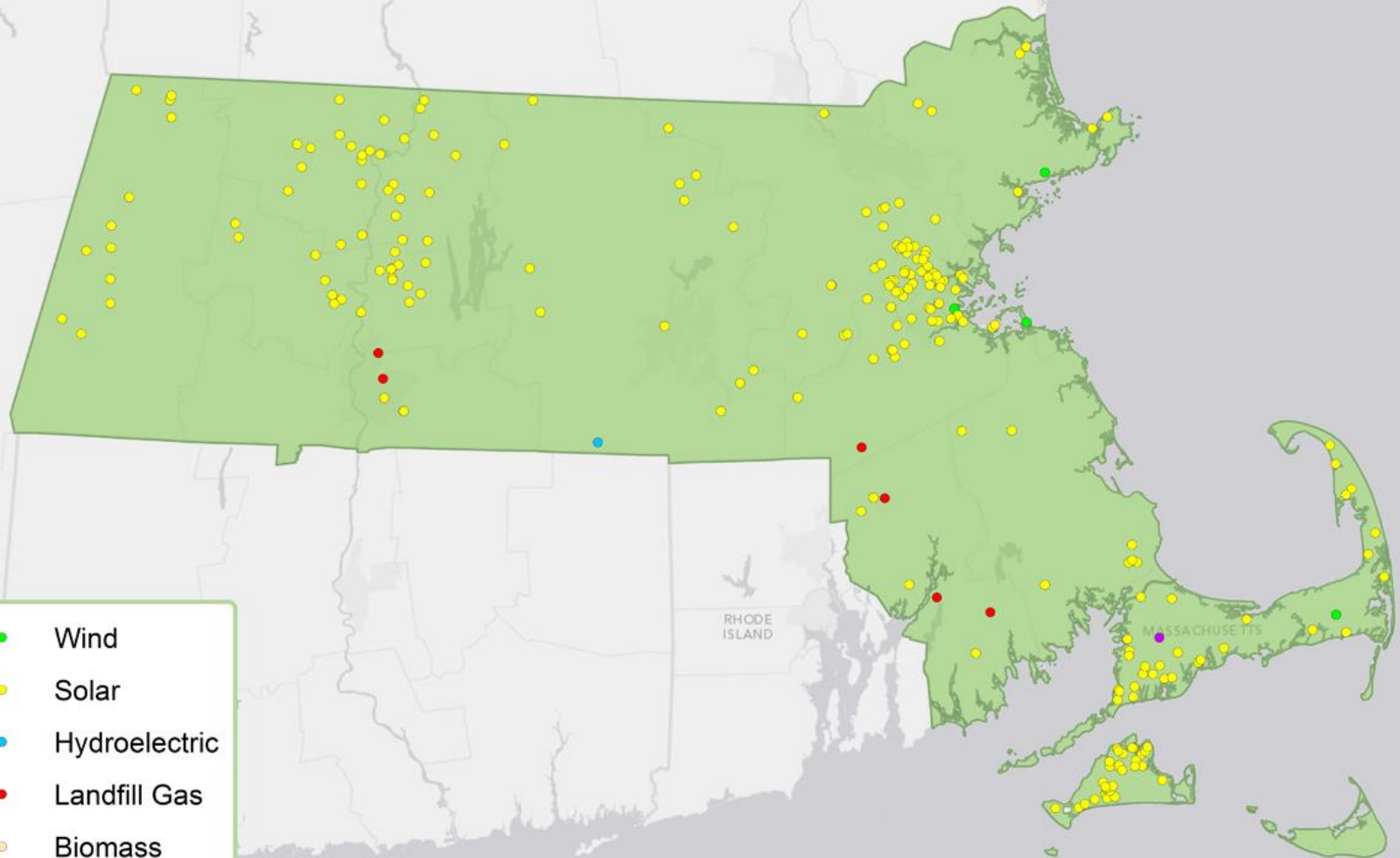


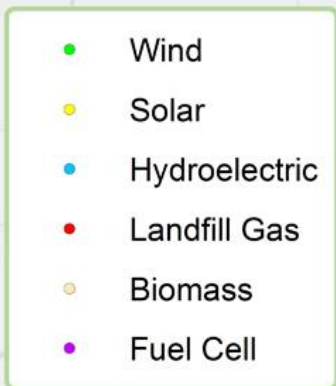




MASSACHUSETTS  
CLEAN ENERGY  
CENTER

2006

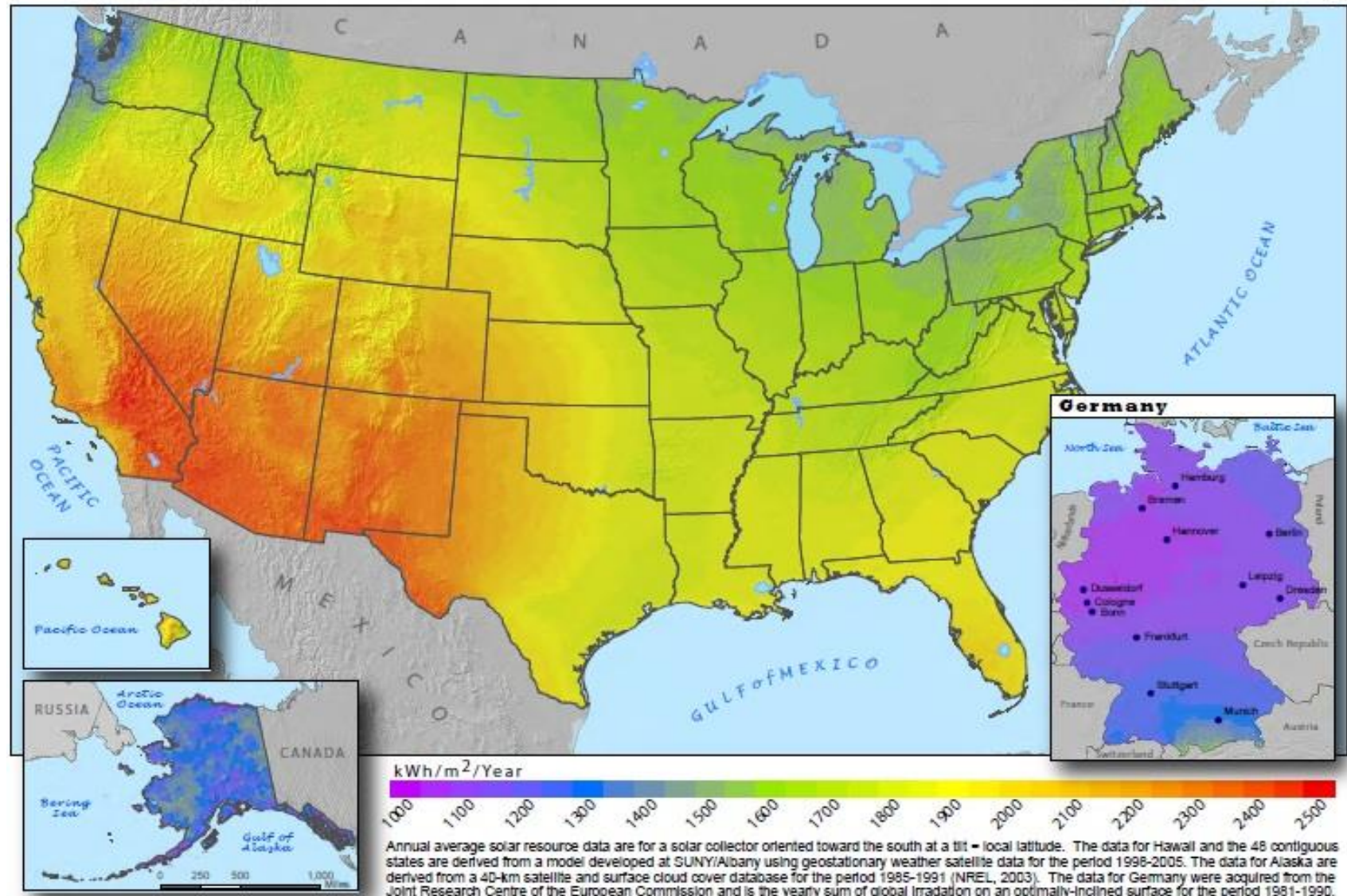






# Is There Enough Sun In MA?

Yes, we have ~50% more than Germany





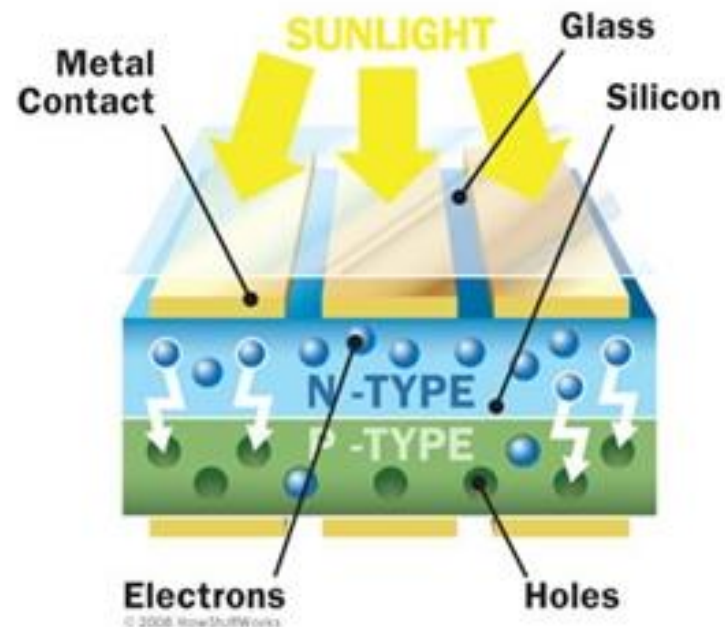
# How does Solar PV work



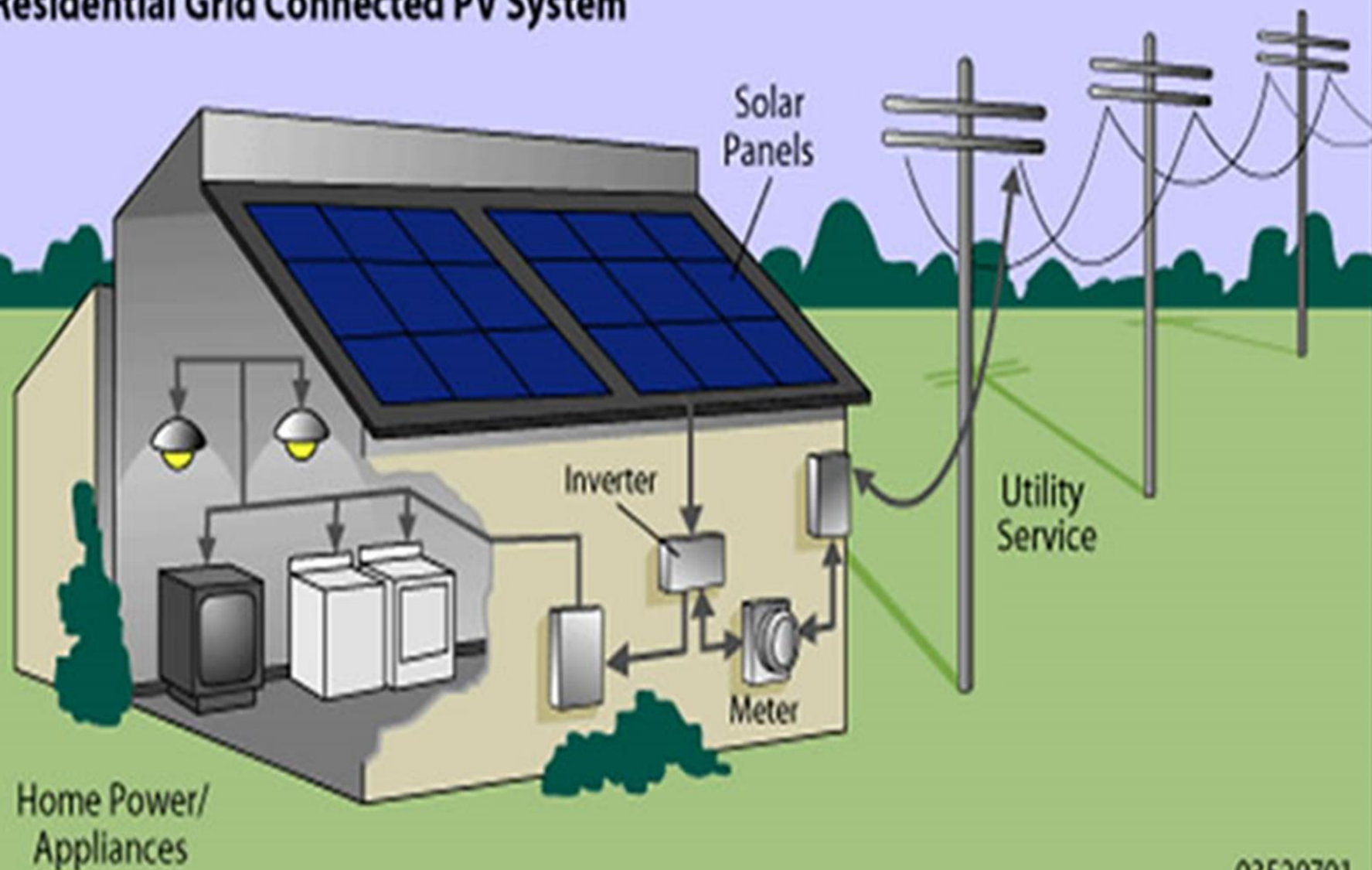
# How Solar Works

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Solar panels capture sunlight and convert photons to create an electrical current (DC)



## Residential Grid Connected PV System

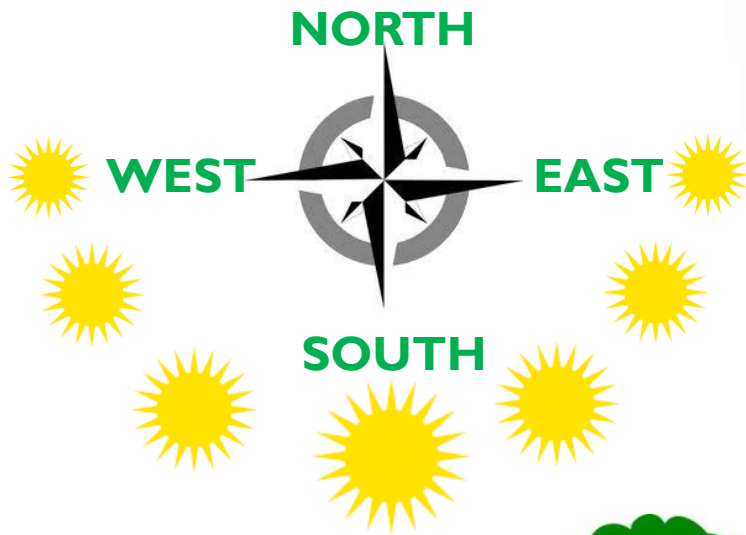


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# Homes Best for Solar

✓ Lots of Sunshine



✓ Little Shade

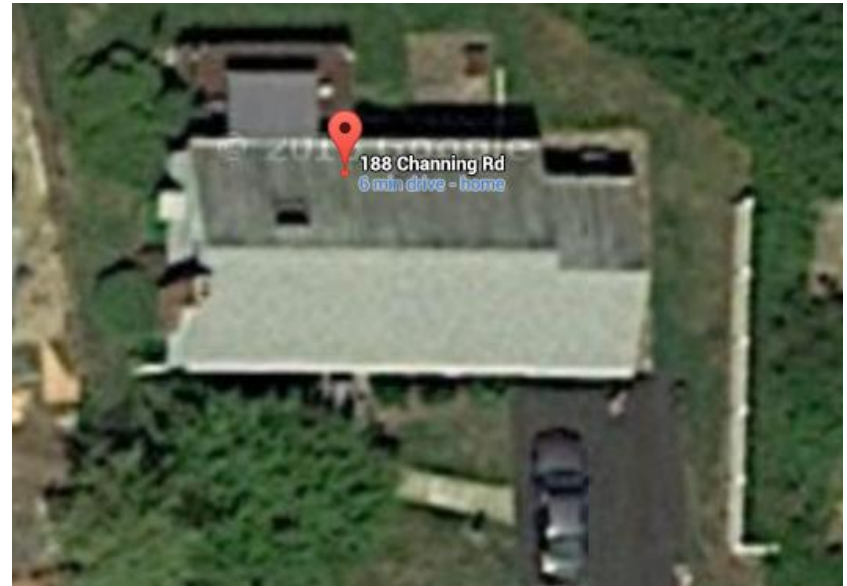


✓ Open Roof Structure



# Example: Ideal Roof for Solar

- **Southern orientation**  
(West and East works too)
- **Little Shading**
- **Clean Roof**
- **Roof in good shape**



188 Channing Rd, Belmont, MA 02478, USA

✓ Analysis complete. Your roof has:

- 1,586 hours of usable sunlight per year  
Based on day-to-day analysis of weather patterns
- 595 sq feet available for solar panels  
Based on 3D modeling of your roof and nearby trees

**\$27,000 savings**  
Estimated net savings for your roof with a 20-year lease



Data from Google  
Project Sunroof



# Different PV Systems



**Roof Mount**



**Ground Mount**





## **Example: Colonial with whole roof coverage – very clean look**

**Note: Belmont requires 1 foot offset from edges**







**Partial Roof Coverage**

**Multiple Arrays**

**Working around  
dormers**







**Ground mounted system**





# Environmental Benefits – 5kW System

## Equivalent Environmental Benefit

OVER 30 YEARS



3,030 trees planted



22 cars taken off the road for a year



0.6 railcars of coal not burned



41 tons of waste recycled rather than landfilled



1.6 tanker trucks of gasoline not burned

Source: <http://www.directenergysolar.com/the-basics/environmental-benefits/>

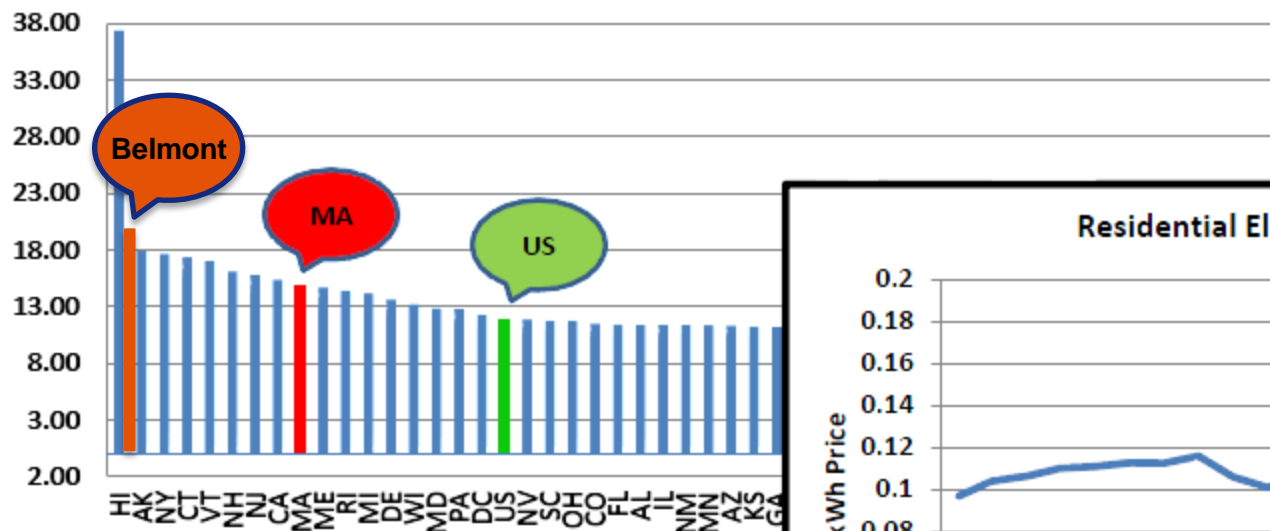


# Economics

## Residential Solar in Belmont

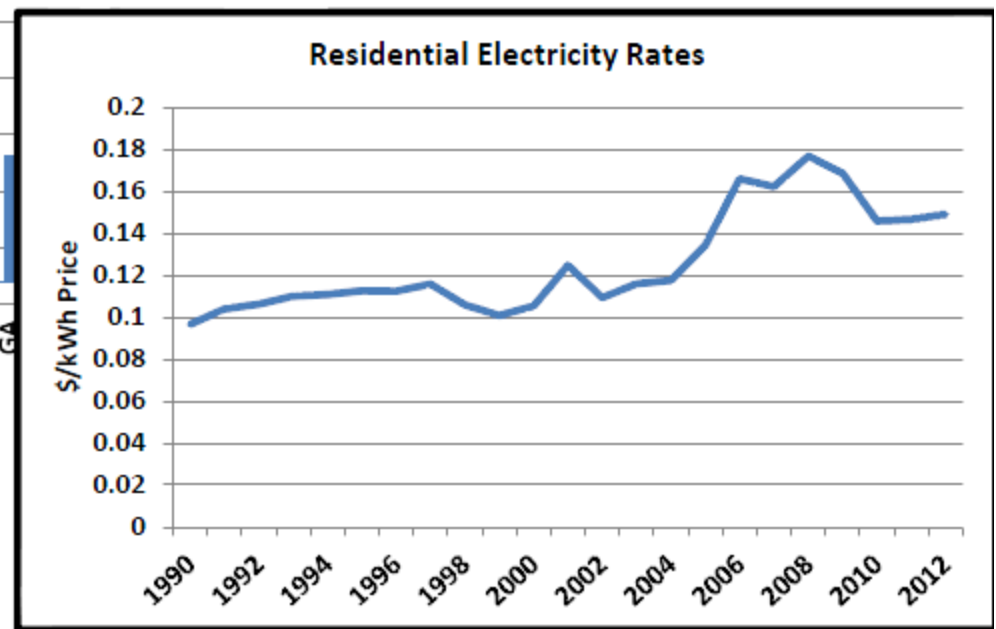
# Mass Residential Electricity Prices

2012 Avg Residential Electricity Prices  
(cents per kWh)



MA homeowners had the 9<sup>th</sup> highest average electricity prices in 2012.

Sources: EIA 2012 Data



>> MA Electricity Rates increased on average 3-4% per year

# Financial Benefits of Solar

---

## **Federal Tax Credit (not a deduction)**

- 30% of gross system price, uncapped

## **MA State Tax Credit**

- 15% of system cost, capped at \$1,000

## **SREC's (Solar Renewable Energy Certificate)**

- State program provides income for 10 years

## **Electric Utility Bill Savings**

- Solar Electricity used in the house eliminates the need to buy it from Belmont Light at ~19 cents/kWh

## **Belmont Light Buyback Credit for Excess Power**

- Credit for electricity sent back to the grid at 11 c/kWh

## **No Increase in Property Tax; No Sales Tax**



# Basic SREC Information

---

- State incentives for solar for 10 years
- 1 SREC for each 1,000 kWh of solar production
- SREC's are auctioned by the State
- SREC-II prices expected: ~\$285 (year 1) to ~\$180 (year 10)
- SRECs get paid normally once per year
- Direct Energy Solar offers free SREC aggregation for 5 years

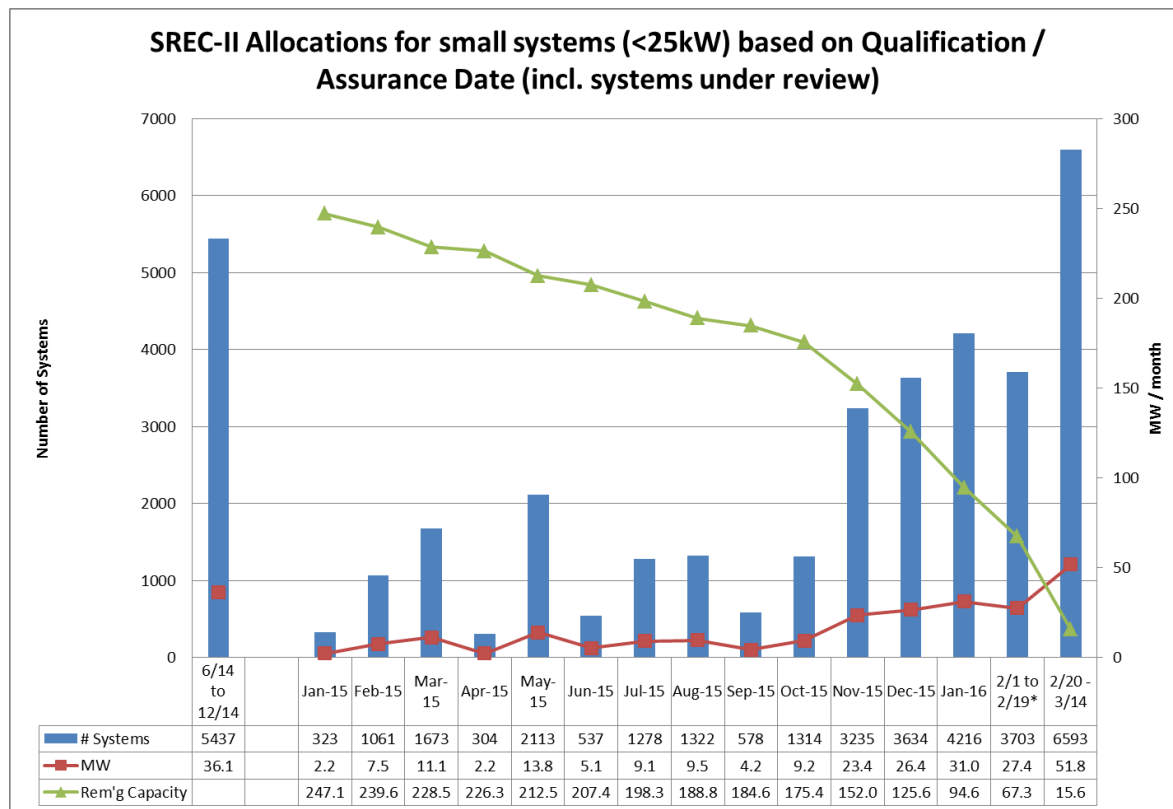


# The Current SREC Situation

- SRECs are important for financial payback
- SREC-II program cap of 1600 MW has been reached - but:
- **MA-DOER has temporary extended the SREC-II program until a new solar program is announced.**

➤ **Good news!**

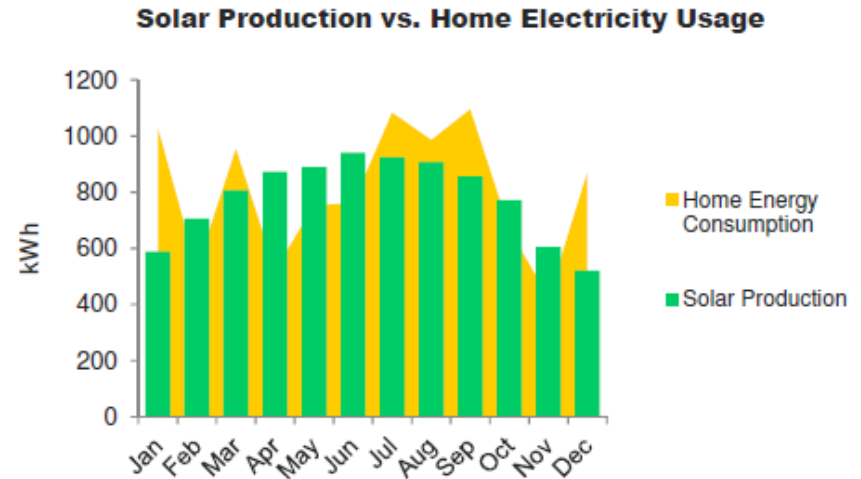
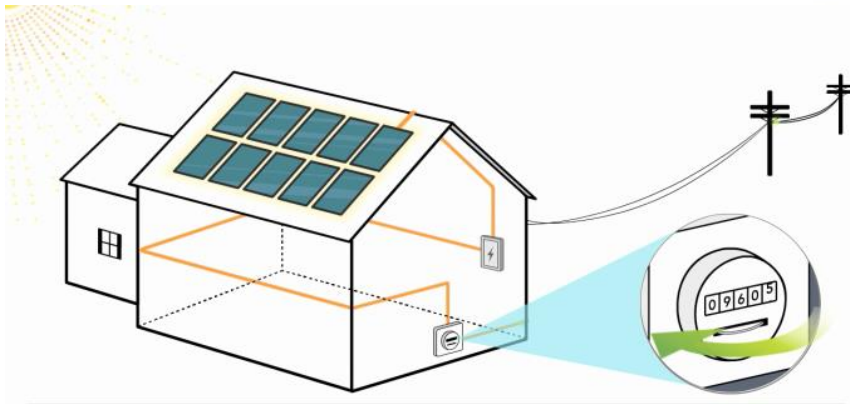
➤ **Get in on SREC-IIs now because the next program will provide less incentives!**





# Belmont's Solar Buyback Credit

- Solar electricity used in the home saves 18.5 c/kWh
  - Excess energy sold back to Belmont Light at 11 c/kWh
- **Value of solar electricity in Belmont is ~13-15 cents/kWh depending on usage profile**



# BGS Base Package

---

**\$3.30/watt**

- High-quality Q-Cells 265W panels
- Enphase Microinverters with 25 year warranty

## All-in Package Price includes:

- Permits
- Design & Structural Analysis
- Roof Enforcements (up to \$750)
- Installation & Interconnection
- System Monitoring
- 10-year Production Guarantee
- 10-year Workmanship Warranty
- 5 years free SREC management





# Adders & Enhancements\*

## Upgrades:

- All-black 300W LG panels (\$3.60/W)
- 20 year Workmanship Warranty (10c/W)
- 20 year Production Warranty
- Panel Level Monitoring

## Site-Specific Adders (examples):

- Critter or snow guards (\$45/panel)
- Flat roof installation
- Ground-mount system



*\*Every system is unique;  
design and cost depends on your  
site and preferences*



# Financing Options

## Purchase

- Upfront Cost
- **No** Monthly Payments
- Tax Credits & SRECs Go To Owner
- **Most savings**

**0% interest bridge loan for amount of tax credits available**

## Finance

- **No** Upfront Cost
- Monthly Payments
- Tax Credits & SRECs Go To Owner
- **Guaranteed SREC payment plan**
- Substantial savings



# Pricing Example 1

## (value system with good sun)

---

**Production Factor: 1,200 kWh/kW**

PURCHASE	
Belmont Goes Solar Base Price (5 kW system at \$3.30/watt)	\$16,500
30% Federal Tax Credit	(\$4,950)
15% MA Tax Credit (max 1000)	(\$1,000)
<b>Net System Cost</b>	<b>(\$10,550)</b>
Annual Electricity Savings (6,000 kWh @13 cents)	\$780
SREC payment \$225 (est. avg payment price over 10 years)	\$1,350
<b>Total Avg. Yearly Savings</b>	<b>\$2,130</b>
<b>Payback Period</b>	<b>~5.0 years</b>

# Pricing Example 2

## (high efficiency system with some shading)

---

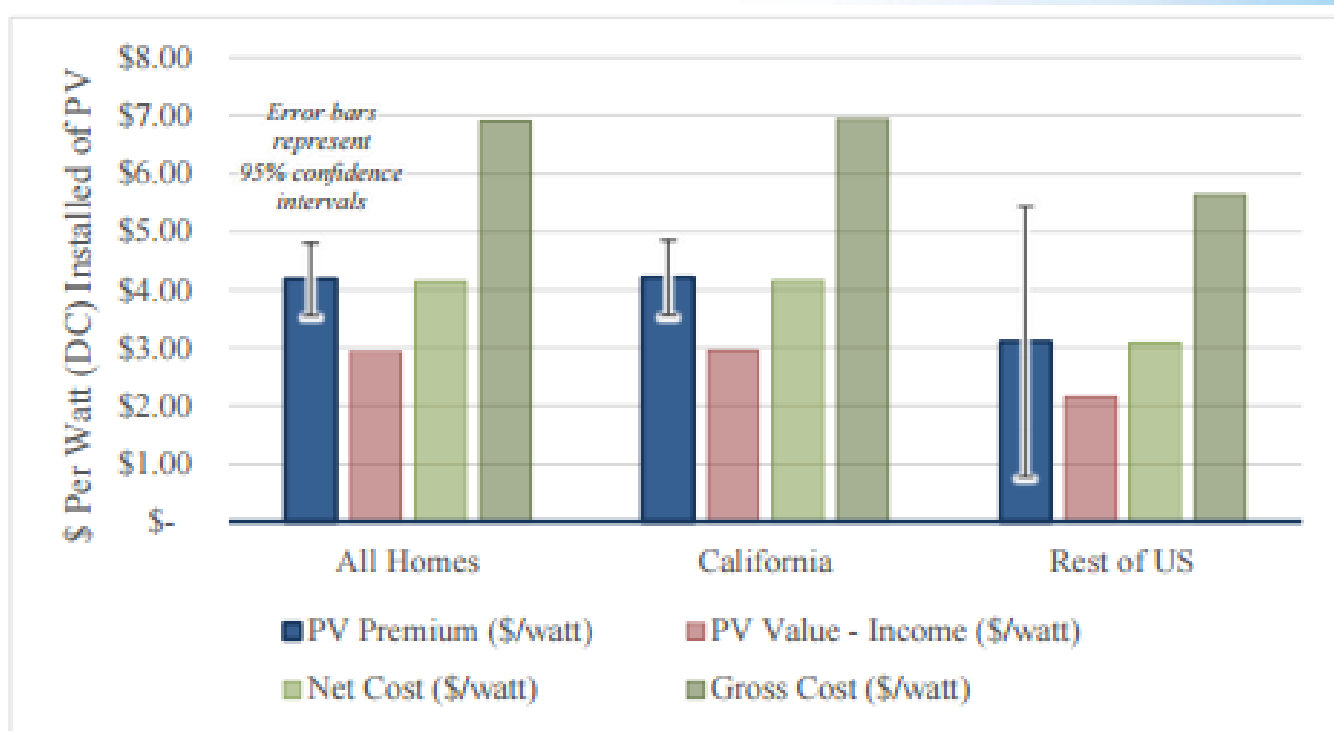
**Production Factor: 1,100 kWh/kW**

PURCHASE	
Belmont Goes Solar Price (5 kW LG system at \$3.70/watt incl. ext. warranty)	\$18,500
30% Federal Tax Credit	(\$5,550)
15% MA Tax Credit (max 1000)	(\$1,000)
<b>Net System Cost</b>	<b>(\$11,950)</b>
Annual Electricity Savings (5,500 kWh @13 cents)	\$715
SREC payment \$225 (est. avg payment price over 10 years)	\$1,125
<b>Total Avg. Yearly Savings</b>	<b>\$1,840</b>
<b>Payback Period</b>	<b>~6.5 years</b>



# Effect of Solar on Home Values

- Average Price Increase \$3-4 per Watt installed
- ~\$15,000 average premium per house sold



Source: Berkeley Nat'l Lab Study from 1/2015  
of 18,900 homes sold in CA and 7 other States incl. MA



# Process of going Solar

# Pre-Sales Process

---

## 1. Qualification Call



- Satellite Site Review
- Collect Information
- Schedule Sales Visit

## 2. Site Survey



- If required an auditor will do an onsite review

## 3. Solar Consultation



- System/design Review
- Financial Proposal

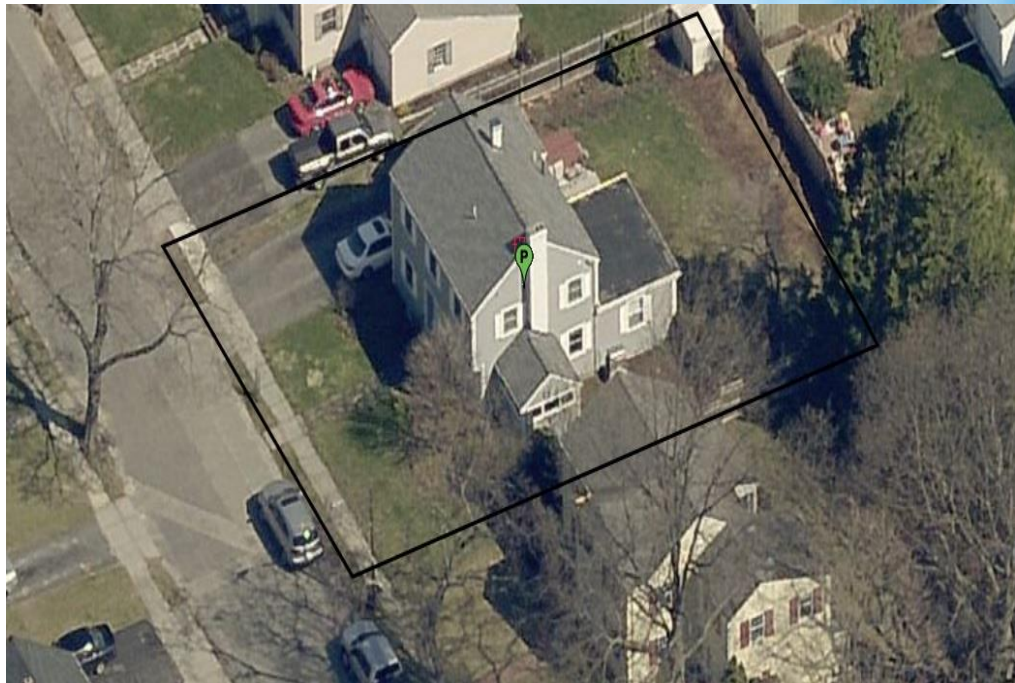


# Satellite Surveys

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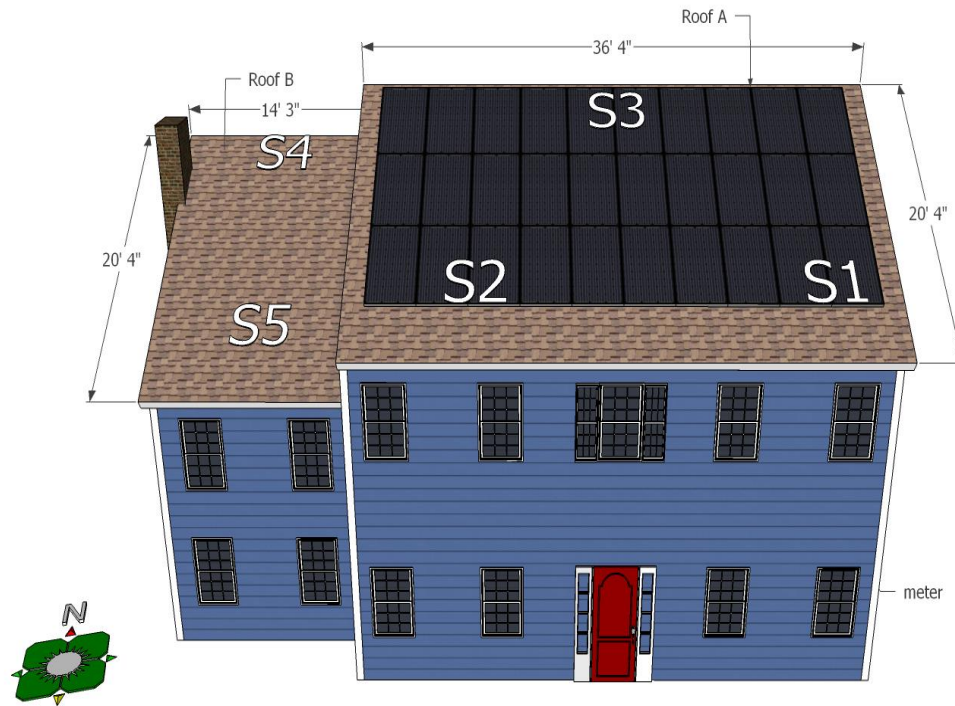
- **What we look for:**

- Dimensions
- Obstructions
- Shading
- Sun Exposure





# Custom Design Analysis



# Proposal



## SOLAR OWNERSHIP PLAN

<b>Total Cost</b>	<b>\$14,840.00</b>
Belmont Goes Solar First 20 Discount	\$500.00
MA Solar Income Tax Credit	\$1,000.00
30% Federal Tax Credit	\$4,302.00
<b>Net System Price</b>	<b>\$9,038.00</b>

### Standard Warranties

10 Year Production Guarantee

Production Guarantee covers 90% of Estimated Production

Installation Guaranteed in 120 Days

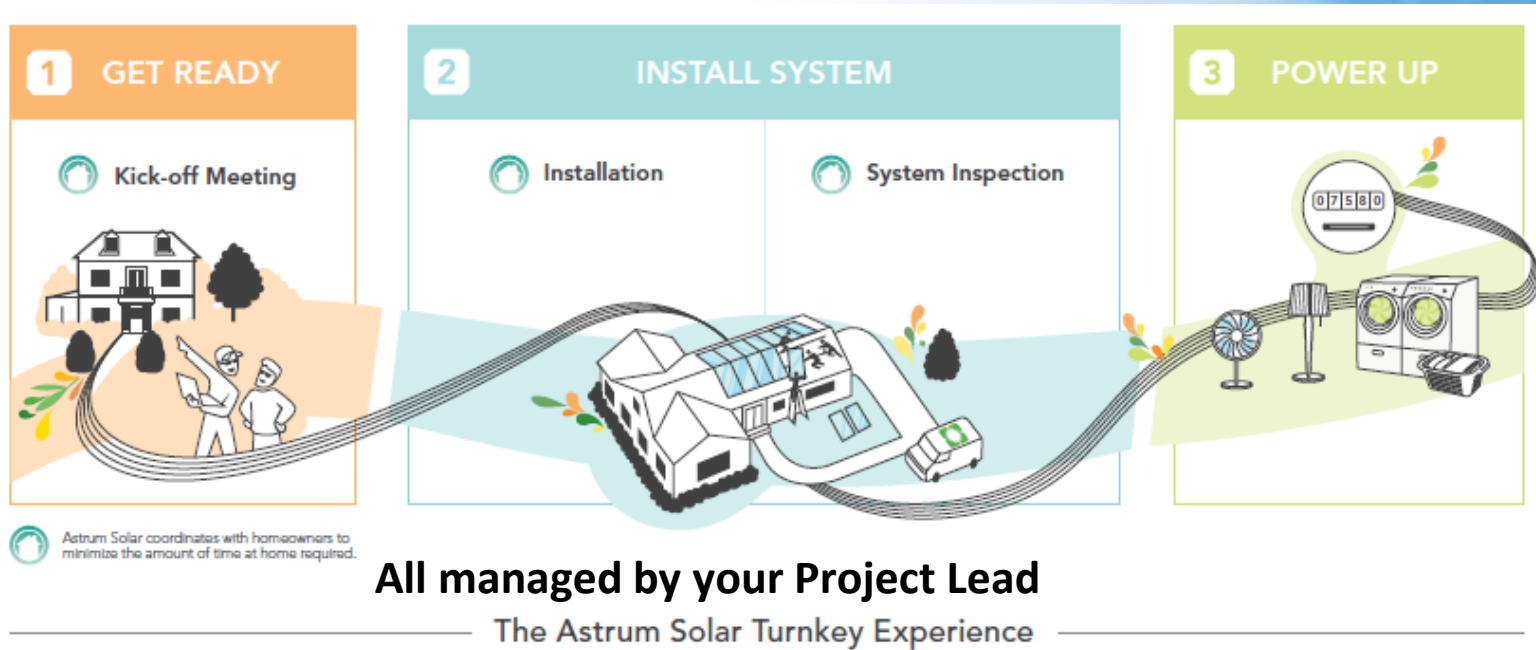
### Premium Warranties

Direct Energy Solar Extended Warranty (10->20 years)

SolarEdge Extended Warranty (12->25yrs) - Belmont

Year	Utility Savings	SREC Earnings	Yearly Cash Flow	Cumulative Cash Flow	Guaranteed Output	Guaranteed Cumulative Output
Initial Outlay			(\$9,038.00)	(\$9,038.00)		
1	\$390.83	\$277.50	\$668.33	(\$8,369.67)	3,196	3,196
2	\$404.51	\$767.50	\$1,172.01	(\$7,197.66)	3,180	6,375
3	\$418.67	\$945.00	\$1,363.67	(\$5,833.99)	3,164	9,539
4	\$433.32	\$617.50	\$1,050.82	(\$4,783.17)	3,148	12,687
5	\$448.49	\$735.00	\$1,183.49	(\$3,599.68)	3,132	15,819
6	\$464.18	\$442.50	\$906.68	(\$2,693.00)	3,117	18,936
7	\$480.43	\$505.00	\$985.43	(\$1,707.57)	3,101	22,037
8	\$497.24	\$332.50	\$829.74	(\$877.83)	3,085	25,122
9	\$514.65	\$312.50	\$827.15	(\$50.68)	3,070	28,192
10	\$532.66	\$370.00	\$902.66	\$851.98	3,055	31,247
11	\$551.30	\$0.00	\$551.30	\$1,403.28	3,039	34,286
12	\$570.60	\$0.00	\$570.60	\$1,973.88	3,024	37,311
13	\$590.57	\$0.00	\$590.57	\$2,564.45	3,009	40,320
14	\$611.24	\$0.00	\$611.24	\$3,175.69	2,994	43,314
15	\$632.63	\$0.00	\$632.63	\$3,808.32	2,979	46,293
16	\$654.78	\$0.00	\$654.78	\$4,463.10	2,964	49,257
17	\$677.68	\$0.00	\$677.68	\$5,140.78	2,949	52,206

# System Installation - Post Sales Process



- Paperwork and Permitting
- Installation and Inspection
- Interconnection, Net Metering and Monitoring





## Typical Installation:

- 1-2 days on site
- 3-4 man crew
- Certified Electricians
- Most work done outside





# Experiences with Solar

**Belmont Homeowners**



# What happens when it snows?

**Sunshine penetrates snow,  
heats black surface of  
panels; snow clears itself.**

**Typically this happens  
within a day or two of a  
significant snowfall.**

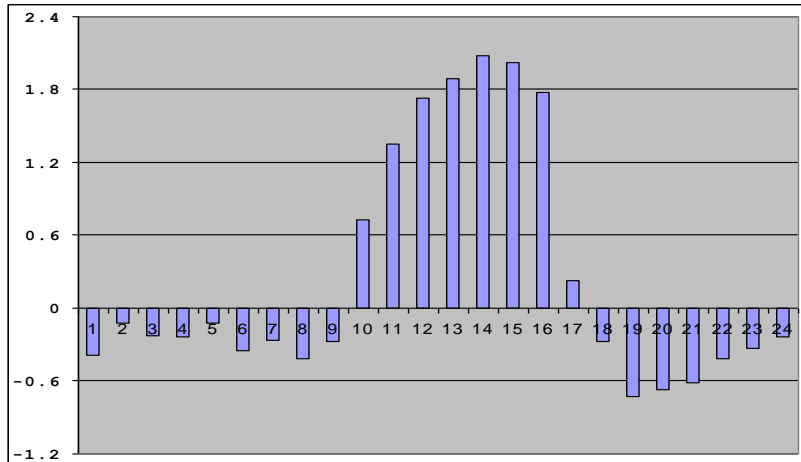




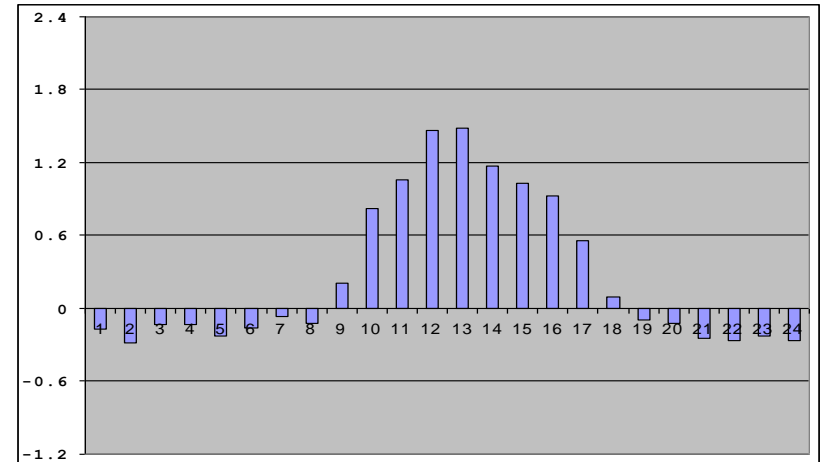
# Solar Host Experience

Energy Sent back to the grid (positive) and bought from the grid (negative)

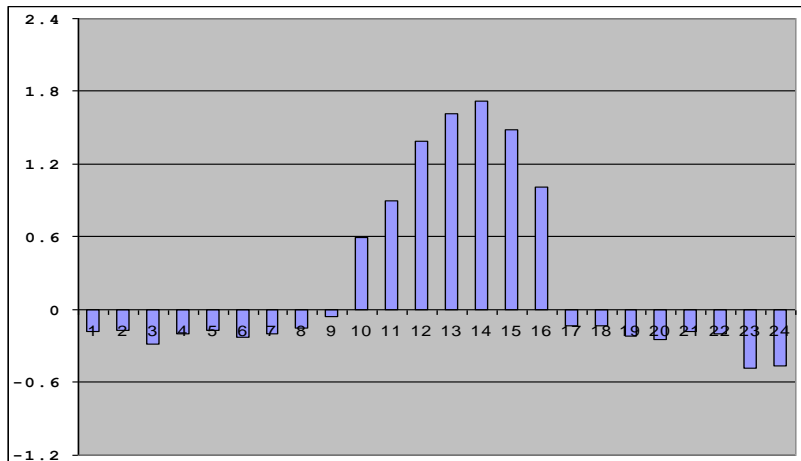
In summer: net positive >> credits accumulate, In Winter: net negative, credits are used up



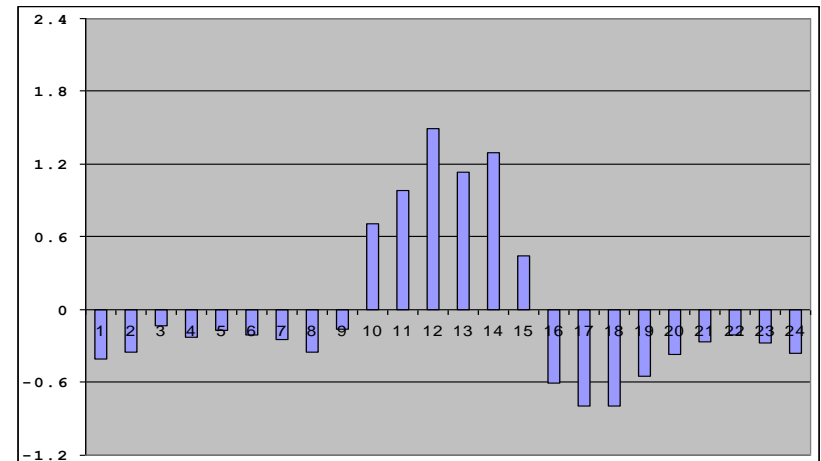
Mar



JUN



SEPT



DEC

# Solar Host Testimony

- **Rooftop photovoltaic (PV) solar panels will produce reliable, consistent electric energy for 30 plus years.**
- **Installations are maintenance free.**
- **You WILL save money on your electric bill immediately, and your investment will be recouped.**
- **You WILL be shifting a large percentage of your fossil fuel consumption to a renewable source.**
- **Don't wait any longer -- the time is now.**

# Squirrel Experiences

Common in Belmont, Critter Guards Recommended





# Critter Guards





# Solar makes for happy homeowners...



# Why Go Solar NOW?

---

- **Limited-time low group pricing (until April 30)**
- **New Belmont Solar Buyback policy**
- **Generous federal and state incentives**
- **Increased home value**
- **Lower environmental impact**
- **Free electricity after payback**





# **Sign-up for a free Solar Site Assessment before April 30:**

**Direct Energy Solar  
800.903.6130**

**BelmontGoesSolar.org**

**Solar Coaches Help Line:  
617.855.8209**

***Thank You!***

***Questions?***

