

# Solar-Ease Workshop

February 7, 2018



CLIMATE SMART  
MISSOULA



Missoula County



This presentation was given as part of a workshop on February 7, 2018. Presenters were:

- Andrew Valainis, Montana Renewable Energy Association
- Bryan Von Lossberg, Renewable Energy Consultant
- Paul Herendeen, Missoula Federal Credit Union

Please contact Climate Smart Missoula with any questions: [info@climatesmartmissoula.org](mailto:info@climatesmartmissoula.org)



# Montana Renewable Energy Association

## Mission & Focus areas:

- Education and Outreach
- Policy and Advocacy
- Industry Engagement



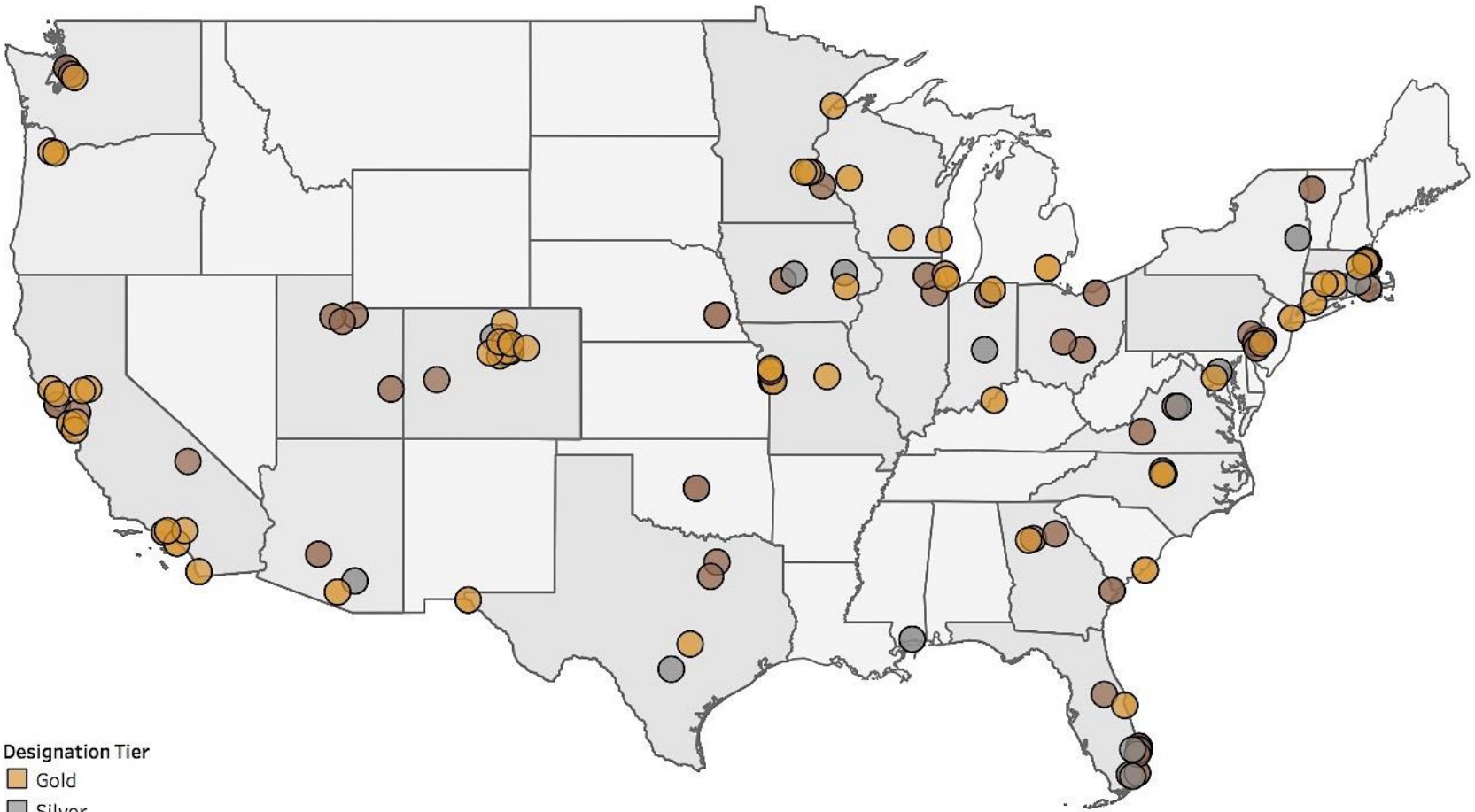
[www.montanarenewables.org](http://www.montanarenewables.org)



# SolSmart

- “Solar Ready” communities – making process of going solar easier
- Focuses on “soft costs” (non-hardware)
  - Permitting and inspection
  - Fees and overhead
  - Planning and Zoning
  - Utility outreach
  - Contractor education
  - Consumer education
- Missoula, Missoula County, Bozeman, Helena, Whitefish, Red Lodge, Great Falls



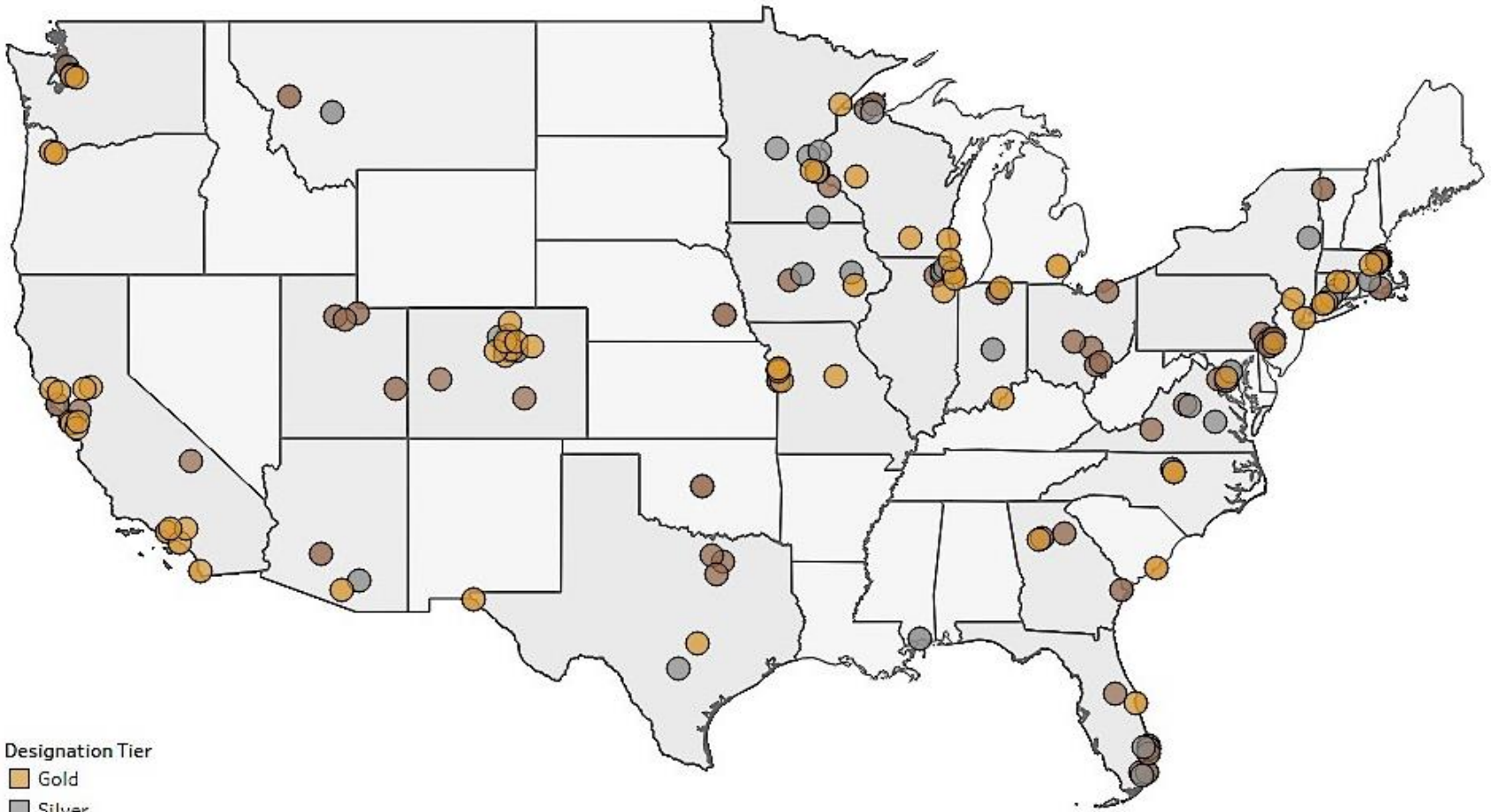


**Designation Tier**

- Gold
- Silver
- Bronze

Since 2016, 100+ designees  
 SolSmart goal: 300+ by October 2019





Designation Tier

- Gold
- Silver
- Bronze

Missoula County – Bronze Designation  
 City of Helena – Silver Designation



# Montana's Solar Landscape

- Small, rooftop systems: ~ 8.5 MW since 2000
- Shared solar by CoOps: ~ 500 kW since 2015
- Utility scale solar: 17 MW, in 2017 alone
- Today: ~26 MW of installed solar capacity

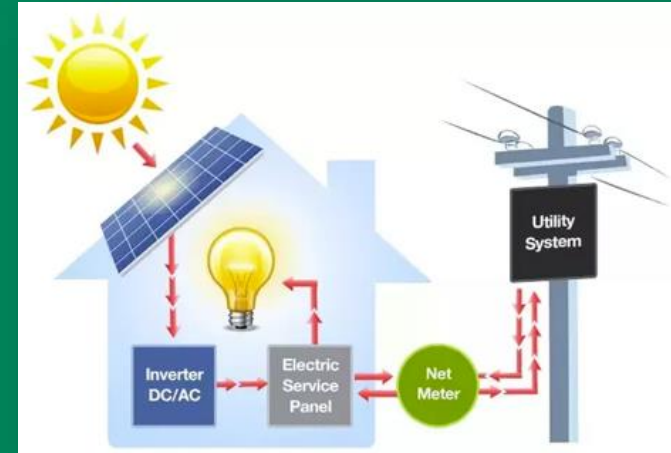
Solar today:  
**< 1%** of MT electricity

Rooftop solar potential:  
**28%** of MT electricity needs  
(NREL 2016)



# Net Metering

- On-bill credit for excess energy exported to grid
- Net metering debate!\*
- Cap: 50kW (NWE), 10kW (MEC)
- On-bill credit: retail rate (NWE: \$0.11/kWh, MEC: \$0.07/kWh)
- No aggregate net metering
- 12-month cycle to use excess credits, then forfeited



\*shameless plug: [www.montanarenewables.org/policy](http://www.montanarenewables.org/policy)



# Shared solar?

NWE – No    MEC – Yes

- Buy “share” of a larger array
- Just as if array were on your home
- CoOps leading the way



Photos: (Top) MEC Solar I; (Bottom) MEC Solar II

# Solar Tariffs

- **January 2018:** President sets 30% tariff on imports (~ \$0.10/W) following USITC petition and ruling
- **Impacts:**
  - artificial price increase sets industry back
  - curtails business expansion
  - utility scale hit hardest

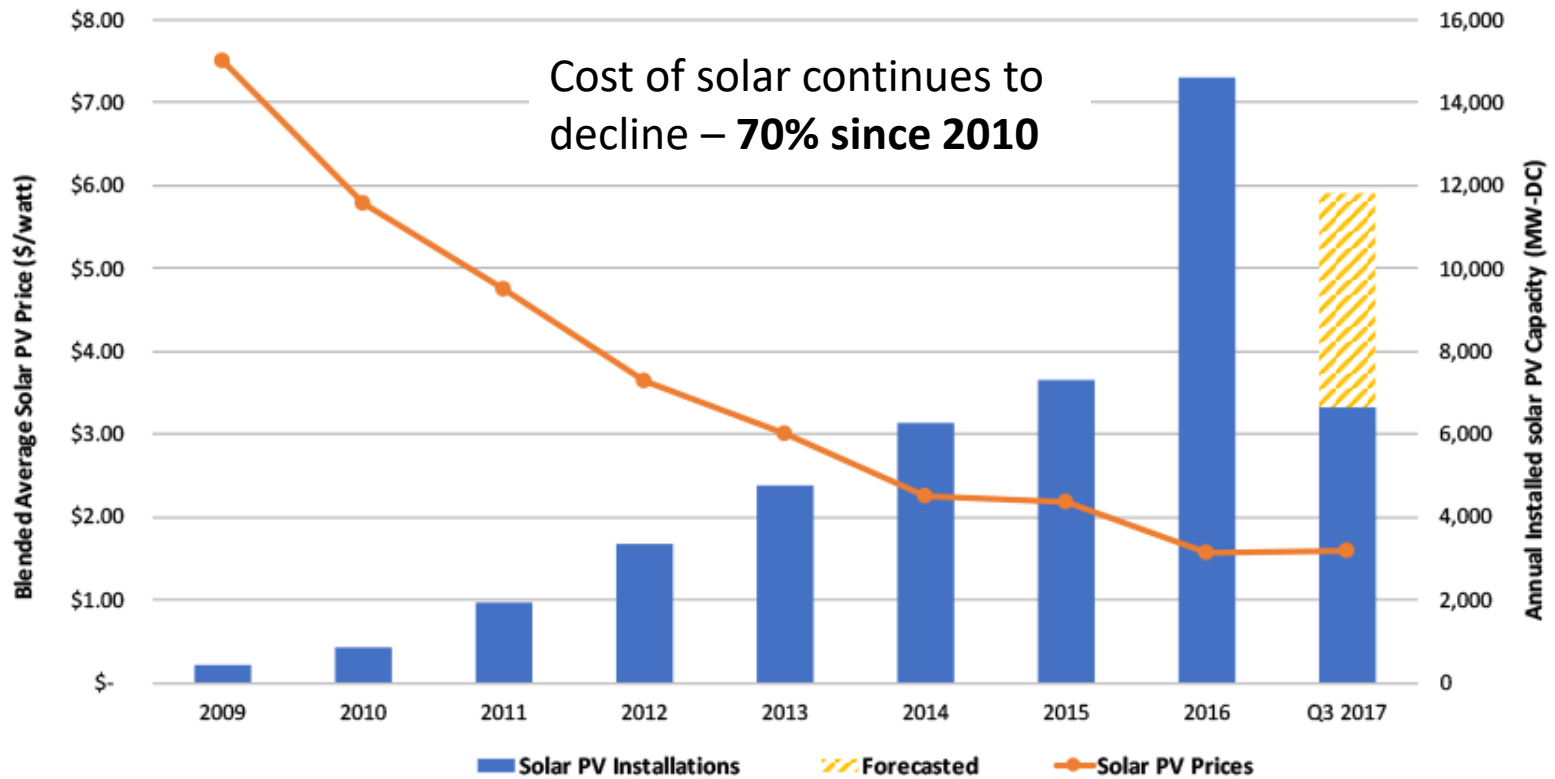


Yet another political speed bump for solar:

ITC sunset, State NEM Policies, attacks on state incentives, etc

**BUT: This is not the end of the solar industry!**

# Solar Tariffs



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gtmresearch

SEIA  
Solar Energy  
Industries  
Association®



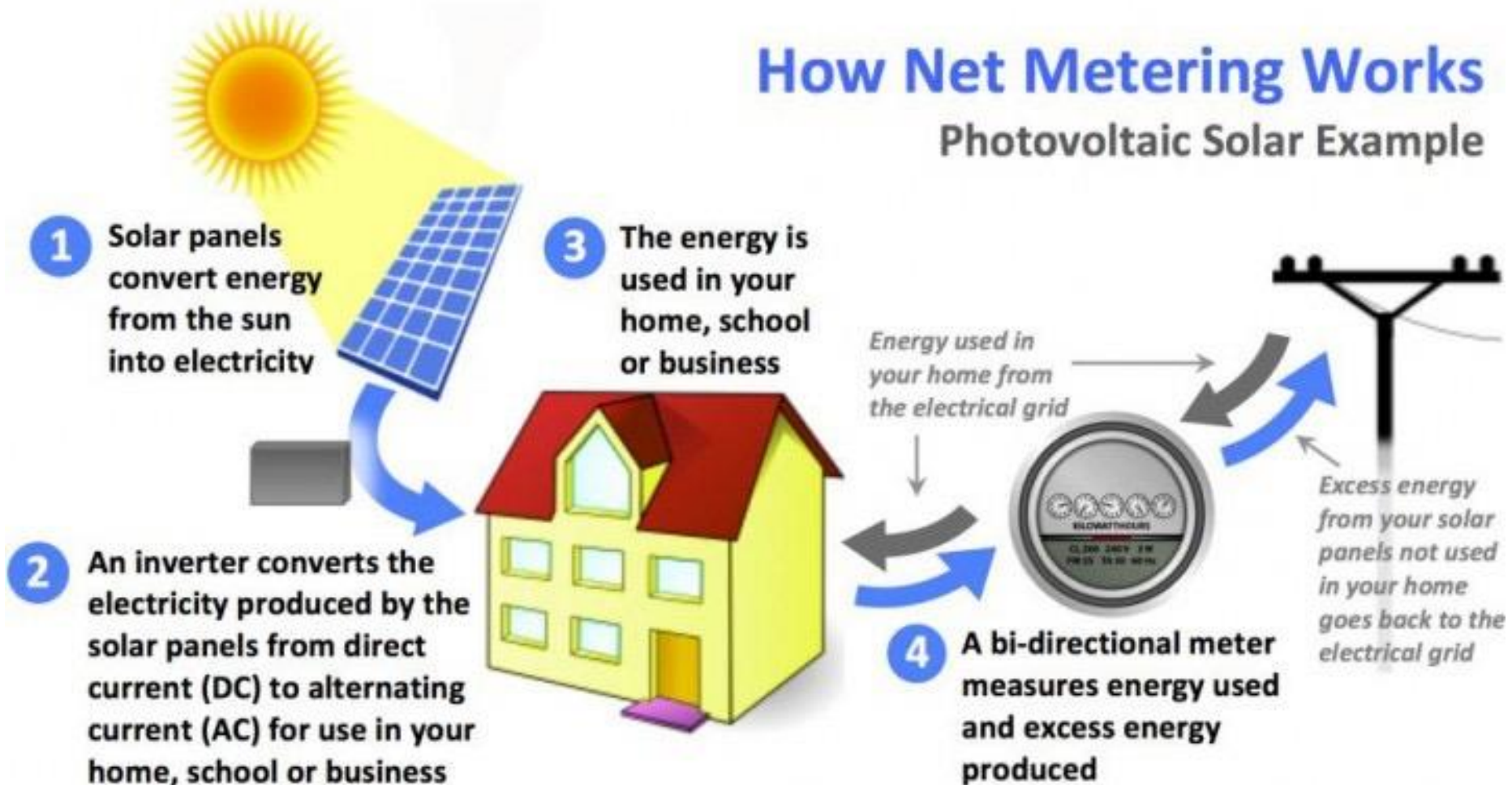
# Why Go Solar?



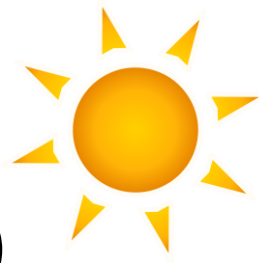
excellence  
work life balance  
honesty trust  
rules integrity quality service  
ethical teamwork innovation quality  
conduct collaborate personal growth  
success faith openness achievement  
growth  
accountability commitment correctness  
organisation participation consistency



# Solar Energy & Net Metering



# Solar Panels



- Typical size: 65 inches (5' 5") by 39 inches (3' 3")
- E.g., 10-panel system: ~ 11' high by 16' wide



- Typical panel: **265 watts** (also 210, 280, 320 W)
- 10 panels X 265 watts = 2,650 watts or **2.65 kW** system

# Installations



# The Ecstasy of Information

8 kWh net! 18.7 produced today!



Sorry, you must be sick of me nerding out over this, but I can see what each individual panel is producing...

891.5 Wh	860.75 Wh	880.25 Wh	866 Wh	881.75 Wh
1.0.5	1.0.1	1.0.9	1.0.7	1.0.4
873.5 Wh	883 Wh	869.5 Wh	863.25 Wh	877.75 Wh
1.0.2	1.0.3	1.0.8	1.0.1	1.0.6

**Last Update**  
4/2/15, 3:57 PM

**Energy Production**

Today	389.9 Wh
This Month	389.9 Wh
Lifetime	32.3 KWh

**Mostly Cloudy**

Day	Week	Year	Total
Wh	4/2/15		

02:00 07:00 12:00 17:00 22:00

MISSOULA, MT 59802-2615

**Usage Graph** **Usage History**

Select a date to view a bill.

Bill Date	Usage	Unit of Measure
05/18/2015	0	kWh
04/16/2015	404	kWh
03/17/2015	542	kWh
02/16/2015	615	kWh
01/19/2015	846	kWh



# Power from the Sun!

## Solar Energy, Missoula Style



# Simple path:

- Attend workshop
- Contact local installer
- Free site assessment
  - ✓ physical installation
  - ✓ your energy usage
- Cost & financing options
- Sign contract
- Go solar!



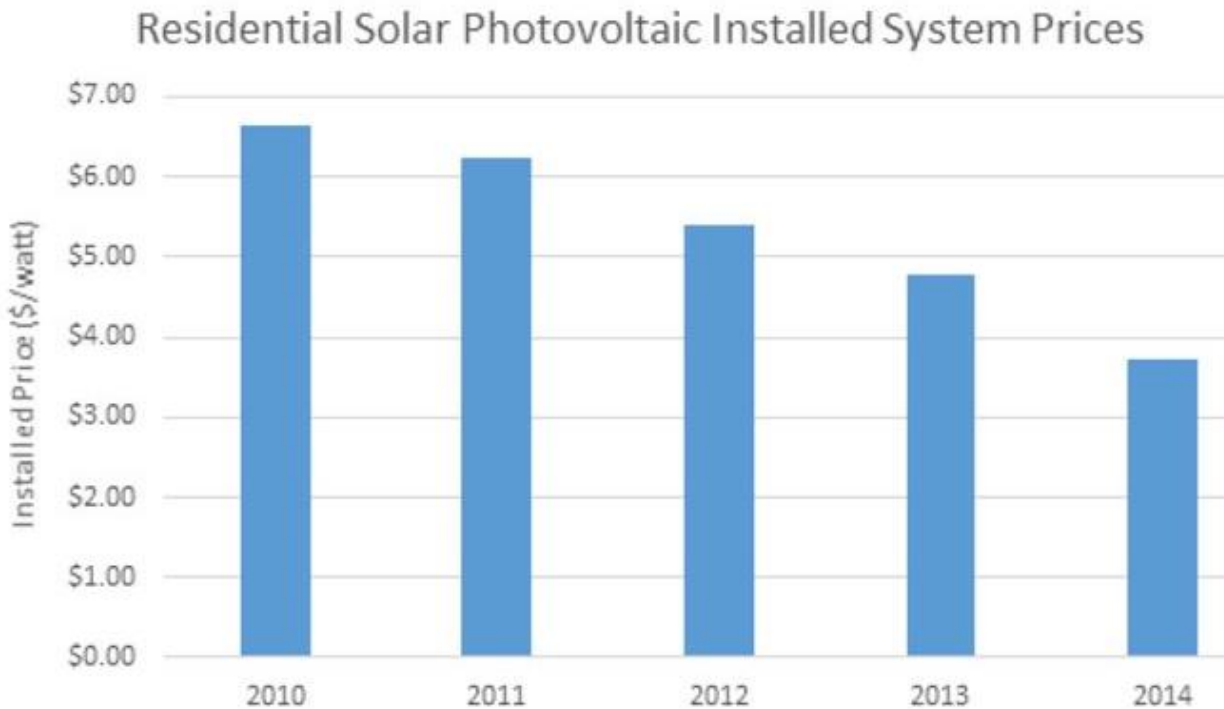
# Installer Qualifications

- NWE Qualified Solar PV Installer
- Local experience
- California SB1 eligible equipment
- Licenses and insurance
- Equipment and workmanship warranties
- Reference checks

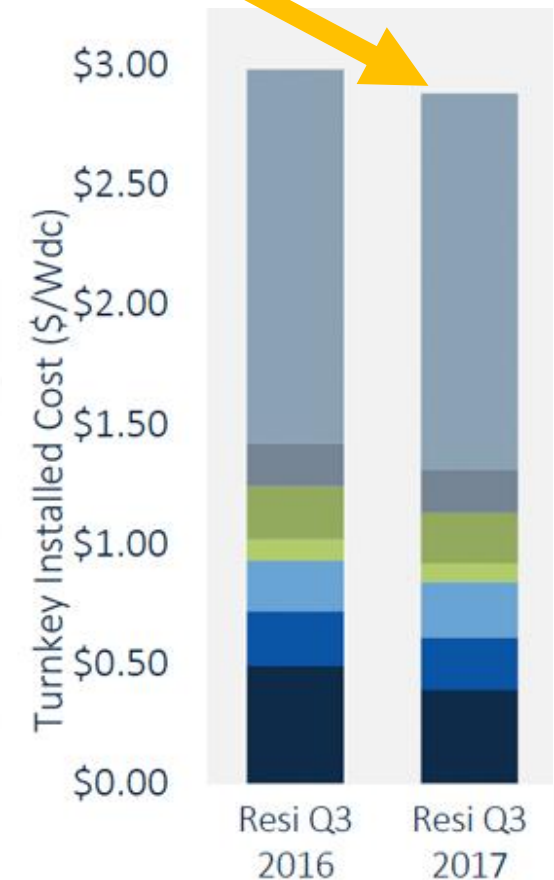
# Pricing Data & Trends



Average price of residential PV installation  
in Q3 2017: **<\$3.00/Watt**

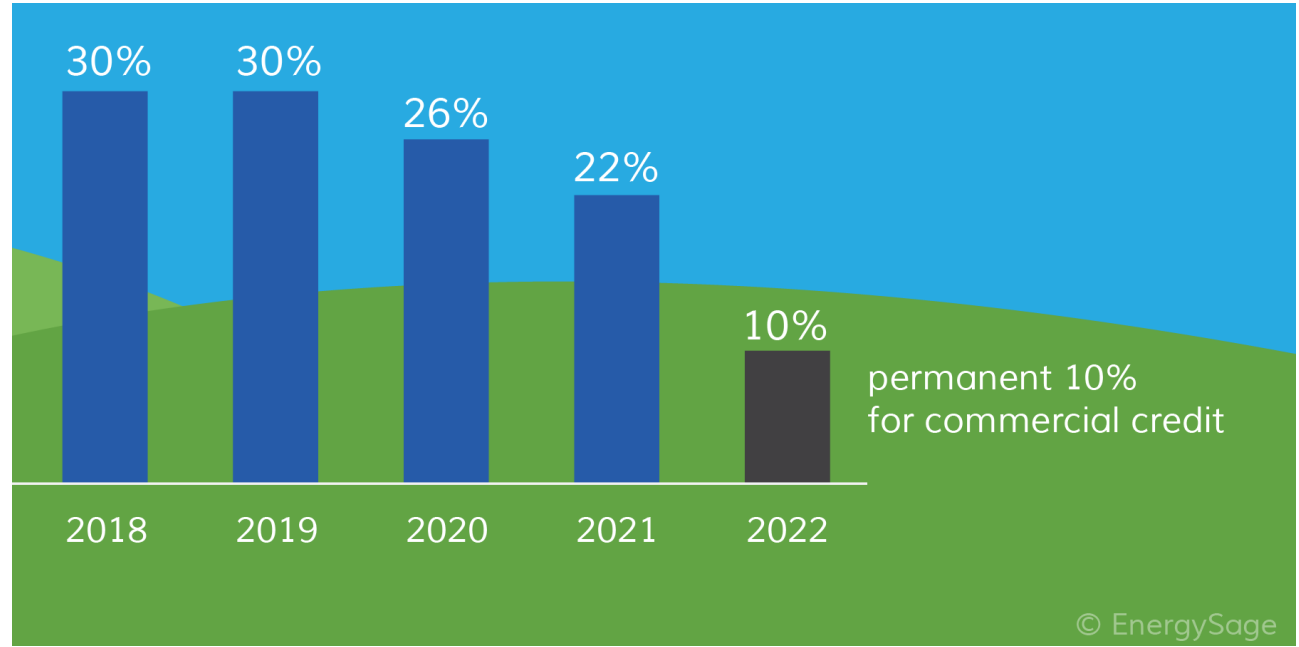


Source: SEIA/GTM Research *Solar Market Insight*



# Federal Income Tax Credit (“The ITC”)

Up to **30%** of total installed cost, no maximum



## Montana Alternative Energy Systems Credit

- \$500 per taxpayer, up to \$1,000 per household
- Solar PV, solar thermal, small wind, biomass, geothermal
- Does not expire

# Does Solar Make Financial Sense?

**BELONG**

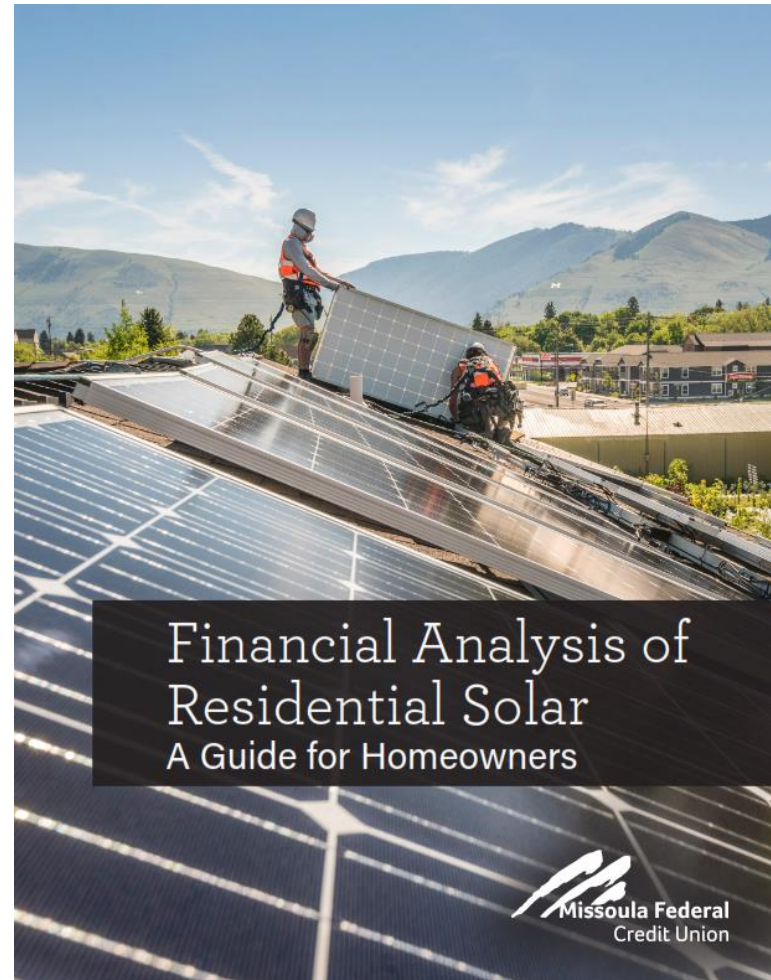


# Does Solar Make Financial Sense?

Details in report

$$NPV = \sum_{n=0}^N \frac{C_n}{(1 + d)^n}$$

Available at [www.missoulafcu.org/environment/](http://www.missoulafcu.org/environment/)



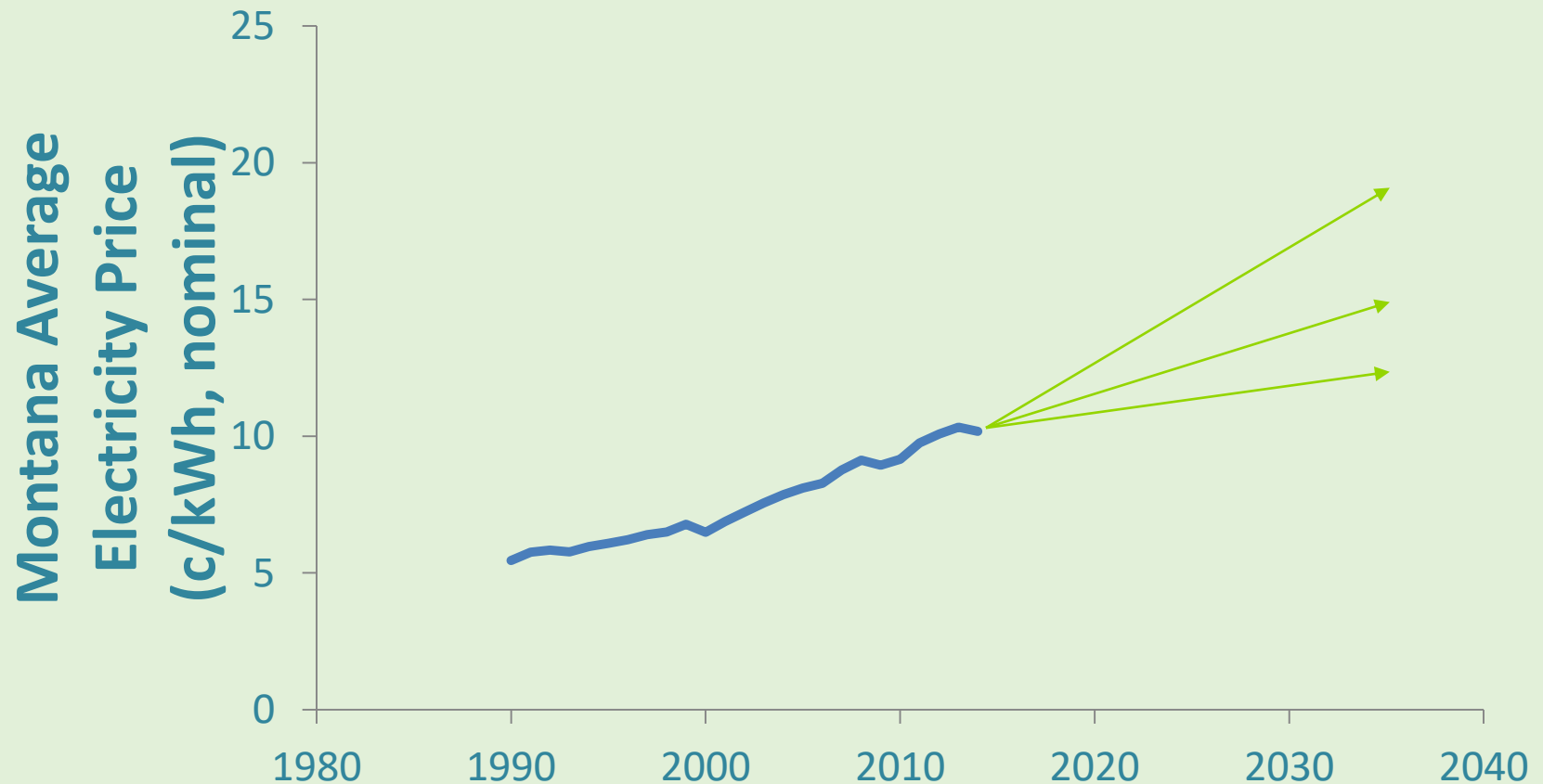
# Does Solar Make Financial Sense?

Lots of details / assumptions



Photo by Mark Longair. Licensed under Creative Commons CC BY-SA 2.0 (<https://creativecommons.org/licenses/by-sa/2.0/>)

# Does Solar Make Financial Sense?





# Does Solar Make Financial Sense?

## No One Metric

- Good investment?
- What's the payback?
- Buy now or wait?

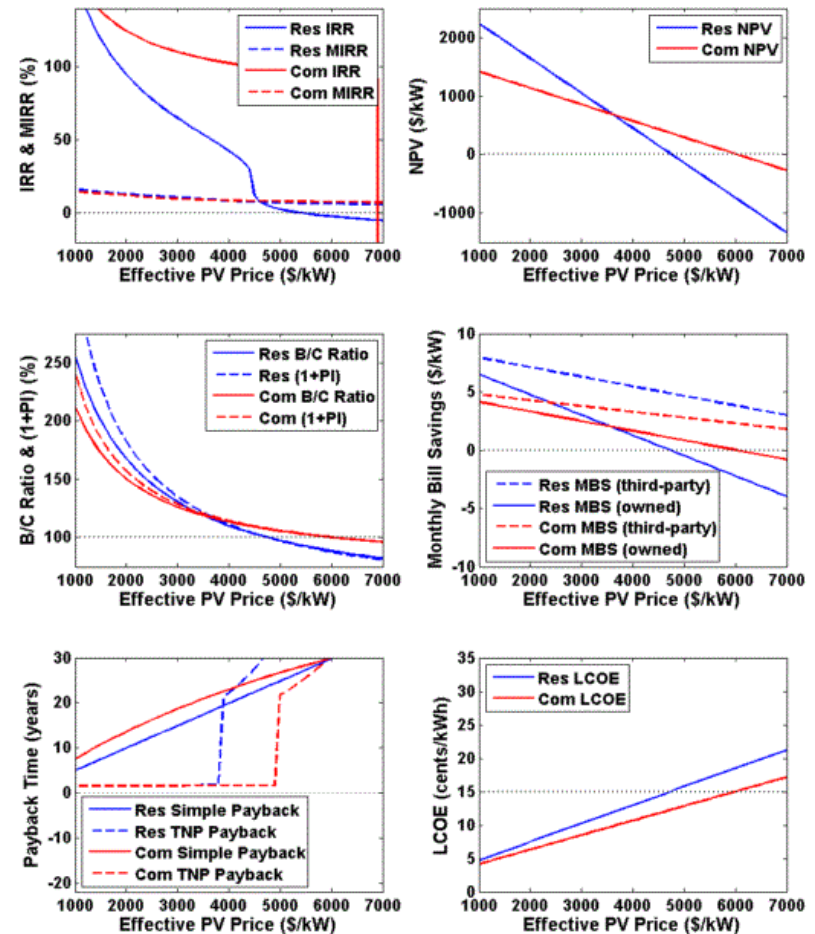


Figure 2. PV economic performance, characterized using several metrics, for a range of effective PV prices for residential ("Res") and commercial ("Com") systems

# Base Case



©emily mills

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## System size

5 kW

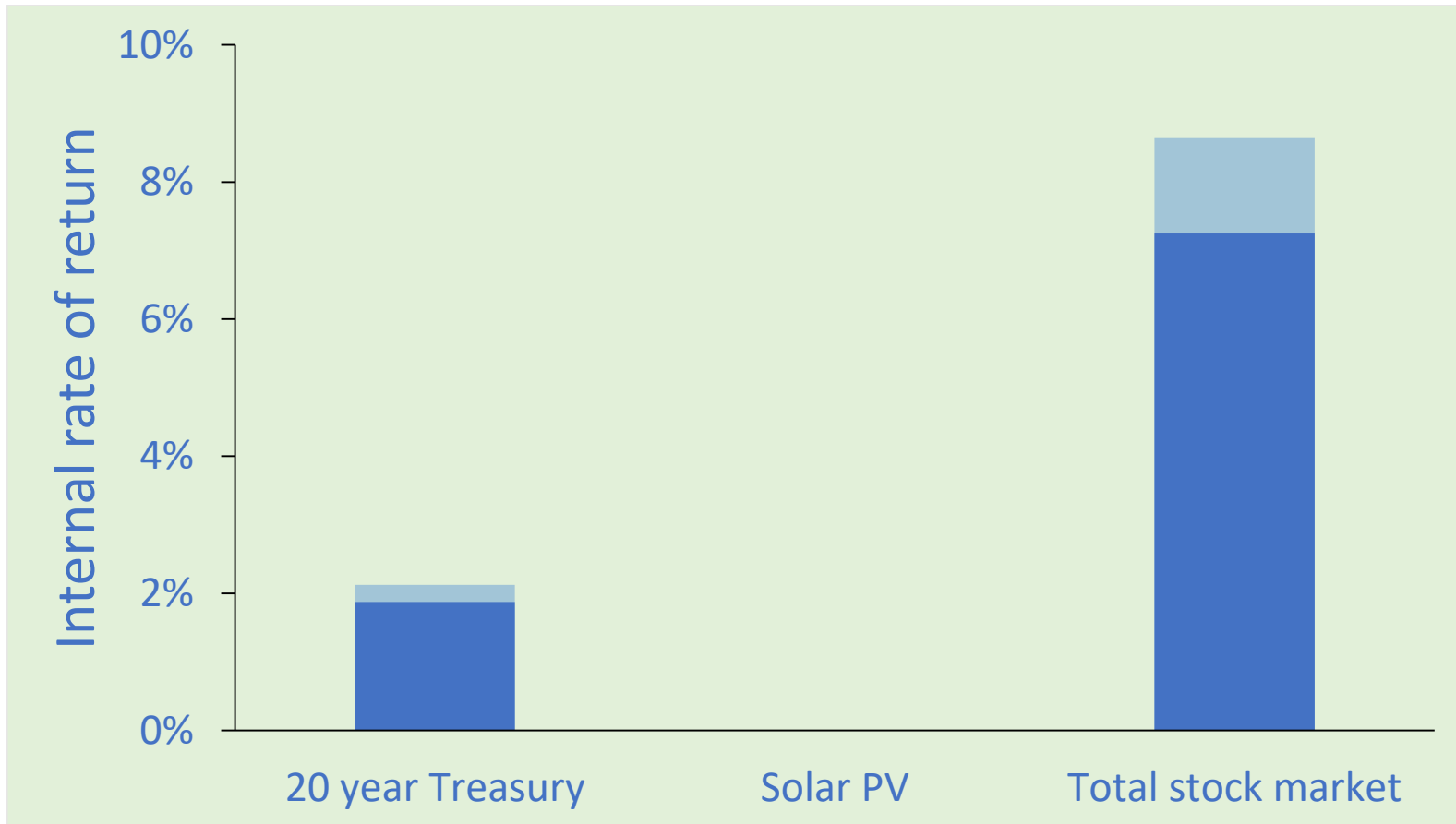
## Price

\$3/W

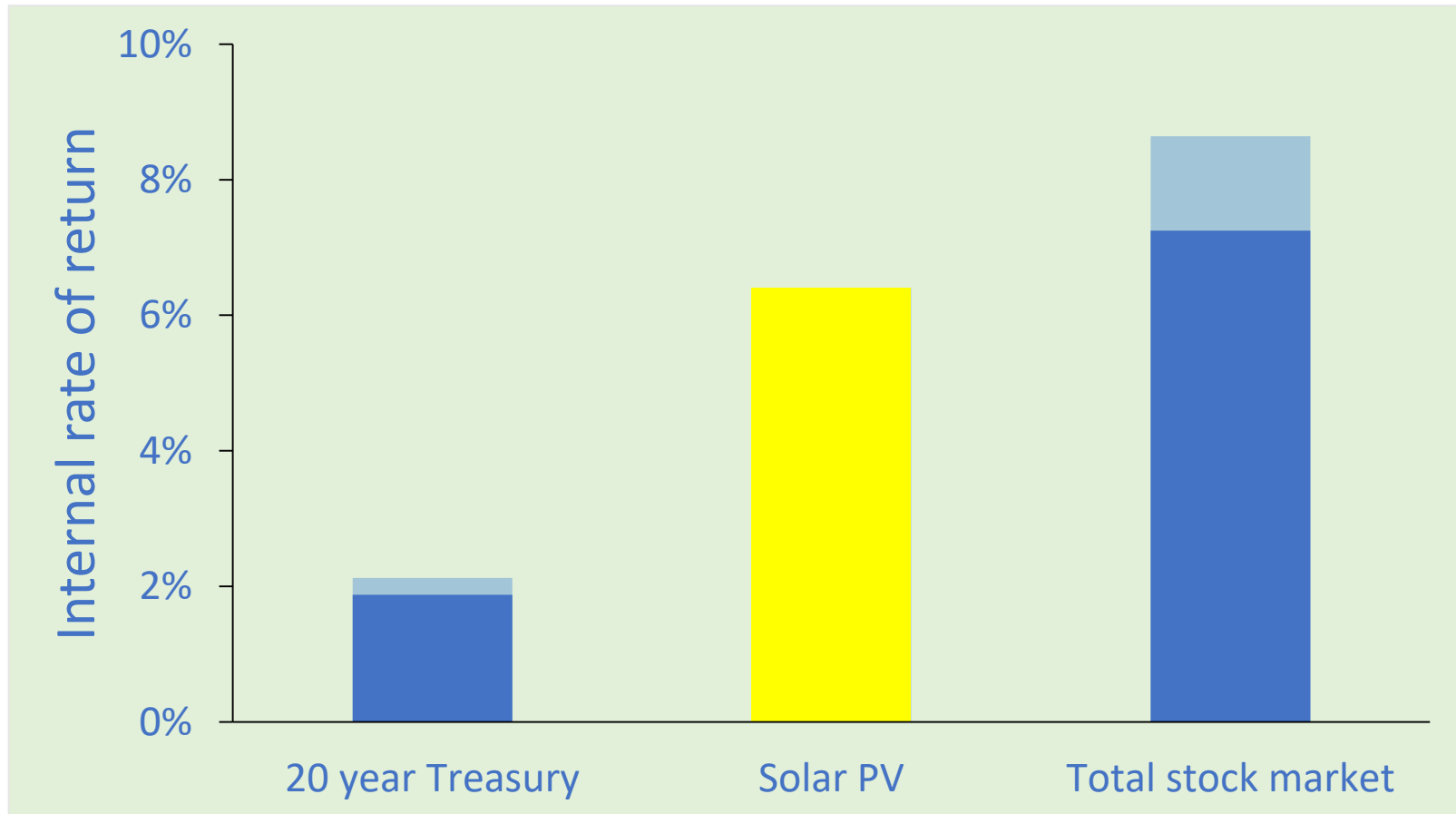
## Production

1,200  
kWh/kW-year

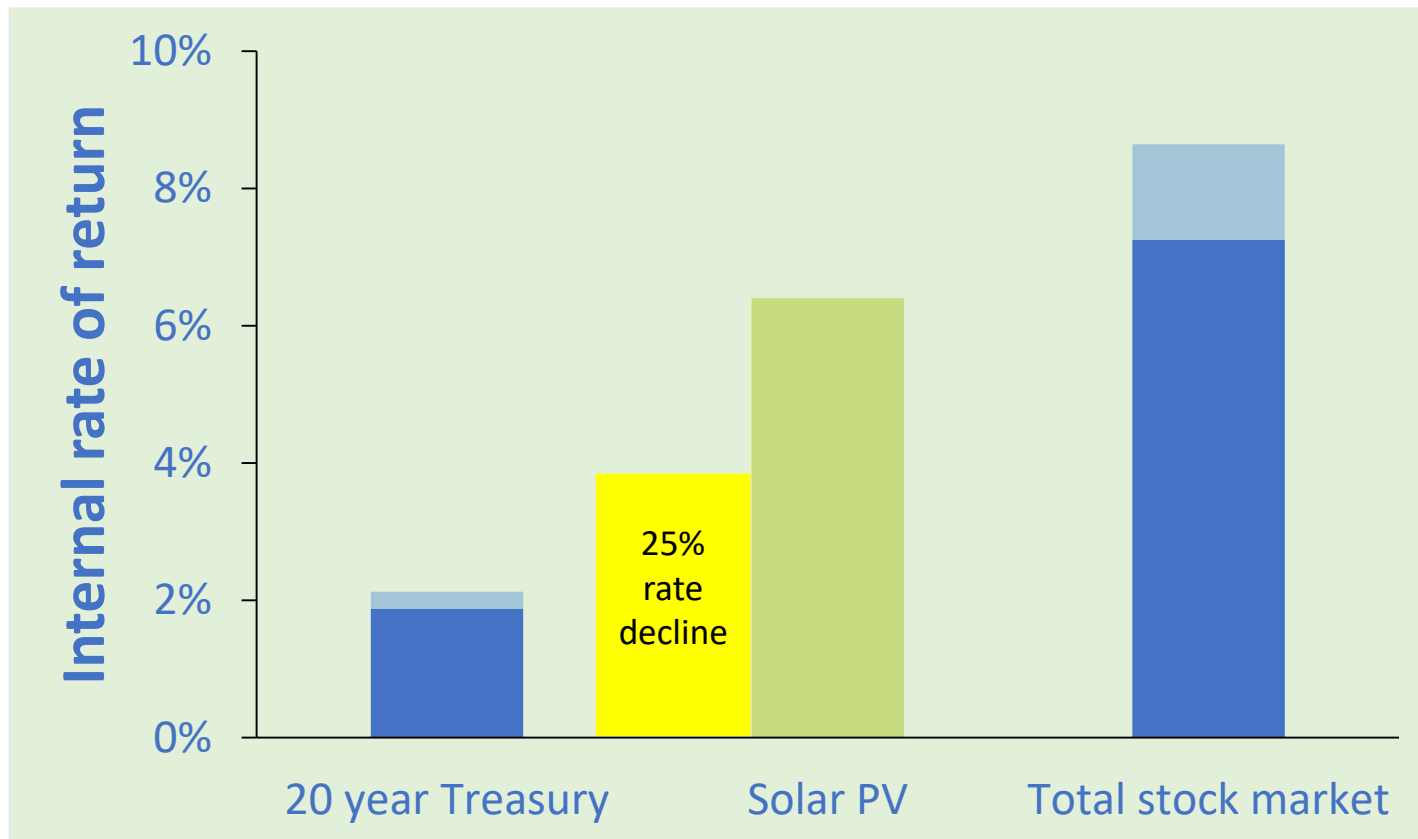
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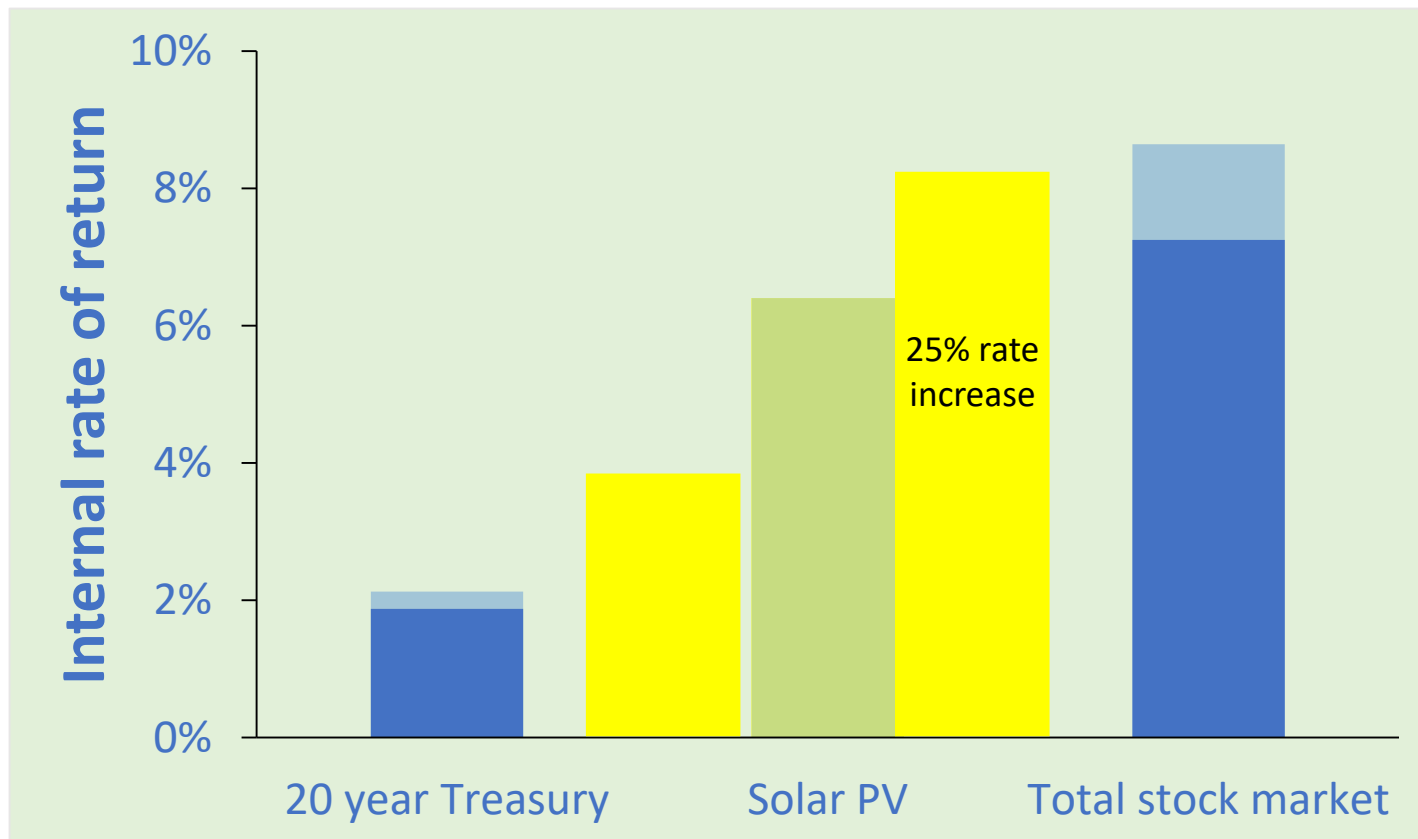
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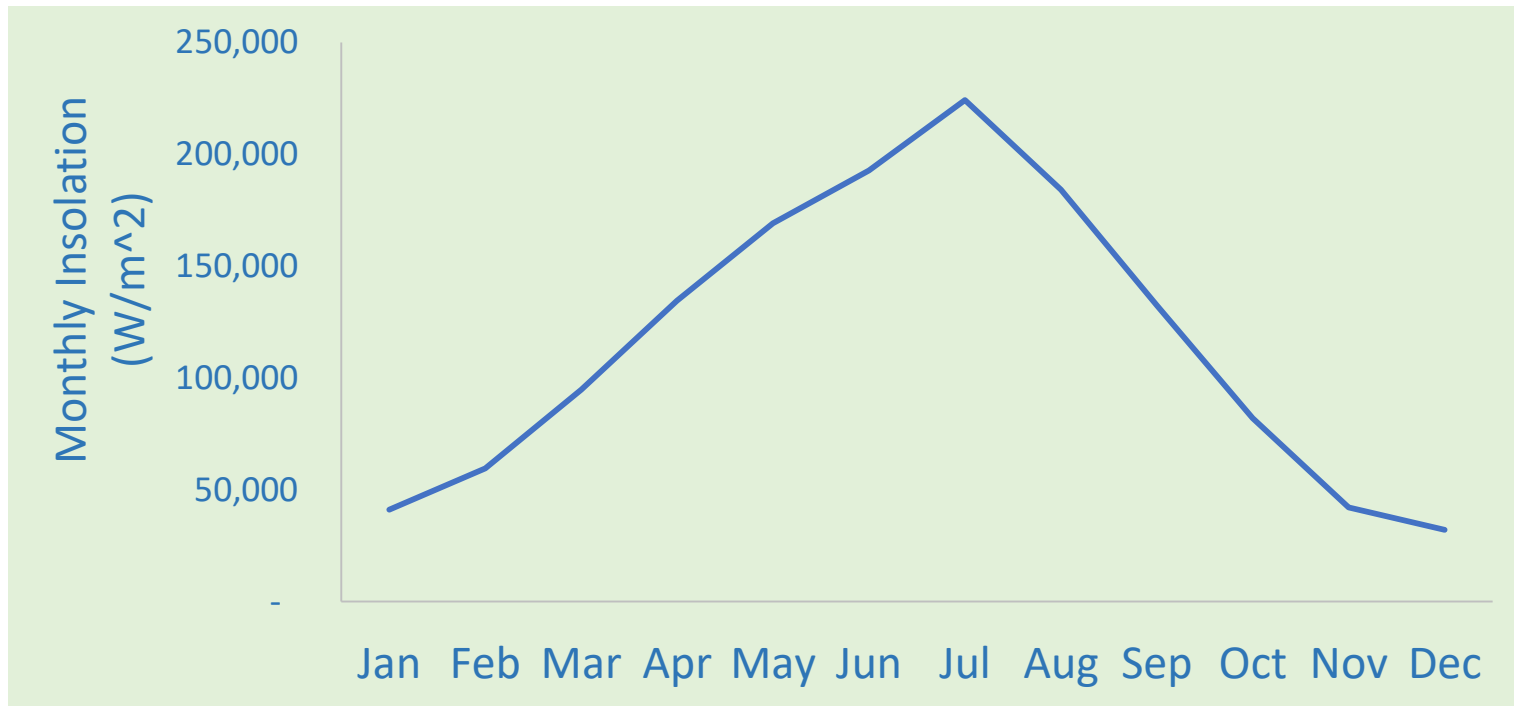
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# What's the Payback? How Much Will I Save?



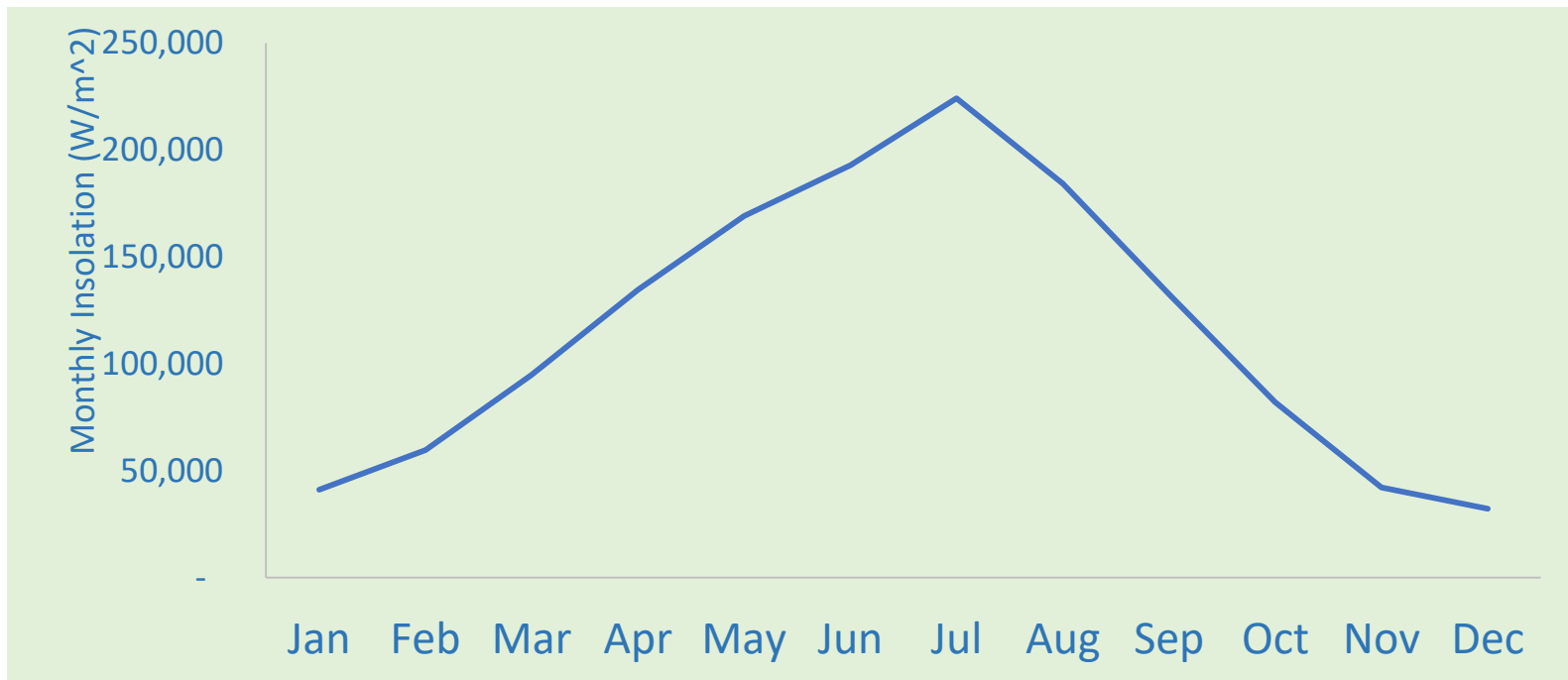
**Monthly Savings (Avg)**

**\$56**

**Payback**

**13 years**

# What's the Payback? How Much Will I Save?

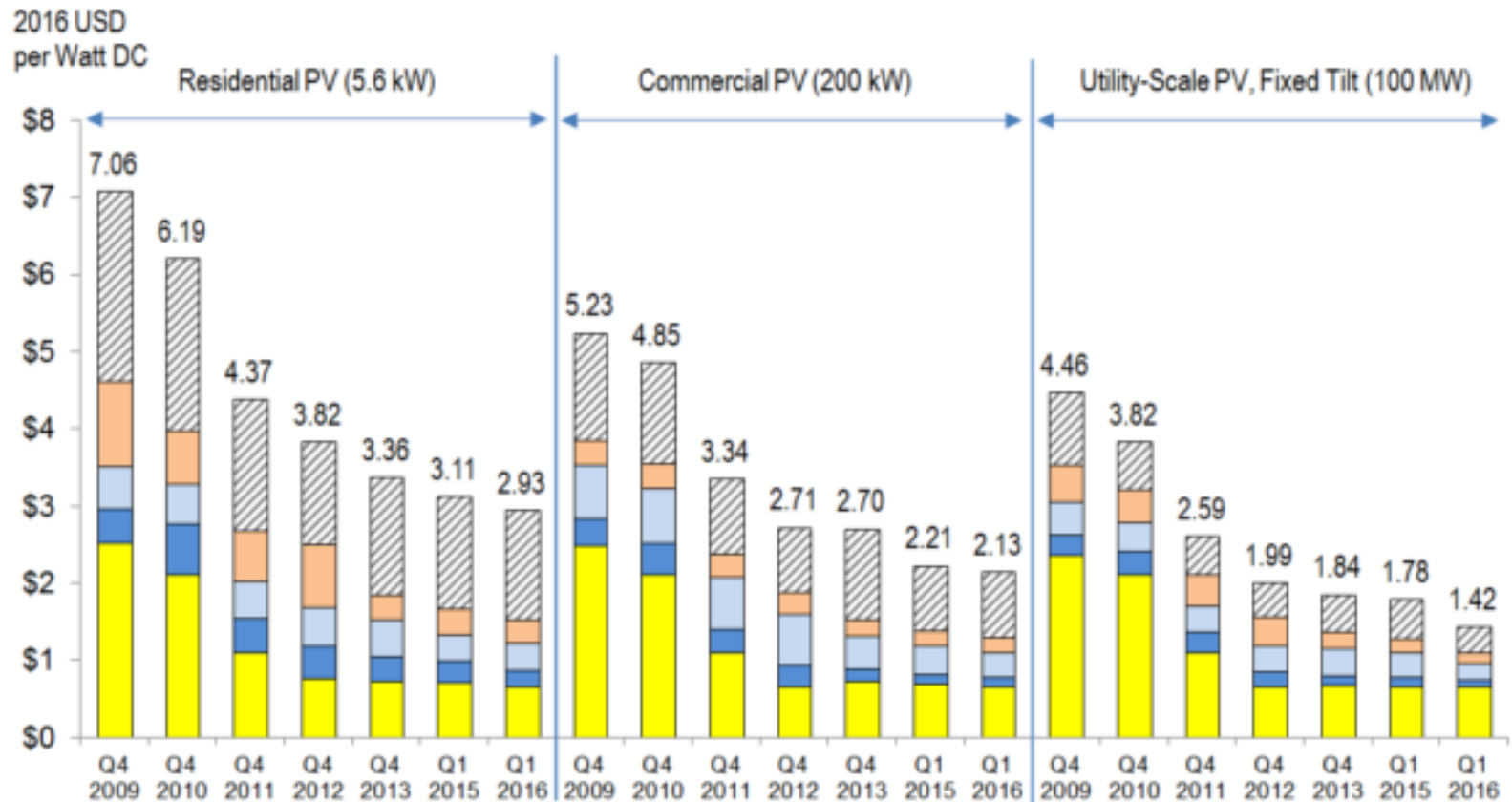


<b>Monthly Savings (Avg)</b>	<b>\$56</b>
<b>Payback</b>	<b>13 years</b>

<b><u>Loan Payment</u></b>
<b>\$100 - \$140</b>



# Buy Now, or Wait?



- ▨ Soft Costs - Others (PII, Land Acquisition, Sales Tax, Overhead, and Net Profit)
- ▤ Soft Costs - Install Labor
- ▥ Hardware BOS - Structural and Electrical Components
- Inverter
- Module

# Buy Now, or Wait?

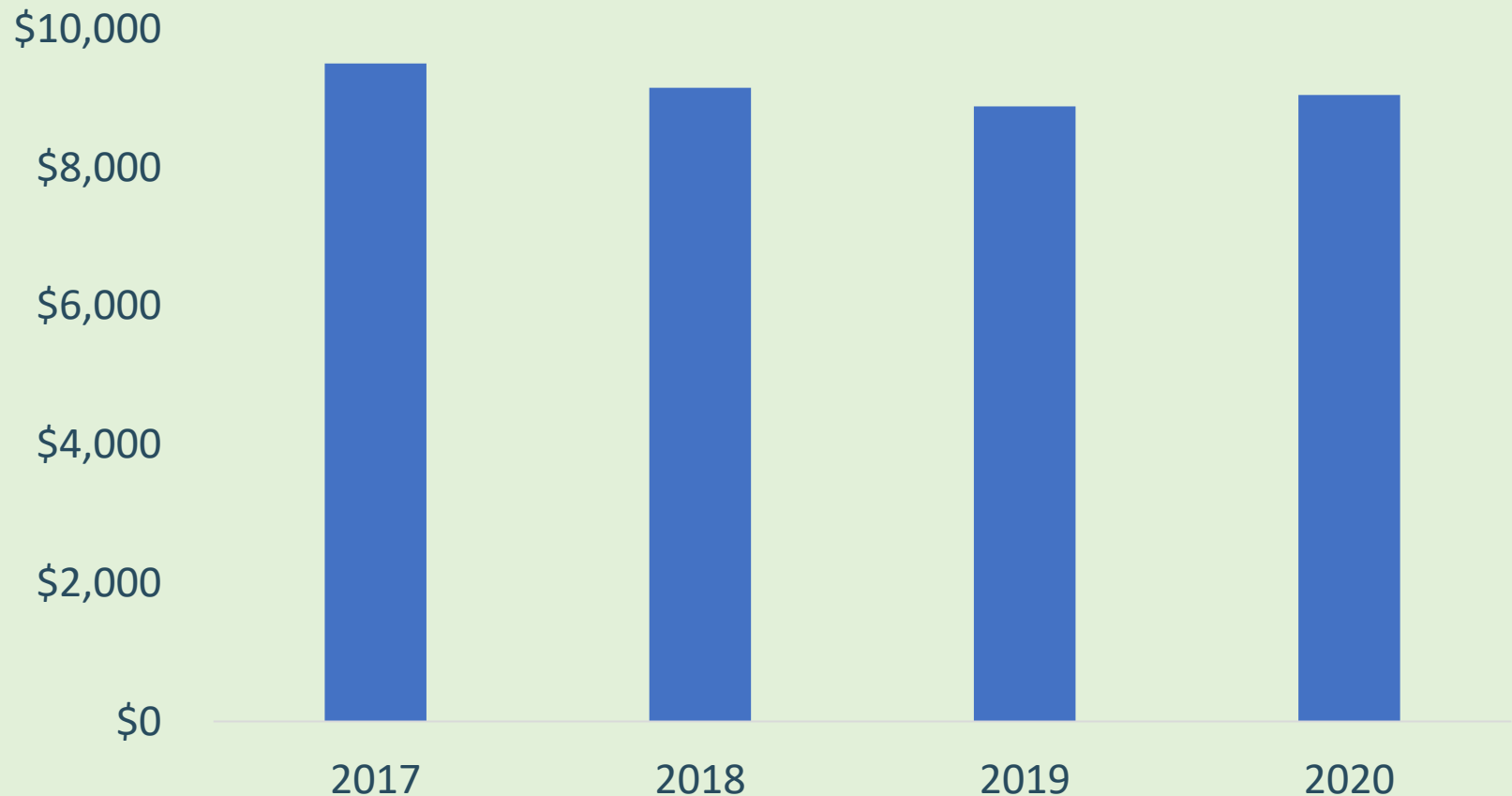
	2017	2018	2019	2020
Price (\$/W)	\$3.00	\$2.76	\$2.54	\$2.34
Alternative Rate of Return (%/yr)	n/a	1.25%	1.25%	1.50%
Gross Cost	\$15,000	\$13,800	\$12,696	\$11,680
State Tax Credit	\$(1,000)	\$(1,000)	\$(1,000)	\$(1,000)
Federal Tax Credit	(4,500)	\$(4,140)	\$(3,809)	\$(3,037)
Additional electric cost	n/a	\$678	\$1,374	\$2,087
Interim Interest Earned	n/a	\$(188)	\$(377)	\$(685)
<b>Total Cost</b>	<b>\$9,500</b>	<b>\$9,151</b>	<b>\$8,883</b>	<b>\$9,046</b>

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# Buy Now, or Wait?

Projected System Price (net)



# What About Home Value?

## Selling Into the Sun: Price Premium Analysis of a Multi-State Dataset of Solar Homes

Ben Hoen, Sandra Adomatis, Thomas Jackson, Joshua Graff-Zivin,  
Mark Thayer, Geoffrey T. Klise, Ryan Wiser

**Lawrence Berkeley National Laboratory**



# What About Home Value?

$$\ln(P_{itk}) = \alpha + \beta_1 (T_i) + \beta_2 (K_i) + \sum_a \beta_3 (X_i) + \beta_4 (PV_i \cdot SIZE_i) + \varepsilon_{itk}$$

where

$P_{itk}$  represents the sale price for transaction  $i$ , in quarter  $t$ , in block group  $k$ ,

$\alpha$  is the constant or intercept across the full sample,

$T_i$  is the quarter  $t$  in which transaction  $i$  occurred,

$K_i$  is the census block group  $k$  in which transaction  $i$  occurred,

$X_i$  is a vector of  $a$  home and site characteristics for transaction  $i$ ,

$PV_i$  is a fixed-effect variable indicating a PV system is installed on the home in transaction  $i$ ,

$SIZE_i$  is a continuous variable for the size (in kW) of the PV system installed on the home prior to transaction  $i$ ,<sup>7</sup>

$\beta_1$  is a parameter estimate for the quarter in which transaction  $i$  occurred,

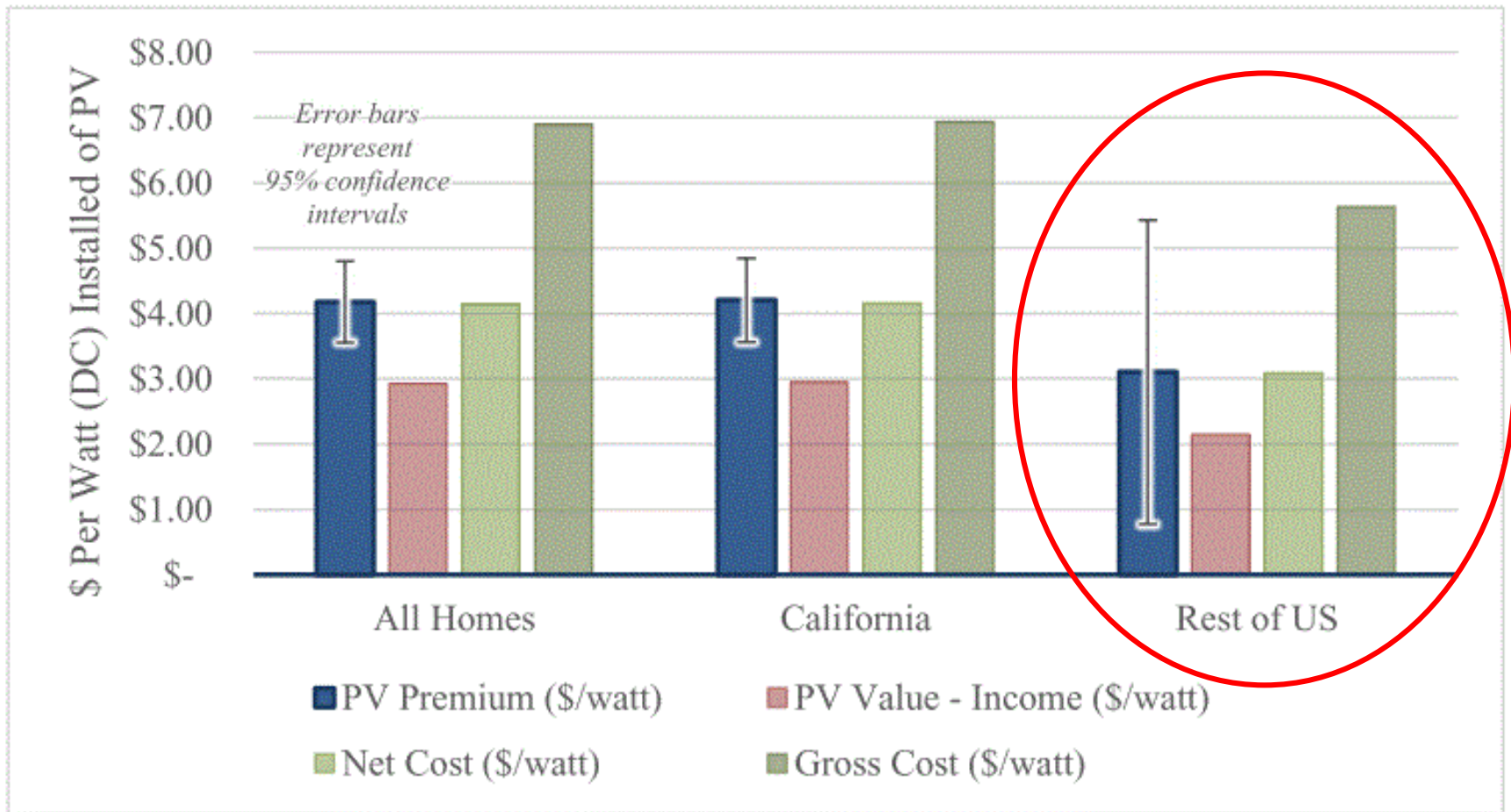
$\beta_2$  is a parameter estimate for the census block group in which transaction  $i$  occurred,

$\beta_3$  is a vector of parameter estimates for home and site characteristics  $a$ ,

$\beta_4$  is a parameter estimate for the change in sale price for each kilowatt added to a PV system, and

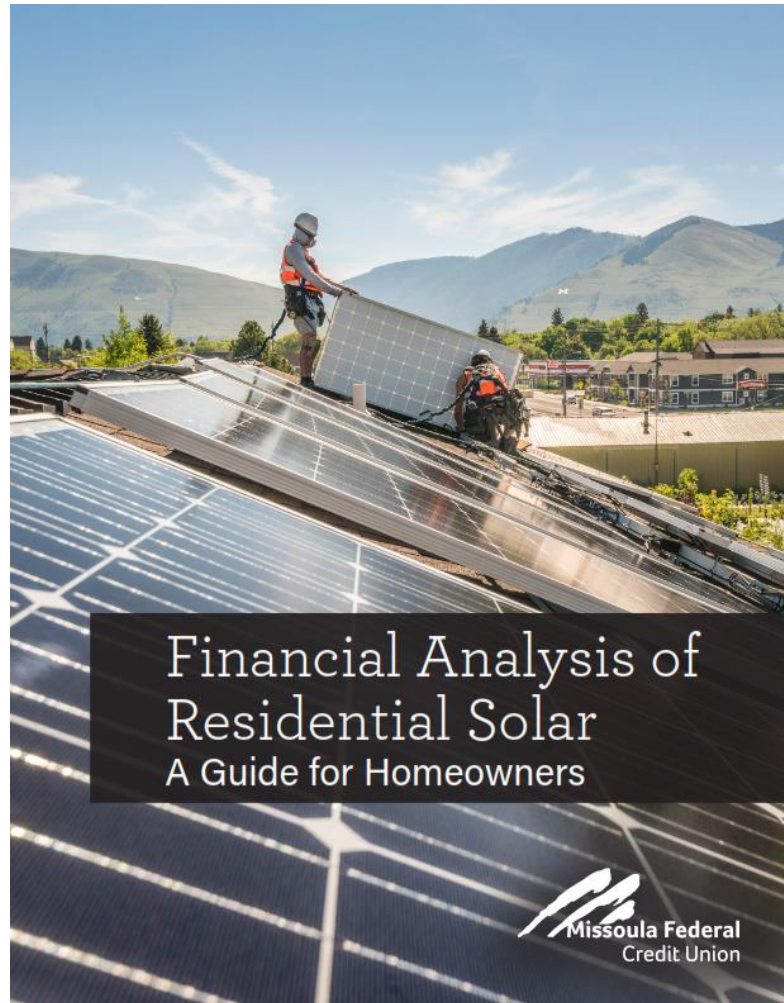
$\varepsilon_{itk}$  is a random disturbance term for transaction  $i$ , in quarter  $t$ , in block group  $k$ .

# What About Home Value?



# Other Questions

- Loan or cash?
- System size?
- Best type of loan?





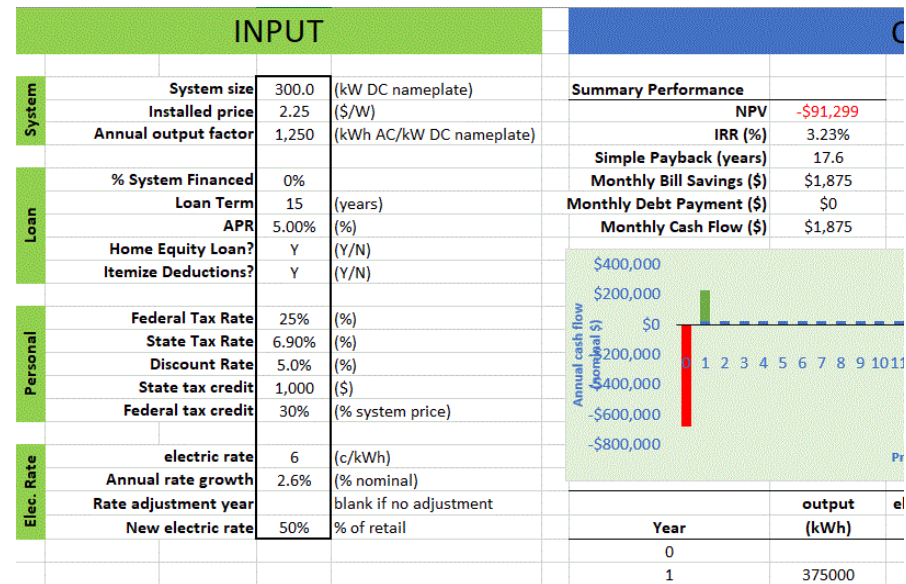
# Putting it All Together

## 1. Pick Your Questions

## 2. Collect Data

- Electric rate
- Installed Price
- Production

## 3. Calculate!



Available at [www.missoulafcu.org/environment](http://www.missoulafcu.org/environment)

# Available Loans



## Alternative Energy Revolving Loan Program

- 10 years
- \$40,000
- 3.5%
- Secured

### **Contact:**

Ben Brouwer 444-6586



## Home Energy Loan

- 15 years, \$25,000
- 4.9 - 5.9%
- Reamortization
- Unsecured, easy-access

## Solar Home Equity Loan

- 20 years, \$150,000
- 5 – 5.5%
- Secured
- Deductible interest



**Questions?**