



Thank you
Jamen & Jane
&
Sierra Club
East Bay Dinners!

Solar Guided Tour

5/25/2017

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Solar Guided Tour

Who's Doug?

SunWork.org



NorCalSolar.org



LightsOnSolar.com

AspirationalCoaching.com

[LinkedIn.com/in/renewabledoug](https://www.linkedin.com/in/renewabledoug)



LONG Time Sierra Club Member

[EV enthusiast](#)



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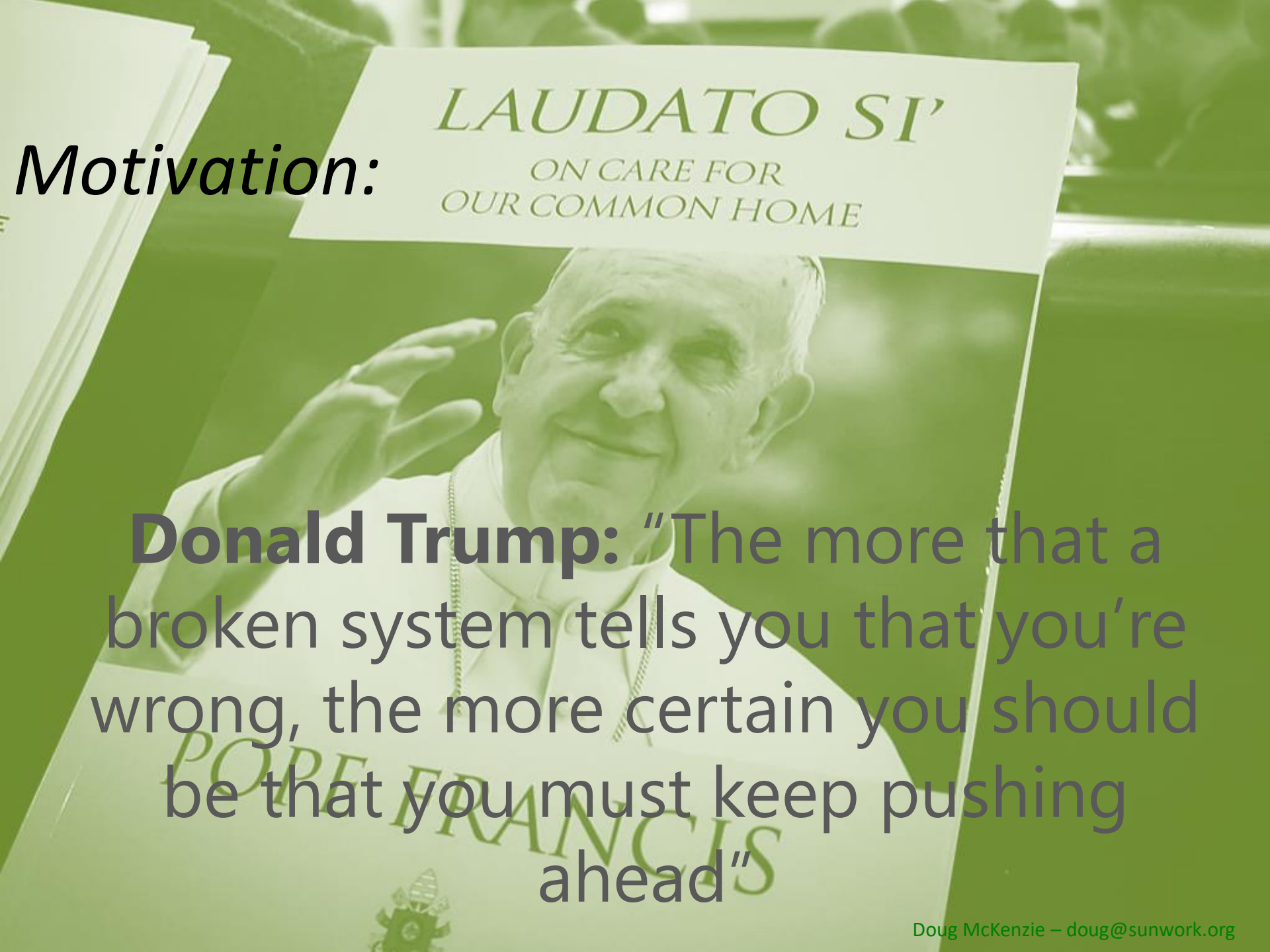
Motivation...

Steve Bannon: "Darkness is good...
Dick Cheney. Darth Vader. Satan.
That's power. It only helps us when
[liberals and the media] get it
wrong. When they're blind to who
we are and what we're doing"

Motivation:

LAUDATO SI'

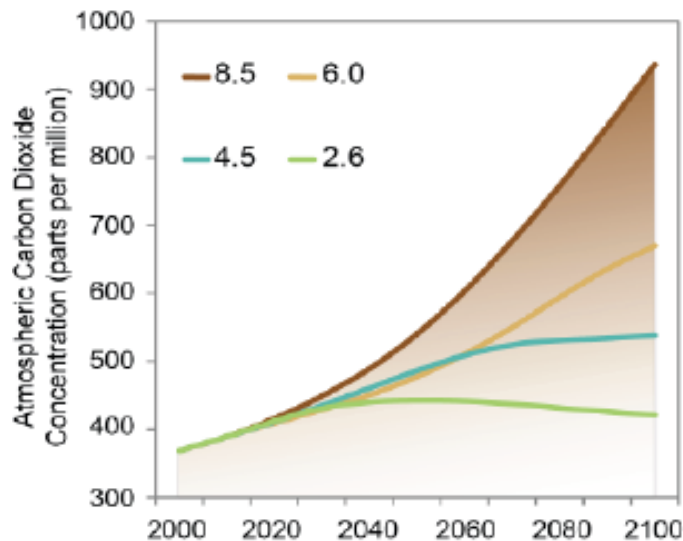
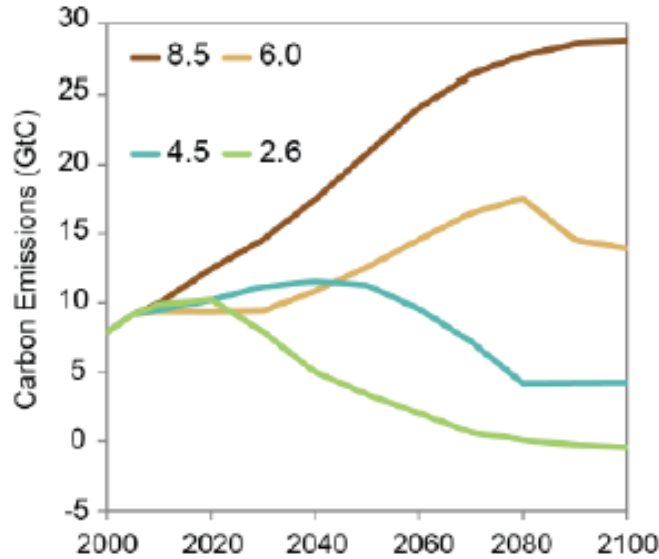
*ON CARE FOR
OUR COMMON HOME*



Donald Trump: "The more that a broken system tells you that you're wrong, the more certain you should be that you must keep pushing ahead"

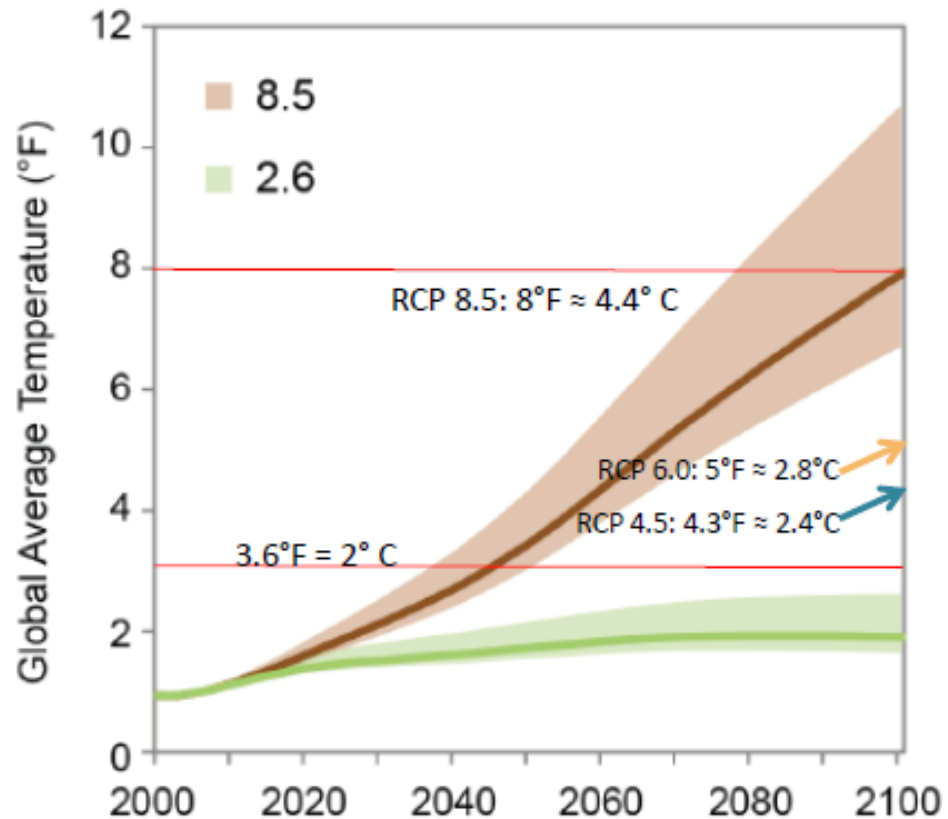
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Motivation...



Climate Change

RCP* 2.6, 4.5, 6.0, 8.5



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Motivation...

The Sun: Less than two hours of sunlight reaching the earth contains enough energy to provide all of humanity's energy needs for a full year

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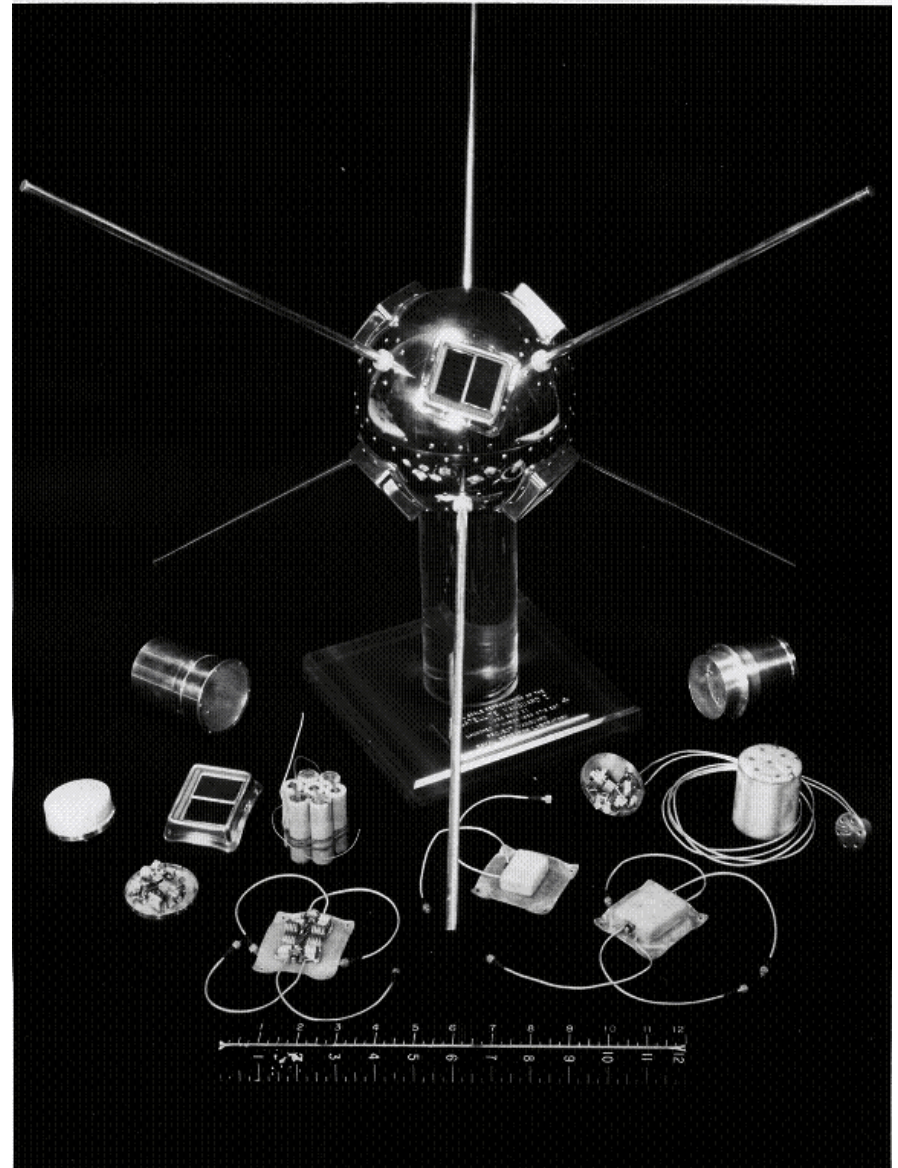
Motivation...

Tony Seba: "Your next oil well makes my next oil well more expensive. Your next solar panel makes my next solar panel cheaper"

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Vanguard I (1958)

~0.005 watts



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Solar Calculator (1985)

~0.01 watts



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Solar Watch (2016)

~0.3 watts



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Solar Water Fountain - 1.2 watts



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**Solar Powered
Fan + Light**
~2 watts



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Solar Powered USB Battery Pack

~5 watts



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Solar Daypack

~10 watts



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Solar Sailing ~40 watts



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Street Light - ~50 watts

Bonus:
Wind
power!



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SolPad - 72 watts



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Solar Driving - 180 watts

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> Panasonic Newsroom TOP > Press Release > Panasonic's Photovoltaic Module HIT(TM) adopted for Toyota Motor's New Prius PHV

 [Print](#)

Feb 28, 2017

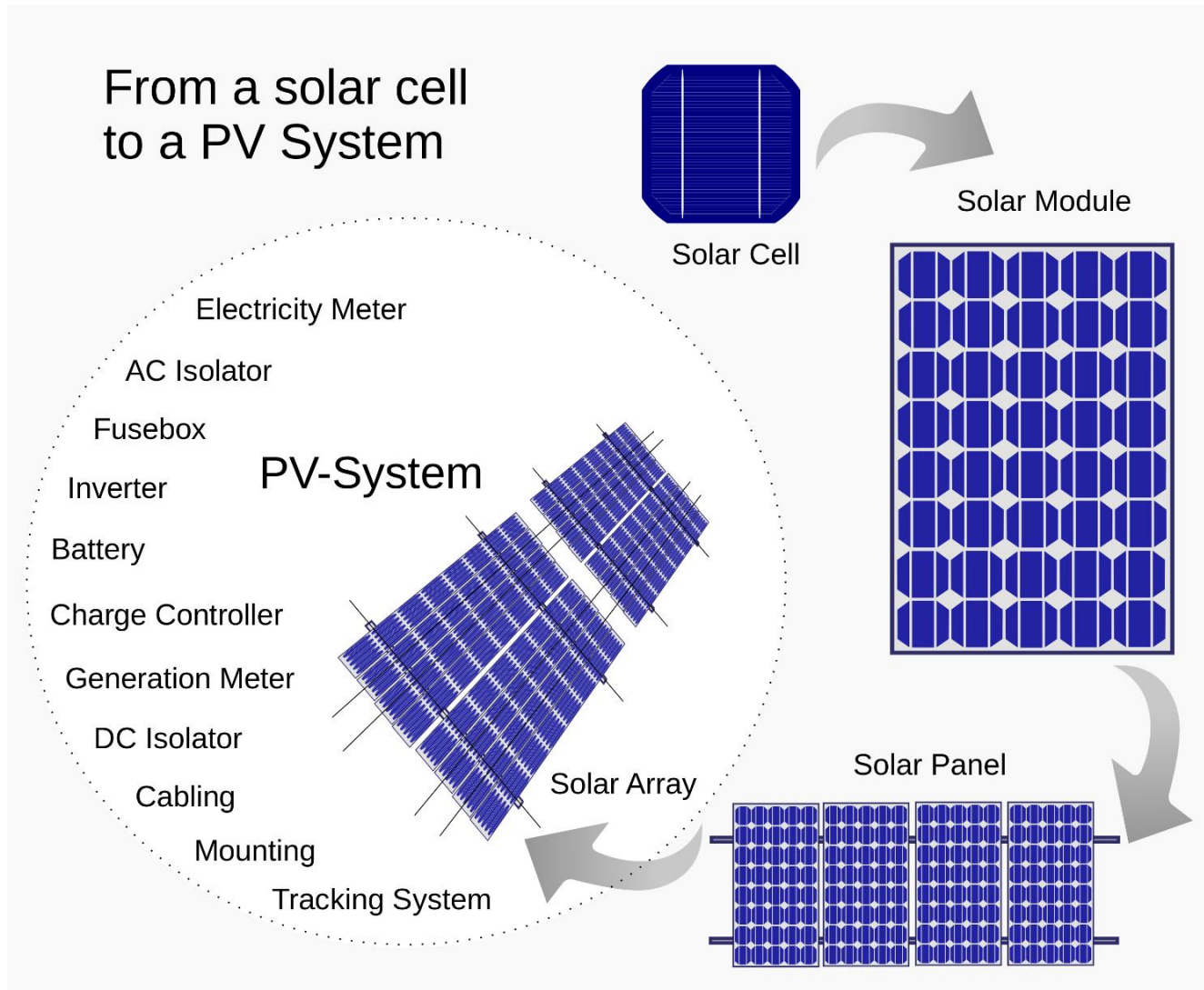
Panasonic's Photovoltaic Module HIT™ adopted for Toyota Motor's New Prius PHV



[HIT™ Photovoltaic Module for Automobile]

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Solar Panel ~300 watts



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Off-grid Solar

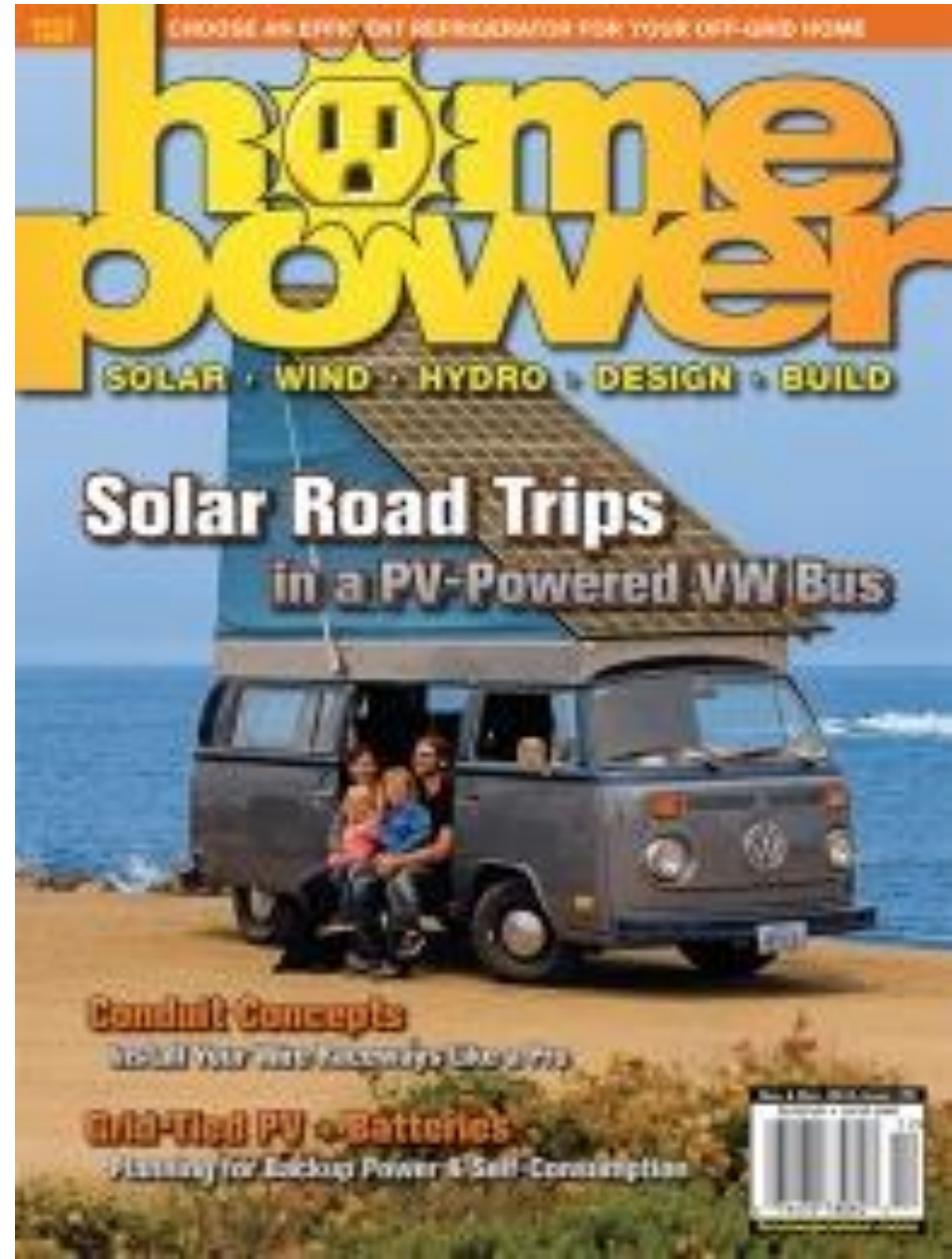
Nepal ~100 watts

Rwanda ~10 watts



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**Solar Powered
VW Bus
1.2 kW**



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Solar Powered Home

2.24 kW



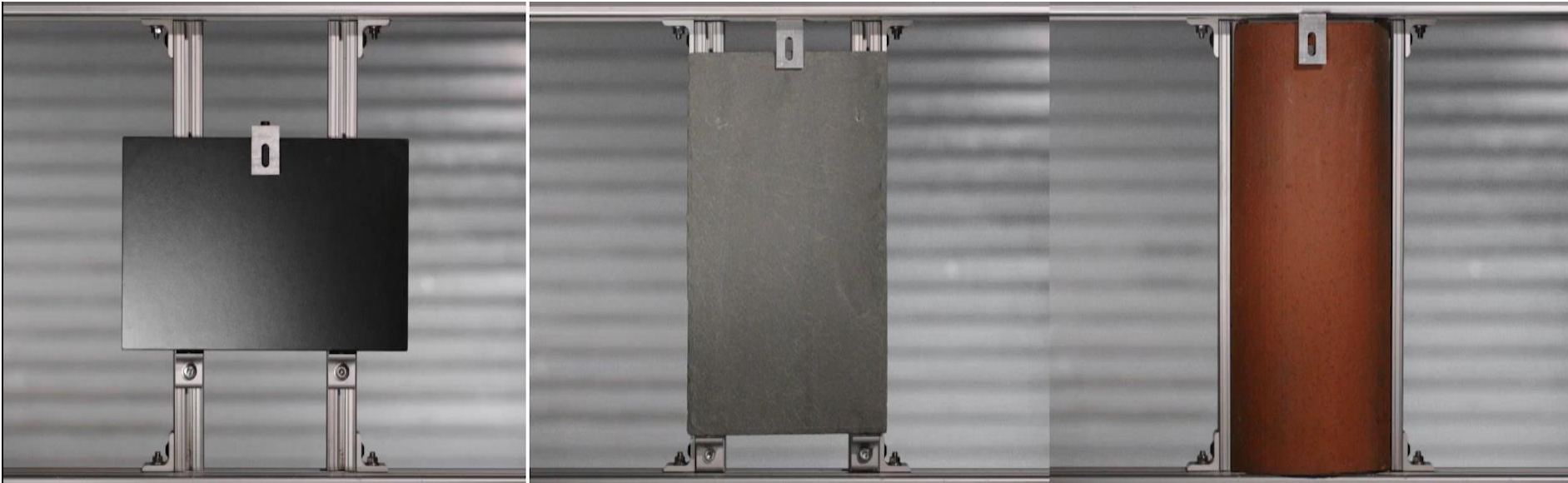
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Tesla Solar Roof – ~10 kW



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Tesla Solar Roof



https://www.tesla.com/ns_videos/Hail_3up_Smooth_h264.m4v?20170509a

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Solar Powered Plane – Solar Impulse

45 kW



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Solar Parking - De Anza College - 201 kW



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Solar Power Plant – 90 MW



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Ivanpah Solar Power Plant – 392 MW



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Timeline of the largest PV power stations in the world

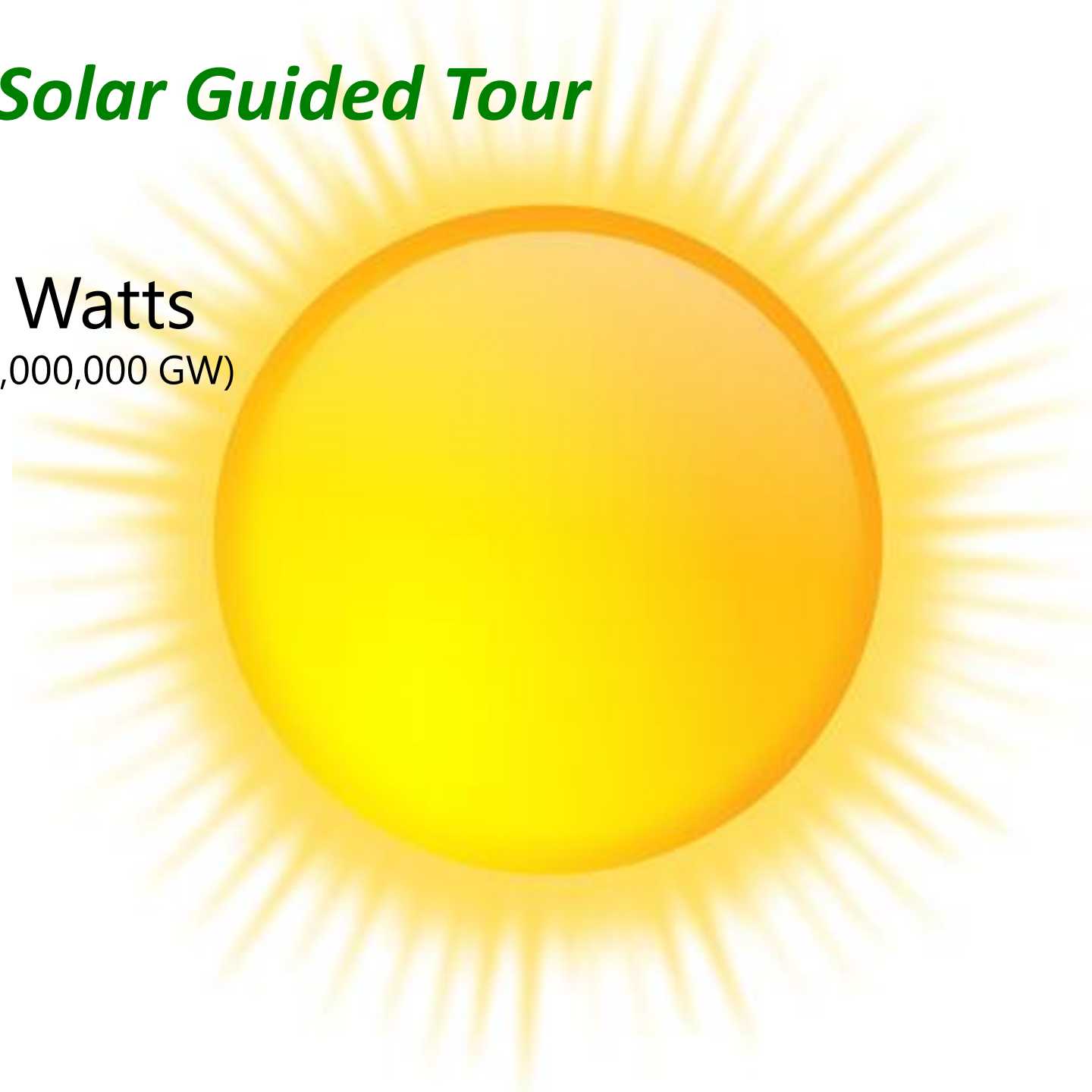
Year ^(a)	Name of PV power station	Country	Capacity MW
1982	Lugo	 United States	1
1985	Carrisa Plain	 United States	5.6
2005	Bavaria Solarpark (Mühlhausen)	 Germany	6.3
2006	Erlasee Solar Park	 Germany	11.4
2008	Olmedilla Photovoltaic Park	 Spain	60
2010	Sarnia Photovoltaic Power Plant	 Canada	97
2011	Huanghe Hydropower Golmud Solar Park	 China	200
2012	Agua Caliente Solar Project	 United States	290
2014	Topaz Solar Farm ^(b)	 United States	550
2015	Solar Star ^(b)	 United States	579
2015	Longyangxia Dam Solar Park	 China	850
2017	Kurnool Ultra Mega Solar Park	 India	900

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Our Sun

$3.8 * 10^{26}$ Watts

(380,000,000,000,000,000 GW)



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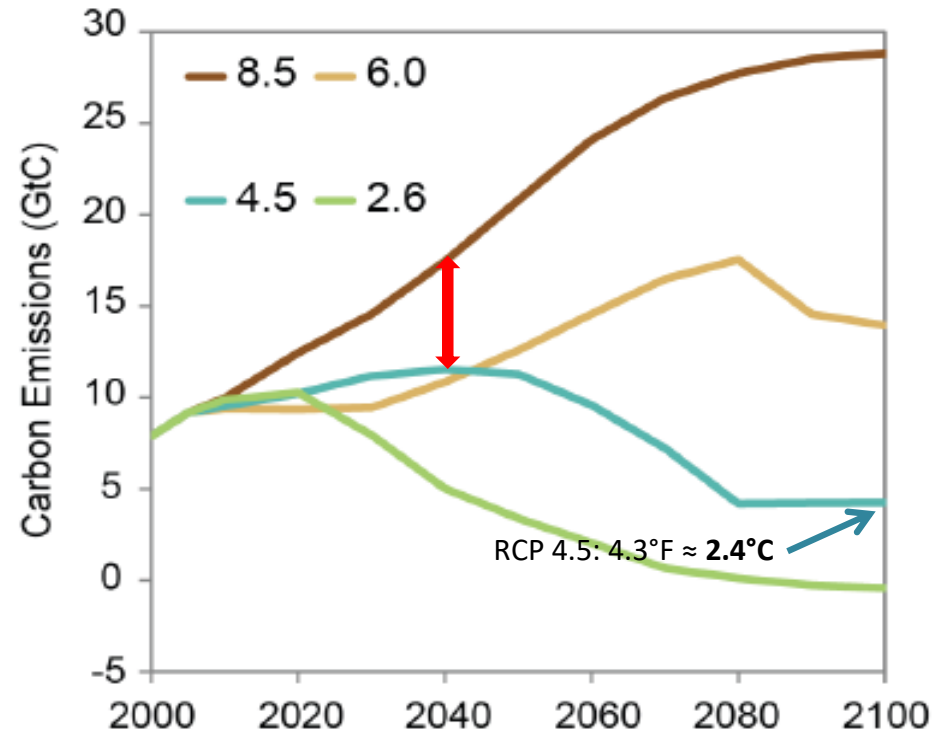
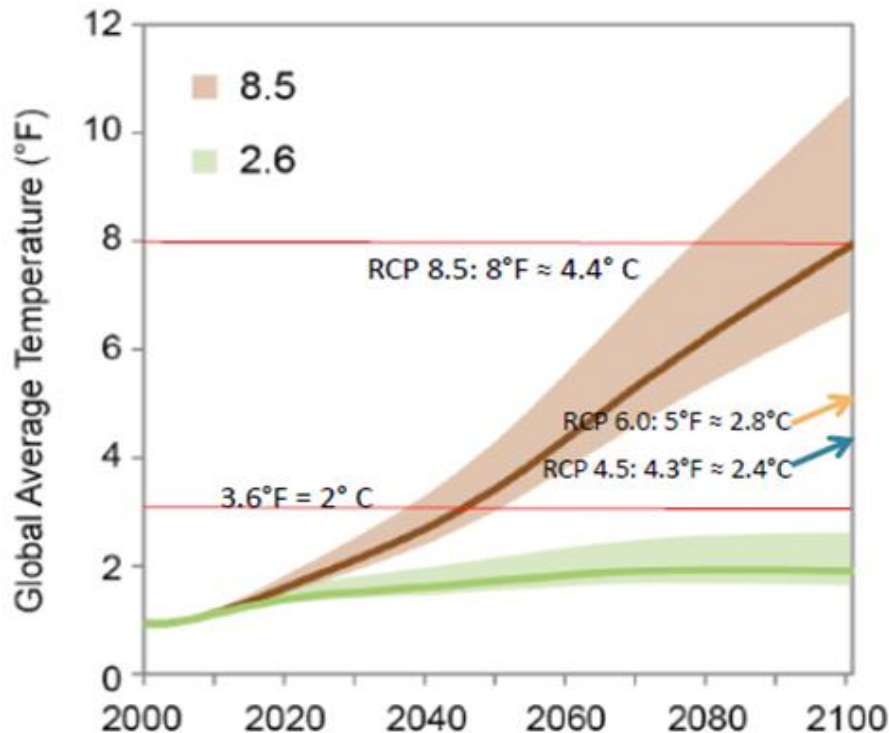
Headed back home



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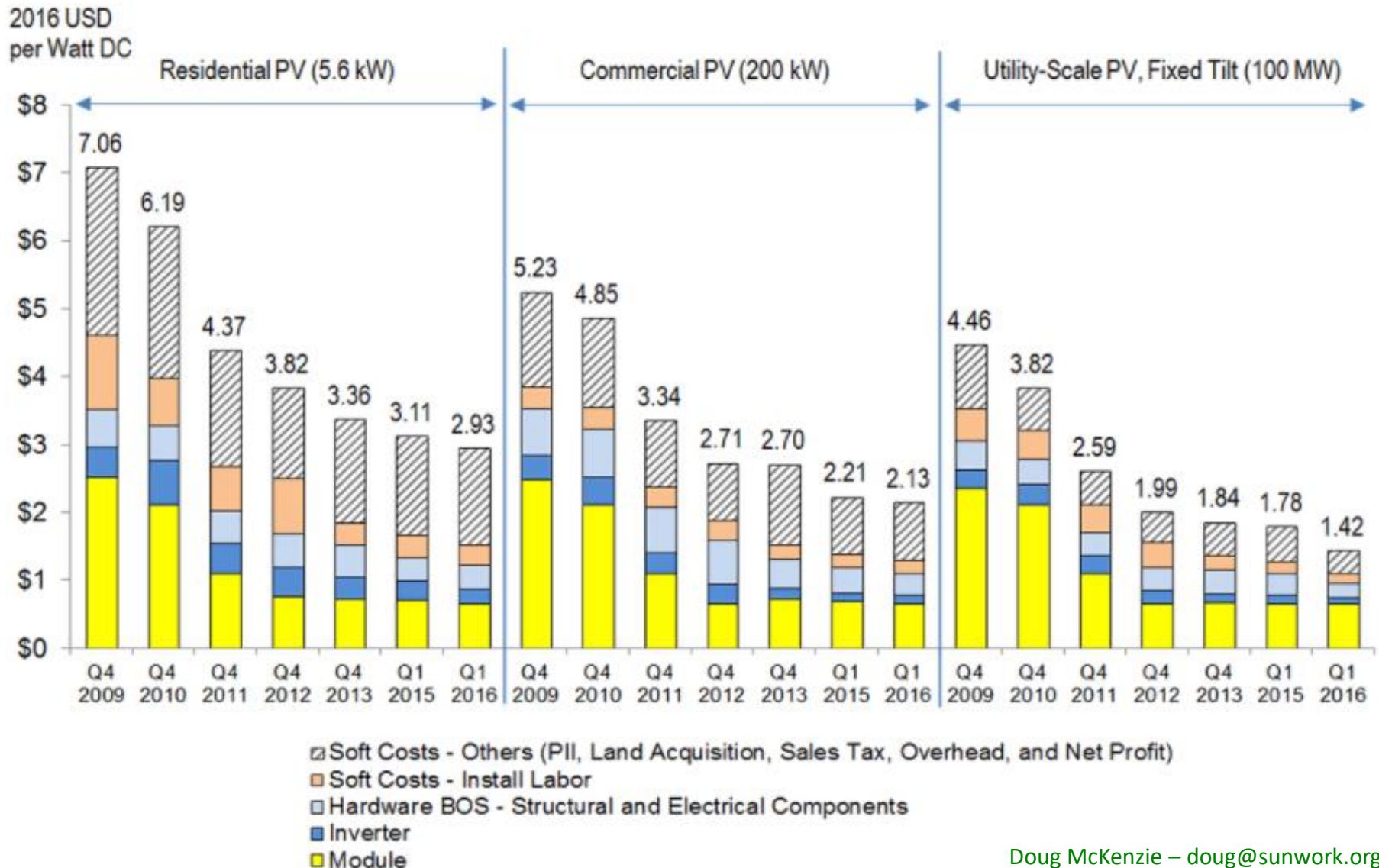
Worldwide growth of photovoltaics

One estimate... We need 13,500 GW of solar installed by 2040 to lower us to the path of 2.4°C (4.3°F) rise by 2100



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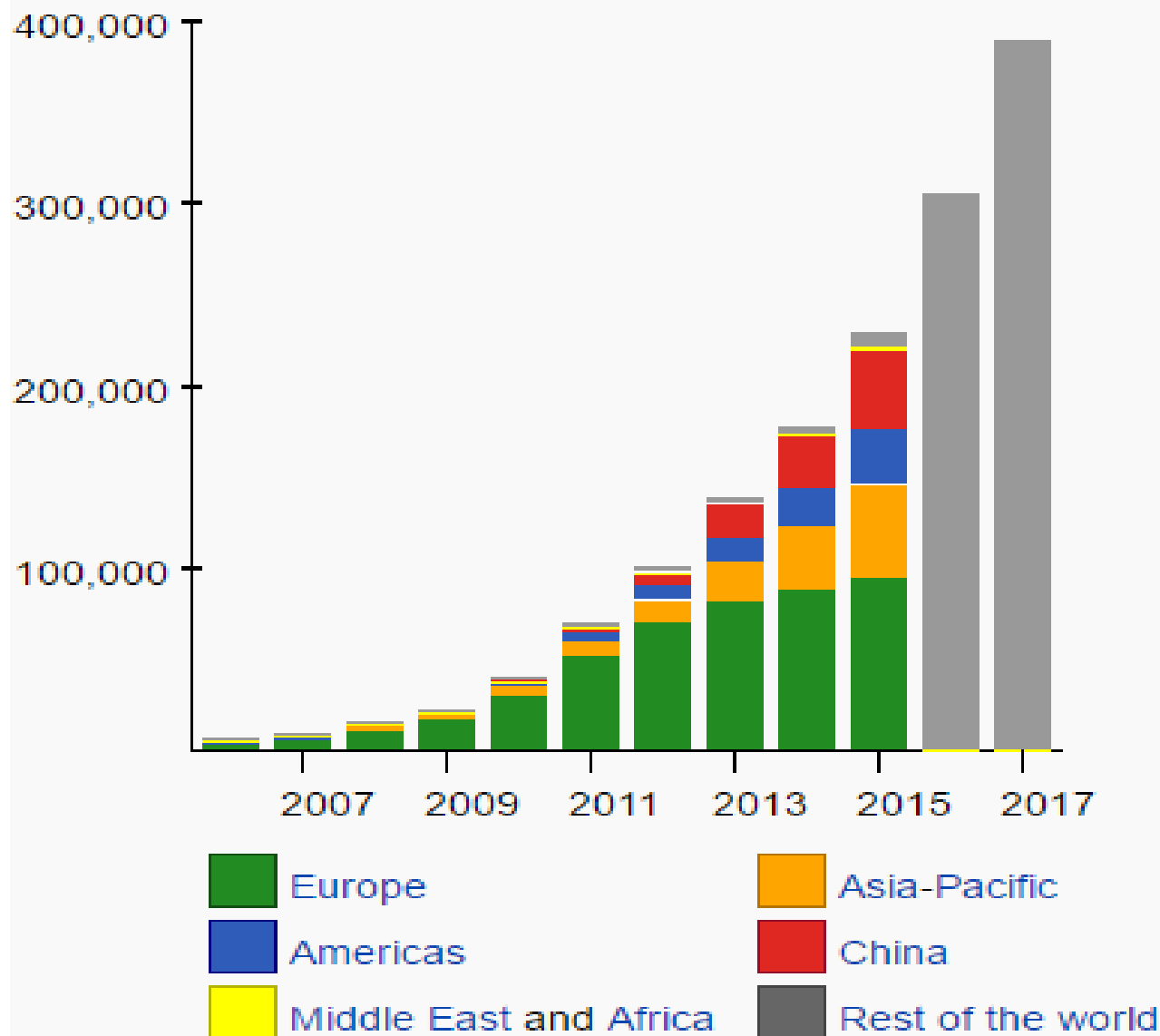
Drop in Solar Cost (USA)



Worldwide growth of photovoltaics

Cumulative capacity in megawatts [MW_p] grouped by region^{[1][2][3][4][5]}

No split-up by region for 2016 and 2017 available yet



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Tour*

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Worldwide growth of photovoltaics

China's New 5 year plan

- \$360 billion into renewable power by 2020
- \$144 billion into solar
= 150 GW of solar by 2020

India's New National Solar Mission

- Expand from 3 MW today to 20,000 MW (20 GW) by 2020, and 200 GW by 2050.

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Meanwhile

LA Times
5/25/2017



As Trump wavers over Paris climate accord, European leaders give him an earful



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**Still closer to
home**



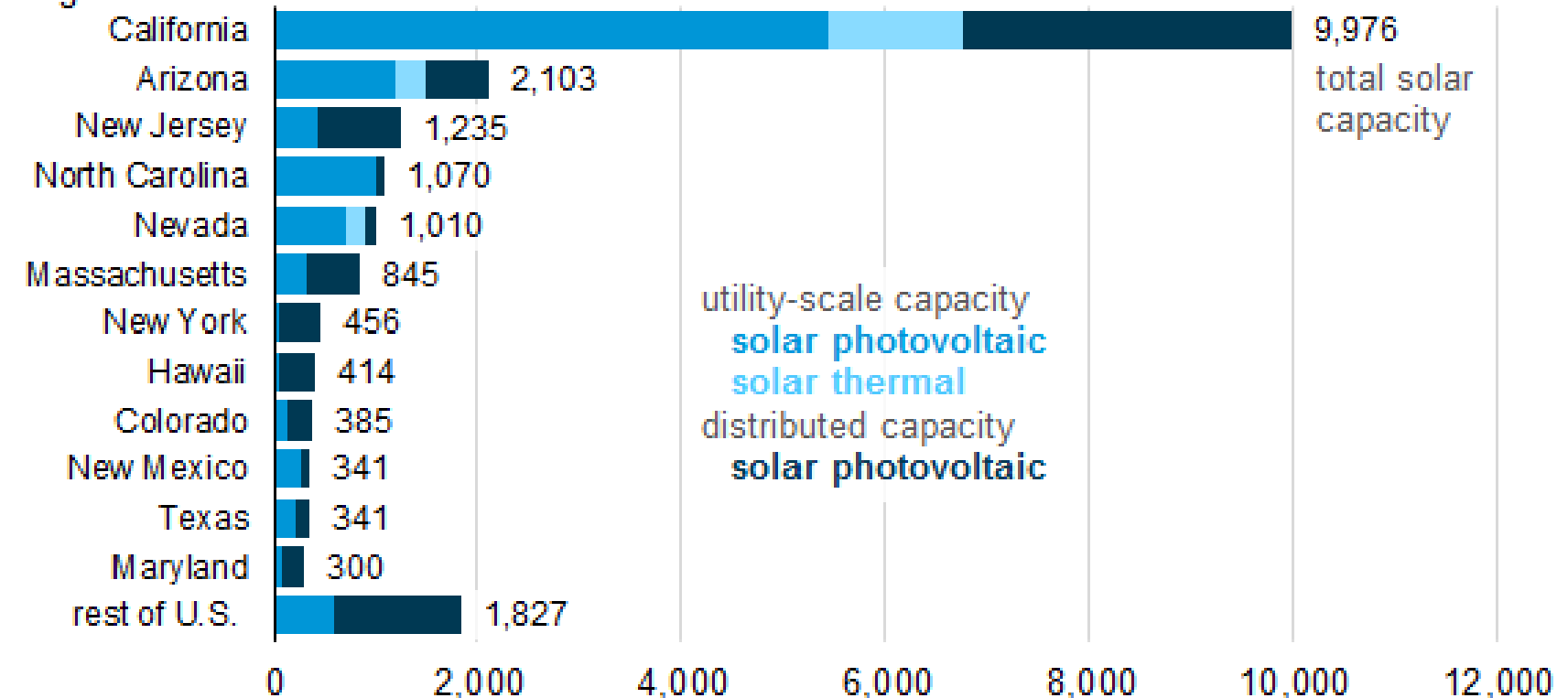
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California Solar

Half of all solar in the US is in California

Solar electricity generating capacity, end of November 2015

megawatts



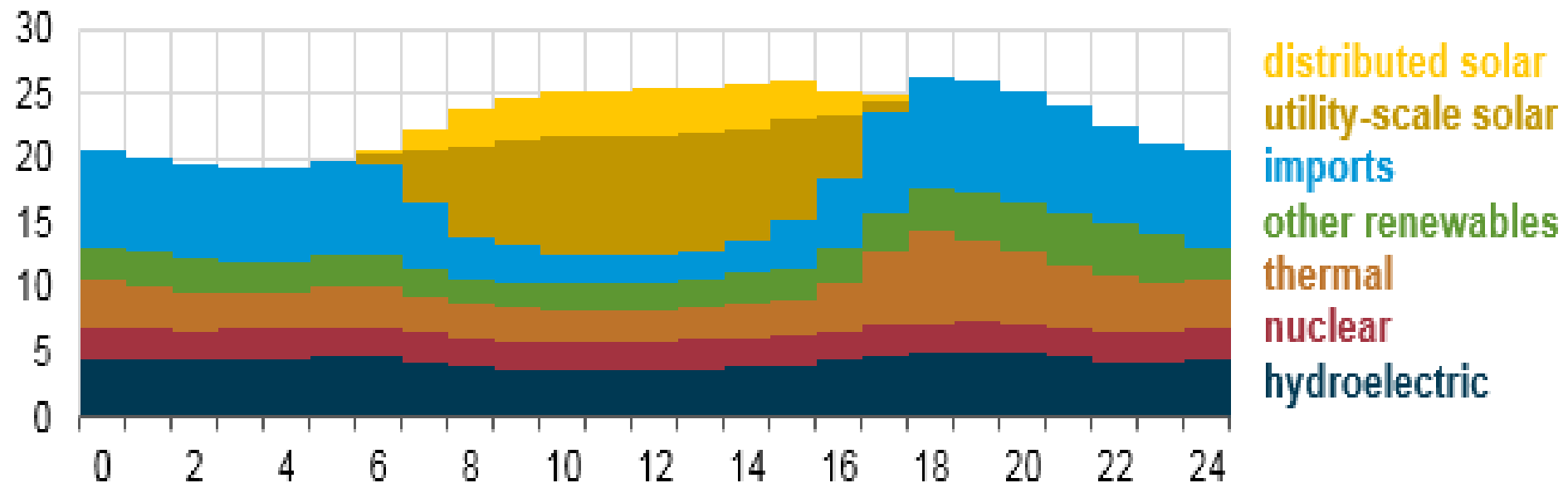
Source: U.S. Energy Information Administration, *Electric Power Monthly*

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California Solar

March 11, 2017 midday: solar generated half of California's total electricity demand

California Independent System Operator net generation, March 11, 2017
gigawatthours



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California Solar

Distributed Generation (DG)

Alameda Co: 155 MW

Contra Cost Co: 203 MW

Marin Co: 37 MW

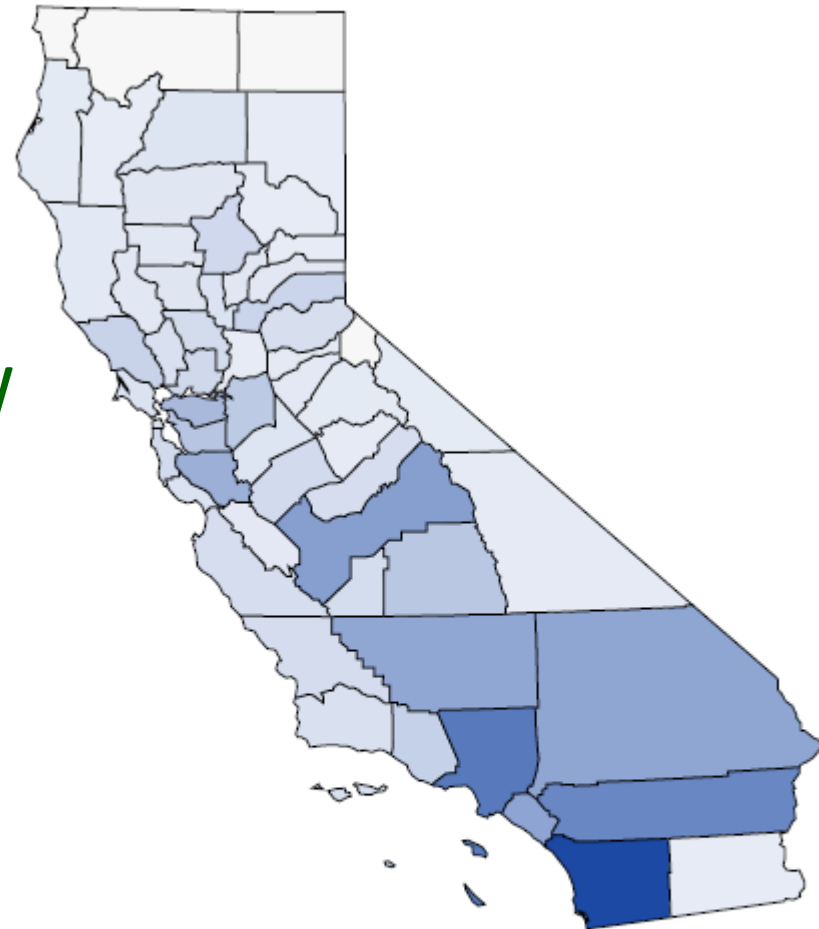
San Mateo Co: 66 MW

SF Co: 29 MW

Santa Clara Co: 246 MW

Fresno Co: 309 MW

San Diego Co: 661 MW



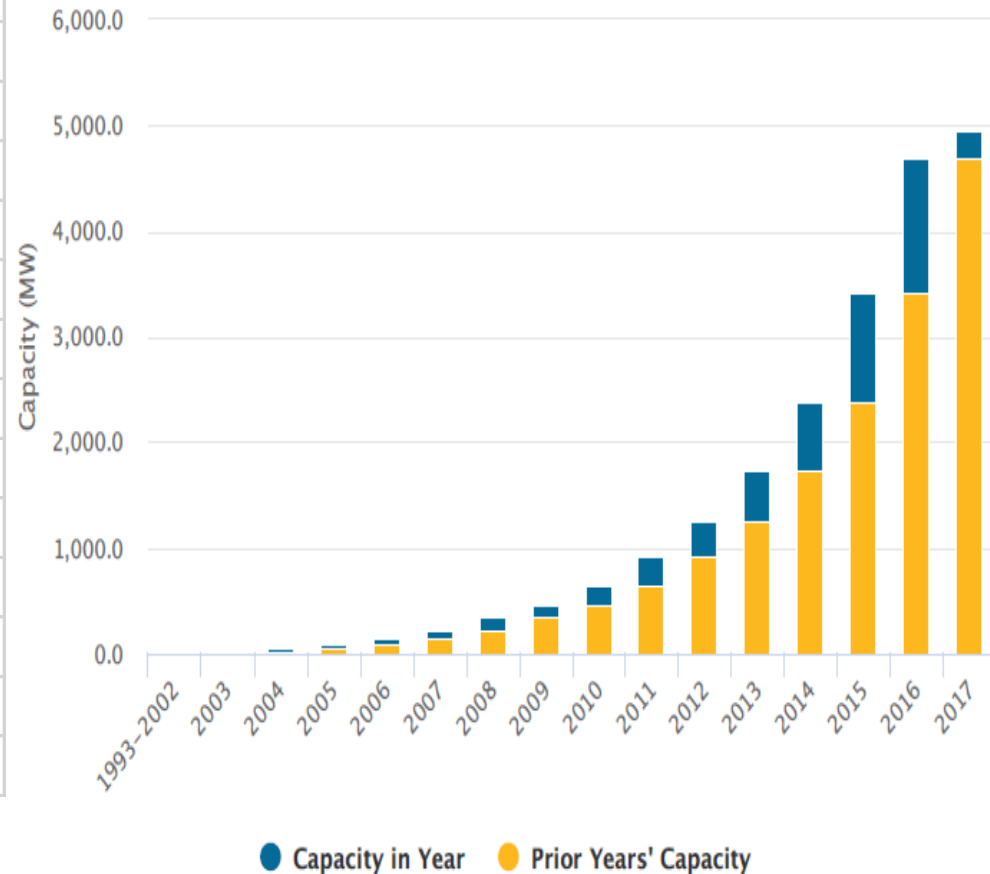
Capacity (MW)



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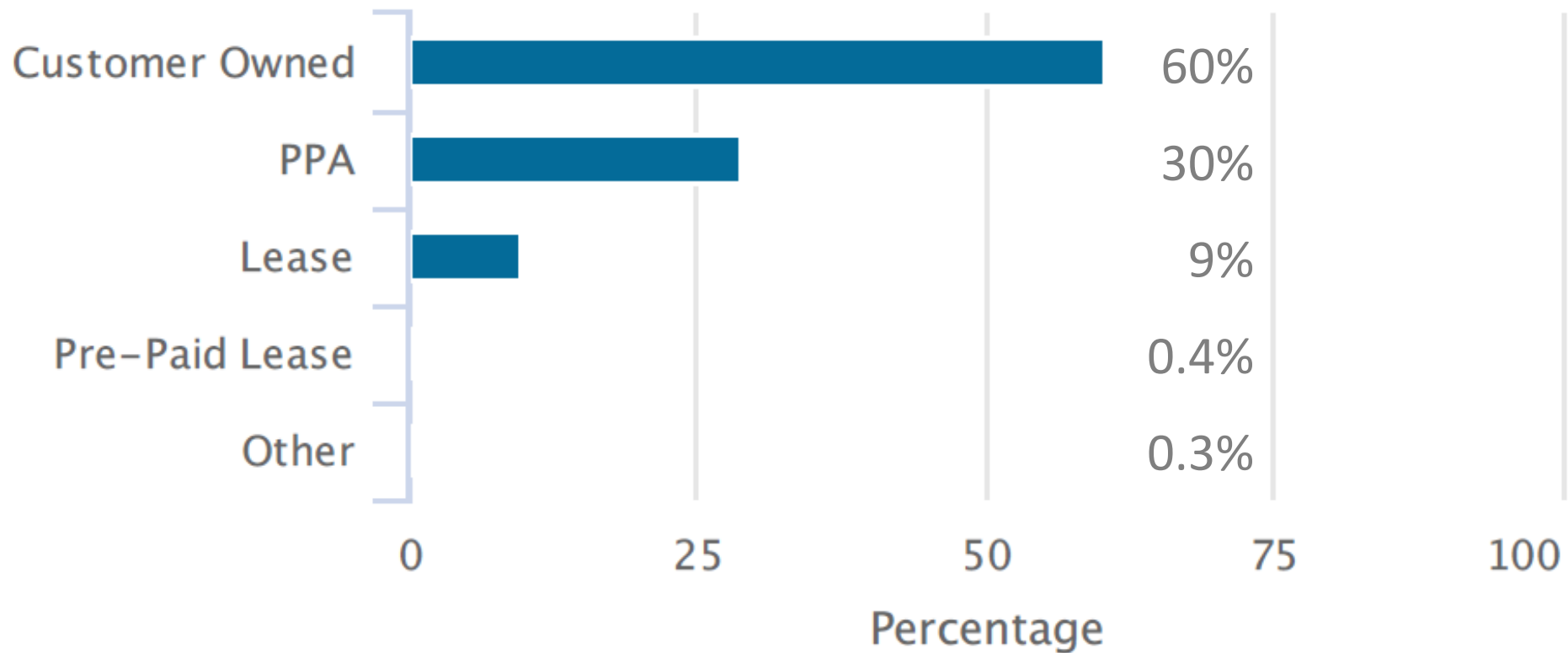
California Solar - DG

Year	DG MW	Growth	Cumulative	CAGR
2004	30		61	
2005	34	14.9%	95	
2006	49	44.7%	145	
2007	83	68.1%	228	
2008	128	54.0%	356	
2009	117	-8.5%	473	
2010	175	49.8%	648	
2011	283	61.1%	931	
2012	335	18.7%	1266	
2013	473	41.0%	1739	
2014	641	35.5%	2380	
2015	1049	63.6%	3429	
2016	1267	20.8%	4696	36.7%
3/31/17	243		4938	



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California Solar - DG



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Home!



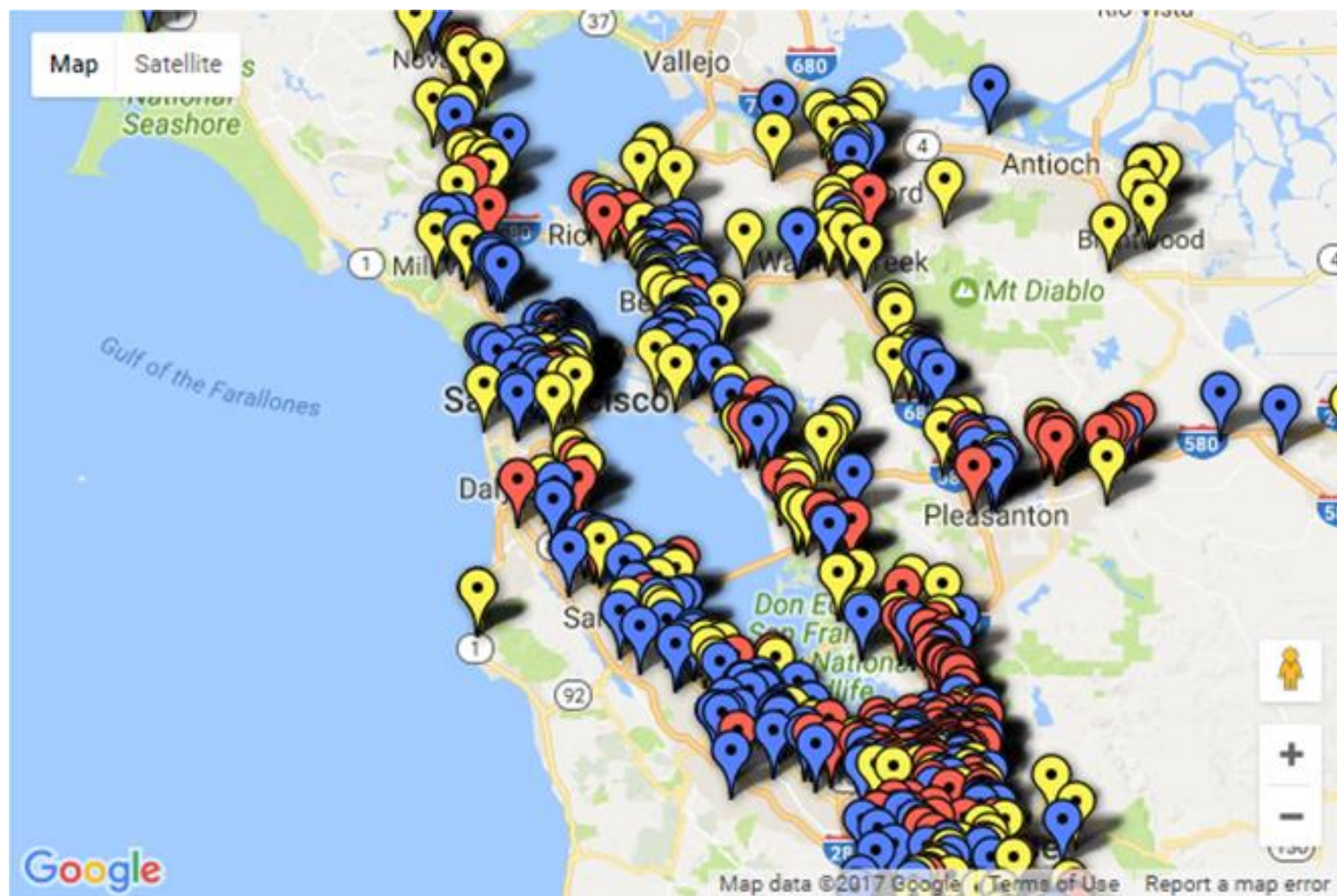
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Alcatraz – Join the NorCal Solar tour! July 10, 2017



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Lots of local installers!



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Benefits of rooftop solar

- Reduces need for fossil-fuel power
- Enables clean transportation
 - Solar powered EVs
- Reliable and safe
- Reduces need for utility equipment & maintenance
- Creates jobs (design, installation, sales, marketing)
- Increases voter awareness of energy
- Saves money (7-15% *non-taxable* return!) and protects against rising electricity rates
- Enables clean home appliances (oven, cooktop, clothes dryer, A/C, space & water heat)
- Starts conversations, enables clean power bragging rights



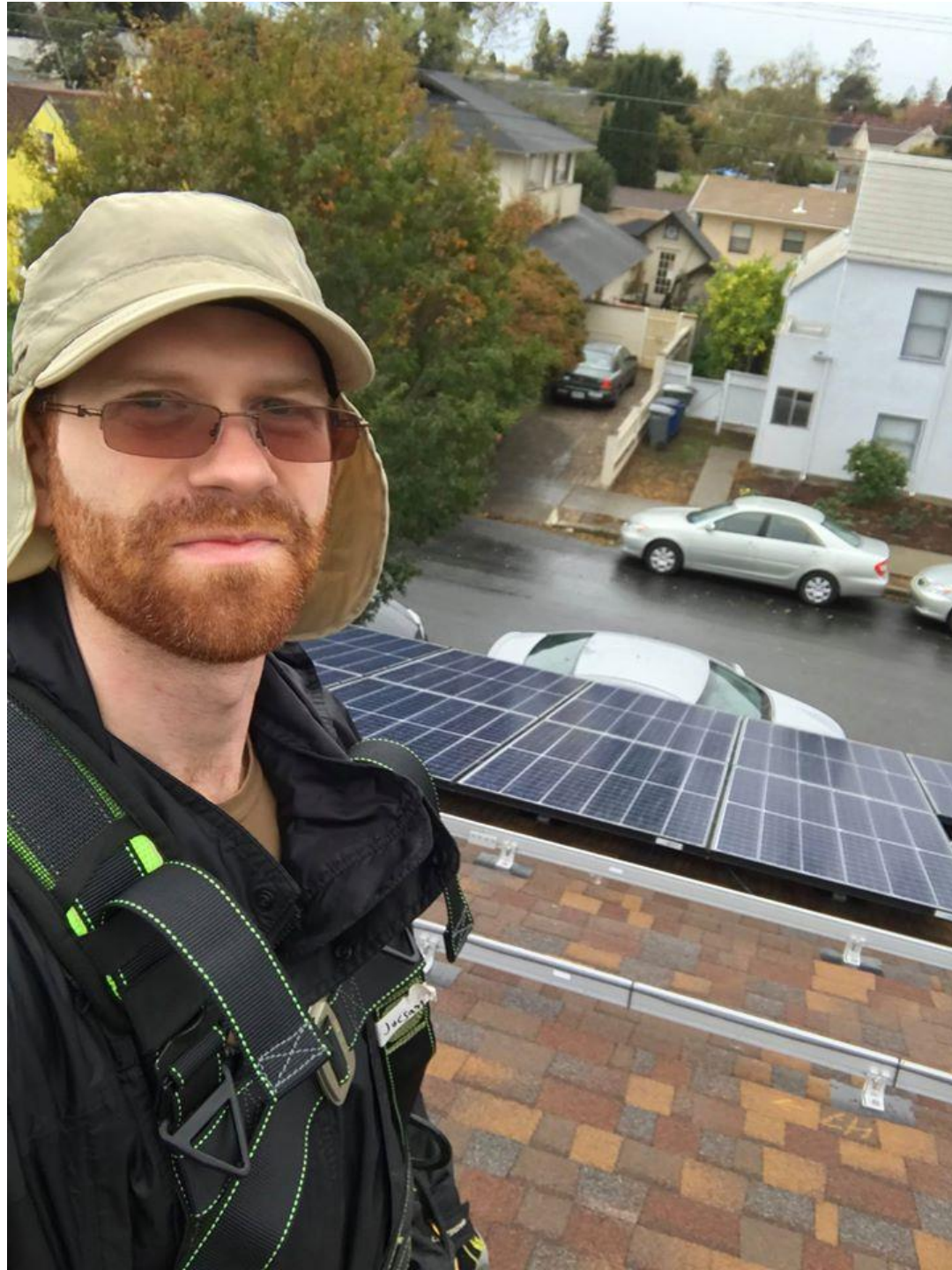
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Lots of rooftop solar nearby!



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**Lots of
rooftop
solar
nearby!**



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Lots of rooftop solar nearby!



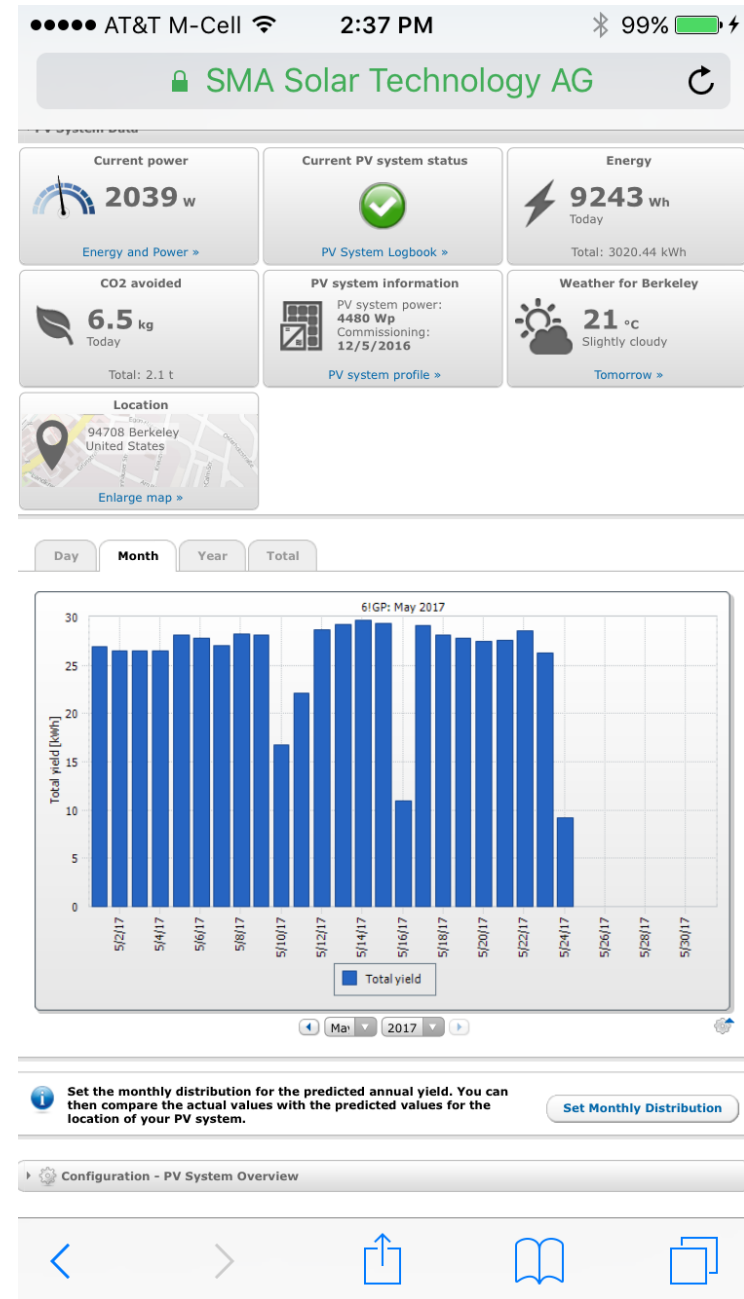
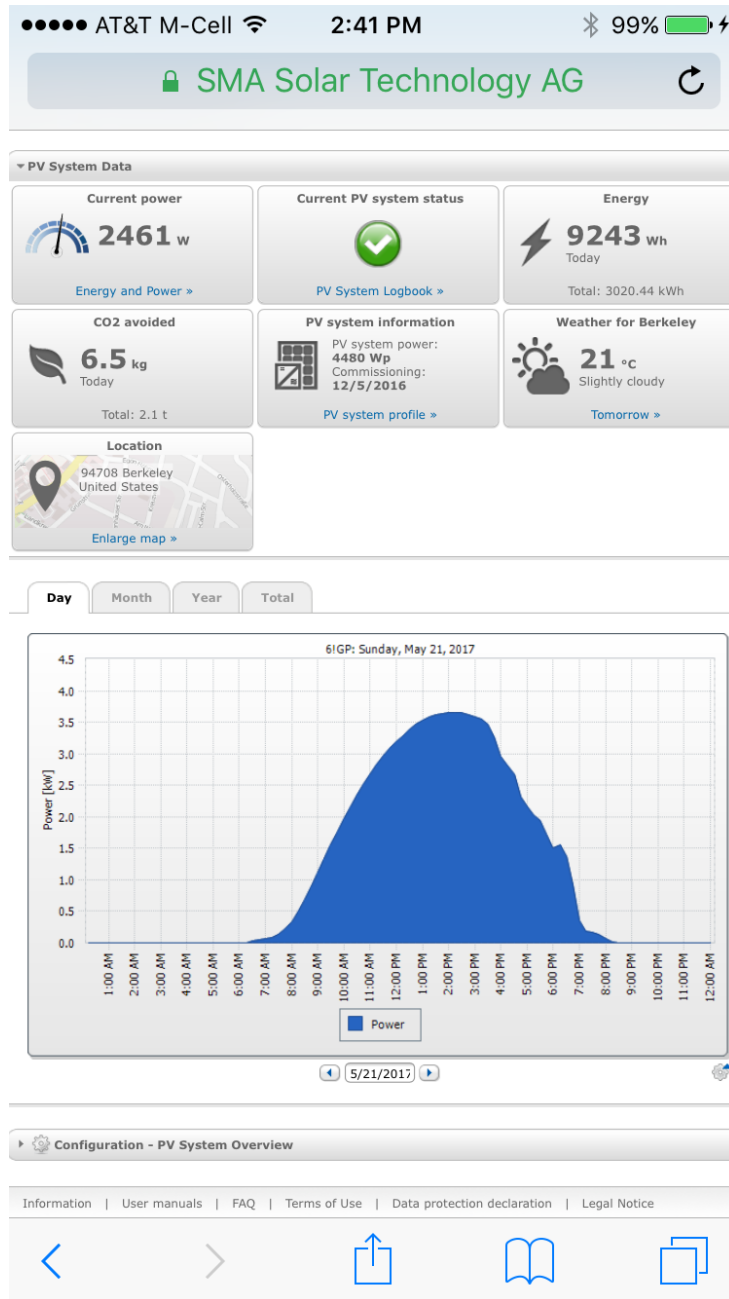
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Lots of rooftop solar nearby!



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Smartphone Monitoring



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Rooftop Solar - Clean and Green



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What about Community Choice Energy (CCE)* ???

- Marin Clean Energy (MCE -1st in California)
- Silicon Valley Clean Energy (SVCE)
- CleanPowerSF
- Peninsula Clean Energy (PCE)
- East Bay Community Energy (EBCE)
- Sonoma Clean Power (SCP)

* aka Community Choice Aggregation (CCA)

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East Bay Community Energy (EBCE.org)

- Alameda County jurisdictions
- Locally controlled electricity supplier
- Goals
 - *Competitive, more stable rates*
 - *Clean, local, renewable energy*
 - *Local job creation*
 - *Revenues can be used for local investment*
- Partner with PG&E
 - *EBCE generates energy, PG&E maintains infrastructure & delivers energy*

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East Bay Community Energy (EBCE.org)

- Everyone is in unless you opt-out
- One bill (from PG&E)
 - *EBCE: Generation charge*
 - *PG&E: Transmission, distribution and (many) miscellaneous charges*
- Start at 50% renewable, opt-in to 100%
- MCE offers:
 - *50% "Light Green" (same prices as PG&E)*
 - *100% "Deep Green" (1¢/kWh more)*
 - *100% "Local Sol" (14.2¢/kWh more)*

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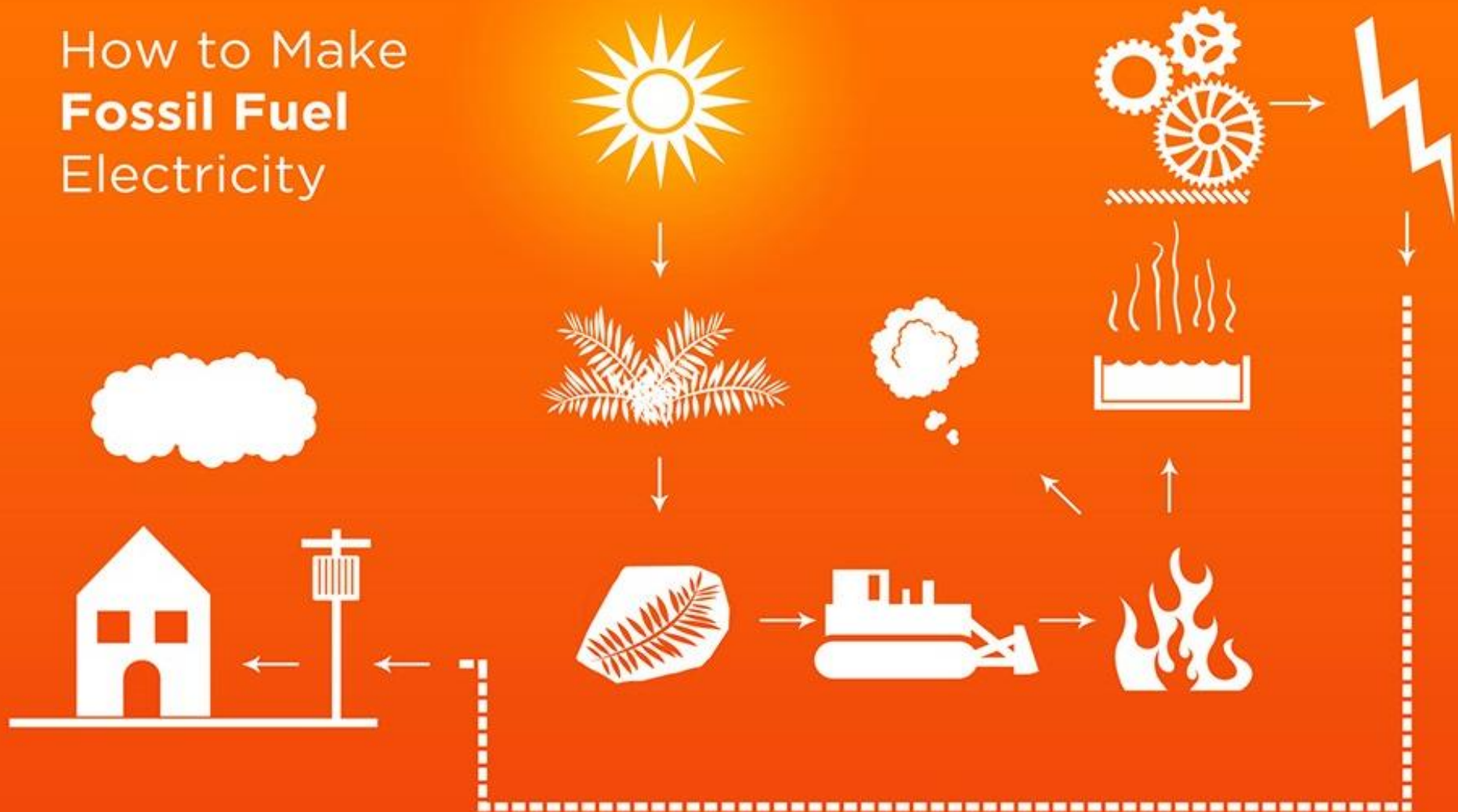
East Bay Community Energy (EBCE.org)

Learn more

- Local Clean Energy Alliance – June 8
 - *Rosana Francescato from MyDomino*
- Ecology Center & Sierra Club – Two Part
 - *Doug from SunWork*
 - *June 10 – Getting started*
 - *June 24 – Deeper Dive*
- NorCal Solar - June 20
 - *Clarifying the New PV Value Proposition:
The ABCs of NEM 2, NBCs, and CCAs*

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Help go from this...



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To this!

How to Make
Solar
Electricity



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And watch your meter run backwards!



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In early 2014,