



Welcome
October 19th 2018

Meydenbauer Center, Bellevue, WA

Dean Van Vleet,
President - Solar Washington



Presented by Solar Washington

- **501(c)3 Non-Profit**
- **Founded June 2000**
- **Advancing Solar Energy in Washington State**
- **Organizing Community Outreach and Educational Activities**
- **7 Volunteer Board Members**
- **1 Executive Director**



Solar Washington Board and Staff

- **Dean Van Vleet – President**
- **Britton Rife – Vice President**
- **Joan Schrammeck – Secretary**
- **Chandra Romel – Treasurer**
- **Craig Wahl**
- **Jack Newman**
- **Leslie Moynihan**
- **Patrick Nugent – Executive Director**



Additional Summit Committee Volunteers

- **Bart Hansen – Clark PUD**
- **Allison Arnold – Solar Installers of Washington**
- **Leslie Moynihan – PSE**
- **Kendra Hubbard – SEIA, OSEIA, Unirac**
- **Craig Olson**



Topics of the day

- **State of Solar in WA and the US**
- **Diversity, Equity and Inclusion in Clean Energy**
- **Net Metering 2.0**
- **Initiative 1631 potential influence on Solar**
- **5939 Incentive program update**
- **Legislative Panel**



Goals for the day

- **Gain more knowledge of the solar industry – fast changing and churning with many new faces**
- **Gain more knowledge of the electrical distribution industry – stable, low risk, and high reliability are paramount**
- **Do this respectively**



What does respectively mean?

Lets review the “Story of the pig”



Story of the pig

- A man was driving a winding mountain road in his sports car.



The logo features a green silhouette of the state of Washington. Inside the state's outline, there is a bright yellow sun with white rays emanating from it, partially obscured by the green background.

Washington State SOLAR SUMMIT

- **At the same time a woman is driving in the opposite direction towards him in her sports car**

- northyorkshireclassiccarhire.co.uk





- **As they pass each other the woman leans out her window and yells, “Pig!”**
- **The man immediately leans out his window and replies \$#%@*&!**
- **He then storms off into the next curve...**



Washington State

SOLAR SUMMIT

...only to wreck his car trying to avoid a pig in the roadway.



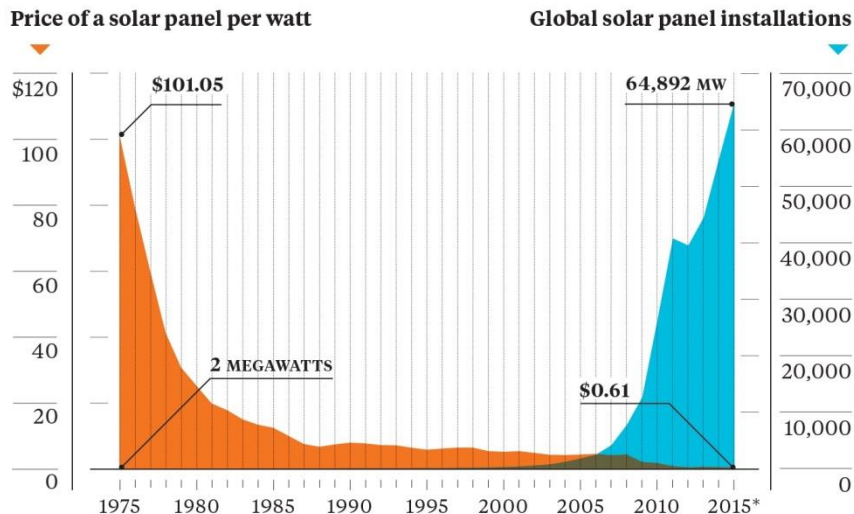


The moral of the story

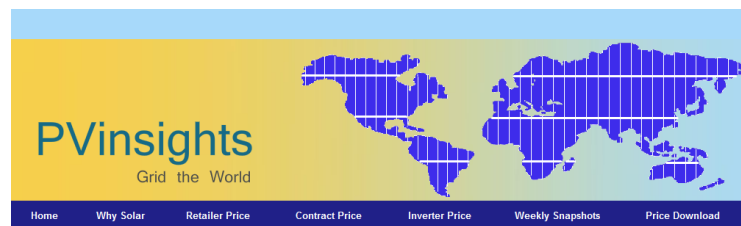
- **Don't be so thin skinned you can not take feedback from people. Particularly from experts on the "other side"**

Other reminders for the day

- Accept that lots of things will change

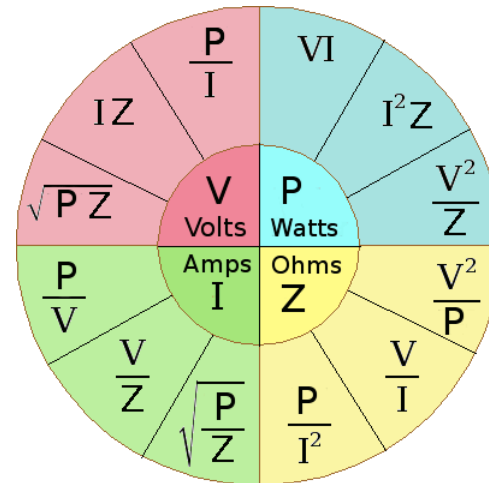
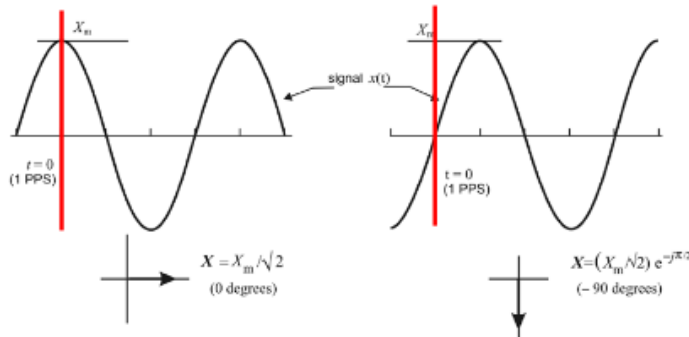


*Estimate. Sources: Bloomberg, Earth Policy Institute, www.earth-policy.org



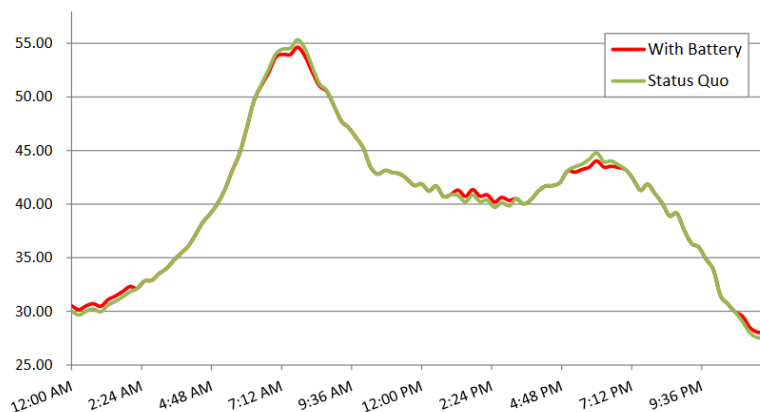
- **Accept that somethings do not change -
such as laws of physics**

$$x(t) = X_m \cos(2\pi f_0 t + \varphi) \Leftrightarrow X = (X_m / \sqrt{2}) e^{j\varphi}$$

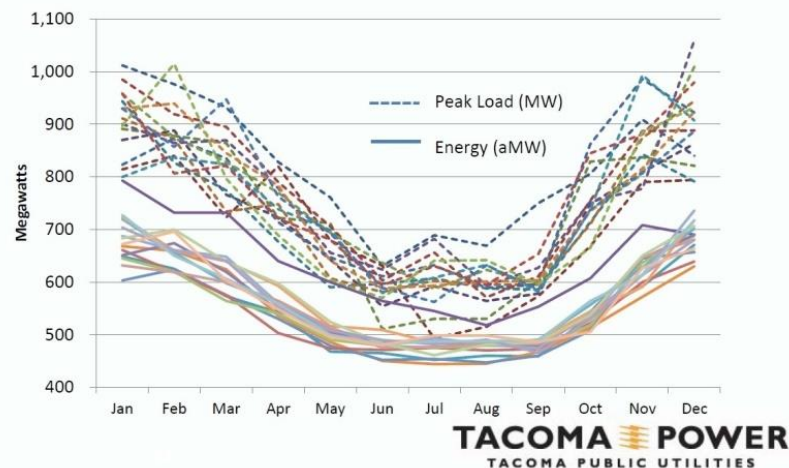


- **Accept that human nature is rather resistant to change – In particular to match load use with solar production**

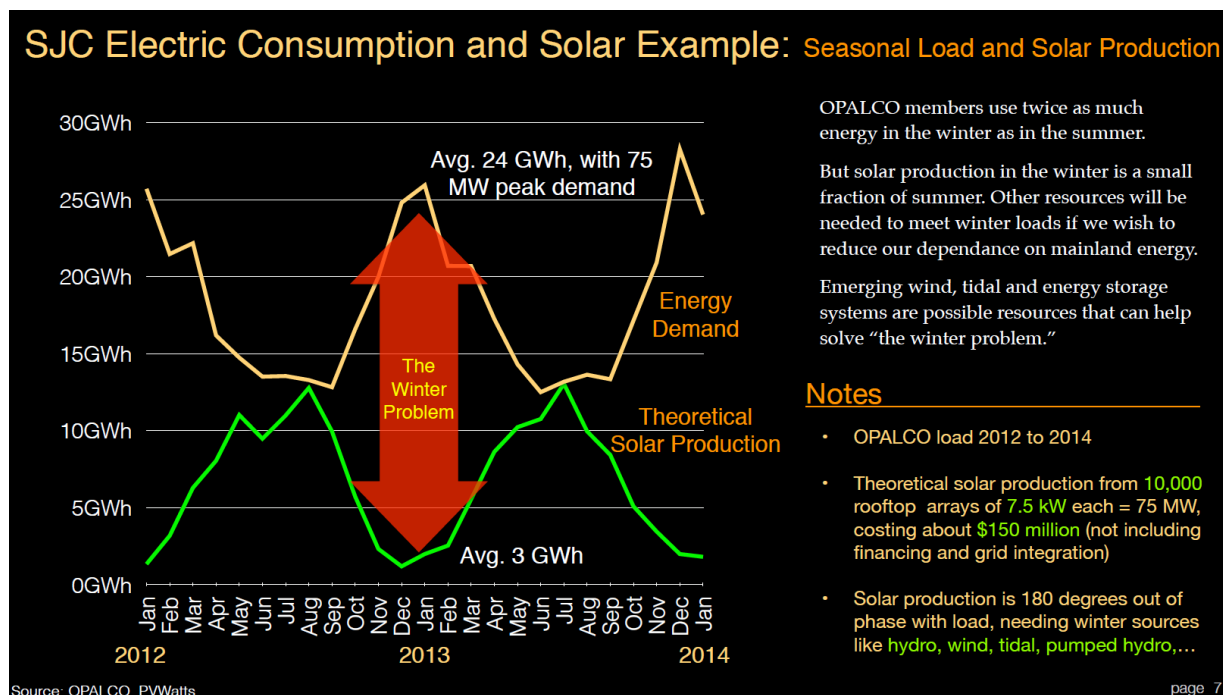
Example Battery Impact on Murden + Winslow Load - February 6, 2014



Monthly Energy and Peak Load (2000-2014)



- Accept that Washington is not California
- We won't get a "Duck Curve" - We'll get a different type of curve. Maybe the "Rainier Curve"??



Graph by Orcas Power & Light Cooperative (OPALCO)

A 4 hour storage solution for CA is not a 6 month storage solution for WA

- **New buzz words alone aren't magical fixes for perceived issues with the grid**

My microgrid
is better than
your
microgrid!

Nikola Tesla



Thomas Edison

AC ⚡ DC



**So what to do when incentives are
running dry?**



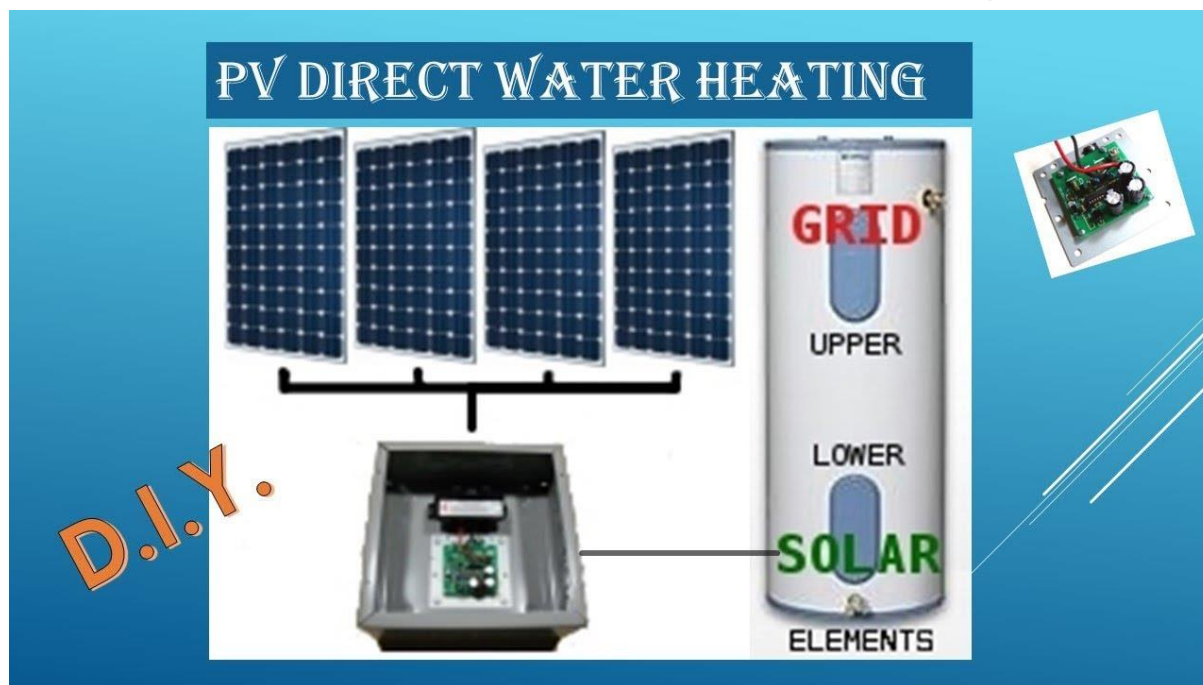
Diversify!!



Should kWh production be the only metric to define ROI?

M-Bar-C Solar Carports - mbarconline.com

- **Technology is moving fast!**
- **Resilient, Conservation, Energy Storage, Cheap, and No Interconnection agreement**



Solar energy is stored overnight as thermal energy

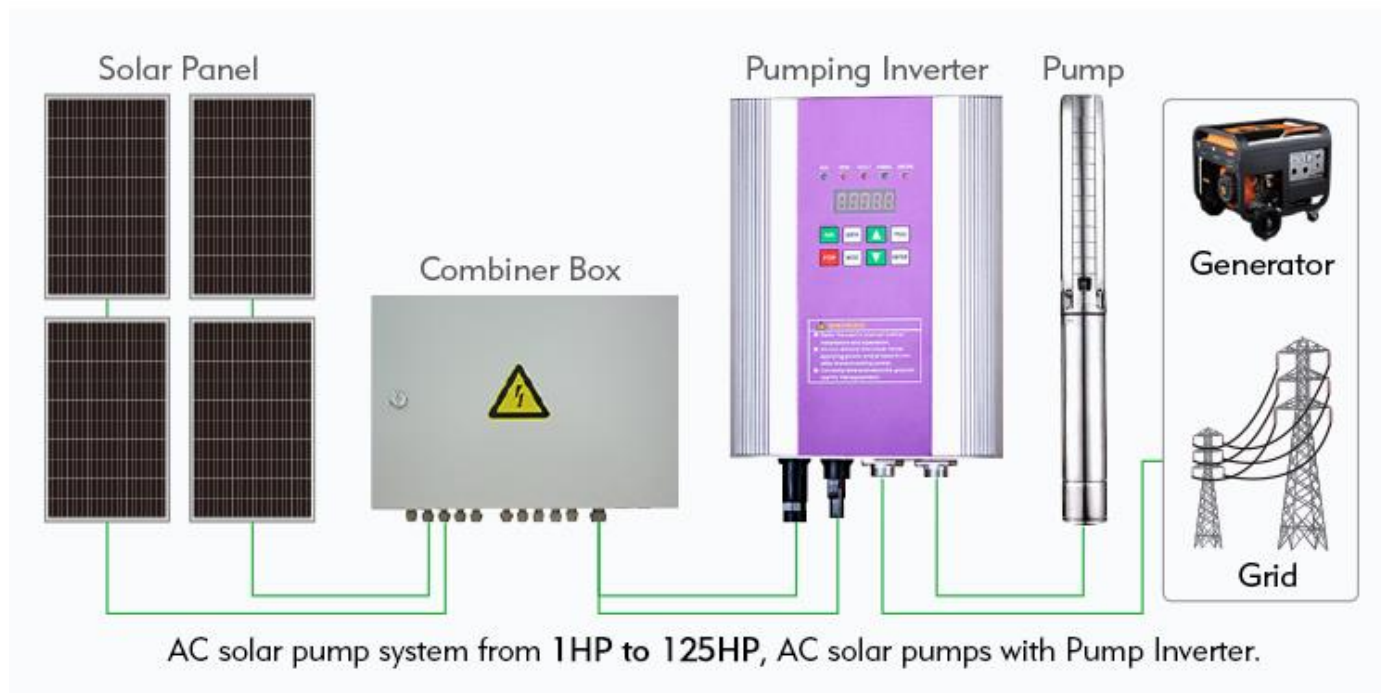
Quest MPPT PV direct hot water heater controller

- **Technology is moving fast!**
- **Resilient, Conservation, Energy Storage, Cheap, and No Interconnection agreement**



Solar energy is stored overnight as pumped domestic water in a reservoir or tank
Similar to current “pumped energy storage” projects

- **Technology is moving fast!**
- **Resilient, Conservation, Energy Storage, Cheap, and No Interconnection agreement**



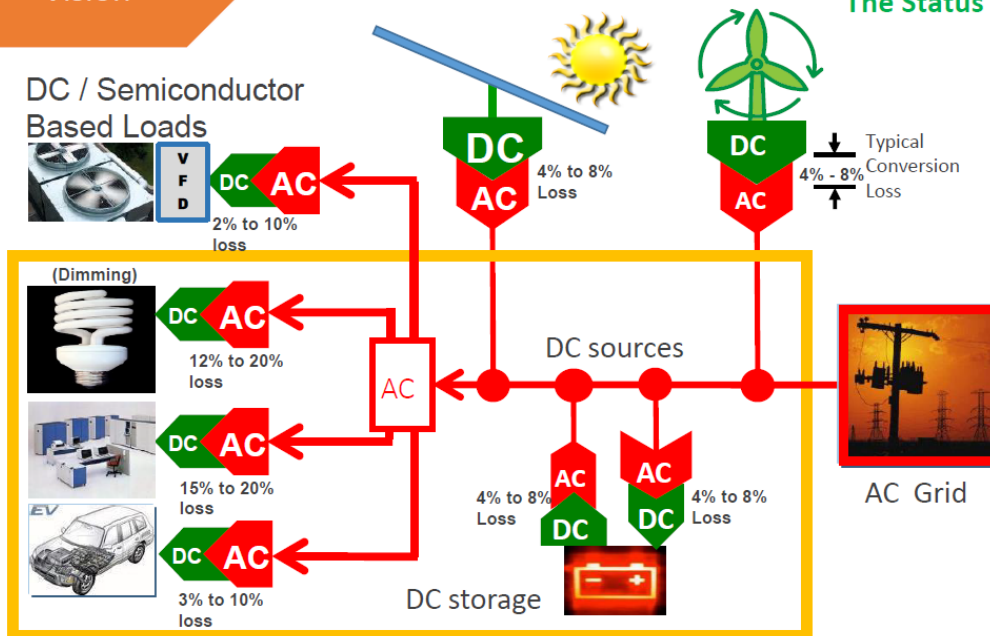
- Technology is moving fast!
- AC centric buildings will be challenged

The EnerNet

Vision

About Hybrid AC/DC Microgrids

The Status Quo...



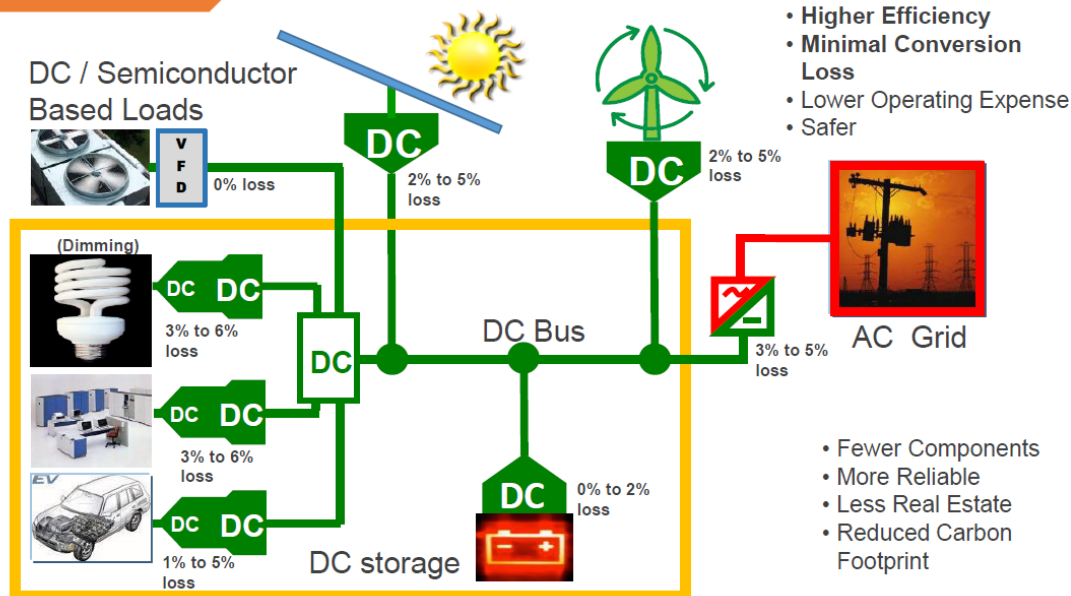
- Technology is moving fast!
- By DC – Similar to DC telecom systems

The EnerNet

Vision

About Hybrid AC/DC Microgrids

The Ideal End State...

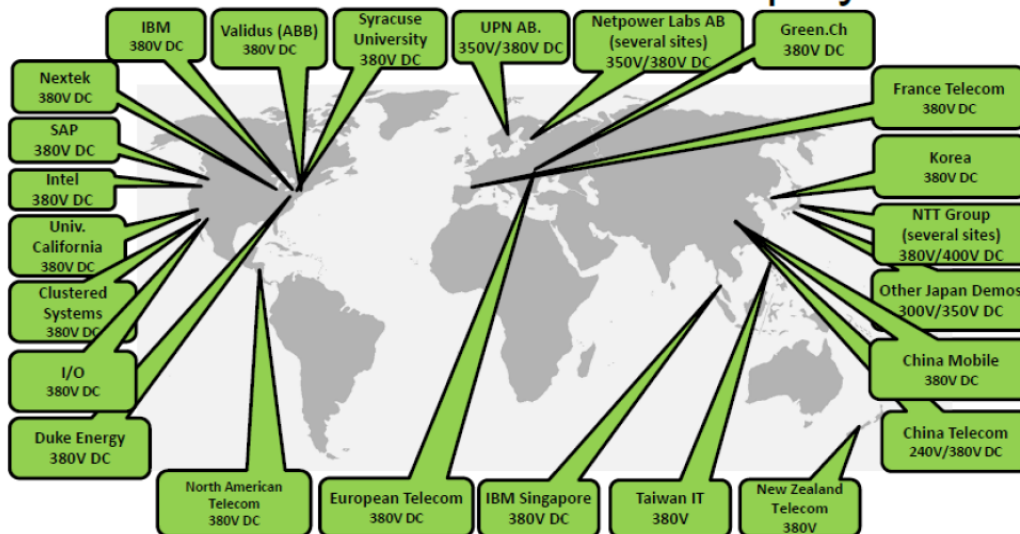


- Higher Efficiency
- Minimal Conversion Loss
- Lower Operating Expense
- Safer

- Fewer Components
- More Reliable
- Less Real Estate
- Reduced Carbon Footprint

- **Technology is moving fast!**
- **Where are DC buildings happening?**

Some of the World-wide DC Deployments



Sizes vary from 15 kW to 1MW

North America

- Proof of concept - 9
- Production - 4

Europe

- Proof of concept - 2
- Production >20

Asia

- Proof of concept - 11+
- Production - >

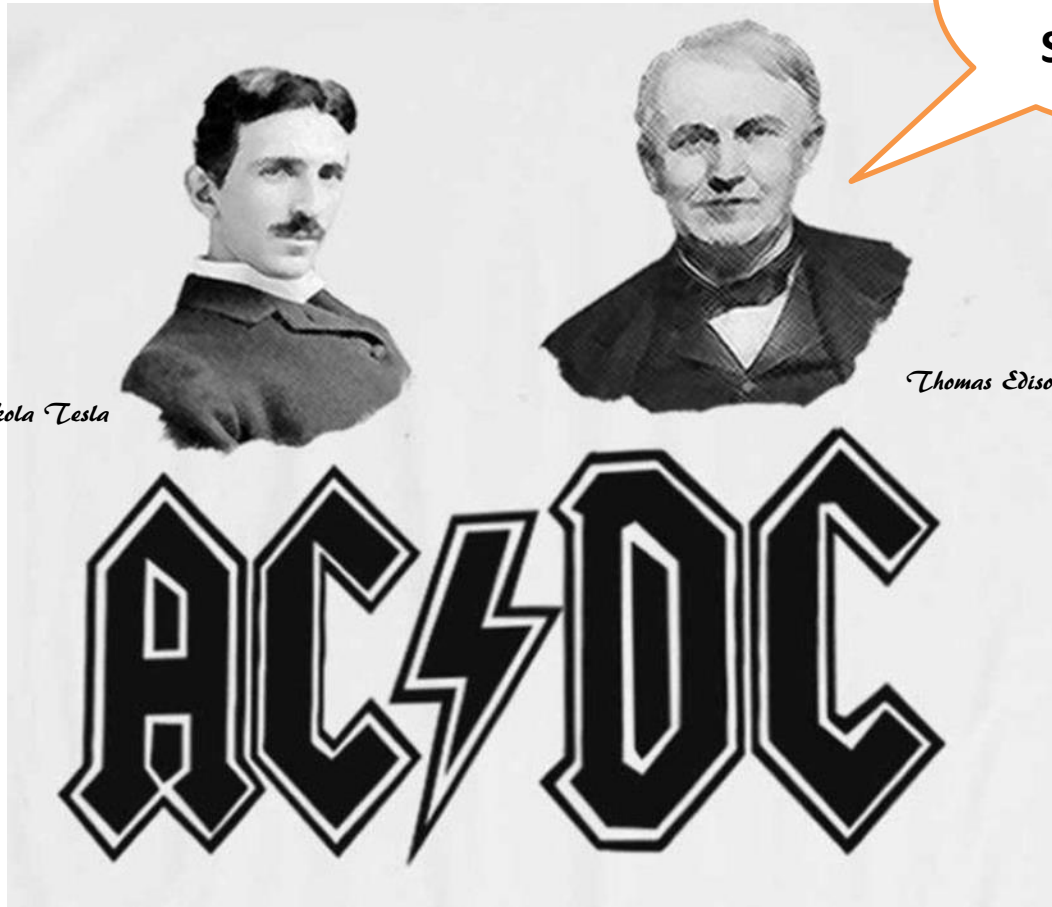
Update
More than 1000 sites operational
today in China

www.emergealliance.org

What would Thomas Edison say now?



Washington State
SOLAR SUMMIT



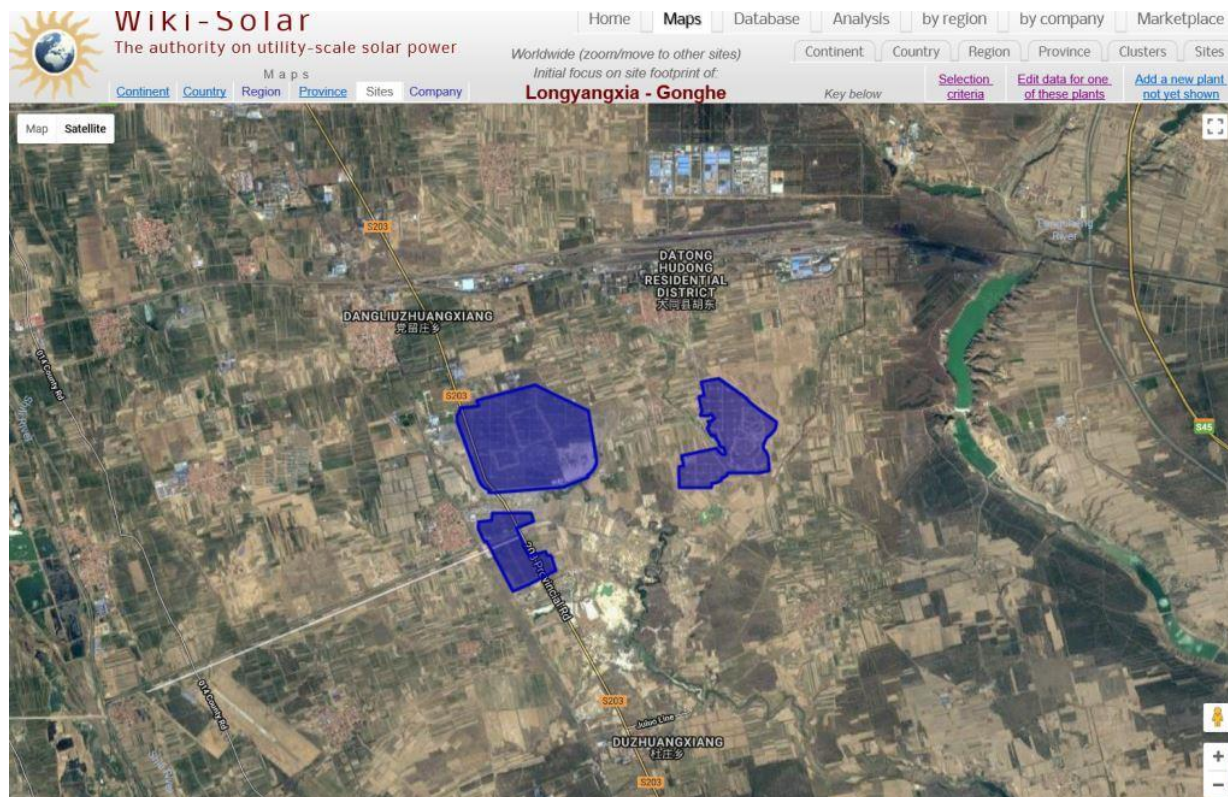
**Woohoo!!!
Take that
Sparky Boy!!**

- **Who's getting into solar? China obviously...**

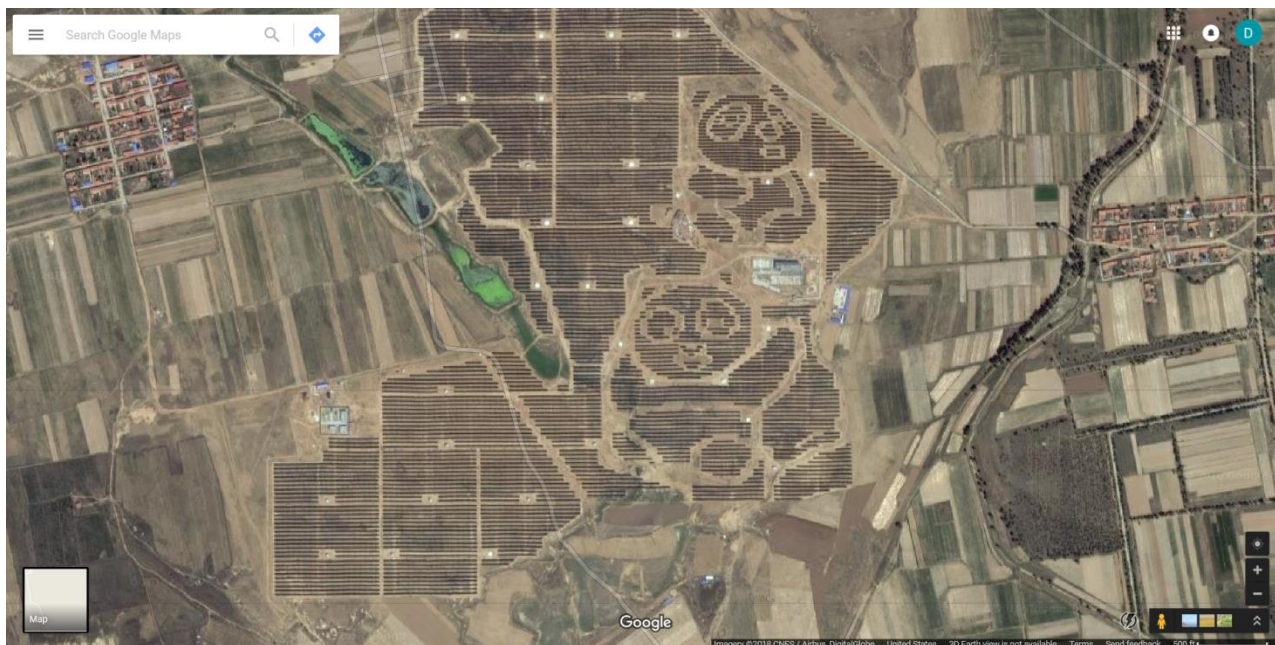


Jerri/Longi PV manufacturing factory in China with a multi MW rooftop array

- **Who's getting into solar? But China isn't the evil giant that everyone is accusing them of being**



- **Who's getting into solar? China is actively making a better country for their youth by installing 5 times the solar we do. And having a little fun at it too.**



Via Google Maps @ 39.977128,113.486222,736
Southwest of Datong, Shanxi, China

- **Who's getting into solar? The Oil Industry.**
Yes, really...

www.pv-tech.org/news/tata-power-installs-6mw-rooftop-solar-project-at-indian-oil-refinery

Tata Power installs 6MW rooftop solar project at Indian oil refinery

By Tom Kenning | Aug 20, 2018 12:55 PM BST | 0

Share [f](#) [in](#) [t](#) [e](#)



Credit: Goodwe

Tata Power has built a 6MW rooftop solar project across 34 rooftops of an oil refinery site of Mangalore Refinery and Petrochemicals Limited, which is based in the south Indian state of Karnataka.

Tata Power chose 95 string inverters for the project from PV inverter manufacturer Goodwe, which has an Indian office in Mumbai. The GoodWe MT Series inverters (50-70kW), which are aimed at the C&I solar market, have 30% DC input oversizing and a continuous maximum AC output power overload of 15% for use on large-scale commercial rooftops and ground-mount solar PV plants.

- **Who's getting into solar? Even NASCAR fans like solar now!**



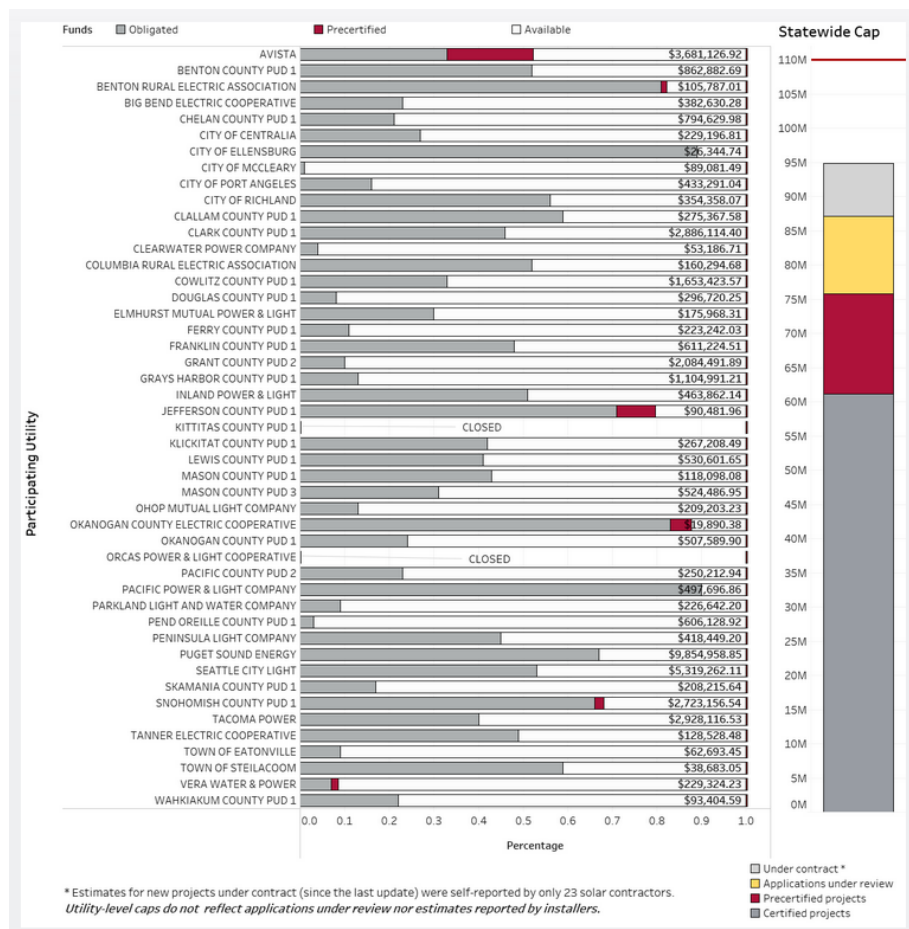
- **So how do utilities stay relevant?**
- **The rapid advancement of PV manufacturing scale is continuing to lower acquisition costs and will be a key win for utilities to act on.**



Avista's 28MW Solar Select project in Lind, WA during construction phase – October 2018

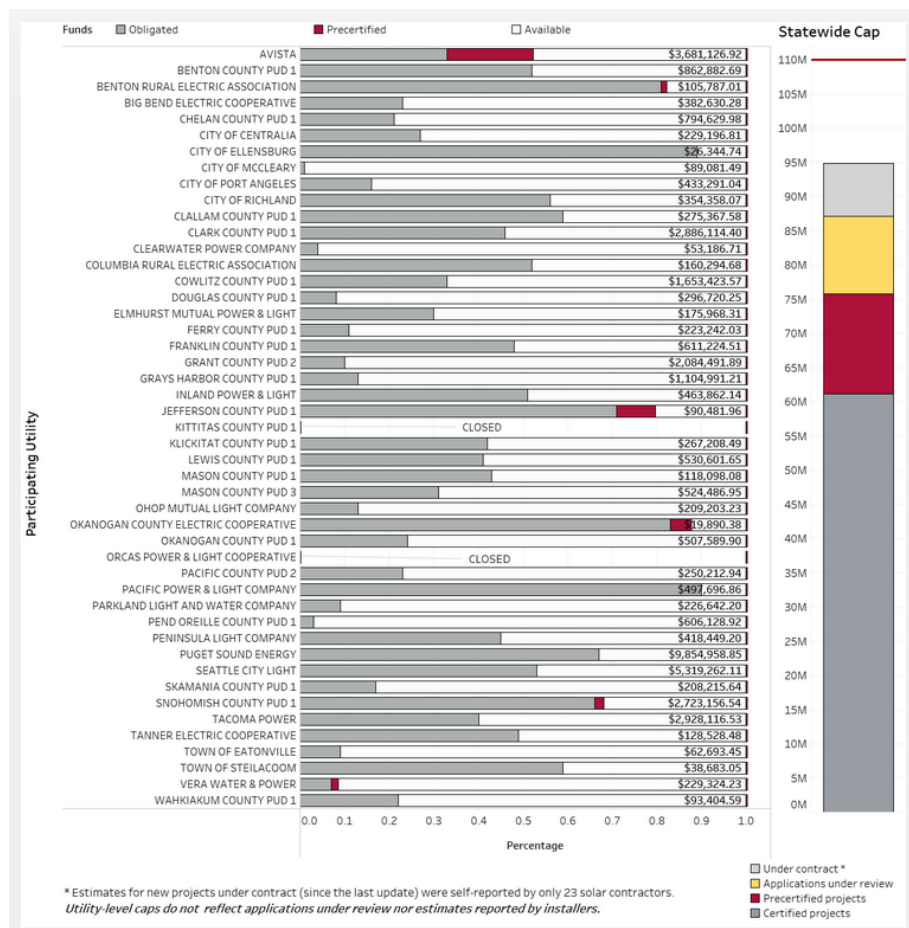


- So how do utilities stay relevant?
- Install solar!



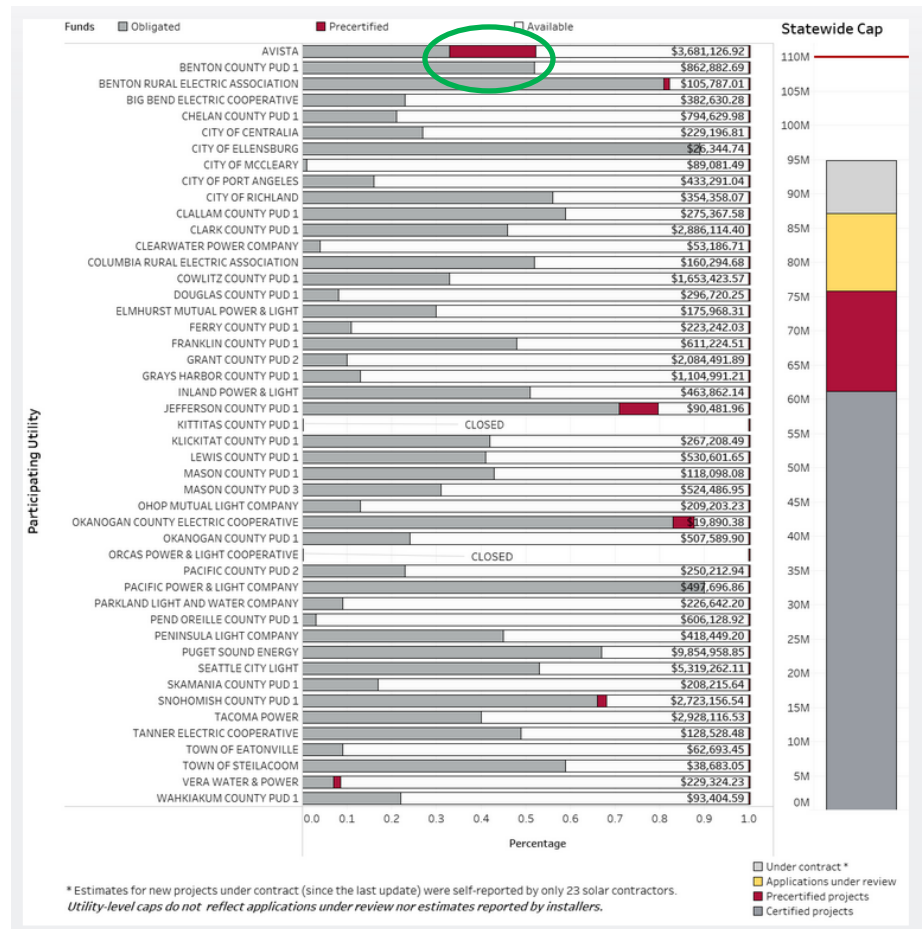


- So how do utilities stay relevant?
- Avista's 28MW went in at the lowest cost in WA – by far





- So how do utilities stay relevant?
- Despite Avista's project being ~40% of the Statewide MW installed this year, very little of the incentive was used





So what really are our goals?

- **Carbon reductions?**
- **Attract internationally competitive PV manufacturers? (bringing cash to the State)**
- **Stable install community?**
- **Utilities embracing new technologies while still staying healthy?**
- **A recycling program that doesn't increase the cost of solar?**
- **Keeping our eye on the ball?**



Washington State

SOLAR SUMMIT

**And if you have an idea, ask for
review and input**



Collaboration on ideas is a path for the best wins



Dog hammock by Upsky



Washington State
SOLAR SUMMIT

**Thank you
And enjoy the Summit**

Avista's 28MW Solar Select project in Lind, WA during construction phase – October 2018