State Policies - Distributed Energy Resources

Ken Nichols

Presented to:
NCSL 2015

August 2, 2015

ken@eqlenergy.com
503-438-8223

Distribution Utility of the Future

Distribution utilities will no longer just supply electric energy to customers, but will plan for, coordinate, and manage the flow of electric energy to, from, and between customers.

Steps Toward the Future

- Is Solar City/Tesla the utility of the future?
  - Utility business models in transition
    Large Supply-Side Capex >>>> Grid Modernization, Reliability, IT
  - "Every feeder is a snowflake"
  - DER value: Location, Location, Location
    Battle: Utility Integration Cost vs. DER Value
  - Push: Technology Vendors, Policy, and Customers
    Pull: Utilities Roadmaps>Pilots>Demos>Scale
- Legislative actions that work
  - Value of ~~solar~~ DER >>> DRP
  - Energy Efficiency >>>> Capacity Efficiency (demand response)
  - Distribution Resources Planning (CA AB327, WA 2045)
  - Rate and NEM Strategies (reflect Utility cost structure)
  - Everyone loves EVs?
  - Combined Heat and Power
  - Support (Mandate) Standards (OpenADR, IEEE1547)
  - Clean Power Plan 111(d) – uncertainty for state governments

Distributed Energy below 69kV

Dispatchable	Non-Dispatchable
Automated Demand Response	**Energy Efficiency**
Energy Storage (Customer, Utility)	**Solar**
Dispatched Generation	**Wind**
Electric Vehicle Charging	
Combined Heat & Power	
Smart Inverter services (e.g., VAR Support)	

DER Drivers

- Cost declines in solar, storage, and smart grid
  - 40% decline since 2011, Panels $1.31/Watt to $.50/Watt (peaker is $1.2/Watt not including fuel)
  - Import tariffs on Chinese solar will slow the steep decline, but decline will continue.
  - $.038/kWh 20 year solar PPA for NV Energy
  - Tesla's gigafactory to reduce Li-ion battery cost
  - Smart building management systems, thermostats, water heaters, motor load, VFDs
- Customer Expectations
  - Lower costs, reliability, and environmental concern
- Economic Development
  - 830,000 Energy Efficiency jobs, 174,000 Solar Jobs
- Reliability
  - 90% of outages is on distribution system. (200GW of backup power in US)
  - Hurricanes, Earthquakes, and Animals oh my
- Environmental Costs/Policy
- Reduce rates
  - Avoided costs for Transmission, Distribution, Generation, etc.
  - *1990s Puget Sound Reliability: voltage support, targeted EE*

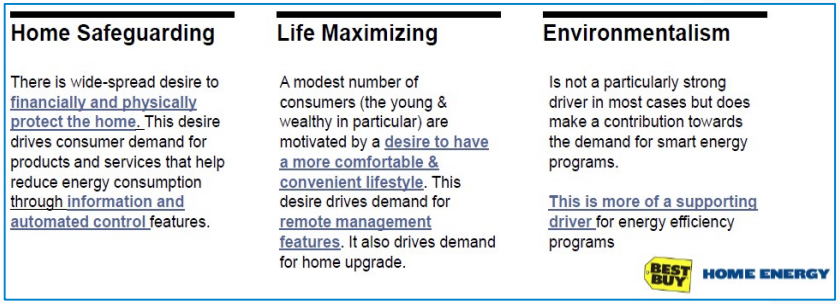
Customers are looking for reliability, self generation, and environmental stewardship.

Customer desire for self-reliance increasing

- **E&Y**: **33%** of the multi-national firms are expected to meet a greater share of their energy needs through **self-generation over the next five years**

- **Navigant**: nearly **75%** of surveyed **residential customers** have "**concerns about the impact electricity costs** have on their monthly budgets, and **63%** are interested in **managing energy used in their homes**"

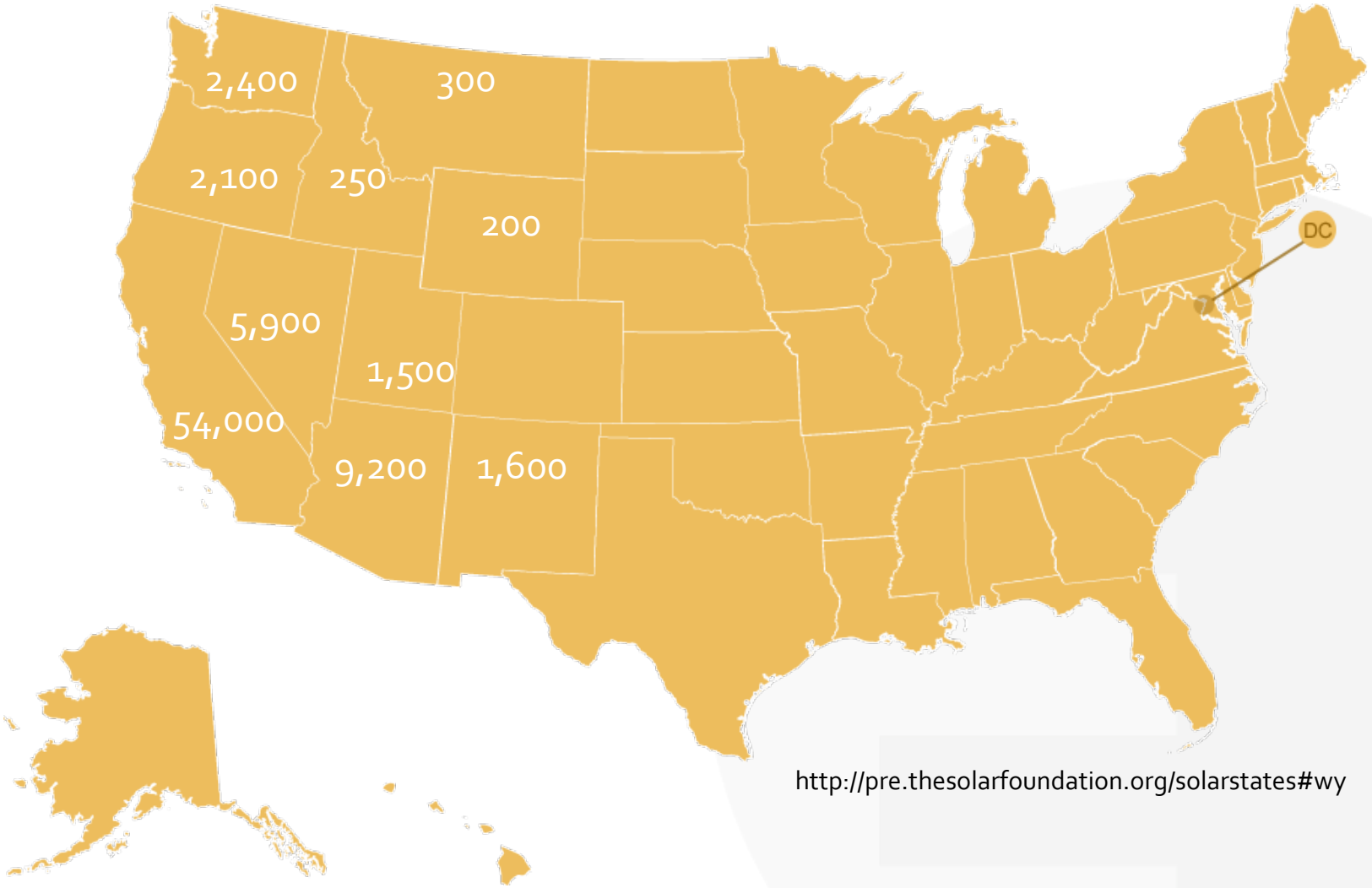
- **Best Buy**: **36% of residential** customers desire to "financiall and physically protect the home" (Home Safeguarding persona)



Home Safeguarding	Life Maximizing	Environmentalism
There is wide-spread desire to financially and physically protect the home. This desire drives consumer demand for products and services that help reduce energy consumption through information and automated control features.	A modest number of consumers (the young & wealthy in particular) are motivated by a desire to have a more comfortable & convenient lifestyle. This desire drives demand for remote management features. It also drives demand for home upgrade.	Is not a particularly strong driver in most cases but does make a contribution towards the demand for smart energy programs. This is more of a supporting driver for energy efficiency programs

BEST BUY HOME ENERGY

Jobs: 174,000 Solar, 830,000 Energy Efficiency

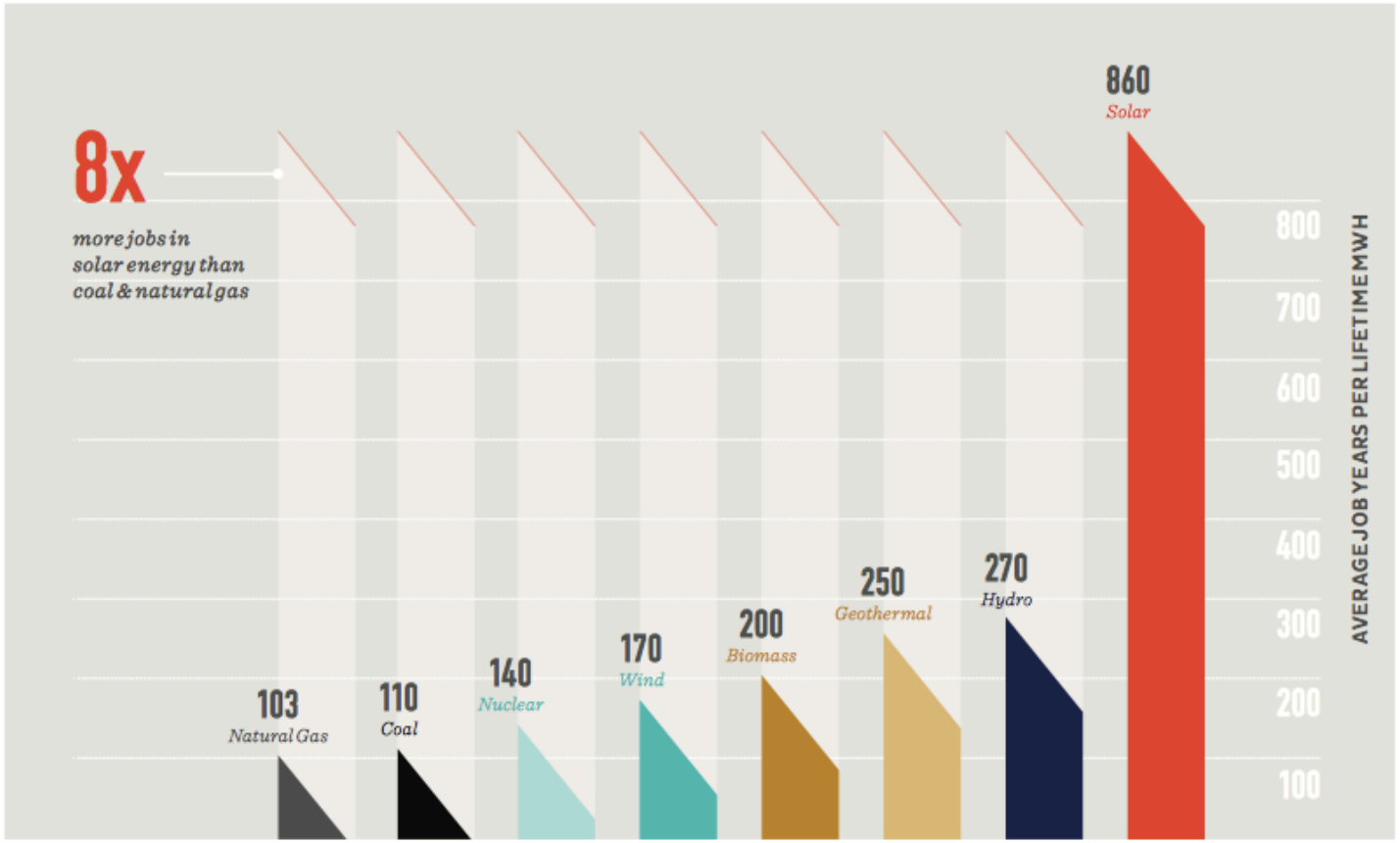


http://pre.thesolarfoundation.org/solarstates#wy

Solar creates 860 jobs per lifetime MWh

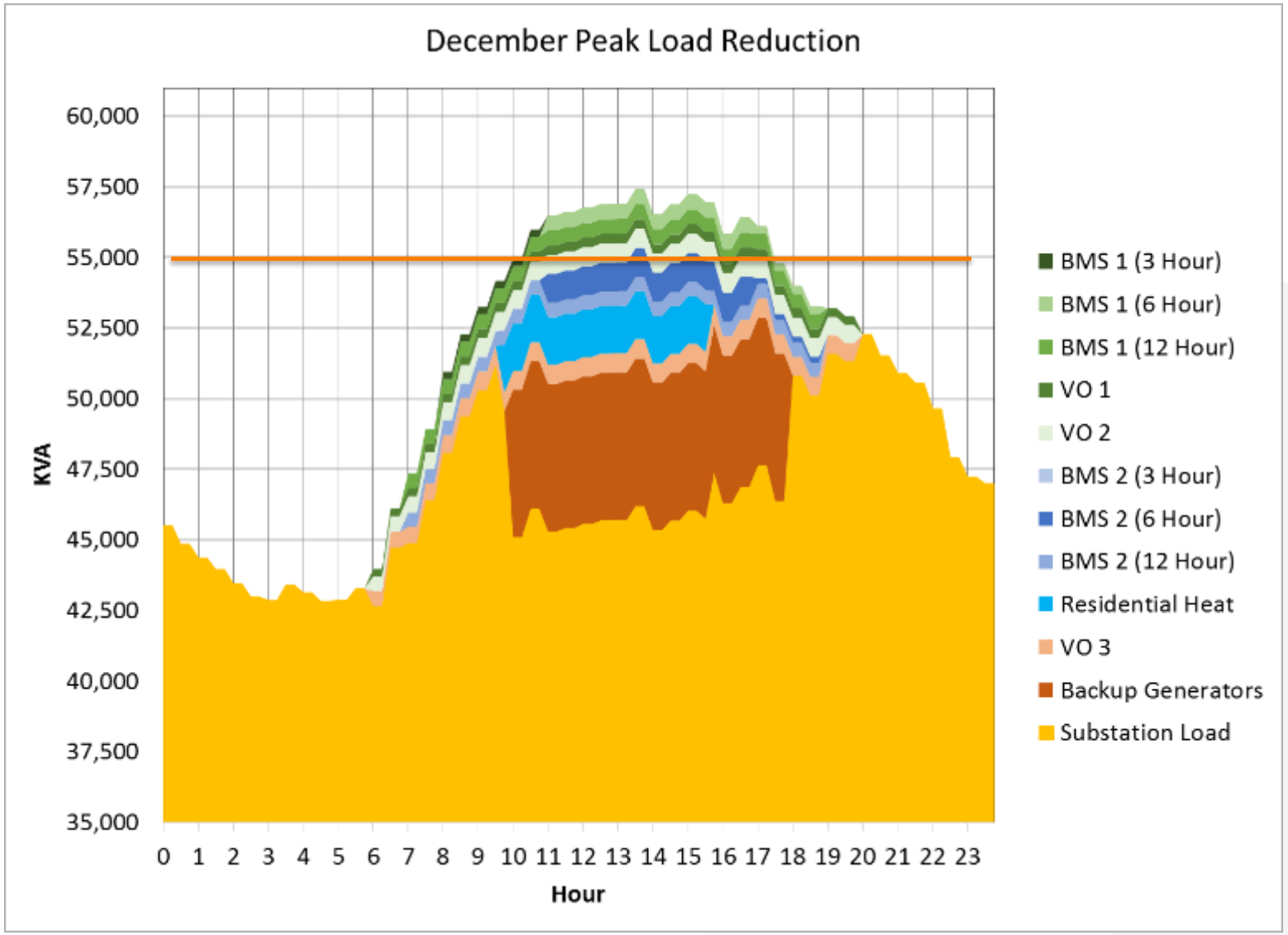
[FIGURE 07]

U.S. Job Creation by Energy Source

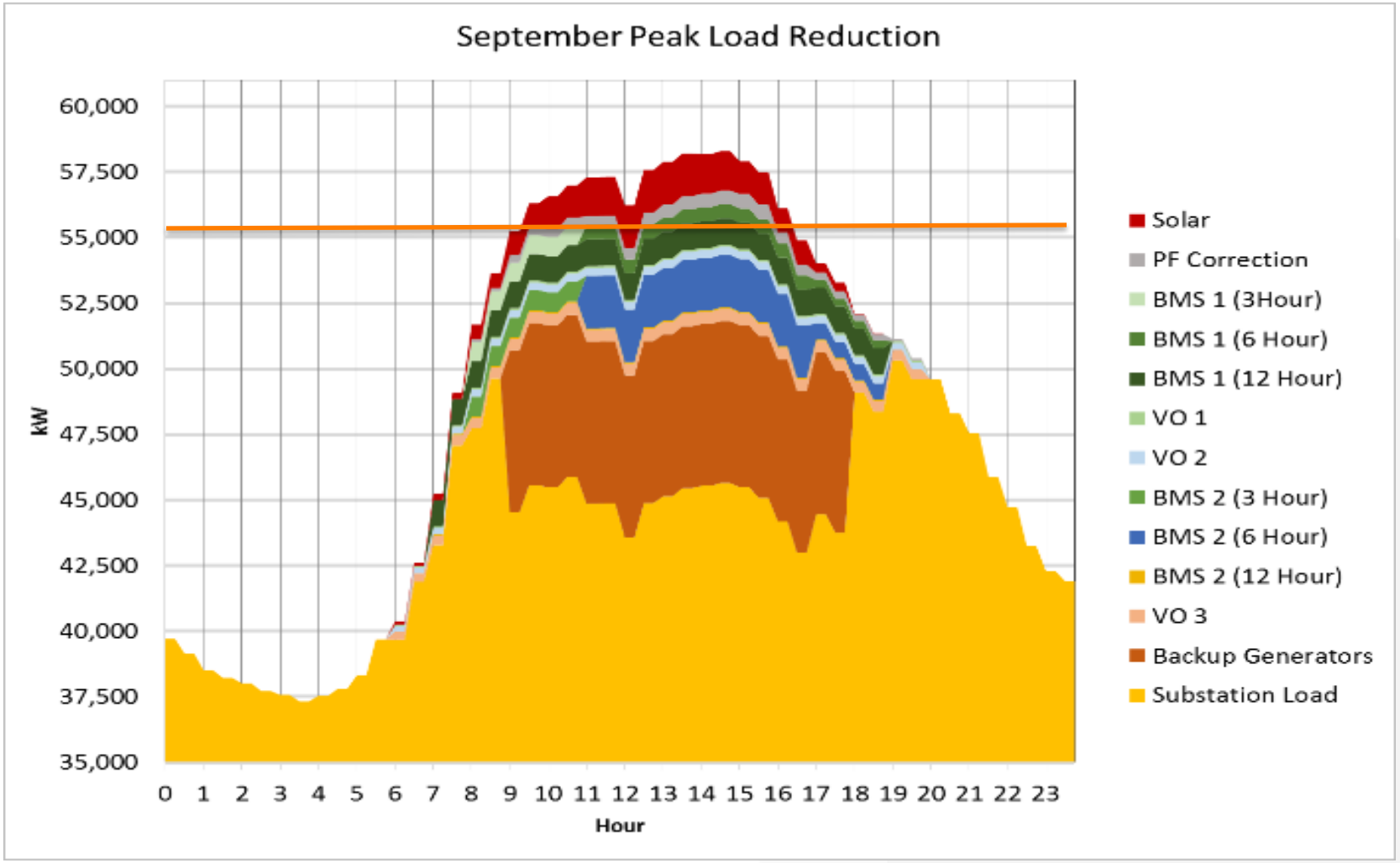


SOURCE: (FIG. 6) THE SOLAR FOUNDATION; (FIG. 7) RENEWABLE AND APPROPRIATE ENERGY LAB

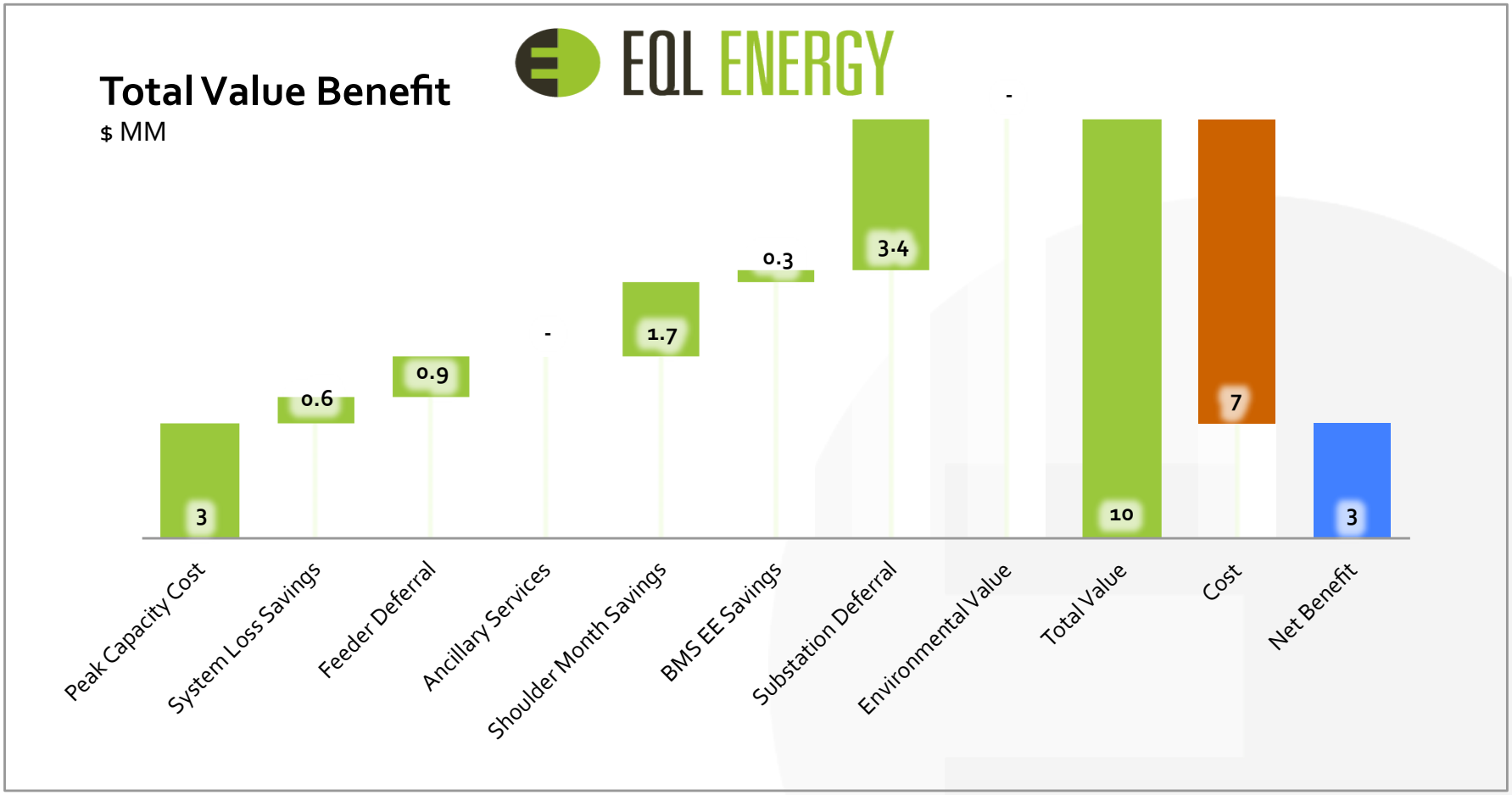
Campus DER for 69kVA Substations



DER for two 69kVA Substations



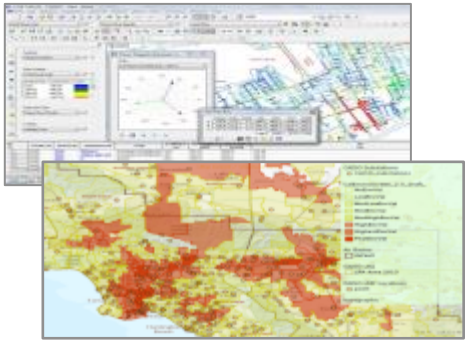
NPV of Substation Capacity DSM

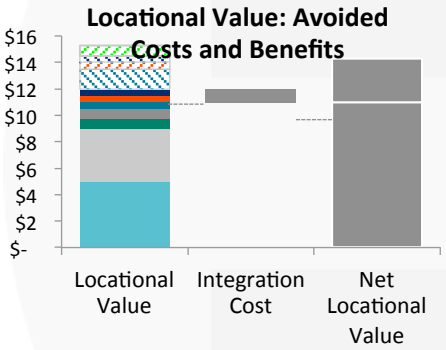


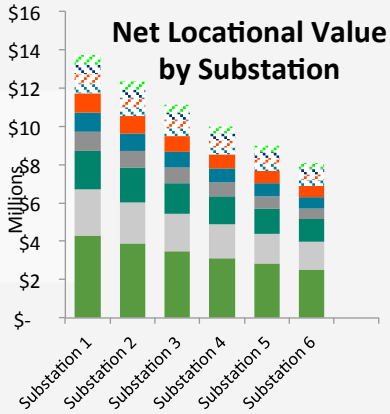
Distribution Resource Planning (DRP)

- Purpose is for distribution planning to **include DER** energy capacity, “smart” capabilities, energy efficiency, and market incentives during long-term distribution planning
- These factors would then be balanced against the **avoided costs** of “”traditional” distribution planning

Identify DPA & Substations → **Perform Planning Analyses** → **Calculate Locational Net Value** → **Rank Substations by Locational Net Value**



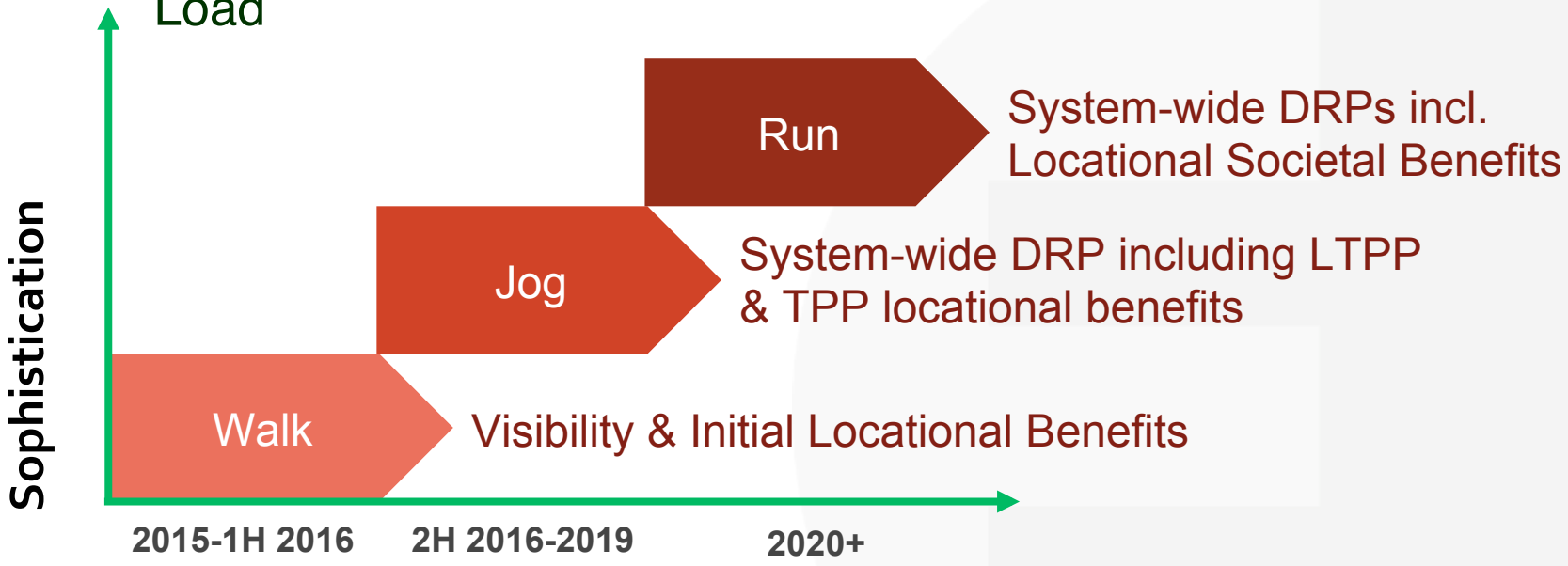




When to DRP?

States should mandate DRP whenever utilities are

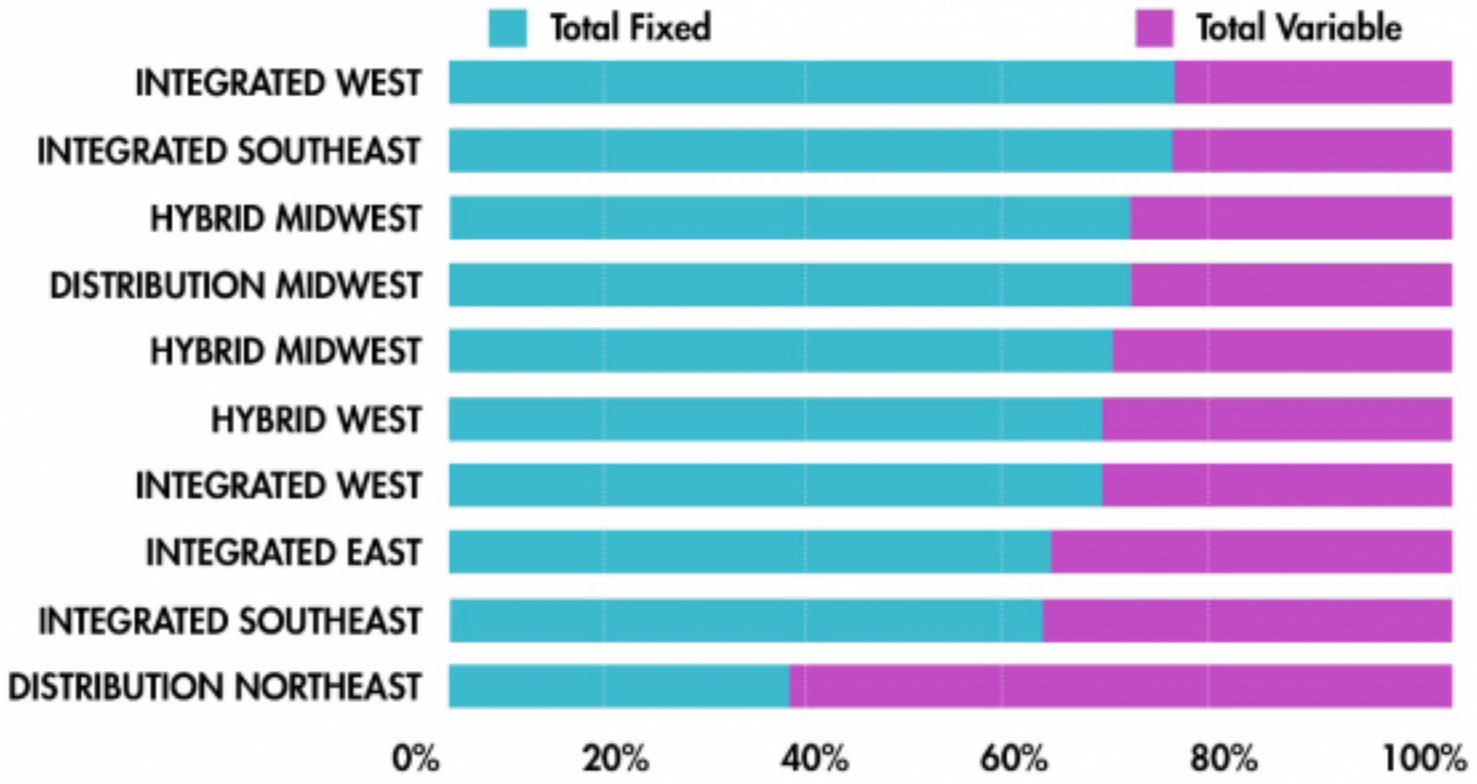
- proposing new infrastructure investment to meet load growth (Gen, Trans, Dist)
- DER kW forecasted to exceed 40% of Feeder Daily Minimum Load



Everyone likes EVs

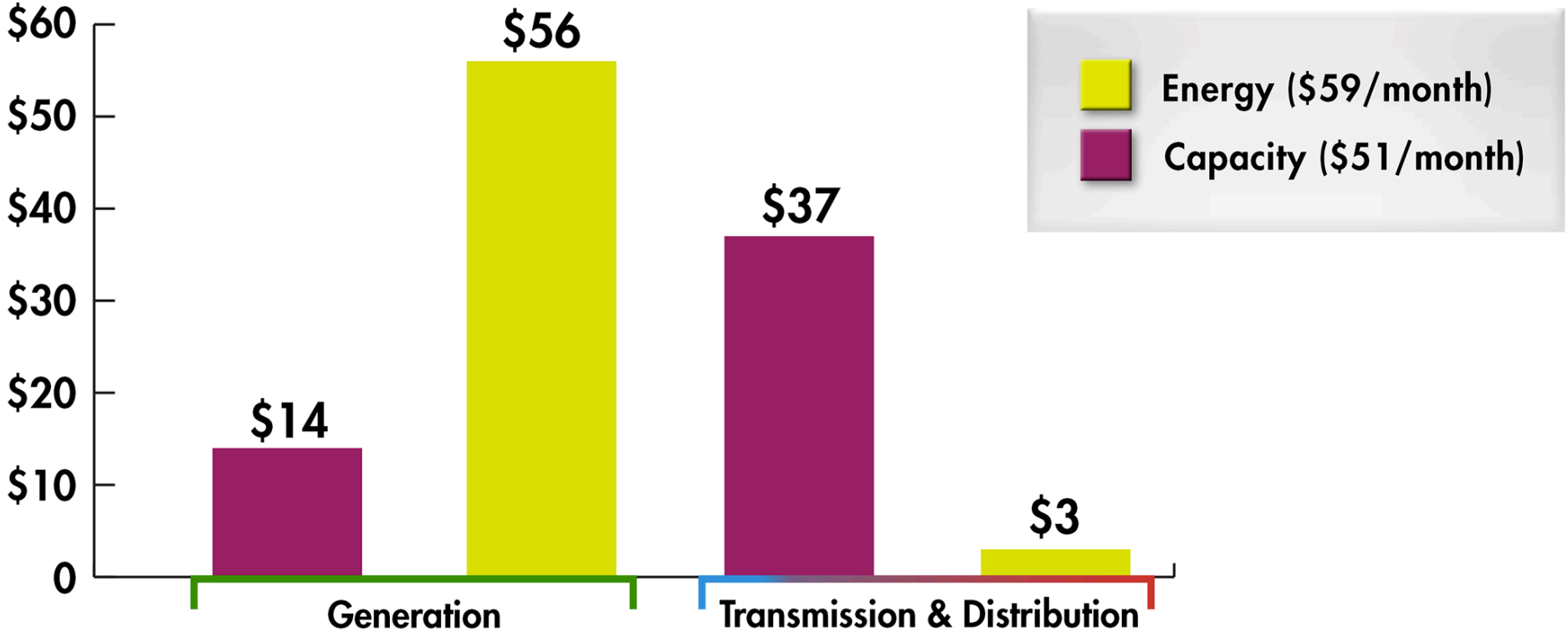
	EE	PV	EV
Customer Cost			
Integration Cost			
Utility Revenue			
Ratepayer			

Utility Rates should reflect Cost Type



2015 EPRI "Capacity and Energy in the Integrated Grid

Utility Rates should reflect Cost Type



2015 EPRI "Capacity and Energy in the Integrated Grid

DSIRE™

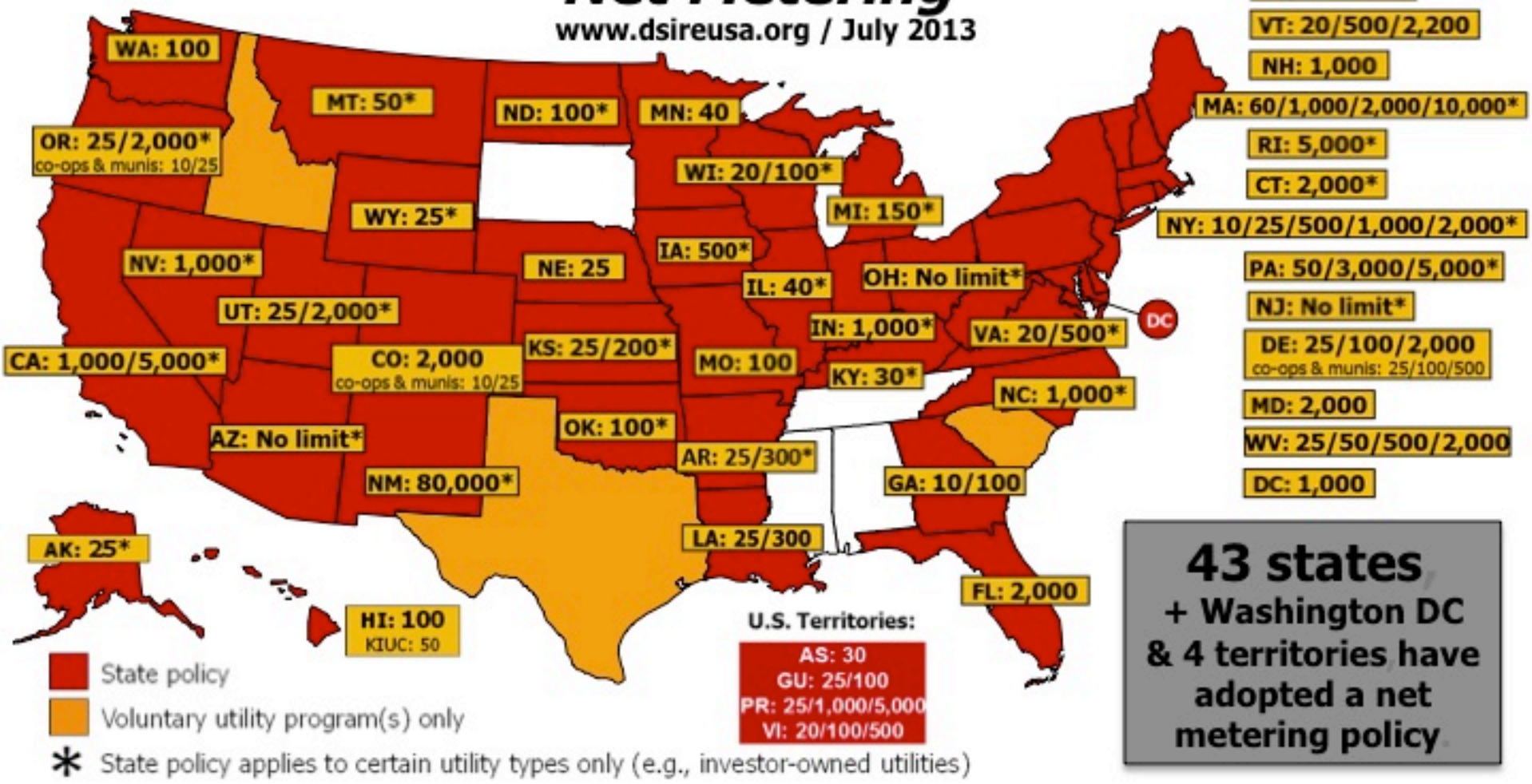
Database of State Incentives for Renewables & Efficiency

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy | IREC

NORTH CAROLINA Solar Center

Net Metering

www.dsireusa.org / July 2013



U.S. Territories:

AS: 30
GU: 25/100
PR: 25/1,000/5,000
VI: 20/100/500

43 states, + Washington DC & 4 territories have adopted a net metering policy

State policy

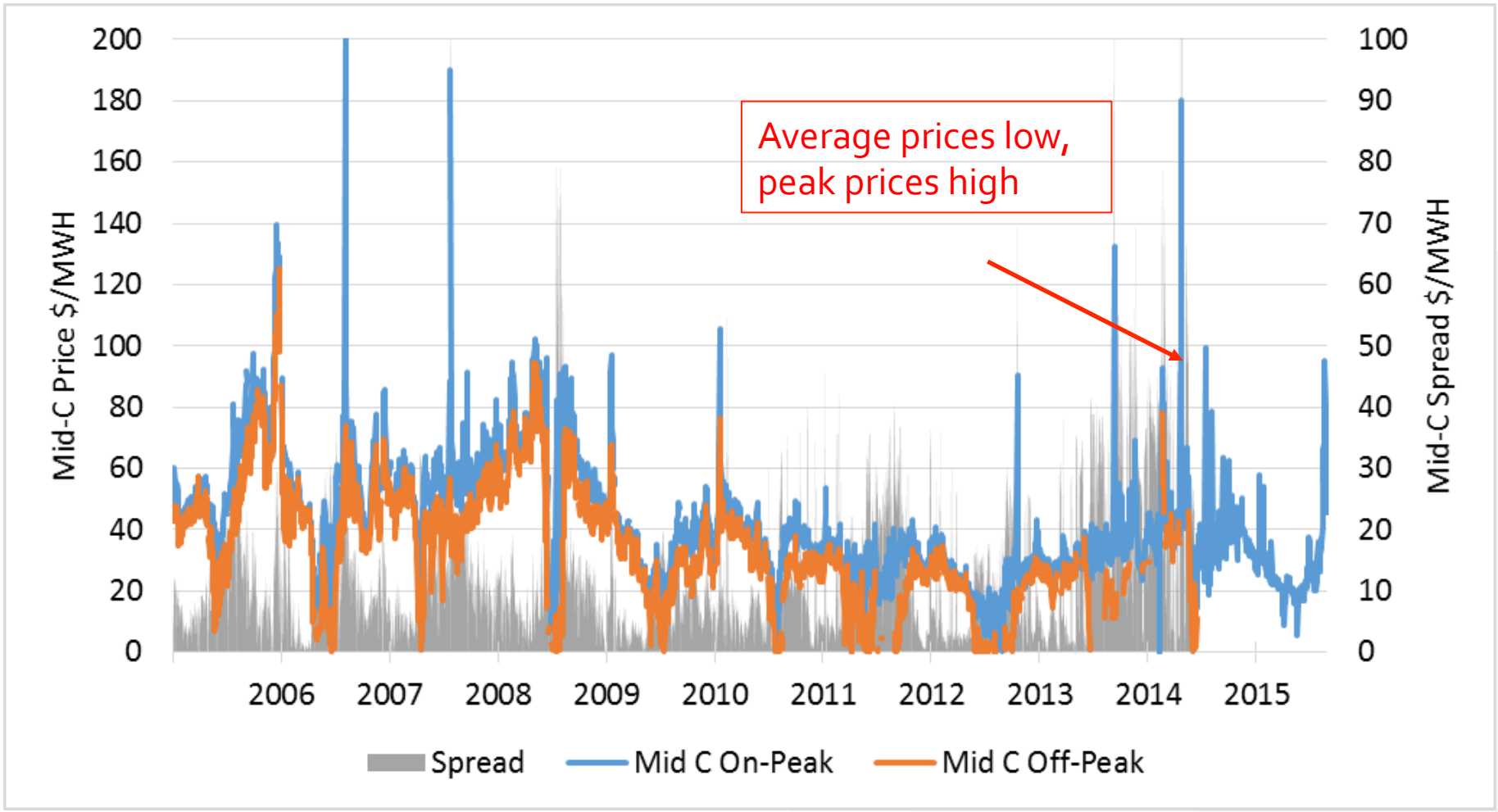
Voluntary utility program(s) only

* State policy applies to certain utility types only (e.g., investor-owned utilities)

Note: Numbers indicate individual system capacity limit in kilowatts. Some limits vary by customer type, technology and/or application. Other limits might also apply.

This map generally does not address statutory changes until administrative rules have been adopted to implement such changes.

Focus on Peak Demand Reduction



DER could be 23% of western power by 2022

DER	2022 WECC (MW)[1]	2013 PNW (MW)	2022 PNW Market Potential[2, 3]
Solar (Helena better than Jacksonville FL)	25,000	188	2,300
Combined Heat and Power (CHP)	9,000	15	1,000
Demand Response – Renewable Integration	2,600	0	305
Demand Response – Peak Reduction	4,700	420	1,000
Energy Storage	1,800	5	55
Dispatchable Backup Generators		100	800
Energy Efficiency (amounts not included)			
Total	**43,400**	**713**	**14,660**

1. Source: EQL Energy for Western Interstate Energy Board May 2015,
2. Summary of 2013 TEPPC high DG case, 2013 LBNL
3. http://www.westernenergyboard.org/sptsc/workgroups/dsmwg/webinars/2013/2-HiDSM-DGwebdr.pdf

Stakeholder views

Likes DER	Cautious DER
Independent System Operators	Distribution Utility
DER Owners	Utility Shareholders
Solar Industry	Traditional utility equipment vendors
CleanTech	
Economic Development	
Far Left and Right	**Moderate Right**

Summary

- Legislative / Regulatory actions
  - Support Utility Transition in business models
  - Value of ~~solar~~ DER >>> DRP
    - Distribution Resources Planning (CA AB327, WA 2045)
  - Utility Roadmaps - pilot>demo>scale
  - Combined Heat and Power (WA E2SHB 1095, OR SB 844)
  - Support (Mandate) Standards -OpenADR, IEEE1547
  - Obtain Demand Response with Energy Efficiency
  - Everyone Loves EVs, make sure it benefits ALL ratepayers

Ken Nichols, Principal, EQL Energy

503 438 8223

ken@eqlenergy.com

www.eqlenergy.com

Link to Western Interstate Energy Board paper:
Emerging Changes in Electric Distribution Systems in Western States and Provinces

http://westernenergyboard.org/2015/05/final-report-released-by-eql