

# ZNE and Utility Futures

ETCC Conference, Pasadena, CA

Tuesday, October 16, 2012





# Why are we here?

My informal, anecdotal assessment of utility views toward ZNE, both within CA but especially on a national level, reveals a certain level of skepticism that ZNE is or can be “real” . . .

However: Is the utility skepticism colliding with the vision of policy makers and other market actors?



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However: Is the utility skepticism colliding with the vision of policy makers and other market actors?

*"In five years, anyone would be crazy to design a building that isn't green. But I'll bet you that **Greenbuild in five years** won't just be about green buildings. It **will be about zero net energy buildings, and about technologies to increase the amount of excess energy building owners can sell on the grid.**"*

Former President Bill Clinton,  
Greenbuild Keynote Address,  
**November 2007**



# Governor's energy agenda includes ZNE



## Jerry Brown's Eight Point Energy Plan (point 4)

### Create New Efficiency Standards for New Buildings

- “..We should establish a plan and a timeline to make **new homes and commercial buildings** in California “**zero net energy**”—highly efficient structures that use onsite renewable energy for all their electricity and natural gas needs.”



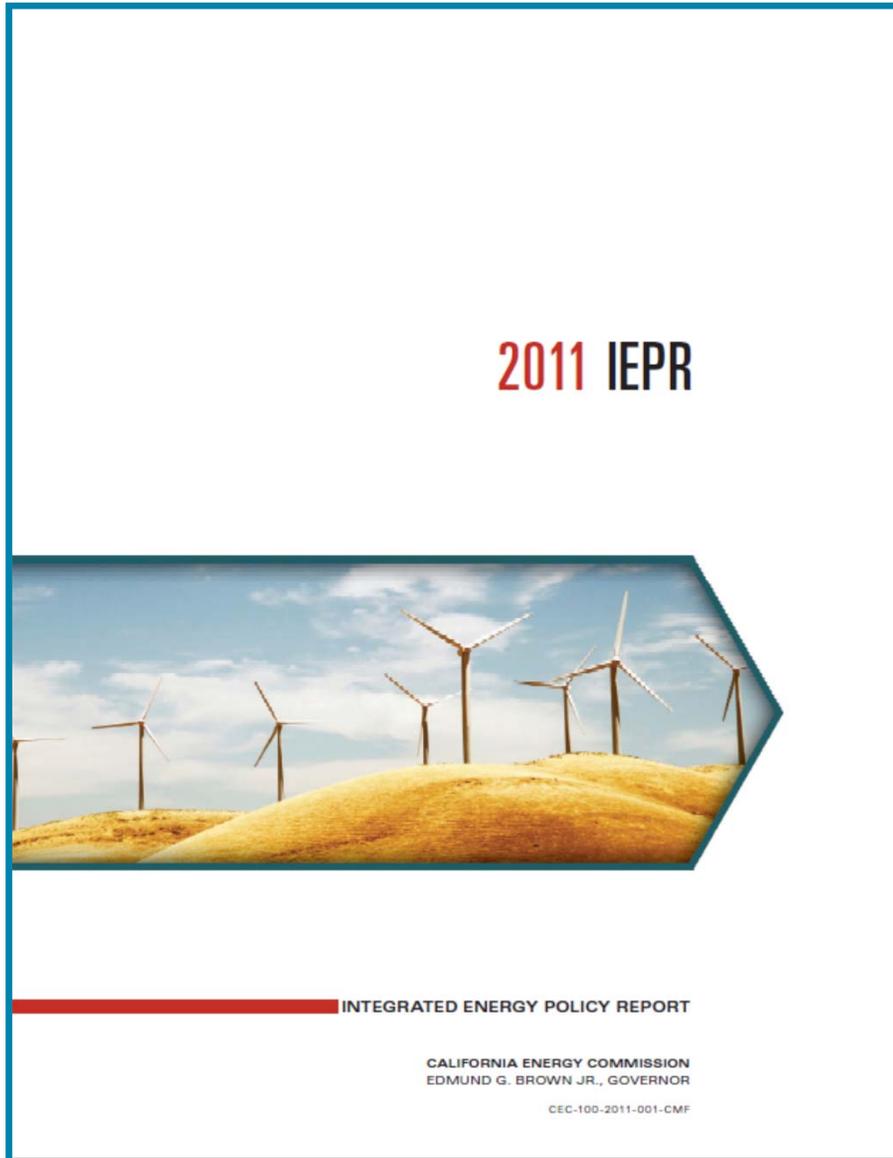
### Executive Order B-18-12 – State Buildings

- Reduce GHG of state facilities by 10% in 2015 and 20% by 2025
- 50% of new state buildings be ZNE by 2020
- All new state buildings be ZNE by 2025
- Reduce grid based storage by 20% by 2018
- State bldgs > 10,000 sf be LEED rated Silver or higher

Sources: [http://www.jerrybrown.org/sites/default/files/6-15%20Clean\\_Energy%20Plan.pdf](http://www.jerrybrown.org/sites/default/files/6-15%20Clean_Energy%20Plan.pdf)  
<http://gov.ca.gov/news.php?id=17508>



# CEC 2011 Integrated Energy Policy Report



## ZNE Definition

- Highly efficient buildings using cost-effective EE and making up rest with renewable generation

## Code Path to ZNE

- CEC goal to provide 20-30% savings in each three year update
- CEC should focus on appliance standards for plug loads to enable achieving the ZNE goal



# Hallmark Building Performance Goals of the CPUC's EESP

## Residential New Construction:

- Goal of around 135,000 ZNE housing units/yr by 2020

## Existing Residential Buildings:

- Goal of 8.6 Million housing units with 25% savings by 2020
- Goal of 2.9 Million housing units with 75% savings (near ZNE) by 2020

## Commercial New Construction:

- Goal of around 147 Million sf/yr is ZNE by 2030

## Existing Commercial Buildings:

- Goal to complete 2.5 Billion sf of ZNE retrofits by 2030



# Architecture 2030 Challenge: American Institute of Architects

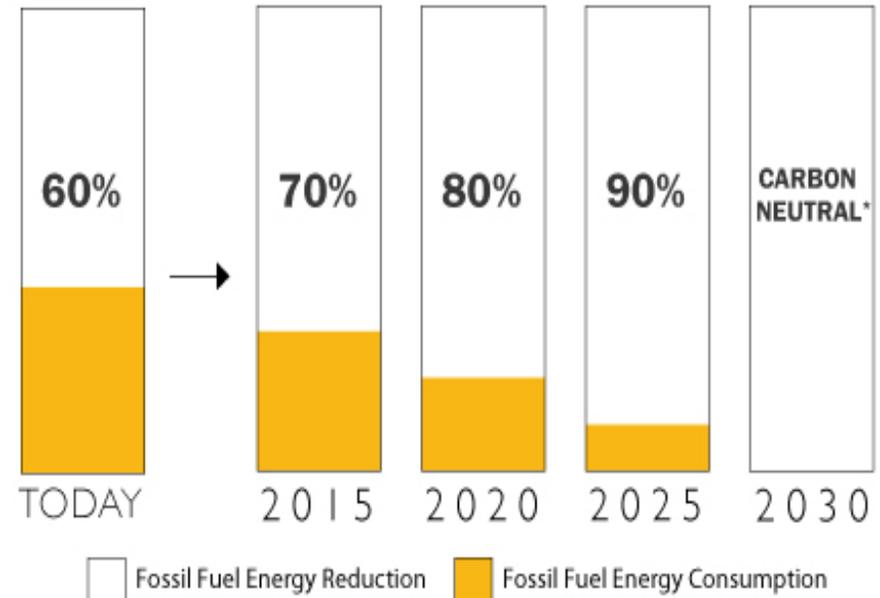
A voluntary program for AIA members

Sets aggressive carbon-neutrality targets culminating in 2030

Participating firms sign up by way of a commitment letter

Consistent reporting methodology for participants

More than 200 firms nationally have signed on representing many thousands of architects



## The 2030 Challenge

Source: ©2010 2030, Inc. / Architecture 2030. All Rights Reserved.  
\*Using no fossil fuel GHG-emitting energy to operate.

## Accomplished by:

- sustainable design strategies,
- generating on-site renewable power
- and/or purchasing (20% maximum of 2003 baseline ) off-site renewable energy
  - Green-e RECs are considered acceptable



# The German experience: Can we also do this?

Freiburg solar settlement and business park



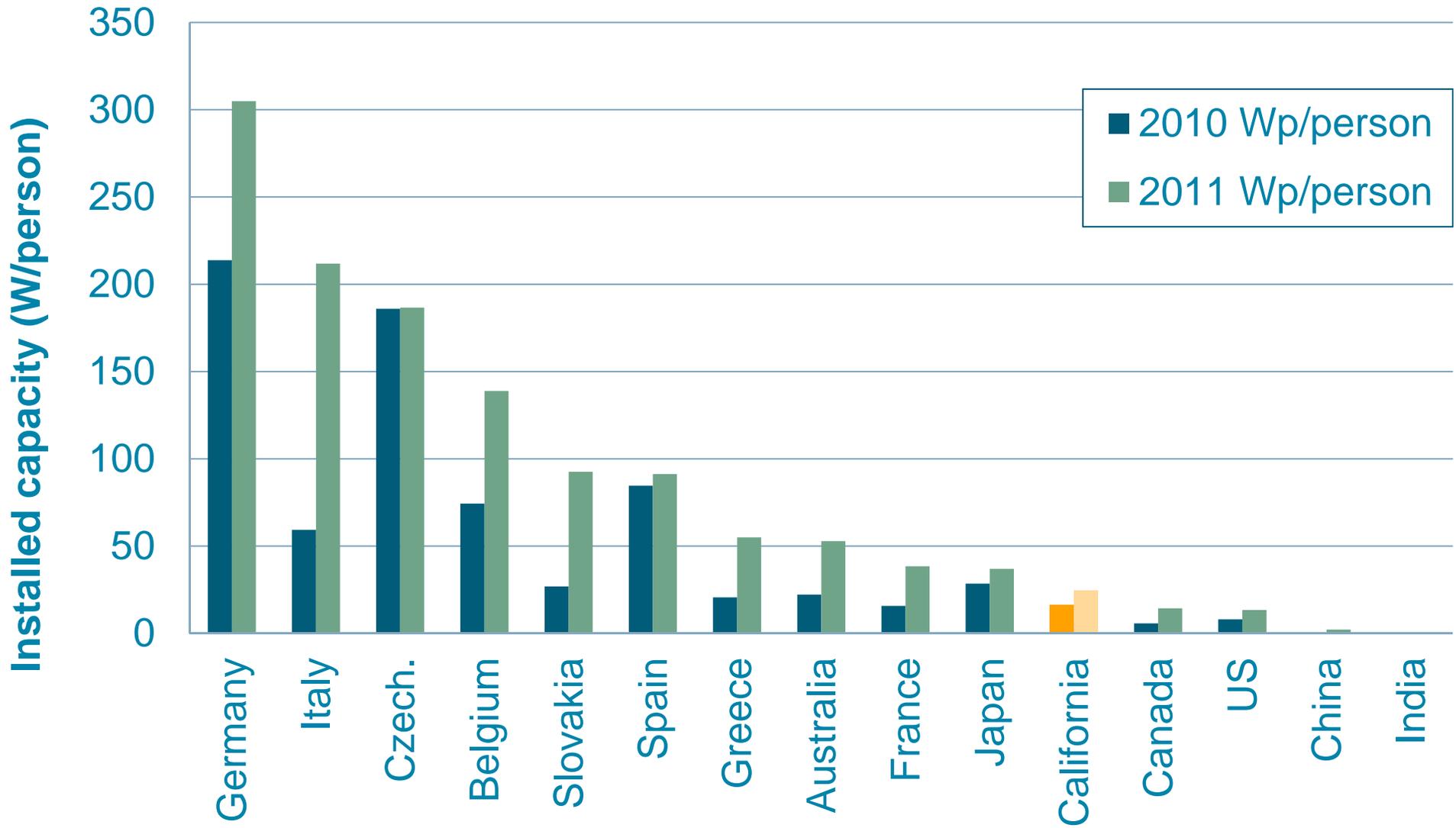
Neighborhood in Hamburg



- **Germany population 81 Million**
- **Germany 25 GW installed PV capacity, 18,000 GWh/yr production**
- **Germany installed cost is approximately 60% of US installed cost**
  
- **California population 38 Million**
- **CA 1 GW installed capacity, 1,500 GWh/yr production**
- **CA Solar Initiative program added 310 MW over last 12 months**
- **All ZNE homes in 2020 would add approximately 400 MW/yr**



# Installed PV capacity Watt (peak) per person

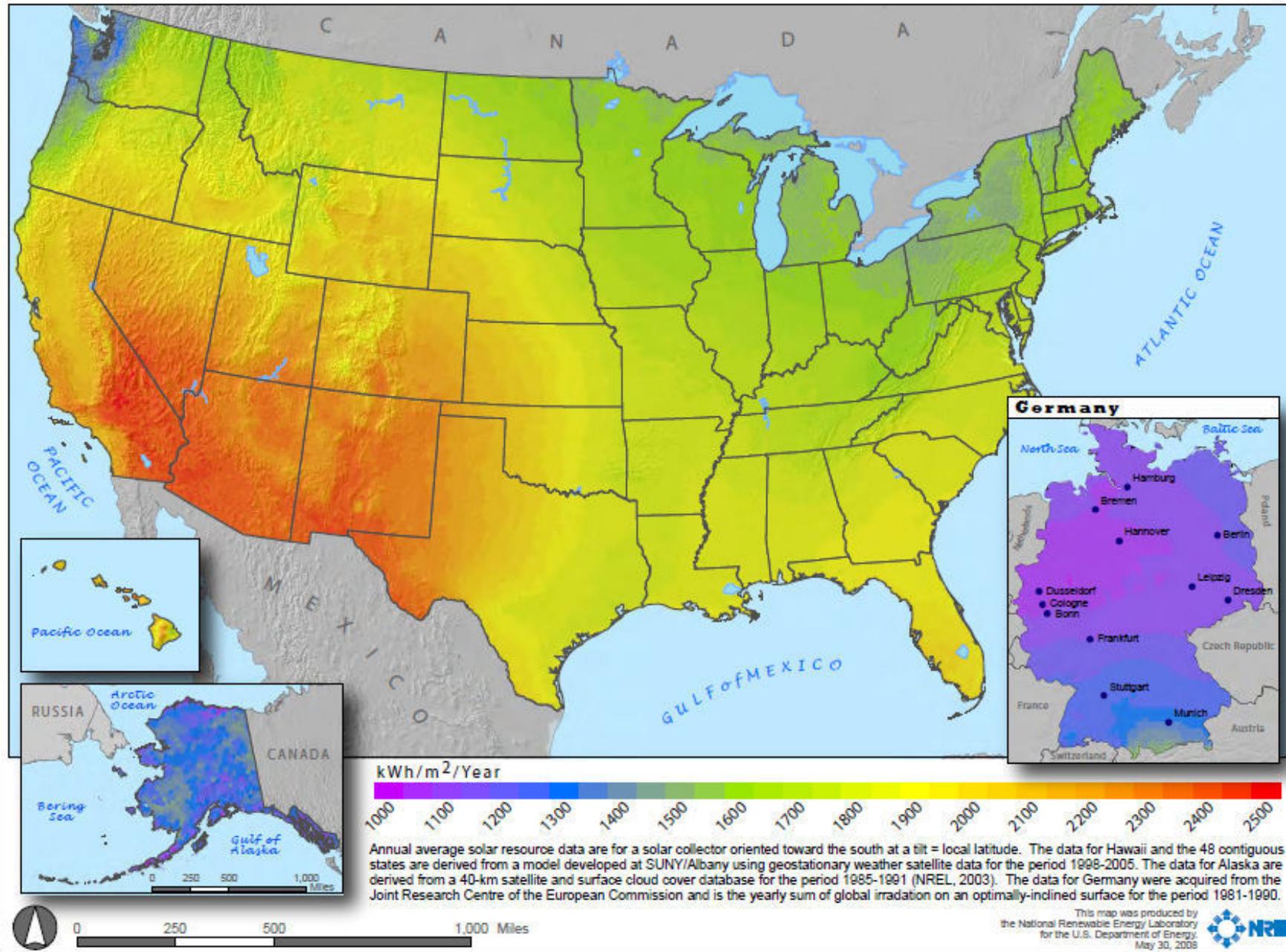


[http://en.wikipedia.org/wiki/Solar\\_power\\_by\\_country](http://en.wikipedia.org/wiki/Solar_power_by_country)

CA from [http://www.californiasolarstatistics.ca.gov/reports/monthly\\_stats/](http://www.californiasolarstatistics.ca.gov/reports/monthly_stats/)

# California and the US Compared to Germany

## Photovoltaic Solar Resource : United States and Germany





# PG&E/RMI Roundtable, Fall 2011: Key Questions

## Representation from:

The Brattle Group, the CPUC, Viridity, the Regulatory Assistance Project, UC San Diego, the State of CO and RMI

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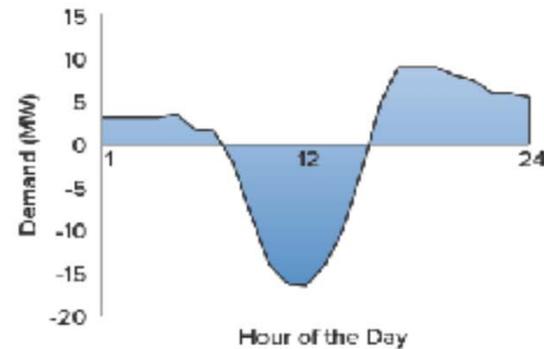
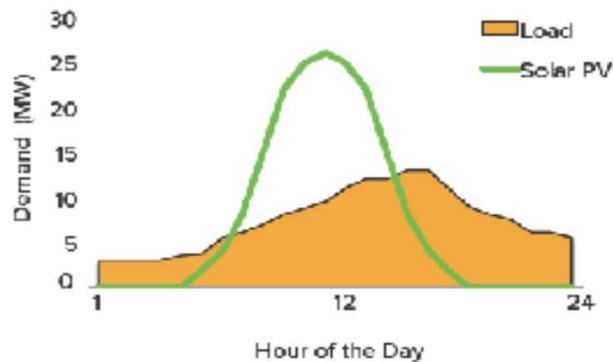
## Key Questions:

- *How will increased penetration of distributed resources and ZNE buildings affect cost and value for the utility and its customers?*
- *How could rate structures be modified to enable sustainable, fair, and efficient development of these resources?*
- *How might utility business models change?*
- *What innovative energy services could be provided by the utility in conjunction with distributed resources and ZNE customers? What is the value of these services to all customers?*

## A Tale of Two Buildings

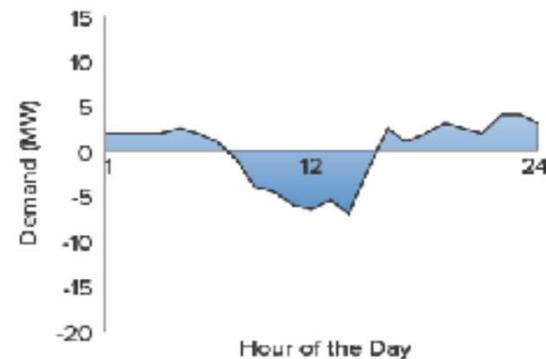
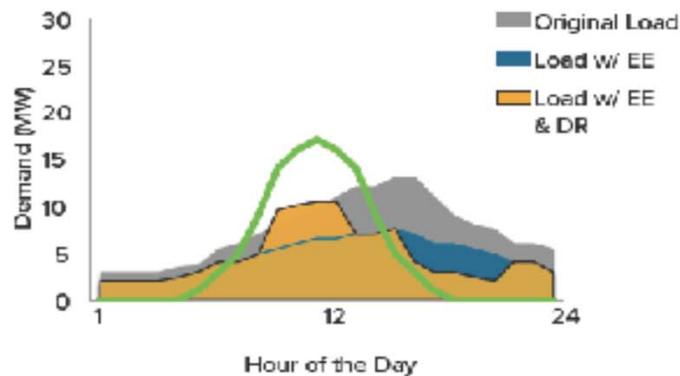
### Solar PV

Daily 30 MW grid usage



### Energy Efficiency, Demand Response, then Solar PV

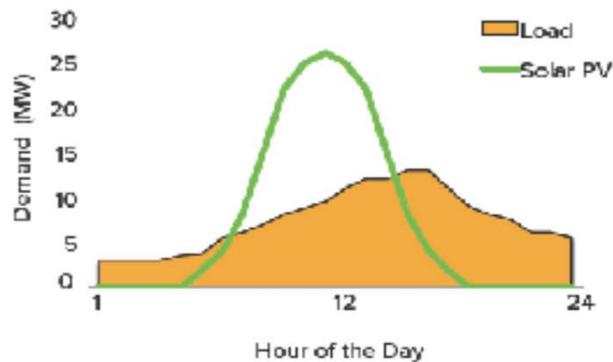
Grid usage cut to 10 MW



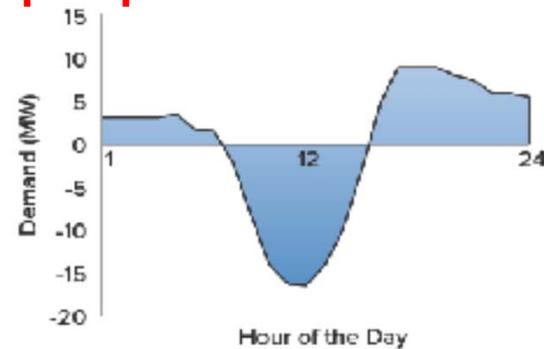
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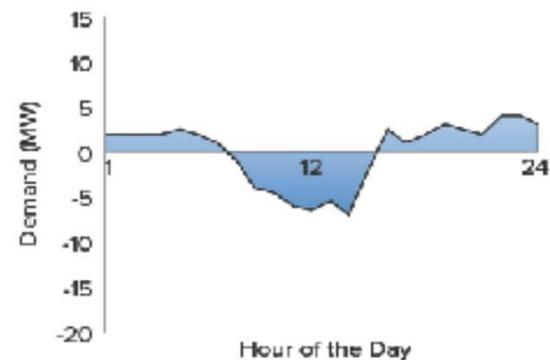
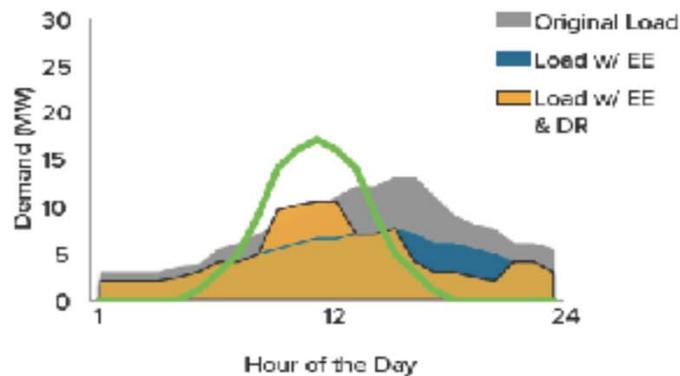


Which scenario is preferable from a grid perspective?



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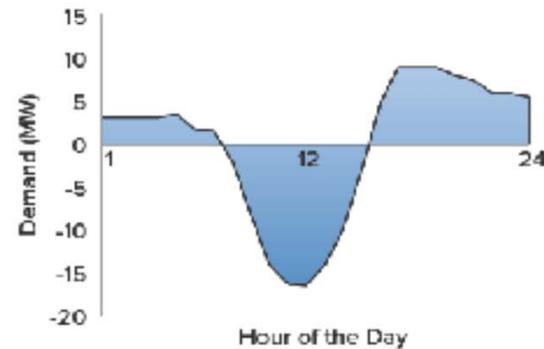
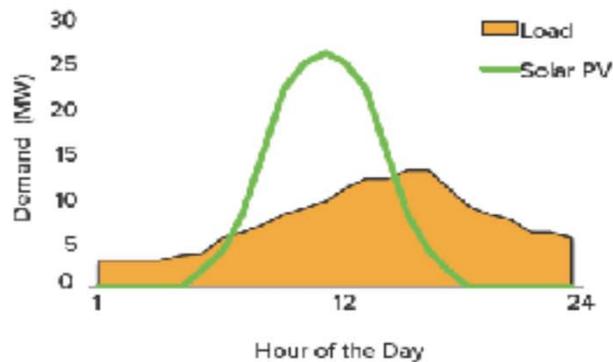
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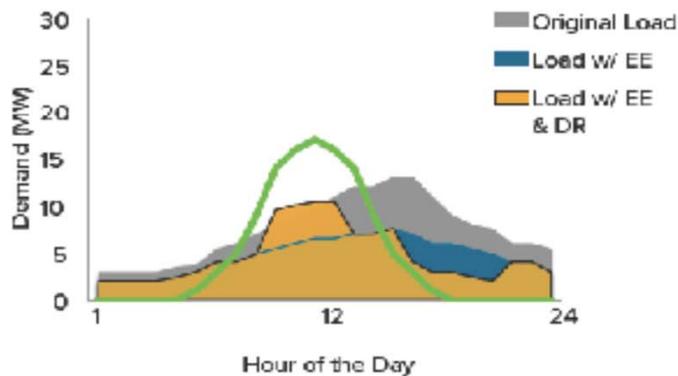
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**Which scenario is encouraged by our current rate and rule structures?**

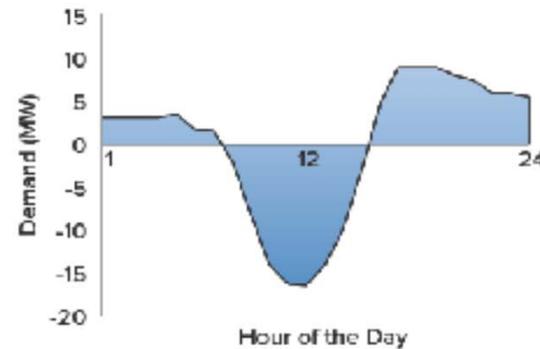
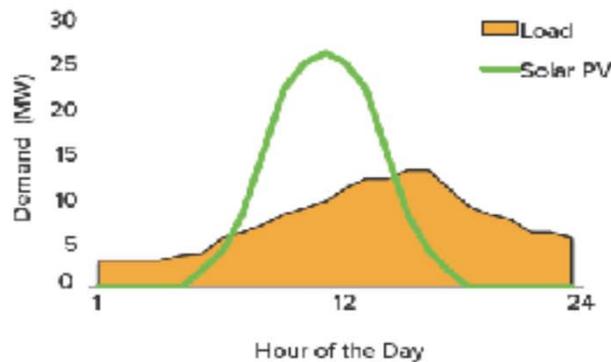


# Implications for ET and other Utility Research

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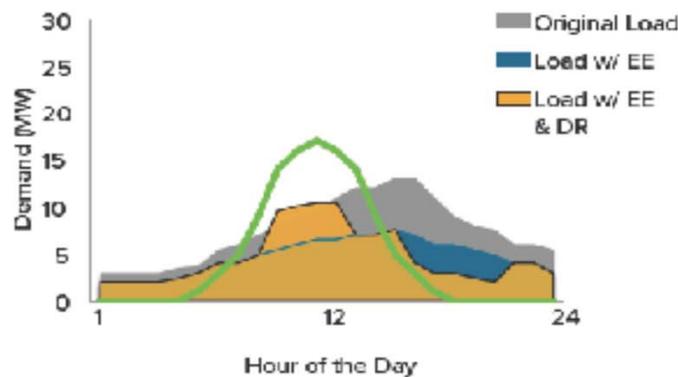
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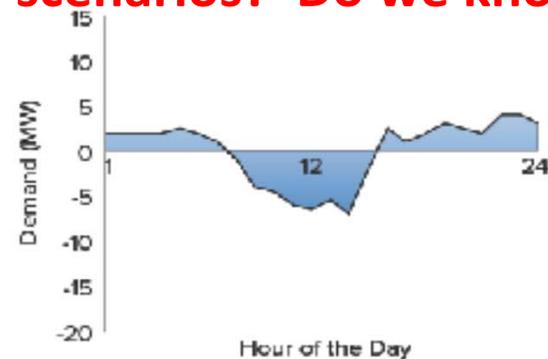


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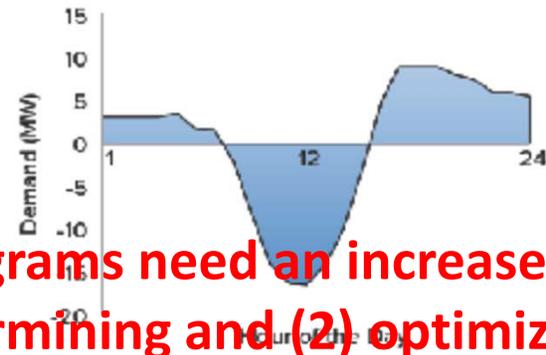
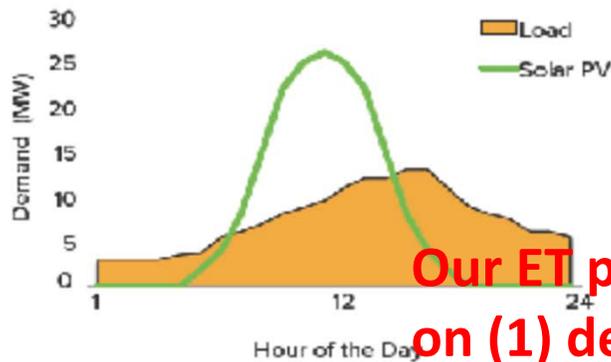
**What are the comparative grid-related costs of the two scenarios? Do we know?**



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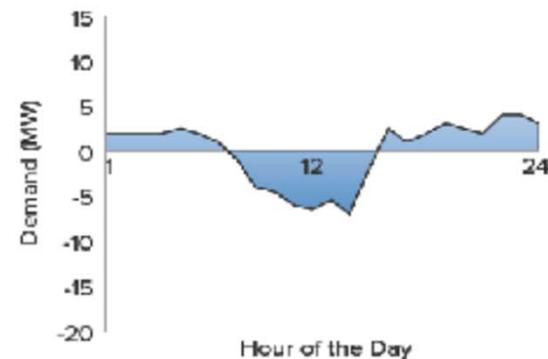
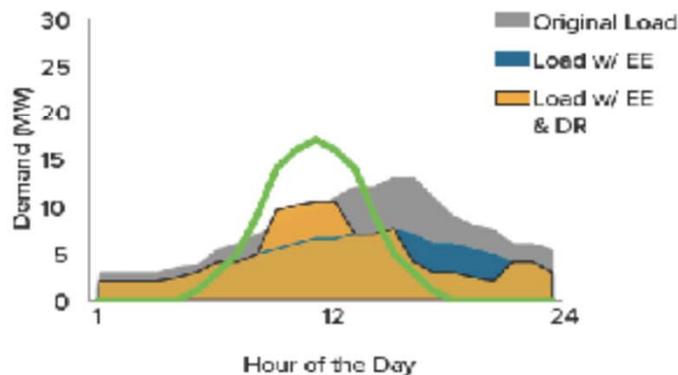
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**Our ET programs need an increased focus on (1) determining and (2) optimizing the cost and value of the desirable load shapes from the grid perspective**

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## Further Reading . . .

Net Energy Metering, Zero Net Energy and The Distributed Energy Resource Future: Adapting For The 21st Century:

[http://rmi.org/rmi\\_pge\\_adapting\\_utility\\_business\\_models](http://rmi.org/rmi_pge_adapting_utility_business_models)

[Reinventing Fire](#) by Lovins et. al., Rocky Mountain Institute

[Smart Power](#) by Peter Fox Penner, The Brattle Group