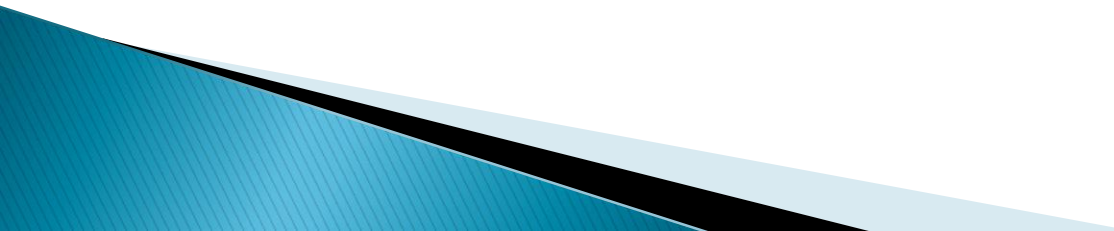


BEYOND NET ZERO

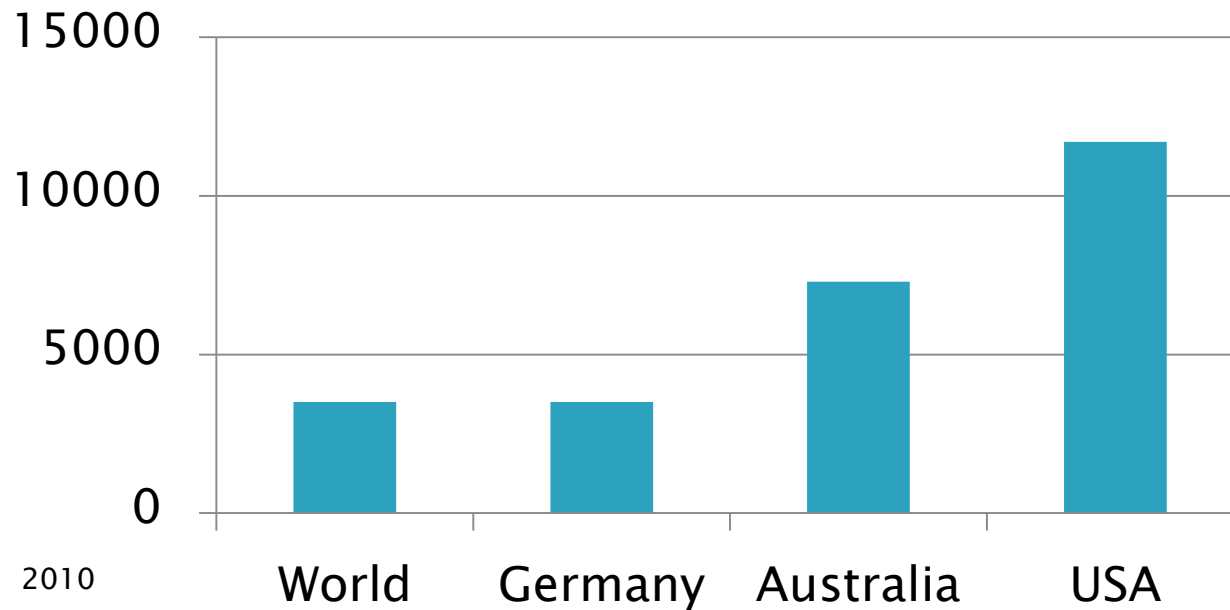
Karen Faerber-Hall
SusTech 2014

THE CHALLENGE – RESIDENTIAL ENERGY SECURITY IN THE US

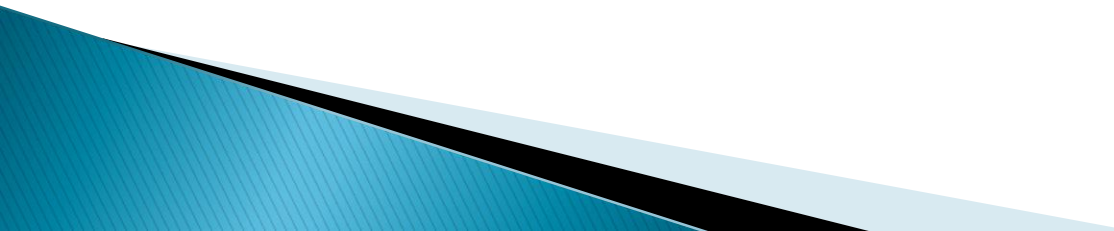
- ▶ Natural Disaster
 - ▶ Civil Unrest
 - ▶ Escalating Competition from other energy demands
 - ▶ Increasing costs
- 

KEY ELEMENT – ELECTRICITY

Residential Electricity Consumption Average kWh /yr



US Residential Usage Details

- ▶ Residential usage accounts for 34% of the electricity generated in the US
 - ▶ Only about 35% of that usage provides heating, cooling, hot water and food preparation/preservation
- 

CARBON FOOTPRINT

▶ US Power generation by source

- Coal 39%
- Natural Gas 27%
- Nuclear 19%
- Hydro 7%

A POTENTIAL SOLUTION

- ▶ Residential buildings that connect to the Smart Grid as power generation facilities
- ▶ 130,000,000+ existing residential building (2010 Census)

DEPARTMENT OF ENERGY

▶ ZERO ENERGY READY HOME

- High performance home – new or retrofit – so energy efficient that a renewable energy system can offset its annual energy consumption

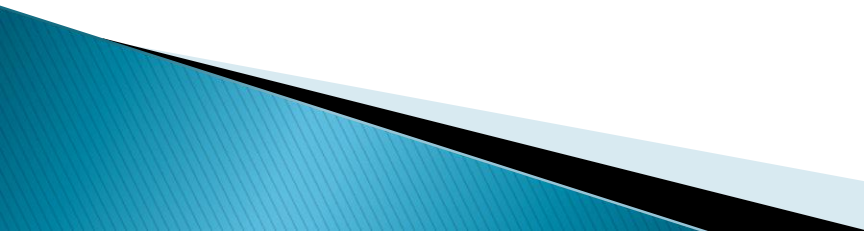
HIGH PERFORMANCE MEANS

- Air Sealing
- Insulation
- Fenestration
- Heating/Cooling
- Major appliances
- Lighting
- TVs
- Mobile Devices

Energy Efficient Building
Techniques & Materials

Energy Efficient Appliances

ENERGY READY MEANS

- ▶ Roof structure allows optimal placement of residential scale solar and/or wind power generating system
 - ▶ Mechanical and electrical systems designed to connect to solar and/or wind power generating system without structural changes
 - ▶ Space provided for components such as inverters and battery storage
- 

MANUFACTURERS



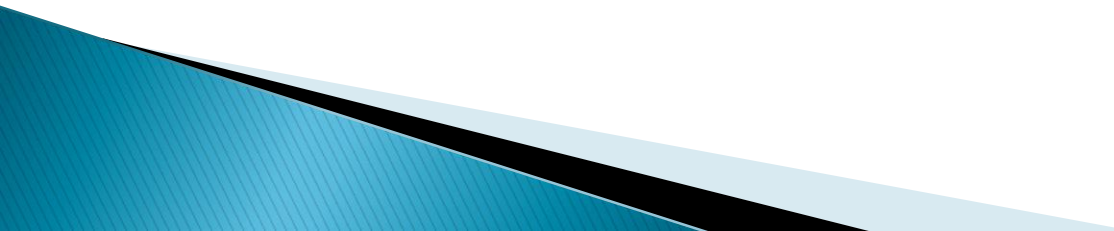
- ▶ Building Integrated Solar Technologies
- ▶ Residential Wind Turbines
- ▶ Grid-tied Battery Systems
- ▶ Smart Inverters with grid interactive functions
- ▶ Smart Thermostats and Load Controls

POWER PROVIDERS



- ▶ Net metering still not available in all states
- ▶ Net metering with storage available in a few states but restricted to emergency back up
- ▶ Smart Grid technology not set up to include residential energy storage systems in the automated load balancing functions

RESIDENTIAL EMPOWERED SMART GRID

- ▶ Distributed energy assets with
 - significant storage capacities
 - on-site digital controls
 - real time bi-directional management systems
- 

BEYOND NET ZERO

- ▶ Turning homes into grid-tied sustainable sources of renewable energy producing more energy than they consume

Residential Energy Independence

=

Residential Energy Security

QUESTIONS ?



