

# BEYOND NET ZERO

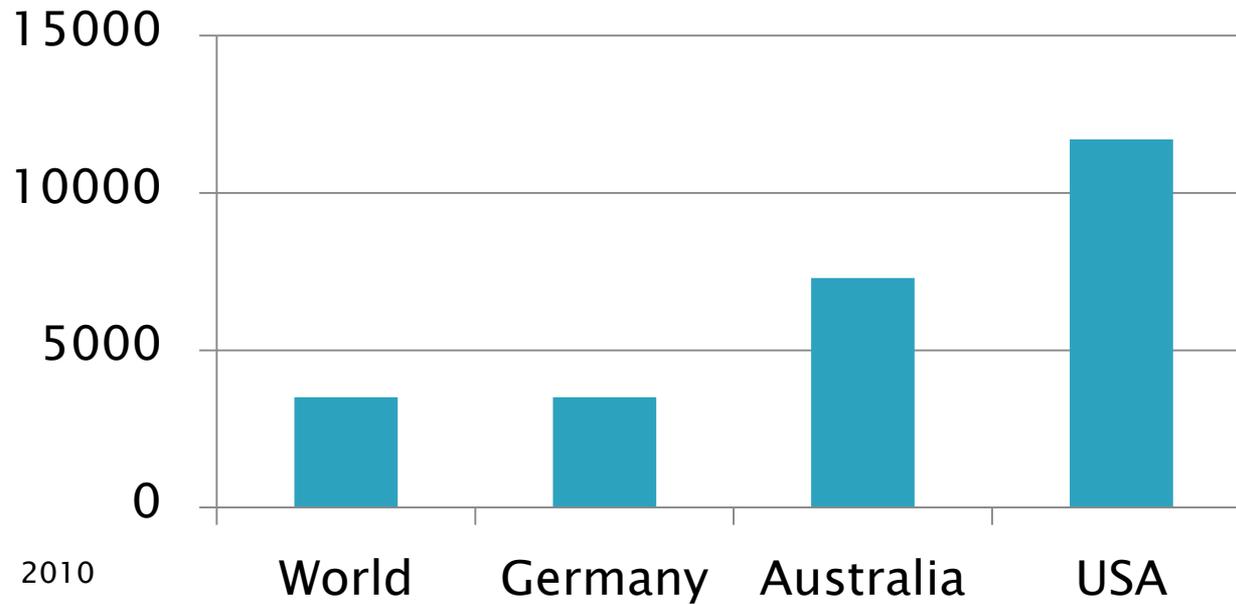
Karen Faerber-Hall  
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# THE CHALLENGE – RESIDENTIAL ENERGY SECURITY IN THE US

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

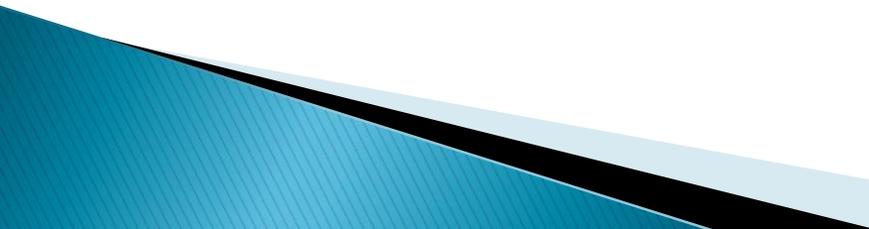
# HIGH PERFORMANCE MEANS

- 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
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# 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
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# BEYOND NET ZERO

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

Residential Energy Independence

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Residential Energy Security

**QUESTIONS ?**

