



The Dan and Shaun Show!

What the Duck?

Distributed Energy Resources
and Demand Response

EEBA, 2017

Why?

Why do you do Energy Efficiency?

Let's think about this as we discuss



HOW AND WHY
DO WE CREATE?

Agenda and a word...

- DERs and Duck Curves
- Hot in Market Demand
- Hot in Utility needs
- How WE fit in
- Building Value Propositions



Popular



Reality



Why are we here today?

When can we cost-effectively impact homes?

- *New Construction*
- *Major Remodels*
- *Incentivized interventions*
- *Motivated stakeholders*



Outlook

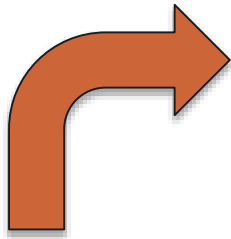


What is the duck curve anyway?

- No solar, loads grow throughout day
- Solar production peaks around mid-day
- Impact is a “duck” shaped curve
- Impact to utility generation?



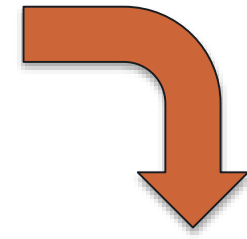
Demand Response



Plane seats 85 people

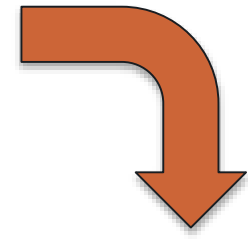
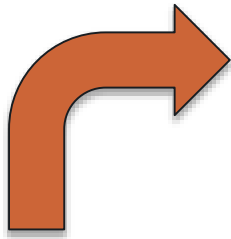


100 people want to fly to Hawaii



Airline pays 15 people to take later flight

Demand Response



The grid has 85 MW



The people need 100 MW of power



Utility pays people to use 15 less MW or use it at different times

Then what are DERs?

- Distributed generation
- Distributed storage
- Time of use efficiency
- Two way metering
- Interactive platforms
- *Demand Response*



A photograph of two construction workers on a building site. The worker on the left is wearing a white hard hat and a light-colored shirt, pointing towards the wooden framing of a building. The worker on the right is wearing a blue shirt and jeans with a tool belt. The background shows the skeletal structure of a building under construction against a clear blue sky. An orange square is positioned to the left of the text overlay, and a dark grey rectangle contains the text.


Market Influences

Technology implementation

- Field perspective on implementation of relevant technologies
- How this tech relates to wider DER marketplace

Let's look at two technologies with this lense





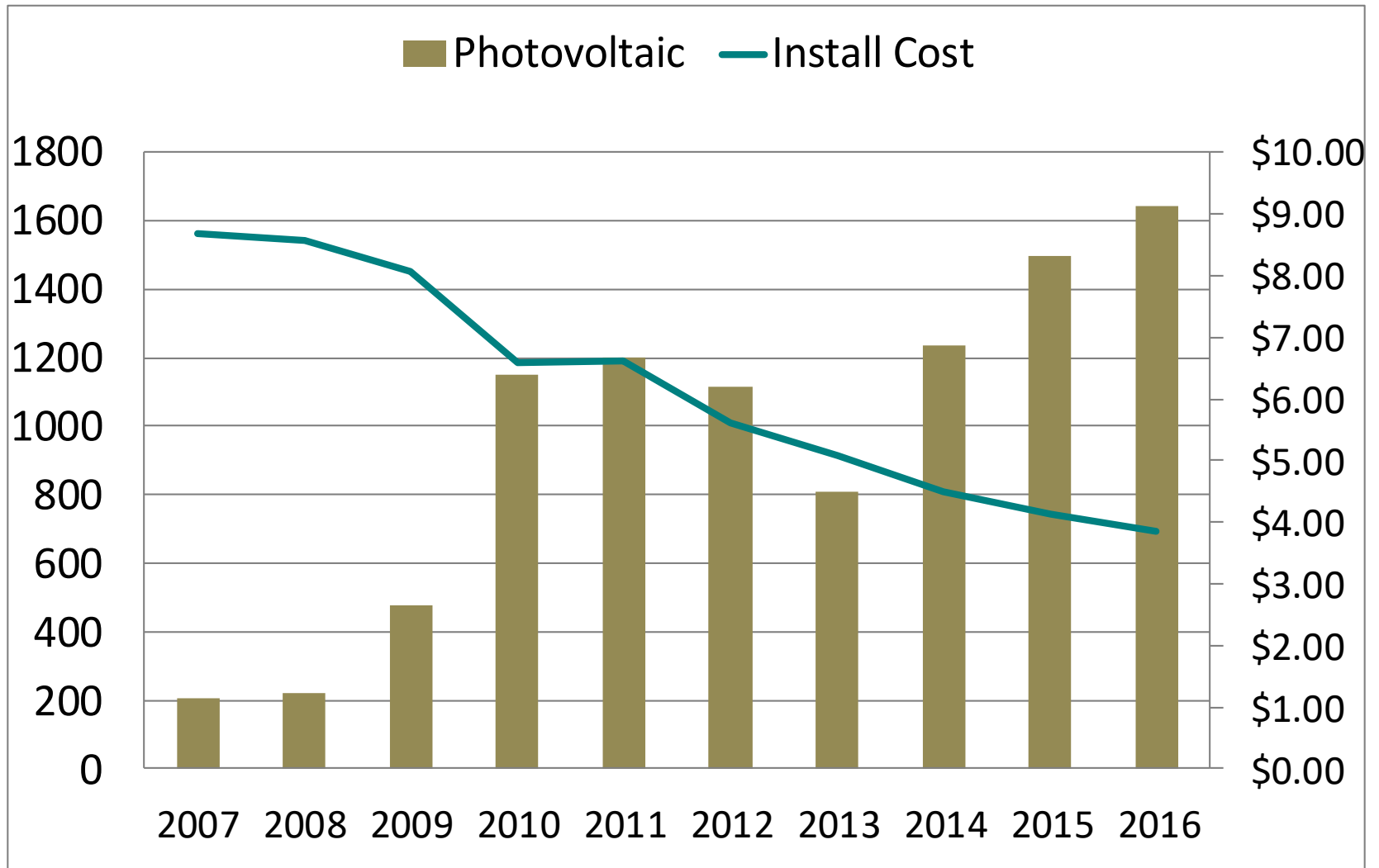
Residential Solar

Solar in the residential marketplace

- Growth as costs continue to decline
- Wide appeal
- Variety of ownership models, accessible
- New technologies driving increased outputs, monitoring and analytics



Residential solar installations in Existing Homes

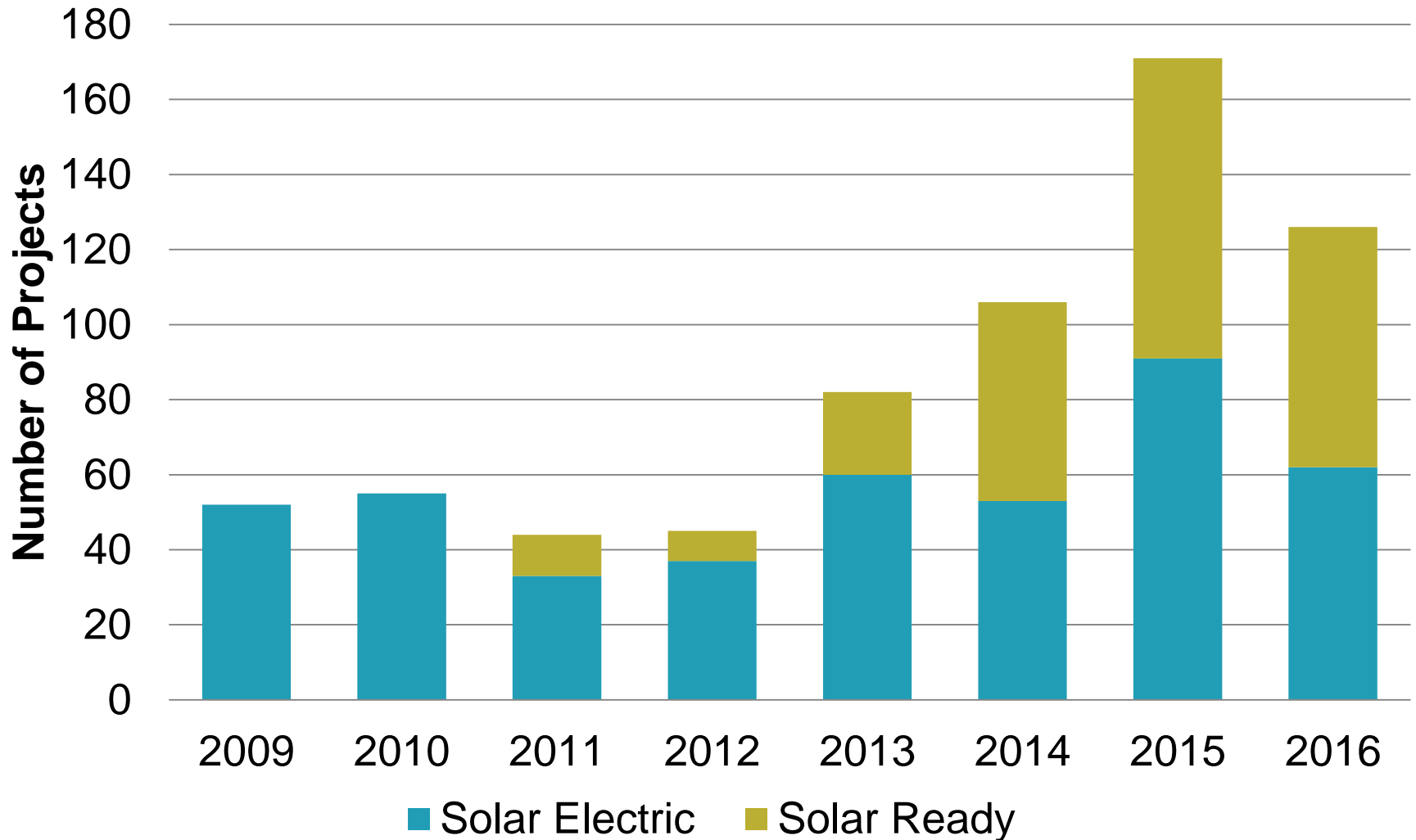


Solar and new construction

- Solar as a viable building product
- Consumer interest vs. builder interest
- Solar as a *standard* or as a *standard option*
- Designing for solar



New home solar installations



Challenges/Opportunities

- Integration into production model
- Builder/installer relationships
- The local marketplace Tax Credits
- Regulatory/policy concerns
- Real estate valuation



Challenges/Opportunities

- Exploring paired storage and advanced battery systems
- Simultaneous installation with smart thermostats
- Solar as part of community design





Smart Home Technologies

Residential smart thermostats

- Popular and available *everywhere*
- Consumer-facing incentives
- 1-2.5% Increased whole home efficiency
 - Incentives vs. incremental costs
- Missed opportunities for builders



Smart t-stats as a distributed resource

- Smart thermostat aren't just smart, they're *connected*
- Smart T-stats as a platform for demand response and optimization
 - Utility programs for customers
 - Utility ↔ customer interactivity



Smart thermostats are a first step

- DR utility offerings may be customizable
- Smart home 'ecosystem'
- Smart homes can be marketed
- Smart homes are a part of smart communities

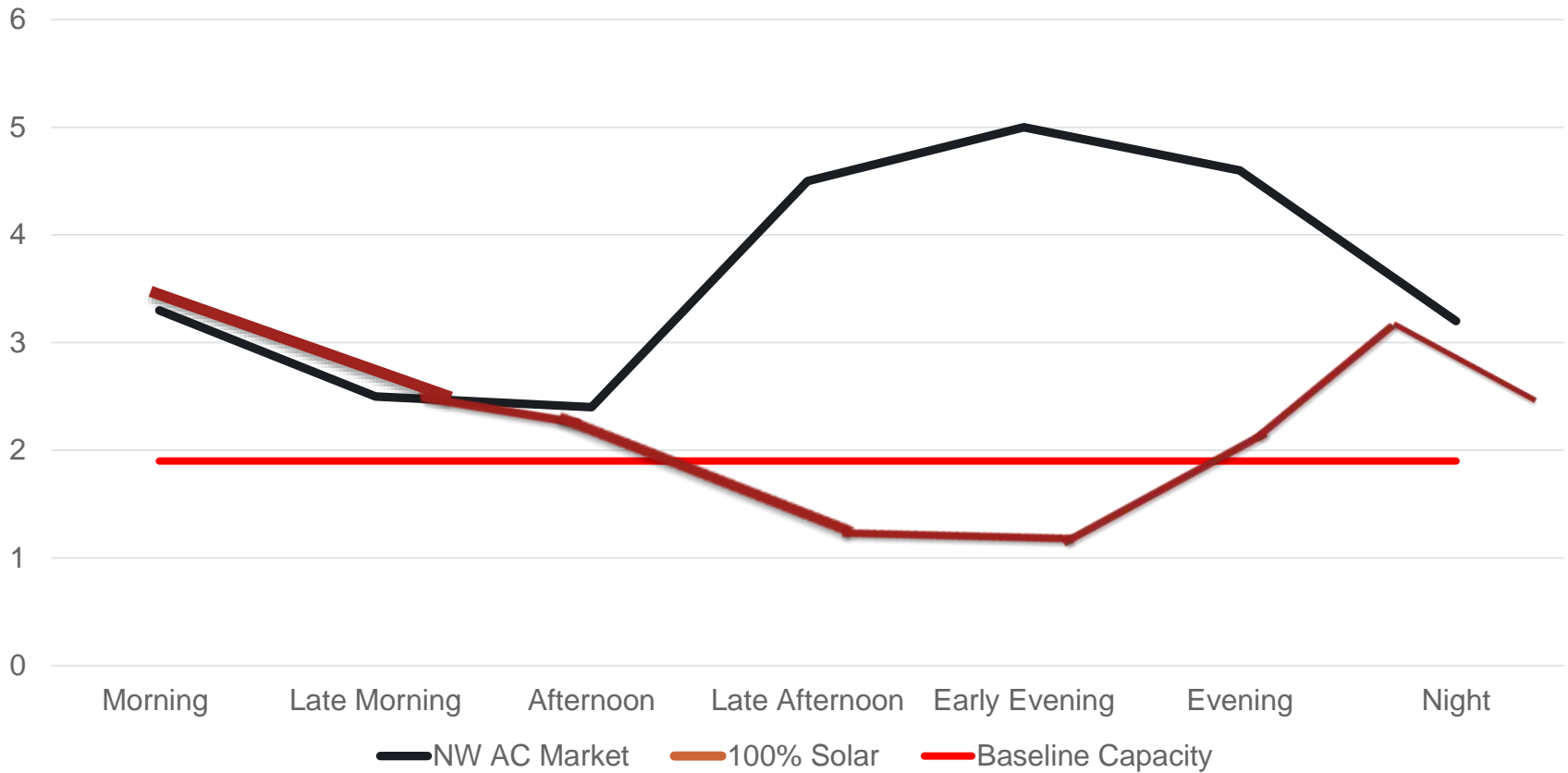


The background of the slide is a photograph of a building's wooden frame under construction. The structure consists of numerous vertical studs and horizontal joists, creating a grid-like pattern. The lighting is bright, casting long shadows across the wooden surfaces. In the foreground, several long wooden planks are stacked on the floor. The sky is visible through the open structure, showing a clear blue color with some light clouds.

Utility Needs

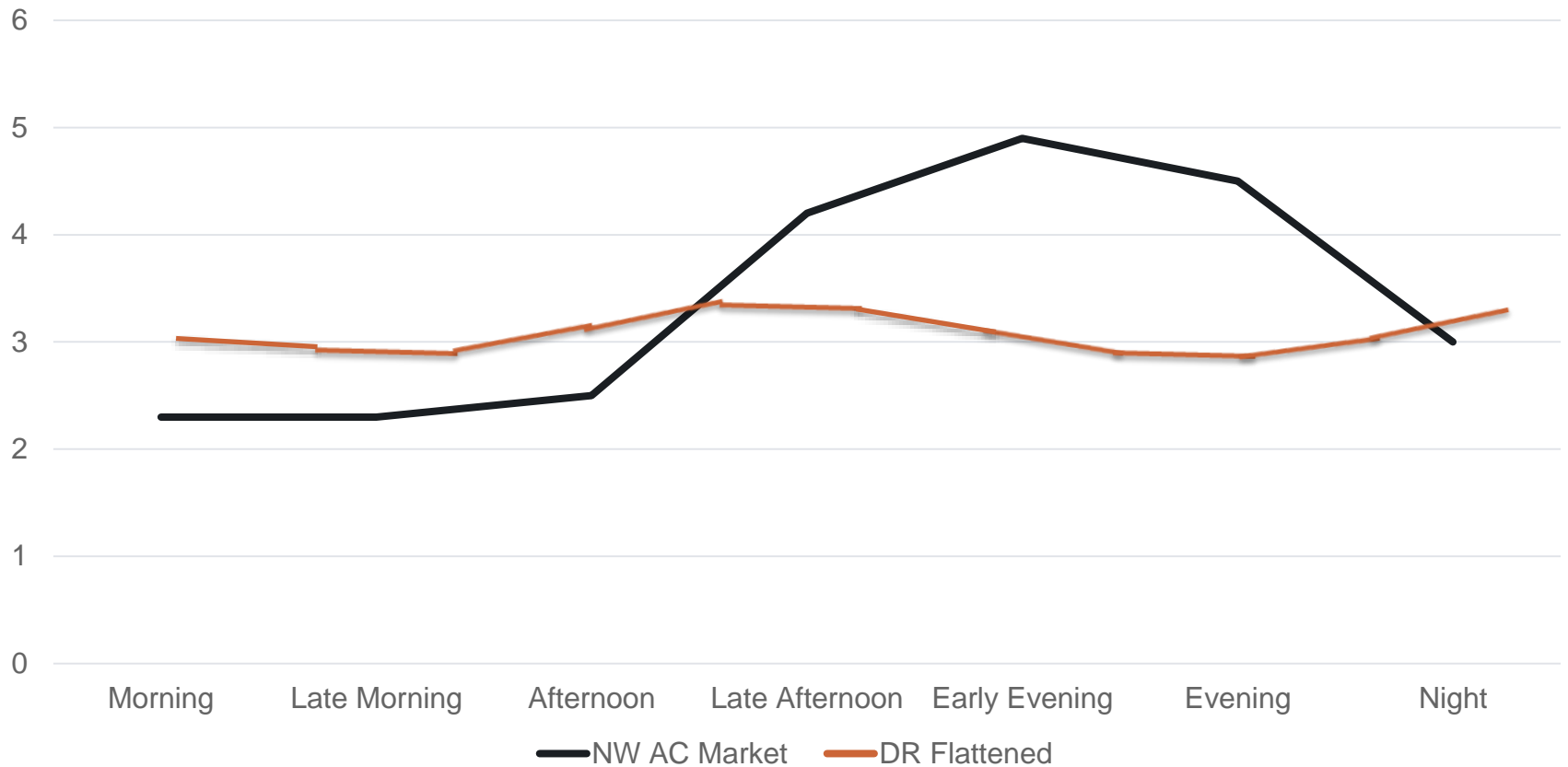
Capacity with and without Solar

Capacity by day

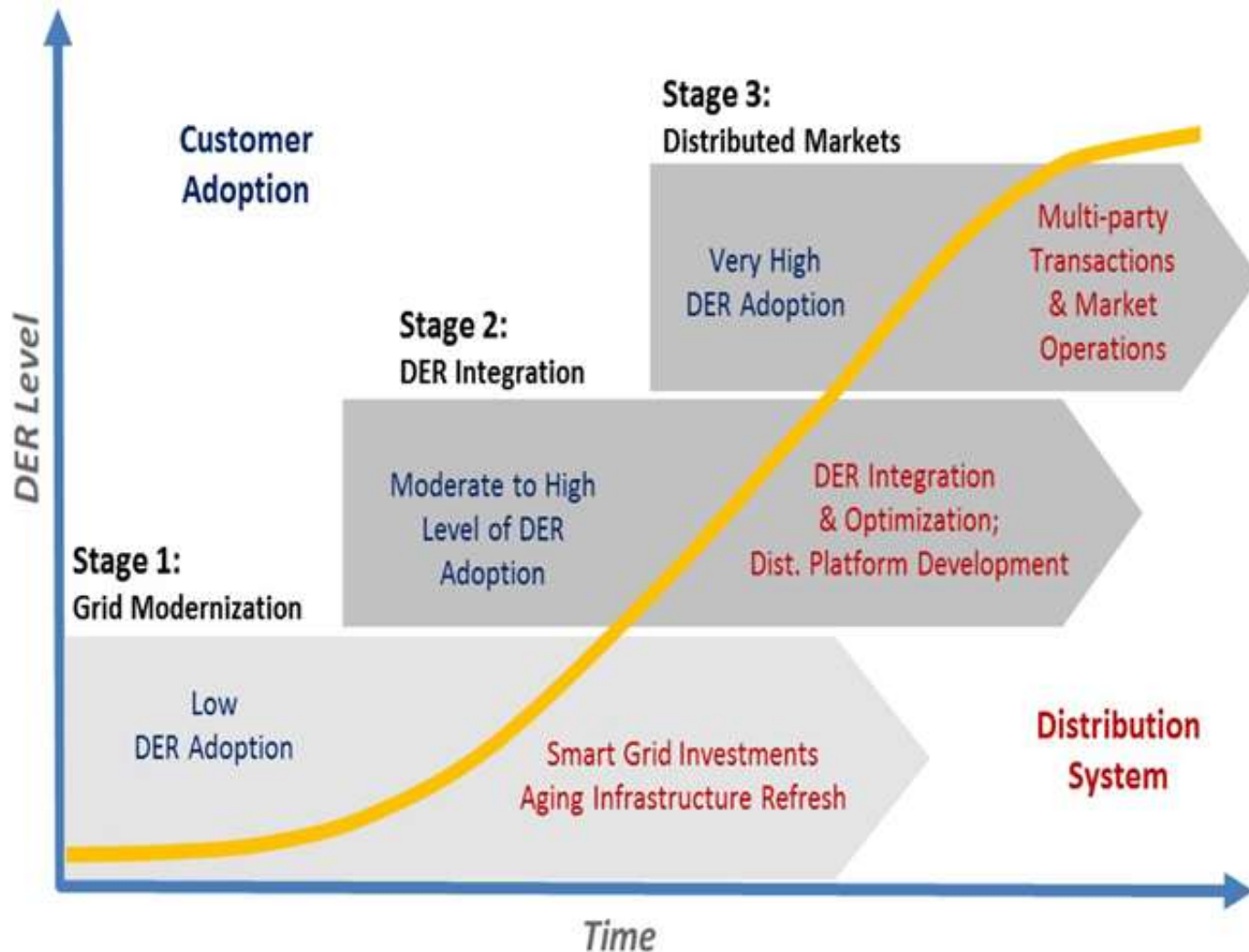


Capacity with and without DR

Capacity by day

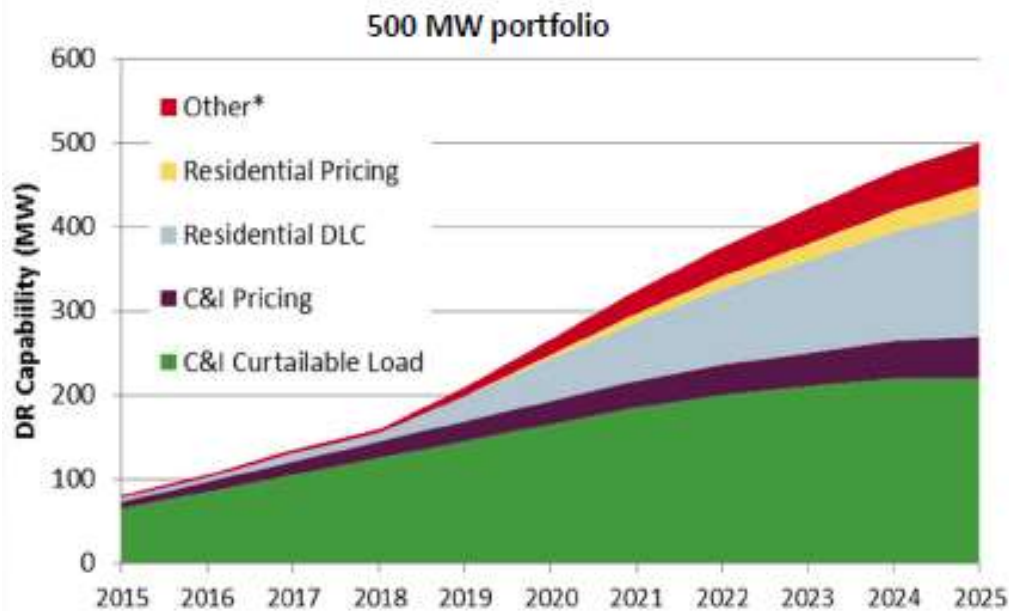


How DERs play a role over time



Is Residential the likely answer?

DR Growth Trajectory of the Portfolio



* Examples of "Other DR" programs include electric vehicles, industry-specific (e.g., agriculture) and generator programs, etc.

- Existing programs continue to grow, or phase out
- Some programs may reach maturity/saturation quickly
- Pricing may be contingent on AMI

Source: Confidential Utility DR Strategy Team

Credit: Peak Load Management Alliance

Translating to DR solutions

Duke Energy Florida's EnergyWise Home Program

- **418,000 participating customers** and 550,000 Direct Load Control switches installed
- **653 MW load management**
- Controlling water heaters more than **140 times per year**, on average



Translating to DR solutions

Pacific Gas and Electric Company's Smart AC Program

- **150,000 customers** with one-way paging load control devices that provide peak period **load reduction of ~ 80-100 MW**
- Lead a consortium of utility reps and vendors to reconfigure using Smart Grid-based, two-way load control switches



Translating to DR solutions

National Grid

- Combined technologies and strategies to achieve DR through ***dynamic prices, direct load control, and behavioral energy efficiency***
- Provides customers with ***smart thermostats, load control devices, web apps, and in-home displays*** to deliver real-time energy use and compelling messages

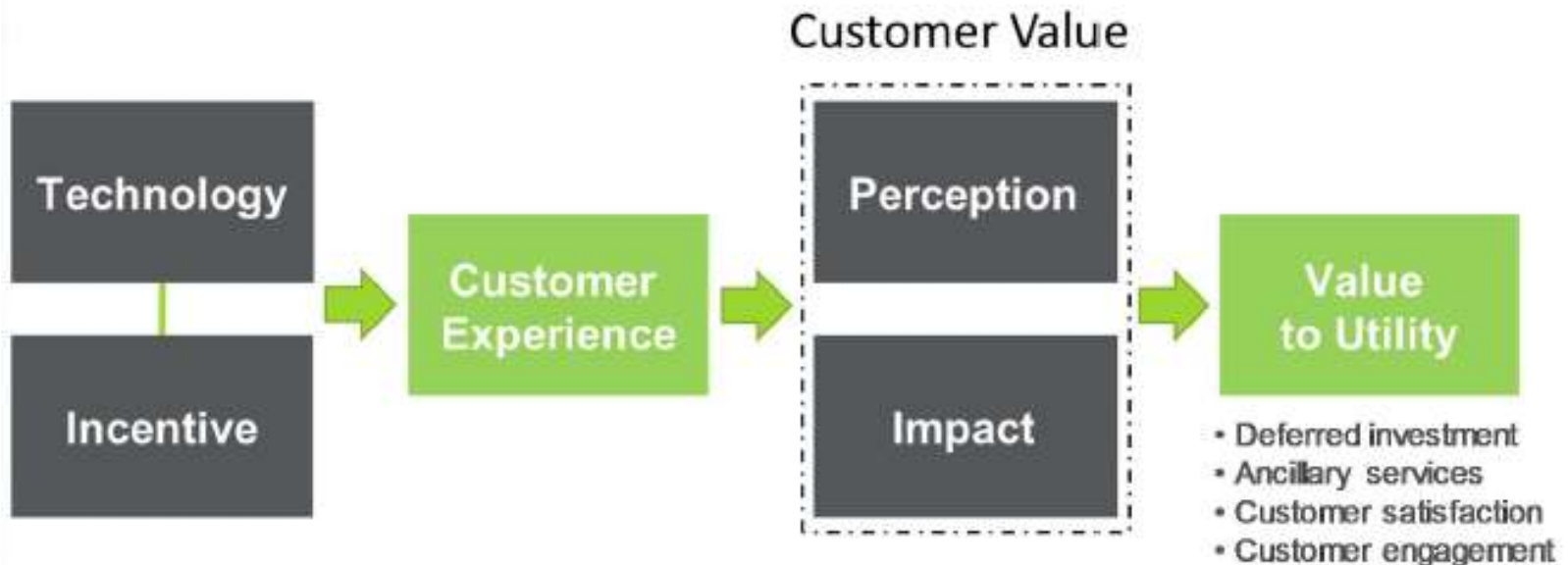




Builders, Raters, and Key Stakeholders

Value Propositions

Customer Experience Drives Utility Value



Source: Navigant



Value Proposition #1

Low-carb, gluten-free, less-hassle, earth friendly power usage

- Partnering DERs in construction can lead to less reliance on fossil fuel powered peaker generators
- Partners well with Energy Efficiency efforts



Value Proposition #2

More control and reduced reliance on “the grid/the man”

- Building homes with storage, generation, and complete controls speaks to desire for more control
- App controls for devices, lighting, and appliances control regardless of where you are



Value Proposition #3

Grid and National Energy Security

- Reduce dependence on foreign fuel sources
- Stabilize the reliability of the grid
- The military is pioneering advancements in micro-grids!



What do we propose as a response?

Smart Homes are a no brainer

- Low cost of entry
- High customer interest
- Possibility for energy efficiency and demand response



Pre-wire, plumb, frame, and ready homes for Solar



<https://www.silkroadenvironmental.com/products>

Consider your water heaters

Tanks are nice thermal batteries

HPWHs are cutting edge and provide savings

Newest units come with smart controllers and apps

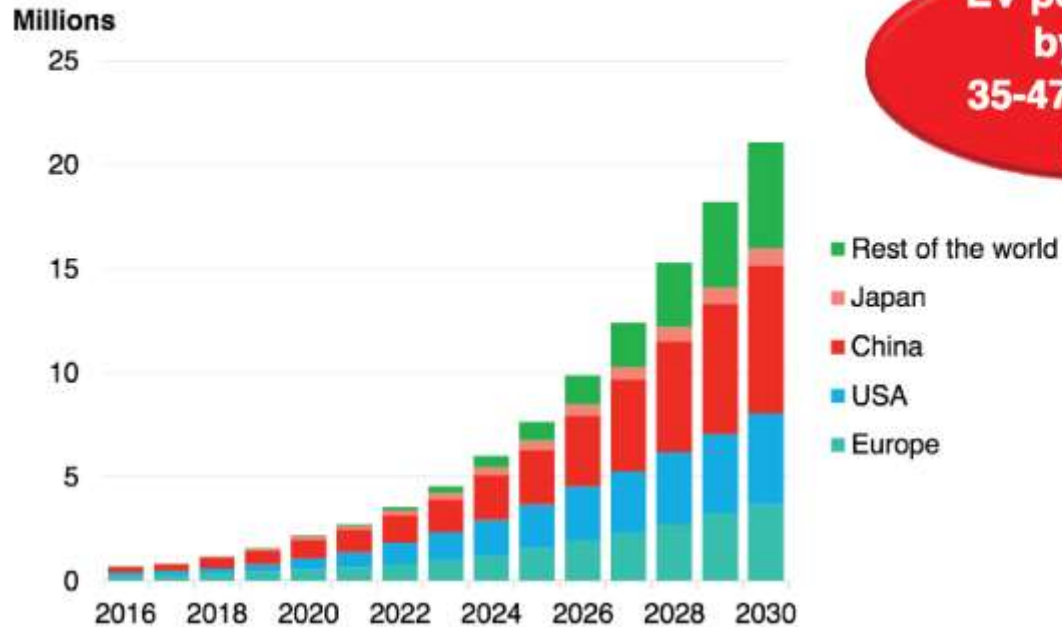


http://www.rheem.com/products/water_heating/tank/hybrid/

Install or wire for charging stations

The Rise of Electric Cars

BNEF sees more than 20 million sales by 2030



EV penetration
by 2040
35-47% of new
cars



Bringing it back together...

- The reasons why align with reasons for EE
- Engage local utilities and programs
- Find the value propositions for your buyers
- Adopt future grid considerations into core business model



Our questions for YOU!

- What are you seeing in the New Con market around DERs?
- What barriers are you seeing on technology adoption?
- What are you seeing/hearing with Utilities?
- What technologies or equipment has you excited?
- What value propositions do you see?



Thank You

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Find us on LinkedIn!