



A Modular Approach to Water Heater Demand Response and Ancillary Services

An Introduction to USNAP (ANSI/CTA-2045)

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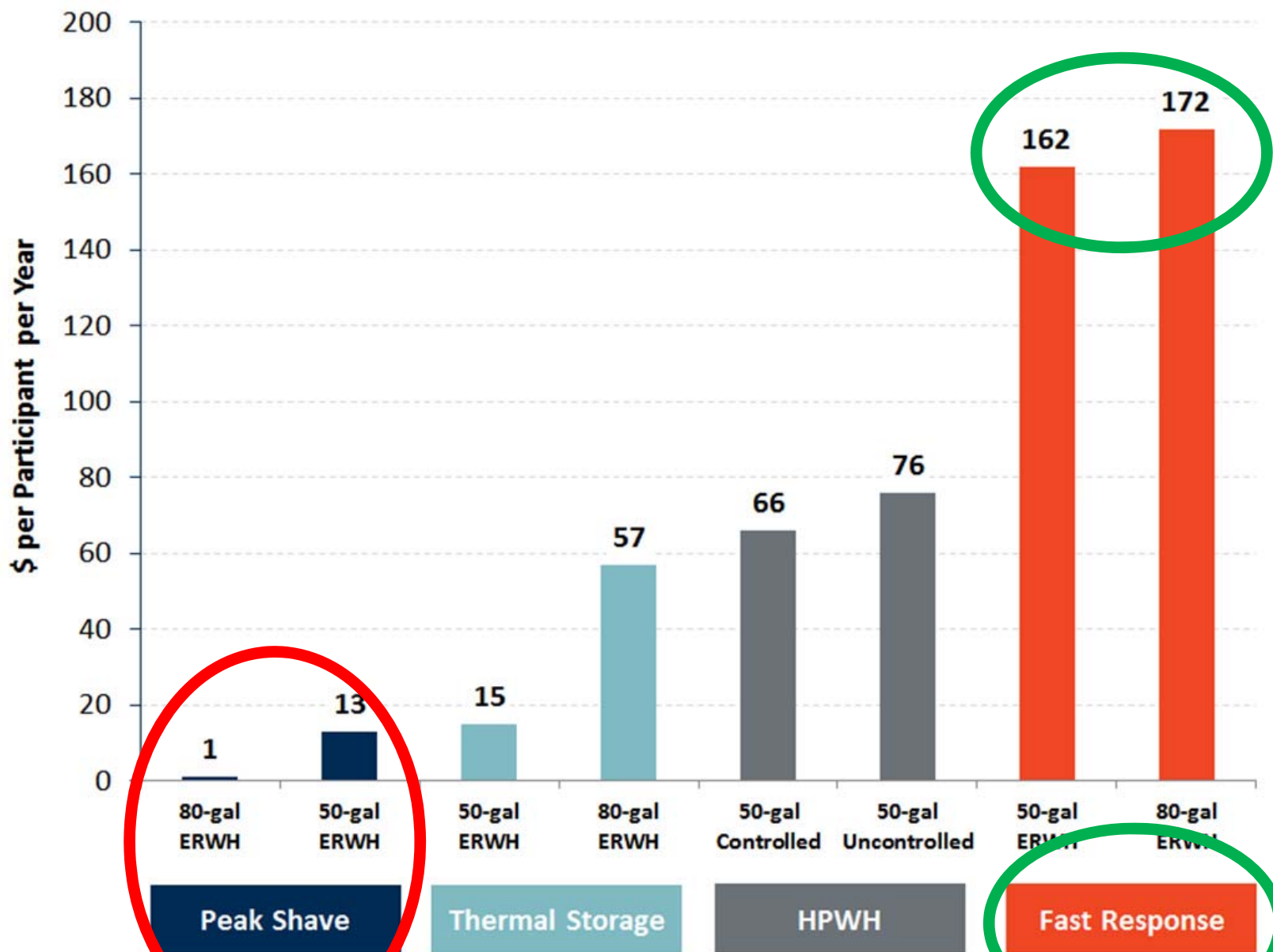




“Electric water heaters are essentially pre-installed thermal batteries that are sitting idle in more than 50 million homes across the U.S. By heating the water in the tank to store thermal energy, water heaters can be controlled in real-time to shift electricity consumption.... Further, recent technological advancements have enabled “grid interactive water heaters” to be controlled over very short time intervals and with near instantaneous response, allowing them to provide frequency regulation and other grid balancing services”

“The Hidden Battery: Opportunities in Electric Water Heating” Pg. i

Where the dollars are



"The Hidden Battery: Opportunities in Electric Water Heating" Pg. Iii – Based on 2014 PJM data



An ***industry alliance*** bringing together customer equipment manufacturers, utility equipment vendors, aggregators, electric service companies, and utilities to develop and promote a modular communications interface to enable customer equipment communication and coordination for energy management and demand response.

A ***common name*** for ANSI/CTA-2045, a modular communications standard for grid-interactive devices, that includes the Physical through Presentation layers of the OSI Model, as well as other design parameters (such as case size and shape.)

Relationship with EPRI and CTA



- Initial Development:



- Published by



- Pilots and Trials:



- Ongoing Development, Promotion, Testing & Certification by



How Standards Proliferate...



HOW STANDARDS PROLIFERATE:
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC.)



The most important thing to remember



USNAP (ANSI/CTA-2045) **is not** a new standard that replaces any existing standard.

USNAP (ANSI/CTA-2045) **is** a new standard that enables any existing *or future* standard.

The only real constant is change...



Comments heard at a recent IoT conference:

“Wireless technologies change every 5 years. In 5 years, we'll be doing something else... How are you going to handle that?”

How many protocols will that modem need to be able to handle world-wide?”

“How do you warranty a Wi-Fi module inside a fridge? How do you support it? Do you really want to?”



Internet of Things vs. **Demand Response**

✓ Small, Low Power
and/or Mobile

✓ Exclusive

✓ Interactive

✓ The market tolerates
reliability issues

✓ The market expects
rapid turnover

✓ Large, High Power Draw,
and Stationary

✓ Common

✓ Ignored unless they break

✓ The market will not tolerate
reliability issues

✓ The market expects long
lifespan

So, who cares?



“This is a great system! ...”

“I wish I could watch my water heater with an App on my phone!”

...said nobody. Ever.



There are many large loads in the home where the customer doesn't really care about *how* or *when* it does it's job, as long as it does it's job.

Those loads are the keys to Residential Demand Response, so let's let them do their jobs without bothering the customer.



The **OSI Model** is a handy way to talk about different standards based on how (or whether) they answer certain questions:

7. Application

7. What are you doing?

6. Presentation

6. How do we describe that?

5. Session

5. How do we manage politeness?

4. Transport

4. How do we manage traffic?

3. Network

3. Who is talking to who?

2. Data Link

2. How do we use the medium?

1. Physical

1. What is the physical medium?

Gettin' Geeky, Gettin' Stacked...



The questions themselves, or what we call them isn't that important for our discussion here:

What matters for our discussion is that every one of the standards out there answers one or more of these questions

differently

and those differences make them to one extent or another unable to work together.

1 Physical

2. Data Link

3. Network

4. Transport

5. Session

6. Presentation

7. Application



To date, demand response has required significant integration efforts, whether rolling a truck to fit a control switch, creating a cloud service, or having equipment built to handle a specific platform.

This inherently limits the market penetration of grid-interactive hardware, as compared to what is possible when grid interactivity is a part of commodity hardware.

The Manufacturer's Conundrum....



I want to do DR, but which platform do I build for?

If I use a "cloud", which one?

How many "clouds" will I have to deal with?

What happens tomorrow?

