



# Water Heaters and the Grid – Policy Considerations

Keith Dennis, PE  
Senior Principal  
End-Use Solutions and Standards  
Energy and Power Division



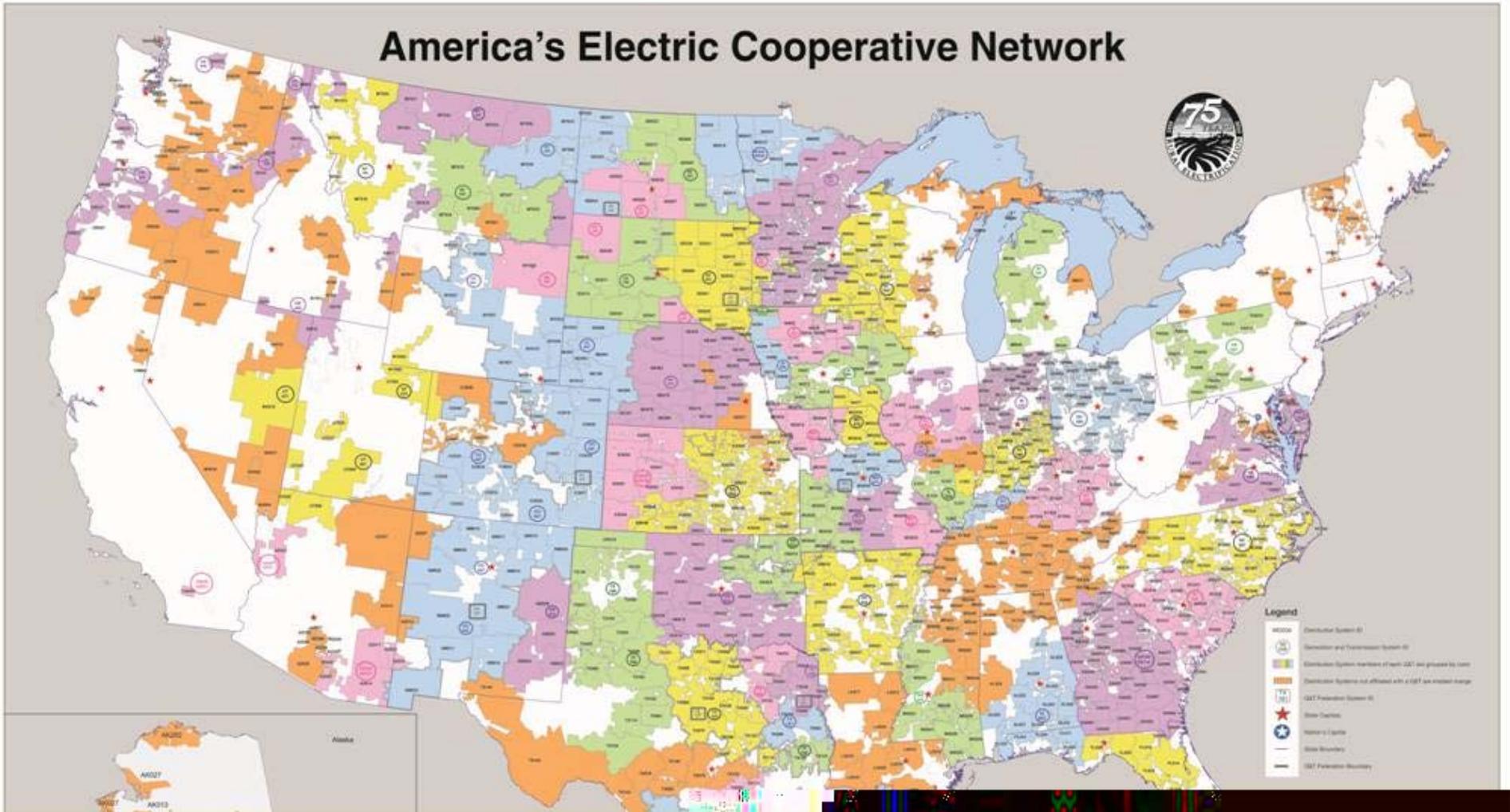
**NRECA**

A Touchstone Energy® Cooperative 

# NRECA Overview

- Not-for-profit, national service organization representing over 900 not-for-profit, member-owned, rural electric cooperative systems.
- Serve 42 million customers in 47 states. NRECA estimates that cooperatives own and maintain 2.5 million miles or 42 percent of the nation's electric distribution lines covering three-quarters of the nation's landmass.
- Cooperatives serve approximately 18 million businesses, homes, farms, schools and other establishments in 2,500 of the nation's 3,141 counties.

# America's Electric Cooperative Network

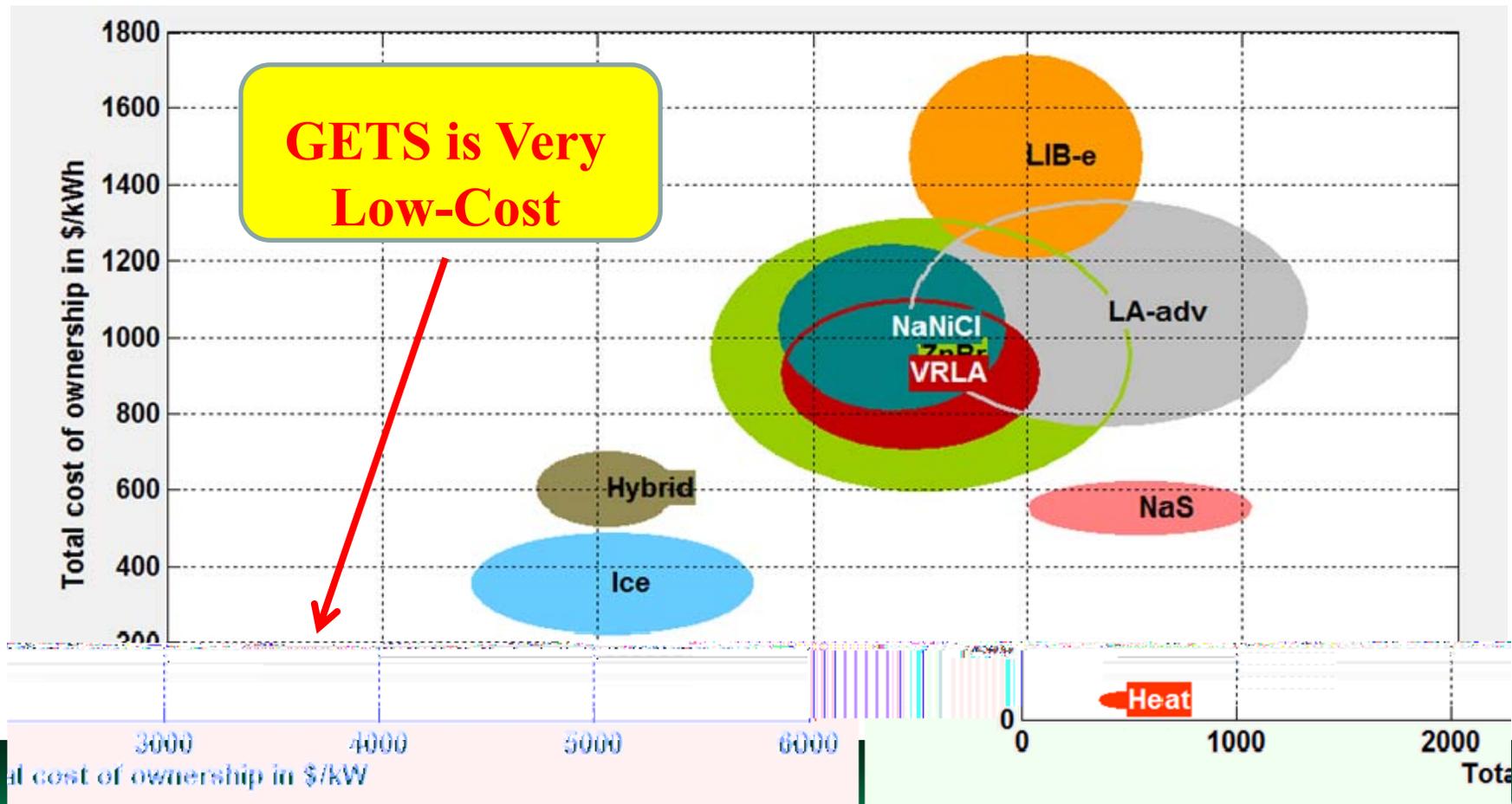


# Benefits of Cheap Storage of Non-Peak Energy

- ~250 co-ops in 35 states have large water load control programs, saving >500 MW of demand and \$100Ms for consumers
- There is great potential for more benefits if we can continue to store the renewable/efficient power generated at night that is curtailed or should be used more efficiently so we don't have to produce more peak power.
- There are **MANY** Federal policies that support the DR benefits and cheap energy storage
- **These programs conserve our natural resources and make the grid operate more efficiently.**

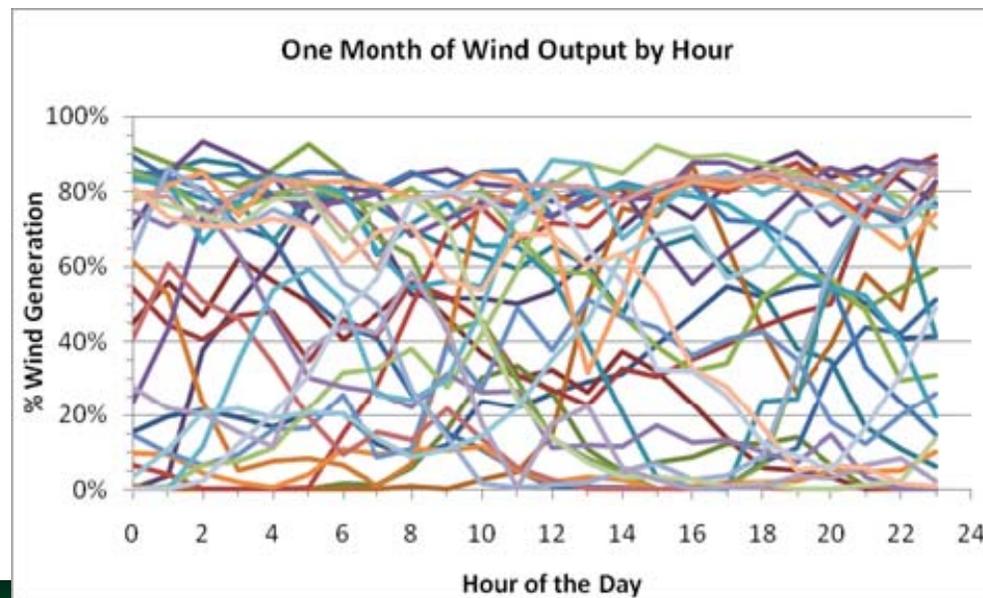
# The Most Cost-Effective Storage

- Not sexy, but has been reliable for decades and is cheapest solution available, and is **HERE!!!!**



# Thermal Storage, DR, and Load Control

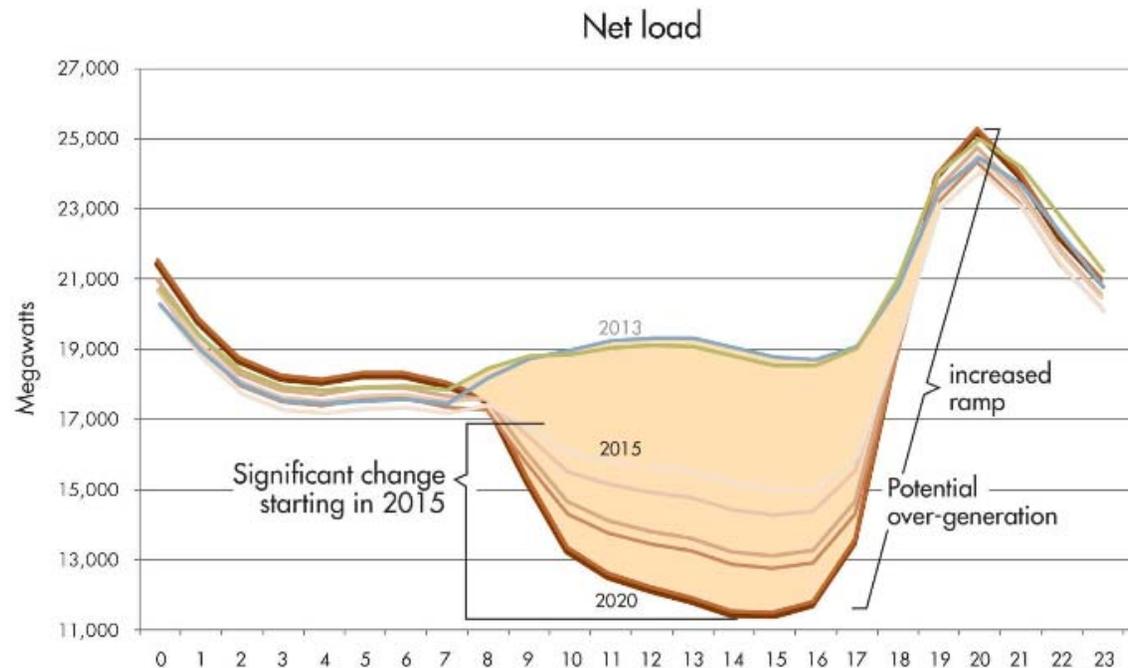
- Some DR cuts load when energy use is high or supply is low.
- Thermal storage can make use of energy when it is available and stores it for later – ***can cut use or add it.***
- Grid Interactivity can take it even further, with water heaters proving frequency response and acting like a peaker plant.



PJM 2012 Data

# Teaching the “Duck” To Fly

Growing need for flexibility starting 2015



-“1 million electric water heaters means that up to 4000MW of load could be dispatched as needed, and that up to 10,000MWh per day could be shifted as needed.” – RAP

- “Supercharging” smaller tanks is not necessary and brings unnecessary risks into the home, larger water heaters are not significantly less efficient.

# DOE Standards Timeline

- December 2009 DOE Issues Stds. NOPR
- April 2010 DOE Issues Stds. Final Rule
- June 2012 DOE issues RFI
- **February 2013** **DOE issues Waivers NOPR**
- March 2013 DOE holds public meeting on NOPR
- August 2013 Broad stakeholder group negotiates proposal for fix to issue
- June 2014 Steffes Corporation submits a request for exception with negotiated criteria
- Sept. 2014 DOE rejects Steffes' request on standing
- Nov. 2015 Vaughn Corporation submits a request for exception with negotiated criteria

# Legislation

- Provides for legal production of grid-enabled water heaters that are 75+ gallons in capacity, are at least 94% efficient, are equipped an activation lock, are labeled for use only in ETS/DR program.
  - The activation lock/key is a physical device directly on WH locked by default and contains a physical, software, or digital communication means that must be unlocked for the product to work.
- Includes provisions to allow DOE to specify communications capabilities on the WHs.
- Enforcement provisions making it illegal to activate devices, distribute keys inappropriately, or remove labels.
- **All advancing technology while preserving benefits of rule!**

# Legislative Path

## 113th Congress:

### *House:*

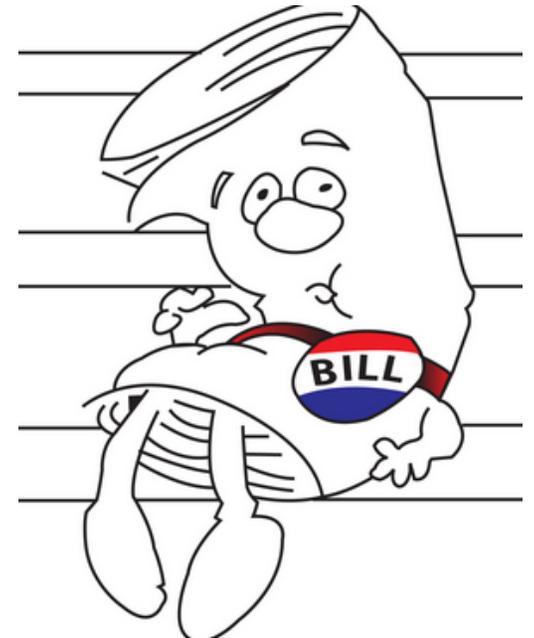
- Passed H.R. 2126, Small Efficiency Package with Water Heater Title March 5' 2014 (375-36)

### *Senate:*

- S. 1739 (Hoeven-Pryor), Standalone Water Heater Bill
- Shaheen-Portman (S. 2262), Comprehensive Efficiency Package
  - Failed cloture May 12, 2014 (55-36).
- **Lame Duck Session – Gridlock Stops H.R. 2126**

## 114th Congress:

- Portman Amendment to S. 1, a bill to approve Keystone XL
  - Passed 94-5
- House and Senate passed S. 1; expected Presidential veto
- S. 259 (Hoeven-Klobuchar), Senate Standalone Water Heater Bill
- H.R. 906 (Whitfield-Welch), House Standalone Water Heater Bill



# Reality Bites – Adaptation Strategies

With no solution from DOE or Congress, programs will be forced to (further) adapt, but that's not ideal:

- Higher temperatures provide scalding risk, mixing valves needed, and are unnecessary – just use a bigger efficient tank!
- Two tanks can work – solar thermal and geothermal and historic programs do this – but less efficient, more costly.
- Other more creative options – sub-optimal, we already have a great tool that is effective, proven, and efficient!

# If Relief Were Granted Today...

- Business case must make sense to manufacturers.
- Product design must be completed.
  - Activation key
  - Interface and load switches
  - New UL certifications
- Manufacturing lines must be retooled.
- New distribution channels must be established.
- Utility programs must be adapted.
- If DOE is involved, application processes must be developed and rules would need to be promulgated.
- ***This will all take time and effort – no solution is business as usual.***

**April 16, 2015 is Approaching!**

