

# Water Heaters and the Grid – Policy Considerations

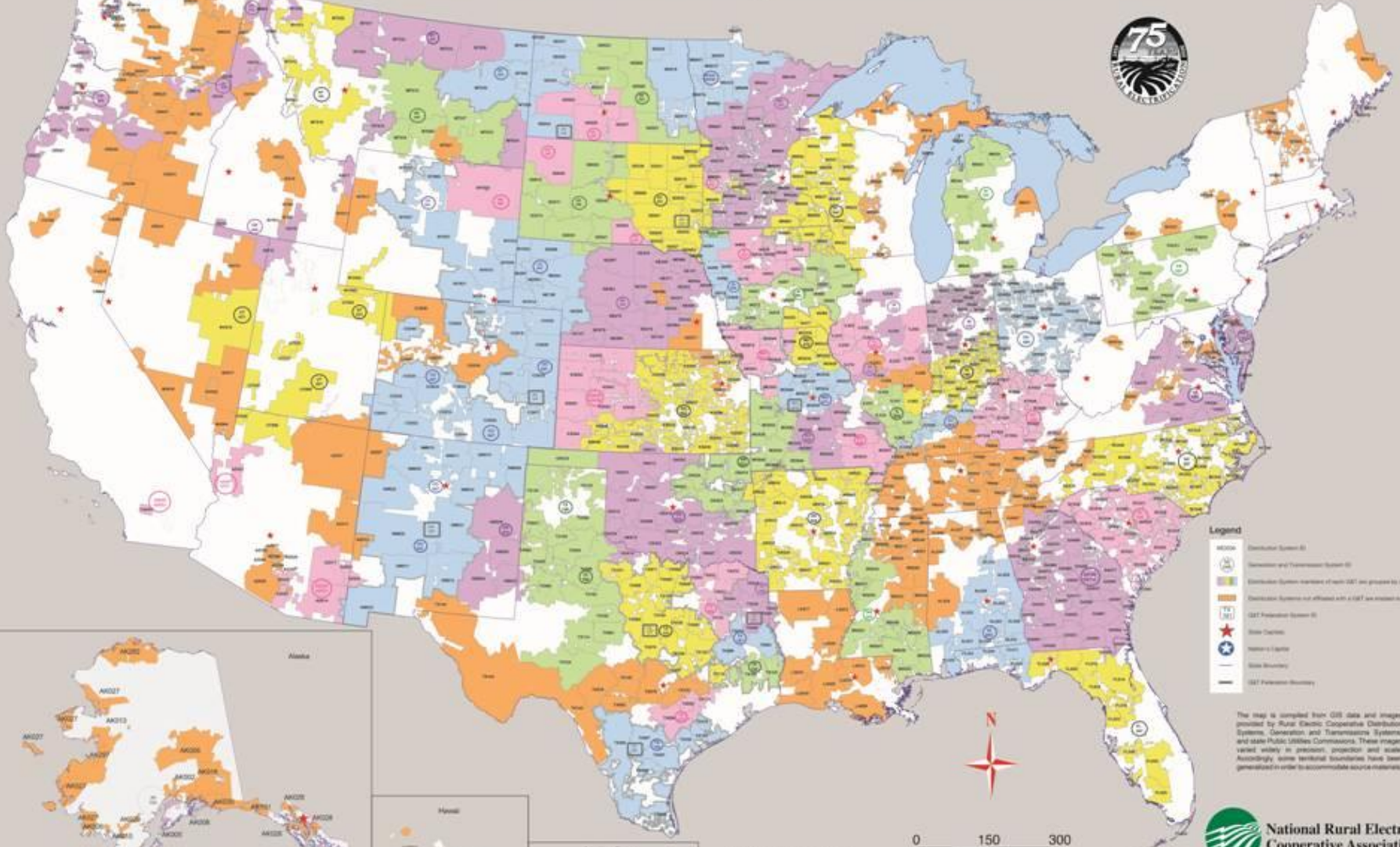
Keith Dennis, PE  
Senior Principal  
End-Use Solutions and Standards  
Energy and Power Division



# 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



- Legend**
- Distribution System ID
  - Generation and Transmission System ID
  - Distribution Systems members of their DSE are grouped by color
  - Distribution Systems not affiliated with a DSE are shown in orange
  - DSE Population System ID
  - State Capitals
  - Major Cities
  - State Boundary
  - DSE Population Boundary

The map is compiled from GIS data and images provided by Rural Electric Cooperative Distribution Systems, Generation and Transmission Systems, and state Public Utilities Commissions. These images varied widely in precision, projection and scale. Accordingly, some territorial boundaries have been generalized in order to accommodate source materials.



Cartographic design by Louise Williams  
 Strategic Analysis Unit, NRECA  
 4321 Wilson Blvd  
 Arlington, VA 22203-1800  
 703-967-8800  
 www.nreca.org

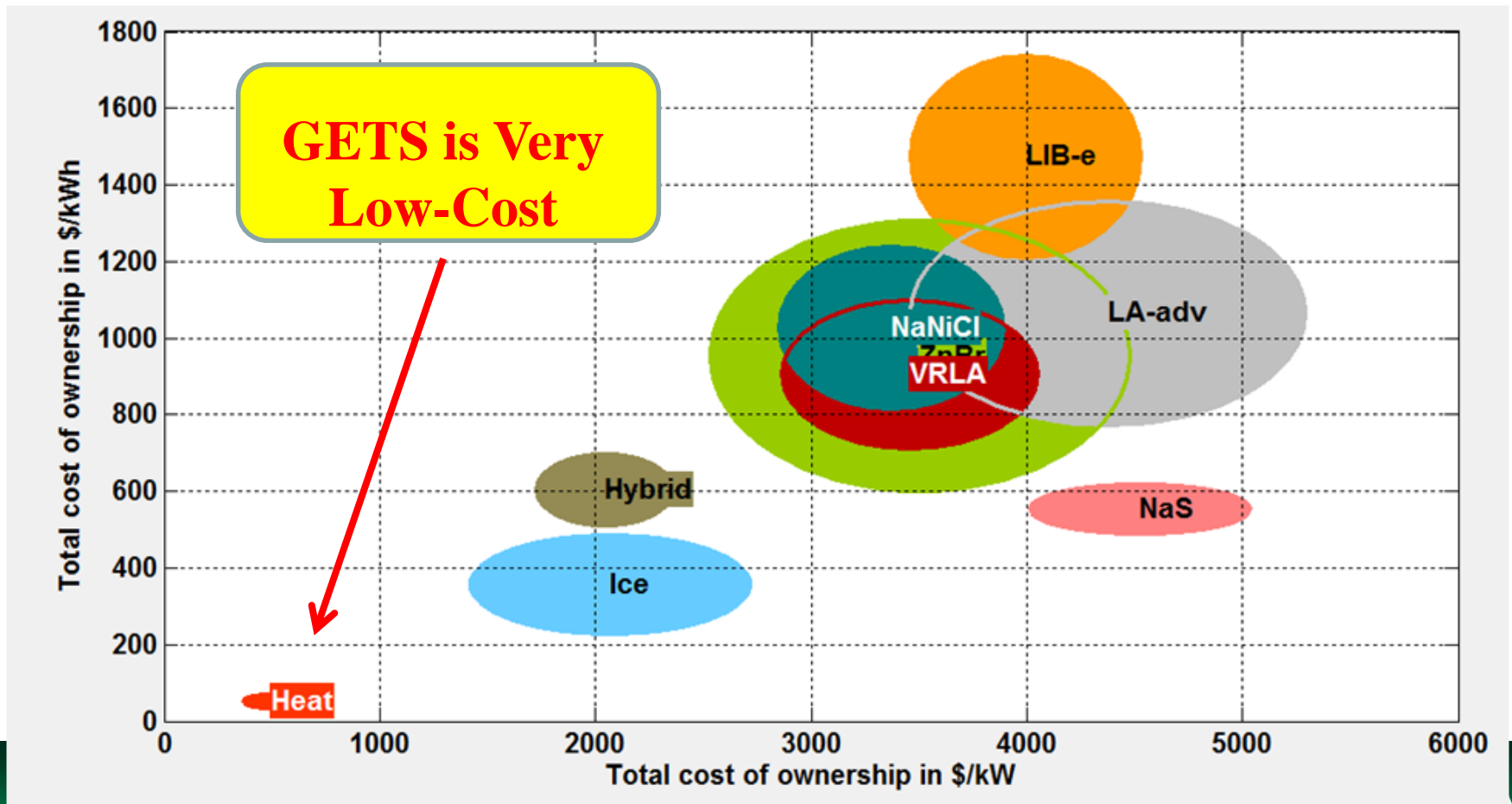


# Benefits of Cheap Storage of Non-Peak Energy

- ~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.**

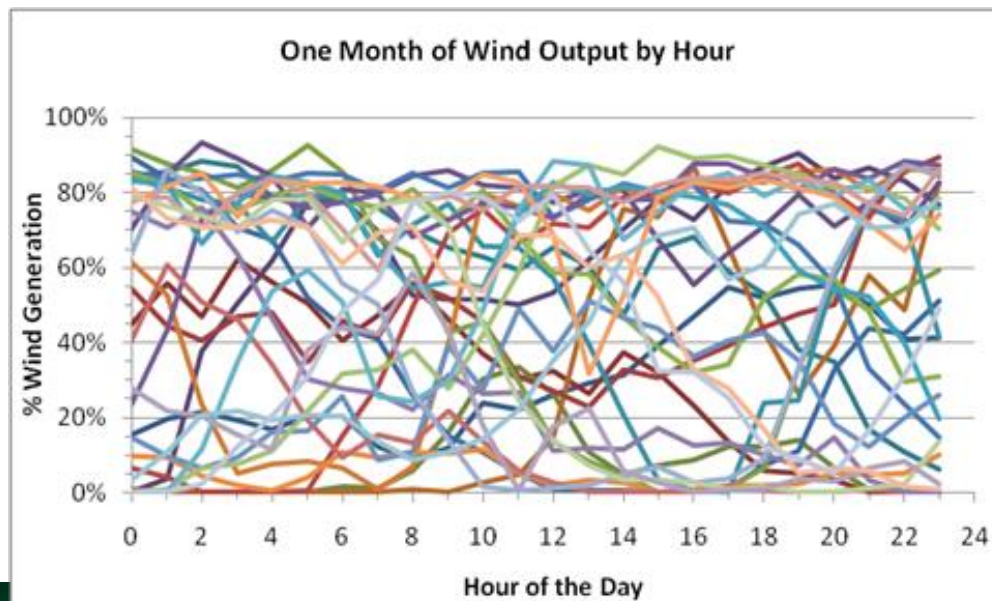
# The Most Cost-Effective Storage

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



# Thermal Storage, DR, and Load Control

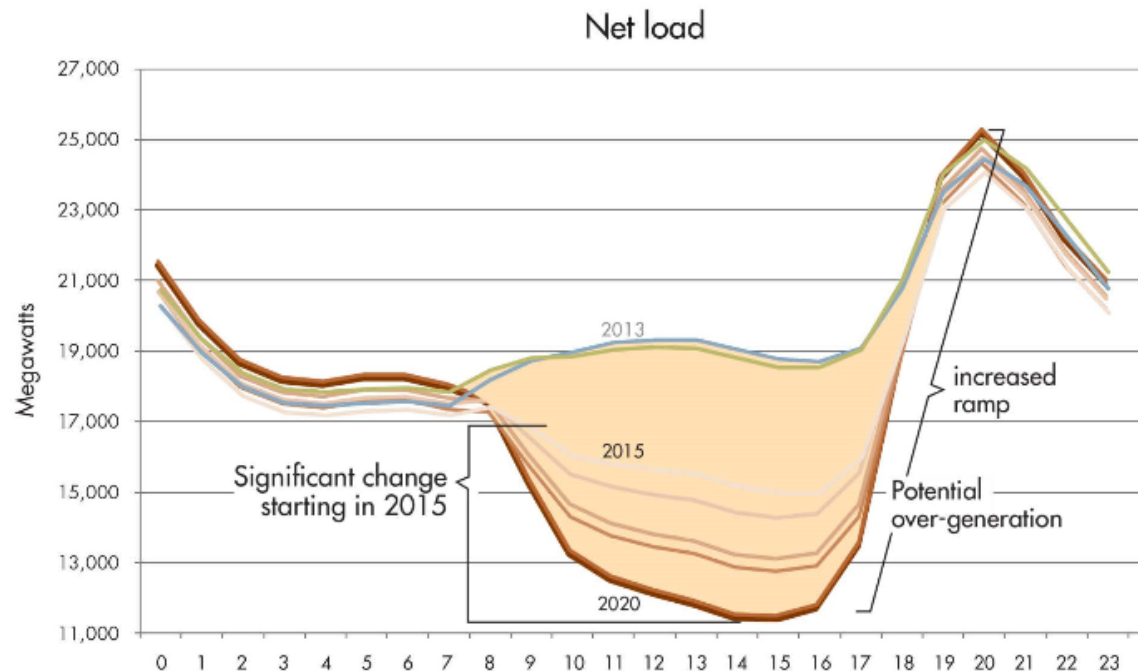
- Some DR cuts load when energy use is high or supply is low.
- Thermal storage can make use of energy when it is available and stores it for later – ***can cut use or add it.***
- Grid Interactivity can take it even further, with water heaters proving frequency response and acting like a peaker plant.



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:*

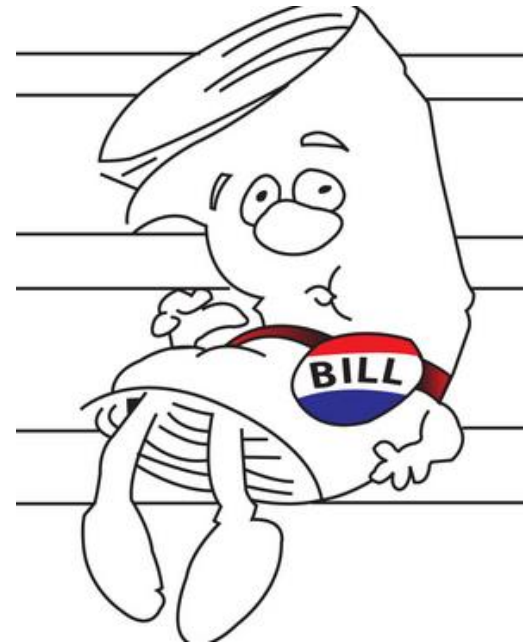
- Passed H.R. 2126, Small Efficiency Package with Water Heater Title March 5' 2014 (375-36)

### *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!

