Data & Opportunities in the Smart Home

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Northeast Energy Efficiency Partnerships (NEEP)

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About NEEP

"Assist the Northeast and Mid-Atlantic region to reduce building sector energy consumption 3% per year and carbon emissions 40% by 2030 (relative to 2001)"

Mission

We seek to accelerate regional collaboration to promote advanced energy efficiency and related solutions in homes, buildings, industry, and communities.

Vision

We envision the region's homes, buildings, and communities transformed into efficient, affordable, low-carbon, resilient places to live, work, and play.
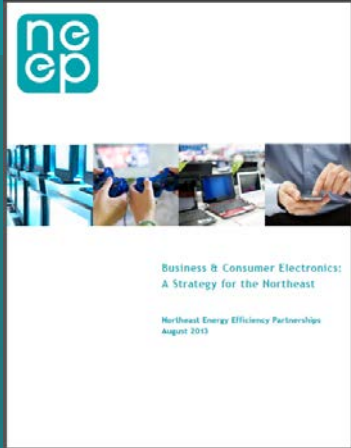
Approach

Drive market transformation regionally by fostering collaboration and innovation, developing tools, and disseminating knowledge

One of six REEOs funded in-part by U.S. DOE to support state and local efficiency policies and programs.
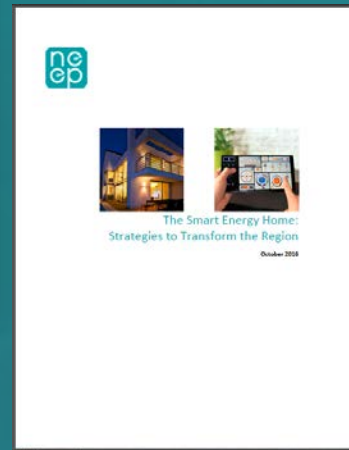
NEEP's background in the Smart Energy Home

2013

+

2014

Product List
2015

2016

Briefs and Trainings:
- Claiming Savings from Smart Thermostats: Guidance Document,
- The Smart Energy Home and Cross-Promotional Opportunities in Energy Efficiency,
- The Smart Home Interface: A Tool for Comprehensive Residential Energy Efficiency
- The Contractors Guide to the Smart Home

2017

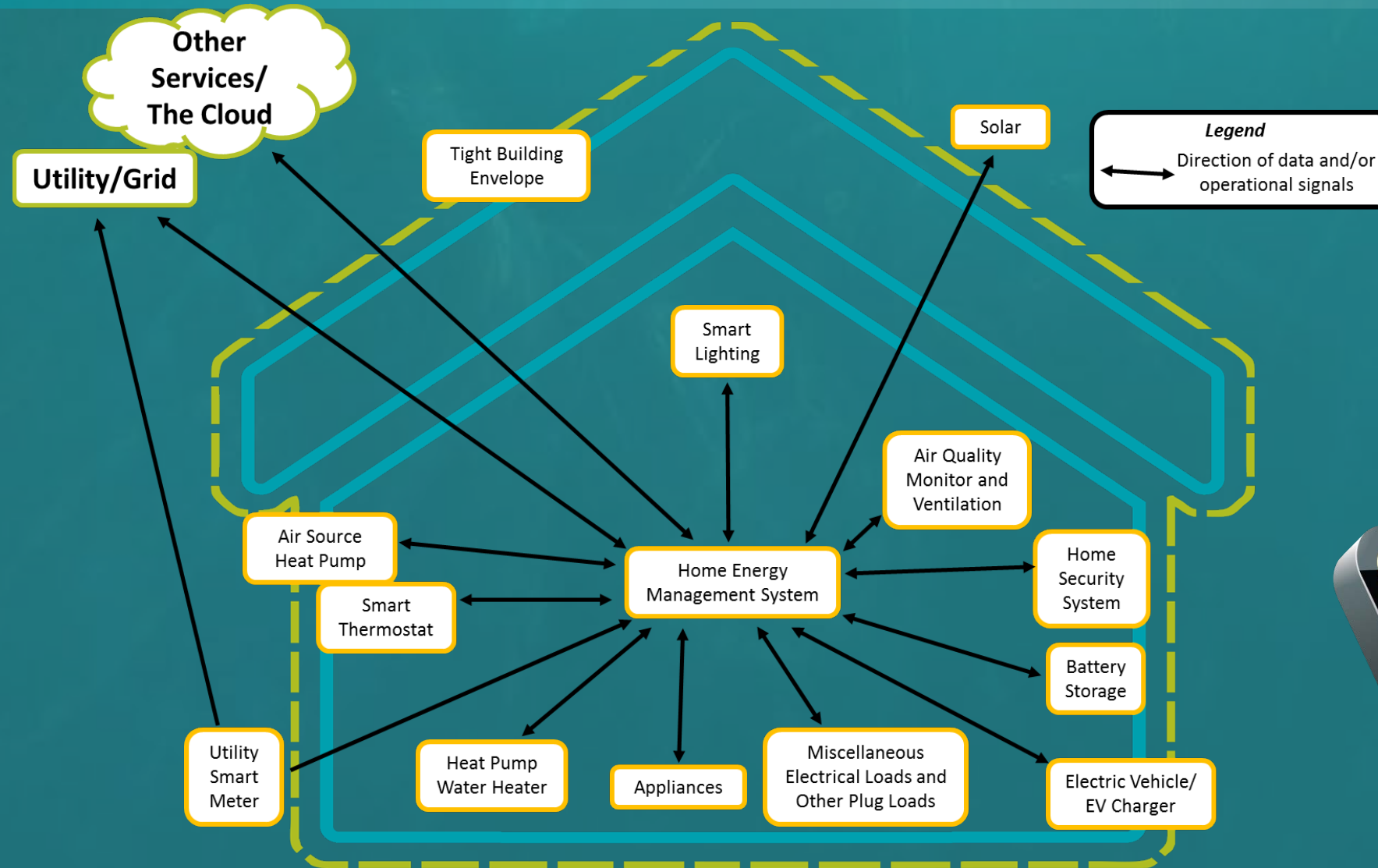**Smart Energy Home to Drive Building Decarbonization** (whitepaper forthcoming)
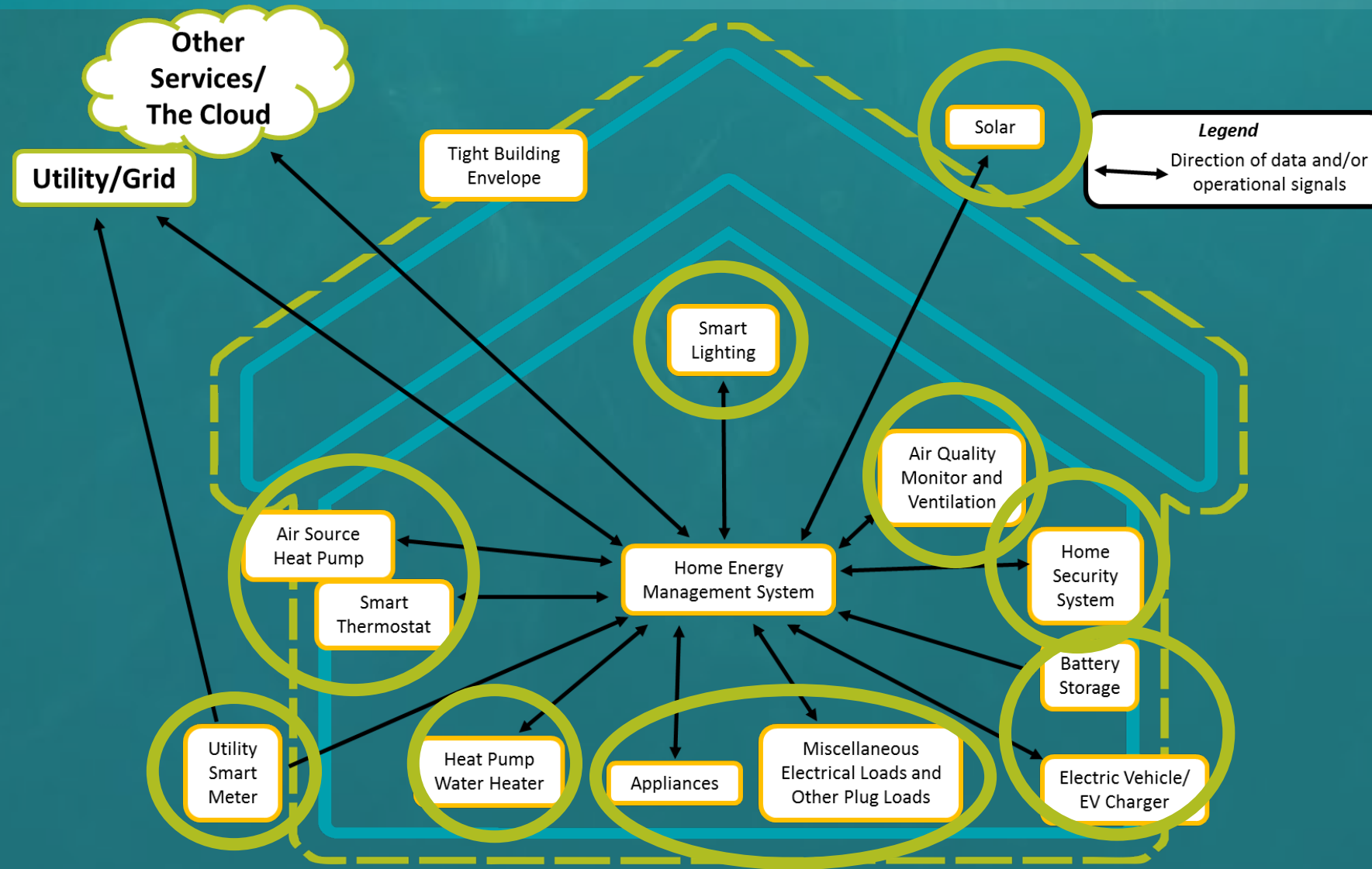
2018

2019

What is the Smart Energy Home?

- Bringing together the elements of a smart home, DERs, utlity needs of the future, and strategically electrified end-uses for a low carbon grid

Other Services/ The Cloud

Utility/Grid

Tight Building Envelope

Solar

Legend
← → Direction of data and/or operational signals

Smart Lighting

Air Quality Monitor and Ventilation

Air Source Heat Pump

Home Energy Management System

Home Security System

Smart Thermostat

Battery Storage

Utility Smart Meter

Heat Pump Water Heater

Appliances

Miscellaneous Electrical Loads and Other Plug Loads

Electric Vehicle/ EV Charger

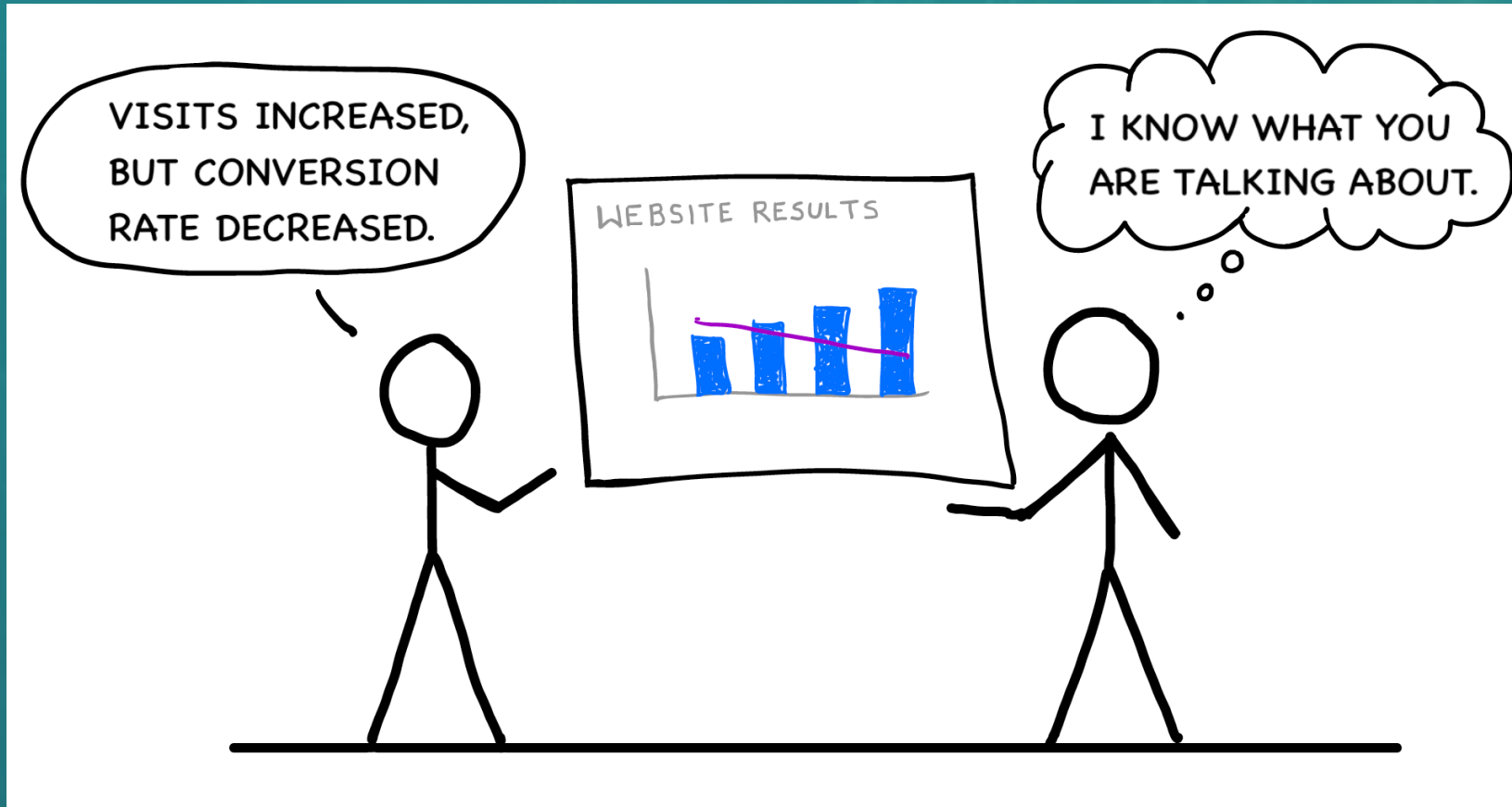WORK IN PROGRESS

Data in the Smart Energy Home

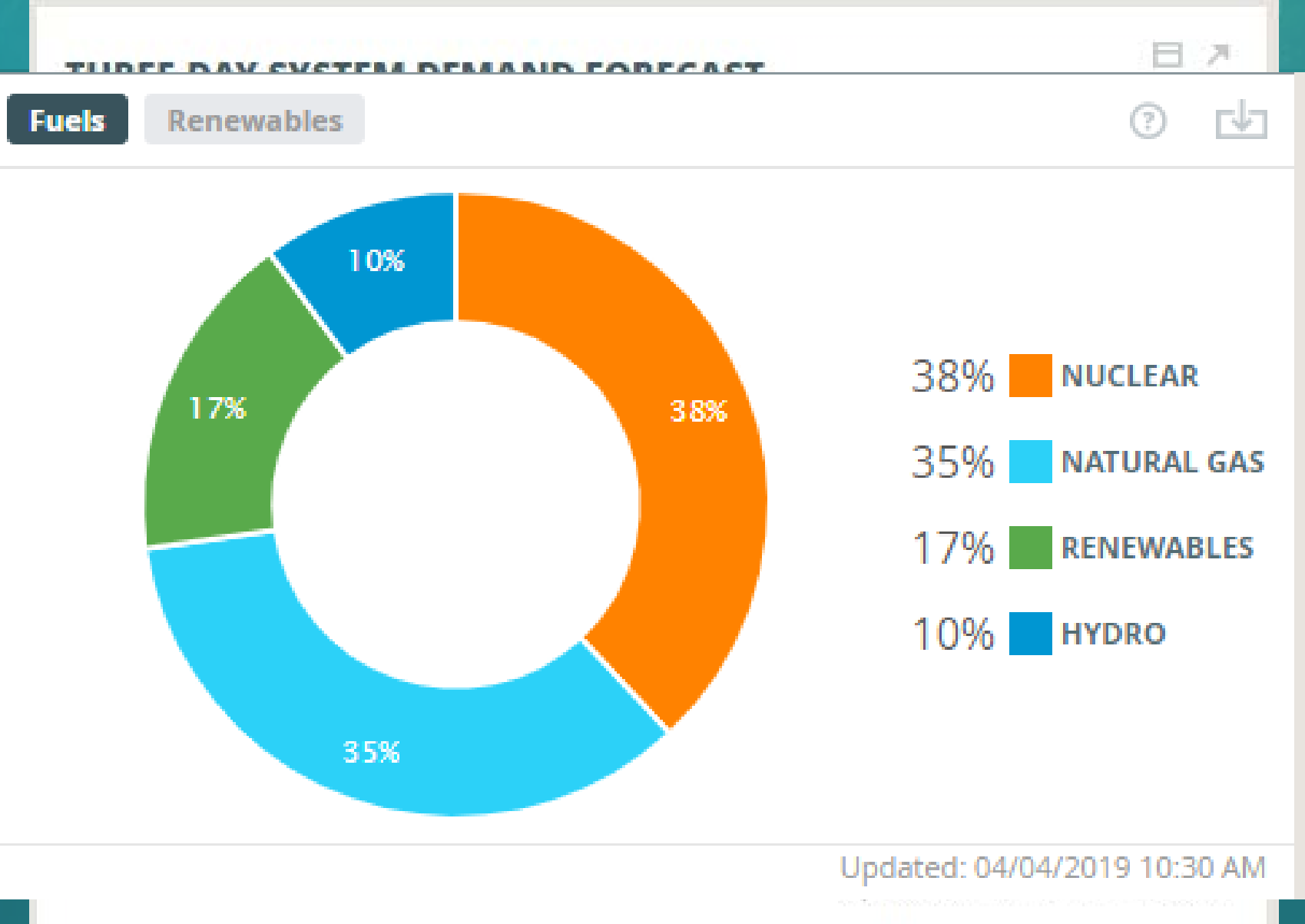- Lots of sources of Data for many purposes

4

But First...

What do we even mean by data? And what do we really need?

- Security vs. Privacy
- Raw vs. Processed
- Open vs. Secret Sauce
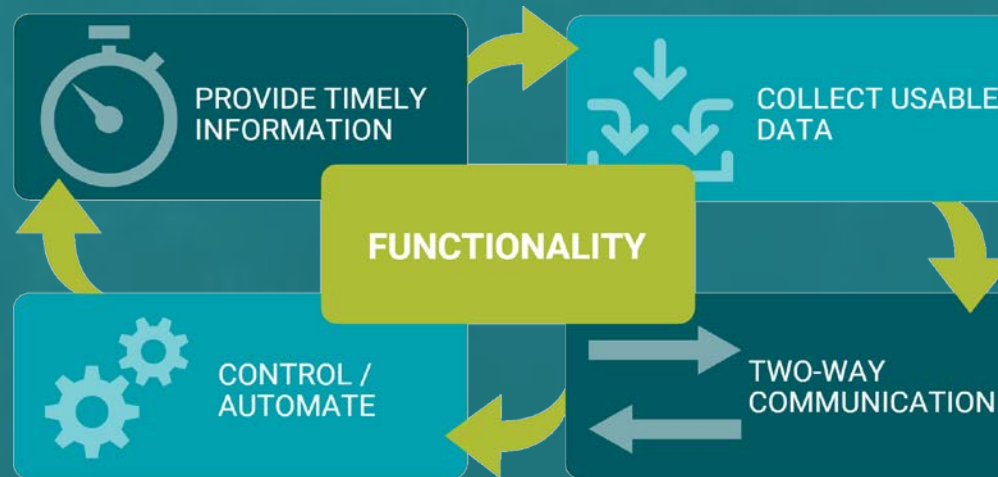- Data literacy
- Data vs. knowledge

Data to Action?

Definition: What is *Smart*??

- (my definition) "smart": have a chip/connection, and a mechanism to know what to do with it!

- Ideally, smart devices have this functionality:

- Most importantly, they can send "data" and signals about their operations as well as receive and interpret signals dictating their operations.

Putting Data to use from the Smart Energy Home
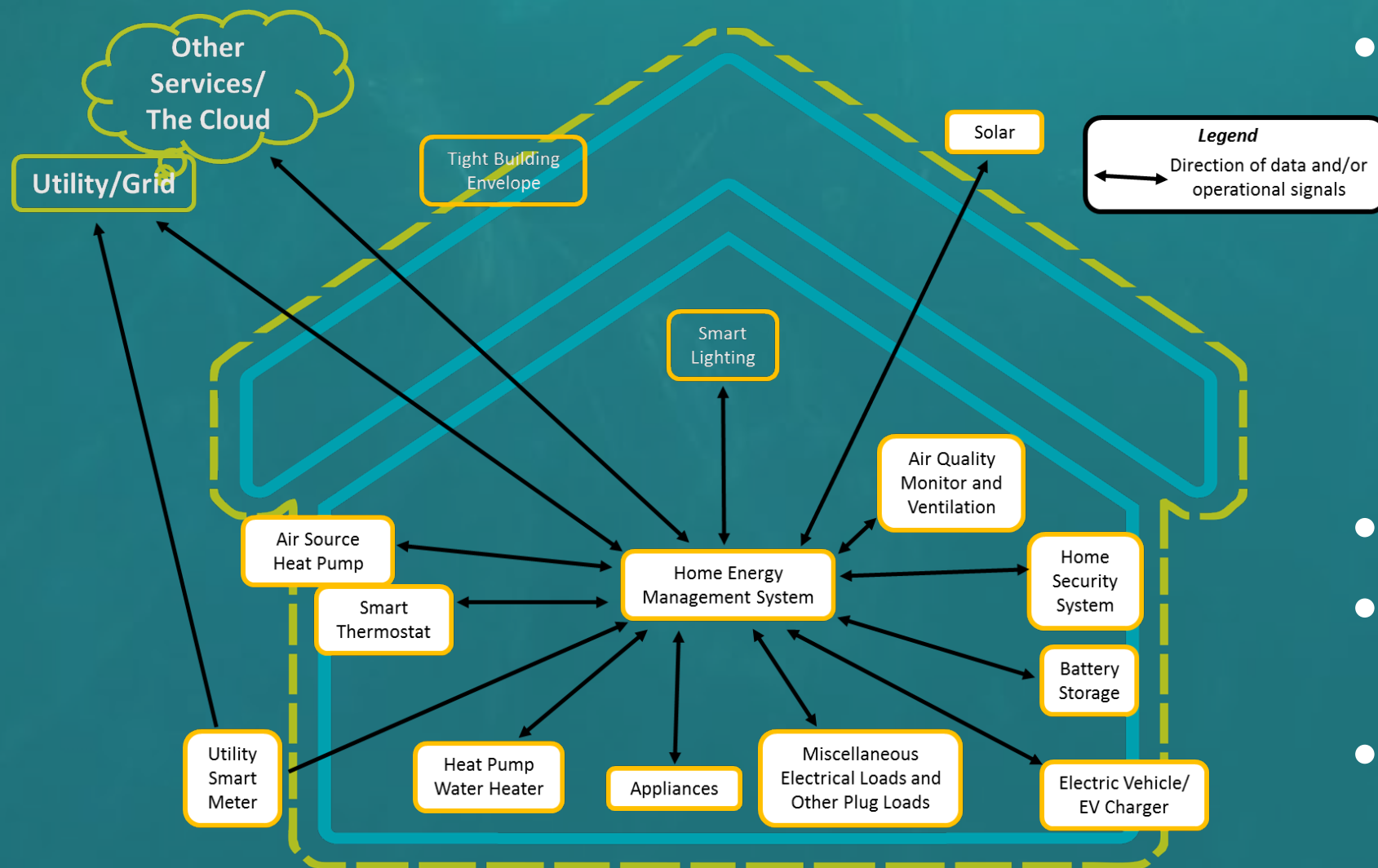
- Lots of sources
- Practitioner benefits
  - Engaging with customers
  - Better understanding or work
  - Tracking longer term operations
- Improved performance
- System alerts *before* it fails
- EM&V improvements for programs

Example: Smart Thermostat Analytics Toolkit (STAT)
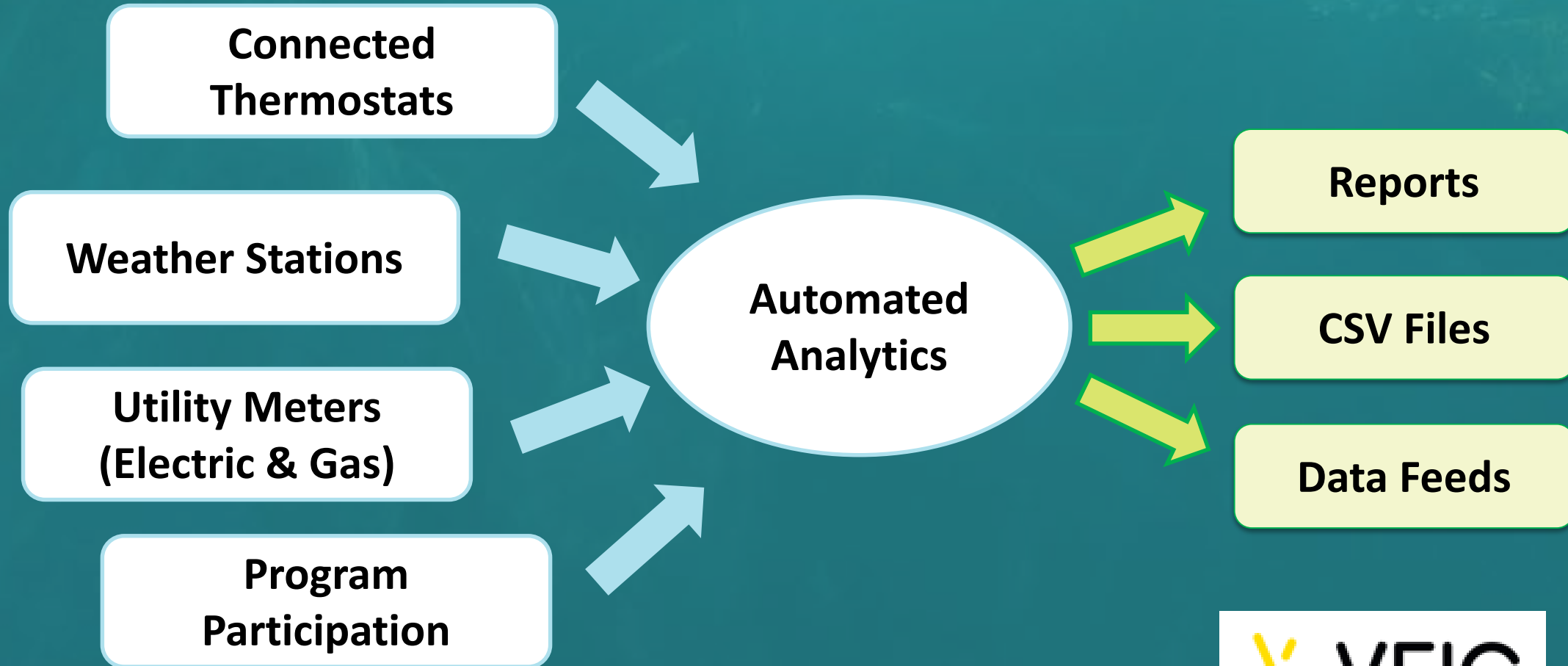
# Example: Fraunhofer Center Massachusetts Smart Thermostat

- 600+ homes

- Goal: Assess the feasibility of using smart thermostat data to perform a remote audit.

- Conclusion: for homes with one smart thermostat,
  - the whole-home R-value (insulation level, not air sealing) can be classified
  - the ACH50 (measures airflow) can be estimated

Example: Real Time Data Driven Measurement and Verification (M&V 2.0)

- CT pilot (funded by US DOE) with utilities, CT energy department, Lawrence Berkeley National Lab, and NEEP

- Looking to take large set of data from homes and run through advanced analytical tools to measure energy savings (from whole-home retrofits) and insights into program performance
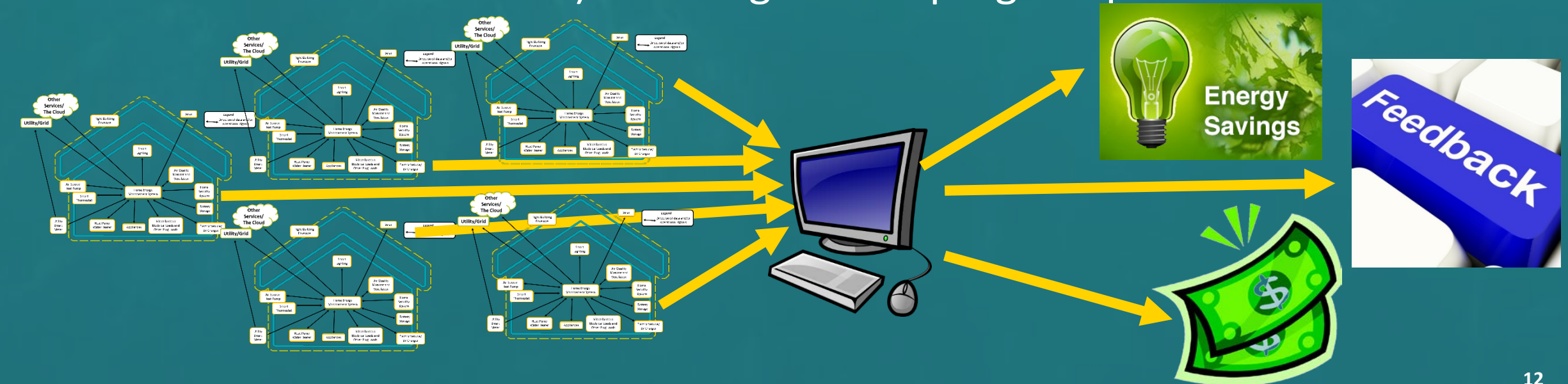
Another option for Claiming Savings from Smart Thermostats: Guidance Document

- Studies upon studies have showed that smart thermostats save energy.
  - BUT how much depends on HVAC types/age, tightness of home, climate zone, previous occupant behavior with thermostat, etc...
- ENERGY STAR's Specification changes the ballgame for Smart Thermostat
  - Standard metric that calculates the run-time reduction from smart thermostats in the field
- Using ENERGY STAR's methodology and metric tool, programs could negotiate with manufacturers to run the field data from a given state/sub-region (with a state-specific baseline?) to determine an appropriate savings level for utilities to claim.

Savings $

Want more? Smart Energy Homes: Driving Residential Building Decarbonization

The Smart Energy Home: Driving Residential Building Decarbonization

March 2019

- Available from:
  - https://neep.org/smart-energy-home-driving-residential-decarbonization
  - Public webinar slides/recording here
  - Had some great reviewers and contributors

- NEEP Staff
- Harsh Engineer
- ACEEE
- Cadmus
- CLEAResult
- Con Edison
- CT DEEP
- Daikin
- E Source
- Ecobee
- Efficiency Vermont
- Embertec
- Energy Futures Group

- Eversource
- Franklin Energy
- Fraunhofer
- Fujitsu
- Home Performance Coalition
- ICF
- LG
- Lockheed Martin Energy
- MEEA
- National Grid
- NREL
- NRDC

- NH PUC
- NYSERDA
- Optimal Energy
- Pacific Gas and Electric
- Panasonic
- Performance Systems Development
- United Illuminating
- U.S. DOE
- U.S. EPA
- WattTime
- WECC (now Slipstream)
- Xergy Consulting.

THANK YOU!

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