



# Building Towards a Smart, Strategically Electrified Future

David Lis, NEEP

Claire Miziolek, NEEP

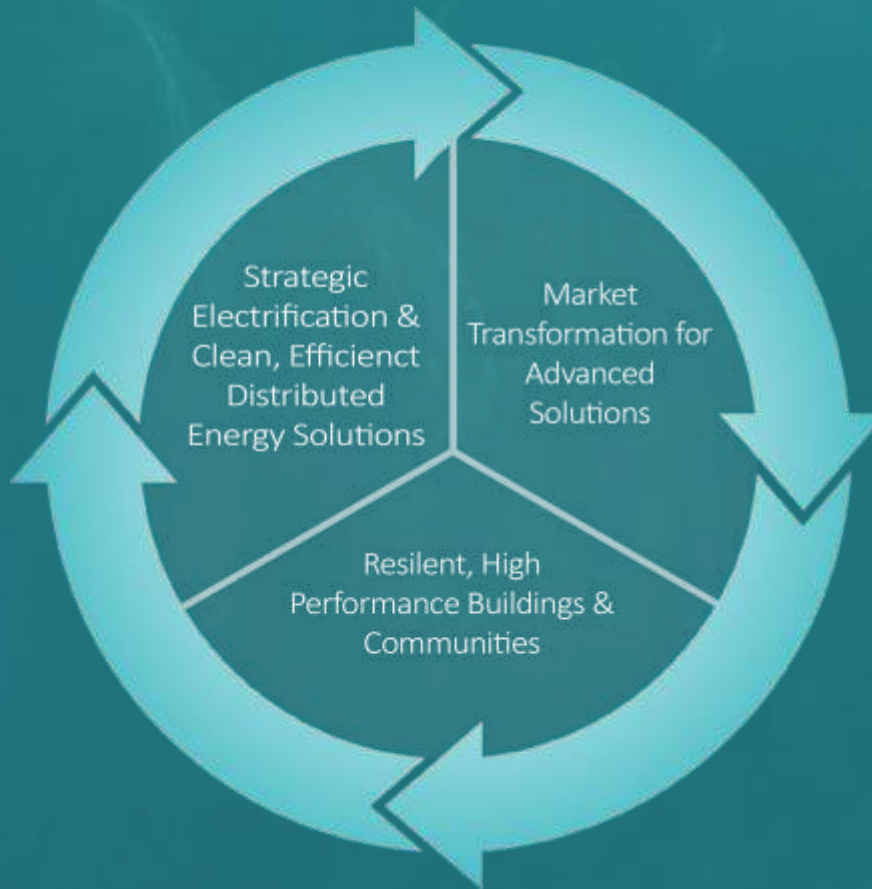


# NEEP's Next Generation Efficiency Strategic 2017-2019 Agenda



## Advanced Efficiency Leadership Network

*For 80% Carbon Reductions by 2050*



### NEEP Products & Services

**Events & Stakeholder  
Engagement**

**Research, Analysis,  
Reports, Case  
Studies**

**Regional Market  
Transformation  
Strategies**

**Technical Assistance  
& Web-based  
Resource Centers**

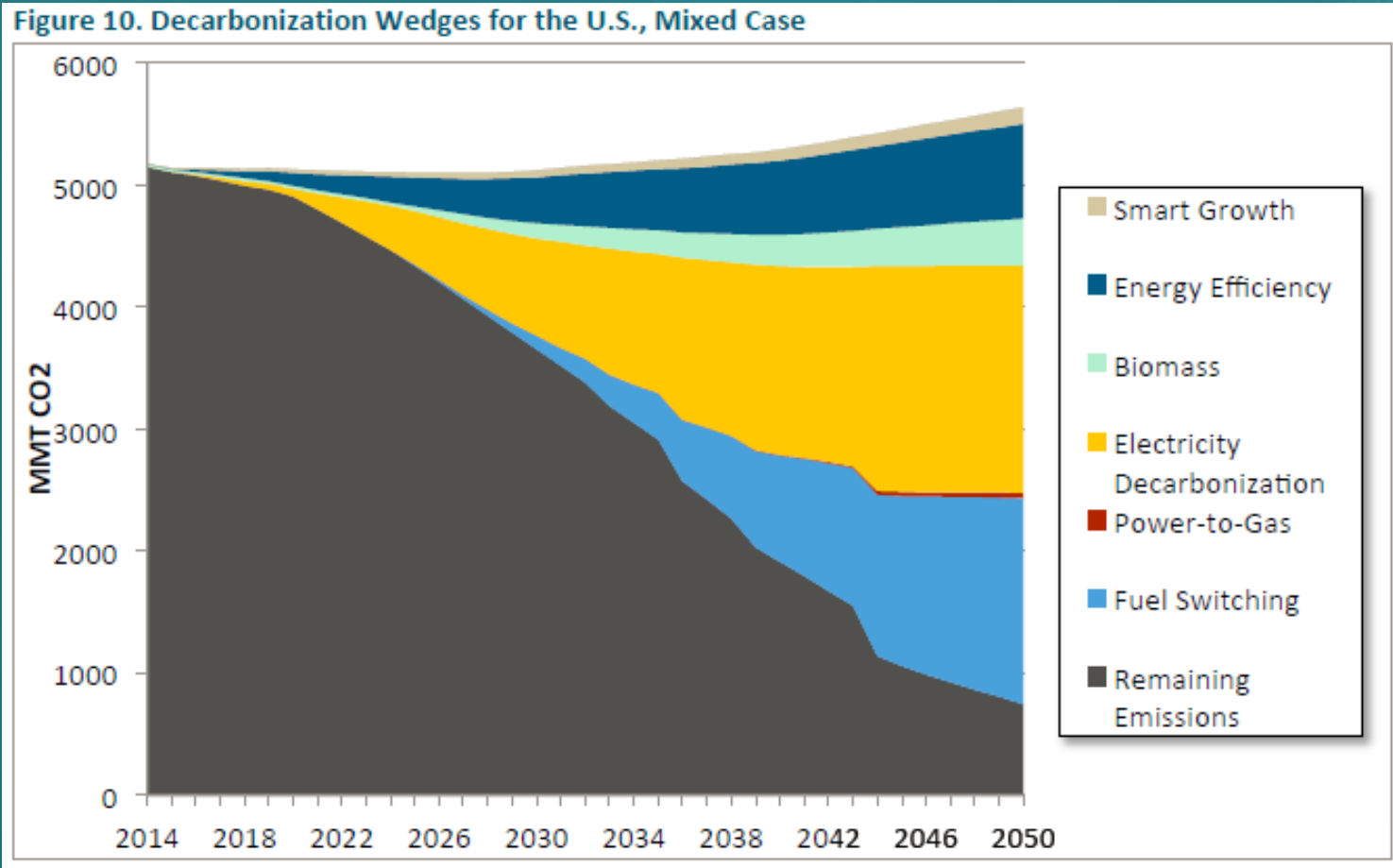
# Region's Aggressive Carbon Reduction Targets

*Table 1. Individual state decarbonization targets<sup>1</sup>*

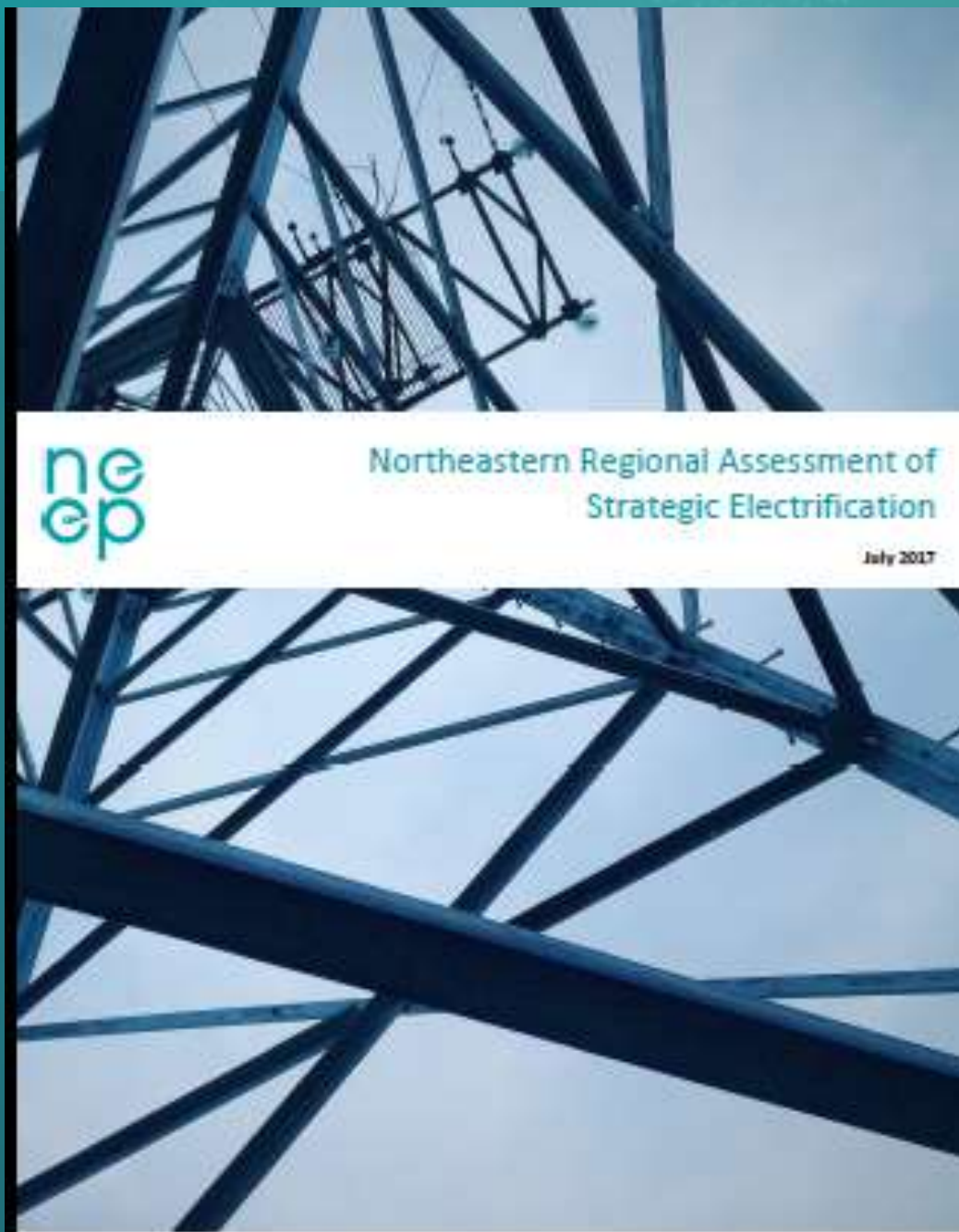
Connecticut	80% below 2001 levels by 2050
Maine	75-80% below 2003 levels in the long term
Massachusetts	80% below 1990 levels by 2050
New Hampshire	80% below 1990 levels by 2050
New York	80% below 1990 levels by 2050
Rhode Island	85% below 1990 levels by 2050
Vermont	75% below 1990 levels by 2050



# Aren't we on the path to 80% reductions?



Source: E3/LBNL/PNNL - Pathways to Deep Decarbonization in the United States (November 2014)



- Framing of the Issue
- Technology and Market Assessment
- Policy/Program Assessment
- Modeling of impacts
- Recommendations and Next Steps

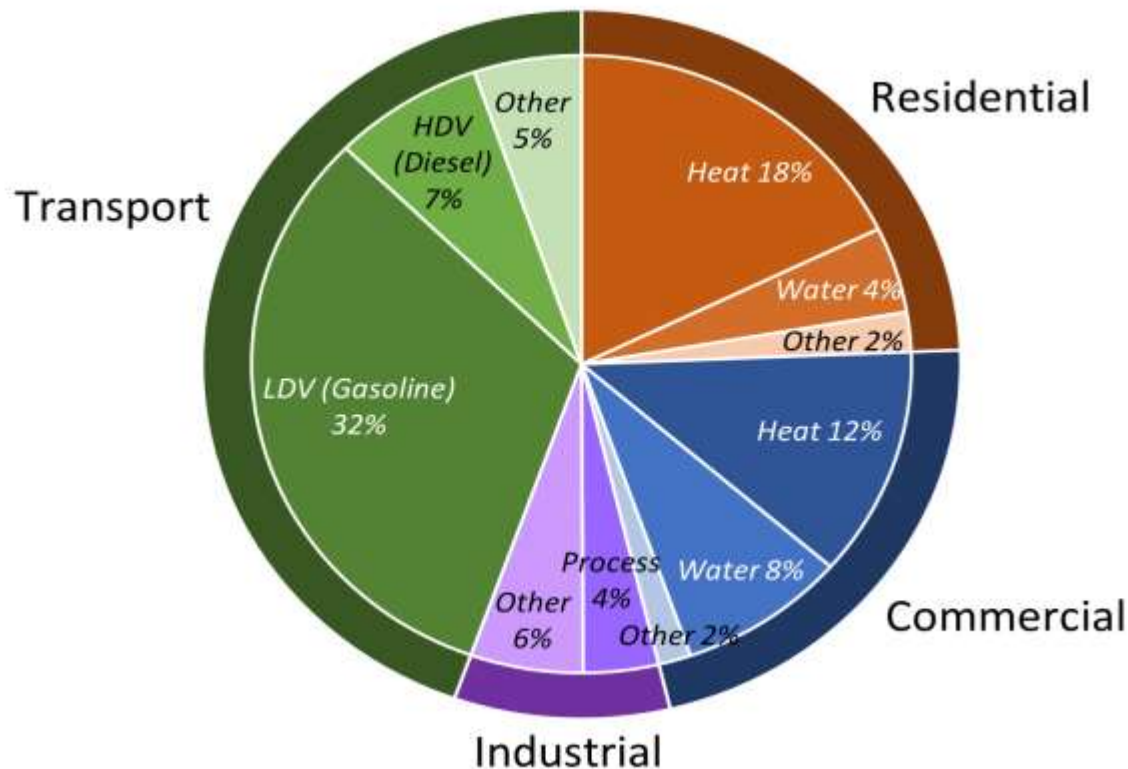
# “Strategic Electrification” means...

- powering end uses with electricity instead of fossil fuels
- in a way that increases energy efficiency and reduces pollution,
- while lowering costs to customers and society,
- as part of an integrated approach to deep decarbonization.

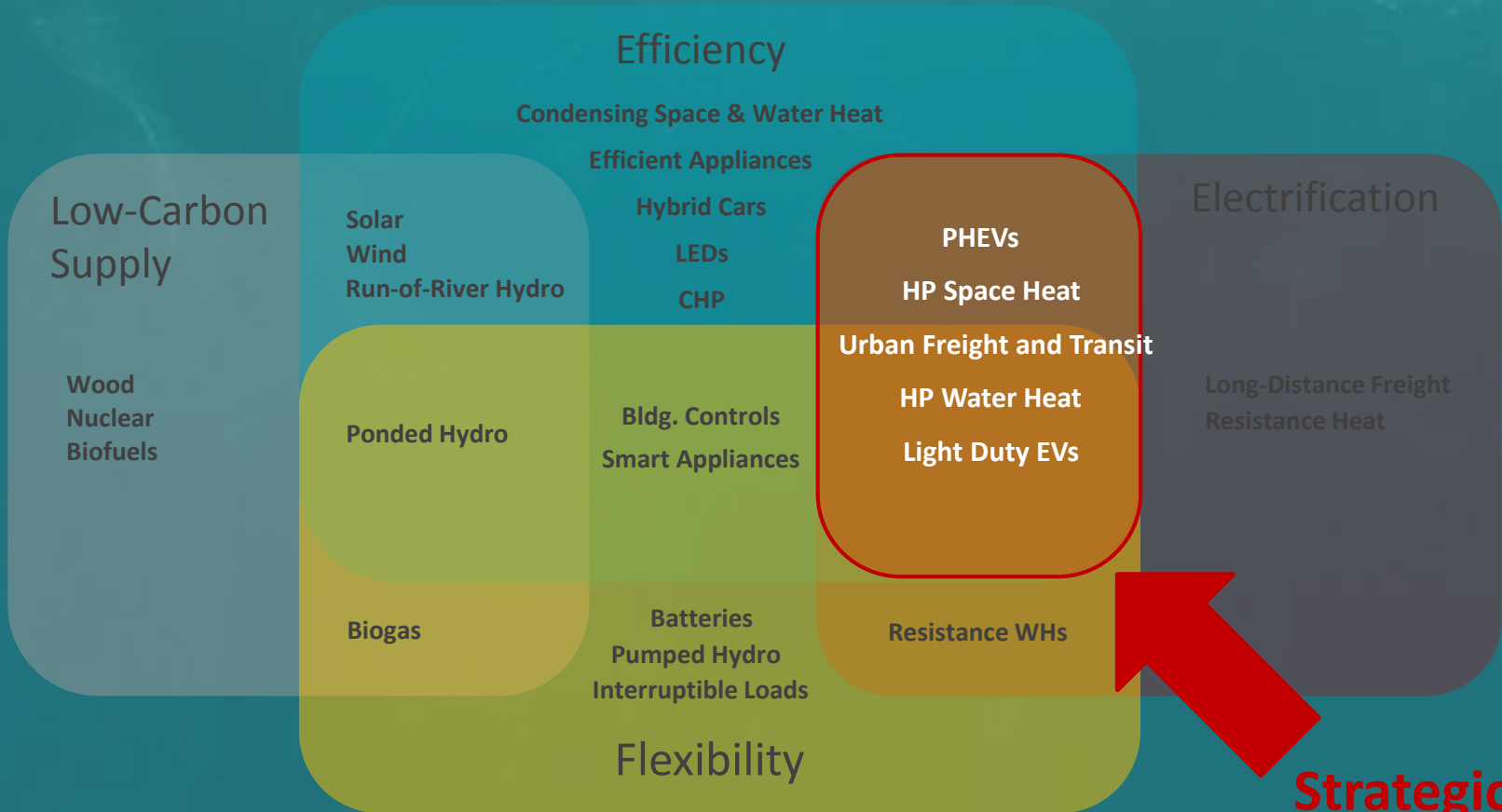
# Direct uses of Fossil fuels in New York and New England

4.2 Quadrillion BTUs per year of direct fossil fuel use

Residential end uses (including LDVs) make up ~50%



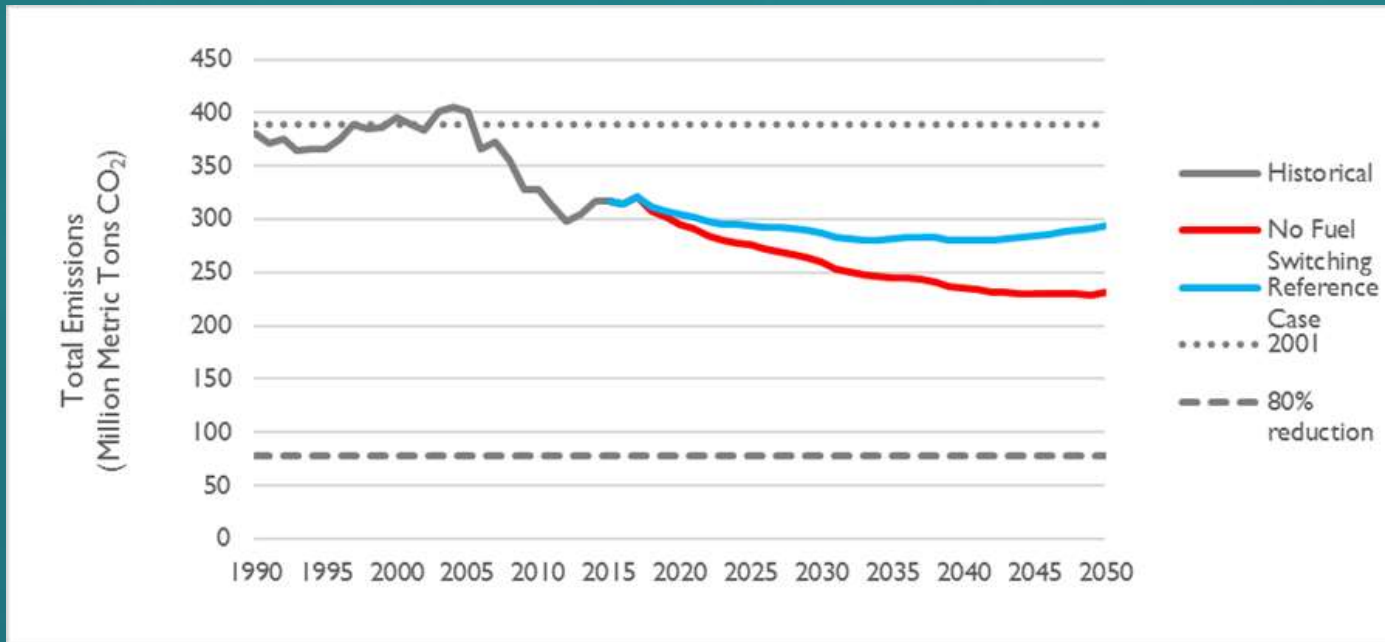
# Decarbonization context



**Strategic  
Electrification**



# Aren't we on the path to 80% reductions?

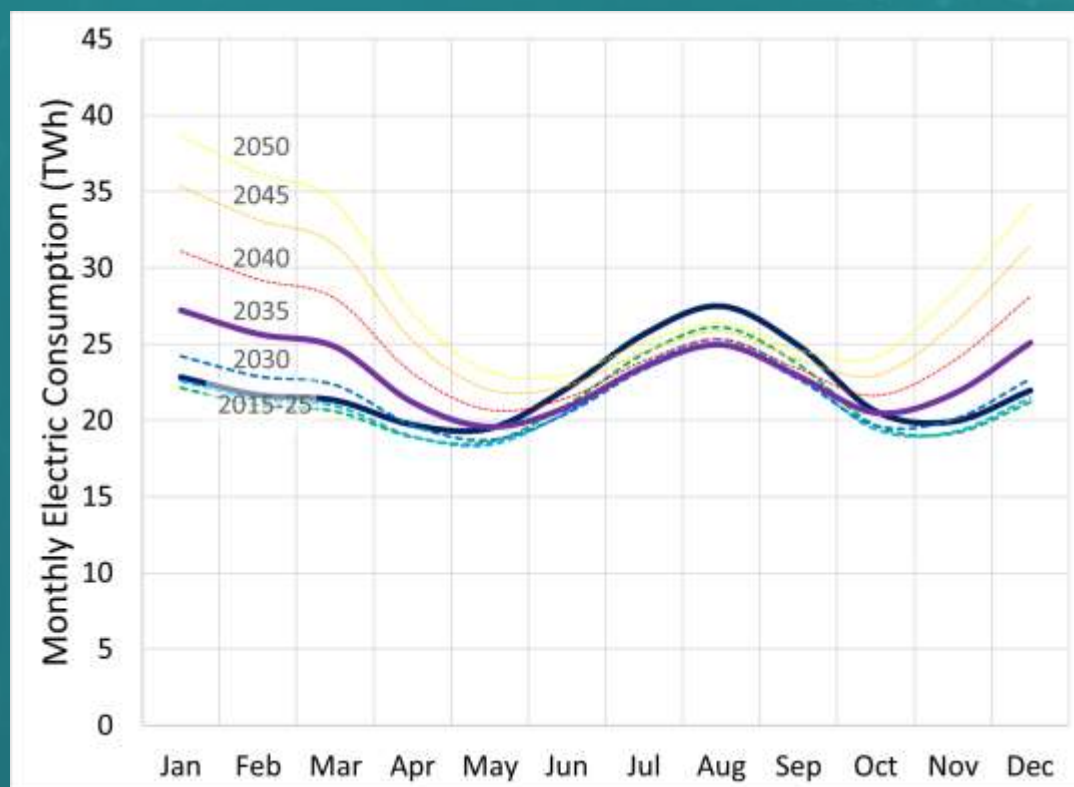


GHG  
reduction:  
41% below  
2001 levels

- Emissions are nearly *triple* the goal of 80% reduction
- Conclusion: New/3<sup>rd</sup> Strategy is necessary... Strategic Electrification

# Shifting seasonal load shape

- January consumption passes August in mid-2030s
- Need more than double the low-carbon electricity currently used in the region, biased toward winter
- One grid challenge: Reach and integrate new variable supplies



# What did the report and subsequent work highlight about HEMS?



1. Ability of residential loads to be “**flexible**” is crucial to the effective implementation of strategic electrification and deployment of renewables (grid and distributed)
2. **Value proposition** for home energy management will increase as states increasingly adopt strategic electrification policies/programs
3. **Thermal Efficiency** is an important lever to mitigate shift to winter peaks

# How the Smart Energy Home Plays into all this...



# Energy What is the Smart Home?



Have formal definition, but short answer is it's a wide umbrella:

- Software
- Hardware
- Energy Monitoring and Feedback
- Controlling end uses

Home Energy Management Systems (HEMS) enable the Smart *Energy* Home

# NEEP's History in this Space



2013



2014



2015



2016



Resource Guidance  
Concept Briefs  
Trainings  
and More!



2017

<http://neep.org/initiatives/high-efficiency-products/home-energy-management-systems>

<http://www.neep.org/business-consumer-electronics-strategy-northeast-2013>

<http://www.neep.org/smart-energy-home-strategies-transform-region>

<https://www.nysersda.ny.gov/-/media/Files/Publications/PPSER/Program-Evaluation/2016ContractorReports/Smart-Thermostat-Market-Charaterization-Report.pdf>

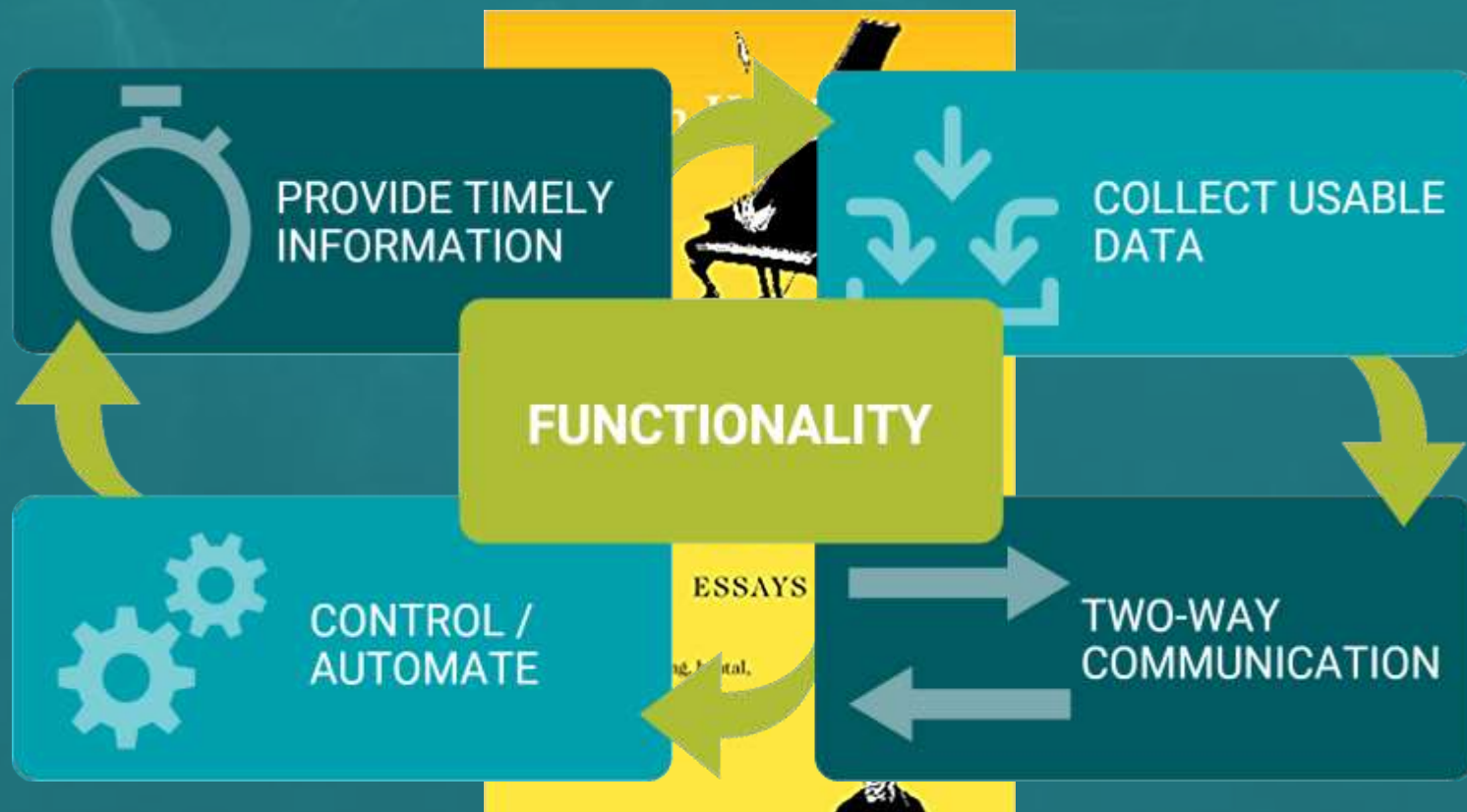
<http://www.neep.org/claiming-savings-smart-thermostats-guidance-document>

More resources coming soon to <http://neep.org/initiatives/high-efficiency-products/home-energy-management-systems>

# What Have we Learned?

No!

We know what we want a smart system to look like:



# Well that's great, but do HEMS save energy?



- Short answer: some.
- Long answer: it really depends
- Savings potential from HEMS:
  - Brand new data from recent NYSERDA pilot of 50 NY homes

**Table 3. Base-load Simulation Model Maximum Annual Savings Potential by End Use**

Smart Device	Electricity Savings (kWh/year)	Heating Fuel Savings (therms/year)	Cost Savings* (\$/year)	Assumptions
Smart Thermostat	688	52	\$174	No existing setback controls
Smart Outlets	341		\$58	15-minute occupied delay
Smart Lamps or Switches	212		\$36	Controls only
<b>Total HEMS Savings</b>	<b>1,241</b>	<b>52</b>	<b>\$268</b>	



# Do HEMS do more than save energy?

- Yes!
- Benefits from demand response, load shifting, and potential integration with DERS can be as big or bigger than energy savings

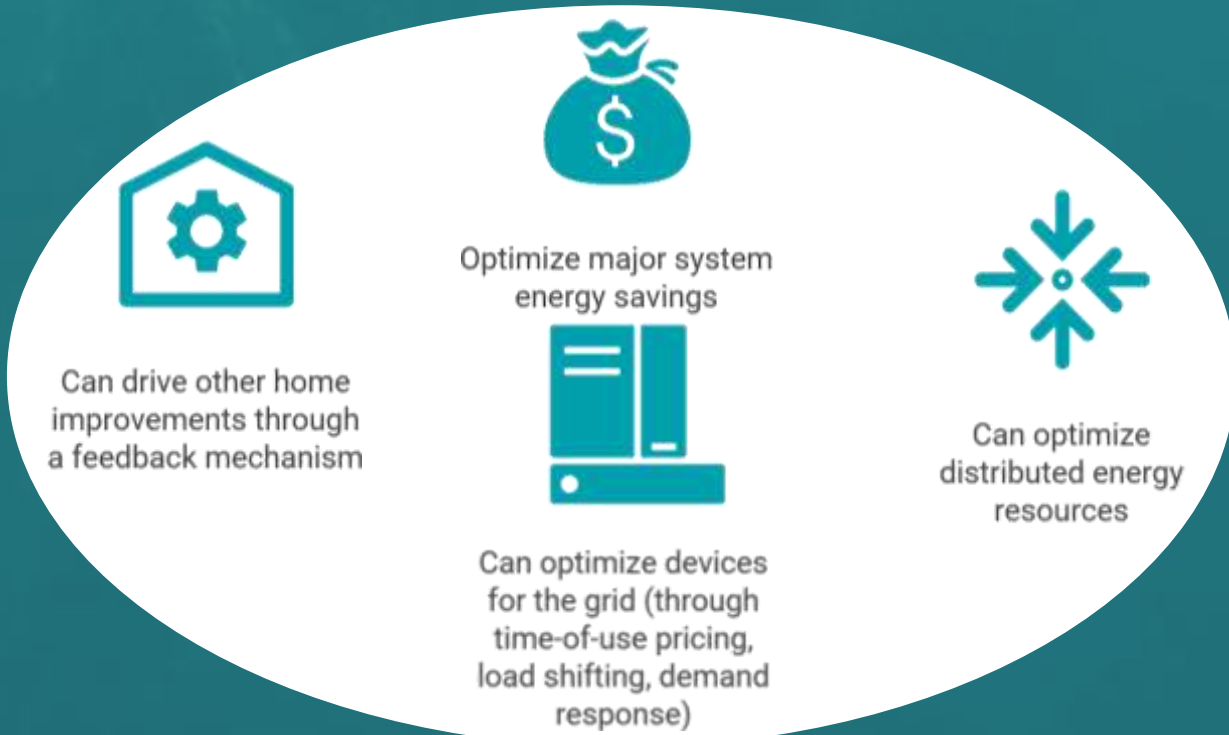
Smart Product	Energy savings	Demand response	Load shifting	DER integration
Smart Thermostat	Red	Orange	Orange	Yellow
Smart Water Heater	Red	Orange	Red	Red
Smart Appliances: Inflexible timing (refrigerators, stoves, ovens, small appliances)	Yellow	Yellow	Yellow	Yellow
Smart Appliances: Flexible timing (clothes dryers, clothes washers, dishwashers)	Yellow	Orange	Orange	Orange
Smart TV	Yellow	Orange	Yellow	Yellow
Smart plug, outlet, or switch	Orange	Orange	Orange	Yellow
Smart Hub	Yellow	Orange	Yellow	Yellow
In-Home Display	Orange	Orange	Orange	Yellow
Energy Portal	Orange	Orange	Yellow	Yellow
Smart Home Platform	Orange	Orange	Orange	Orange
Smart Lighting	Yellow	Yellow	Yellow	Yellow

# Led NEEP to our Regional Market Transformation Goal

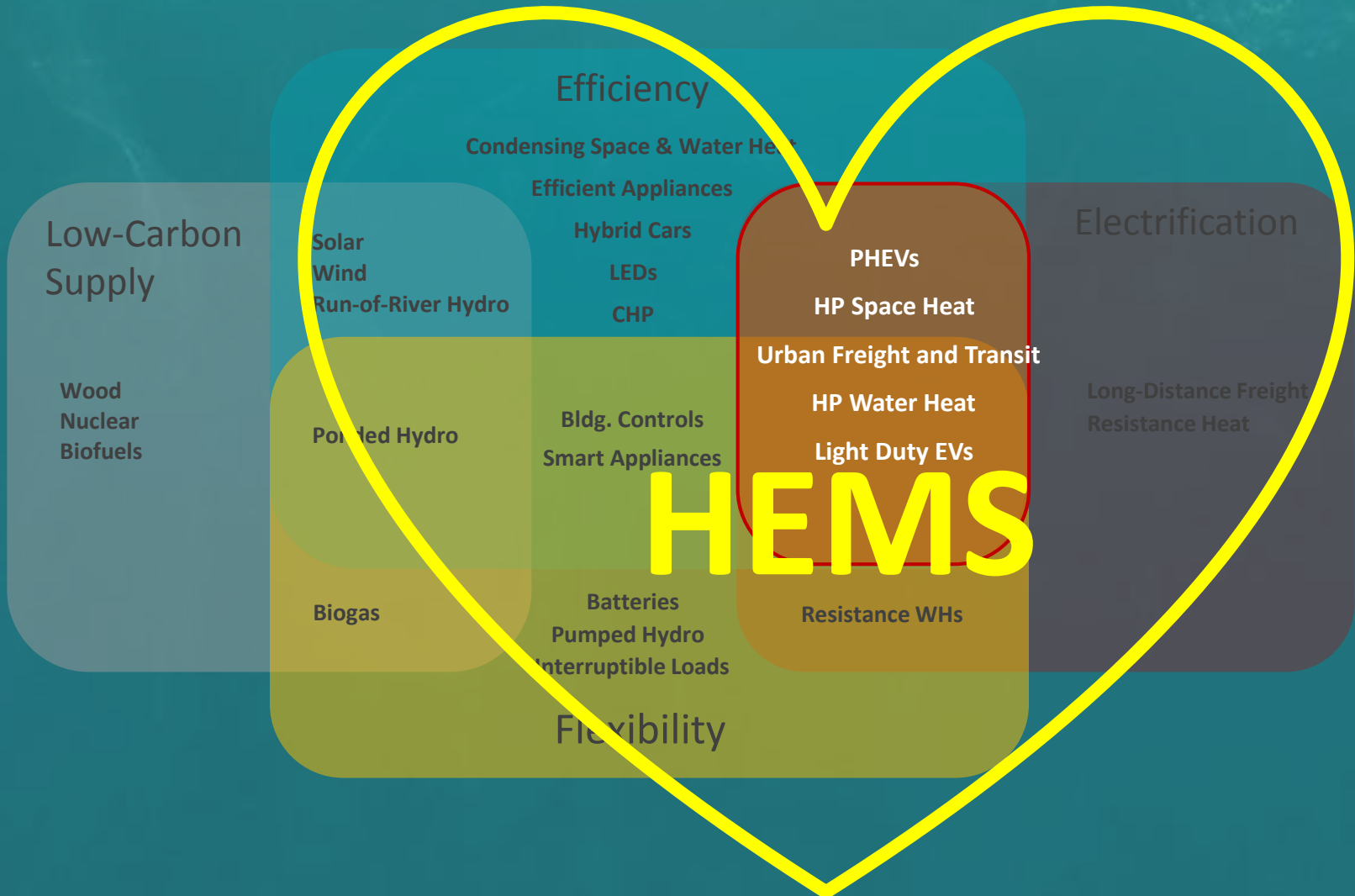


Truly smart homes will delight the resident and optimize the energy components of a home.

*Regional Goal:* By 2030, more than 50% of total homes (75% of new construction) in the Northeast and Mid-Atlantic have at least two “energy smart” major systems (HVAC, water heating, plug load). This means they:



# HEMS is poised to be that flexible, efficient, electric resources to help the residential sector achieve DEEP carbon savings



# QUESTIONS

