



# Pathways for Heat Sector Modernization: Technology Options for Decarbonizing Heat

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Northeast Energy Efficiency Partnerships

To: NGA Rhode Island In-state Retreat– January 28, 2020

Facilitating Heating Sector Transformation in Rhode Island

# Northeast Energy Efficiency Partnerships



## Mission

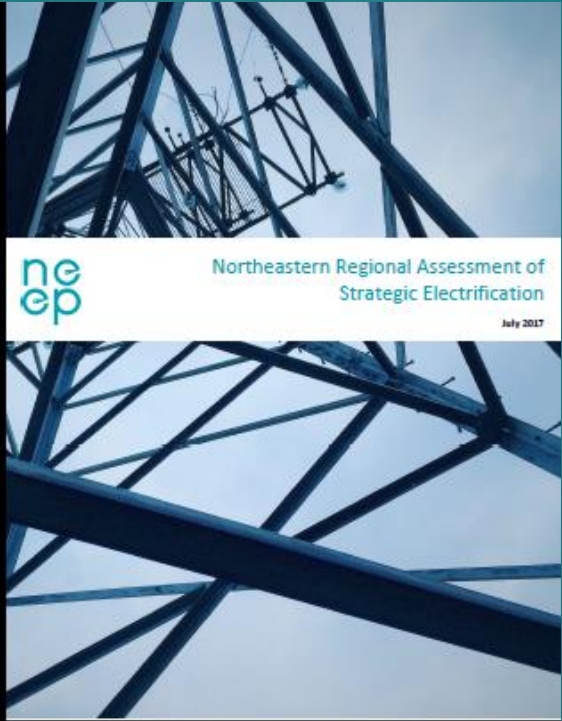
We seek to accelerate regional collaboration to promote advanced energy efficiency and related solutions in homes, buildings, industry, and communities.

## Approach

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



# Background in Building Decarbonization





# Building Decarbonization → 3 Key Elements

Advanced  
Electric  
Technologies



Space/Water  
Heating – Heat Pumps

Deep Energy  
Efficiency



Thermal  
Improvements

Grid  
Integration



Flexible use of  
Low-Carbon Electricity

# Rhode Island Renewable Thermal Market Development Strategy (2017)

- ❖ Comprehensive strategy and policy platform to break down market barriers and drive Renewable Thermal investment in Rhode Island
- ❖ Renewable thermal is defined as a technology that can utilize renewable energy resources to provide space heating/cooling, water heating, and process heating

## RHODE ISLAND RENEWABLE THERMAL MARKET DEVELOPMENT STRATEGY

Prepared for Rhode Island Office of Energy Resources  
January 2017



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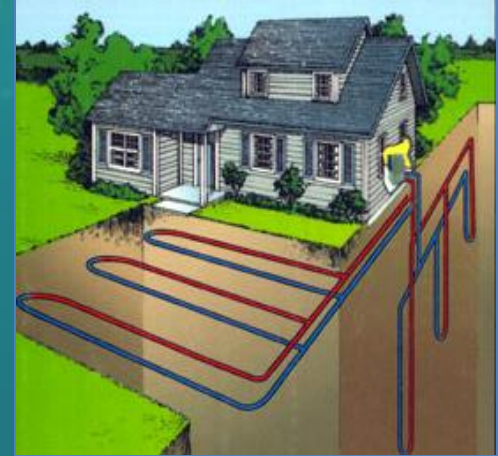
# Pathways to Deep Decarbonization





# Heating Decarbonization Technologies

- Air-Source Heat Pumps
  - Mini-Splits (residential)
  - VRF (commercial)
- Ground-Source Heat Pumps
- Solar Thermal
- Central Biomass Heating
- Advanced Wood Stoves



# ASHP Market Size and Trends

- ~100k ASHPs sold in the New York (61k)/New England (36k) region in 2017
  - ~50k ASHPs sold in the same region in 2013
  - ~20% Annual growth over four years
- Still significantly smaller than regional furnace (235k)/boiler(160k)/Central AC (220k) markets





# Sizing the current market; Massachusetts Example

	# of incentivized Projects (total)	# of incentivized Projects (per year)	Timeframe
<b>Residential ASHP</b>	20,094	<b>4,673</b>	November 2014-March 2019
<b>Commercial VRF</b>	107	<b>54</b>	May 2017-May 2019
<b>GSHP (Res)</b>	414	<b>81</b>	November 2014-December 2019
<b>GSHP (Comm)</b>	16	<b>3</b>	September 2013- June 2019
<b>Solar Hot Water</b>	1,314	<b>151</b>	April 2011- December 2019
<b>Pellet Boilers (Res)</b>	117	<b>23</b>	November 2014- December 2019
<b>Modern Woodstoves</b>	2,564	<b>366</b>	December 2012-December 2019

# A look at cost..

	Installed Costs (thousand Btu/hour)	
<b>Residential ASHP</b>	<b>\$ 325</b>	
<b>Commercial VRF</b>	<b>\$ 695</b>	
<b>GSHP (Res)</b>	<b>\$ 866</b>	
<b>GSHP (Comm)</b>	<b>\$ 998</b>	
<b>Solar Hot Water</b>	<b>\$ 4,700</b>	Average Cost per Collector
<b>Modern Woodstoves</b>	<b>\$ 4,234</b>	Average Cost per stove
<b>Pellet Boilers (Res)</b>	<b>\$ 434</b>	

# Benefits and drawbacks

	Benefits	Drawbacks
<b>Residential ASHP</b>	Low upfront costs for supplemental systems, ease of install	Design/sizing for whole home systems
<b>Commercial VRF</b>	Highly zonable, simultaneous heating/cooling	Design/sizing for whole building systems
<b>GSHP (Res)</b>	Superior efficiency, capacity maintenance	upfront costs, installation
<b>GSHP (Comm)</b>	Superior efficiency, capacity maintenance	upfront costs, installation
<b>Solar Hot Water</b>	DHW Solution	small contractor market
<b>Modern Woodstoves</b>	Solution for popular system	Sourcing sustainable wood, onsite combustion
<b>Pellet Boilers (Res)</b>	"Drop in" for existing hydronic systems	Sourcing sustainable wood, onsite combustion



# Conclusions

- Clean Heating and cooling technologies offer solution for decarbonizing enormous chunk of RI energy usage
- Technologies are relatively mature and industry is prepared for growth
- Market demand exists today and is growing
- Heating system replacements/fuel switching is difficult
- Opportunity to bundle deep weatherization with heating upgrades to reduce heating system upfront costs, improve performance, and gain large savings



# Taking these markets to scale

- ❖ Continued opportunities for state/program support in order to scale industries in line with state ambitions
- ❖ Key Strategies
  - ❖ Cost reduction Programs that ensure quality
  - ❖ Customer awareness/education
  - ❖ Installer awareness/education
- ❖ Partner regionally
- ❖ Hurry up slowly...



# For More Information:



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email Jessica Augat, Industry Relations & Event Manager: [jaugat@neep.org](mailto:jaugat@neep.org)