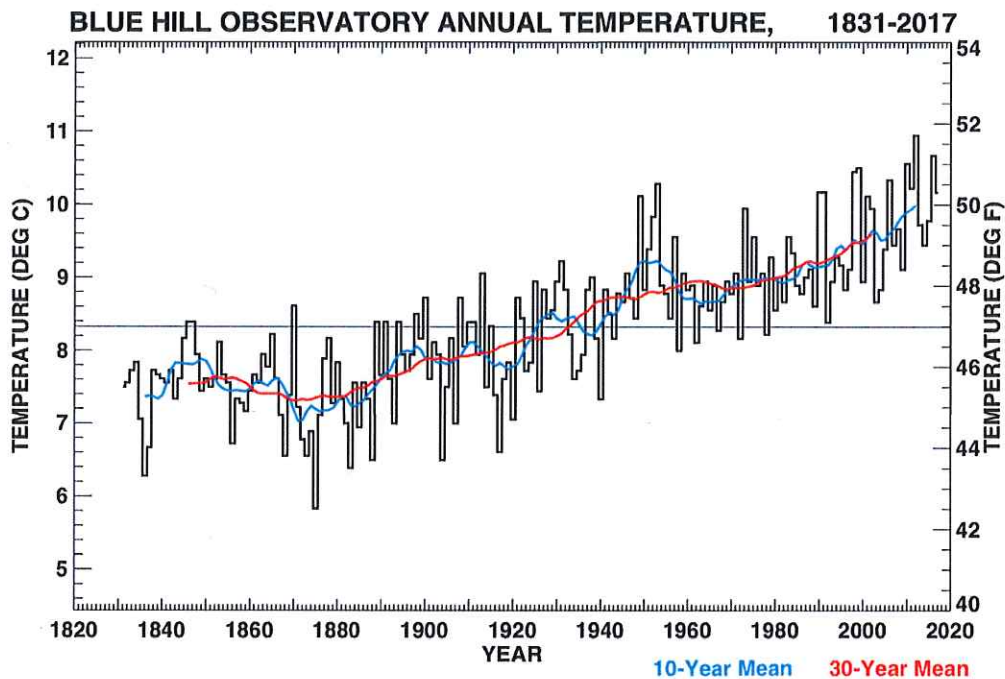


Clean Heat  
for Arlington

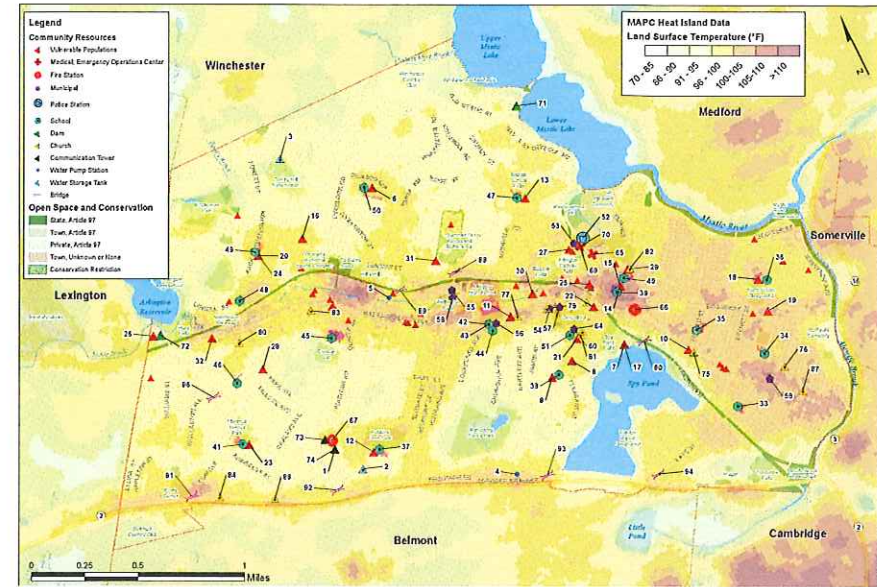


Warrant Article #13  
Select Board Hearing  
3/9/20

# Arlington is already feeling the effects of climate change



<http://bluehill.org/observatory/2018/08/state-of-the-climate-at-blue-hill-observatory-2018/>

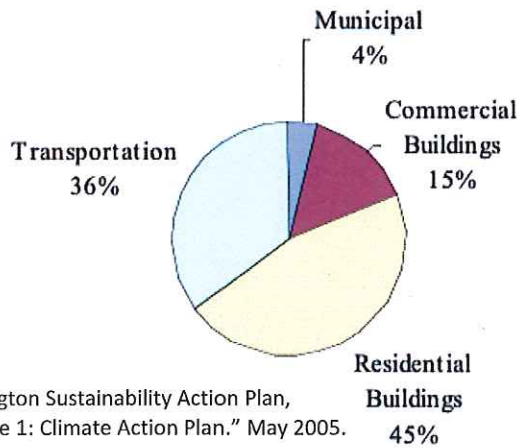


# We must drastically reduce building emissions to meet our goals

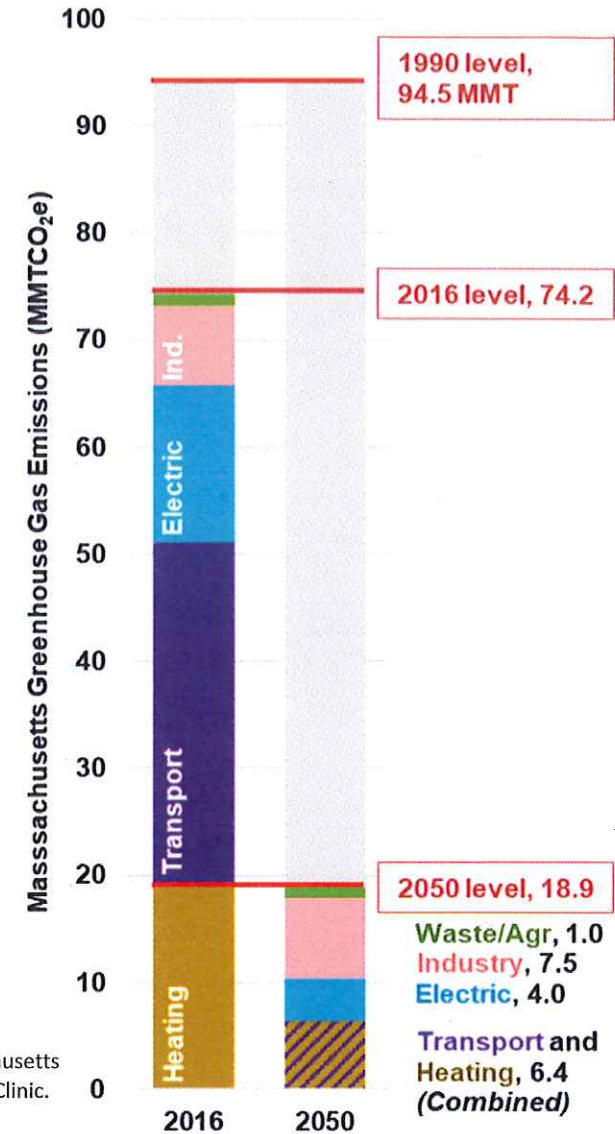
2008 → State passes Global Warming Solutions Act, commits to reduce 80% by 2050

2018 → Arlington Select Board votes to set goal of Net Zero by 2050.

Town of Arlington Carbon Dioxide Emissions,  
Baseline Year 1997



"Arlington Sustainability Action Plan,  
Volume 1: Climate Action Plan." May 2005.



"Massachusetts Gas versus Massachusetts Climate Goals." Applied Economics Clinic. December 2019.



The proposed bylaw prohibits new fossil fuel piping in:

New Construction



Gut Renovations



**Existing buildings, kitchen renovations, additions, etc. will be entirely unaffected**

# The proposed bylaw includes a variety of practical and commonsense exemptions:

Customer side only



All gas cooking appliances exempted



Backup generators are exempted



Portable propane appliances unaffected



Hot water for large buildings exempted

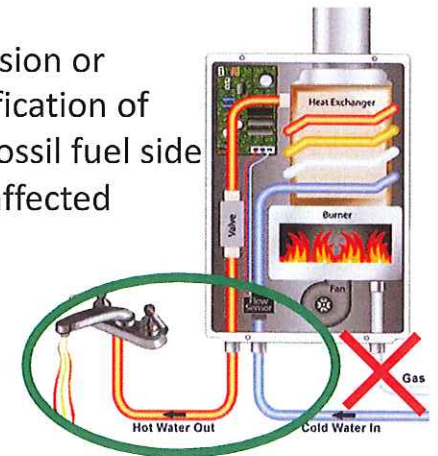


Research and medical facilities are exempted



Repair of existing unsafe piping is exempted

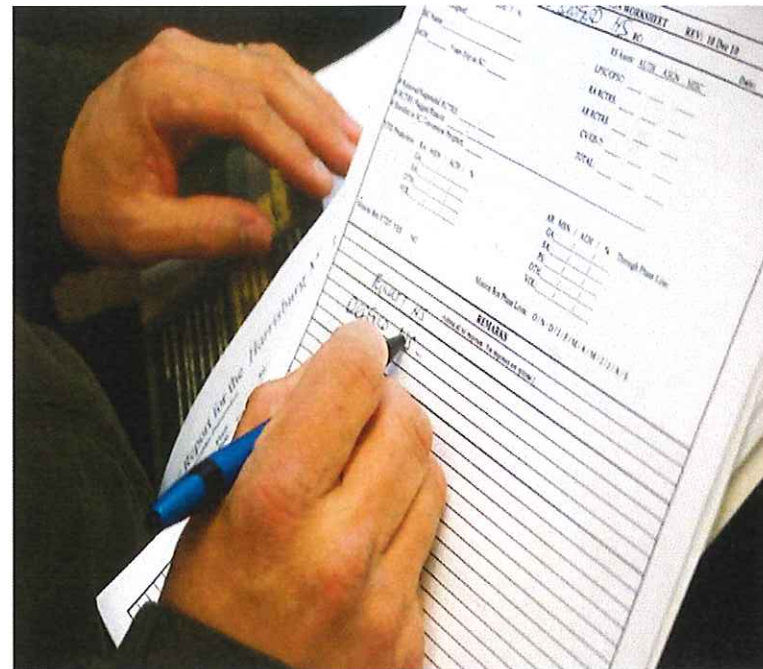
Extension or modification of non-fossil fuel side is unaffected





# Waivers process exists to handle unforeseen issues

- If the bylaw causes undue expense or practical obstacles, a waiver can be sought.
- Building Inspector grants waivers, may consult with town staff and local energy experts.



# Heat pumps are a practical and economical solution

Air Source



Ground Source  
(Geothermal)



Water Heater



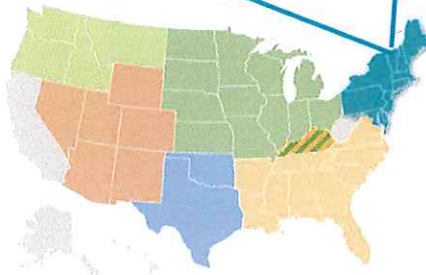
Images courtesy of: Boucher Energy Systems, New England Ductless, EnergySmart Alternatives, and Hot Water Solutions Northwest

# Heat pumps are efficient and can serve as the sole source of heat in our climate



**Air Source:  
220-350+% efficient**

**Ground Source:  
350-480+% efficient**



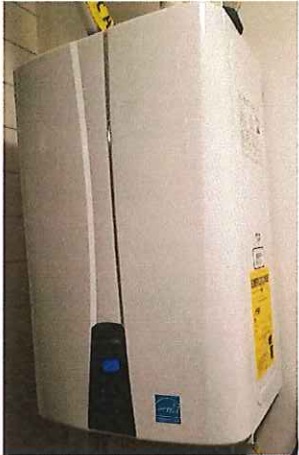
**Cold-Climate Air Source Heat Pump Specification requires high-efficiency at 5°F, many systems perform to -13 to -22°F**

- In 2017, approx. **10%** of new homes in MA used a heat pump as the **only source of heating/cooling**
- Dozens of systems installed through HeatSmart 2019 in retrofits had **no backup heat**



# Heat pumps add minimal costs to new construction

**Traditional**  
 Gas Furnace  
 Central AC  
 Tankless Gas HW



Installed Cost	Annual Operating Cost
\$11,724	\$1,511

**All-Electric**  
 Minisplit Air Source Heat Pump  
 Heat Pump Water Heater



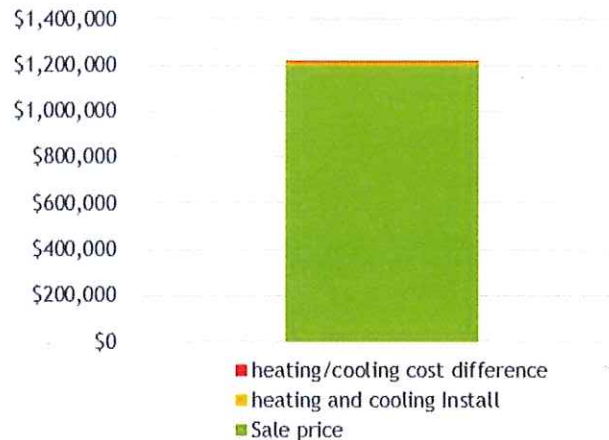
\$12,478	\$2,007 (\$1,362 powered with solar)
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“RLPNC 17-14: Mini-Split Heat Pump Incremental Cost Assessment.”  
 NMR Group, Inc. November 27 2018.

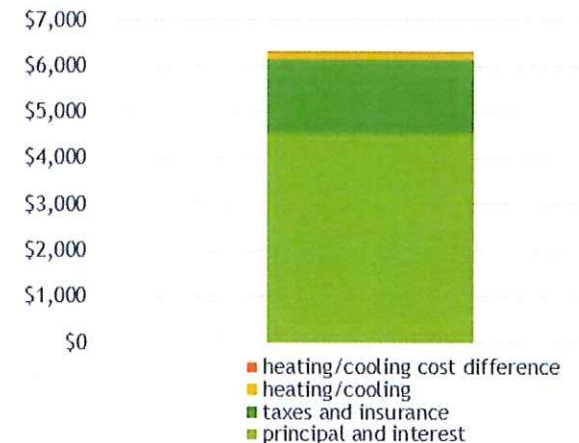
# Increased costs represent a fraction of new residential construction costs

Installed Cost	Annual Operating Cost
\$11,724	\$1,511
\$12,478	\$2,007 (\$1,362 powered with solar)

Approximate price for a new 3,000 sf home



Approximate monthly costs for a new 3,000 sf home



"RLPNC 17-14: Mini-Split Heat Pump Incremental Cost Assessment." NMR Group, Inc. November 27 2018.

Assuming \$1.50/therm; \$0.2063/kWh; 20% down payment, 4% interest rate on 30yr mortgage. Assumed average price of \$1.2million. Homes sold in 2019 for between \$1million and \$1.5 million had a 3,196 SF average.



# Affordable housing is leading the way on heating electrification

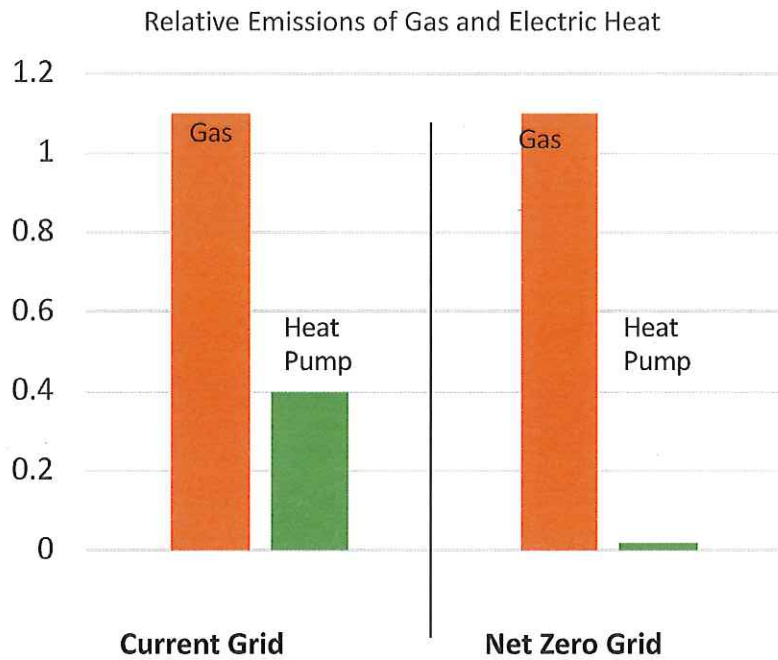


Finch Cambridge, 98 affordable housing units, passive house standard with VRF heat pumps

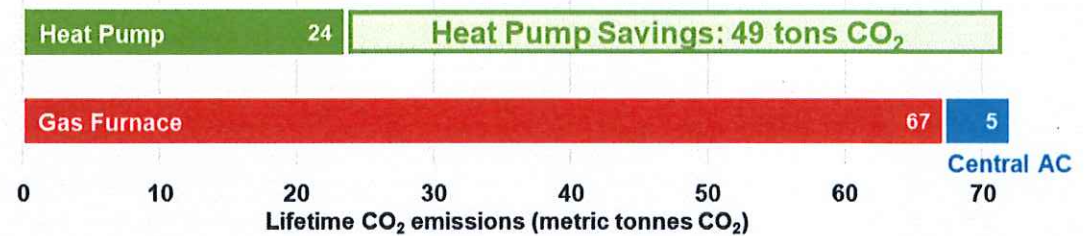


O'Shea house, Brookline Housing Authority property, 100 units of affordable housing, VRF heat pumps.

# Electrification is the only way to reach net zero, but it also provides immediate emissions benefits



Calculated assuming a 90% efficient gas furnace, heat pump seasonal COP of 2.5, and 50% of electricity generated with natural gas



"Home Heat Pumps in Massachusetts." Applied Economics Clinic. July 2019.

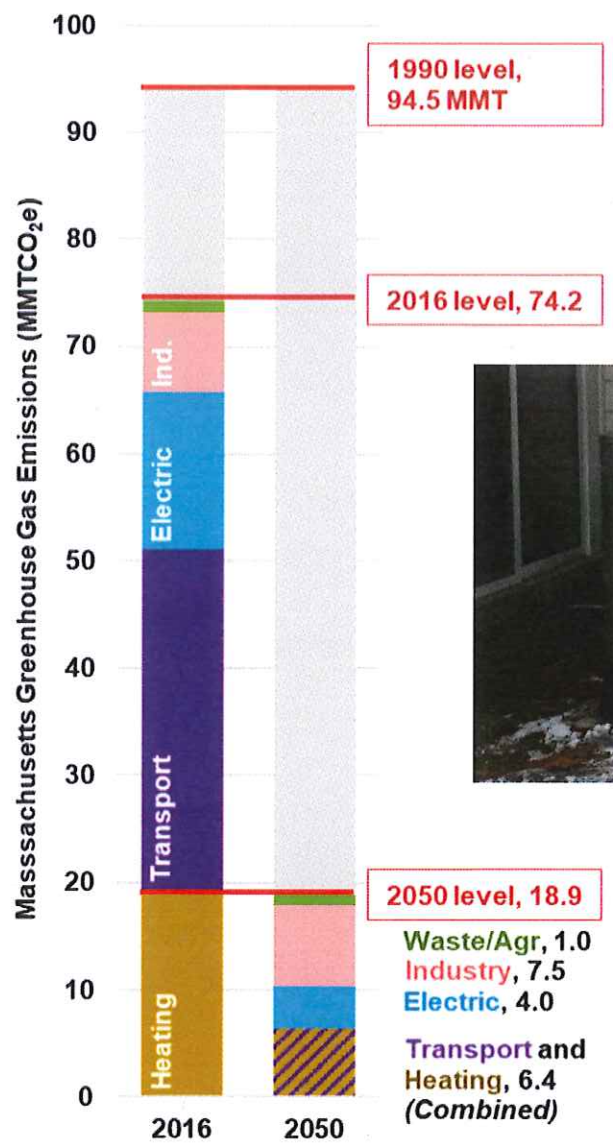


# Outreach is ongoing but engagement so far has been positive

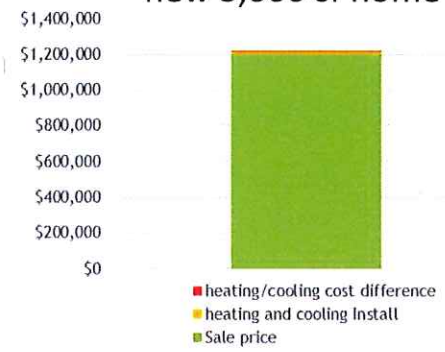
- 60-70 person public meeting
- Electronic outreach on Arlington List, Sustainable Arlington List, and Facebook
- Multi-family, commercial, and residential developers and property owners
- Arlington realtors
- Arlington architects
- HCA Staff
- Chamber of Commerce
- Most Town Meeting Members already contacted



# Overall, the proposed bylaw is necessary, practical, economical, and feasible



Approximate price for a new 3,000 sf home



Approximate monthly costs for a new 3,000 sf home

