

Newburyport Old Home Case Study

Barriers to heat electrification in an older home



Circa 1760 Home

- ▶ Georgian Gambrel
- ▶ 3-unit condo
 - ▶ Side-by-side & in back
- ▶ 3 stories plus basement
 - ▶ Approx 2200 sq.ft
 - ▶ 1st fl, kitchen, dining, living & bath
 - ▶ 2nd fl, 3 BRs, full bath
 - ▶ 3rd fl, 3 BRs, full bath
- ▶ Natural Gas
 - ▶ 125,000 BTU furnace, 28yrs old
 - ▶ Forced hot air
 - ▶ Single zone / lousy distribution
 - ▶ 1st fl. Lots of vents
 - ▶ Upper floor, 1 vent/room
- ▶ Window AC in 2 rooms
- ▶ Solar on roof covers entire electric bill



Updates Done

- ▶ Single pane windows to appropriate double panes
- ▶ Leveraged Mass Save programs
 - ▶ Lots of crack sealing
 - ▶ Blew in insulation into walls
 - ▶ Insulated tops of walls in attic
 - ▶ Sealed utility chases
 - ▶ Foam insulated attic at roof
 - ▶ Added insulation to floor of attic
 - ▶ Insulated air ducts where exposed
 - ▶ Basement
 - ▶ Attic

Dream

- ▶ Move to heat pumps for all heating
- ▶ Get AC in all rooms
- ▶ Add zones for efficiency and comfort
- ▶ Foreseeable issues:
 - ▶ I don't like heating hoses strung along outside of historic home
 - ▶ Reuse some of existing ductwork for coolant hoses inside home
 - ▶ I don't like the look of the wall mount vent units in an historic home
 - ▶ Smaller flush ceiling mount units look suitable

Dream Meets Reality

- ▶ Heat pump rep could do anything I want
 - ▶ He wouldn't recommend it
 - ▶ It will become very expensive
- ▶ General issues
 - ▶ Largest compressor is 50,000 BTU
 - ▶ Probably need 2
 - ▶ Wall mount vents are \$5000 apiece
 - ▶ Might need 7-8 for \$35,000-\$45,000
 - ▶ Ceiling flush mounts (my preference) add another \$4000 each
 - ▶ Might need 7-8 for \$63,000-\$72,000
 - ▶ Some risk as need a certain amount of space between ceiling rafters, won't know until open up
- ▶ Could bury hoses under siding, but requires a lot of surgery
- ▶ I would be spending more on electricity than I am now on gas
 - ▶ I don't have much excess solar power
- ▶ He did not recommend my dream
 - ▶ He gave 2 "sensible" options

Simple Recommendation

- ▶ Replace furnace with another more efficient gas furnace, probably 80,000 BTU
- ▶ Continue to use window air conditioners
- ▶ Wait for technology to improve
 - ▶ Next time HVAC needs upgrade
 - ▶ Next owner's decision
- ▶ Cost \$9,000
 - ▶ \$1,000 Mass Save rebate
 - ▶ 7 yr 0% interest Mass Save heat loan

Larger Recommendation

- ▶ Replace furnace with another more efficient gas furnace, probably 80,000 BTU
- ▶ Add outdoor heat pump for AC
 - ▶ Heat exchange coil at furnace
- ▶ Use existing ductwork for all
- ▶ Cost \$15,000
 - ▶ \$1,000 Mass Save rebate
 - ▶ 7 yr 0% interest Mass Save heat loan