Climate + Clean Energy Solutions for everyone. The knowledge, people, and resources to solve our biggest energy challenges.
Paths to Electrification

- Weatherization
- Electric Service Upgrades
- HVAC Replacements
- Appliance Replacement
Many ways to begin Electrification

Weatherization

• Envelope sealing (closing the gaps in your home)
  - Door and window Seals or replacements
  - Wall / roof penetrations

• Insulation
  - New Insulation
  - Upgrading Insulation
  - Duct Sealing
  - Duct Insulation
Electrical Service Upgrades

• Panel and service replacement
• Sub Panel Additions

Appliance replacement

• Water heater Upgrades (HPWH)
• Induction Stoves
• HVAC Systems
• Energystar clothes washer and dryers
HVAC Replacement Options

Going All Electric

• Air handlers Require more Power than the Furnace 2 pole
• Outdoor units with higher SEER have lower Amperage draws
• Mini Splits lower Amperage only need power to outdoor unit

Dual Fuel Heat pumps

• Smaller amperage draw at the outdoor unit
• Best of both worlds
• Allow grid resiliency
Verified Operation in Michigan

• Dual fuel heat pump monitoring 2019
• 8 homes with heat pumps systems sized for cooling load
  • Up to 1-ton increases to meet more heating hours
• Single, two-stage, and inverter heat pumps
  • OAT between 20 to 30°F
• Two stage and inverter without lockout reduced propane by
  • 59% and 67%
• Climate zones 5 and 6

• All electric home Marquette 2019
• 2 Multi-splits maintain comfort at -26°F
• 1978 construction 2,200 sq ft.
• Climate zone 6

“After a big storm we had to dig out the unit buried in snow. It was in its own trench and it happily hummed along and did its job. It didn’t break down. I was super pleased about that.” ~DON
<table>
<thead>
<tr>
<th>Site</th>
<th>Square Feet</th>
<th>Year Built</th>
<th>Lockout Temp °F</th>
<th>Compressor Type</th>
<th>Capacity (95, 47, 17) °F</th>
<th>HP Model</th>
<th>Capacity Btu/hr</th>
<th>Model</th>
<th>Site Energy reduction</th>
<th>Annual Savings to Homeowner</th>
<th>Emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2426</td>
<td>1998</td>
<td>20</td>
<td>Variable-speed</td>
<td>34,600 32,200 26,400</td>
<td>American Standard Platinum 17</td>
<td>80,000</td>
<td>American Standard Platinum 95</td>
<td>64%</td>
<td>$811</td>
<td>9%</td>
</tr>
<tr>
<td>2</td>
<td>2400</td>
<td>1860</td>
<td>25</td>
<td>Variable-speed</td>
<td>34,800 31,600 20,200</td>
<td>Lennox Signature XP25</td>
<td>88,000</td>
<td>Dave Lennox Signature</td>
<td>50%</td>
<td>$678</td>
<td>11%</td>
</tr>
<tr>
<td>3</td>
<td>1400</td>
<td>2018</td>
<td>30</td>
<td>Variable-speed</td>
<td>24,200 21,400 16,900</td>
<td>Trane XV18</td>
<td>60,000</td>
<td>Trane XC 95M</td>
<td>41%</td>
<td>$273</td>
<td>8%</td>
</tr>
<tr>
<td>4</td>
<td>2200</td>
<td>2000</td>
<td>None</td>
<td>Variable-speed</td>
<td>45,000 46,500 48,500</td>
<td>Bryant Evolution Extreme</td>
<td>80,000</td>
<td>Bryant Evolution</td>
<td>67%</td>
<td>$1,085</td>
<td>13%</td>
</tr>
<tr>
<td>5</td>
<td>1700</td>
<td>1996</td>
<td>None</td>
<td>Two-speed</td>
<td>37,200 33,600 21,400</td>
<td>Trane XR17</td>
<td>60,000</td>
<td>Trane S9X2</td>
<td>59%</td>
<td>$578</td>
<td>9%</td>
</tr>
<tr>
<td>6</td>
<td>2000</td>
<td>2004</td>
<td>28</td>
<td>Five-speed</td>
<td>23,200 24,000 16,100</td>
<td>Bryant Evolution V</td>
<td>60,000</td>
<td>Bryant Evolution</td>
<td>43%</td>
<td>$308</td>
<td>12%</td>
</tr>
<tr>
<td>7</td>
<td>2400</td>
<td>2018</td>
<td>20</td>
<td>One-speed</td>
<td>36,000 34,200 22,400</td>
<td>American Standard Silver 16</td>
<td>80,000</td>
<td>American Standard Gold 95</td>
<td>34%</td>
<td>$299</td>
<td>5%</td>
</tr>
<tr>
<td>8</td>
<td>2500</td>
<td>2016</td>
<td>25</td>
<td>One-speed</td>
<td>28,000 28,200 16,800</td>
<td>Bryant Legacy Line</td>
<td>80,000</td>
<td>Bryant Preferred Series</td>
<td>63%</td>
<td>$603</td>
<td>16%</td>
</tr>
</tbody>
</table>
Heat Pumps Work in Cold Climates

- All forms of heat pumps have benefits in cold climates
- Entry level models that have been available since the 80s have reduced heat transfer when outdoor temperature drops
  - Can still be useful but may not be the primary source of heat
- Cold climate heat pumps on the NEEP List perform well in the cold
  - Minimum COP of 1.75 at 5°F or 175% efficient
  - ASHP.NEEP.ORG
- Manufacturers claim operation as low as -22°F
Indoor Air quality Improvements

• Combustion is being removed
  • High efficiency furnaces have sealed combustion
  • All electric appliances
• High Efficiency systems run longer
  • More air passes through filters
  • IAQ products have more time to work
  • Controlled ventilation strategies (HRV / ERV)
• Less risk for CO (Carbon Monoxide) production
Thank You

Zak Paine
HVAC Installation Advisor
zpaine@slipstreaminc.org
608.729.6998