Heating Sector Transformation

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2021 Act on Climate

<table>
<thead>
<tr>
<th>Year</th>
<th>Target</th>
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<tbody>
<tr>
<td>2020</td>
<td>10% below 1990 levels by 2020</td>
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<tr>
<td>2030</td>
<td>45% by 2030</td>
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<tr>
<td>2040</td>
<td>80% by 2040</td>
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<tr>
<td>2050</td>
<td>Net Zero by 2050</td>
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Heating Sector Emissions

Heating Sector responsible for 1/3 of Rhode Island emissions

Rhode Island GHG Emissions by Sector (2015)

- Transportation: 40%
- Residential: 19%
- Electricity Consumption: 23%
- Commercial: 8%
- Industrial: 7%
- Other: 3%

Note: Some but not all industrial GHG is related to heat generation, often for process heat.
Rhode Island heating sector dominated by gas and delivered fuel, with urban/rural split

<table>
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<tr>
<th>Utility Gas</th>
<th>Delivered Fuel</th>
<th>Electricity</th>
<th>Wood/Other</th>
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<tbody>
<tr>
<td>54%</td>
<td>33%</td>
<td>9%</td>
<td>4%</td>
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Heating Decarbonization Pathways

Space and water heat
Several primary options feasible across many applications/buildings

Decarbonized Fuel
Limited supply from less-costly sources

- Renewable gas/power-to-gas (P2G) for gas customers
  - Landfill gas, anaerobic digesters, gasification, synthetic gas
- Biofuel or power-to-liquids (P2L) for most other customers
  - Biodiesel, ethanol, synthetic fuels

Strategic Electrification

- Air source heat pump (ASHP)
- Ground source heat pump (GSHP)
  - Including GeoMicroDistrict

Industrial heat
- May be more specialized (e.g., high-temp)
- Possibly requires decarbonized fuel including hydrogen
First Step: Thermal Electrification

- Thermal Electrification → heat pumps for both heating & cooling
- Most developed clean heating technology in RI
- When electricity is decarbonized, so is heating
Strategic Electrification

Thermal Decarbonization

- Renewable Fuels
  - Renewable Gas
  - Biodiesel
  - Air Source Heat Pumps (ASHP)
  - Ground Source Heat Pumps (GSHP)

Strategic Electrification

Air Source Heat Pumps

- Move heat to warm and cool a home
- Do not burn fuel to create heat
- Extremely efficient
FY 2023 Budget Article

Total funding deployed ≈ $37 million

- >50% of funds for disadvantaged communities
- More equitable access to clean heating & cooling → hard to reach, disadvantaged communities served
- Lower GHG emissions → key step to Act on Climate
- Job creation: workforce development & expansion
- Increased comfort and decreased utility costs
Contact information

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