Cascade Energy & Industrial Heat Pumps (IHPs)

- Scoping case studies
- Customer motivations, barriers
- Contractor & design firm survey
- What next?
Cascade Energy & Industrial Heat Pumps (IHPs)

- IHP Scoping

Source: [Leading States Chart Path for Cutting Emissions with Electrification, Pointing Way for Peers | ACEEE](https://www.aceee.org/chart-path-cutting-emissions-electrification-pointing-way-peers)
## Dairy Scoping - 1

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sink: pasteurization</td>
<td>200°F</td>
</tr>
<tr>
<td>Source: refrigeration condensing</td>
<td>70°F</td>
</tr>
<tr>
<td>70K lift, 2.5 COP</td>
<td></td>
</tr>
<tr>
<td>Spark gap (elect/ng)</td>
<td>4.0</td>
</tr>
<tr>
<td>Gas savings: $</td>
<td>$170k</td>
</tr>
<tr>
<td>Electric increase: $</td>
<td>$200k</td>
</tr>
<tr>
<td>Grid intensity: 635 lb/MWh</td>
<td></td>
</tr>
<tr>
<td>CO2e Savings: 1,000 tonne/y</td>
<td></td>
</tr>
</tbody>
</table>
New construction
Utility allowed electric boiler baseline
Central IHP system not considered
Two add-on IHP projects identified (~5% NG reduction)
Good economics vs. electric boiler
Vegetable processor - 1

Vegetable concentration

Mechanical Vapor Recompression (MVR) on evaporators

Demonstration plants online

Significant incentives offered

Source: Howden.com
MVRHowdenbyChart_MVR_ProductProfileSheet_Digital.pdf
Vegetable processor - 2

IHP’s for Blanching.

Poor Economics
Due to limited hours
$10,000 savings
$1M project cost

Steam
Steam supplements required to reach final product temperatures.
Medical manufacturing

Goals: Phase out R22, Save: CO2, H2O, kWh, Therms

Roof mounted ASHPs and WSHPs for clean rooms

WSHPs use cooling tower water, with air compressor & process loads

Natural gas backup on ASHPs for very cold weather
Customer Motivations & Barriers
Motivations

- Reduce costs
- Reduce CO2 emissions
- CO2 regulatory requirements
Barriers

Cost: Equipment & Operating

Design & Integration Barriers
- Source - sink distance
- Little support from manufacturers, vendors
- Vendors still learning
- Construction schedules

Temperature Limits

Risks
- Don’t see competitors installing IHPs
- Nervous it might not work
Informal survey
Survey Results: 7 well known refrigeration contractors

7 of 7

No Current IHP Projects
Installations or quotes

2 of 7

Successful
Heat Recovery (desuperheaters)
Dedicated Hot Gas Compressors

1 of 7

Not Interested
Current workload is sufficient
No requests for IHPs in plant design

Just quoted IHPs on new plant design, dropped due to cost
What Next?

Beachhead Projects

Industry Development

Financial Support
Beachhead Projects

1. New Construction
   Lots of runway

2. IHP Integration
   From Start

3. Central Plant Design
   Not just add-on

4. Progressive Utility
   With funding

5. Federal Funding
Financial Support

1. Advanced Industrial Facilities Deployment
2. Utility Incentives
3. Tax Credits
4. IRA Funding
5. BIL Funding
Industry Development

1. Higher Temperatures
2. Contractor, Designer Education
3. Design Support
4. Education

Beachhead Projects
Industry Development
Financial Support
Goals

- Track record of success
- Changed perception of risk
- Financial support
- Industry support
Thank you.

Steve Koski, P.E.
Principal Engineer
steve.koski@cascadeenergy.com