2019 BETTER PLANTS SUMMIT
AGROPUR – AMMONIA SYSTEM UPGRADES
Mark Minter CEM

www.agropur.com
Background

- Historically ran at 20.4 PSI suction pressure in order to build ice in rooftop ice bank.
- Ice bank supplemented two undersized plate and frame heat exchangers that provided chilled water to the plant at 35F.
- To do this all three, 400 HP ammonia compressors ran year round.
- Using metered amp data it was shown that the ammonia compressors used 5,151,086 kWh a year or $396k.
AGROPUR - AMMONIA SYSTEM UPGRADES

The most dangerous phrase in the language is “we’ve always done it this way.”

Rear admiral Grace Hopper
Project Details

- Contacted AC&R Specialists to conduct audit of system.
- Identified two ways to mitigate problem.
  1. Install new plate and frame heat exchanger similar in size to the existing two – 50% more capacity
  2. Remove existing plate and frame heat exchangers and install two new ones that combined would have 50% more capacity
- Both options allow the suction pressure to rise to 35.6 PSI.
Obstacles

- Limited space.
- Removal of ice bank from rooftop.
- Increased pipe size to heat exchangers.
- Cost, savings, and payback analysis.
  - Used Vilter ScrewPro Software to estimate roughly 1,000,000 kWh saved
  - Contacted local utility to have project pre-approved for rebate
AGROPUR - AMMONIA SYSTEM UPGRADES

Old Heat Exchangers

New Heat Exchangers
**AGROPUR - AMMONIA SYSTEM UPGRADES**

Data Gathering

Over 2,000,000 kWh Saved

Triggers Formal Measurement & Verification (M&V) From Utility

Approved by State of Minnesota for $64K Grant

Annual Savings of $157,000

<table>
<thead>
<tr>
<th>Plant Location</th>
<th>Le Sueur Cheese</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>7/18/2018</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Compressor #1</th>
<th>Ave Amps</th>
<th>kW</th>
<th>Hours</th>
<th>kWh</th>
<th>2018 Saved</th>
<th>Cost Saved</th>
<th>Rebate Potential</th>
<th>Payback</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>313</td>
<td>225</td>
<td>8760</td>
<td>1,967,045</td>
<td>77</td>
<td>8760</td>
<td>678,046</td>
<td>1,288,998</td>
</tr>
<tr>
<td>Compressor #2</td>
<td>258</td>
<td>185</td>
<td>8760</td>
<td>1,622,652</td>
<td>133</td>
<td>8760</td>
<td>1,164,124</td>
<td>458,528</td>
</tr>
<tr>
<td>Compressor #3</td>
<td>249</td>
<td>178</td>
<td>8760</td>
<td>1,561,389</td>
<td>144</td>
<td>8760</td>
<td>1,265,066</td>
<td>296,322</td>
</tr>
</tbody>
</table>

**TOTALS**: 5,151,086 kWh, 3,107,237 kWh, 2,043,849 kWh

**RAISE AMMONIA SUCTION PRESSURE**

**Raise Ammonia Suction Pressure:**

<table>
<thead>
<tr>
<th>Data Saved</th>
<th>NA</th>
<th>Rebate Potential</th>
<th>$64,000</th>
</tr>
</thead>
</table>

**Gal Water Saved**: NA

**Payback**: 1.41

**Project Cost**: $286,124

**Date**: 7/18/2018

**Cost Saved**: $157,376

**Annual Savings of $157,000**

Data Gathering:

Over 2,000,000 kWh Saved

Triggers Formal Measurement & Verification (M&V) From Utility

Approved by State of Minnesota for $64K Grant

Annual Savings of $157,000
Next Steps

- Gathering data at all other plants.
- Raised suction pressure by 10 psi at our Jerome, ID plant.
- Looking to lower discharge pressure at 2 other plants.