University of Utah Campus Energy Efficiency Project

How the University solved chiller plant capacity needs

Presented by: DJ Hubler & Erick Allen, McKinstry
University of Utah by the Numbers

- **32,760** Total University Enrollment
- **>500** Buildings
- **1,535** Acres of University-Owned Land
- **15MM** Square Feet
- **3** High-Temperature Hot Water Plants
- **5** Chilled Water Plants
Utah Health Science Campus Transformation Project
Master Plan
Long-Term Cost Difference

First Cost

<table>
<thead>
<tr>
<th>Cost (USD)</th>
<th>Central Plant Addition</th>
<th>Conservation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-</td>
<td>$39,300,000</td>
<td>$30,000,000</td>
</tr>
<tr>
<td>$(10,000,000)</td>
<td>$30,000,000</td>
<td>$30,000,000</td>
</tr>
<tr>
<td>$(20,000,000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$(30,000,000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$(40,000,000)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$(50,000,000)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

40 Year NPV

<table>
<thead>
<tr>
<th>NPV (USD)</th>
<th>Central Plant Addition</th>
<th>Conservation Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>$(40,000,000)</td>
<td>$30,384,000</td>
<td>$30,000,000</td>
</tr>
</tbody>
</table>
Scope of Work

Master Plan → IGA → Design → Build → Transition → Optimize
Solutions
Transformation Project Impact Timeline

- Huntsman IV, ~700 tons
- ACC, ~590 tons
- Rehab, ~310 tons
- Plant Peaks w/1600 Ton Addition

Timeline:
- 04/2017
- 10/2017
- 4/2018
- 10/2018
- 4/2019
- 10/2019
- 4/2020
- 10/2020
- 04/2021
- 10/2021
Conservation Strategies

- **400 to 600 Ton Load Reduction** with Evaporative Cooling on Lab AHUs with 100% OA
- **200-300 Ton Load Reduction** with Lab Fume Hood VAV Retrofit with Occupancy Sensor
- **700 to 1100 Ton Capacity Increase on Central Plant**
Installed 82 HW and CHW precision control valves that account for more than 85% of the design capacity of the East Plant.

Valves will measure CHW delta T and flow at each coil providing valuable data for analytics.
Direct Evaporative Cooling

12 Fan Arrays

4 Evaporative Cooling Systems
Indirect Evaporative Cooling

- Installed 1 new cooling tower
- Rebuilt 1 cooling tower
- Installed new indirect cooling coils
Results
East Plant Load as a Function of OAT
East Plant Load as a Function of OAT
East Plant DeltaT as a Function of OAT
East Plant Flow as a Function of OAT

University of Utah Health Science Campus Chiller Plant Secondary Loop Flow

- Baseline
- Post Retrofit

OAT (F) vs. Total Flow (GPM)
East Plant Chillers vs. Building Load

![Graph showing the number of chillers running vs. building load](image)
University of Utah Healthcare Campus

East CHW Plant
Persistence
Campus Performance
Equipment Performance

AHU 1

Supply Fan
Evaporative Cooling
Chilled Water Coil
Heating Coil

High KW / RPM
Very High BTUs / OAT (Evap. Not Working)
OK
Thank You!

DJ Hubler  
*Project Director – Utah*  
(385) 881-6412  
djh@McKinstry.com

Erick Allen  
*Account Executive – Utah*  
(801) 455-5289  
ErickA@McKinstry.com