
AVEVAWORLD

Enhancing Stanford Energy Systems Innovations Overall Reliability and Sustainability with AVEVA

Presented by :
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Dan Young – Controls Engineer

Stanford | Energy Operations
Sustainability, Utilities & Infrastructure

Meeting Safety Checklist

Prior to meetings, trainings, or group sessions; conduct a short safety briefing that outlines the following.

1. Where are the exits?
2. Emergency assembly location
3. Locate fire extinguisher, AED, first aid kit.
4. Identify someone to call 911 in case of emergency

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Occupational Health Center

Contents

What is SESI?

Delivering Energy Sustainably and Reliably

Stanford's Central Energy Facility uses heat recovery, thermal storage, and system optimization to achieve sustainable energy production and delivery to all the Stanford community, over 250 major buildings.

Small Brains and

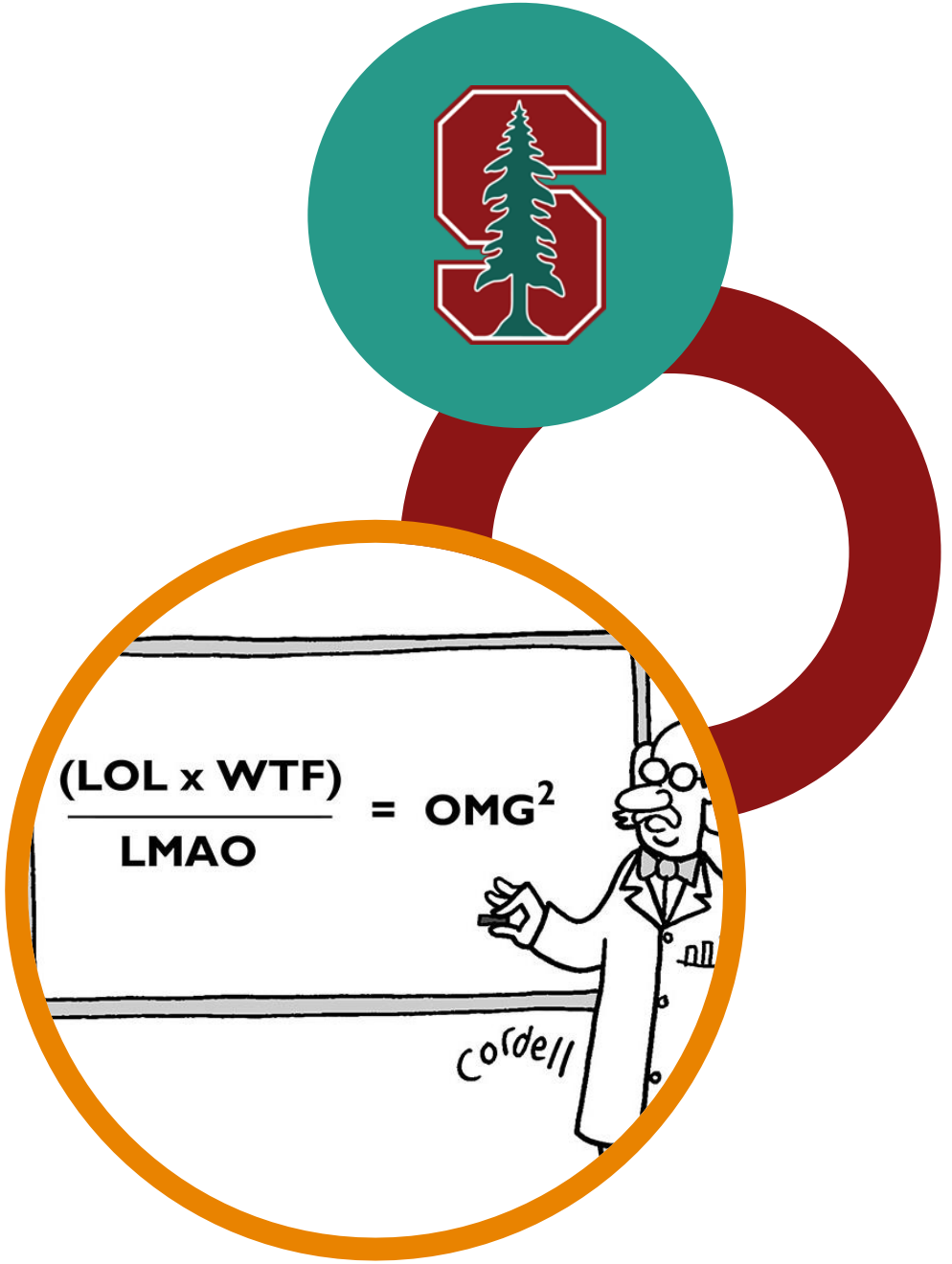
DDC and

Big Brains and

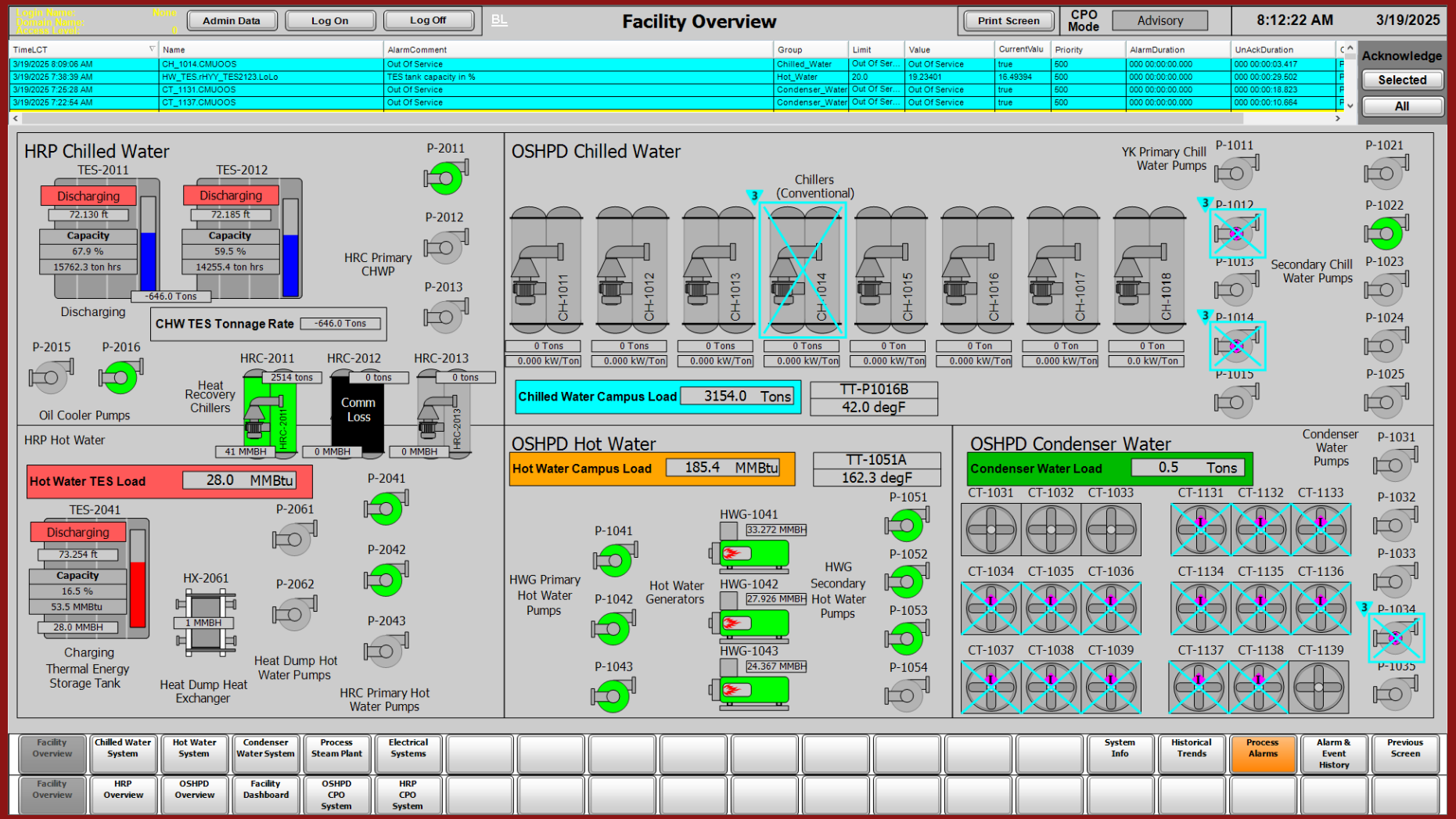
PLC and

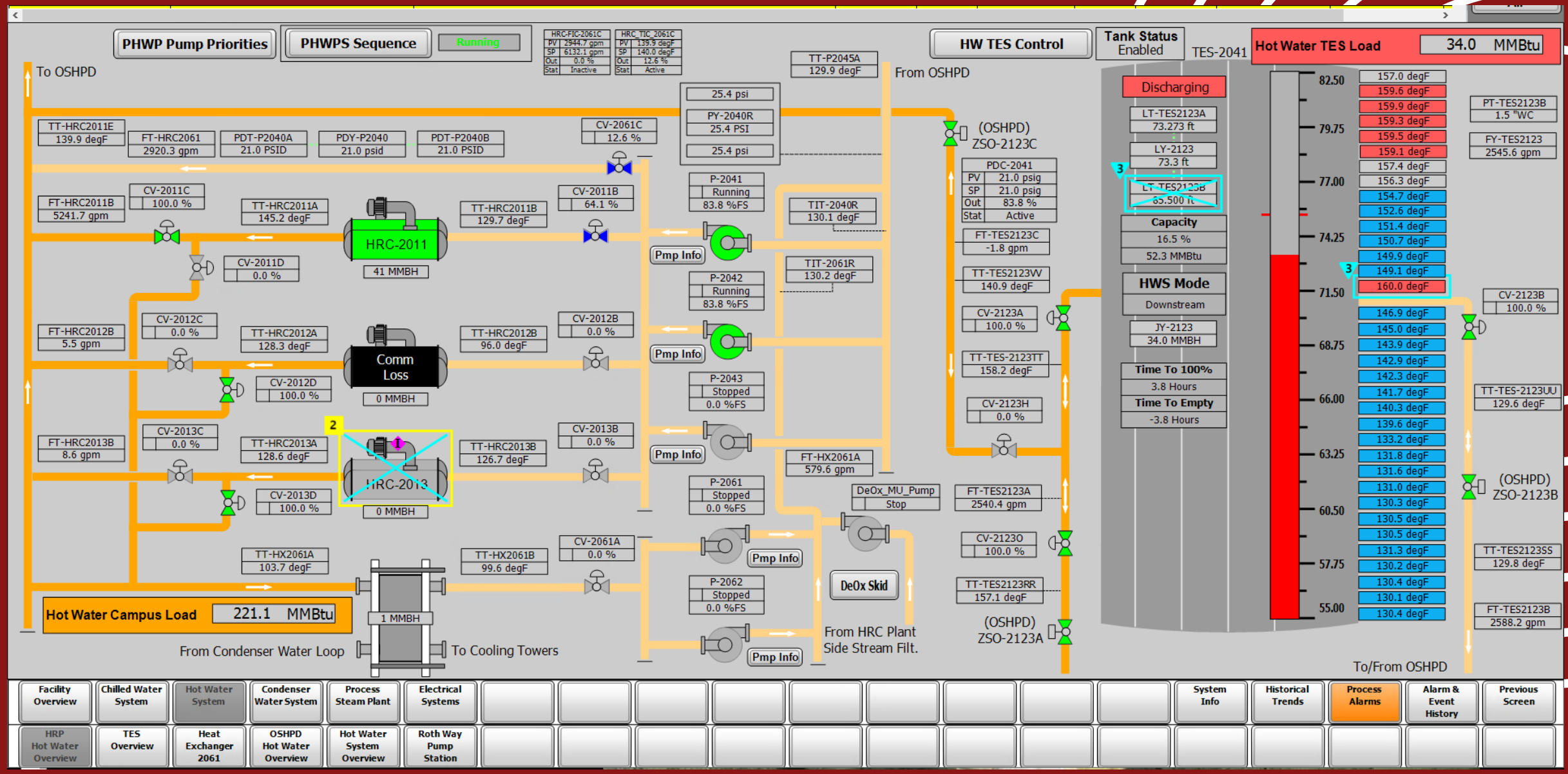
SCADA and

AVEVA System Platform



AVEVA™ System Platform @ CEF enhances equipment reliability




PHWP Pump Priorities
PHWPS Sequence
Running
HRC-FIC-2061C PV 2944.7 gpm SP 6132.1 gpm Out 0.0 % Stat Inactive
HRC_TIC_2061C PV 139.9 degF SP 140.0 degF Out 12.6 % Stat Active
HW TES Control
Tank Status Enabled
TES-2041
Hot Water TES Load 34.0 MMBtu
To OSHPD
From OSHPD
TT-P2045A 129.9 degF
25.4 psi
PY-2040R 25.4 PSI
25.4 psi
TT-HRC2011E 139.9 degF
FT-HRC2061 2920.3 gpm
PDT-P2040A 21.0 PSID
PDY-P2040 21.0 psid
PDT-P2040B 21.0 PSID
CV-2061C 12.6 %
(OSHPD) ZSO-2123C
PDC-2041 PV 21.0 psig SP 21.0 psig Out 83.8 % Stat Active
FT-HRC2011B 5241.7 gpm
CV-2011C 100.0 %
TT-HRC2011A 145.2 degF
HRC-2011
41 MMBH
TT-HRC2011B 129.7 degF
CV-2011B 64.1 %
P-2041 Running 83.8 %FS
Pmp Info
TIT-2040R 130.1 degF
CV-2011D 0.0 %
P-2042 Running 83.8 %FS
TIT-2061R 130.2 degF
FT-TES2123C -1.8 gpm
TT-TES2123VV 140.9 degF
Discharging
LT-TES2123A 73.273 ft
LY-2123 73.3 ft
LT-TES2123B 85.500 ft
Capacity 16.5 % 52.3 MMBtu
HWS Mode Downstream
JY-2123 34.0 MMBH
Time To 100% 3.8 Hours
Time To Empty -3.8 Hours
FT-HRC2012B 5.5 gpm
CV-2012C 0.0 %
TT-HRC2012A 128.3 degF
Comm Loss
0 MMBH
TT-HRC2012B 96.0 degF
CV-2012B 0.0 %
P-2043 Stopped 0.0 %FS
CV-2123A 100.0 %
TT-TES-2123TT 158.2 degF
CV-2012D 100.0 %
CV-2123H 0.0 %
FT-HRC2013B 8.6 gpm
CV-2013C 0.0 %
TT-HRC2013A 128.6 degF
HRC-2013
0 MMBH
TT-HRC2013B 126.7 degF
CV-2013B 0.0 %
P-2061 Stopped 0.0 %FS
FT-HX2061A 579.6 gpm
DeOx_MU_Pump Stop
FT-TES2123A 2540.4 gpm
CV-2013D 100.0 %
CV-2123O 100.0 %
CV-2061A 0.0 %
TT-HX2061A 103.7 degF
TT-HX2061B 99.6 degF
P-2062 Stopped 0.0 %FS
DeOx Skid
TT-TES2123RR 157.1 degF
Hot Water Campus Load 221.1 MMBtu
1 MMBH
From Condenser Water Loop
To Cooling Towers
From HRC Plant Side Stream Filt.
(OSHPD) ZSO-2123A
To/From OSHPD
82.50
79.75
77.00
74.25
71.50
68.75
66.00
63.25
60.50
57.75
55.00
157.0 degF
159.6 degF
159.9 degF
159.3 degF
159.5 degF
159.1 degF
157.4 degF
156.3 degF
154.7 degF
152.6 degF
151.4 degF
150.7 degF
149.9 degF
149.1 degF
160.0 degF
146.9 degF
145.0 degF
143.9 degF
142.9 degF
142.3 degF
141.7 degF
140.3 degF
139.6 degF
133.2 degF
131.8 degF
131.6 degF
131.0 degF
130.3 degF
130.5 degF
130.5 degF
131.3 degF
130.2 degF
130.4 degF
130.1 degF
130.4 degF
PT-TES2123B 1.5 "WC
FY-TES2123 2545.6 gpm
CV-2123B 100.0 %
TT-TES-2123UU 129.6 degF
(OSHPD) ZSO-2123B
TT-TES2123SS 129.8 degF
FT-TES2123B 2588.2 gpm
Facility Overview
Chilled Water System
Hot Water System
Condenser Water System
Process Steam Plant
Electrical Systems
System Info
Historical Trends
Process Alarms
Alarm & Event History
Previous Screen
HRP Hot Water Overview
TES Overview
Heat Exchanger 2061
OSHPD Hot Water Overview
Hot Water System Overview
Roth Way Pump Station

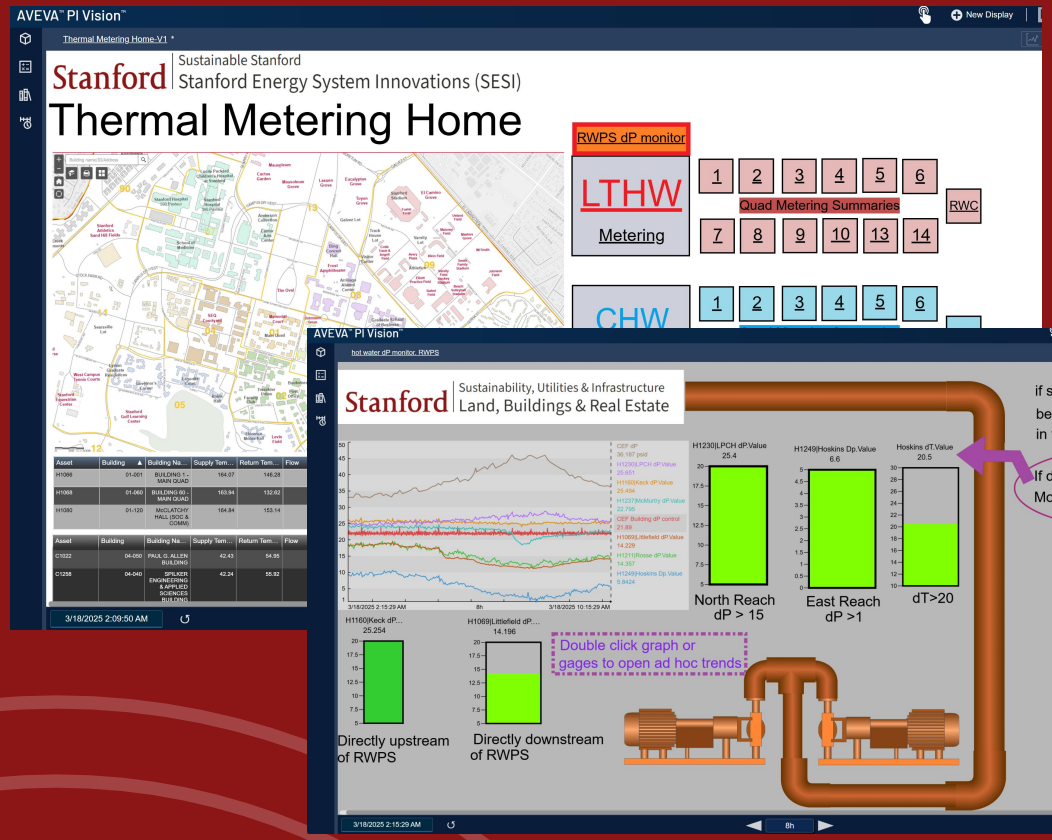
AVEVA™ System Platform improvements

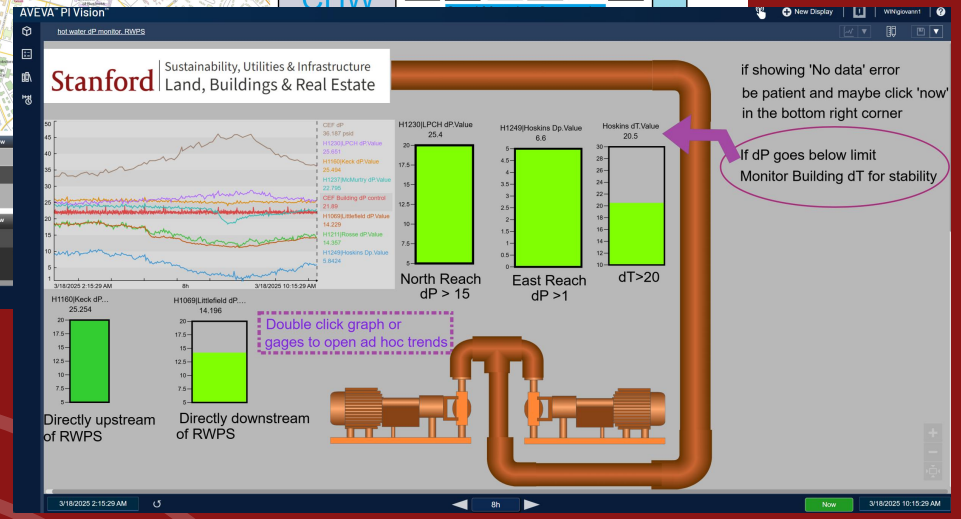
- Lower cost to convert to AVEVA System Platform than to upgrade existing DDC system
- Less failures, more uptime, more reliability.
- Can be operated and optimized centrally and remotely
- Sustainability and longevity
- Robust integrated solution with minimal customizations.

Goodbye DCS Rigidity —

Hello Pi Flexibility

AVEVA™ PI for utility monitoring and engineering





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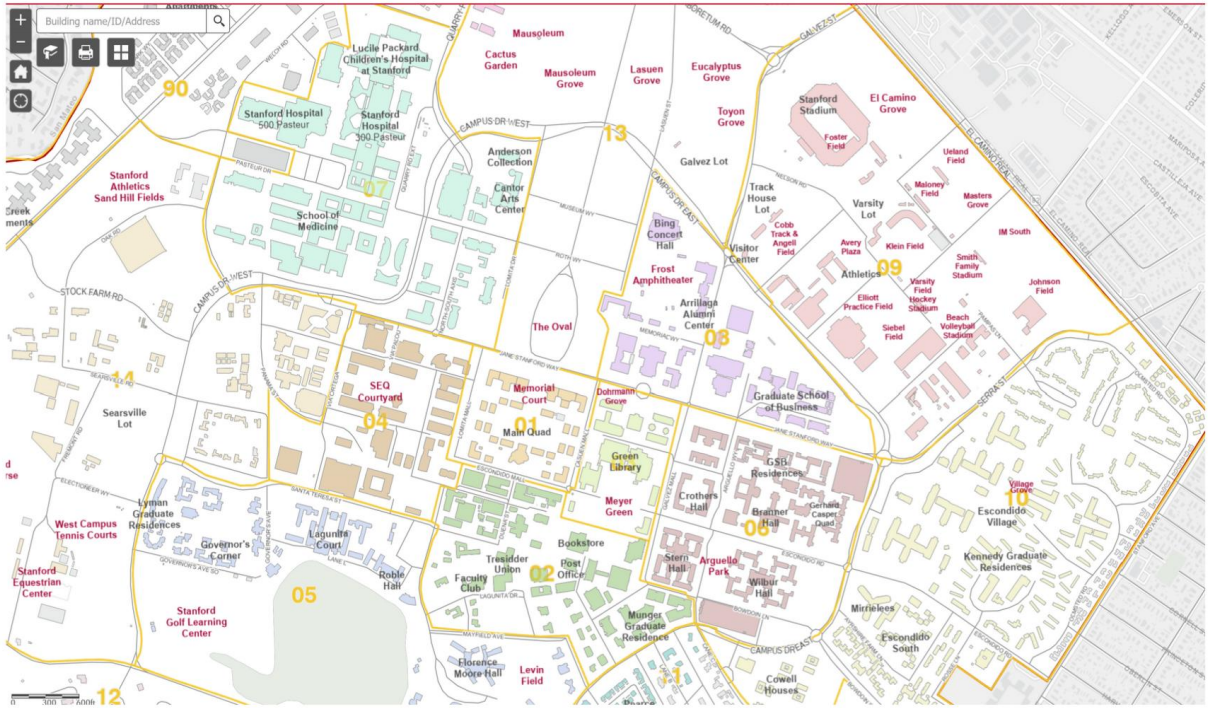
Thermal Metering Home



RWPS dP monitor

LTHW Metering

1 2 3 4 5 6
Quad Metering Summaries
7 8 9 10 13 14
RWC

CHW Metering

1 2 3 4 5 6
Quad Metering Summaries
7 8 9 10 13 14
RWC

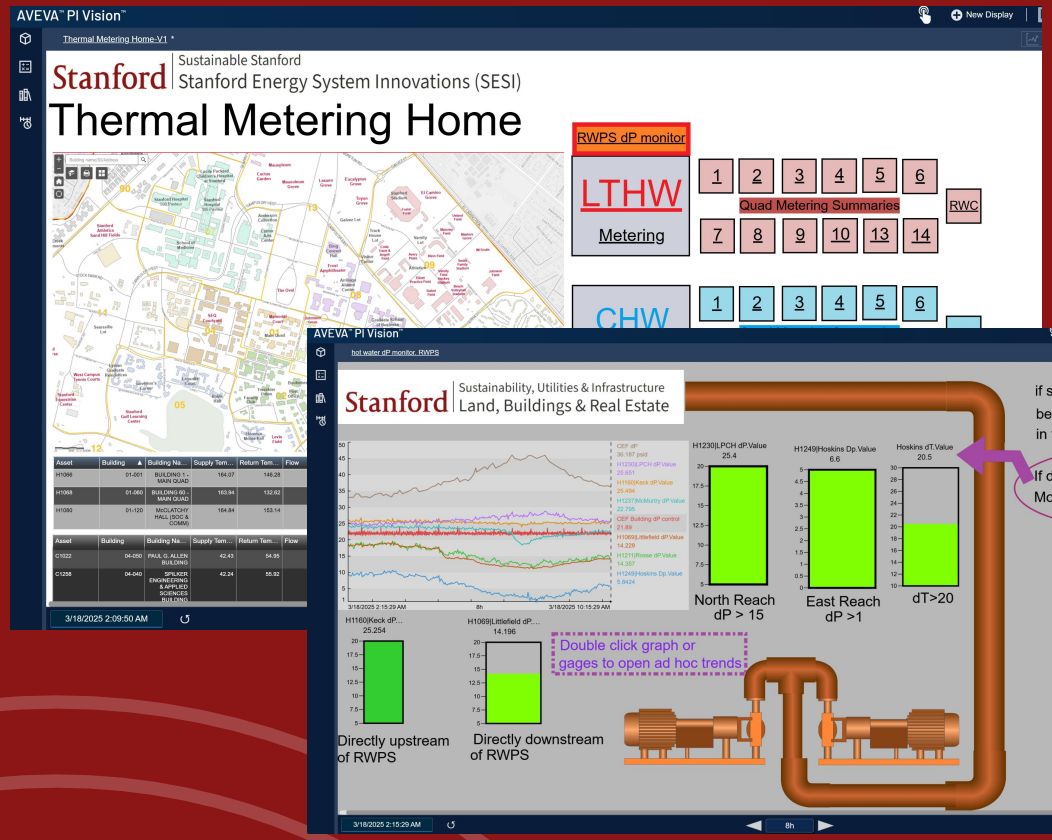
Steam

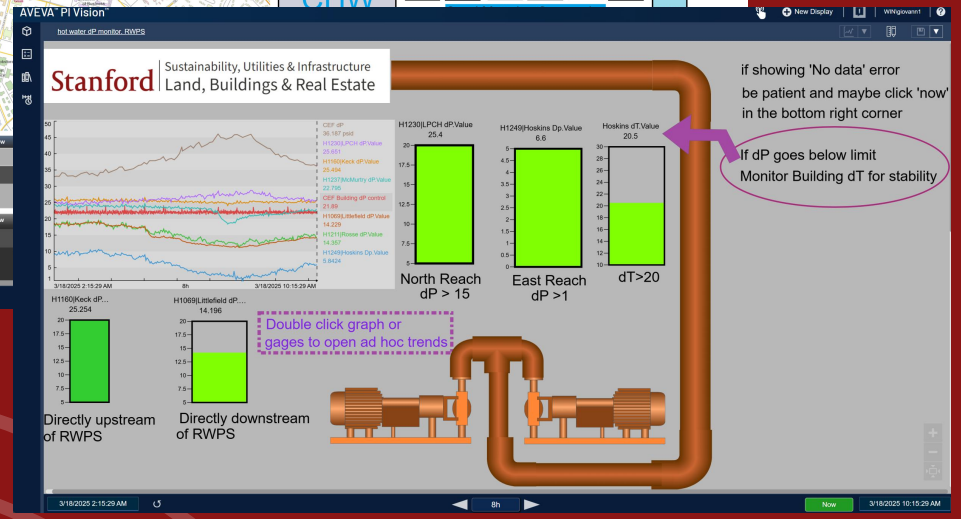
Asset	Building ▲	Building Na…	Supply Tem…	Return Tem…	Flow	Demand	Meter	Supply Pre…	Return Pres…	Consumption
H1066	01-001	BUILDING 1 - MAIN QUAD	164.07	146.28	66.57	580.06	H1066	55.38	37.37	18,573,310
H1068	01-060	BUILDING 60 - MAIN QUAD	163.94	132.62	47.99	738.23	H1068	59.51	37.45	18,825,768
H1080	01-120	McCLATCHY HALL (SOC & COMM)	164.84	153.14	66.04	378.84	H1080	68.92	53.83	6,643,063.5

Asset	Building	Building Na…	Supply Tem…	Return Tem…	Flow ▼	Demand	Meter	Consumption	Supply Pre…	Return Pres…
C1022	04-050	PAUL G. ALLEN BUILDING	42.43	54.95	284.45	148.56	C1022	2,388,684.75	65.57	42.31
C1258	04-040	SPILKER ENGINEERING & APPLIED SCIENCES BUILDING	42.24	55.92	256.40	145.73	C1258	557,258.75	65.41	41.62

Name	Description	Value	Units	Trend
S1054|Demand	Main 07-340 Meter	168.93	lb/h	
S1071|Demand	Main 07-530 Meter	201	lb/h	
S1072|Demand	Main 07-530 Meter	206.3	lb/h	
S1073|Demand	Main 07-330 Meter	83	lb/h	
S1074|Demand	Main 07-330 Meter	470	lb/h	
S1075|Demand	Main 07-520 Meter	0.8	lb/h	
S1077|Demand	Main 07-570 Meter	0.5	lb/h	

AVEVA™ PI for utility monitoring and engineering





AVEVA™ PI Vision™

New Display | WIN\giovann1

hot water dP monitor. RWPS

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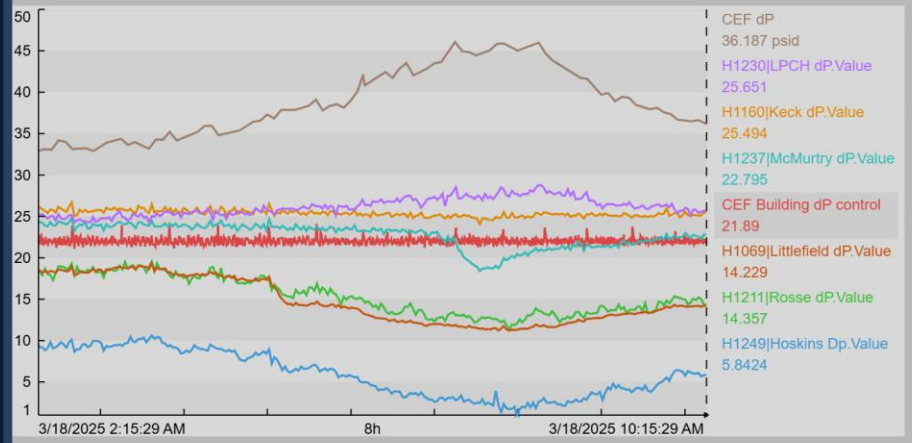
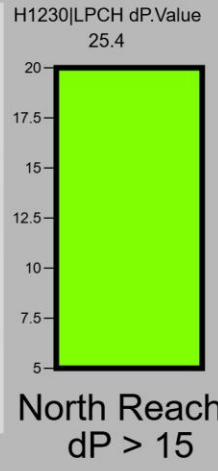
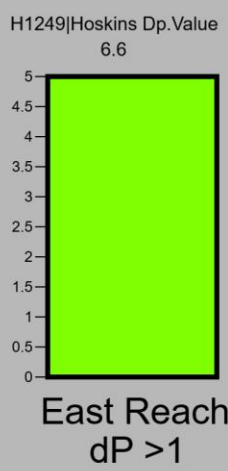
Land, Buildings & Real Estate

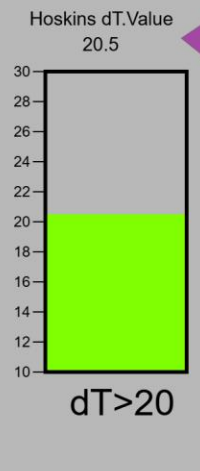




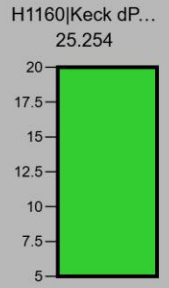
North Reach
dP > 15



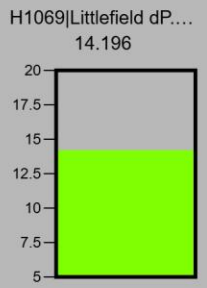
East Reach
dP >1



dT>20

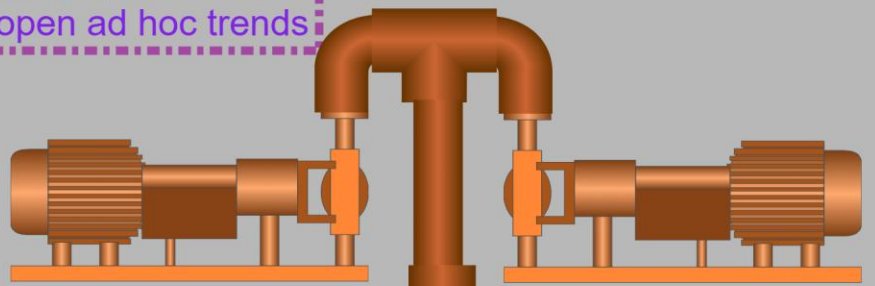


Directly upstream
of RWPS



Directly downstream
of RWPS

Double click graph or
gages to open ad hoc trends

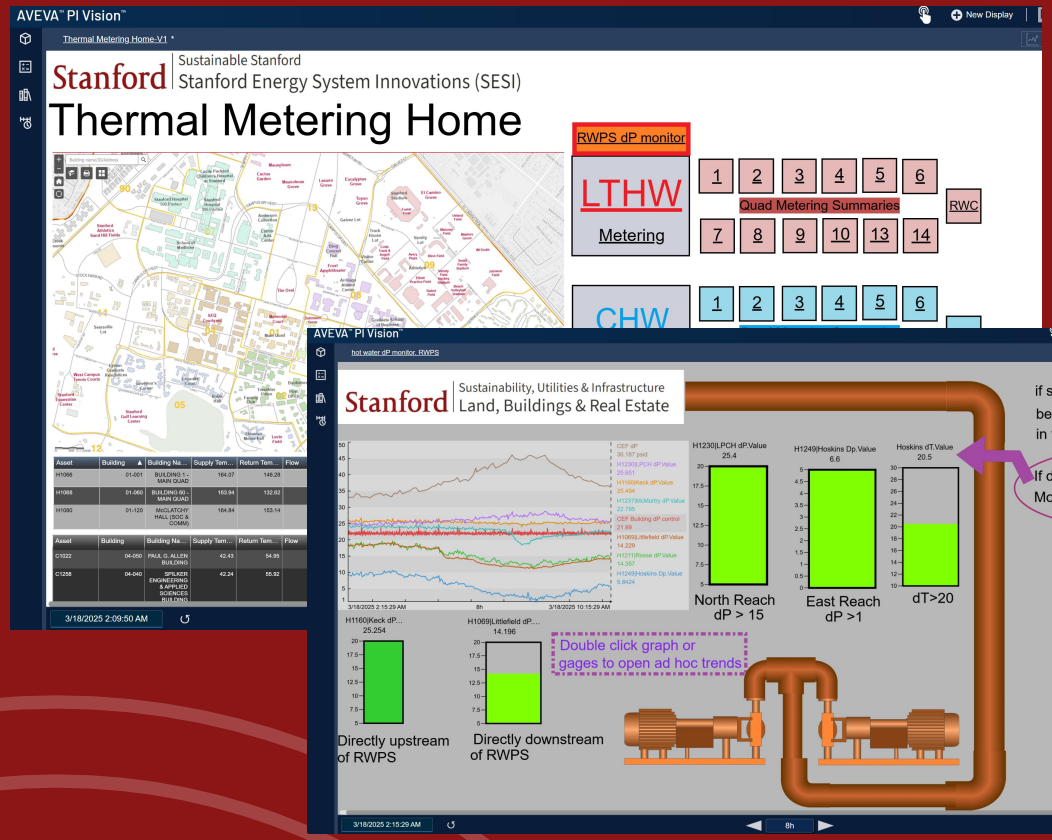


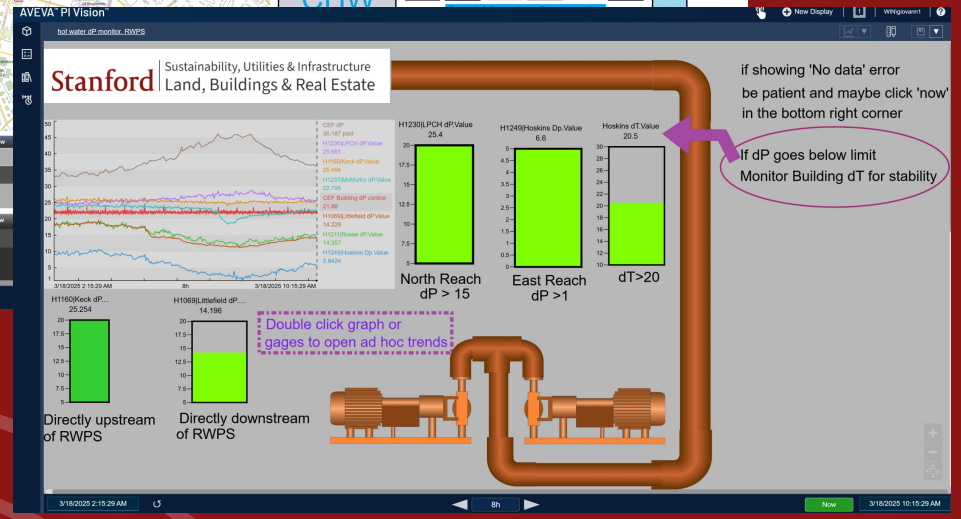
if showing 'No data' error
be patient and maybe click 'now'
in the bottom right corner

If dP goes below limit
Monitor Building dT for stability

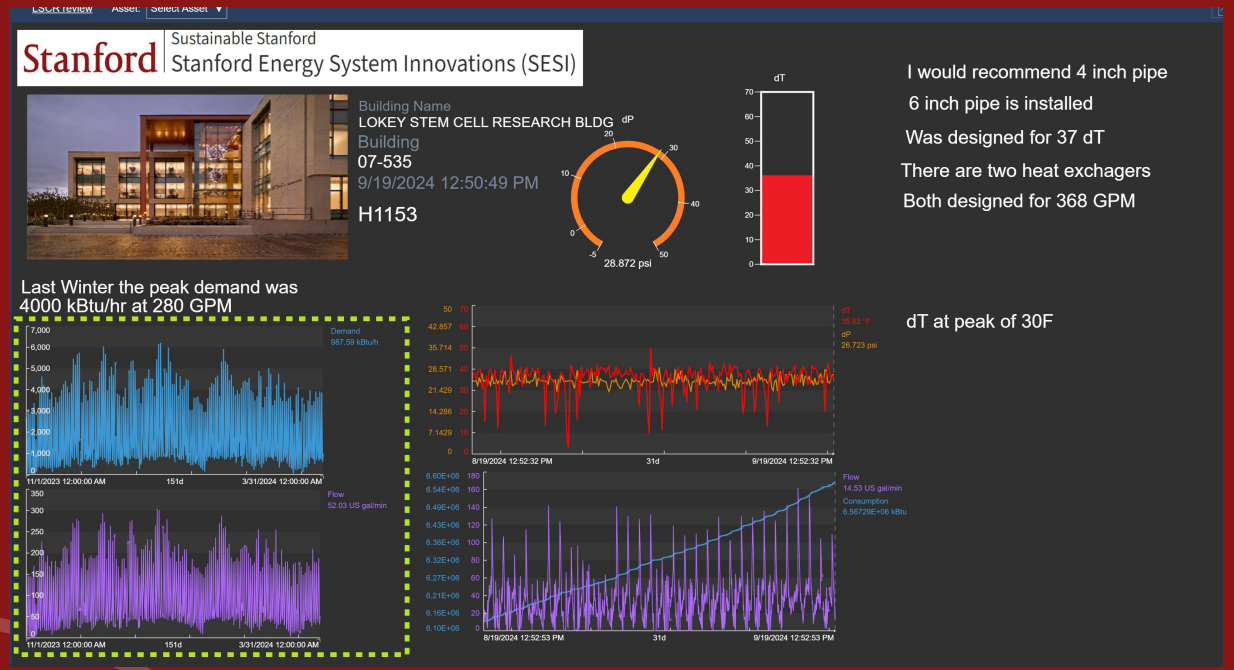
3/18/2025 2:15:29 AM | 8h | Now | 3/18/2025 10:15:29 AM

AVEVA™ PI for utility monitoring and engineering



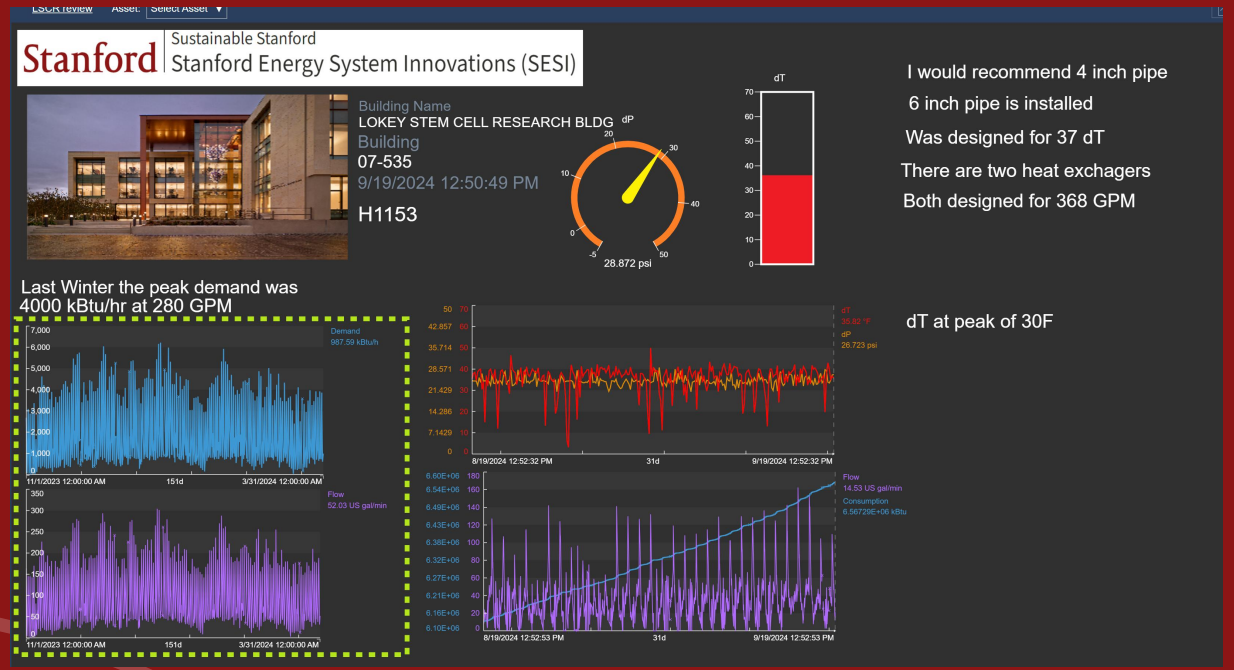


AVEVA™ PI Vision for operations and reporting



Pi Vision for operations and reporting

AVEVA™ PI Vision for operations and reporting



LSCR review Asset: Select Asset

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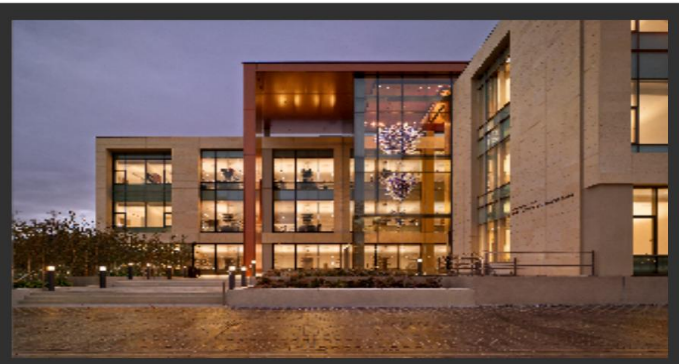
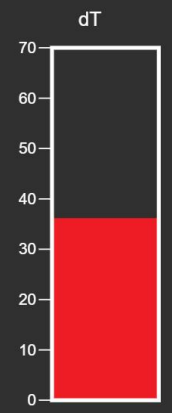


Building Name
LOKEY STEM CELL RESEARCH BLDG
Building
07-535
9/19/2024 12:50:49 PM

H1153



I would recommend 4 inch pipe

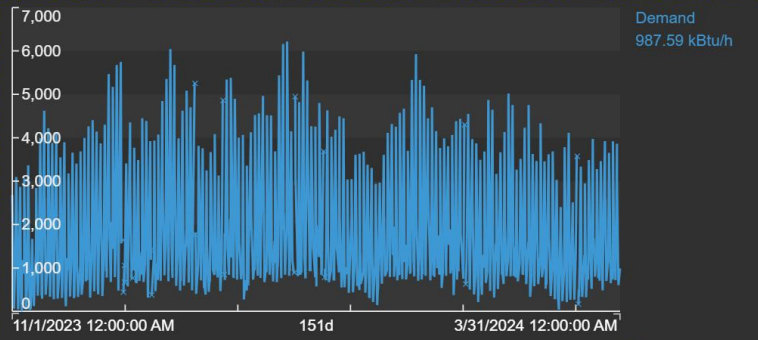
6 inch pipe is installed

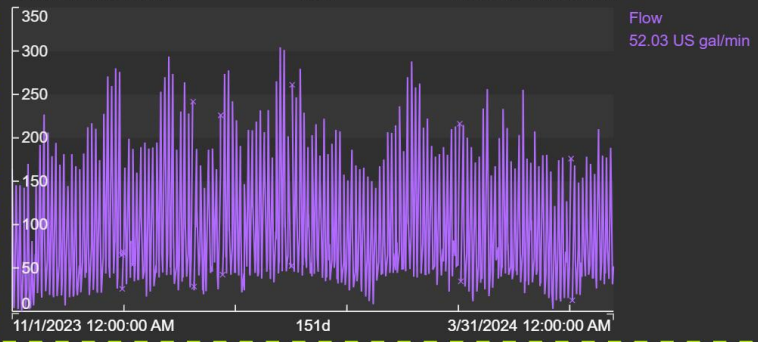
Was designed for 37 dT

There are two heat exchagers

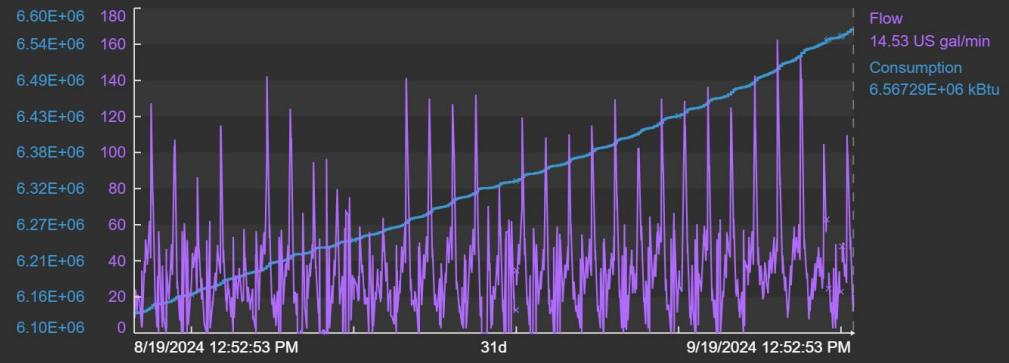
Both designed for 368 GPM

Last Winter the peak demand was
4000 kBtu/hr at 280 GPM

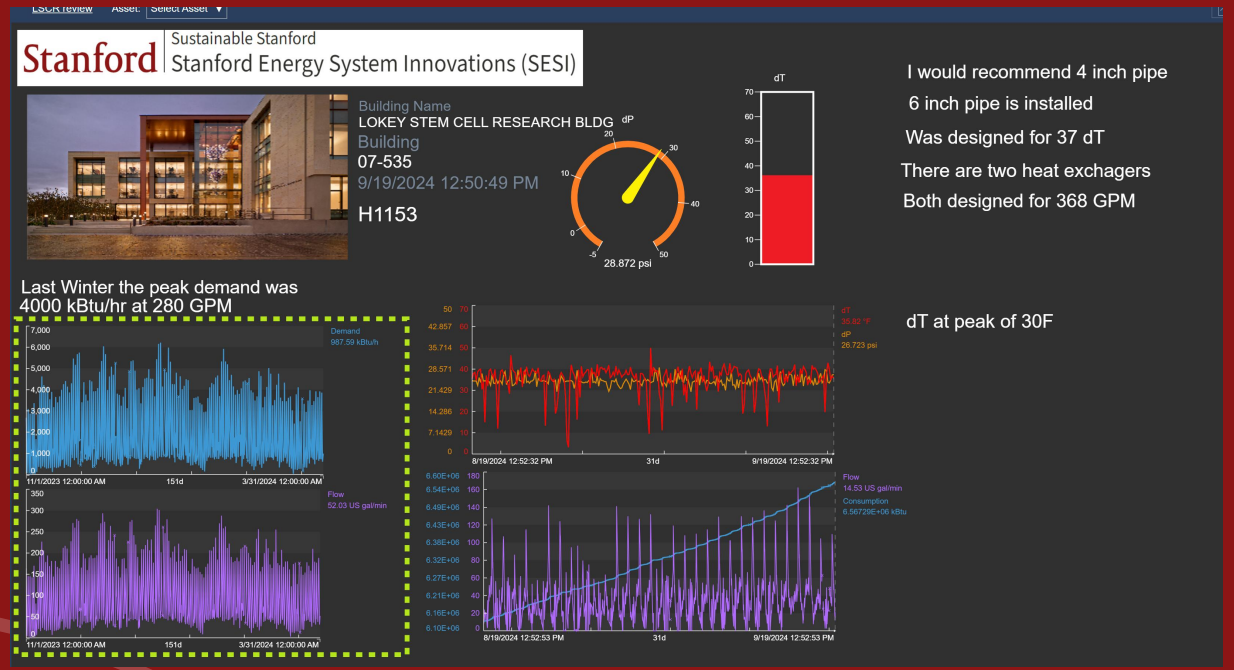




dT at peak of 30F

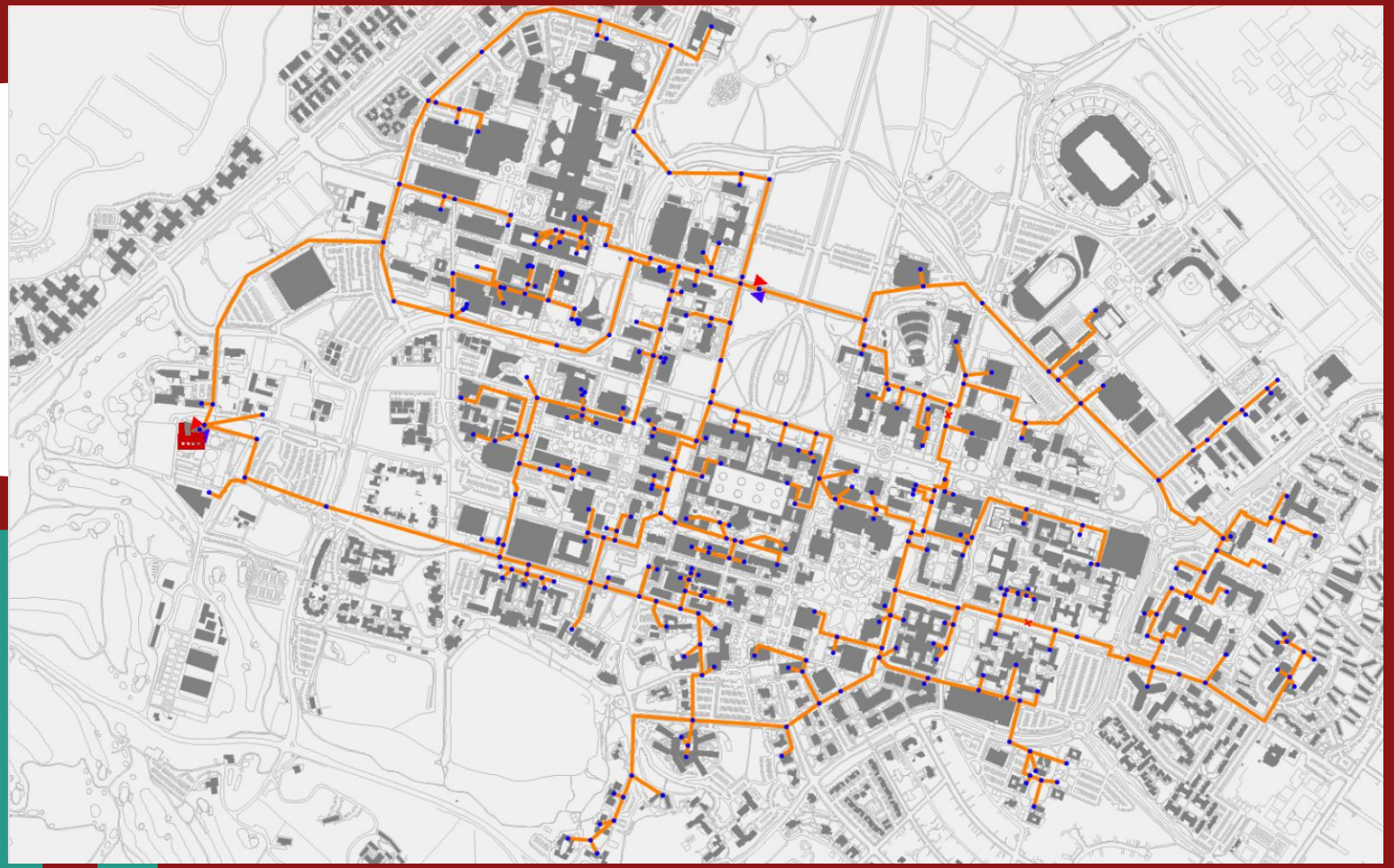


AVEVA™ PI Vision for operations and reporting



PI datalink and Energis

With Pi, all the barriers to my data disappear.



1000 sensors
350 meters
40 miles of pipe
Supported by Pi

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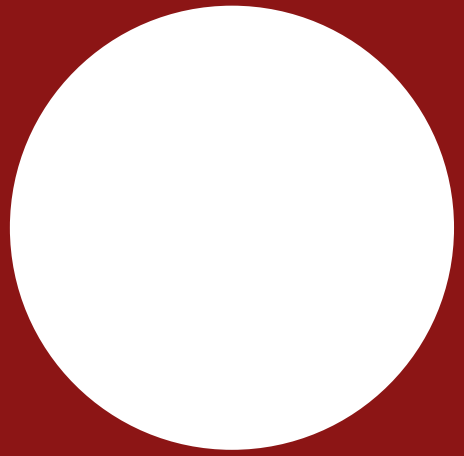
Stanford University's utility systems are over 99% reliable

Challenge
- Equipment could not be centrally optimized or operated
- Data accessibility and analysis challenges
- Rigid and cumbersome controls and operations data infrastructure

Solution
- Transitioned from a DDC system to a PLC system to operate the plant using AVEVA System Platform
- Implemented data analytics using AVEVA Pi System

Results
- Improved reliability and confidence in the system with $3,000,000 capital investment savings
- Reduced time to push changes to SCADA data objects to under 20 seconds
- Converted from DDC to PLC control, increasing reliability to 99+%
- Streamlined reporting and troubleshooting of revenue meters by standardizing data assets and tags



Questions