

Chillin' Idaho

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North Campus Chiller Plant

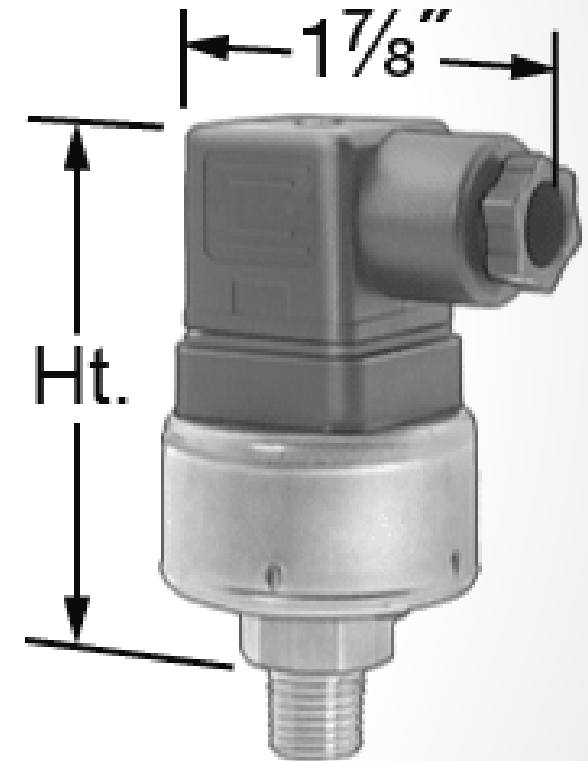


Problem Definition

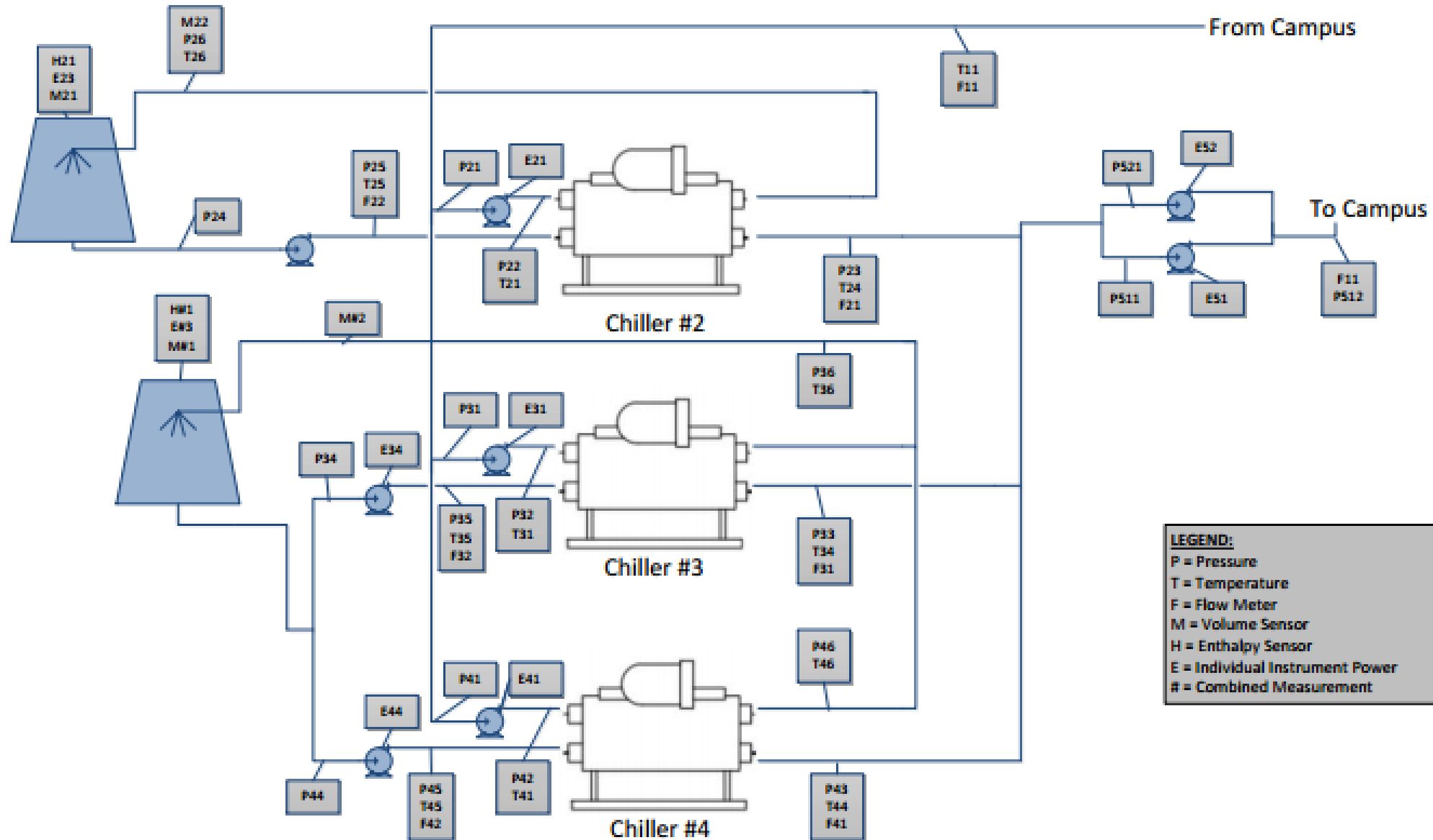
- Data collected from the North Campus Chiller Plant's operating conditions will allow for the validation of our math model(E.E.S.)
- All of chiller two's sensors and data acquisition devices are currently installed and we are able to run the code
- We are still waiting for sensors and data acquisition devices for chiller three
- Chiller four is likely to be moved to the South Campus Chiller Plant so the code we have for it can be used for a future Capstone project

Instrumentation

- 23 pressure sensors:
 - 13 sensors ranging from 0 to 300psi
 - 5 sensors ranging from -15 to 560psi
 - 3 sensors ranging from -15 to 300psi
 - 2 sensors ranging from 0 to 150psi

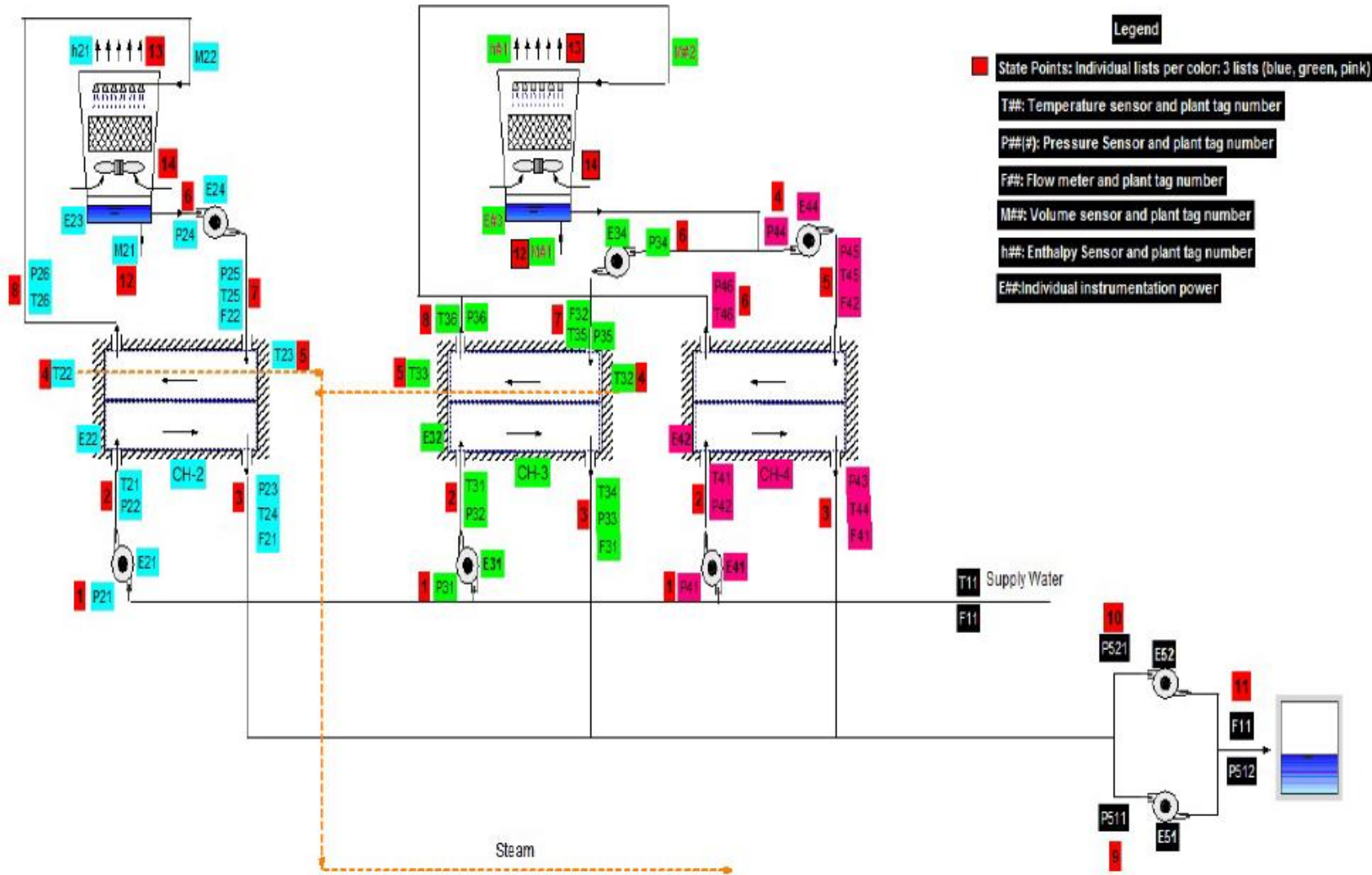


Visio Model



LEGEND:
P = Pressure
T = Temperature
F = Flow Meter
M = Volume Sensor
H = Enthalpy Sensor
E = Individual Instrument Power
= Combined Measurement

EES Diagram



Relevant Variables

$$\dot{Q}_{\text{CH2,EVAP}} = 1310 \text{ [Btu/s]} \{393 \text{ [tons]}\}$$

Heat exchange rate through the evaporator of CH-2

$$\dot{Q}_{\text{CH2,COND}} = -2200 \text{ [Btu/s]} \{-660 \text{ [tons]}\}$$

Heat exchange rate through the condenser of CH-2

$$\dot{Q}_{\text{load,CT2}} = -8676 \text{ [Btu/s]} \{-2603 \text{ [tons]}\}$$

CT-2 Load

$$\dot{Q}_{\text{CT,2}} = 696.8 \text{ [Btu/s]}$$

Heat transfer rate of the air through CT-2

$$\text{SHR}_{\text{CT2}} = 0.08274$$

Sensible Heat Ratio of CT-2

$$\varepsilon_{21} = 0.5834$$

CT-2 effectiveness (heat)

$$\varepsilon_{22} = 0.1606$$

CT-2 effectiveness (mass)

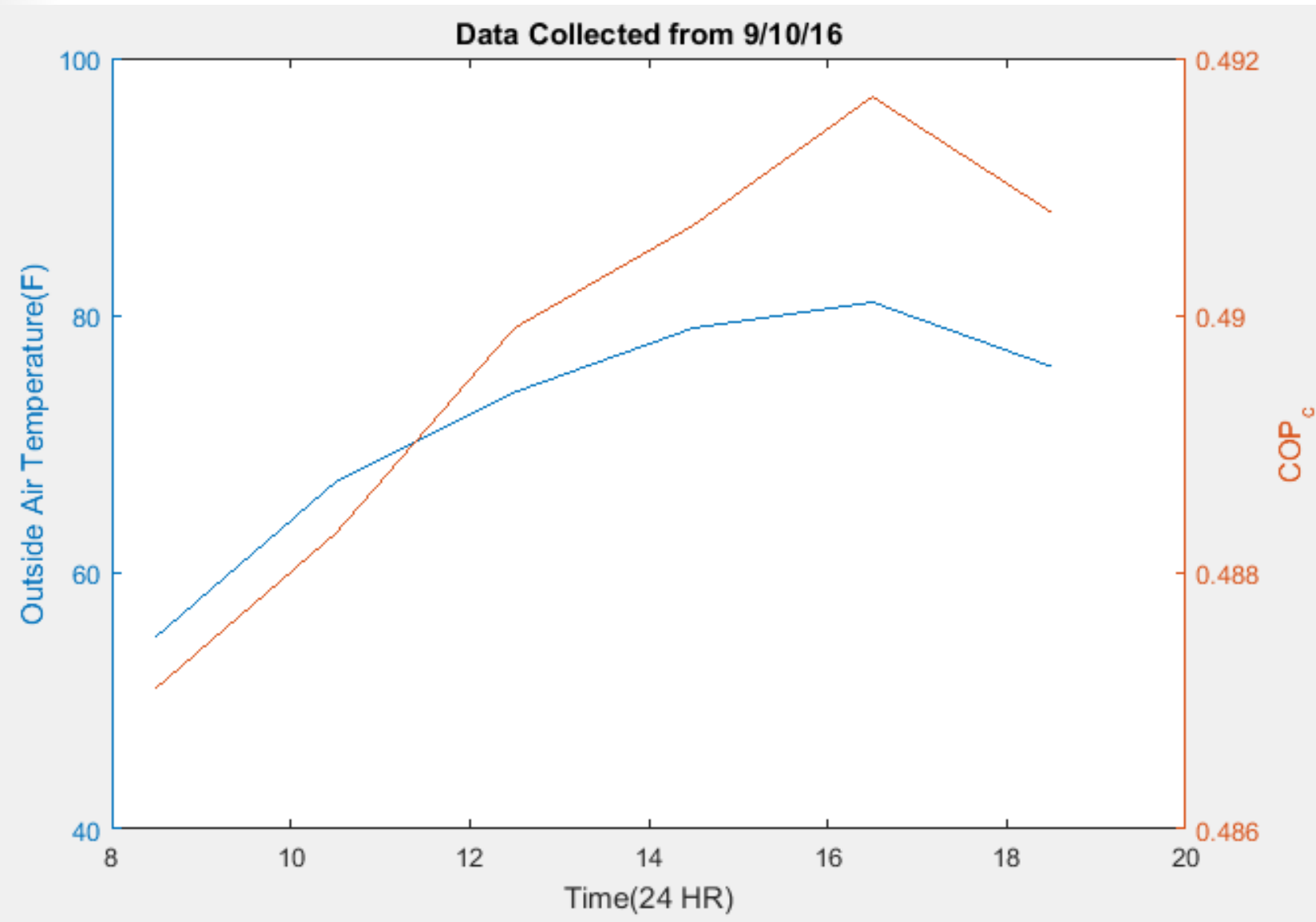
$$\text{COP}_{\text{c,2}} = 0.5069$$

COP_c rating of CH-2

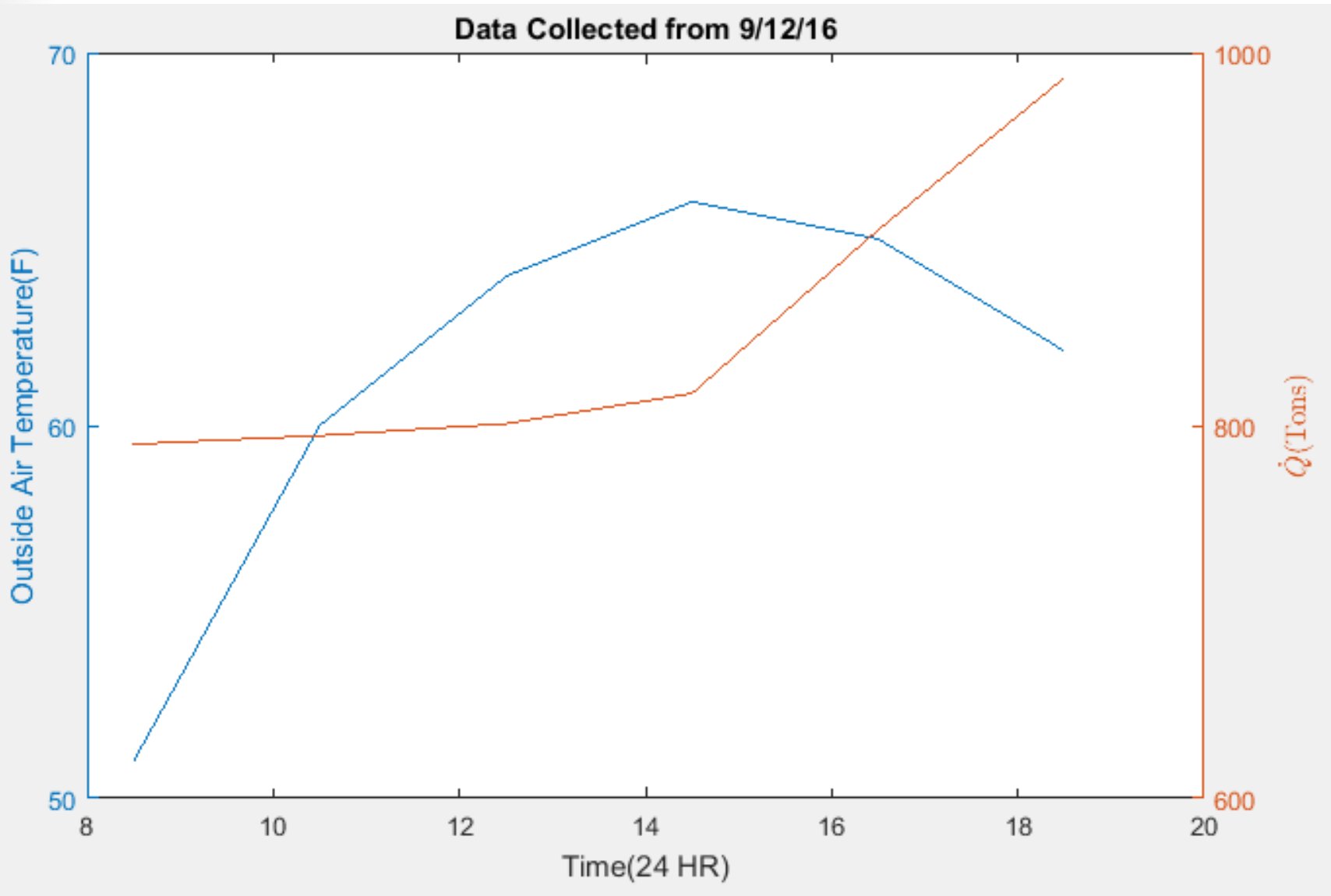
Performance Plot (Hot Day)



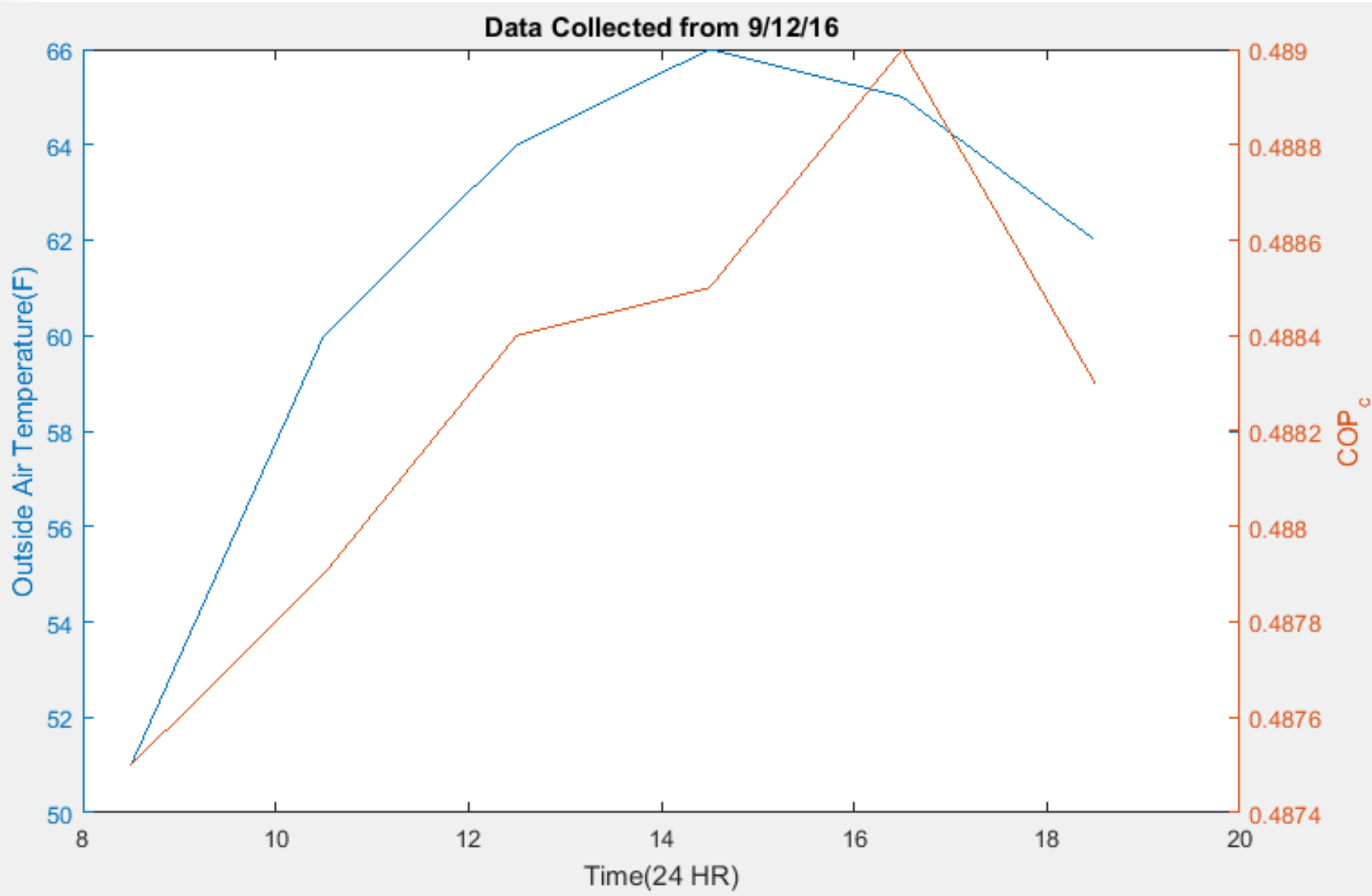
Performance Plot (Hot Day)



Performance Plot (Cold Day)



Performance Plot (Cold Day)



Progress So Far

- Inventory of sensors completed
- Installation of sensors and data acquisition for chiller two has been completed
- P&ID Model (Visio) has been completed
- Math model (EES)

Future Plans

- **Get all required sensors and data acquisition installed for chiller three**
- **Collect data**
 - Utilize the electronic sensors to collect the necessary data from chillers two and three
- **Revise math model**
 - Make final adjustments to the math model based on feedback from facilities users
- **Find a way to import collected data into EES**
 - Document procedure for transferring ATS data into EES model

Thank You... Questions?



University of Idaho