SOLUTION OVERVIEW
University of Utah Health carried out a retro-commissioning (RCx) project to understand the high use of chilled water (CHW) at the properties and optimize air handling units (AHUs). After making updates to the CHW and AHUs to improve systems the energy team then installed a building energy management information system (EMIS) to maintain and monitor performance. With results in hand, the energy team used the EMIS to both optimize energy use and have better access to the building systems’ key performance indicators (KPIs). The energy team found 38% annual CHW savings from the upgrade and collected that data to make the business case to repeat this process in future projects.

CHALLENGE
Wasted energy due to excess use of chilled water and air handling units.

SOLUTION
Retro-commissioned building systems to understand and optimize performance; installed EMIS to ensure efficient operations.

OUTCOME
38% annual CHW system savings and high-performing, optimized building CHW system.

PROCESS
The energy team at University of Utah Health wanted to better understand chilled water use and optimize air handling units, after noticing high energy usage from both of those systems. The team utilized a planned retro-commissioning project to provide that information. After funding approvals from the C-suite and directors, the energy team invested in a 3,000-point EMIS platform to pilot at their Critical Care Pavilion. The EMIS was used as an RCx tool to ensure the persistence of savings over time.

The energy team at the University of Utah Health started the RCx process by purchasing a small pilot-level EMIS package that would cover one building. The first project called for the application of a smart sequence of operation programming to each CHW valve, which would allow the building’s CHW system to take advantage of free cooling during the cold months, eliminating most winter
CHW usage. To make this programming work, the energy team had to install new airflow monitoring stations in all seven air handling units (AHUs) and relocate the differential pressure (DP) monitoring station to a more feasible location for the project. Once the new sequence was applied to each CHW valve, the last step was to sequence the CHW pumps so that they would only run one-at-a-time, instead of all three at once.

The figure below shows the results of the CHW valve position during the first winter of testing, where four out of seven performed well. The energy team monitored the EMIS and had weekly meetings with the controls shop and controls contractor to go over the performance. If they saw that one of the valves was not performing as it should, they could use the data from the system to mitigate quickly.

The figure below shows the CHW valves that did not perform as expected. These two valves have longer underground OSA intake tunnels, so their economizing capacity was slightly limited. AHU 5, for example, serves multiple operating rooms, so it needs to have a lower setpoint than normal. Though it took some time, the team was able to use real-time data to tweak the programming, showing an improvement in performance by late January.
The team determined the CHW doesn’t require as close monitoring during the summer, as the need to chill water is to be expected, but they found that beginning to monitor the valves in the EMIS early in the fall is crucial to achieving high performance over the course of the year.

PARTNERSHIPS
University of Utah Health collaborated with their utility, Rocky Mountain Power, on the project. Rocky Mountain Power walked the building with the energy team, looked at the building automation systems, and gave project suggestions. Once the energy team selected the project, Rocky Mountain Power provided a complimentary preliminary savings estimate, which helped the team make the business case to the C-suite and directors.

MEASURING SUCCESS
The threshold for an energy project for University of Utah Health is a simple payback of 2 years or less. The savings from this project show a simple payback of five months:

- Total Cost: $48,377
- Incentives (Rocky Mountain Power): $20,019
- Post-Incentive Cost: $28,358
- Annual Savings: $67,828
- Simple Payback: 5 months

The energy team meets twice a month with the controls shop and contractors to troubleshoot performance challenges with the system and brainstorm solutions.

OUTCOMES
Since the completion of the RCx process and the installation of the EMIS, University of Utah Health has seen the following improvements:

For more information, visit https://betterbuildingssolutioncenter.energy.gov
22,072 MMBTU savings
163,954 kWh savings
38% CHW system savings
Estimated $189,454 utility savings

The energy team will be partnering with the Facilities Department on the main campus to implement an Air Handler Optimization Project in all hospitals & clinics over the next several years, and the EMIS will be used as a commissioning tool for this project. In the future, when the University has large remodels that include upgrading AHUs, they can use RCx/EMIS process to ensure the proper functioning of the equipment upon completion and prevent performance drift.

Going forward, the University has the ability to upgrade to a larger EMIS package that could accommodate all 19 health system buildings. With this many buildings on the horizon, the energy team is looking to create a dashboard to keep track of all the important key performance indicators to support future investment into the systems.