The facility personnel implemented these recommendations and are now saving 12.8% of their baseline energy usage every year

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Aurora St Lukes – Site Visit Notes UPDATED
February 17, 2009
Brian Basken

1. Boiler steam pressure is about 125 psi. In most hospitals, this can be lowered (to about 90 PSI) because the highest pressure needed at the end devices is 60 PSI at the sterilizers. There may be issues at this facility that will not allow this pressure to be reduced. One issue is that lowering the pressure will shorten the amount of time between a boiler failure and the sterilizer pressure getting too low. We've been told that when the sterilizer pressure/temperature gets too low, they are somehow locked out and a technician from Illinois has to come onsite and reset them. Another concern with lowering the steam pressure is moisture carryover in the steam header. James will be providing me with steam production logs. I will make an estimate of energy saved if the steam pressure can be lowered to 90 PSI. We can then discuss if we want to pursue this.

2. The Flagstore has published hours, and the VAV boxes are controlled by JCI VMA controllers. These VAV boxes can be put on a time of day schedule that corresponds to the actual space usage. When the boxes are unoccupied, the air damper will be closed and the reheat coils off. This will save fan energy, chiller cooling energy and reheat energy.

3. Nuclear Medicine – This space has pneumatically controlled terminal devices, which does not allow us to shut down during unoccupied hours. However, this unit is served by a single AHU which could be on a time of day schedule. There may be an issue with providing continuous air changes in certain spaces because of radioactive particles. This needs to be discussed with the staff in this area.

4. The patient tower hot water heat exchanger has a reset schedule from 140°F to 180°F. We did not find the outside air setpoints that correspond to these hot water temperatures. We looked at the AHU hot water valves, and several of the reheat valve positions. None of them were very far open. We feel that a program should be added that looks at all hot water valves in this loop, and resets the hot water setpoint based upon the most open valve. If all of the valves are less than 60% open, then the water temperature is too high and the hot water setpoint can be lowered. If one hot water valve is greater than 80% open, then the water temperature is too low, and the hot water setpoint can be raised. We would also look into lower the 140°F lower limit to 120°F.

5. We recommend this type of heat exchanger reset for all DDC controlled heat exchangers where the valves are also DDC controlled.

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6. We looked at two steam to hot water converters that are still pneumatically controlled and did not appear to have an outdoor air reset schedule. We recommend upgrading these to be DDC controlled and have a reset schedule added, either an outdoor reset or by using terminal device valve feedback.

7. The patient tower AHUs were controlling to a duct static pressure setpoint of 1.5". There were points on the BAS that looked like there was a static pressure reset between 0.8" and 1.5". Mike is going to communicate with JCI and determine what that reset is. Similar to the hot water reset by valve position, we recommend adding logic to reset the duct discharge static pressure setpoint based up the VAV damper positions. We reviewed all of the VAV air damper positions today, and the most open air damper was only 47% open. Most of the air dampers were less than 30% open. The static pressure could have been much lower than 1.5" today and the spaces would still have been satisfied.

8. There are 6 surgeries in this patient tower. They each have a constant volume box and a VAV box serving them. Each space has an occupancy sensor that increases the airflow to the required air change rate when the space is occupied. When the space is unoccupied, the airflow is reduced, the space temperature and humidity are maintained, and the space pressure is still positive with respect to the corridor. This control logic is very energy conserving. We recommend replicating this in the other nearly 30 surgery rooms, cath labs, and procedure rooms. We can estimate the energy savings, get an estimate to modify the controls to meet this sequence, and provide a simple payback to upgrade the controls in these spaces.

9. We were told that some surgery rooms have more than the code required air changes. If we can get a copy of the balance reports, we can estimate how much energy is being wasted by these excessive air changes. You can then take that information to the staff in those areas and convince them that the air changes should be reduced to the acceptable quantity.

10. The Schroeder building has an enthalpy heat recovery wheel that was doing a good job of recovering heat today. We discussed having the wheel operate at minimum speed during economizer times to avoid the media in the wheel sagging.

11. We reviewed the 5,000 ton chiller plant and the 1,500 ton chiller plant. The 5,000 ton chiller plant is controlled by JCI hardware. The system pumps are an ITT pumping package where the system differential pressures are input to this pumping package. We recommend having the differential pressure sensors input directly into the JCI system and then control the pump speeds. Since the BAS knows what all chilled water valve positions are, the static pressure setpoints can be adjusted intelligently.

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12. The 1,500 ton chiller plant in the patient tower is controlled by the Systecon control system. The BAS has no ability to make any programming changes. We recommend re-using all inputs and outputs, but connect them to a new JCI panel. From the description of tower operations we were given, it does not appear to be the most energy efficient. The piping arrangement at the towers would allow using the entire 1,500 tons of tower when only one chiller is operating. This would greatly reduce the fan energy needed to maintain the condenser water temperature at setpoint. Depending on the cost of the control upgrade, this option may not have decent payback.

13. There are some whole floors in the center building where they are all office spaces. These terminal devices are pneumatically controlled, which can't be unoccupied. We can get the mechanical drawings and review the cost to add a zone damper as the branch duct comes out of the riser. The airflow to these spaces can be shut off during unoccupied hours. We also recommend adding a few occupancy sensors that would override these dampers open if someone entered a corridor in these spaces when the zone damper was closed. This idea should have excellent payback.

14. There are likely many DDC controlled VAV boxes that could be unoccupied at nights. This will require some investigation to determine which boxes can be put on a time of day schedule.

15. A few AHUs in the Knisley building are still pneumatically controlled. There is a plan to upgrade these to DDC. This is a good idea and the improvement in controls will save some energy.

16. The existing AHUs switch to economizer mode on a dry bulb economizer setpoint of 55°F outside air temperature. We recommend adding an outside air humidity sensor, and then comparing the outside air enthalpy with the return air enthalpy to determine whether a unit economizes. There are many hours per year where the outside air temperature is between 55°F and 65°F and using this outside air can reduce the chiller load. The AHUs that we looked at all had return air temperature and humidity sensors in place.

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17. There are several constant volume AHUs with DDC control and pneumatic controlled reheat coils. These units will waste a lot of energy because the DDC system does not have feedback from the spaces. The staff is presently manually adjusting the discharge setpoint to 55°F in the summer and 60°F in the winter. We would like to automate this and add some control logic. We believe that the discharge air setpoint can be reset up a few degrees every night, which will save cooling energy in the summer and a lot of reheat energy throughout the year. These setpoints should be easily adjustable by the staff so that if we get too aggressive and you start hearing complaints, we can adjust the nighttime values down. We will also want to use the return air humidity sensor in the control logic to override the supply temperature back down at night if the return humidity gets too high. We may discover one or two rooms that require colder air at night than the rest. If that is the case, then we can look at the ductwork for those rooms and may be able to make some simple modifications that will allow us to reset the discharge air temperature up at night. If there are a dozen rooms that require cold air at night, then we would want to reconsider this reset on that system. My impression is that if 60°F air keeps the spaces comfortable in the winter, then the only reason to supply 55°F air is to better dehumidify in the summer. The systems should be able to supply 60°F air at night in the summer and possibly 65°F supply air at night in the winter.