**Campus Energy 5 year plan thoughts:**

1. We need to maintain the energy savings that have been achieved previously. We have done a good job in maintaining the savings, however some renewed focus would be helpful. A preventative maintenance program is being put in place to help maintain the savings.
2. RCx has been completed work in 50+ campus buildings covering over 7 million gsf and this includes most of the larger campus buildings at this point. There is still work to be done on campus. We have not touched most of the 5 million gsf of auxiliary space on campus including buildings like the **ARC, CRCE, Memorial Stadium, Harker Hall, ..etc. .** Funding needs to be secured before RCx can work in these buildings. There are buildings like the **Illini Union** that need larger control installation projects ($ 1 million +) prior to saving larger amounts of energy. In my opinion, if student sustainability funding or some other funding source could be applied to these projects in the near future that would be a good way to get these projects started.
3. The design work associated with the next round of large ESCO projects is just getting started on campus and these are scheduled to continue until 2022 at this point. 18 buildings have been selected for ESCOs to date and these are buildings with higher capital needs and larger energy consumption rates. These projects are likely to have the largest effect on reducing the net campus energy consumption in the next several years.
4. We need to invest in smart temperature control systems similar to the one installed at Vet Med as part of the ESCO project. We need a better way to identify energy and operational problems with HVAC equipment on campus. This is a new software technology that is starting to enter the marketplace. Care will need to be taken as this item evolves.
5. Lab ventilation schemes: Lots of potential energy savings in this area. Lots of fume hoods are not used for long periods of time. Movement towards VAV systems with occupancy sensors for unoccupied ventilation rates is advisable, in lieu of the constant volume systems with heat recovery. This can be an expensive proposition. We need a better way to manage campus fume hood inventory. More campus engagement is needed on this item. Can the departments facilitate a 20% reduction of operational fume hoods on campus?
6. We need to continue to retire the lingering older building level chillers that still exist on campus. We need to continue to utilize the campus chilled water loop where possible. Examples of buildings that fall into this category include **Swanlund, IUB Bookstore**, **Temple Buell, Harding Band Building, Campbell Hall, Plant Sciences, Noyes,** departmental level chillers within the Chemistry complex, etc. This will also reduce the maintenance work load to maintain these aging machines. Some of these chillers are near the end of their useful life at this point.
7. There is lots of diversity in the use of university space, typically this occupancy rate is around 25%. We are starting to be able to monitor this item via the campus DDC systems. Ideally we need to have an automated ventilation system which modulate as the space is utilized. An example of this would be occupancy sensors associated with DDC VAV boxes. The occupancy sensor detects where the space is being utilized and allows more airflow to flow from the VAV box. The temperature dead band range is tightened during times of occupancy. At a point in time in the near future it probably will be highly likely that the campus should **retire some of the pneumatically controlled room level systems** and move to DDC systems so that more visibility and/or control are given to these systems. It is likely that DDC VAV boxes will be recommended to replace pneumatically controlled VAV boxes in select areas of campus. Noteworthy also is that most new large capital projects on campus have incorporated this type of scheme into the HVAC system.
8. **Beckman, Madigan, and Animal Science** (future ESCO projects) are good examples of buildings that are operating 24/7. This is a good example of where **the room level pneumatic control system should be retired as a priority** and room level DDC system installed. These buildings have larger manifolded air handling units that can not be shut off at night because of the integral fume hoods with a continuous need for exhaust air in these buildings.

In some of the older campus buildings which have older constant volume systems w/ reheat, large capital projects may be needed to invest in more modern mechanical systems in order to achieve significant reductions in energy usage and individualized room control. Larger buildings that come to mind that are good examples of this are **Everitt Electrical Engineering,** **Bevier Hall, Turner Hall, Krannert Performing Arts Center, DCL, Newmark, and Psychology.** There are many more of these buildings out there at this point.

There is another group of buildings that have existing pneumatic VAV boxes that are non-ESCO buildings at this point such as **MEL, Law, ACES library, Henry Administration, Temple Buell.** Upgrades which include new DDC controls and occupancy sensors should be installed in these locations. How does this interface with the Provost funded projects that are coming forward?

1. We have touched base with campus scheduling regarding the usage of campus buildings and if these schedules could be tightened. More work could probably be done in this area with the cooperation of campus. There are still building systems that are running 24/7 on campus that don’t need to be at this point.