3/8/22

**INTERVIEW WITH**:

Ximing Cai: Civil and Environmental Professor, Water Resources Engineering and Science, Former Associate Director of iSEE

**CONCISE SUMMARY:**

On 3/8/22, the team met with Ximing Cai. He was able to provide us with useful information on biofuels, geothermal, and nuclear options for the campus. He suggests geothermal as a good option, with potential for biofuels or nuclear although there is still a lot to consider. A big issue with these technologies is cost. Also placed an emphasis on energy conservation and advised us to be bold with our plan because it is needed to reach the desired goals. From here, we plan to contact someone with detailed knowledge of nuclear and geothermal systems to learn more about their potential on campus.

**DETAILED INTERVIEW NOTES:**

**Questions:**

1. How much opportunity for solar growth is there on campus?
   1. Solar farm 3, paying local farmers for the use of their land
2. Should we look more into solar farms or rooftop solar?
   1. They are useful but do not provide the necessary scale of energy for campus, speak to Morgan about this more
3. How should we select existing buildings for rooftop solar?
   1. Did not ask
4. What do you believe is the best way to conserve water usage and in turn conserve energy?
   1. Water-energy Nexus, conserving water is a way to conserve energy
5. *Based on your research in water resources, energy, infrastructure, and environmental sustainability, how compatible do you believe some of such technologies would be to our campus and climate, specifically?*
   1. Possibility of biofuel technology to fuel biomass with, would be very expensive
6. Do you have any suggestions for energy efficiency improvements for old campus buildings?
   1. Turning lights off during nonoperational hours, conservation in specific labs across campus, greenhouses use a lot of energy
7. Do you believe it is necessary to convert old buildings that run on steam to run on electricity?
   1. This would be very expensive, emphasized geothermal energy
8. What do you feel is the biggest challenge for the clean energy transition on this campus?
   1. Cost
9. Do you have a personal vision for clean energy transition on campus (*any recommendations*)?
   1. Geothermal
10. What do you believe will be the most important technology in energy transition?
    1. Hard to tell
11. *Are there any energy technologies that you believe are not compatible as a long-term solution for our campus (maybe beyond the field of water resources)?*
    1. Also, hard to tell, he recommends being “bold” and realistically consider different resources
12. Moving forward, do you recommend any people that we could also contact/meet to gain more information?
    1. Talk to someone from nuclear department to get specifics
13. (Closing question) As this project develops, we may have more questions as the scope becomes more consolidated; is it okay if we can keep connected? What would be a preferred method of communication (email, zoom, teams, etc.)?
    1. yes

**General Notes:**

* Does water & biofuels research
* To meet goals, we need both to reduce energy, & choose clean energy sources.
* Carbon reduction is costly
* Solar Farms 1, 2 have significant reduction. Farm 3 is being discussed, but off campus, university would buy the energy
* a large solar farm around campus may not be feasible, a lot of energy should still be bought from the grid
* certain rooftop slopes (i.e., ECE building) are incompatible for solar panels due to structural weaknesses (wind)
* Talk to Morgan/F&S about rooftop solar panel data
* He is hesitant about rooftop panels
  + Less energy than utility farm
  + ECE bldg. used the wrong slope for panels. Angled needed for energy vs needle for structural support
  + Uni doesn’t emphasize rooftop
  + He is hesitant about rooftop panels
* Geothermal- heating (or sometimes cooling); in the experimental stage where we are unsure if it’s a feasible transition resource. Why: Hydrogeological structure underground; dependent on the extractable water underground. We are unsure how difficult this is, the temperature and the availability. This research is expensive to conduct
  + Uni green houses have high energy. Possible geothermal opportunity
* He doesn’t have specific steam ideas
* university buys a lot of energy from the market
* Biomass Facility would be very expensive,
* Water conservation in energy plan
  + UIUC Supercomputer - ⅓ of campus energy use. Needs a lot of cooling water
    - Rough estimated 40% of campus cooling water
* Nuclear small-scale generators
  + can provide a lot of energy, small scale generators are also rather portable
  + Nuclear stakeholders hesitant because radiation concerns- Cai doesn’t think this is that large of an issue
  + lots of people worry about radiation
  + professor believes that it is not a bad thing to have radiation (i.e., largest plant in Illinois is by a lake and it’s warmer, but everyone still uses it for recreational use)
  + if we can research and try to implement a nuclear plant for champaign, this would be great solution (may be financially expensive to find a cooling water source for a microreactor)
  + do not need a lot of water for a portable reactor
* Biofuels- mainly for transportation.
  + Use biomass boilers for small scale biofuels on campus.
  + On the energy farm there's acres of perennial grasses. Possible ethanol extraction
  + they can burn biomass *without* emission
  + May not be necessarily cost-effective solution to maintain heating load
  + But don't have refinery plant
  + University has a boiler. Energy goes toward farm loads (green house)
* On campus energy use is very small compared to campus load (buy a lot from the grid)
* Thermal power plants use a lot of water
* once we complete technical research, we can reach to SSC to investigate financial feasibility and available funds for allocation