ABE Capstone Project: F&S Strategic Clean Energy Transition Plan

Interview Summaries

4/18/22

**Bill Rose -** *iCAP Energy Team Co-Chair*

**Andrew Stumpf -** *iCAP Energy Team Co-Chair*

On 2/25/22, the team met with Bill Rose and Andrew Stumpf. As we are still in the stage of initial research and this was the first interview of this project, we were hoping to learn about their experience as Energy iCAP leaders as well as their recommendations. From this interview, we gained a lot of important information about their beliefs surrounding a clean energy transition as well as what they believe to be the biggest challenges. Overall, Bill Rose places a lot of emphasis on conservation and demand side improvements. Andrew also sees the importance of conservation but focuses on generation and supply side improvements. He places importance on a diverse portfolio of energy generation, including the use of geothermal for steam generation. They also provided us with peer institutions to investigate including Stanford and Ball State. Additionally, they provided us with potential people to interview including Meredith Moore, John Zhao (geothermal), a couple committees on campus and another senior design group that Andrew is working with. This was a very beneficial meeting to see the bigger picture and everything that must go into this plan. A recommendation from Bill was to potentially narrow the scope of our project as there are a lot of components that go into a clean energy transition plan. He is worried it may be difficult for us to cover everything.

**Ximing Cai -** *CEE Professor, Former Associate Director of iSEE*

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.

**Maria Maring** - *SSLC iWG Representative*

**Gabriel Kosmacher** - *SSLC Member*

On 3/11/22, the team met with SSLC representatives from the iWG, Maria Maring and Gabriel Kosmacher. They had beneficial insight into the human side of energy implementation on campus. They both have experience in allocating SSLC funds to student proposed projects, so it was interesting to hear their point of view of sustainability projects on campus. They recommended energy conservation techniques that do not rely on individual actions. They also provided insight into the fact that students just want to see clean energy on campus, and they do not care how it happens. Finally, they expressed concerns on the location of micro nuclear reactors on campus, while also stressing that students would not be against nuclear power if they are educated on the topic.

**Rob Roman** - *F&S Director of Utilities & Energy Services*

On 3/22/22 the team interviewed Rob Roman. Rob’s biggest concern with a clean energy transition was the monetary aspect. The university only gets a certain amount of funding each year and a large amount of money is going to be needed for improvements to the system. Rob thought that geothermal is a good option for the University and thinks that it could be feasible on a large scale but would need to consult an expert to determine the land use. Rob also thought that a micro nuclear reactor was a very good option for the University with the caveat that it will be very expensive. He thought that the university does need to transition from its steam use for heating on campus unless a better emerging technology comes along. Rob told the team that biofuels have already been tried for the steam production, but it wasn’t feasible due to the transportation costs compared to natural gas and coal. Rob felt that for future energy plans they account for ambiguity and emerging technologies and have a place for energy storage which the campus currently does not utilize.

**Scott Willenbrock** - *Former Physics Professor, UIUC Solar Farm Involvement*

On 3/24/22, the team met with Scott Willenbrock. He provided a lot of valuable information on Solar Farm 1 and 2, as well as the potential for a Solar Farm 3. He described that Solar Farm 3 will likely be an off-campus farm due to the lack of space on campus. He did mention that there was potential for putting a farm on campus in between Solar Farm 1 and 2, but it would be necessary to relocate the research that the fields are currently being used for. He thinks Solar Farm 3 will most likely be off campus, and he says the biggest challenge with this is getting things moving and having enough people behind it. He gave us some advice on rooftop solar, stating that the fault is in the economy of scale, but rooftop panels can be useful due to their visibility on campus/ promotion of clean energy. He also believes that storage is a challenge that needs to be addressed, batteries are too expensive now.

**Cynthia Klein-Banai** - *Director of Sustainability at UIC*

On 3/28/22, the team corresponded through email with Dr. Cynthia Klein-Banai, who is the Director of Sustainability at UIC. We inquired about the plans for the energy transition at UIC and she provided us with valuable insight on the University’s current initiatives. While the energy situations at UIUC and UIC are different, there is crossover between many aspects.

**Caleb Brooks** - *NPRE Professor, UIUC Micro-Nuclear Involvement*

On 3/31/22 the team spoke with Dr. Caleb Brook, who is a professor in the nuclear engineering department here at the University. The team spoke to him about the feasibility of using micro nuclear reactors as a power source for the campus. Dr. Brooks is about to start research to determine these exact questions. In his opinion, campuses will be using micro nuclear reactors to power themselves, but it is going to take eight to ten years to get to that point. The research done with micro nuclear reactors has been more theoretical and not applicable at this time. The team still feels that the university should start saving money now to purchase a nuclear reactor once they are commercially available.

**Clark Bullard** - *Former MechE Professor, Experience in Thermal Systems*

On 4/5/22 the team spoke with Clark Bullard. In this meeting we were provided with valuable insight into the importance of conservation and updating the current steam heating system on campus. In his opinion, the University should focus on conservation mainly and purchase renewable energy from the grid. This would allow more resources to be put towards conservation, where there is currently a lot of energy being lost. Additionally, he stressed the importance of updating the campus heating system to something more modern, such as a hot water and heat pump system. The team found that this interview gave good insight and recommendations on a potential way to approach the energy transition.

**Xinlei Wang** - *ABE Professor, Experience in Renewable Energy Systems*

**John Zhao** - *ABE Doctorate Student, Research in Geothermal Systems*

On 4/5/22, the team interviewed Dr. Xinlei Wang and John Zhao. Professor Wang is a subject matter expert with regards to geothermal energy and has done research on other forms of renewable energy. Professor Wang explained that geothermal energy is the most efficient way to both heat and cool buildings and that despite high upfront costs it is a cheaper system to implement than traditional heating and cooling. Professor Wang explained that if the University was to switch to a geothermal system, then it would have to be done building by building and it would take a lot of planning and time. Professor Wang also told the team that geothermal and solar energy can be used together to create an energy efficient system and make it viable for the University.

**Mike Larson** - *F&S Director of Utilities Production*

On 4/7/22, the team met with Mike Larson. This interview gave valuable insight on the transitioning to clean energy, as well as the challenges that go along with using renewable sources. In the short term, it is recommended to focus on conservation as well as carbon capture technologies. He does not believe carbon capture is feasible for the long term, but it could be a valuable technology to use while technologies such as nuclear are being developed further. He believes that when nuclear is commercially viable, it will be the best option for campus. He also thinks that electrification of the university could be positive, but only if the grid electricity becomes more renewable. At the moment, the efficiency of Abbot is greater than the electricity sources that power the grid. If the campus were to be electrified and converted to hot water, technology such as heat recovery chillers should also be considered.

**Paul Foote** - *Energy Efficiency and Conservation Specialist*

**Karl Helmink** - *F&S Associate Director of Utilities and Energy Services*

On 4/8/2022, the team met with Karl Helmink and Paul Foote. They both stressed an emphasis on energy conservation for the energy plan. They stated that a large problem stopping energy reduction is the “billions of dollars” worth of deferred maintenance that exist in campus buildings. This is in addition to the new buildings being constructed despite existing abandoned building space. They also informed us about the retro-commissioning team that they are both a part of. They reduce energy by an average of 25% for each building retro-commissioned and have saved the university over $100,000,000 in utilities since 2007. They do this by focusing on the “low hanging fruit,” this being scheduling, sensors and some maintenance. They roughly estimate that it will cost about 2 billion dollars to make the steam to hot water transition. This would take many years and about 10 boilers for redundancy. They recommend geothermal but warn that the university already has a lot of underground, so it would need to be placed carefully, possibly on the perimeter of campus. It would also still need a backup system (probably Abbott).