May 8, 2015 ACSF Topical Lunch

Strategic and Sustainable Town-Gown Bioenergy Systems
Presenters: Ruth Richardson (CEE); Steve Beyers(CU Facilities); Dan Ramer and Jose Lozano (Ithaca WWTPlant)

Regrets: Lindsay Anderson (BEE), Jeff Tester (ChemE), Barb Eckstrom (Tompkins Cty Solid Waste & Recycling Facility)

Summary:

Ruth Richardson first presented an overview of the Climate Action Plan and the bioenergy-related recommendations of the Acceleration Working Group for reaching climate neutrality by 2035. These included implementing the CURBI (CU Renewable Bioenergy Institute) and investigating the Hybrid Earth Source/Biomass campus Heating plant. CURBI would be a multifeedstock/multiconversion technology facility that could explore conversions of dedicated bioenergy crops and wastestreams from campus operations: agricultural wastes (manure and crop residues), food wastes, and forestry by-products. Steve Beyers of Cornell Facilities then presented the vision for the Hybrid Earth Source/Biomass. He showed the role of Biomass to make up heating needs on the coldest days of the year. Even if the biomass provided 2.6% of the overall Ithaca campus heating needs, it would allow the geothermal system to be much smaller (63% of the size needed to meet peak heat demands). Local biomass markets could expand. WWTP staff then described current plant operations related to bioenergy. Currently all wastewater from Cornell is treated by the WWTP (CU is one-quarter of the overall plant flow). They discussed their methane digester that makes biogas from organic solids from WW and trucked waste (septage, whey, e.g.). The current digester biogas output is then burned to generate both heat and electricity that is more than half of the energy needs of the plant. The plant's methane digester capacity is three-times the current usage and locations for further expansion exist at the plant. Currently the alkaline hydrosolate waste from the CU Vet School is sent to the digesters at the treatment plant and they would be very interested in also receiving Cornell's food waste. They also discussed some exploratory research in Microbial Fuel Cells and plans for expansions/new energy recovery streams (e.g. thermal recovery from WW for localized neighborhood heating).

In the discussion that followed, we discussed other parties to involve in future conversations, possible funding schemes - including external funding - as well as what policies at CU might make projects more attractive for CU to fund projects/personnel (e.g. a price-per-ton for Carbon; an extended return on investment payback period). We also discussed the feasibility of distributions of facilities (both implementation scale and research scale) between Ithaca and CU.

Other pertinent information shared at the lunch included:

- Current energy usage at the IAWWTP plant is ~400kW after reductions during $8M upgrade recently
- Cornell's peak Heat load (winter) is ~400 MMBtu/hr (111,000 kW)

Discussion notes:

The presentation ended with the proposed Discussion topics listed below. Not all discussion questions could be covered in the lunch. Those that were discussed are bolded with summary points listed:

1. **What are the viable carbon allocation schemes for Town/Gown collaborations?**
    a. **Bert Bland suggested that the levels of carbon for CURBI related wastestreams is small compared to CU's overall carbon footprint. Perhaps donations of wastestreams to the WWTP or other local facility is feasible for CU (ie. CU might not worry so much about whether the Town gets the Carbon credits.)**
    b. **By email reply, Jeff Tester (who couldn't attend in person) suggested Renewable Energy credits (RECs). They are "feed in tariffs for Renewable deployment, carbon offset credits for energy efficiency measures that are deployed."**
2. What should Research Scale facilities include? (CURBI plan not set in stone)
    a. Jeff Tester replied by email: "a range of biomass liquefaction, gasification and anaerobic digestion technologies for a mixed set of feedstocks including Municipal, ag, and food wastes . I also like the idea of Cornell deploying a renewable energy research and demonstration park near the campus- where TC residents can see how various biomass options work when integrated into a distributed energy system involving other renewables."
3. **Would it make sense to split Research and/or implementation scale facilities between Cornell/Ithaca?**
    a. **Implementation wise, yes. There are a number of rich carbon streams from Cornell that could be treated at the IAWWTPs large digesters. If cornell invests in biomass gasification (thermal technology) then the WWTP could divert their residual biosolids to this technology (rather than landfilling it for a fee – the current policy).**
    b. **WWTP has various waste handling permits and is less risk averse than Cornell and therefore costs for implementation may be lower than what they would be on Cornell's campus.**
    c. **For a biodiesel implementation, either CU or the WWTP could be good. If CU wants to use the biodiesel in its own AES vehicle/tractor fleet, location near Farm machinery facilities would be important. If instead the waste veggie oil from cafeterias goes to the WWTP, fuel could be produced and used/distributed there (either from digester biogas or a biodiesel plant). Glycerol byproduct of biodiesel prod'n could also be digested (or possibly used by soap producers)**
    d. **Steve Beyers mentioned by email followup "The CURBI study attempted to estimate the available bioenergy resources that were available from the Ithaca campus operations and from land owned and operated by Cornell based primarily on current land practices with some reasonable changes in feedstock production. It was not intended to estimate resources from surrounding private lands or significant changes in land use, which could result in higher volumes of feedstock. CURBI was envisioned as a research and demonstration platform that might also provide some real energy, but**

not as a "primary campus utility energy" operation. However, the CAP also envisions a permanent bioenergy operation with technology choices influenced by CURBI results"

   e. **Johannes Lehmann discussed the scale issue for CURBI and it has to be a hybrid of what CU needs (generally larger scale) and what researchers need (smaller scale). Although faculty do need to be involved, he believes a faculty member is not the right person to lead/manage the facility. This suggests that funds would be needed for a dedicated manager/director. Bert Bland does think Faculty leadership is critical to making it successful.**
   f. **It is worth noting that bioenergy-related collaborations have existed b/n CU researchers (and MEng project teams) and WWTP personnel for decades and working relationships are very strong.**
   g. **Dan Ramer pointed out that biosolids from the digesters could be used as biomass for the Hybrid system. Currently they must pay to landfill these. Though they make a good soil amendment, in NYS it is very hard to gain approval for land application**
   h. **For biomass for the Hybrid system, biomass (e.g. grasses, willow, wood) from local non-CU lands would certainly be a piece**

4. **How best can we integrate local businesses/farmers?**
   a. **Matt McArdle representing Mesa energy reflected on the last decade of attempts to work with academics/Cornell. He felt that any R and D effort like CURBI would need to be led by academics to make it viable. He also saw value in having a committee that represents both business and university interests – and one that wouldn't change rapidly.**
   b. **Todd Cowen pointed out that ACSF is aiming to be that central point of contact between businesses and CU.**
   c. **Investment in local carbon-reducing endeavors could support local businesses. Auditing would need to be addressed.**
   d. **For the biomass piece of the hybrid system, many local farmers/foresters could be employed.**
   e. **Jeff Tester offered by email :" Companies who might be interested in providing technical support and/or collaborating on data collection and analysis"**
5. How best can we integrate student project teams? **(was not discussed but both ESW and CUSD are interested in campus/community bioenergy; they should focus on specific projects; Engineers for a Sustainable World teams and MEng teams in both CEE and MAE have examined/implemented local bioenergy projects)**
6. **Who else do we need to bring into this conversation (some of these people were on the invite list but did not reply to the RSVP)?**
   a. **AEP's next Director after Mike Hoffman (Jan Nyrop)**
   b. **Other Academics: Lars Angenant, Norm Scott and Bill Jewell in BEE; David Weinstien and Tim Fahey in Nat Res; Antonio Bento & Bill Sholtz from Economics; Johnson School folks in the Sustainable Global Enterprise (Mark Milstein or Monica Tousnard); Susan Christoferson and Kiernan Donaghy of CRP); Betsy Keokowski**
   c. **County reps (e.g. Barb Eckstrom at the Solid Waste and Recycling Facilty)**

d. **Cornell Cooperative Extension (Dave Astrina)**
e. **CALS administration (Kathryn Boor and Beth Ahner)**
f. **Folks who could be intermediaries b/n CU and local businesses (who?; Maybe the Sustainable Enterprise and Entrepreneurship (SEEN))**
g. **Town and City of Ithaca (Nick Goldsmith)**
h. **Local businesses/farmers**

7. **Where can we obtain funding for facilities: funding agencies/schemes?**
    a. **Cornell has $0 to devote to capital for achieving the CAP by 2035. However, CU could contribute in-kind matching funds for outside funding (e.g. faculty time, facilities, staff time)**
    b. **Real dollars for facilities/personnel: NYSERDA, USDA, Water Envt Res Fdn (which is supporting the triple bottom line for water utilities: IAWWTP has gotten grants from them before); Todd mentioned that NYSERDA CAT proposals are due May 26 . It might be possible to include a piece of this in the $1-2M/year CAT proposal underway but matching would need to be secured quickly and a description of a project that meshes with the overall CAT. Matching could be creative (in kind from both academics and from industry, e.g.). It was unclear if the WWTP would qualify as outside matching. Ruth will follow up with Todd Cowen re: whether this timeline is feasible.**
    c. **76 West Southern Tier Energy has funds for infrastructure.**
    d. **Subsidies/taxes: Without CU naming a price per ton of carbon ($70/ton? $100/ton?) bioenergy is unable to compete cost-wise with coal or natural gas. Johannes mentioned another major challenge is Cornell's return on investment demands (payback timeframes are too restrictive b/c the facility for research will not be cost neutral)**
    e. **Demand reduction incentives on campus are also important. Perhaps proceeds from demand reduction savings (or high demand charges) could be funneled into a fund for capital costs?**
8. **What are good next steps after today? Who is willing to be involved in proposal writing and directing bioenergy initiatives? (need staff and academics on the "team")**
    a. **Ruth will summarize the conversation and disseminate notes.**
    b. **Several individuals expressed willingness to be involved. On the academic side, Mike Hoffman and Johannes Lehmann both stepped up.**
    c. **Key people and parties that couldn't make the meeting or were suggested at the lunch will need to be approached for future meetings. The Notes and Discussion questions will be shared with them.**

Attendees:

Last Name	First Name
Aboulmouna	Lina
Beyers	Steve
Bland	Robert

Cowen	Todd
Davis	Sarah
Evans	Glenn
Gottleib	Ed
Hoffman	Mike
Kerslick	Graham
Koelbel	Courtney
Lango	Ken
Lehmann	Johannes
Lozano	Jose
Mayton	Hilary
McArdle	Matt
Miller	Chris
Myers	Ann
Ramer	Dan
Richardson	Ruth
Stewart	Gary
Tebay	Alexandra
Vanek	Francis
Wykstra	Wade
Zemanick	Sarah
Zhang	Max