



Minutes – Friday, March 28, 2025
Video Conference
9 am to 11 am

Attending: Stacey Edwards, Jaimee Wilson, Sarah Carson, Terry Carroll, Alice Green, Anabel Flores Cevallos, Fernando de Aragon, Bert Bland, bethany ojaehto mays, Brian Eden, Chris Skawski, Cynthia Brock, Dan Antonioli, Dan Lamb, Dave Bradley, Eric Banford, Fenya Bartram, Gay Nicholson, Gerri Wiley, Guillermo Metz, Hailley Delisle, Inger Aaberg, Jennifer Tavares, Kate Supron, Krystal Alba, Margaret Johnson, Rob Thornton, Jacob Mays, Hilary Swartwood, Dawn Montanye, Wade Pickren, Tony Ingraffea, Tom Hirasuna, Susan Riley, Sujoy Chakma, Sheila Out, Margaret McCasland, Marie McRae, Mark Spurr, Matt Kozlowski, Meredith Rutherford, Mike Hoffman, Paul Moore, Ray Burger, Rebecca Evans, Rick Burgess, Rod Howe, Scott Doyle, Peter Bardaglio

Transitioning Cornell's District Energy System – Sarah Carson, Stacey Edwards, Jaimee Wilson

Sarah Carson, Director of Campus Sustainability Office, Stacey Edwards, Utilities Reliability and Energy Transition Program Manager, and Jaimee Wilson, Senior Energy & Sustainability Engineer provided a brief update on planning to decarbonize the Ithaca campus district energy system following on our June presentation to TCCPI, and then were available for questions and discussion.

- Members of team introduced themselves – then Sarah shared a few updates, including installation of first ground source heat pump at Cornell childcare center and solar array on top of Atkinson Hall, commissioning of hot water system on East Campus, contract on large new solar farm (should come on line in 2030), and new research project on tidal energy on Long Island Sound
- District energy is central feature of university campus master plan
 - Central plant generates heating, cooling, and/or electricity
 - Distributed to multiple buildings
 - Over 600 district energy systems across US
- Combined heat & power plant provides both heat & electricity to campus – natural gas powered
- Majority of campus' cool water comes from lake source cooling – used to cool campus buildings
- Renewable energy sources include hydroelectric and off-campus solar
- Why District Energy? How does it compare to building-by-building systems?
 - Increased energy efficiency (e.g. combined heat and power)
 - High resilience: redundancy, reliability, and recoverability
 - Lower operating costs, less equipment
 - Flexibility—allow a portfolio of solutions, transitions without disruption
- Additional Benefits of District Energy at Cornell

- No new fossil fuel fired equipment for new buildings (due to energy conservation)
- Allows use of waste heat (i.e. sewer heat recovery, building heat recovery)
- Reduces peak demand (enabled by aggregating loads from multiple buildings and shifting peak demand with thermal energy storage)
- Economies of scale (for example of bore field construction)
- Allows decarbonization of existing buildings (i.e. existing building electric infrastructure and mechanical spaces were not designed in building level HVAC)
- Cornell's Decarbonization Strategy
 - Building out additional renewable electricity
 - Steam to hot water conversion
 - Energy conservation
 - Energy storage
- Key project is Earth Source Heat effort – involves 10K ft wells bringing 185 degree water to surface that can be used to heat campus
- Different than conventional shallow geo-exchange coupled with heat pumps – 500 to 1,000 ft wells that bring 50 degree water to surface – can also use heat pump for cooling in summer
- Besides drawing on campus staff, administration leadership, faculty, and students, Cornell hiring small army of consultants to help with implementation of campus energy transition
 - Steam to hot water conversion
 - Steam and power condition assessment
 - Chilled water expansion and renewal
 - Earth Source Heat
 - Shallow geo-exchange GSHP
 - Sewer heat recovery
 - Battery & thermal energy storage
- Individual Building Energy Systems
 - Most building owners only make a decision about heating equipment once every 15-20 years
 - Makes sense to electrify even if it increases emissions in the first few years of operation, if forecasted that grid will get cleaner over time to overcome initial negative emissions (i.e. Cornell Child Care Center)
- District Energy Systems
 - Avoid initial increases in emissions by leveraging district energy to plan decarbonization at the district level (i.e. Atkinson Hall) using:
 - Estimates of future grid mix and availability of clean electricity
 - Status of Earth Source Heat and other clean heat technologies
 - Economies of scale that may come from incorporating geothermal and heat recovery technologies, energy conservation, and steam to hot water conversions, etc. with system planning
- We're not trying to avoid decarbonization on campus and we're not asking for exemption from IECS – we believe district energy is way forward
- Cornell's request: enable district energy in IECS phase 3 to enable campus-wide decarbonization

Q&A

- Mark Spurr: What exactly are you asking for to provide flexibility to use district system and not be forced into individual building solutions
- Sarah: Definitions in IECS around what is heating plant or heating system and need to clarify installation of new equipment vs. ongoing use of already existing equipment and considerations involving gas in our electric grid vs. gas in district energy systems
- bethany ojaalehto mays: A district system in your analysis seems to require special analysis – a “then year marginal forecast” – could you say more about this? Is it a form of short-run marginal emissions analysis?
- Bert Bland: Marginal emissions analysis allows you to evaluate the impact of a project on grid – in central NY marginal emissions rate is about 800 lbs/MWh – in upstate NY when a new load is added to grid, natural gas-fired plant picks up that load
- That plant is less efficient than our central energy plant – if we were to shut down plant and put 30 MW load of electricity on grid, that load would be picked up by natural gas plant and increase overall emissions in state
- Marginal emissions rate of our plant is about 450 lbs/MWh vs. marginal emissions rate of 800 lbs/MWh
- Longterm marginal emissions rate focuses on eventual transition of grid to clean energy based on projection
- “Then-year” future marginal emissions rate is what is predicted to be marginal emissions rate each year as grid cleans up: 2030, 2035, 2040, e.g.
- Sarah: When we have option of deciding when to transition, we want to time it so we can avoid any increase in emissions
- Rebecca Evans: Is Earth Source Heat totally reliant on external grants, especially federal grants? Isn't this something Cornell should be willing to invest in?
- Bert: We weren't able to secure contract with DOE before change in administration – we're now discussing with NYSERDA possibility of funding – we will continue discussions with DOE in meantime
- Demonstration project with high risk so not able to finance it with bank – so we're looking to state and federal grants to allow us to proceed with project
- We also will still be willing to consider shallow geothermal heat exchange as viable option
- Sarah: We're more optimistic about receiving federal funding for shallow geothermal at this point, than for deep Earth Source Heat
- Brian Eden: Believe that we could install geothermal surface units incrementally, not pulling them off thermal energy network permanently, just until funding for Earth Source Heat project could be secured and project completed – could be pulling lot of emissions out of system if we adopted this approach
- Stacey Edwards: Need to balance shallow geothermal heat exchange with electric cooling but would mean abandoning lake source cooling, which is much more efficient – it's not an Earth Source Heat or nothing situation – but don't see transformational technology we could deploy today that would reduce campus carbon emissions
- If we were to drill geothermal exchange system, that would like to me like a PR exercise because it wouldn't reduce Cornell's emissions

- Rob Thornton (International District Energy Association: Cornell's not unique – we have lots of colleges and universities in our organization – universities employ scale that they do so they have flexibility to be adaptive to carbon intensity of grid and take advantage of their overall efficiency
- When it comes to stretch energy codes, district energy is different fish, codes that are developed for building scale intent can create perverse impact for district systems, which are able to adapt to real carbon intensity of grid
- Reality is plan for putting more green electrons on grid thru offshore wind, for example, is being delayed – hard to predict when those green electrons will actually be on grid
- There may be Hail Mary pass for Cornell in sense that new energy secretary in Washington is from fracking industry – may be willing to see how Cornell could be useful to his cause
- Mark Spurr: What is level of confidence we can have in long-term marginal emissions rates projections given that we're falling behind in achieving decarbonization of electric grid – at same time we're seeing growth in demand for energy – in this context, approach Cornell is taking seems much more grounded in reality
- Margaret McCasland: Is Cornell looking at ways to use less Pennsylvania fracked gas given amount of leakage in that system? With heat pumps, likewise, we have to look at refrigerant leaks
- Sarah: Agree that upstream methane leakage is problem and we continue to look at ways we can enhance efficiency of our gas-burning systems – bottom line is we want to stop burning gas
- Dave Bradley: Important to remember Cornell not limited in its financial resources – could be directed to build, for example, wind farms that could supply campus with electricity for ground source heat pumps – looks, however, like board has decided it doesn't want to use university resources in these ways
- Brian: I was not opposed to lake source heating and I've talked about ways in which lake water could be used in geo-exchange system – why isn't this possible solution?
- Stacey: Major barrier to doing this is existing campus buildings don't allow for heat pump in every building – literally not space in many buildings themselves – but option not off table and something we're looking at – there may be places in our campus where that could work – also might be able to use that heat to balance any bore field that might be put in place
- Peter: My greatest fear is that we don't have rational government in Washington right now and it seems as if administration is attacking universities in almost every way they can find – it makes me wonder whether DOE is going to come through with grant that Cornell has applied for – seems to me that administration is trying to dismantle system rather than strengthen it
- Completely outside of complex, nuance discussion we're having here – seems like external environment has shifted dramatically in just last couple of months

Expanding Access to Residential Heat Pumps in Our Community – Gay Nicholson
Gay Nicholson, President of Sustainable Finger Lakes, shared the results of two innovative heat pump pilot programs that are wrapping up this month.

- Last here two years ago to talk about these programs
- Clean Energy & Equity Pilot (CEEP) Objectives

- Increase accessibility to energy efficiency for low-to-moderate income tenants in 1-4 unit rentals
- Address the split incentive
- Provide energy education to tenants
- Document quantitative and qualitative data on costs, energy use, comfort, and landlord/tenant relationships
- Who Qualified for Pilot?
 - Rental in Ithaca and Tompkins County
 - 1-4 unit buildings
 - Use natural gas for heating
 - At least half of rental units are low income
 - Must be brought up to insulation standard
 - Landlords limited to 5 rentals in pilot
- What are the Incentives in Pilot?
 - Empower+ envelope incentives
 - NYSEG Clean Heat and Lansing NPA
 - CEEP--
 - \$6,000 first 2 tons ASHP, then \$1,000/ton
 - \$500 for Heat Pump Water Heater
 - \$2,000 for Electric Panel Upgrade
- What was Required of the Landlords?
 - Can't raise rent for two years
 - If heating costs moved from Landlord to Tenant, must reduce rent equal to previous year's heating load
 - Utility Release Form
 - Media Release Form and Interview
 - Must insulate and air seal first
- What was Required of the Tenants?
 - Utility Release Form to track energy
 - Media Release Form and Interview
 - Take a Pre-installation Survey
 - Take a Post-installation Survey
 - Attend a Home Energy Workshop (and receive a dozen LED bulbs!)
- CEEP PARTICIPATION

	Landlords	Rental Units
Interviewed	48	117
Signed Landlord Agreements	24	59
Signed Tenant Agreements	-	43
Completed Projects	13	28

- Installer Participation: 40 invited, 4 signed up for CEEP, 2 did the work (Halco Energy and Simply Installs)
- Barriers to Electrification in CEEP
 - Market Condition Changes over Time
 - Rising equipment and labor costs
 - Electric delivery and supply costs
 - Rising property taxes and rents

- Changes at NYSERDA
 - Summer 2023 NYHEP portal launched without full capacity
 - May 2024 sudden elimination of gas conversion projects from Empower+
- Infrastructure Capacity
 - Scarcity of envelope + heat pump installers
 - High demand from local market rate customers
 - Lack of communication and long delays for customers
 - Often sporadic follow through on CEEP application packet
 - Variability in Buildings and Occupants
- Project Costs for 28 Rental Units

	Total Cost	Average	Range
Project Cost	\$774,271	\$29,780	\$16,157 - \$59,000
Envelope (24)	\$142,414	\$5,477	\$0 - \$12,491
ASHP (28)	\$498,224	\$19,612	\$8,844 - \$26,704
HPWH (20)	\$87,250	\$3,356	\$1,875 - \$6,500
Panel Upgrade (4)	\$14,000	\$3,500	\$2,000 - \$5,500

- Project Costs for 28 Rental Units

	Total Cost	Average	Range
Project Cost	\$774,271	\$29,780	\$16,157 - \$59,000
Landlord Share (18%)	\$141,908	\$5,458	\$0 - \$12,855
Subsidies Provided	\$632,363	\$22,584	\$8,288 - \$57,734
Empower+	\$212,225	\$8,023	\$964 - \$14,500
NYSEG (11)	\$44,003	\$4,000	\$2,625 - \$5,500
Lansing NPA (15)	\$141,077	\$9,405	\$6,125 - \$26,250
CEEP (30%)	\$232,156	\$8,929	\$4,632 - \$16,984
ASHP	\$154,750	\$5,952	\$3,000 - \$9,000
HPWH	\$7,125	\$396	\$125 - \$500
Electric Panels	\$6,000	\$2,000	\$2,000
CEEP Replacements	\$64,281	\$2,891	\$391-\$7,484

- Economic and Environmental Benefits

	<u>Total</u>	<u>Average</u>
Tons of CO2 over lifespan	3,258	121
Energy Savings*	\$139,908	\$5,182
*Envelope plus ASHP and/or HPWH		

- Recommendations
 - Wait for market conditions to change
 - Moratorium on fossil gas conversions to heat pumps for lower-income homes
 - Green light on other fuels
 - Take control of policy

- Public v. investor-owned utilities
 - Build installer capacity
 - Plan to pay for liaison services
 - Field staff overwhelmed
- Electrify Tompkins! LMI Mobile Home Heat Pump Pilot
 - Tompkins Community Recovery Fund
 - Launched April 2023, 18 months
 - Upgrade 50 mobile homes
 - 4,054 MH (1750 in parks, 2304 solo)
 - 300% Federal Poverty Level
 - Unique needs of mobile homes
 - Survey occupants pre-and post-install
 - Track barriers to participation
- Mobile Home Participation

Contacted/Interviewed	132
Enrolled in Program	87
Awardees (TCRF and FLCF)	38
Completed Heat Pump Projects	34
Insulation Only Projects	7

- Installer Participation: 40 invited, 3 signed up, 2 did the work (Halco and Simply Installs)
- LMI Mobile Home Results
 - 34 Mobile Home heat pump upgrades – 68% of goal
 - Envelopes brought up to Comfort Home standard
 - Projects in 4 villages and 8 towns
 - 3 Karen refugee families in MH park with translator
 - Six \$13,909 Climate Fund grants from SFLX
 - 4 Karen families: insulation only \$6609 Climate Fund grants to correct illegal water heaters
 - Fuels displaced: kerosene, fuel oil, propane, wood, electric, natural gas
- LMI Mobile Home Results

<u>34 Energy Upgrades</u>	<u>Total</u>	<u>Avg</u>
Total Project Cost	\$1,017,645	\$29,931
Owner Share (6%)	\$63,379	\$1,864
Empower+ & NYSEG (70%)	\$716,979	\$21,088
Total SFLX (23%)	\$237,287	\$6,979
ASHP	\$187,378	\$5,511
Electric Panels	\$36,000	\$2,000
Climate Fund	\$13,909	\$2,318

- Economic and Environmental Benefits

	<u>Total</u>	<u>Average</u>
Tons of CO2 over lifespan	3,517	103
Energy Savings*	\$714,680	\$21,020
*Envelope plus ASHP		

- Recommendations
 - Moratorium on fossil gas conversions to heat pumps for lower-income homes
 - Green light on other fuels
 - County Task Force findings
 - Will be included in task force report
 - Build installer capacity
 - Plan to pay for liaison services
- Lots of good tenant and landlord stories about these projects on the SFL YouTube channel

Q&A

- Both Peter & Brian commended Gay on work she carried out for these two projects
- Brian pointed out that GAP Fund Act could really make a difference with these kinds of projects – AM Kelles introduced this bill
- Hailley Delisle: Where do things stand now?
- Gay: Deadlines coming up fast and we're worried about whether installers will get all their paperwork in on time as well as slow-motion Empower+ approvals
- A lot of work that needs to get done to smooth out process and have it be less of a turn-off