

Ford Energy Study Technical Advisory Group January 29, 2015 Meeting

Attending:

- TAG - Andraos, Carmody, Engh, Grant, Graves, Hansen, Klass, Kramer, McCarten, Noble, Schuerger, Smith, Strom, Thorton; Absent - none
- Others - Hunt, Giebel, Clapp-Smith, Drummond, Kantner (City staff); Marshall (Xcel)
- Consultants - Pernille, Jakob, Flemming

Status of reports and work since last meeting - led by Pernille

Pernille reviewed status of the reports (see slide)

Report - Energy Technologies and Systems

TAG energy technologies subcommittee reviewed the draft report and discussed it on a conference call in December. Notes from that meeting will be posted on the project website soon.

Report - Best Practices in Building Design

Report recommends use of SB2030 as the energy efficiency assumption for Ford site buildings. Residential efficiency in 2030 is not very high though; maybe residential bldgs should be held to a higher standard, such as Danish 2010 standard. The building systems are not as dependent on air vent delivery; more based on water.

Graves - We've been looking at higher residential standards and testing it with the Aeon affordable housing project "The Rose" - it's at a Danish level.

Strom - Some developers like unit based heat/cooling delivery because the tenants like to set their own heat and cooling.

Plug Loads - slide

Increasing electricity consumption per household is offsetting decreasing building consumption. Energy Star requirement can help, as well as above standard plug load controls.

Recommendations - slide

- Andraos - Rebates can be a strong incentive for developers/tenants.
- Klass - Is there a way for the city of 3rd parties to externally monitor site energy use, at building level, to help identify buildings that need more assistance to reduce demand?
Flemming - It's technically possible to track it, but there are legal and regulatory steps that will shape how it is collected and used.
- Strom - Some rules in MN just made it harder to use people's data.
- Klass - Some other states like California have been creating new mechanisms to collect and share energy data publicly.
- Smith - Monitor water usage is also an important area and there are more efforts to do so.
- Graves - Commercial bldgs. - Bullit tenants sign water and utility budget; then if you reach it there is no cost, if you go above there was a penalty.

- Andraos – There are similar programs in Michigan – charge premiums during certain hours is one good mechanisms.
- Engh – Reduce peak loads and reduce “vampire” loads – energy to run the other systems like water.
- Smith – Use term “monitoring’ instead of compliance.

Developer Meetings Recap

Three developer groups were separately interviewed on Wednesday, January 28th to get input on the Ford energy study. They were Ryan Companies, Opus Group, and United Properties. Background information on the study and some questions were sent to the interviewees ahead of time. The meetings lasted one hour each and included Jonathan Sage-Martinson, Merritt Clapp-Smith, Richard Graves and Matt Kramer. Eric Engh, Anne Hunt and Jim Giebel assisted in preparation of the questions.

Recap:

- It’s easy to be a true believer when you don’t incur the market risk. There need to be a compelling financial reason to pursue a different energy approach.
- Expect that energy infrastructure will be designed for them; it will be there
- Confirmation that 2030 building strategy and performance based targets better than pursuing LEED
- They like proven technologies; something that has been done before to reduce risk
- Prefer pay-as-you-go infrastructure
- There is some premium in the market for “green”, highest in office, then retail, not as much residential
- Unique characteristics of the site (river, hydro, etc)and providing energy redundancy can be a competitive niche for the site
- Some developers/tenants are nervous about new technologies, even District Energy; sometimes education on it doesn’t help

Strom – Could there be a modification of the PACE concept – to be site –based assessment instead of just building-based. Find guaranteed cost recovery for the capital installation of the infrastructure.

Engh – Balance between objectives of Ford, Master Developer, and City. Corporate vision for green in strong, but corporations are having a hard time figuring out what payback is has for their bottom line.

Smith – Does market require proven technologies? Do they need to be proven in North America?

Engh – Developers want evidence that technologies work in cold climates (like Minnesota) and it’s helpful if they are continental examples.

Strom – Who builds the energy infrastructure if the developer doesn’t want to?

Nobel – DE in St. Paul has a good reputation which will help tell the story for DE at the Ford site.

McCarten – Would a DE system at the site also have a natural gas distribution system?

Jakob – It wouldn't be economical to do both systems.

McCarten – Xcel could provide gas as part of its franchise to each lot; how does gas fit in. Is there also an assumption that there will be no combined heat and power plant at the site?

Andraos – You can say no natural gas, but future tenants should have some flexibility to offer gas if it's a necessary source for industrial or other process. Sizing is also important to get economies of scale, but can we predict that well enough to attract investors?

Energy System Concepts – Led by Jakob

Criteria for the site discussed and reweighted – innovation rolled into other goals; resiliency already high in metro, so it's not a priority. This left 3 key priorities: cost-effectiveness, energy efficiency, and net-zero (see slide)

Jakob showed slide 3 energy system concepts

- “Business as Usual” is furnace based natural gas system.
- The Headache – How can we beat the performance of the current energy system in the area?
- Schuerger – How can we count hydro as a local source? We shouldn't count it multiple times.
- Jakob – You reconnect a feed between the hydro and the site.
- Andraos – Independent power producer is transporting to the Xcel grid for the MISO (Midcontinent Independent Systems Operator) market.
- Klass – If you use the hydro, you aren't creating a net increase, unless you increase the capacity.
- Noble – Hydro is a unique asset of the site that isn't replicable elsewhere.
- Pernille – Use the local hydro source and replace that energy with new green elsewhere.
- Smith - Local hydro is a very good narrative if you tie it into the site.
- Jakob – Biomass CHP at the site would not be large enough to be efficient, maybe only 30%.
- Hunt – Range of energy demand is wide depending on the level of efficiency assumed.
- Jakob – Even with an energy intensive anchor user at the site, it's still probably not enough to create a baseload that makes CHP economical.

- Smith – If you have a micro-grid and utilize the hydro source for the site, that may be an attractive feature to the market.
- Schuerger – The hydro isn't official "on the site", it's next to it, so you can't use it as part of the 'net zero' narrative, unless you reconnect to the site.
- Strom – The hydro is already there. Let's focus on driving down load and utilizing other energy sources.
- Jakob – We need cheap, reliant based load that the hydro can supply.
- Graves – Greater context is a carbon neutral St. Paul and region; that's we weren't counting the hydro. This site needs to push the energy innovation as much as possible.
- Klass – Does proximity of the hydro source increase its efficiency as a power source because you reduce transmission losses.

Most Likely Energy Concepts - slide

- McCarten – In 'Baseline' is the nature of the use such that heat pump /electricity is the base power? Yes.
- Pernille – Gas powered CHP isn't net zero. Bio-mass CHP would be net zero. Need to be about 20-25 MW demand to make CHP economically viable. There are small -scale bio-gas, but they aren't market proven.
- Andraos – Seems like doing a new technology, that is very efficient like CHP, is in favor in a lot of places and may be competitive with natural gas in the long-term.
- Flemming – it's 50/50 thermal (3 MW) and electrical (3 MW)
- Saint Paul Green bldg. policy ties city funding to higher standards already.
- Jakob – The site could be sourced differently in different locations.
- Jakob – Area C could be a place for solar PV.
- Thorton – How about wind sourcing for the site? Not local wind, but purchased from the grid.
- Thorton – Is net zero a definitive goal? Hunt – Mayor set it as a goal and we are striving to get that.
- Engh – Any energy solution requires density of users – this development needs mass and density to support the energy infrastructure. Users are price sensitive; not very source sensitive. Tall building are 80% heat need and 20% cool, smaller buildings are 50% heat

and 50% cooling need. The cost metrics need high density. The hydro is a huge draw for some jobs/companies – it is a site asset. Attracted by the source reliability of hydro.

- Graves – Range of solar generation potential from roofs is based on firm of buildings. Space of buildings related to roof space. Rooftop density is a key factor in evaluating solar potential.
- Jakob – Space for solar PV would be figured into the financial sensitivity analysis.
- Flemming – The 2 scenarios analyzed had close energy demand.
- Strom – Low temperature water piping is more energy efficient and that's what's being considered.
- Smith – Use plastic piping for system (there is a local manufacturer in Minnesota).
- Is District cooling being considered?
- Jakob – We have to determine if it's economically viable. Distance from river to plant to users changes the efficiency of using river water.
- McCarten – You could build distant renewable source to offset the energy demands of this site.
- Smith – Did you look at bio-mass thermal boiler (not CHP)?
- Jakob – From a resource perspective, it's not that efficient.
- Pernille – DE concept is a flexible grid to retrofitting with new technologies. Individual energy solution is less flexible to evolve.
- Smith – How do we accommodate future technologies? We might be able to get to net zero in the future, when technologies improve; and the goal is to design a system to move toward that.
- Pernille – What if goal is achieving net zero at a defined time in the future, say 10 years, and the system grows toward that goal.
- Carmody – How about a 4th concept with DE, not using hydro as the base power? What is the carbon outcome and price premium for that?
- Klass – What about off-site renewables? Shall we count those; or could they be part of the base?
- Jakob – The group said stay local in the first meeting.
- Strom – DE concept is good and electricity as the base source is a good solution. We can then determine what the source of that electricity is.

- Smith – Build flexible infrastructure to move to net zero.
- Grant – Solar garden success is partly driven by cheap ex-urban land. It's been attractive due to how the program was structured. That financial structure might change.
- Graves – Mayor's goals of net zero seems to be, what's the very best we can do to get there. We then figure out what to do if we fall short of that through site-based sources.
- Graves – Identify range of options for MW demand.
- Jakob – We will begin by analyzing them separately and then combine elements of them, if prudent.
- McCarten – Good approach; the mix and match can happen later.

Pernille – The weighting of the objectives is important. If net zero isn't a day 1 goal, that changes approach options.

Noble – Natural gas isn't a deal breaker if it's a low amount for reliability. However, we should push for as many renewable as possible and reduce reliance on natural gas.

- Schuerger – We need to have enough information for the concepts to begin to see any hybrid concept potential. How do we grow into economically viable over time and net zero over time? How do we preserve that information to tell time sensitivity?
- Jakob – Gas CHP is expensive, so you'd have to run it at full to make it economical.
- What's the marginal cost point between investing in energy efficiency and energy system design?
- Flemming – It's more cost effective in an urban setting to invest in an energy delivery system than to drive energy efficiency to its highest point at a building level. The energy efficiency standards we recommend are where the tipping point in the extra efficiency investment isn't worth it.
- Engh – Go the DE direction with more focus on how.
- Schuerger – Let's not put all the DE base dependent on the hydro.
- Strom – Whether or not we use the hydro is an accounting issue.
- McCarten – The focus is on how to get a green source for the DE base energy – we can determine the source later.
- Is on-site the goal or not?
- Thorton - Do the analysis of DE assuming hydro and worry later about actual source.
- Smith – Proximity and branding/marketing of local hydro source has value.

Next steps - Jakob

Consultants will draft basic assumptions to use in the concepts analysis and then meet with the Technologies Review subcommittee to discuss the assumptions before proceeding with the analysis.

The City of Saint Paul is adding another \$25,000 to the consultant budget and will add a scope of work activity to have them conduct financial analysis of the energy concepts.

Ford Study trip to Europe - Hunt

Foundation funding some city staff, joined by private parties invited to go on the trip at their own expense. Key stakeholders participating in energy study TAG, Ford Task Force, and jobs group. Size is capped at 26 people. If spots open we'll let people know. Trip is March 13-19.

Next TAG meeting - April

Next TAG meeting – April 2nd or 3rd week. Merritt will send a meeting wizard to test dates.

Evening public meeting

Public meeting tonight on the Energy Study -- meeting will be a general overview of energy and trends, followed by preliminary findings from the study, and then open for Q & A with audience.