Illinois EE Stakeholder Advisory Group
Fuel Conversion Working Group

Monday, May 24, 2021 (Meeting #4)
10:00 am – 12:00 pm
Teleconference

Attendees and Meeting Notes

Meeting Materials

- Posted on the May 24 Meeting page:
  - May 24, 2021 Fuel Conversion Working Group Agenda
  - Air Source Heat Pump Source and Site Scenario Spreadsheet (updated)
  - Combined Heat and Power Scenario Spreadsheet (Guidehouse)
  - Combined Heat and Power Scenario Spreadsheet (NRDC)
  - Responses to Fuel Conversion Follow-Up Items

Attendees (by webinar)
Celia Johnson, SAG Facilitator
Samarth Medakkar, Midwest Energy Efficiency Alliance (MEEA) – Meeting Support
Brian A'Hearn, CLEAResult
Matt Armstrong, Ameren Illinois
Rick Berry, Guidehouse
Shonda Biddle, Walker Miller Energy Services
Joe Birschbach, Leidos
Patrick Burns, Brightline Group
Ben Campbell, Energy Resources Center, UIC
Emily Cross, Guidehouse
Sam Dent, VEIC (IL-TRM Administrator)
Ram Dharmarajan, Gas Technology Institute
Nick Dreher, MEEA
Gabe Duarte, CLEAResult
Allen Dusault, Franklin Energy
Greg Ehrendreich, MEEA
Jim Fay, ComEd
Scott Fotre, CMC Energy
Jean Gibson, Peoples Gas & North Shore Gas
Pace Goodman, ILLUME Advising
Molly Graham, MEEA
Vince Gutierrez, ComEd
Cliff Haefke, Energy Resources Center, UIC
Amir Haghighat, CLEAResult
Travis Hinck, GDS Associates
Jim Jerozal, Nicor Gas
Tarun Kapoor, Energy Solutions
Thomas Manjarres, Peoples Gas & North Shore Gas
Mark Milby, ComEd
Abigail Miner, IL Attorney General's Office
Jennifer Morris, ICC Staff

Phil Mosenthal, Optimal Energy, on behalf of National Consumer Law Center
Chris Neme, Energy Futures Group, on behalf of NRDC
Charles Newborn, SEEL
Eric O'Neill, Michaels Energy
Randy Opdyke, Nicor Gas
Noah Purcell, Walker Miller Energy Services
Joe Reilly, Applied Energy Group
Zach Ross, Opinion Dynamics
Tyler Sellner, Opinion Dynamics
Hardik Shah, Gas Technology Institute
Grant Snyder, IL Attorney General's Office
Jacob Stoll, ComEd
Mark Szczygiel, Nicor Gas
Taso Tsiganos, IL Attorney General's Office
Andy Vaughn, Leidos
Ted Weaver, First Tracks Consulting, on behalf of Nicor Gas
Ken Woolcutt, Ameren Illinois
Brittany Zwicker, CLEAResult

Meeting Notes
Action items are indicated in red font.

Opening and Introductions
Celia Johnson, SAG Facilitator

The purpose of the May 24th meeting:
1. Discuss Air Source Heat Pump and Combined Heat and Power (CHP) project examples, using three scenarios (following the current IL-TRM; using a source conversion; and using a site conversion).
2. To discuss follow-up items from prior Working Group meetings

Fuel Conversion Project Examples
Thomas Manjarres, Peoples Gas & North Shore Gas
Chris Neme, Energy Futures Group, on behalf of NRDC
Rick Berry, Guidehouse

Air Source Heat Pump Spreadsheet (presented by Peoples Gas & North Shore Gas)
- There are questions that need to be answered, but through the TRM TAC. This group needs to address the policy questions.
- This is a simplified version of the heat pump fuel switch scenario. It has gone through a number of iterations.
- What value should we be using for heat rate? What baseline should we use? The conversation is currently underway for the TAC to take on. Our role is to determine the policy directions.
- Current methodology for counting savings (TRM)
    - Beginning with the takeaway (green table)
    - How the TRM allocates savings as of today. Site calculation on the electric side, but the final piece of calculating the avoided gas consumption to claimable kWh is done using the source heat rate of the electric grid.

- Characterization of TRM method: Site savings for most of the calculation, but at the end, converting from kWh to Therms, does a source calculation.
- Note that we are in the process of determining the right methodology; as of today, if gas is converted to kWh using source conversion, this is the kWh savings that electric utilities would claim.
- If we use the same allocation methodology, if we're converting reduced site gas use to convert to kwh, the electric savings claim is greater. Nearly 10X increase. Not due to more efficient HP, but rather site gas reduction usage.
- We have to decide, are we ok with claiming more savings than actually occurs in the state of Illinois?
    - If we're looking at the site savings methodology, 11,000 kWh = 39.7 MMBtu.
    - Right now, source savings criteria in ITRM. So before allocating savings, we had to determine if the measure saves source energy. The result is there are 12.3 MMBtu worth of source savings; so it's a valid fuel switch
    - Neither methods add up to source energy savings (12.3 MMBtu). The current method undercounts. If we shift to site savings, we over

[Chris Neme] On row 59; talk us through how this currently works? 7.6 is source (row 35) and 2.5 is site? Is 2.5 from site converted to kWh?

[Thomas Manjarres] Yes

[Chris Neme] And that's a subset of 11.23; the portion of 11.23 associated with heating is equal to the difference between the baseline heat pump and the efficient heat pump? Confused how you're capturing heating savings.

[Thomas Manjarres] Also confused how this is happening, but this is straight by the book. Will be offering a more simplified option that directly get at one of these two numbers.

[Ted Weaver] The baseline heating shift does not save source energy; negative source energy. In line 59, electric utility has to take penalty for fuel switch.

[Chris Neme] Why is it showing positive source energy savings in row 34?

[Ted Weaver] Because there's two parts to row 34; baseline fuel switch and the efficiency gain. That efficiency gain saves source energy but the fuel switch doesn't. The fuel switch itself uses more energy; I think that's what's going on.

[Phil Mosenthal] The source heating savings is only reflecting the incremental improvement; not the fact that you have new electric consumption from baseline.

[Ted Weaver] I think if you broke the 4.7 into two parts; fuel switch part, which is a negative savings (uses more source energy); then there's a gain from improving efficiency of appliance. It's the efficiency gain saving energy, not the fuel switch.

[Chris Neme] So the overall measure saves energy.

[Phil Mosenthal] Confused; if the 12.3 MMBtu is the total savings at source; any conversion happening is source; how come row 59 doesn't end up with same 12.3?

[Ted Weaver] Because row 65 is site conversion. I think because current TRM doesn't allocate source savings.

[Phil] Cooling savings and baseload heating savings aren't being counted at source.

[Thomas Manjarres] Correct

[Ted Weaver] I think we got there by taking the total savings, saying that we know the cooling and efficiency savings and convert to kWh. The fuel switch itself is done at source and is not saving energy.

[Phil Mosenthal] My point is I agree in terms of what's happening; although we don't need to convert cooling savings or incremental; in practice we leave as kWh, in this example, aren't we trying to show total claim savings using different conversion factors. So we are converting back to kWh using site instead of source for components.

[Thomas Manjarres] "Reduced…source" is the only difference between green and red tables. Are we converting reduced gas consumption to kWh using source or site conversion factor? This one conversion results in a 10X savings increase.

[Ted Weaver] That number is the ratio of 11000 to value in N59 (this is correct)

[Chris Neme] Want to reiterate a past discussion. We need to be careful what we're calling a fuel switch. That fact that a customer had a gas furnace does not mean this is a fuel switch; is the program influencing the fuel switch. If it isn't a fuel switch, then the gas wouldn't be involved at all, but that the electric utility would claim is 1810. Cooling savings and efficiency savings.

Counting Savings Options

- Different methodology of claiming savings, but the difference between site and source still exists; site energy number is always going to be greater than source energy number.
- Another option for allocating savings (blue table); step 1 calculates source energy savings for screening. Take total, divide amongst participating utilities. If electric-only, then all source MMBtu gets converted to kWh on equivalent basis at the site (3,412 Bu/kWh). Even though we are claiming source energy savings, we're converting on an equivalent basis on the site as per FEJA.

  [Chris Neme] You're calculating source energy savings and now you're using a site. You're mixing source and site in this calculation?

  [Thomas Manjarres] That's one perspective; what I'm really saying is that there's 3412 Btus in a kWh. If we figure how much total energy this measure savings, then it would make sense to use the definition of a kWh to claim savings.

  [Phil Mosenthal] I think this is a result of forcing things into the current TRM framework, resulting in mixing conversion factors.

  [Ted Weaver] Looking at lines 46 and 48; I think that is the source conversion. I don't think there's anything is mixed. How much is allocated in the middle is unclear but,1029 MMBtus available.

[Phil Mosenthal] I think that's giving us pure source. But in reality, we don't do that; we don't take our lighting savings and covert to Btu. And normally we'd do that for cooling, but then when we convert it back to source, we're mixing fuel conversion.

[Ted Weaver] None of this is a recommendation; just options. This option is how to allocate source savings and stay consistent.

[Thomas Manjares] Yes, this is a good example of conversation that will have in the TAC. We need to inform those discussions. This group needs to tell us what our options are? Looking at are we going to pick between the two source or site savings on the table?

[Chris Neme] What are the two source and site savings options?

[Thomas Manjarres] Existing way of doing it. The site energy savings for the exact same measure is going to be greater than the source energy savings. We need to know if this is the right way to do this.

[Taso Tsiganos] The 11,000 kwh is significant because in essence we're ignoring line loss and other factors on the equation from source savings? We have gas, burned at the site that is what it is in kwh (small line loss). We're not reflecting what's being saved then. 10X is a substantial difference. The goal should be to reflect what's actually happening. We're basically ignoring the inefficiencies of electricity to get to site to get this number.

[Ted Weaver] It's not the line loss so much as the generation loss.

[Chris Neme] In the bottom yellow table; 39.2 converted to kWh by dividing by conversion factor. It seems like a pure source conversion would take 10900 source savings and divide by 10475.

[Thomas Manjarres] That might be double counting in my opinion.

[Chris Neme] Let's assume this is a Central AC. You converted the source Btu, you have to divide source Btu with heat rate; otherwise what you're showing in source Btu is claiming more savings for cooling. Just want to be clear; I think there's a third option, source Btu converted to kWh using heat rate. Not arguing for this.

[Taso Tsiganos] When you use the example of an AC, you just have a straight kWh savings, why are you converting to Btu.

[Chris Neme] Because heat pumps cool and heat, and in this scenario, the heating part is the fuel switch. Source Btu change is one way to determine if this is eligible. Well how do we convert heating savings to kWh. What Thomas is showing is that this is an option. I think another option is dividing heat rate to get back to source conversion of source savings in kWh.

[Phil Mosenthal] Isn't that what the first (current TRM method) doing?

[Thomas Manjarres] Yes

[Phil Mosenthal] What I was raising before, taking that number converted half at site and half at source and converting into all at source. In other words, the 1000 kWh shouldn't be converted to Btus

[Thomas Manjarres] If I used Chris recommendation, converted 12.3/heat rate. This gives you source kWh.

[Chris Neme] I think there's a third option. The first option – source converted to kWh using site Btu. Second option, site btus converted to kwh using site BTUs. Third option is source Btus converted to kWh using source Btus.

[Ted Weaver] 4th option; what the current TRM does is trying to get to what you're doing Chris; it converts the efficiency stuff, but the fuel switch itself at source. We're talking about the fuel switch itself; baseline fuel switch. Maybe the current TRM is appropriate cause it isolates the fuel switch.

[Sam Dent] If you 1123 kWh multiply by heat rate, divide by million, get 12.3. If you do the same for next line, subtract the 7.2 MMBtu gas, get 12.3. That's what the current method is doing.

[Phil Mosenthal] Maybe there's an error in 1123, when you do that multiplication, you're a little short than 12.3

[Chris Neme] Any calculation at site should include gas line losses. None of these calculations currently do.

[Sam Dent] Correct.

[Thomas Manjarres] Switching to screening criteria tabs. Using national avg distribution system losses (1 %). That was the immediately available number. You can see between scenarios 2 and 3, what happens when you include that. You play with the nat gas source to site ratio, you can see how that impacts the screening test.

[Jim Fay] What is the source for 1.01 %?

[Thomas Manjarres] eGrid 2018.

[Jim Fay] Does that include gas transmission losses?

[Thomas Manjarres] No, just at local distribution company

Background Tab: Ultimately, why are we having this conversation now? If we're looking at an electric efficiency measure, we don't need to calculate the source energy impacts. When we move from fuels, we need to keep in mind that we're looking at two different forms of energy. Nat gas would be considered primary energy source, electricity is secondary. Nat gas gets converted to secondary for on site. Gas furnace to takes primary source, natural gas, converts to secondary energy, heat. If we just stay with site energy for evaluating fuel conversions, then we're including the conversion losses of the natural gas conversion, but not conversion losses of electricity conversion. The only way to make an equitable comparison would be conversion factor for fuel to get electricity.

[Phil Mosenthal] Seems to me that's a theoretical way; isolate fuel conversion to baseline unit. Then treat incremental efficiency improvements the way we always do.

Key question: What is the definition of a kWh saved? Are we being consistent? We need to make sure output is consistent with what we report for savings. The policy discussion impacts double counting and double penalizing.

[Chris Neme] From your view, is this generation loss applicable only in the context in the burning of fossil fuels? When thinking of a solar generator you're not suggesting we convert some solar heat rate?

[Thomas Manjarres] No (re solar question]; I would say we go with the well-established captured efficiency approach for renewables. For solar panel, incident energy on solar panel is significantly more that the energy generated from it. We count the captured energy, in this case solar panel converting radiation to energy is 100%.

[Ted Weaver] Essentially BTUs of fossil fuel is what we care about.

[Thomas Manjarres] These numbers are the marginal heat rates or the fossil heat rates of the grids.

[Jim Fay] We need to take a forward-looking basis for determining the heat rate. The heat rate is very high and represents more fossil generation because it's historical. I think we all agree it will change.

[Sam Dent] The heat rate numbers haven't changed much over the last 8 years.

[Chris Neme] We only focus on fossil fuel heat rates. A. This is what egrid reports. B. It only looks at dispatchable generation as what's on the margin. This is a short-term view of what's marginal.

[Sam Dent] Heat rate will be discussed by TRM TAC.

CHP Spreadsheet Scenarios (presented by NRDC)

- I went back to the spreadsheet that ERC/UIC and I worked on together in 2013/2014 to initially develop what's now in the TRM for CHP. We classified 5 different systems with different capacities. I used the middle one and slight rounding for ease of discussion. What you see on the screen in rows 9-25 are either inputs in the yellow or outputs calculations from inputs.
- Bottom line; you're burning 50 MMBtus (row 24) of gas, and producing 26 million BTUs of waste heat usable (b 21). You end up with 76 mil BTUs of energy, costs 50 mil BTUs to produce.
- What's shown in row 29 and 30 is what's happening at the building; reducing site BTU basis, worth 17 million btu. You're burning 50 mil BTU of gas, but saving 26 million, net increase of 24 mil btus on site but also true on the source. Haven't included line losses.
- Reviewed Scenarios 1-5
    - Scenario 1: Electric utility only, claiming 5 mil kWh of savings. Gas conversion in addition to this for heating savings. This scenario is if you don't have to adjust for increased gas consumption.
    - Scenario 5: What the current TRM would do. Simplified set of rules that fit multiple CHP systems given a carbon equivalency (row 4)

- Scenario 2: Site BTU conversion. In this case 5 mil kWh output from CHP, but increased gas, divide by 3413, 7 mil kWh of increased gas consumption. So site Btus gas increases.
- Scenario 3: Instead of taking increased 24 mil Btus, dividing by assumed heat rate. Source BTU savings.
- Scenario 4: 24 mil Btus of gas, looked at carbon impact (bottom of spreadsheet). 50 mil Btus of gas on system is displacing emissions from boiler and electricity from grid, so net decrease in emissions. Then convert emissions savings to kWh. This is a precise calculation for this precise system. TRM meant to align roughly with carbon equivalency.

[Phil Mosenthal] What's driving carbon equivalency is how much renewables mixed with fossil fuels; same thing as using a lower heat rate. If we forecast additional renewables and defined the heat rate, it would be essentially the same.

[Chris Neme] Partly true. It's not just more renewables; there's a shift from coal to gas on fossil generation as well. Absolutely right that the heat rate would be impacted by that. If we were actually using a forward-looking heat rate, emissions rate would have to come down as well. One of the factors.

[Jennifer Morris] In all the scenarios, it really doesn't make a difference how much savings gas can claim for CHP for a gas utility.

[Chris Neme] I think that's right. If we continue with TRM's conceptual framework where gas utility only gets to claim savings if it's a joint program and joint program is causing CHP adoption.

[Jennifer Morris] We don't have a box for gas utility only. It seems CHP was a gas utility only measure based on the project example presentations.

[Chris Neme] I would say gas utility only would be the same as joint program given FEJA framework.

[Phil Mosenthal] Re joint savings, the way you have it, you're showing two separate pieces. Seems that if it was gas only, they have to combine them, end up with negative savings if it's on site.

[Chris Neme] You could do that. The concept here is that if it's a gas program, you're driving more efficient adoption not adoption of a CHP system.

[Ted Weaver] It seems like we should have a gas-only approach as well.

[Chris Neme] What's not here is, even if that's the way you count savings, there's a fuel switching element nonetheless. The joint program therm savings is the same as the gas only savings. Same as gas claiming all savings for efficiency above 65%.

[Phil Mosenthal] But if gas utility wanted to promote CHP with a program that causes CHP adoption, then they'd have to track all that gas increase at source or site.

[Chris Neme] that's a fair point, this is not here.

[Phil Mosenthal] If you just look at incremental thermal savings above baseline, gas savings is all the same. If you assume a gas-only program drove CHP adoption, then it would matter because under scenario two (site), you'd have overall negative gas savings at source.

[Ted Weaver] For scenario 3, but there would be much higher savings overall. Right now, electric utility gets to claim all the savings whereas gas only claims incremental efficiency savings.

[Chris Neme] To be clear, right now, the TRM doesn't adjust for this either. The gas utility just gets to claim a savings relative to a 60%

[Sam Dent] We fixed this issue for ASHP where electric only scenario was only looking at efficiency gains; couple years ago we decided that we were not dealing with the actual fuel switch.

[Taso Tsiganos] For or an ASHP, there's a method to count savings from natural gas otherwise used as heat, but not for CHP purposes for the gas utility only?

[Chris Neme] That's correct. There's a legitimate policy question on whether that's permissible. But currently in TRM, gas doesn't get to count any savings for the efficiency from the system that might result from the production of electricity, displacing generation on the grid. We should at least show what that looks like.

[Jennifer Morris] Would you be able to do a gas utility only therms savings column? [Yes – NRDC will share after the meeting]

[Phil Mosenthal] It does create an inconsistency if we treat the definition of whether it's an eligible fuel switching measure due to source savings, yet measure uses more site savings.

[Taso Tsiganos] I don't know about that; I read the definition of energy efficiency differently for electric vs. gas.

[Ted Weaver] Just so I'm clear; scenario 4 is the CO2 equivalency, scenario 5 is TRM method, doesn't report exact CO2 equivalency.

[Chris Neme] Yes; it was intended to be an approximation given what we knew about the grid emissions rate at the time.

[Phil Mosenthal] If that's the case, why is scenario 5 thermal savings change? Aren't we not converting thermal savings either way? Row 40 vs row 43

[Chris Neme] Because the formula in the TRM for joint program is gas utility gets to claim 2% of thermal output for incremental efficiency increase of CHP, it's simply an approximation. I just realized, currently on the TRM, if it was a gas only program, they get incremental efficiency savings over 60%, not 65%.

[Phil Mosenthal] Wouldn't it be the same formula as K 49?

[Chris Neme] No k40 is an approximation.

[Jennifer Morris] If we move to a site btu conversion, which is the compromise proposal from VEIC, then an electric utility would never support a CHP system.

[Chris Neme] Yes, you would never support CHP as a fuel switch, you can only support it as a gas utility if the customer was going to purchase another end-use.

[Jennifer Morris] It seems weird because gas would get negative savings.

[Ted Weaver] It's the same issue on the ASHP side, just not as dramatic.

[Ted Weaver] Chris, from your perspective, how do you rationalize site conversion as the right method?

[Chris Neme] I think the most compelling argument is the legal one; the only place where FEJA talks about conversion is site conversion. If you ignore that and go straight to the policy question, I think one might look at either source or carbon. You can get the grid clean enough where HP is increasing carbon emissions over its life.

[Phil Mosenthal] I also look at it from a public policy question; source or carbon equivalency seems appropriate. Thinking site might be more appropriate though if states have plans to decarbonize during the life of the CHP measure.

[Celia Johnson] Due to time constraints, we are going to skip Guidehouse's CHP spreadsheet and discuss during June meeting.

Fuel Conversion Follow-Up Items

IL AG's Position on Fuel Switching

- Speaking directly to legal issue. Reviewed language from 8-103b. Needs to be the context of (b-25) language, which gives electric utilities direction for touching another fuel.
- For electric utilities, they must look at IPA EE definition. 3rd sentence from this definition raises the question of whether an electric utility can increase electric consumption and still consider measure EE. AG's position is that it can't. Must reduce electricity according to the language. Statute contemplates load reduction.
- 8-104 doesn't have that same restriction for gas utilities when reducing electricity. EE definition for electric utilities means load reduction, in terms of btus savings, all fuels are reduced. For gas, however, there's no specific requirement that both fuels are reduced. So we read different restrictions for both fuel utilities according to different definitions under 8-103 and 8-104.
- There is no language that speaks to eliminating natural gas; it is a load reduction statute for both.

[Jennifer Morris] Based on your interpretation, an electric utility would not be able to promote ASHP measures, but gas utility could promote CHP?

[Taso Tsiganos] There are nuances. In theory, that's correct. You're increasing electricity consumption. But it was conveyed that in this case, we're only assuming that they were already going to go with an ASHP. This makes sense but raises question whether you're asking the customer.

[Sam Dent] That was the old position; new position is that an electric utility would have to factor the reduced gas and increased electric.

[Taso Tsiganos] Raises additional issues; look at size of incentive. Does it promote electrification? Electrification is not contemplated in the statute. It is a load reduction statute.

[Celia Johnson] To clarify, IL AG is preparing a written memo describing legal analysis?

[Taso Tsiganos] Yes. No specific date yet when the memo will be available.

[Sam Dent] Relates to discussion on definition of fuel switch. NRDC stated that new construction should not be considered fuel switch. If a company supporting ASHP in a new home, TRM implies that baseline be defined by evaluation. Can and should be a mix of what heating systems the market would otherwise favor.

[Chris Neme] Do you mean average or specific to individual project?

[Sam Dent] TRM is agnostic; up to evaluators. Assume done by average.

[Ted Weaver] It doesn't have to, though. Evaluators can answer those questions more clearly.

[Sam Dent] From AG's legal perspective, can an electric company promote ASHP in new construction?

[Taso Tsiganos] Not prepared to answer this question yet.

[Chris Neme] If you accept AG's legal interpretation, it seems clear that the answer is yes, as long as the intention is to promote efficiency. All a function of what you believe the baseline to be. Conceptual point.

[Taso Tsiganos] Sounds good in theory, but what are your assumptions and baselines? Need to know what the customer was actually going to do.

[Chris Neme] I think this is a methodological question. How do we establish baseline?

[Taso Tsiganos] The stated goals of the policy goals should be contemplated. i.e. decreasing environmental impact. Our position is the heat rate needs to be whatever it is today. We shouldn't make too many assumptions.

[Sam Dent] I'd like to hear opposing views to this position. I assume we will continue to have that discussion at some point.

[Celia Johnson] We can follow-up in the June meeting after there is an opportunity to review IL AG memo.

Closing & Next Steps

- Working Group meeting #5 scheduled on Monday, June 21 – meeting expanded to 3 hours (9:00 – 12:00)
- Additional Working Group meeting to be scheduled in July

Next meeting topics (June 21):

1. Update from VEIC on the progress of the TRM TAC Fuel Conversion discussions
2. Follow-up discussions on spreadsheet scenarios
    a. Chris Neme shared an updated spreadsheet with a gas scenario: Combined Heat and Power Scenario Spreadsheet – updated with gas scenario (NRDC)

    b. Guidehouse to present overview of CHP scenarios
3. Discuss responses to follow-up items from prior Working Group meetings
    a. Key follow-up items:
        i. Follow-up on IL AG's office legal analysis memo
        ii. Proposed definition of "Fuel Switching" (drafted by NRDC and NCLC)
        iii. ComEd's legal position on exemption to 10% cap
    b. Discuss questions on additional follow-up items, if needed
4. Check-in on the positions of interested parties / discuss whether to prepare Comparison Exhibit for July meeting