Illinois EE Stakeholder Advisory Group
Large Group Meeting
Tuesday, September 3, 2024

10:00 am – 12:00 pm Teleconference

Attendees and Meeting Notes

Meeting Materials

Posted on the September 3, 2024 meeting page:

- Agenda
- SAG Facilitator Introduction to September 3 Meeting
- Applied Energy Group Presentation: Peoples Gas & North Shore Gas Market Potential Study

Attendees

Name	Company or Organization
Celia Johnson	SAG Facilitator (Celia Johnson Consulting)
Jane Anderson	SAG Meeting Support (Inova Energy Group)
Abigail Miner	IL Attorney General's Office
AJ Young	Greenlink
Andrew Cottrell	ScottMadden
Andy Braatz	Franklin Energy
Andy Wahrer	Primera Engineering
Arvind Singh	DNV
Bill Risley	Franklin Energy
Bruce Liu	Nicor Gas
Cameron Seeley	Walker-Miller Energy Services
Cassidy Kraimer	Community Investment Corp.
Chad Balthazor	Cascade Energy
Chris Neme	Energy Futures Group, representing NRDC
Chris Vaughn	Nicor Gas
Christina Frank	Peoples Gas & North Shore Gas
Danish Murtaza	Peoples Gas & North Shore Gas
David Brightwell	ICC Staff
Dimitry Burdjalov	Applied Energy Group
Elder Calderon	ComEd

Name	Company or Organization
Eli Morris	Applied Energy Group
Elizabeth Applegate	Applied Energy Group
Elizabeth Horne	ICC Staff
Erin Stitz	Applied Energy Group
Fernando Morales	Ameren Illinois
Fuong Nguyen	Applied Energy Group
Gregory Norris	Aces 4 Youth
Haas, Shawn	Peoples Gas & North Shore Gas
Hilary Snover	CLEAResult
Houston Dowen	Frontier Energy
Ian VanArsdall	Nicor Gas
Jarred Nordhus	Peoples Gas & North Shore Gas
Jean Gibson	Peoples Gas & North Shore Gas
Jennifer Alvarado	Franklin Energy
Jim Fay	ComEd
Joe Mays	Cascade Energy
John DeRosa	Illinois EPA
John Lavallee	Ameren Illinois
Josh Ramos	Nicor Gas
Kanchan Swaroop	Resource Innovations
Karen Lusson	National Consumer Law Center
Kari Ross	NRDC
Keely Hughes	The JPI Group
Keith Cronin	VEIC (IL-TRM Administrator)
Ken Walter	Applied Energy Group
Kim Brown	ComEd
Kim Janas	IL Attorney General's Office
Kim Swan	ComEd
LaJuana Garrett	Nicor Gas
Laura Agapay-Read	Guidehouse
Lilieric Florez Monroy	Peoples Gas & North Shore Gas
Lisa Fennell	Bidgely
Maria Onesto Moran	Green Home Experts
Matt Armstrong	Ameren Illinois
Melissa Helphingstine	Primera Engineering
Michele McSwain	Sustainable Environmental and Economic Development Solutions
Mike King	Nicor Gas
Nate Baer	i3 Energy
Nick Warnecke	Ameren Illinois
Nicole Popejoy	IL Association of Community Action Agencies
Nikki Pacific	Ameren Illinois

Name	Company or Organization
Philip Mosenthal	Optimal Energy, representing NCLC
Randy Opdyke	Nicor Gas
Rashaan Keeton	Center for Energy & Environment
Samuel Morris	The Will Group
Selena Worster Walde	Erthe Energy Solutions
Tamika J. Cole	Walker-Miller Energy Services
Tara Cunningham	Rinnai
Ted Weaver	First Tracks Consulting, representing Nicor Gas
Thomas Manjarres	Peoples Gas & North Shore Gas
Wade Morehead	Morehead Energy
Zach Obert	Franklin Energy
Zachary Froio	Applied Energy Group

Meeting Notes

See red text for follow-up items.

Opening and Introductions

Purpose of September 3rd meeting: To discuss draft baseline and potential study results for Peoples Gas and North Shore Gas

- SAG Facilitator Introduction

Peoples Gas and North Shore Gas Baseline and Potential Study Results

Ken Walter, Applied Energy Group

Agenda

- Overview of Analysis Approach
- Primary Data Sources
- Levels of Savings & Adoption Rates
- Market Characterization and Baseline
  - Code Impacts
- Peoples Gas and North Shore Gas Draft Potential
  - Overall Residential and Commercial potential
  - Savings by case and select years
  - Top measures – Realistic Achievable Potential
  - Top measures – Technical Comparison
- Key Takeaways
- Planned Sensitivity Scenarios

Potential Study Modeling Approach

- Market Characterization
  - Base year is 2023 – involved taking build loads, breaking down into different segments to accurately categorized end use being used.
  - Baseline studies
  - Utility data – building data
  - Secondary data – to fill in gaps as needed
- Baseline Projection

    - Utility forecasts
        - What we're producing is not necessarily the same as utility forecast.
    - Standards and building codes
        - Also includes natural market trends and purchases
    - Serves as the foundation for potential
- Identify Demand-Side Resources
    - EE equipment
    - EE measures
    - Emerging tech
- Potential Estimation
    - Taking long forecast of turnover and applying different measures at the opportunities that arise.
    - Technical – highest possibility
    - Economic – cost screened but no market participation rates
    - Achievable – applies customer willingness to participate factor

Major Modeling Inputs and Sources

- Most of the major inputs, not exhaustive
- Peoples/North Shore foundational data
    - PGL/NSG gas 2023 sales by customer schedule
    - Current and forecasted customer counts
    - Retail price forecasts to inform customer decisions in economic model
    - Program & pilot data that can feed assumptions for measures or stock of things
    - Economic assumptions (avoided costs, discount rate, carbon value, etc.)
    - Previous potential study – referenced occasionally to stay consistent or identify where to improve
- Survey data showing presence of equipment
    - PGL: Implementation data
    - Third party and secondary sources used as well
        - US Energy Information Administration: Residential, Commercial, and Manufacturing Energy Consumption Surveys (RECS 2020, CBECS 2018, and MECS 2015)
- Technical data on end-use equipment costs and energy consumption
    - Illinois TRM (v12 primarily)
    - US Department of Energy and ENERGY STAR technical data sheets
    - Energy Information, Administration's Annual Energy, Outlook/National Energy, Modeling System data files
- State and Federal energy codes and standards (capture things moving through time)
    - Illinois State Energy Code
    - Federal energy standards by equipment class
        - Latest furnace efficiency requirements taking effect in 2029
- Market trends and effects
    - Annual Energy Outlook purchase decision and trends
        - Look to see building stock turnover and who is purchasing what equipment
    - ENERGY STAR sales data

Levels of Savings

- Technical: At every opportunity, customers choose the most efficient option regardless of cost

    - Highest possible efficiency that could be achieved
        - Maximum insulation, top efficiency levels, etc.
        - Provides upper boundary of what efficiency is possible
- Economic: Includes only cost-effective measures, but assumes 100% of customers participate in anything that is cost effective
    - This study uses the Total Resource Cost test (TRC)
    - Still represents above possible case, but is a good measure of what is cost effective out there
- Achievable: A subset of economic potential that accounts for likely measure adoption within the market
    - Requires forecasts of adoption rates
    - AEG modeled two levels of achievable potential:
        - **Realistic** achievable potential reflects current customer willingness to participate and incentives consistent with current programs
            - Going back through different surveys
        - **Maximum** achievable potential applies a "lift" factor to the base adoption rates, representing maximum incentives and customers' ideal program delivery
            - Based on AEG's past research
            - Ideal delivery, 100% incentives

Adoption Rates – Methods and Examples

- Market research from the previous potential study included residential customer willingness-to-participate (completed in 2020)
    - Furnaces were tested with varying incentive amounts and payback periods from 1-5 years (see previous study report for documentation)
    - Customers were also asked about a hypothetical 100% incentive, direct-install weatherization upgrade, which sets a strong maximum participation level
- Measures not included in the previous research (including Commercial and Industrial) were assigned adoption rates derived from prior AEG studies elsewhere, but scaled to be in proportion to the Peoples Gas/North Shore Gas research (see graph)
- Example scaling in graph:
    - Orange bar is customer willingness to adopt for high efficiency furnaces
    - Shaded bars – average furnace take rate from other research
    - Findings show that customers very willing to patriciate in efficiency

Chris Neme: In this example on the slide 6, 62.7% is the response on 50-year payback. What is payback without any incentive? Did you ask what the uptick would be without any incentive?

- *Chris Neme: If there is no difference between 5-year payback and getting it for free, then suggests that free one would be high?*
- *Ken Walter: It could. 63% is fairly close to adoption rate for 100% incentive rate direct install.*

Abigail Miner: Can you confirm if the survey data you relied on was coupled with site visits or survey data exclusively?

Ken Walter: I believe it's all survey online, will double check.

Market Characterization and Baseline

Market Characterization – Peoples Gas and North Shore Gas, Natural Gas Consumption by Sector in 2023

- Peoples Gas and North Shore Gas loads are majority residential (56%)
- Majority of customers use gas for both space heating and water heating
- Other end uses, including Industrial process account for just ~14% of gas loads

Residential Market Characterization

- Residential space and water heating saturations taken from joint utility implementation assessments.
    - Values compare well with the federal Residential Energy Consumption Survey (RECS) 2020 data for Illinois when filtered for natural gas customers
        - Filtered four respondents to the RECs
- Initial values for gas consumption by individual technologies comes from a mix of building simulations and technical data from the Energy Information Administration
    - Prior market research was used to inform building characteristics (age of building, occupancy rate) for simulation
- Use per customer is calibrated to actual bill data.
    - This ensures derived savings include the impacts from the current efficiency mix and real behavior of customers rather than relying specifically on federal minimum to an efficiency standard

Commercial Market Characterization

- Not as granular of data compared to residential
- Primary source for breaking commercial gas loads down comes from the federal Commercial Building Stock Assessment (CBECS) 2018 data
    - Overall therms per square feet
    - End use and technology saturations
    - Age and size of buildings to inform simulations
- Breakdown of end use level in gas use in commercial spaces shown in chart
    - Using same use per sf assumptions

Industrial Market Characterization

- Previous potential study (2020) included Industrial within Commercial, but some additional insight is gained in separating it
    - However, the loads are too small to meaningfully break individual segments/manufacturing types
    - Difficult to apply population model to a sample of three businesses
- Data from the 2019 Manufacturing Energy Consumption Survey (MECS) helps break industrial gas loads into end uses
    - Miscellaneous includes co-generation

Baseline Projection – Peoples Gas and North Shore Gas

- Overall use of natural gas is projected to slightly decline from 2024-2045
    - In the absence of future efficiency programs
- Customer growth projections were provided by Peoples Gas & North Shore Gas through 2028; AEG extended the trends through 2045
    - Overall market growth is ~0.8% per year
- Building shells and equipment have some natural improvement over time based on:
    - U.S. Dept. of Energy's Annual Energy Outlook building decay/renovation rates
    - Equipment lifetimes and efficiency codes & standards

Codes, Standards, and Market Impacts – Peoples Gas and North Shore Gas Combined

- The baseline includes the impacts of federal furnace and water heater standards on all equipment turnover, as well as Illinois energy code for new construction and renovations
- Some customers may also choose above-minimum code equipment at time of replacement or construction
    - Projections for the efficiency of replacement and new equipment is taken from the Dept. of Energy's Annual Energy Outlook national stock forecast model and ENERGY STAR sales data
    - Estimated potential savings on following slides do not include these "naturally occurring" higher-efficiency installations
- Blue line on bottom is reference baseline – drawing potential against; dotted line is if all customers only purchased minimum standard equipment at time of turnover; red line is a hypothetical, projected no future code

Peoples Gas: Residential and Commercial Savings (Draft)

Draft Potential Summary

- Combined residential and commercial savings (industrial is still in draft)
    - Residential and commercial combined are about 90% of the load
- Baseline forecast total by 2045 is 1.6 billion therms
- Technical savings by 2045 is 902 million therms
    - Strong technical savings are out there
- Max and realistic potential, not a lot of distance between them. Leads to achievable potential overtime – 243 million over 20-year time span
- Good for gas
    - Impact of cost effectiveness

Savings by Sector, Selected years – Peoples Gas

- Different levels growing over time
- All four cases on each of the selected year – RAP, MAP, Economic, Technical
- Technical growing a ton, economic a bit slower
- Residential has a lot of technical potential, bigger drop from technical to economic on residential side

Residential Top Measures - Peoples Gas, Realistic Achievable Potential

- Top two measures are thermostats; next two are water heaters
    - Top twenty are in controls, weatherization, some sealing
- Residential furnace savings are impacted by effects of new federal standard requiring AFUE 95% beginning in 2029
- Dual-fuel (aka hybrid) heat pumps, which use a gas furnace as backup for an electric air-source heat pump, were an option in the model
    - Did not pass cost effectiveness screen

Residential Top Measures - Peoples Gas, Technical Comparison

- Some measures have significant technical potential but do not yet meet the threshold for Economic Potential:
    - Dual fuel (aka hybrid) heat pumps replacing furnaces
    - Combination heat pumps serving both space and water heating needs
    - Weatherization measures: Upgrading insulation and windows in buildings that are below current code

- Peoples Gas may continue to monitor these measures or consider them for pilot or custom programs
- Large water heaters and wall cavity installation don't have cost effectiveness

Commercial Top Measures – Peoples Gas, Realistic Achievable Potential

- While boilers are the #1 measure, more space heat savings come from controls and weatherization collectively than from equipment upgrades
- Savings account for interaction/overlap between measures like thermostats, automatic radiator controls, and equipment upgrades
- For this model, when testing for cost effectiveness, we test in isolation. When reporting total savings potential, they are applied in cascading order.

Commercial Top Measures – Peoples Gas, Technical Comparison

- As in Residential, some measures with large technical potential do not yet meet the threshold for Economic Potential, including heat pump replacements for furnaces
- Other measures with high technical but much less economic potential include:
    - Boiler upgrades to condensing systems in several segments
    - Advanced controls for rooftop packaged HVAC systems
    - High efficiency window upgrades

Residential Discussion

Chris Neme: For residential, when you talk about what was cost effective, what would you say something about avoided cost?

- *Ken Walters: Using the same avoided costs that are currently being used to develop the DSM. Including the gas supply and commodity cost, carbon and emissions adder, layered on consist non-energy impacts. Total value is about 90 cents a therm for PGL and little less for NSG.*

Chris Neme: What is the carbon adder based on? Is AEG presenting the same value for the grid emission rates that was present to SAG in June/July?

Chris Neme: When screened the heat pumps, what did you assume to screen on the grid?

- *Ken Walters: We did model full residential and commercial profiles on the electric side so if going to do a conversion, we have a building simulation load for ASHP. In plan values, using the agreed upon carbon values and emission rate.*
- *Chris Neme: Curious as to if that's the same as the values that Ted presented to on grid rates.*

Chris Neme: Question on residential windows. Is this a time of replacement measure that you're looking at?

- *Ken Walters: Windows would be retrofit.*
- *Chris Neme: Why not time of replacement?*
- *Ken Walters: Historically, haven't seen programs that have managed to intervene on that.*
- *Chris Neme: If you look at national data, there is an average point in which they get replaced. And there's a substantial number of windows sold as replacements every year. The MT program is a targeted replacement market.*
- *Ken Walters: Question comes down to "would that window still be there in 5 years if they weren't participating in this program?"*

- *Chris Neme: Assumption is that you have to push people to undertake the expense as part of replacement.*

Karen Lusson: Can you explain more on how the connected thermostat Energy Star ended up as #1 achievable potential measure for residential customers? I find that surprising.

- *Ken Walters: Can't speak to every input, especially savings per unit. The calculation is consistent with IL TRM. It's the number of households in the territory that have equipment that can be controlled; the remaining market is what portion of applicable systems have that unit and what don't.*
- *Karen Lusson: Did you do any assessment of which of homes have WIFI?*
- *Ken Walters: Yes, took that info from REC survey data.*
- *Karen Lusson: These are homes with WIFI that don't have a smart thermostat?*
- *Ken Walters: Yes, we have the have percentage of different housing type and income level. A lot of it is things like the new standards are pushing the measures that used to be on top to further down on the list.*

Chris Neme: Comment on windows – the IL TRM defines point of sale in new construction baseline.

- *Ken Walters: Yes, new construction is an incremental adjustment.*

Chris Neme: On whole home air sealing – did you analyze the blower door measure?

- *Ken Walters: Yes, have both measures in there. Will need to look further into it to see why it's not on the list.*

Chris Neme: You have a number of building output measures like insulation measures. Did you do an analysis separately for low-income households vs non-low-income?

- *Ken Walters: Yes. And these numbers are the combined of the two. Did not assume that the retrofits were 100% paid for, assuming more standardized incentive.*
- *Dimitry Burdjalov: Also note that we do assume a less insulated envelope for the low-income buildings as well?*
- *Chris Neme: is the 97% furnace relative to a baseline of 95% or 80%?*
- *Ken Walters: Both. That would be the sum over the 20 years. Prior to 2029, it is against the market mix that includes 80% as a minimum, may also be a 90%. Past 2029, increasing the population of 95 significantly. Percentages at the end are in 2045.*

Ken Walters: Cost effectiveness: for PGL, have single family and multi family, and regular income and low-income. Cost effectiveness is being tested separately. So when we see small measure for windows, that means it's probably only passing for one segment. Testing it for individual segments and vintages. Will take a look at wall sealing.

- *Chris Neme: So showed 4 housing types. Did you screen it once for each of those groups?*
- *Ken Walters: No, just average R value for SF LI, for example.*
- *Chris Neme: This is problematic. For retrofit programs where services being given to projects that need it, averaging across hundreds of thousands of homes seems problematic.*
- *Phil Mosenthal: I agree.*

Chris Neme: Is this report finished, or is it in draft form where feedback could be incorporated?

- *Jean Gibson: We are presenting the draft version today.*

- *Chris Neme: Biggest concern – not uncommon for certain building measures on average to not pass, but need to segment the market a lot more than that to capture efficiency potential. Houses bringing the average up would not be the ones targeted.*

Phil Mosenthal: Forecasts showed long-term sales growth and customer growth. How much have you considered potential electrification and state energy goals?

- *Ken Walters: The long-term forecast declines. Did offer dual fuel heat pumps so they can partially electrify. Not including in forced electrification.*
- *Phil Mosenthal: Looking back, doesn't say forecast sales went up but does indicate market growth by .8% per year for a number of customers.*

Commercial Discussion

Zach Obert: Can you share more details about furnace measures on commercial list? Are 2029 code changes reflected?

Ken Walters: It reflects commercial sized, and did not find that 2029 standard applied to commercial side.

Phil Mosenthal: For the "connected thermostat" measure, are you assuming baseline of programmable or manual? This question is for both residential and commercial connected thermostats.

North Shore Gas Residential and Commercial Savings (Draft)

Draft Potential Summary – North Shore Gas, Residential and Commercial Combined Savings

- Similar percentages for maximum and realistic compared to PGL side

Savings by Sector, Selected Years – North Shore Gas

- Lots of residential technical
- Lower gap in the commercial side

Residential Top Measures - North Shore Gas, Realistic Achievable Potential

- Measure mix is similar to Peoples Gas, however North Shore Gas has a more homogenous, mostly single-family (>99.5%) residential segment which shifts some measure ranking around
- Top measures are similar: thermostat on top, water heater and home energy management systems following

Commercial Top Measures – North Shore Gas, Realistic Achievable Potential

- Different segment mix from Peoples Gas moves some measures down in ranking, such as Connected Thermostats and HVLS fans
- However, other than ranking, the makeup of the top measures remains similar –Boilers at the #1 position with space heating controls and weatherization contributing the majority of savings

Technical Comparison – North Shore Gas

- Very similar to Peoples Gas
- Residential Cumulative Savings in 2045 (Million therms)
    - Not seeing the insulation measures making it up far in the technical – comes down to the segment mix in their territory (older, low-income homes)

- Commercial Cumulative Savings in 2045 (Million therms)

Phil Mosenthal: RTU advanced controls?
- *Dimitry Burdjalov: Primarily on retrofit. New construction is up to code.*
- *Phil Mosenthal: For purposes for cost effectiveness, not counting any of the cooling savings that would come with that?*
- *Dimitry Burdjalov: We are documenting those.*

Chris Neme: Assumption on avoided cost on electric grid?
- *Ken Walters: Yes, avoided cost on electric grid*.

Chris Neme: Avoided cost of carbon, using social cost of carbon 1.5 or 2%. In 2024, the cost of carbon was $1.25 a therm – 4x more what you are assuming in this analysis. Changing to whichever of those two numbers landing on will have a significant impact on what is cost effective.

Phil Mosenthal: Did you include demand control ventilation?
- *Ken Walters: Yes - #13 on North Shore and is on the Peoples Gas list as well.*
- *Phil Mosenthal: What about economizer control?*
- *Ken Walters: Yes, do have them but don't have any gas savings.*
- *Phil Mosenthal: That's right, good point.*

Key Takeaways
- Upcoming federal equipment standards changes will reduce customer loads especially in the future, but constrain opportunities for cost-effective program savings
- The majority of potential has shifted from equipment upgrades to building shell and control systems as a result
- Heat pump technologies and advanced control systems have promising technical potential, but will require targeted strategies, as they are not quite on their own merits yet
- Custom projects may also provide a path to more savings

Planned Scenarios
- Once the reference case is finalized, AEG will create duplicate model sets that vary the foundational input assumptions:
- Electrification Scenario
    - Big conversation around this
    - Will explore the impact on gas loads and subsequent savings potential
    - Will include all-electric new construction option
- Avoided Emissions Sensitivity
    - Plan is to remove the carbon value from avoided costs to assess what measures are cost effective purely from their gas efficiency savings
- Climate Future Scenario
    - Right now using normal weather
    - Replaces the 20-year Normal weather data with projected Cooling and Heating Degree Days representing changes in climate

Karen Lusson: For the climate future scenario, what timeline on the heating cooling degree days are you looking at?

- *Ken Walters: Not set in stone yet. If you have a suggestion, please reach out to PG-NSG.*

Ted Weaver: Could you walk through the different potential scenarios? On the realistic, is that just taking into account how people respond to rebate levels or also various budget constraints?

- *Ken Walters: Not a specific budget constraint. Mostly based on customer willingness from survey data: "if someone offering an incentive, would you do it?" The lift between the two is trying to tease that out. There's a big difference between mail in rebate vs instant.*
- *Ted Weaver: Realistically achievable will require more funding than Peoples Gas and North Shore Gas have.*
- *Ken Walters: Fair point. This is separate from a program plan where you look at things like the budget. We don't want to constrain the potential savings to a budget. We want it to be a menu to select from.*

Matt Armstrong: Question on the mention on dual fuel heat pump. Are you speaking to gas heat pumps or traditional ASHP with gas furnace as a backup?

- *Ken Walters: Both. On the equipment replacement, as standard furnaces turn over, was a conversion to standard ASHP with gas back up (on two levels). Separately, had gas driven HP combo system— those were not found to pass the economic screen.*

Karen Lusson: How did the statewide study results completed for Ameren Illinois, ComEd and Nicor Gas enter into your assessments? For example, ComEd's service territory was a part of statewide potential study, and that territory overlaps with Peoples Gas.

- *Ken Walters: These efforts were done independently. When they presented on August 13th to the SAG, we were interested in seeing findings, but no coordination of numbers.*
- *Karen Lusson: As a lay person, it would help us stakeholders to have a better understanding as to how assumptions in AEG study on baselines, surveying, etc. differed from the statewide study because if statewide study results were different in a significant way, those assumptions matter. Can PG-NSG coordinate with the other utilities to summarize in a memo for stakeholders?*

Closing and Next Steps

Summary of follow-up items:

1. In the example on the slide 6, 62.7% is the response on 50-year payback. What is payback without any incentive? Did you ask what the uptick would be without any incentive?
2. Confirm if the survey data relied on was coupled with site visits or survey data exclusively.
3. What is the carbon adder based on? Is AEG presenting the same value for the grid emission rates that was present to SAG in June/July?
4. Residential study results – look into why the blower door measure was not on the list as a top measure.
5. For the "connected thermostat" measure (both residential and commercial), are you assuming baseline of programmable or manual?
6. Stakeholder request: How did assumptions in the AEG study for Peoples Gas and North Shore Gas differ from the statewide study performed by GDS Associates for Ameren Illinois, ComEd, and Nicor Gas? If the assumptions or study results differ in a significant way, it would be good to understand via a summary memo.