

**Illinois Energy Efficiency Stakeholder Advisory Group
Large Group Meeting
Tuesday, June 23, 2020
10:00 am – 12:00 pm**

Teleconference Meeting

Attendee List and Meeting Notes

Meeting Materials – Tuesday, June 23 Meeting

- Meeting page: [Tuesday, June 23 Meeting](#)
- [Tuesday, June 23 SAG Agenda](#)
- [ComEd 2021-2030 Economic Potential Assessment Draft Results Presentation](#)

Tuesday, June 23 Meeting Attendees (by webinar)

Celia Johnson, SAG Facilitator
Samarth Medakkar, Midwest Energy Efficiency Alliance (MEEA) – Meeting Support
Dean Alonis, Metropolitan Water Reclamation District
Matt Armstrong, Ameren Illinois
Jean Ascoli, ComEd
Tyler Barron, Environmental Law & Policy Center
Bob Baumgartner, Leidos
Kathia Benitez, Franklin Energy
Jordan Berman-Cutler, ComEd
Shonda Biddle, Walker-Miller Energy Services
Janice Boman, Skill Demand
Brian Bowen, Uplight
David Brightwell , ICC Staff
Patrick Burns, Brightline Group
Madeline Caldwell, CLEARResult
Ben Campbell, Energy Resources Center, UIC
Lauren Casentini, Resource Innovations
Craig Catallo, Franklin Energy
Jane Colby, Apex Analytics
Salina Colon, CEDA
Andrew Cottrell, Applied Energy Group
Tim Cycyota, CLEARResult
Leanne DeMar, Nicor Gas
Scott Dimetrosky, Apex Analytics
K.C. Doyle, ComEd
Julie Drennen, Center for Energy & Environment
Gabe Duarte, CLEARResult
Deb Dynako, Slipstream
Katherine Elmore, Community Investment Corp.
Jim Fay, ComEd
Jason Fegley, Ameren Illinois
Natalie Fortman, Opinion Dynamics
Scott Fotre, CMC Energy
Julia Friedman, Oracle
Omayra Garcia, Peoples Gas & North Shore Gas
Aimee Gendusa-English, Citizens Utility Board
Jenny George, Ameren Illinois
Jean Gibson, Peoples Gas & North Shore Gas
Stacy Gloss, Indoor Climate Research & Training
Jon Gordon, Enervee

Andrey Gribovich, DNV-GL
Randy Gunn, Guidehouse
Vince Gutierrez, ComEd
Dave Hernandez, ComEd
Alex Hill, Dunsky
Travis Hinck, GDS Associates
Julie Hollensbe, ComEd
Jeffrey Ihnen, Michaels Energy
Cheryl Jenkins, VEIC (IL-TRM Administrator)
Jim Jerozal, Nicor Gas
Mary Johnson, Resource Innovations
Lalita Kalita, ComEd
Haley Keegan, Resource Innovations
Kurtis Kolnowski, Applied Energy Group
Larry Kotewa, Elevate Energy
Ryan Kroll, Michaels Energy
John Lavallee, Leidos
Kris Leaf, Willdan Energy Solutions
Bruce Liu, Nicor Gas
Ashley Lucier, SEEL
Karen Lusson, National Consumer Law Center
Mathieu Lévesque, Dunsky
Marlon McClinton, Utilivate
Adam McMurtrey, Exxon-Mobil
Brady McNall, DNV-GL
Rebecca McNish, ComEd
Nishant Mehta, Guidehouse
Mark Milby, ComEd
Jake Millette, Michaels Energy
Abby Miner, IL Attorney General's Office
Fernando Morales, Ameren Illinois
Jennifer Morris, ICC Staff
Denise Munoz, ComEd
Tom Myers, Slipstream
Chris Neme, Energy Futures Group, on behalf of NRDC
Rob Neumann, Guidehouse
Victoria Nielsen, Applied Energy Group
Lorelei Obermeyer, CLEAResult
Maria Moran Onesto, Green Home Experts
Randy Opdyke, Nicor Gas
Antonia Ornelas, Elevate Energy
Briana Parker, Elevate Energy
Patricia Plympton, Guidehouse
Deb Perry, Ameren Illinois
Hanh Pham, Willdan Energy Solutions
Michael Pittman, Ameren Illinois
Beatrice Quach, Resource Innovations
Ingrid Rohmund, Applied Energy Group
Cory Read, Ecometric Consulting
Anthony Santarelli, SEDAC
Elena Savona, Elevate Energy
Leah Scull, CLEAResult
Raman Singh, ICF
Jon Soehl, Dunsky
David South, West Monroe Partners
Jacob Stoll, ComEd
Mark Szczygiel, Nicor Gas
Mike Ting, Itron
Rick Tonielli, ComEd

Chris Townsend, Freeborn
Carl Uthe, Embertec
Andy Vaughn, Ameren Illinois
Ted Weaver, First Tracks Consulting, on behalf of Nicor Gas
Shelita Wellmaker, Ameren Illinois
David Whittle, Leidos
Jessica Williams, Green Home Experts
Selena Walde Worster, Erthe Energy Solutions
Fred Wu, Aiqueous
Angie Ziech-Malek, CLEAResult
Brittany Zwicker, CLEAResult
Brent Langille, Dunsky
John Pady, CEDA
Arvind Singh, DNV-GL
Chris Vaughn, Nicor Gas
Sara Wist, Cadmus Group

Opening & Introductions

Celia Johnson, SAG Facilitator

- Purpose of June 23rd meeting: For ComEd's consultant to provide an overview of the ComEd Potential Study results.

ComEd Potential Study Results

Alex Hill & Mathieu Levesque, Dunsky Energy Consulting

- [Introduction to Potential Study – Jim Fay] We look at opportunities for energy savings for every portfolio. The study performed for plan 6 includes two parts – 1. Baseline survey; customer-based looking at equipment, how it's used, age, other characteristics; snapshot of ComEd's service territory, 2. Potential study; look at how the market will evolve up to 2025. Answer question like, where do savings lay.
- Introduced team and Dunsky Energy Consulting. Outside of implementing programs, Dunsky provides services across DSM process. Potential studies, design and savings opportunities.
- Reviewed Potential study schedule. We're in the latter end of the process (final results and learning).
- Reviewed Key Parameters slide.
- Reviewed Scope slide. Focus on Economic potential for this study.
- Reviewed Granularity of model.

[Deb Dynako] Why was program achievable list outside of scope?

[Jim Fay] Since we completed the last potential study, we asked what is the meaning of achievable? How does it relate to programs and portfolio? Discussion that's been ongoing since then. Original assumption: if achievable potential is designed to capture specific barriers and measure penetration, our collective program experience over a decade suggests we'd not be able to adequately define the specific market barriers to the point where they're able to interpret results to inform the planning process. Instead, take the funds spent on that, use in other areas of project.

- Reviewed Market Segmentation

- Reviewed Industrial Approach slide. If there's any questions on this approach, reach out.
- Reviewed Market Evolution slide.
- Reviewed Lighting and HER slide.
- Reviewed DEEP model. Parameters for each study; Technical, Economic, and Naturally Occurring Market Adoption Baseline (NOMAD)
- Reviewed Model Calibration. 3 steps outlined. Calibrate, NOMAD (without any programs), NTGs (measure level NTGs) were used to run the net economic assessment.

[Andre Gribovich] Regarding NLC. Standalone measure?

[Answer] Yes.

[Chris Neme] You have one data point; what is market adoption under current offerings. How do you extrapolate from that to NOMAD. To run NOMAD, remove programs. Remove assessments, remove impact on barriers. For example, if you have a tech with 40% market and 100\$ rebate. You have one data point you can calibrate to but how does this tell you the true natural baseline

[Alex Hill] This is why we don't typically include natural adoption market assessments with a reference on range. Calibrating establishes the market barrier level of each segment. Combination of understand the differences in technologies and customer segments; those present market barrier levels already from a number of potential studies performed by Dun. Based on experience, Dun assigns expected barrier impacts, run the influence the programs have on reducing customer barriers and influence of improved economic of case; you get a good representation of the IL market. Another factor was ITRON's overall uptake of key technologies. Used projected uptake of various technologies. Determined they are generally in the range. Is it precise, well there's high error bars, but this gives us a read on the market baseline in absent of programs.

[Chris Neme] You have already developed a model of customer uptake, based on data developed over time, and you're calibrating the model to current ComEd's service territory.

[Alex Hill] In addition to ITRON's market analysis for reference.

[Chris Neme] Is ITRON's research primary or secondary research?

[Alex Hill] It was secondary research.

- Reviewed Model calibration Current state slide.
- Big data points in multi-year reporting. First step was to calibrate model to forecast programs. Residential and non-residential markets. High level approach to program definitions in the model, since it's not an achievable tech potential study. Also considers IE market impacts.
- Looks at what may be changing in the market.

[Chris Neme] What does 2021 calibration mean? Gross savings if they ran the same programs?

[Alex Hill] Running ComEd's programs in the model with similar incentive levels using 2021 markets and using the same program NTG. Equivalent to achievable potential in 2021 with exact same programs.

[Chris Neme] Thought these were gross savings and the whole point is to understand what model will get in 2021 versus last two years.

[Alex Hill] Doesn't account for different measures. Not a granular look at ComEd's programs.

- Key differences between res and non-res is scale of lighting opportunities. There's a high penetration of t12's in ComEd's market. Removing t12s gives calibration.
- Provided breakdowns by end use.
- When they remove programs from model, apply gross savings by end use by sector; lighting makes much of the naturally occurring savings. Generally consistent non res and res. Using these savings, they assess the proportion of tech potential, expected

[Question] How are you handling early replacement measures in these studies?

[Answer] For T12 measures, T8 baseline. Perspective of luminaires. In competition with T12. Dual baseline for remaining life of tech and impact on overall cost effectiveness – what's the natural replacement schedule and early adoption. Back when more programs had T12 and potential studies looked a them, lots of opportunities. Reflected in improved cost effectiveness that speeds of natural market adoption. Despite incentives from ComEd, there's considerable t12 in the market place.

[Comment] By definition, there's no such thing as early replacement.

[Dunsky Response] Will verify and follow-up.

[Julia Friedman] How was the behavior program modelled?

[Alex Hill] HER is behavior program. Not in nomad savings.

[Randy Gunn] I assume that ITRON used residential lighting NTG results you came up with; they've done NTG assessment on lighting for a number of years.

[Alex Hill] NTG are forward looking. Typically assessed retroactively; this is forward looking NTG. What proportion of market potential is naturally occurring. From that determine if there's a justification for adjusting NTG going forward or keeping them. If you look at other potential studies in north east, NTG drops significantly. Again, this is portion of economic savings that could be reasonably attributed to free riders. If program is designed effectively, achieve higher NTG. Avoid double counting while informing ComEd team about where they need to be mindful

[Chris Neme] You're forecasting market share? If you have 50% NTG, you're saying 50% of measures purchased in X year would've been the high efficiency

one. If you were to run a program to address the other 50%, you can have a lot of free riders or target the harder to reach customers, lower free riders.

[Alex Hill] Yes.

- Reviewed Impact on sales on all sectors. NOMAD is higher than expected. Attributable to lighting, seemed justified given turnover. Shrinking market size and high free ridership from lighting.

[Chris Neme] I understand how you would do the analysis for new construction or equipment purchases, but how do you deal with retrofits? Can be done any time. How are you spreading NTG out?

[Alex Hill] Using a diffusion curve, trajectory into the model. Considers a combination of the market barriers for that measure. In some cases, there's a baseline tech and sometimes there isn't. Look at specific measure EULs in this case.

[Alex Hill] Not linear like that. Each attic has an opportunity within the 10 years. It's all in the 10-year horizon. Each attic will have one opportunity. Achievable potential as opposed to economic potential. That way they release opportunities for attic insulation. They'd take the entire number of attics that can be measures and are cost effective.

[Chris Neme] On market transformation, such as code compliance or advancing codes; are those included here or not?

[Alex Hill] It depends, to some degree, but there isn't a code compliance measure. Applying codes to high performance NC measure.

[Jim Fay] While we don't answer the question in the potential study, the analysis can help answer these questions.

[Chris Neme] Good point. If econ analysis is assuming code is baseline is something less than code. They did a separate study to capture that potential. Just finished up MEEA study in bringing market into compliance with existing code.

[Question] Assumption on how tech will improve in efficacy or reduce in costs? LED pads for example. OR static?

[Response] Most tech treated as strategic. Higher efficiency light to account for that market turned. No cost curves, maintain a steady incremental cost. Account for discounting future cash flows.

[Chris Neme] Merits looking into how conservative this approach is.

[Alex Hill] Will mention this in report so it's clear. Handful of tech where you'd expect a change in incremental costs over time. More than a handful, true for mor. Some more obvious than others.

- Reviewed electricity sales under the three study scenarios.

[Chris Neme] What did you assume for electrification?

[Alex Hill] None, expected general uptake of heat pumps. Not a sales forecasting exercise.

[Chris Neme] To the extent that ComEd's forecast says that there will be a certain number of EVs, did you look at savings from efficient charges or EVs?

[Alex Hill] Transportation was out of scope. EV charging is demand response vs EE.

[Chris Neme] To the extent tech like variable frequency drive have the potential to make electric new construction more unlikely to show up in baseline, that would've just been a reaction.

[Alex Hill] The study looked at what are the heat pump. efficiency models, not looking at fuel switching. We did account for growth of market. But didn't look into what was driving the customer choice.

- Reviewed 2025 breakdown of naturally occurring and potential by market sector. Removed natural adoption in IE market.
- Reviewed impact on demand.
- Reviewed TRC supply curve (2021)

[Chris Neme] How do you capture operational efficiency improvements?

[Alex Hill] Through building energy managers.

- Reviewed impact on sales for residential market. Nomad savings includes measures that do or don't pass TRC.
- Reviewed by end use
- Reviewed by segment, residential cumulative 2025.

[Chris Neme] How do NOMAD savings breakdown by end uses?

[Alex Hill] Lighting dominates on nomad savings, but for other end-uses, not a lot of natural adoption.

[Chris Neme] You found that there were more electric heated homes than electric baseboard homes?

[Alex Hill] We see higher electric furnace heating than baseboard.

[Chris Neme] SF or MF or both?

[Alex Hill] ITRON's numbers show more electric furnaces and baseboards. In both SF and MF?

[Mathieu Levesque] MF had more baseboards than furnaces.

- Lighting savings

[Jane Coby] On lighting for residential, inherent any assumption about socket potential declining over time? Few sockets turning over?

[Alex Hill] Savings decline as NTG declines. Account for EULs, much longer than incandescent or CFLs, baseline tech EULs. Number of factors. Didn't account for any EISA enforcement in this study. Remaining non-led opportunities. Projected those forward. Two factors limit res savings, low penetration of ... (missed remainder of response)

[Question] Why is exterior potential so high?

[Response] IL TRM has high hours of use for internal than external bulbs.

[Follow-up] Still, there's only a few exterior bulbs in the home.

[Response] They also have a much lower penetration of LEDs.

[Comment] TRM, 300 hours of use vs 1000. Reflects baseline study. Will provide more detail.

[Question] Why does a lamp potential stay flat? Expected gradual decline.

[Alex Hill] Will follow up on what's influencing this trend.

[Chris Neme] About a quarter of MF is electric heated. Why's it proportionally smaller than single family?

[Alex Hill] Higher penetration in master metered buildings

[Chris Neme] If it was true that most of electric heating buildings are master metered, that would be surprising.

[Alex Hill] Saw high electric heating in lodging. Is possible that electric heating systems were captured in the baseline of loading.

- Reviewed top 10 measures
- Reviewed commercial by end use
- Commercial only not C&I

[Comment] Hard thing to characterize behavioral, follow through rate given program design x is more represented in TRM

[Alex Hill] Difficult assessment to make when starting point is TRM itself. This is a limitation of the study.

- Reviewed non-residential savings by end use; high proportion of HVAC savings
- Reviewed lighting results
- Reviewed top measures.
- On the lighting controls, do the standalone lighting control measures
- When you look at daylighting and occupancy; TRM 23% when separate and 38 percent when used together
- Not shown, separate lighting control measures more potential according to this.

[Carl Urthe] Can you expand on advanced power strips?

[Alex Hill] Characterized from IL TRM; they show up high on the list, a lot of these measures were characterized number of years ago and tech attached were

different. So savings derive from TRM. Constrained by following savings and cost per unit. Program design needs to target the measure to the right customer with right attachments.

- Conducted using top down approach from ITRON. Added lighting measures assessment through the deep model approach. All end uses have significant savings opportunity; notable in lighting but doesn't dominate.

[Chris Neme] Regarding emerging tech, is the analysis limited to those identified and specified; you haven't done anything that's not specific.

[Alex Hill] Yes

[Question] Referenced earlier on industrial – process efficiency improvements not related to any particular end use; change in the type of input material. How are those captured?

[Alex Hill] Captured to a degree that they can be derived from past custom programs performance. ITRON does this analysis. This was not modeled.

Summary of Next Steps

Please send any additional comments or questions on the ComEd potential study results [by Monday, June 29](#) to the following:

- Alex Hill, Dunsky (alex.hill@dunsky.com)
- Mathieu Lévesque, Dunsky (mathieu.levesque@dunsky.com)
- Jim Fay, ComEd (James.Fay@exeloncorp.com)

Follow-up information provided by Dunsky:

Q1: Economic Potential Assessment by Year for Additional Equipment Measures (e.g. Attic Insulation)

For measures that are added equipment rather than replacing existing equipment (e.g. added insulation measures), we apply a diffusion curve that also takes into account the EUL of the measure, so that long EUL measures (typically big ticket items) are more slowly diffused into the market than short EUL measures. For measures with an EUL lower than the study period, the markets evolve into a replace on burnout treatment as the study period progresses.

As discussed, if the measure passes the TRC screen in a given market segment, then all of the Technical potential is captured in the Economic potential. I have provided details below for two envelope measure to illustrate how the economic potential was counted over the study period.

Attic Insulation:

- EUL = 20 years
- 50% of all Residential opportunities are considered within the Technical potential in the first 5 years
- 82.5% of all Residential opportunities are considered within the Technical potential over the 10-year study period

Air-Sealing:

- EUL = 15 years
- 66% of all Residential opportunities are considered within the Technical potential in the first 5 years
- 100% of the Residential opportunities are considered within the Technical potential over the 10-year study period

Q2: Explanation of the High Savings from Residential Exterior Light Bulbs, as Compared to Interior A-Lamps

It was noted that the residential exterior bulbs are generating higher savings than interior A-Lamps, which appears to be counter-intuitive. Checking the input assumptions derived from the TRM and the baseline study results, we offer the following explanation.

- There are approximately 4.5x as many non-LED interior A-Lamps (21,212,000 opportunities residential market wide for interior bulbs, as compared to 4,648,000 for exterior bulbs from the residential baseline study)
- Savings per bulb are approximately 4x higher for exterior bulbs
 - 22 - 24 kWh / year per bulb for interior A-Lamps
 - 91 kWh / year exterior bulbs
- This is due to the following factors
 - Hour of use are 2.3 x as high for exterior bulbs (2,475) than for Interior A-Lamps (1,089) - as per IL TRM
 - CFL saturation was known for interior A-Lamps, but was unknown, and assumed 0 for exterior bulbs. Overall the resulting average change in power draw per bulb (delta Watts) was 23W for interior, and 37W for exterior as a result
- Finally, the baseline EUL for exterior bulbs was lower (due to the high HOU's, and assumed lack of CFLs) which results in the market turning over more quickly in the early study years.

Furthermore, we noticed that the model did not pick up the NTG degradation factor for Residential lighting - which will be fixed for the narrative report. This will impact the residential lighting savings potentials.

Q3: Explanation of the Low HVAC Savings in the Residential MF Segments

Below is the portion of homes that use electric heating as the primary source for each Residential market segment from the baseline study.

Single Family_Non-Low-Income_<2000 sf_Small	Single Family_Non-Low-Income_<2000 sf_Medium	Single Family_Non-Low-Income_>2000 sf_Medium	Single Family_Non-Low-Income_<2000 sf_High	Single Family_Non-Low-Income_>2000 sf_High	Multi Family_Non-Low-Income_<2000 sf_Small	Multi Family_Non-Low-Income_<2000 sf_Medium	Multi Family_Non-Low-Income_<2000 sf_High	Single Family_Low-Income_<2000 sf_Small	Single Family_Low-Income_>2000 sf_Small	Multi Family_Low-Income_<2000 sf_Small
0.054175	0.068241	0.02871	0.091264	0.109224	0.069973	0.117	0.254436	0.121	0.042	0.131364

While the large MF does have a notably higher use of electric heat, we actually see more HVAC savings in SF homes, as this is driven more by cooling savings than heating savings overall.

For a few key measures this is what we notice:

- WiFi Thermostats do not pass the TRC most MF segments
- Whole house fan savings are not applicable to the MF segments measure
- ASHP savings is not applicable to MF segments (larger central systems would be captured in the Lodging C&I segment)
- DMSHP have limited markets for MF segments and savings are limited
- CAC savings are more prevalent and applicable to the SF segments.
- The Electric Resistance to DMSHP measure does not seem to pass the TRC screen

Q4: Technical Potential Savings from Retro-commissioning

The Strategic Energy Management - Retro-commissioning (SEM-RCx) measure assumed a 9% technical savings potential for each applicable building (all buildings with greater than 50,000 sq-ft). This measure was developed in-house by our Lead Engineer (Efficiency) for past studies. Through our past experience applying it in potential studies, we believe that the 9% savings represents a reasonable assessment of the average technical potential in each building.

The document source used from the EPA indicated a 15% rule of thumb potential for a RCx project. (Source: https://19january2017snapshot.epa.gov/sites/production/files/2016-03/documents/table_rules_of_thumb.pdf) We reduced this to 9% based on professional judgement, to account for the fact that there isn't much to commission (e.g. simple heating/cooling systems, manual controls) in many buildings, and or because RCx has been done recently. It also accounts for possible overlap between RCx projects and other savings measures, given that some RCx projects may include lighting controls tuning, or identify higher efficiency lighting change outs.

Q5: Lighting Controls Measure Breakdowns and Coverage of Lighting Systems

Finally, we had some questions about how we established potential coverage for different lighting controls measures. Overall, our approach was to split the market according to engineering and professional judgement that we have evolved through our experience conducting potential studies. Below we provide the portion of the lighting systems that each controls measure is applied to.

- Lighting Controls (Bi-Level): Applied to linear fixtures in Stairways and Corridors (approximately 10 % of all Linear Lighting)
- Lighting Controls (Daylighting): 20 % of linear lamps and High Bays
- Lighting Controls (Dual Occupancy & Daylight Sensors): 20 % of linear lamps and High Bays
- Lighting Controls (Occupancy): 40 % of linear lamps and High Bays
- Lighting Controls (Network): Applied only to linear lighting in medium/large business

In addition, we put the Dual Occupancy / Daylighting controls measure in competition with Daylighting alone (recognizing that both options are viable for locations that are suited to Daylighting). Moreover, while the NLC measure is applied just to large buildings, those represent a significant portion of the overall lighting opportunities. I would note that overall, the result is that the majority of the interior lighting systems are considered for possible lighting solutions.