ComEd Income-Eligible Energy Efficiency Electrification

MEEA
MIDWEST ENERGY EFFICIENCY ALLIANCE

Workshop #3

7/25/22

Housekeeping Items

Reminders

- Coffee and water set up in the kitchen
- Bathroom key on the front desk
- Lunch will be delivered ~11:40
- If you're on Zoom, make sure to mute yourself
- Meeting Owls are projecting video from around the room into the Zoom

Workshop Agenda

Monday, July 25, 2022

10:00 – 10:10 am	Welcome & Meeting Overview
10:10 – 11:40 am	ComEd Report Outs
	Stipulation Agreement Discussions
	Bill Impacts and Case Study
	Fuel Switching Communication Research
	Multifamily Pilot
11:40 – 12:10 pm	Lunch Break
12:10 – 1:00 pm	Single Family Presentation and Discussion
1:00 – 1:50 pm	Multifamily Presentation and Discussion
1:50 – 2:00 pm	Action Items, Next Steps, and Wrap Up
2:00 pm	Adjourn

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July 25, 2022

Review of Discussions with Stipulating Parties

June 15 Meeting with Parties

- Focused on income eligible energy efficiency electrification program design
- Attendees included representatives from: Energy Futures Group/NRDC, Citizens Utility Board, IL Attorney General's Office, ICC, National Consumer Law Center
- Informed stipulating parties of progress to date; updates included:
  - Work to assess to what extent the joint infrastructure can be leveraged; discussed potential of leveraging for customer intake and then moving candidates to EEE pathway to be served separately; relayed we still need buy-in from partner gas utilities
  - Building understanding of building types that make for promising electrification opportunity / development of customer screening
  - Desire to include consumer (homeowner, tenant, building owner) education on new technologies
  - Research underway (propane, communicating bill impacts)
  - Work with Elevate to electrify 100 homes
- Overall, attendees were very receptive of preliminary plans
- Questions surrounding how ComEd will promote electrification, if there is an opportunity to leverage IHWAP, integration of messaging into marketing collateral
- Parties were very interested in leveraging the joint program infrastructure and targeting previous weatherization participants that have older HVAC equipment

July 11 Meeting with Parties

- Focused on bill impacts research and case study
- Attendees included representatives from: Energy Futures Group/NRDC (separate meeting), National Consumer Law Center, Citizens Utility Board, IL Attorney General's Office, ICC, National Consumer Law Center, City of Chicago Mayor's Office
- Informed stipulating parties of work with Center for Energy and Environment (CEE), including:
  - Program design and bill impacts communication
  - Income Eligible Single Family electrification case study
  - Single measure bill impacts
- Questions surrounding how ComEd is thinking of framing the bill impacts communication, if historical bills are needed to assess impacts, how we are addressing alternative supply rates and what impact Percentage of Income Payment Program (PIPP) may have
- Parties were interested in us ensuring only top performing heat pumps are installed in IE homes and considering full range of benefits (health and safety / quality of life) for scenarios where the customers did not previously have air conditioning

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Thank you

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July 25, 2022

ComEd IE EE Electrification Workshop

Isaac Smith, Center for Energy and the Environment
Mark Milby, ComEd Energy Efficiency Program

Agenda

1. Discussion on Program Design and Bill Impacts Communication
2. Income Eligible Housing Electrification Bill Impacts Case Study

Examining Electrification Bill Impacts

- ComEd has worked with Center for Energy and the Environment (CEE) to better understand customer bill impacts from EE electrification. Together, we have created the following:
  1. A calculator and case study for whole-home electrification
     - This is performed for a fictional but representative income eligible customer single family home receiving a full electrification retrofit
     - Includes weatherization as well as natural gas and propane heating scenarios
  2. Bill impact calculators for a set of priority measures, including Air Source Heat Pumps, Ductless Heat Pumps, Heat Pump Water Heaters, Electric Cooking Ranges, Electric Clothes Dryers, and Lithium-Ion Electric Forklifts.
- The purpose of developing these materials is to:
  - Educate program staff on the bill impacts of different EE electrification opportunities
  - Understand different utility rate implications
  - Inform program design in terms of customer targeting and measure mix
  - Create bill impact calculators that can be leveraged by program implementation teams

Bill Impacts and Program Design

- **The level of detail available about an upgrade will be different based on program delivery channel**
  - To accurately estimate bill impacts, even for a single measure (e.g., HPWH), several variables impact actual savings
  - Many programs have little or no way of collecting information on the customer premise prior to their purchase
  - For programs having access to some of these variables through site visits or pre-project modeling, implementation teams may develop a more custom calculation in some cases
  - In all cases, a range of savings potential, rather than a single value, is likely warranted.
- **The ability to communicate with customers, and the communication format, will also differ**
  - For a program with closer customer contact this may look like (as an example) an information packet with potential bill impacts included
  - For a program with no customer contact this may be a bill impacts estimate or calculator on ComEd.com, or EESPs trained to communicate further

Spectrum of Bill Impact Communication

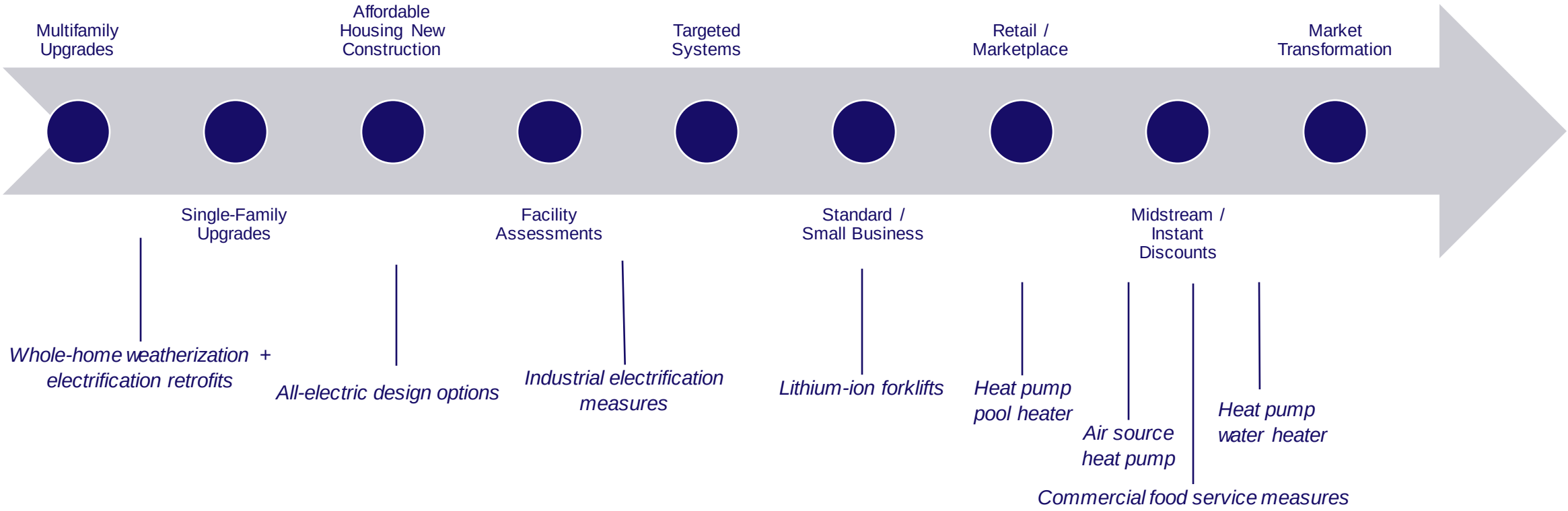
For illustrative purposes only

More Detail/More Personal Communication

- More information about customer premise or making direct recommendation; use more custom approach
- Direct or indirect channel to customer; communicate directly through program partners

More General/Less Personal Communication

- Little to no information about customer purchase or premise available; use average market assumptions
- No direct channel to customer; communicate through contractors, distributors or online resources



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Income Eligible Housing Electrification Bill Impacts Case Study

Whole-Home Electrification Case Study

- ComEd worked with Center for Energy and the Environment (CEE) to create a case study on the bill impacts of whole-home electrification for a fictional but representative income eligible customer home. This allows us to study the interactive effects and the impact of fixed costs.
- An accompanying Excel workbook contains the calculations and assumptions displayed here.
- The sample customer home is as follows:

Building

- 1,300sf single-family detached household built before 1950
- 3 bedroom & 1.5 bathroom
- 1-story ranch stick-frame ranch with conventional siding with 16 double pane windows

Household

- 4-person household (2 adults / 2 children)
- Gross household income of 30k – 40k $/yr

Energy Use (Typical Year)*

- 6,028 HDD and 850 therms for space heat
- 852 CDD and 824 kWh for cooling

**This represents a RECS2015 observation from ENC with HDDs and CDDs matching Chicago for the given year*

Case Study Key Variables and Assumptions

- **General**
  - 4,087 kWh of non-HVAC electric load
  - Propane fixed fee of $15/month in propane scenario
  - All-electric heating backup installed
  - All measure scenarios eligible for ComEd space heating electric rate
- **HVAC**
  - SEER 10 baseline window AC
  - 80% baseline forced air furnace
  - “Good” ASHP performance (avg. sCOP of 1.96)
    - Also compared “Better” and “Best” levels
- **Water Heating**
  - Baseline 50 gallon, 0.56 UEF water heater
  - Measure UEF of 1.8
  - Located in conditioned space
- **Cooking**
  - Average annual cooking energy required (0.72 MMBtu)
  - Baseline replaced by induction range
- **Clothes Drying**
  - Standard dryer size
  - Located in conditioned space
  - Measure is a ventless, ENERGY STAR Most Efficient dryer

Case Study Key Variables and Assumptions

Variables of Interest

1. Baseline energy costs including variable volumetric rates and additional/fixed gas fees
2. Varying ASHP performance characteristics
3. Baseline or alternative air conditioning systems
4. Weatherization impacts

**Qualified Infrastructure Plant (QIP) charge percentage is applied. We are still developing an easy way to include QIP in the analysis. The charge has been applied to all volumetric rate components. QIP charges are recalculated monthly and can vary significantly through the year, for the purposes of this analysis, the latest available QIP percentages have been used.*

Electric rates

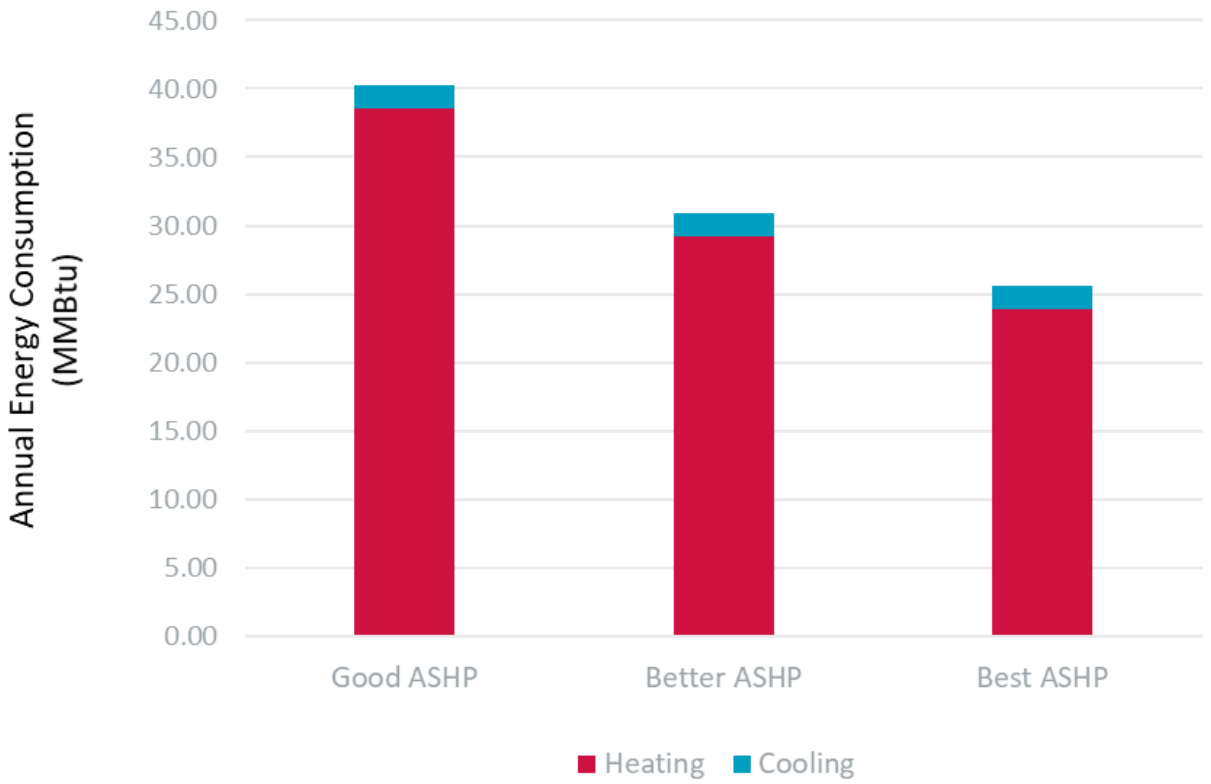
Rate Type	Volumetric Rate ($/kWh)
Electric Regular	$0.1321
Electric Space Heat	$0.1101

Gas rates

Utility	Volumetric Rate ($/therm)	Fixed Fee ($/mo)	QIP charge* (%)
North Shore	$0.822	$15.51	0.00%
Nicor	$0.857	$22.74	0.71%
North Shore Space Heat (SH)	$0.884	$24.12	0.00%
Peoples	$0.893	$17.07	38.24%
Peoples SH	$0.956	$34.12	38.24%
Ameren	$1.108	$18.76	8.32%

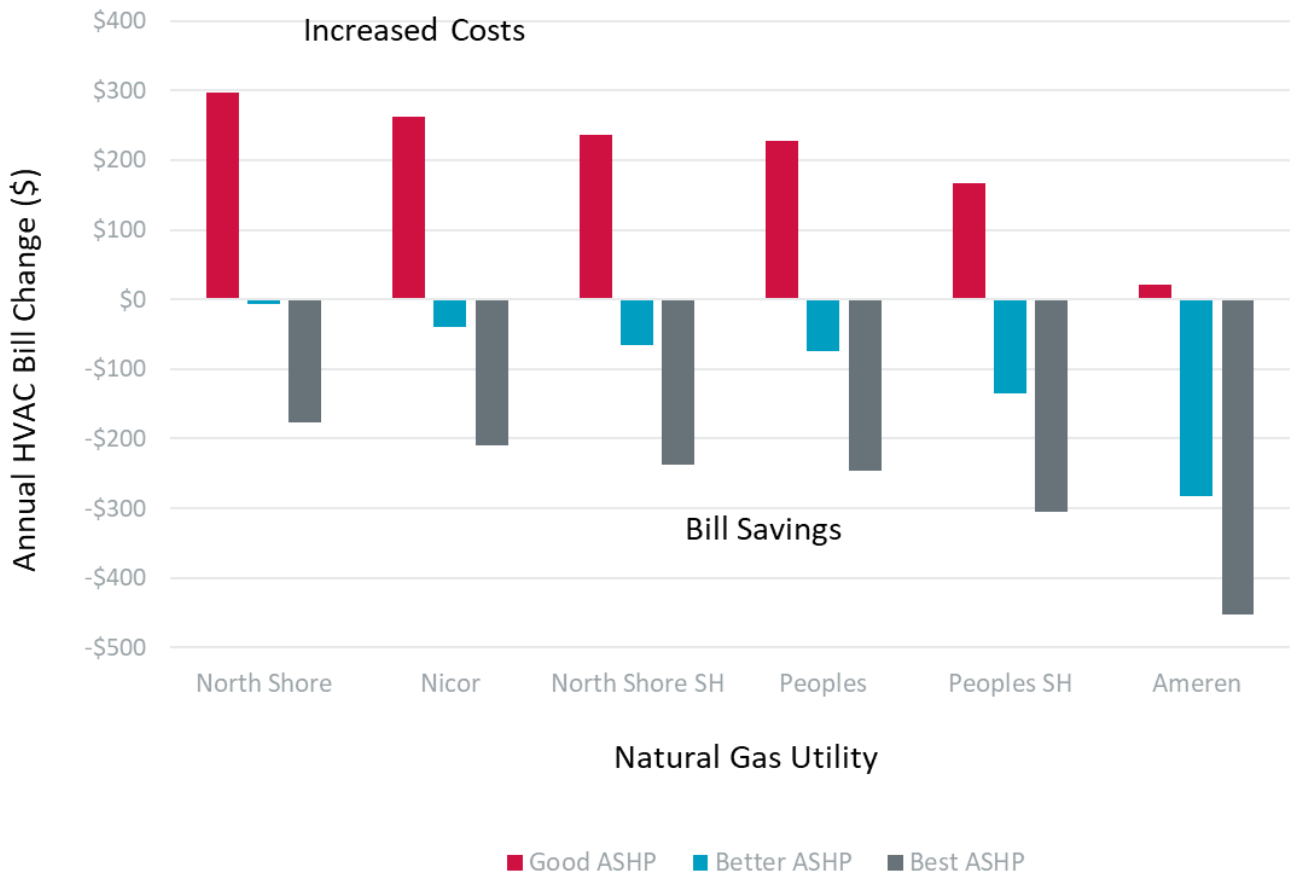
ASHP Performance

- Performance levels:
  - Good (avg. COP of 1.96) – COP vs. temperature curve derived from typical field data
  - Best (avg. COP of 3.16) – performance curve derived from best field data
  - Better (avg. COP of 2.59) – average of good and best field data
- Potential Sensitivities
  - TMY3-2020 is a cold heating season (13 – 23% higher than a recent year's heating load)



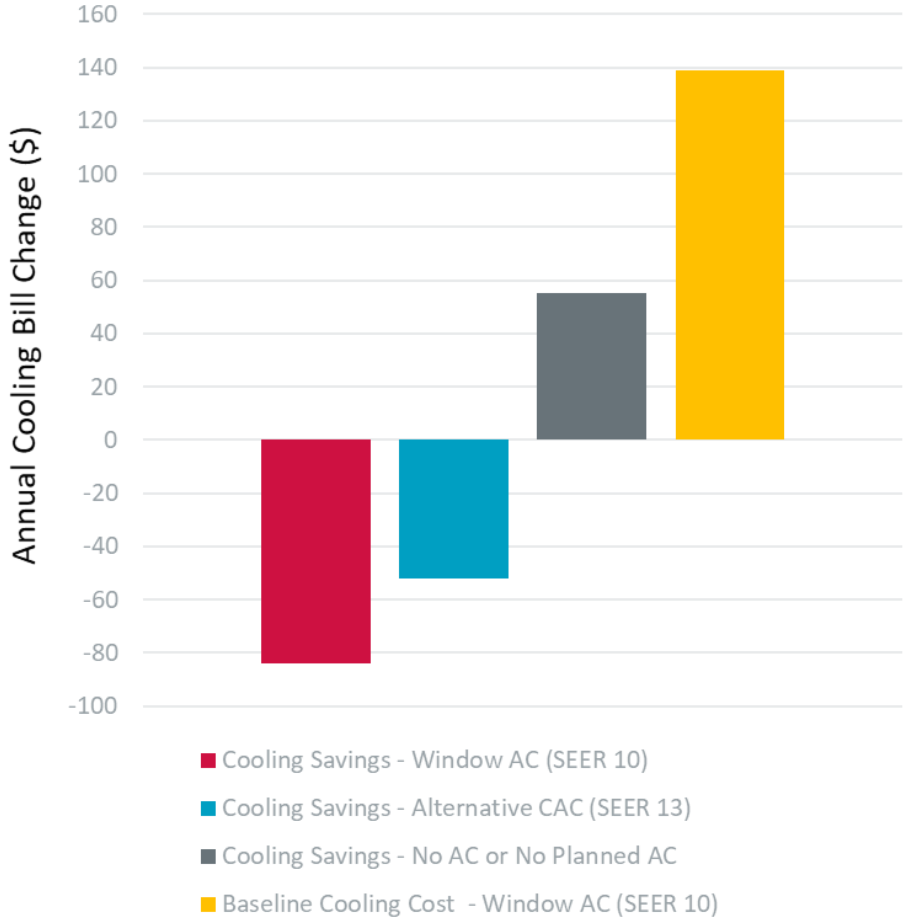
Bill Impact of ASHP Performance

- HVAC bill savings are sensitive to ASHP performance
- “Good” vsASHPs are unable to provide bill savings in any scenario, regardless of gas rates
- “Better” and “Best” vsASHPs can provide savings in every rate scenario
- True ASHP performance can lie anywhere between Good and Best
- ASHP performance (sCOP) is a key factor in determining HVAC bill savings vs increased costs, expectations of average seasonal performance remain highly uncertain
- This analysis assumes the customer switches to the ComEd electric space heat rate



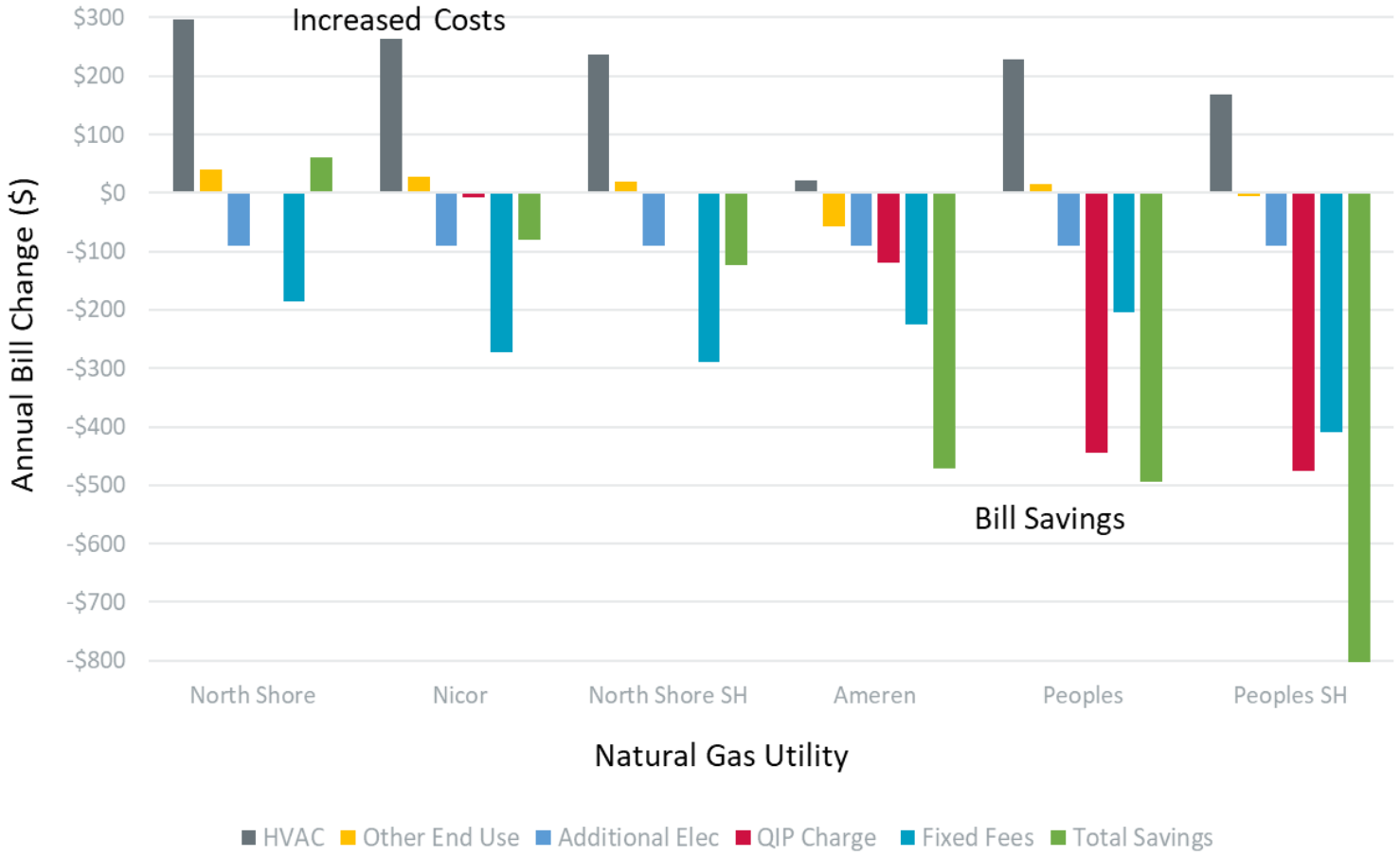
Cooling Scenarios

- Baseline cooling costs and potential cooling bill impacts
  - Baseline annual cooling energy costs are displayed in **yellow**.
  - A negative value in **red**, **blue**, or **grey**, signifies decreased cooling bills over the baseline.
- Cooling savings support space heating electrification
  - Weather, specific customer cooling loads, and to a lesser extent, equipment cooling efficiency affects the size of this lever
  - In these scenarios, the electrification measure benefits from electric rate switching to space heating rates
- Potential sensitivities
  - This customer has Window AC (WAC) introducing two issues:
    - A transition to central air conditioning (CAC) from WAC may increase cooling use, which will lower realized savings
    - This cooling load is likely smaller than a CAC baseline
  - TMY3-2020 is a mild cooling season (12 – 19% lower than a recent year's cooling load)



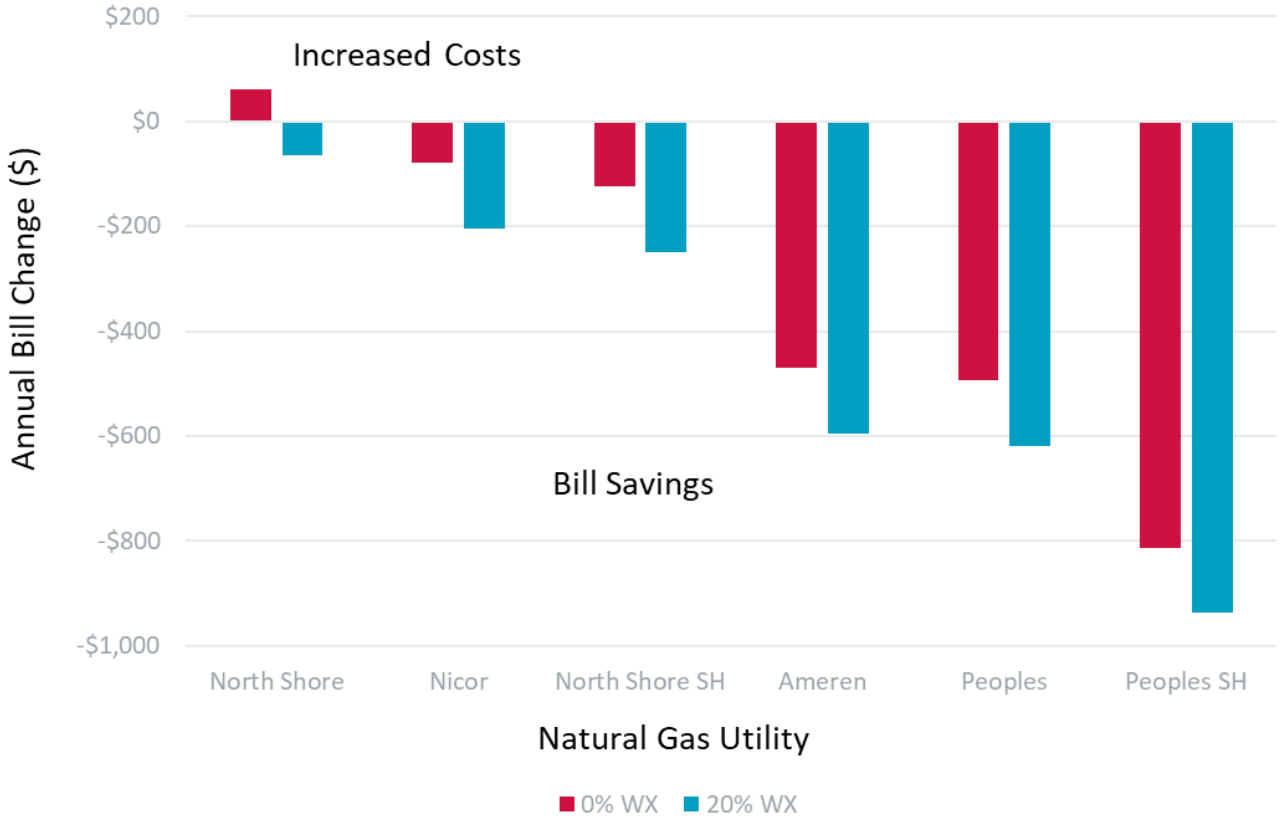
Total Bill Impacts by Utility

- Chart assumes "Good" heat pump performance level.
- Efficient electrification of water heating, cooking, and drying ("Other End Use" in chart) tend to increase customer bills but much less impactful than electric space heat
- Savings unlocked from other electric loads when switching from regular electric rates to electric space heating rates more than offset non-space heating efficient electrification measures
- Fixed fees represent a significant savings component for customers
- Sizable savings are possible when eliminating fixed/QIP fees for Peoples customers



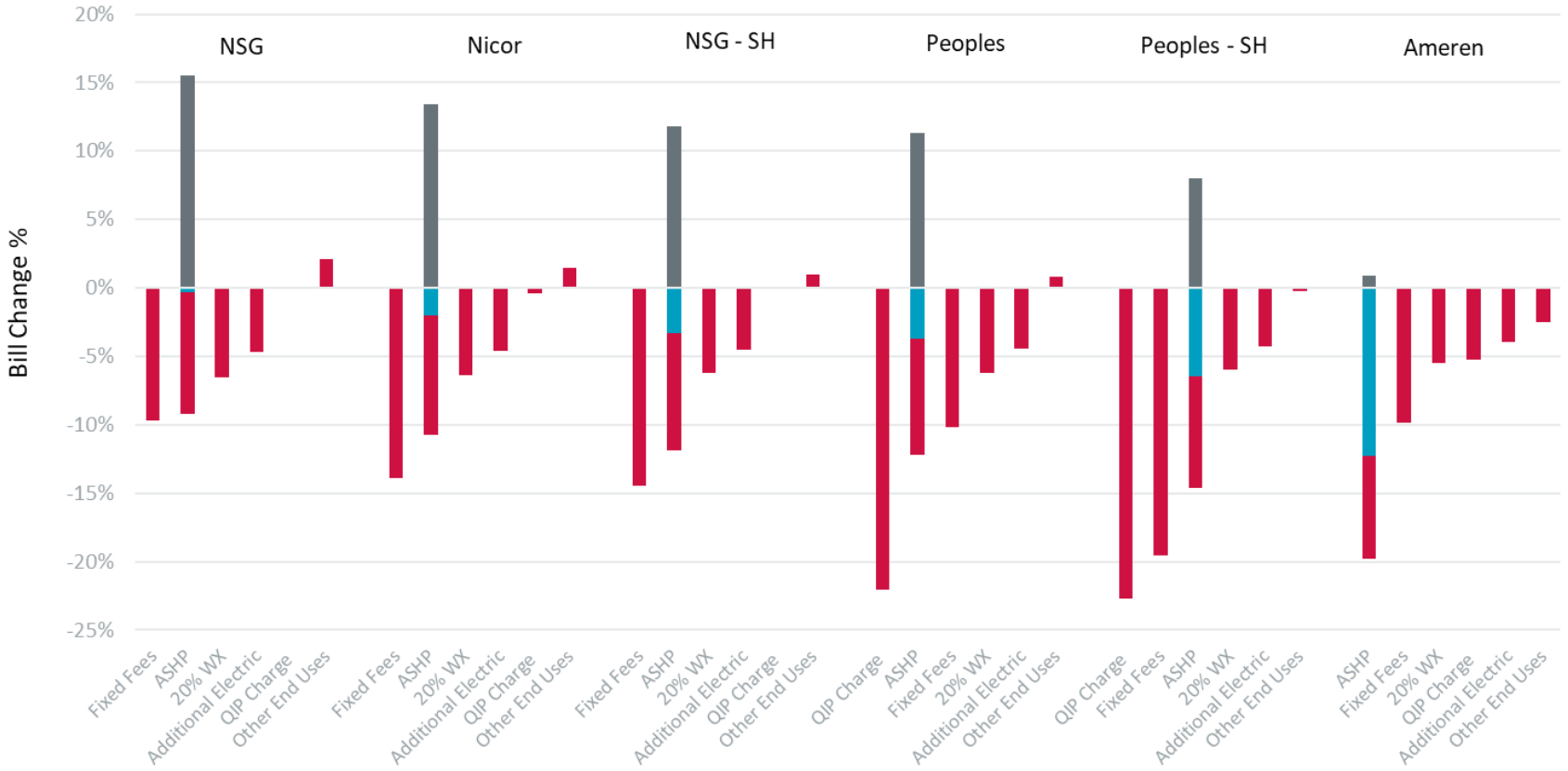
Weatherization

- Negative values signify decreased annual energy costs
- Bill effects are inclusive of QIP and fixed charges
- Weatherization is a meaningful contributor toward annual savings (however can be less impactful than the removal of fixed fees/QIP charges)
- North Shore customers with lower gas rates and no QIP charge must still rely on weatherization to yield savings with the selected system



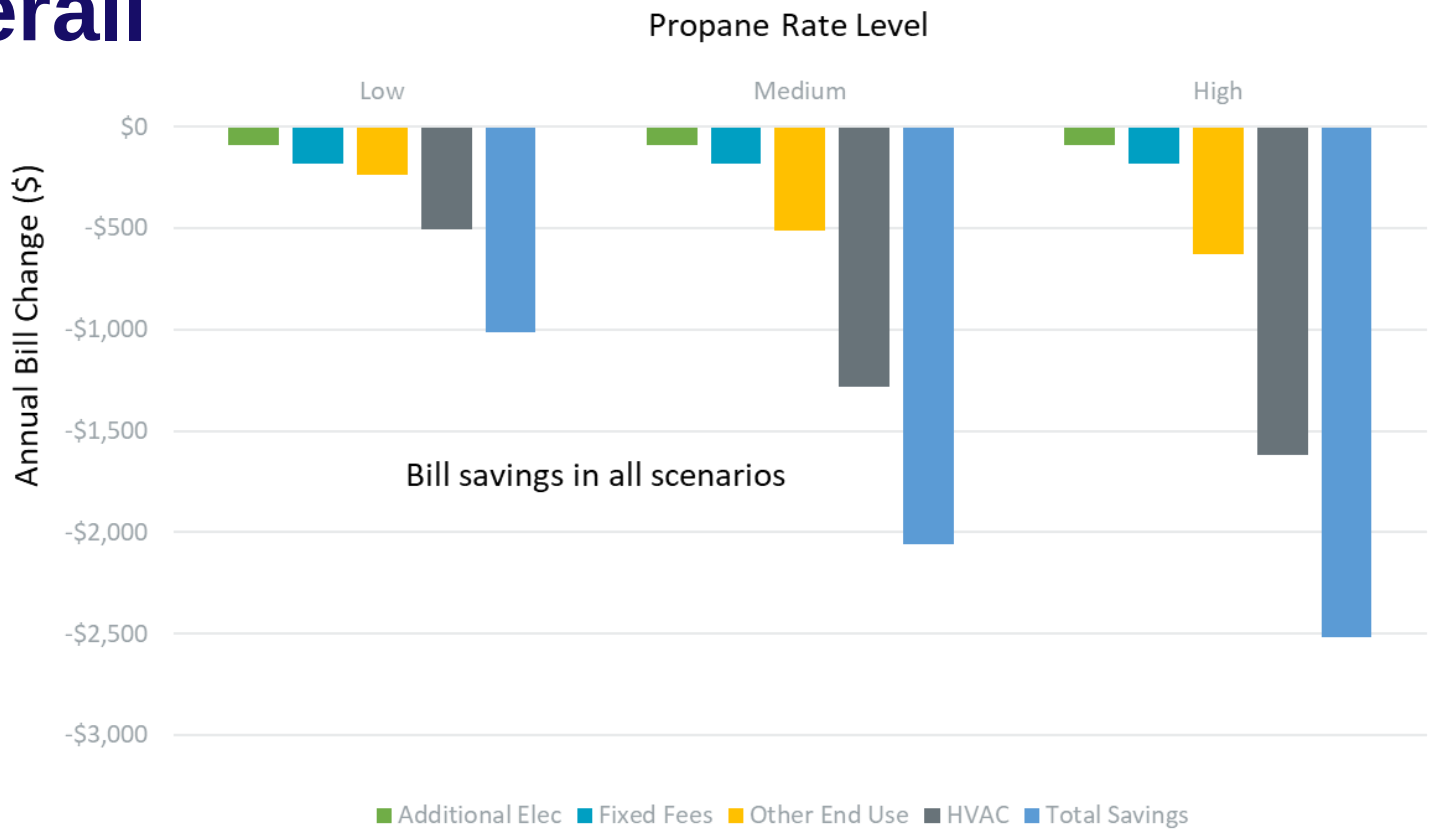
Total Bill Impacts by Utility – Percentages

- This chart displays the effects of each potential savings component on total annual energy bills for each utility, sorted from largest to smallest possible savings.
- Here, negative values indicate bill savings.
- Also shown are the effects of **Good**, **Better**, and **Best** ASHP performance
- Many pathways to provide customer bill savings
  - Only install highest performance ASHPs
  - Full efficient electrification packages to eliminate fixed/QIP fees



Propane Scenario – Overall

- HVAC Costs
  - All scenarios produce reduced HVAC costs when installing all-electric systems.
  - This assumes a Good heat pump performance model, with SEER 20 cooling
- Other End Uses
  - Include water heating, cooking, and drying.
  - These produce savings in every case, contributing to significant annual bill reductions
- Additional Electric End Uses
  - These are savings unlocked from other electric end uses when switching from regular electric rates to lower electric space heating rates
- Fixed Fees
  - While the assumed fixed fee of $15/mo contributes to annual savings, energy savings provide most bill reductions for propane baselines



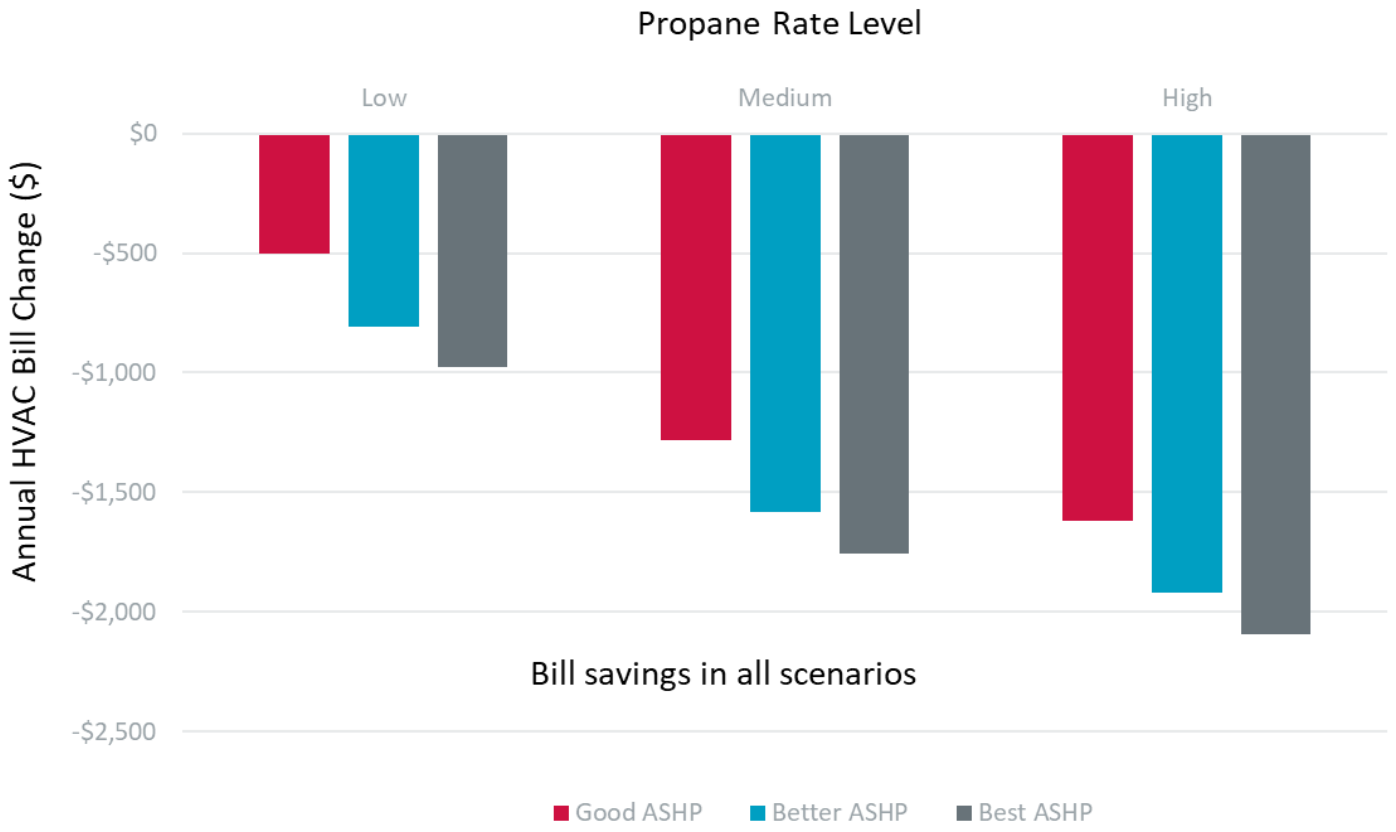
Rates Used

Propane Rate Scenario	Volumetric Rate ($/gal)	Fixed Fee ($/month)
Low*	$1.512	$15.00
Medium**	$2.249	$15.00
High***	$2.570	$15.00

* Low rate is determined using the average of weekly residential propane prices in IL between 03/2020 and 02/2021 (Source: EIA)
** Medium rate is determined using the average of weekly residential propane prices in IL between 03/2021 and 03/2022 (Source: EIA)
*** High rate is a predicted value for residential propane prices in Illinois for 2022. (Source: EIA)

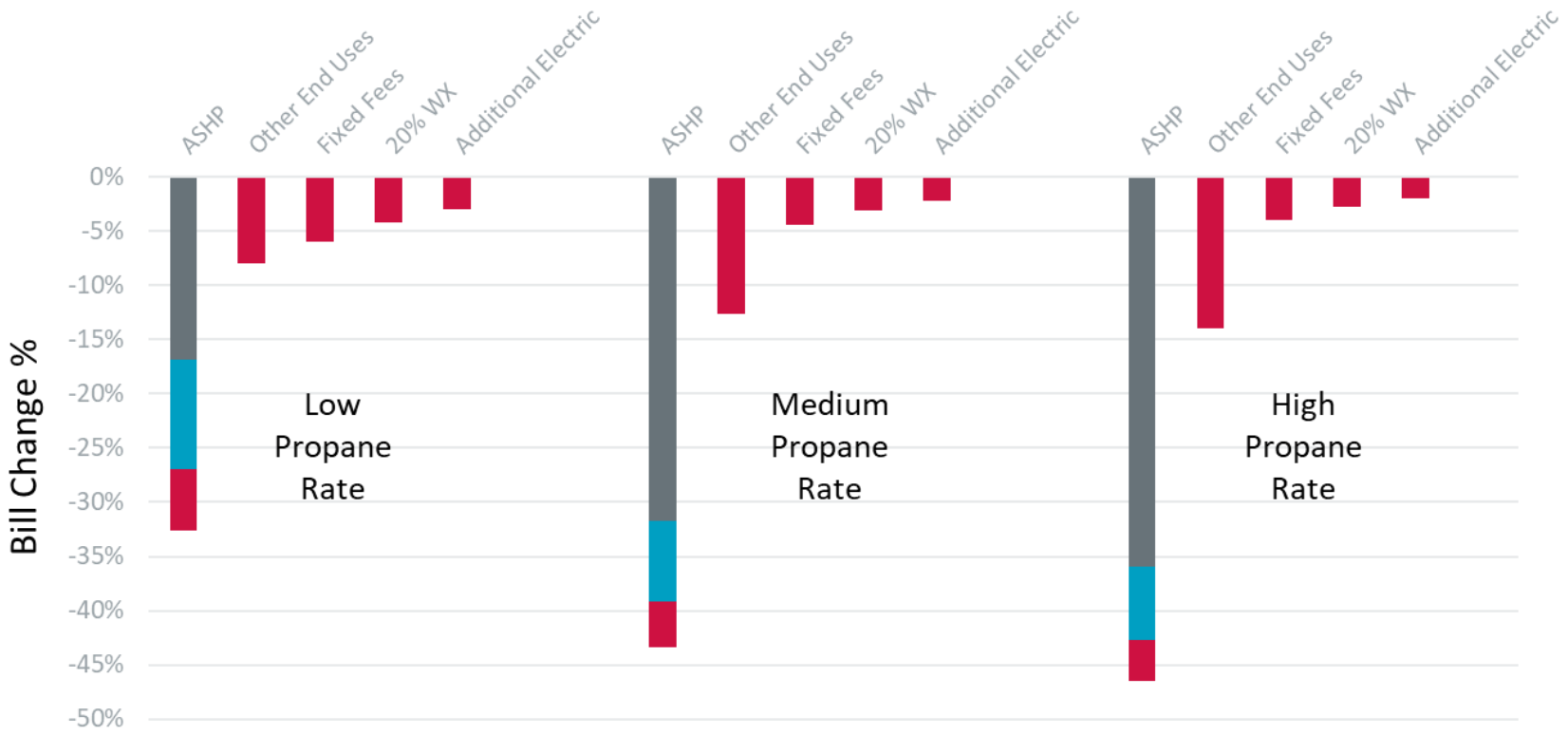
Propane Scenario – ASHP Performance

- While HVAC bill savings are sensitive to ASHP performance, all ASHP performance levels can provide HVAC bill savings at every rate level.
- True ASHP performance can lie anywhere between Good and Better
- Better ASHPs can double HVAC bill savings compared to Good ASHPs.
- As energy savings contribute the largest share of annual bill savings in propane scenarios, ASHP performance is a major factor in unlocking whole-home electrification savings.



Propane Scenario – Bill Impacts by Percentage

- This chart displays the effects of each potential savings component on total annual energy bills for each propane rate level, sorted from largest to smallest possible savings.
- Here, negative values indicate bill savings.
- Also shown are the effects of **Good**, **Better**, and **Best** ASHP performance



Appendix

(Other relevant slides recently shared with stakeholders included for reference)

Single Measure Bill Impacts

- ComEd worked with Center for Energy and the Environment (CEE) to create a set of bill impact calculators (based largely on IL TRM inputs) for the following measures:
  - Variable Speed Air Source Heat Pump
  - Ductless Heat Pump
  - Heat Pump Water Heater
  - Electric Cooking Range
  - Electric Clothes Dryer
  - Lithium-Ion Electric Forklift
- The purpose is to provide program implementation teams with calculators that can be used to generate bill impact estimates for program participants. As discussed earlier, the type of communication will look different based on program delivery channel.
- Predicting bill impacts from a single measure is highly dependent on assumptions about performance. For example, a heat pump water heater's rated efficiency (Uniform Energy Factor or UEF) is reported by manufacturers, but studies have consistently measured lower field performance.
  - To provide a customer with realistic expectation, a bill impacts calculator may need to use assumptions about performance.

Example Calculation – HPWH

Inputs per TRM Savings Methodology

Gallons Per Day Per Household	45.5
People Per Household	4
People Per Household - Custom	4
Gallons Per Day Per Person Per Household	17.60
Tank T_out (F)	125
Tank T_in (F)	50.7
HPWH Location	Conditioned
Location Factor	1
Reduced waste heat causing cooling savings	27%
Cooling?	Yes
Cooling SEER	10
SEER	10
CAC COP - COP_cool	2.93
Latent Multiplier	1.33
Days Per Year	365.25
Specific Weight of Water (lb/gal)	8.33
Heat Capacity of Water (Btu/lb-F)	1
Reduced waste heat causing heating load	5%
Deh_Reduction (kWh)	0
Water Heater FLH	2533
Heating Fuel	Natural Gas
% Natural Gas	100%
Heating System	Furnace
Heating system Efficiency	80%
Electric Rate Type	Regular
Baseline Gas Utility	Peoples
Measure Electric Rate $/kWh	$0.13
Baseline Gas Rate $/th	$0.89
HVAC Heating Rate $/MMBtu	$8.93

Baseline Assumption

Baseline Fuel	Natural Gas
Baseline Rate $/MMBtu	$8.93
Tank Size (gal)	50
UEF	0.56

Efficient Measure Assumption

Life (years)	15
HPWH UEF Type	Rated - low
UEF_efficient	3

TRM Savings Calculation Outputs

Electric Energy Savings - Delta_kWh	
kWh Added for WH	1554.77
MMBtu removed for WH	28.25
Cooling Savings - kWh_cooling	381.01
Heating Load Added - kWh_heating	0.00
Heating MMBtu Saved	-0.66

Estimated Bill Savings

Overall Savings	$91.37

Example Calculation – HPWH (UEF sensitivity)

HPWH efficiency factor options with corresponding bill impact (holding other variables constant):

UEF	Performance Scenario	Annual Savings
1.5	Assumed field performance, low	-$136.21
1.8	Assumed field performance, medium	-$60.35
2.2	Assumed field performance, optimistic	$8.61
3	Manufacturer rating, low	$91.37
4	Manufacturer rating, high	$148.26

Inputs per TRM Savings Methodology

Gallons Per Day Per Household	45.5
Heating Fuel	Natural Gas
% Natural Gas	100%
Heating System	Furnace
Heating system Efficiency	80%
Electric Rate Type	Regular
Baseline Gas Utility	Peoples
Measure Electric Rate $/kWh	$0.13
Baseline Gas Rate $/th	$0.89
HVAC Heating Rate $/MMBtu	$8.93

Baseline Assumption

Baseline Fuel	Natural Gas
Baseline Rate $/MMBtu	$8.93
Tank Size (gal)	50
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TRM Savings Calculation Outputs

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Estimated Bill Savings

Overall Savings	$91.37

EE Electrification in Revised Plan 6

- In Revised Plan 6, key electrification measures include: family of heat pumps, heat pump water heaters, and C&I Forklifts
  - New measures/offerings will be added as they are developed; we have flexibility to pursue any other measure that creates site energy savings and delivers a competitive $/kWh
- IE electrification target on average $10M spend per year 2022-25 – $1.6M in 2022, $8.5M in 2023, $12.7M in 2024, and $16.8M in 2025
- No commitment on Res or Biz/Pub, but Revised Plan has moderate budgets – ~$675K/year for Res and ~$1.35M for Biz/Public – with flexibility to increase or decrease

	2022	2023	2024	2025	Total
IE	$1,620,000	$8,502,500	$12,695,000	$16,820,000	$39,637,500
Res	$315,149	$775,832	$808,369	$848,438	$2,747,788
Biz	$220,284	$1,017,285	$1,541,279	$2,096,799	$4,875,646
Public	$24,476	$113,032	$171,253	$232,978	$541,738

Market Segment	2022 First Year Energy Savings (MWh)	2023 First Year Energy Savings (MWh)	2024 First Year Energy Savings (MWh)	2025 First Year Energy Savings (MWh)	4-Year First Year Energy Savings (MWh)
Residential	2,180	5,419	5,715	6,084	19,398
Income Eligible	1,238	7,752	11,465	14,910	35,365
Business	1,379	3,830	4,772	6,112	16,093
Public Sector	153	426	530	679	1,788
EE Electrification Total	**4,951**	**17,426**	**22,482**	**27,784**	**72,644**

Bill Impacts

2) Program Approaches

b) ComEd will only promote direct installation of IE electrification measures in applications for which all measure installations within each home are collectively expected to lower total energy bills. ComEd and the Parties agree to discuss, with the goal of reaching consensus, how assessments of the way electrification affects customers' total energy bills will be performed under Section 8-103B. Beginning March 1, 2022, all assessments of electrification impacts on customers' bills shall include:

1. Current default retail prices for fossil gas and propane – including both volumetric charges and, whenever applicable, fixed monthly charges.
2. Current default retail prices for electricity, using ComEd's (lower) electric heating rate, wherever applicable – including the cost savings of paying all current baseload (lighting, refrigeration, other miscellaneous appliances, etc.) electricity consumption with the lower electric heating rate.
3. Efficiencies of existing (pre-treatment) fossil fuel heating, water heating and other appliances.
4. Efficiencies of electrification measures.
5. Forecasted impacts of weatherization measures also being installed.

EEE Program Design – IE Long-Term Vision

- Income eligible energy efficiency electrification will rapidly scale over the next four years
  - Target on average $10M spend per year 2022 – 2025 (ramping up over time)
- Priority measures: whole-home electrification
- Offerings: Single-Family Upgrades, Multifamily Upgrades, Affordable Housing New Construction
- Integrate electrification measures into existing whole home program delivery
  - Leverage joint program infrastructure to the extent feasible
- Develop understanding of building types that are viable electrification candidates
- Build robust, diverse energy efficiency service provider (EESP) network for delivery
- Integrate messaging that resonates with customer
- Ensure education on electrification technologies and maintenance

EEE Program Design – IE 2022 Focus Areas

- Overall 2022 goal: conduct research, design, and early pilots to lay groundwork for full program integrations
- Program Design Discussions
  - Implementation contractors (ICs), channel partners, DCEO, and gas utilities
  - Workshop series – including ICs, channel partners, existing electrification implementers – facilitated by MEEA focused on single-family and multifamily IE electrification
- Program Design & Research Topics
  - Propane heating research to confirm opportunity
  - Understanding best practices in communicating electrification savings/bill impacts
  - Customer segment specific bill impacts calculator tool
  - Determining extent joint program infrastructure can be leveraged
  - Survey EESP network for 'electrification readiness'
  - Ensure seamless switchover to ComEd's electric space heating rate when applicable
  - Leverage research findings to inform bill impacts communication methods
  - Development of customer screening criteria
  - Determine incentive and copay amounts for multifamily electrification measures
  - Implementation / electrification conversion
  - Assessing potential supply chain impacts
  - Budgeting for health and safety
  - Information sharing / learnings amongst partners

EEE Program Design – IE 2022 Focus Areas (cont.)

- Pilots, New Potential Partners, and Programs
  - Single-Family and Multifamily Upgrades
    - Elevate Energy (complete electrification of up to 100 housing units (SF and MF) in Chicago)
    - BlocPower engagement
    - Considering targeting propane customers for initial single family IE energy efficiency electrification
    - Potential to target previous weatherization participants / those with poor HVAC systems but not qualifying under 'emergency replacement'
  - Affordable Housing New Construction: worked with Slipstream and Guidehouse to develop baseline (natural gas), have begun offering all-electric option and communicating to developers (several have expressed interest, though potential projects will be in future years)

EEE Program Design – Residential (Non-IE)

- **Preliminary Vision**
  - Priority measures: family of residential heat pumps (HPs) (including partial displacement scenario), heat pump water heaters (HPWHs), new construction, and supplemental measures (e.g., induction cooking, clothes dryers, heat pump pool heater)
  - Offerings: Contractor/Midstream Rebates, Retail/Online, and New Construction
- **2022 Focus Areas**
  - Contractor/Midstream: HPs already included, working to increase uptake and do foundational work to add HPWHs*
    - ASHP Contractor Training Initiative launched Q4 2021, has been successful so far in reaching dozens of residential HVAC Energy Efficiency Service Providers (EESP)
    - Considering ways to enhance offering for HPs
    - HPWH pilot planned for Q3-Q4 2022 to validate savings, train a new EESP network, and develop program design (may spill over into Small Business)
  - Retail/Online: Researching best opportunities for 2023 measure inclusion
    - Induction cooking pilot planned for Q3-Q4 2022 to better understand customer perceptions and design future messaging
    - 2023: clothes dryers and heat pump pool heaters
  - New Construction-Res Pilot: Concluding and being phased into a regular offering
  - Additional Research
    - Variable Speed Cold Climate ASHP demonstration as central AC replacement
    - 120V HPWH market readiness research

* Contractor/Midstream focus for HPWH is preliminary and may be revised based on foundational work

EEE Program Design – Commercial & Industrial

- **Preliminary Vision**
  - Priority measures: lithium-ion battery electric forklifts, HPs, HPWHs, commercial food service measures, and industrial processes (e.g., electric infrared)
  - Offerings: Midstream/Upstream, Assessments, Small Biz, Incentives, and Targeted Systems
- **2022 Focus Areas**
  - Midstream/Upstream: Adding forklifts and updating Commercial Food Service Equipment (CFSE) Pilot
    - New forklift incentives and outreach planned for Q3-Q4 if supply chain allows, including tech demonstration with 1-2 large customers
    - New electric-focused complement to CFSE Pilot planned for Q3-Q4 (working closely with EPRI Electric Food Council to build a model borrowing from successful utility initiatives)
  - Assessments: Integrating key EE electrification opportunities for C&I customers into the existing FA tools and processes
  - Incentives
    - VRF heat pump research initiative to study system performance and integrate into EE portfolio
  - Additional Research
    - Very High Efficiency HVAC (VHE DOAS) Pilot concept demonstrations on 3-5 commercial properties
    - Best program design options for 2023 incorporation of HPs, HPWHs, and industrial processes in Small Biz/Incentives/Targeted Systems

ComEd

Energy Efficient Electrification Communication Research

Preliminary Findings

7.25.2022

ComEd Income-Eligible Energy Efficiency Electrification Workshop #3

Research Questions

- *What is the best channel to communicate with customers about fuel switching? What is the best timing?*
- *What are customers current understandings of concepts like home appliance fuel use, fuel types, cost, and electrification? What are their perspectives and concerns about these concepts?*
- *What language do customers currently use and understand when it comes to their energy use and fuel types? Where might they need things defined or explained better?*
- *How have other program administrators addressed this issue? Are there lessons learned from other EEE efforts?*
- *What role can contractors and market actors play in educating customers about EEE? What are their perspectives and/or concerns on it?*

Directional Findings

These preliminary findings are intended to be directional and provide general guidelines and principals ComEd can begin to follow and employ in their EEE communication efforts.

To date, **this research has not included any primary customer research**. As such, all findings and perspectives presented have been from the various market actors who serve and engage with ComEd's customers daily, or from outside organizations currently promoting EEE.

Future research efforts (including a forthcoming customer survey) will seek to provide more specific, targeted findings and recommendations, related directly to customer's experience, needs, barriers, and opportunities.

Key Findings

Message Content

The level of detail needed in message content varies. The amount and type of information a customer will need to understand the potential bill impacts from EEE likely varies significantly across customers and **is correlated with their interest in the project process overall.**

The message delivering the potential bill impacts can and should be **simple and straightforward**, but some customers will seek more detailed information about the equipment and how it works.

Communication Timing

Ongoing communication including multiple touchpoints is necessary to raise customer awareness and their level of understanding of electrification technologies.

Timing of messaging related to EEE can be broken into three somewhat distinct categories: **priming messages** that a customer receives prior to being presented with an electrification measure for their own home, **situation specific** information of a project including the potential bill impacts, and **operational information** that a customer needs to know in order to live with and operate their newly electrified equipment.

Communication Channels

Who delivers the final message regarding potential bill impacts is less important than **the need for a consistent message to be delivered throughout the entire process.**

Different customers may put more trust in different actors, so it is important that the information they receive is consistent across all engagements, and that **any new information confirms or builds upon the messages that they have already received.**

Communication about Bill Impacts is Already Happening

Based on interviews with program staff and affiliated EESPs and CAAs we understand that:

Braided IHWAP – Interviewed CAAs reported different approaches to communicating potential bill impacts.

- Tri-County CAA: communicates results of the SIR (Savings to Investment Ratio) test.
- CEDA: doesn't currently communicate potential bill impacts of the projects they conduct.
- CAP Lake County: communicates potential changes in energy consumption, but not the resulting bill impacts.

Retrofit – Interviewed contractors reported that they provide savings estimates to their customers but unclear what their requirement is to do so and how standardized this approach is.

IE MF – Building owners need to understand potential bill impacts of capital investments to calculate their own ROI.

- Additional considerations necessary for voucher housing, or places with requirements that monthly rent/energy expenditures are a fixed amount or percentage of income.

Market Rate – Interviewed contractors reported that they consistently provide savings estimates to their customers.

Outside Organizations Use a Variety of Messages and Themes

Our team reviewed marketing materials from nine organizations focused on communicating the benefits of electrification to residential customers. **Programs utilize a variety of themes in their promotional materials** that speak to the potential benefits of the equipment, and customer motivations.

Org/Program	Bill or cost Savings/ Efficiency	Reducing Carbon Emissions	Indoor Air Quality/ Safety/Health	Increased Comfort	All-in-One HVAC	Other Environmental Benefits	Other
Beneficial Electrification League	X		X	X		X	Overall quality of life, increasingly renewable
Great Lakes Energy	X	X					
Love Electric	X	X	X	X			Utilize grid resources more efficiently and flexibly
MassCEC	X	X		X	X		Versatile (ducted or not)
MasSave	X	X	X	X			Flexibility (ducted or not)
NYSERDA	X				X		Zoned temp control, cleaner, easier to maintain
Rewiring America	X		X				Help progress toward national emission goals
SMUD	X		X			X	Help our world
Winneschiek Energy District	X	X					

Interim Recommendations

Recommendation #1: Consider opportunities to create priming, situation specific, and operational messaging, and layer onto existing marketing channels where possible.

- Consider creating standardized templates for EESPs to use to present situation specific and operational messages
- Identify opportunities to layer priming messages onto existing marketing collateral

Recommendation #2: Consider ways to create consistency in messaging within current channels.

- Codify language for assessors and EESPs to use when discussing EEE projects with customers
- Ensure that assessors and EESPs inform customers of the behavioral component of their projected energy savings

Next Steps

Customer survey (~200)

Including cognitive pre-test interviews to test and validate survey language

Findings in Fall 2022

Questions?

WE'VE GOT ANSWERS

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ELEVATE
Equity through climate action

Building Electrification, Emerging Technology

ComEd IE Electrification Workshop #3

July 25, 2022

Agenda

- Elevate's Building Electrification Program
- Approach
- ET Pilot Research Scope
- Project Status Update
- Next Steps

ELEVATE

Equity through climate action

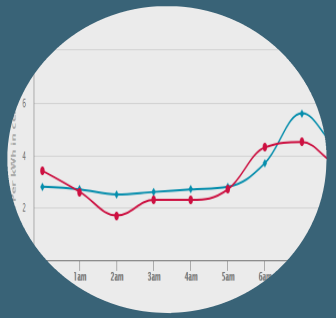
- Elevate seeks to create a just and equitable world in which everyone has clean and affordable heat, power, and water in their homes and communities — no matter who they are or where they live.
- Elevate develops clean energy projects with a place-based approach that ensures much needed services and value go to our most vulnerable communities and citizens.

The Approach to Electrification as Part of Decarbonization

Energy Efficiency

Electrification

Renewable Electric Supply

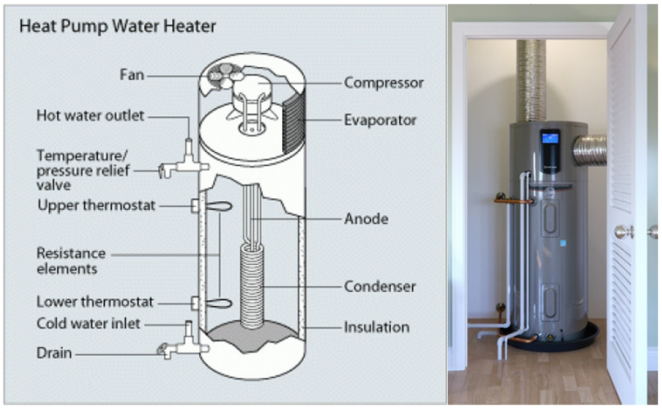


Managed Electricity Loads

Building Electrification Comprehensive Scope

- **Electric-fueled air source heat pumps**
- **Electric heat pump domestic hot water heaters & clothes dryers**
- **Induction stoves**
- **Electrical service upgrade**
- *LED lighting**
- *Air sealing & insulation**
- *Potential for rooftop solar photovoltaic (PV)**

**Leveraging additional funds*



SOURCES: National Resources Defense Council & US Department of Energy

Building Electrification Program Approach

In 2022, we will upgrade and electrify 100 units in underserved communities across Chicago.

Program Approach:

- Includes installation of heat pumps, electric stoves, (with efficiency improvements, as needed).
- Reduces carbon emissions, saves tenants money, and improves indoor air quality.
- Expands BIPOC workforce with Chicago-based contractor accelerators.

Program process flow:

1. Initial owner screening and application
2. Preliminary energy analysis and cost implication estimate
3. Engineering staff completes audit and final cost analysis with contractor proposals
4. Construction staff manages the installation of equipment and technical support
5. Engineering and Research survey and monitoring

ET Pilot Research Scope

- Pre- and post- installation participant surveys to assess customer experience.
- Pre- and post-retrofit NOx monitoring.
- Pre- and post-retrofit EUI & cost impacts analysis
- Explore the feasibility of adding rooftop solar panels on 2-3 projects.
- Document pilot descriptives and learnings with program design recommendations

Building Electrification Progress

Assessments Completed

- 14 single family (1-4 unit) properties assessed (41 units in pipeline).
- 3 multifamily properties (104 units) assessed in ComEd territory, currently in analysis or bidding stage (24 units in pipeline).

Retrofits in Progress

- 14 single family units currently on schedule for installations by end of August.

Views from the Field, Chicago 2-Flat Retrofit Underway

Views from the field, Oversight in Detroit, MI

- Removed the failed steam boiler and radiators that were heating seven units of the building, and replaced it with in-unit ductless mini-split heat pumps and thermostats.

Views from the field – Oversight in Madison, WI

- Installed Indoor ducted air source heat pumps and outdoor condensing units for the Variable Refrigerant Flow (VRF) heat pump system.

Thank You

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ComEd Single Family Beneficial Electrification– Program Design and Customer Journey

July 25, 2022

Big Picture Overview

Home Energy Savings "umbrella":

- Serves SF customers
  - Home assessments (DIs)
  - Retrofits (comprehensive)
  - IHWAP

Number of BE customers we plan to serve:

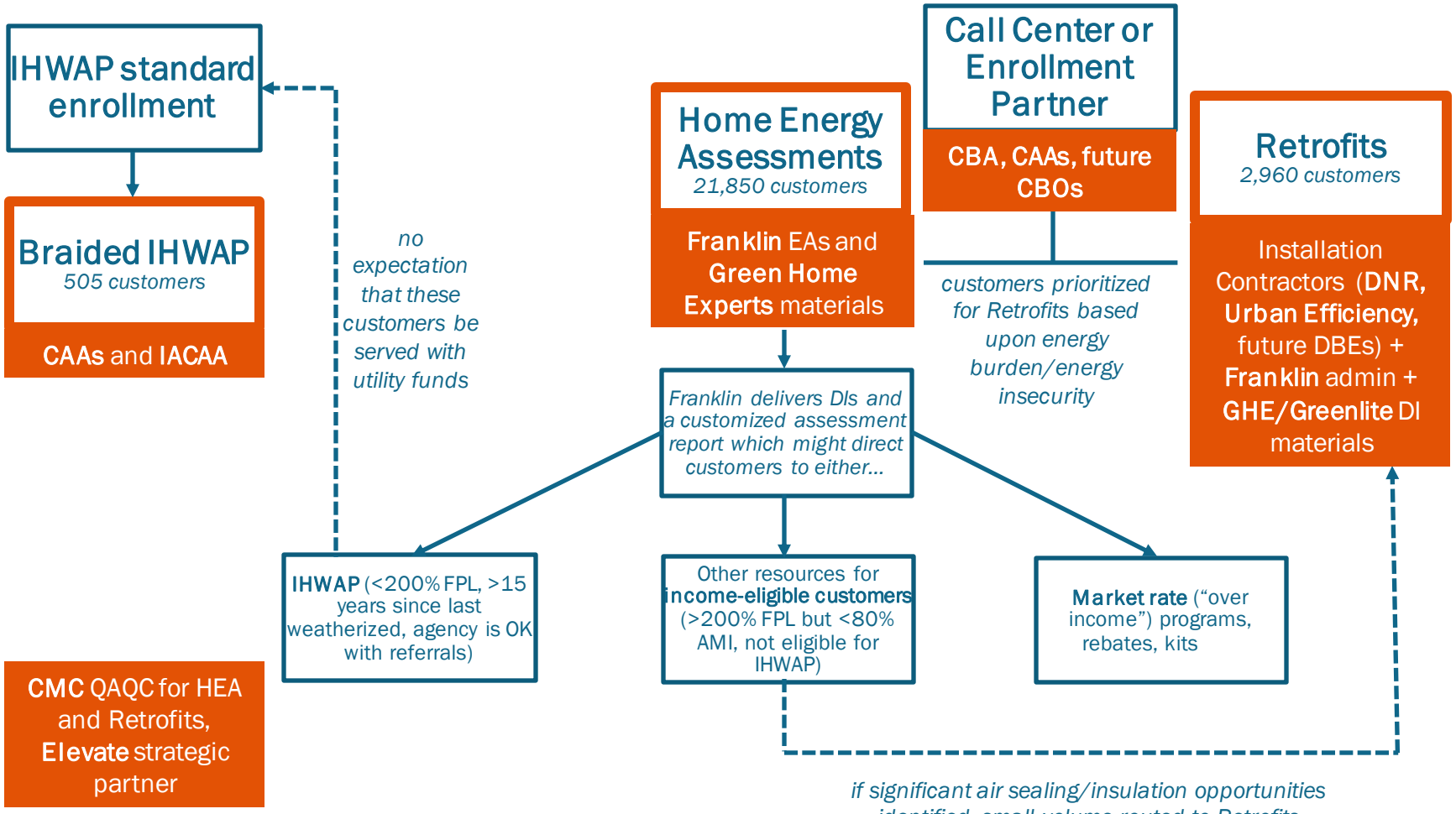
- 2022 = 25
- 2023 = 125
- 2024 = 188
- 2025 = 250

Types of electrification measures we're planning:

- Comprehensive Retrofits – Air sealing, duct sealing, insulation, advanced thermostat, LEDs, etc…
- Health & Safety - Electrical panel upgrades
- Fuel Switching Measures – Air source Heat pump, ductless heat pump, heat pump water heater, electric or induction cooktop, Energy Star clothes dryers

Options for Customer Outreach and Screening

Joint Utility Home Energy Savings Program Services and Partners



Options for customer outreach, pre-screening, and intake

- **Option 1**
  - Leverage the full existing Home Energy Savings infrastructure to identify customers for electrification.
- **Option 2**
  - Offer more comprehensive services to customers receiving home assessments (DIs only) through existing HES program.
- **Option 3**
  - Create a separate CBO engagement pathway, combined with programmatic data mining, to identify and serve customers with electrification.
- **Likely, a hybrid of all 3 over the course of the 4-year cycle.**

Option 1: Leverage full existing HES process

- Intake screening
  - Completed by call center, community partners, or online enrollment tool
  - Existing HES decision tree has BE "offshoots" added at multiple points
    - Non-natural gas fuel source
    - Condition of gas appliances

- Contractor screening
  - At the time of home assessment, contractor determines if customer can be best-served by joint program or electrification.
    - Is HVAC equipment ineligible for emergency replacement, but would benefit from replacement?
      - Evaluation based on age, capacity, and condition.
      - Mismatched capacity for needs of home contributing to high bills or uncomfortable conditions
    - Is gas stove or water heater in disrepair?

Option 2: Offer more comprehensive services

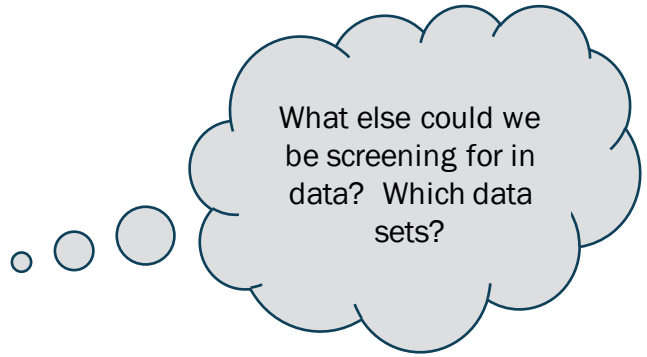
- **This leverages Option 1's intake screening component; it does not include contractor screening.**
- **Customers receiving HEA as opposed to Retrofit who could be served more comprehensively with BE:**
  - Any fuel other than natural gas used for heating or cooking
    - Propane
    - Heating oil
  - Any home with gas appliance(s) in the following condition:
    - Non-functioning
    - Functioning, but unsafe
    - 15-25 years old

YTD, we have ID'd >10,000 customers through HES; 2 are IE and non-natural gas.

These questions would be added to our HES screening process for BE.

Option 3: Separate intake pathway from HES

- **Create a separate pathway to identify and serve customers with electrification.**
  - Use historic program data to determine non-natural gas reach-backs
  - Use billing data to identify potential participants (zip code; high usage)
  - Use one or two dedicated community partners for outreach and screening



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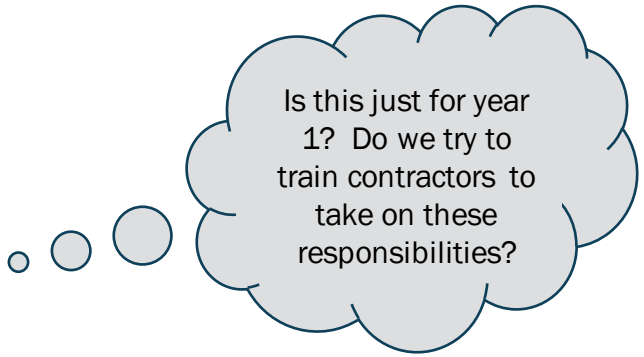
Customer Communication and Journey

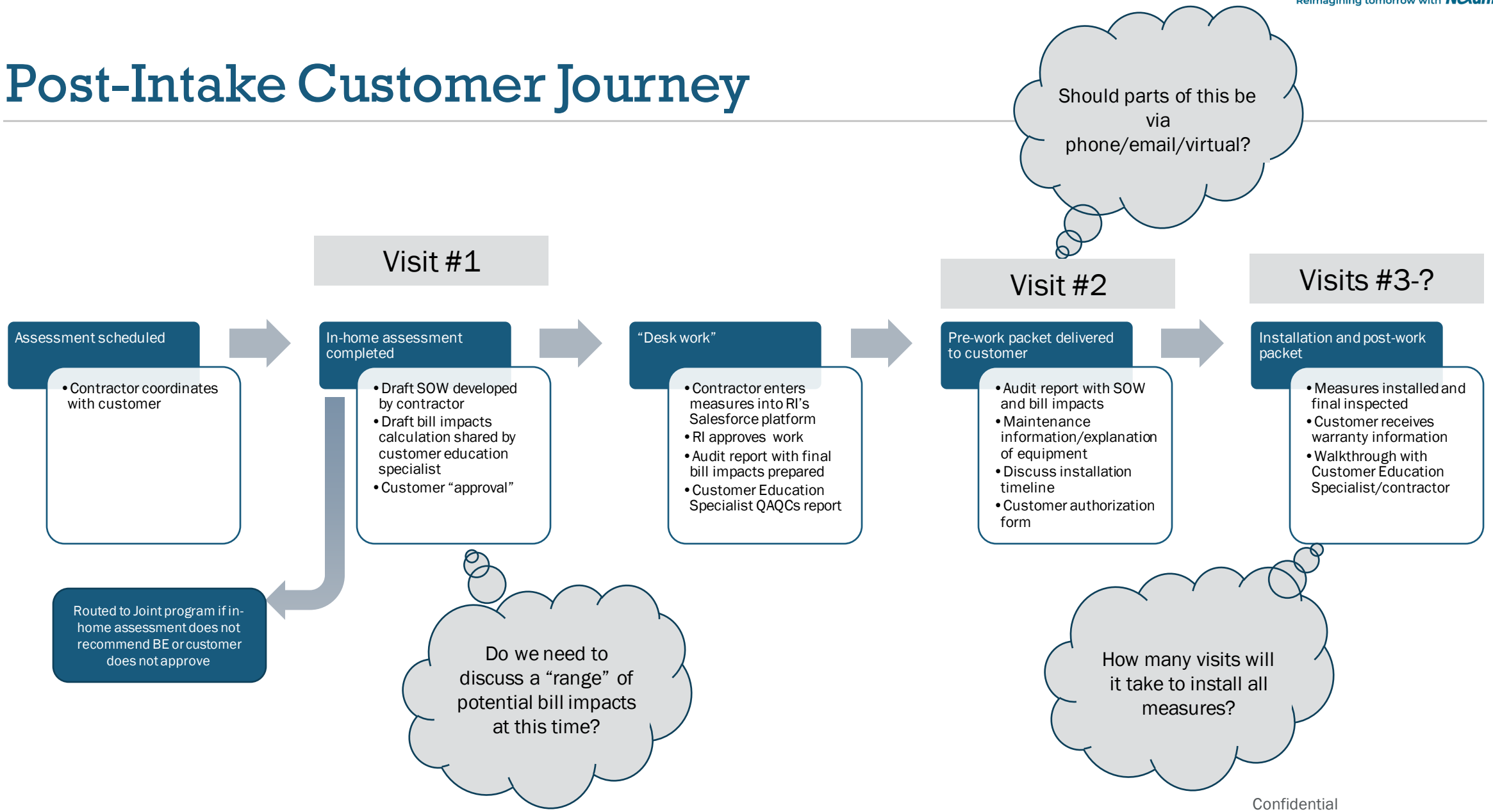
Customer communication

RI plans to use a dedicated resource as a "customer education specialist"

- On-site to communicate with customer
  - Will discuss measures, bill impacts, maintenance, timelines, and other general education around weatherization/electrification
- Responsible for designing customer education tools
  - Looking forward to insights from Illume
  - Pre-work: customer presented with audit report including final SOW and bill impacts analysis
    - Customer authorization form?
  - Post-work: Warranties/maintenance information



Post-Intake Customer Journey



Customer communication – more discussion!

What if a customer says "no"?

- To specific measures?
  - Can we partially electrify? Leave a gas stove, for instance?
    - Do we need to recalculate bill benefits? There will still be a delivery fee for gas, for instance.
- To all fuel switching measures?
  - Can we route these folks to Retrofits?
    - They could still receive air sealing and insulation measures.
    - Hopefully because we're using the same contractor network, we can switch easily.

Bill Impacts Calculations

Bill Impact Calculator Progress

- Template created
  - Gas side
    - Calculates gas system annual energy consumption
      - i.e., potential therms we could save
    - Translates therm savings to bill savings
  - Electric side
    - Calculates added electric consumption
    - Calculates electric energy savings (e.g., wx, central A/C upgrade)
    - Associated bill impacts
  - Combined bill impacts

Air Source Heat Pump Example		
Gas System Annual Energy Consumption	109	MMBTU
Convert to therms	1093	therms
Gas utility Charge Rate	0.6138	$/therm
Annual Bill Savings	**$670.88**	
Electric Savings from System Upgrade	5.97	MMBTU
Electric Added Consumption	31.39	MMBTU
Electric Energy Usage Impact	25.42	MMBTU
Convert to kWh	7,450	kWh
Electric utility Charge Rate	0.07777	$/kWh
Annual Bill Impact	**$579.40**	
Annual Bill Savings	**$91.48**	

- Lingering questions
  - What should we use for bill rates?
    - Customer specific or generalized?
    - How do we factor in fixed fees/delivery expenses?
    - Do we use the new electric rate?
      - Do we apply that to *everything* in their home (e.g., TV, computer, lighting we don't touch, etc.)? Using annual data? How?

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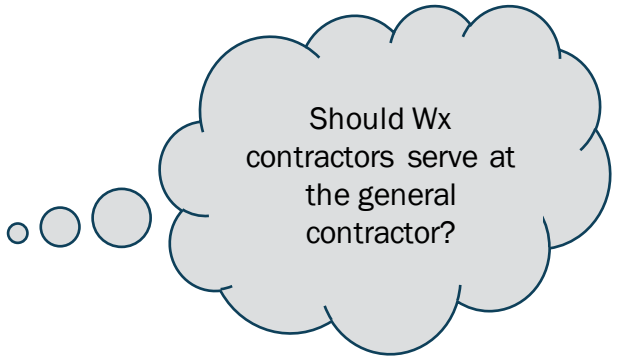
Contractors

Contractors

- **Current contractors**
  - Evaluate skillsets, interest in program participation, capacity
    - Should have data by July 29
- **Identify new contractors**
  - New skilled contractors for HP, HPWH, and misc appliances
  - Electricians to support electrical panel upgrades, running proper electrical lines for new appliances
  - Plumbers to support removal of gas service
  - Pair with existing successful Wx contractors
- **Support available**
  - Training on multiple manufacturers for all equipment
  - Midstream program engagement HVAC connections



Random questions

- If a customer is getting an induction stove, do we need to get them new pots and pans?
- What about lawnmowers? Snow blowers?

Next steps

- Customer identification – what's the fastest way to 25 for 2022?
  - Re-scripting intake tools for HES?
  - Data mining?
- Customer education tools
- Bill impacts calculator
  - Potentially a high-level overview tool for customers as well
- H&S proposal (e.g., caps per project)
  - Likely mirroring HES + electrical upgrades, though data from CA programs suggest these needs are not as prevalent as we might expect
- Contractor recruitment, training, and support
  - Existing contractor survey
    - Current capacity/capability
  - Field data tools for contractors

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MULTIFAMILY ELECTRIFICATION

July 25, 2022

Objectives

- High level customer journey review
- Validate assumptions
- Improvement opportunities
- Seek additional resources and input
- Discuss open questions

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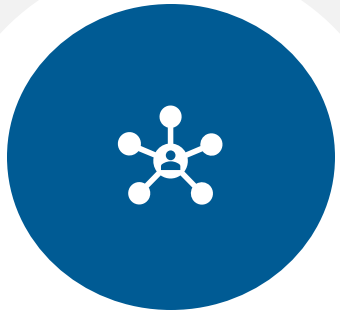
Multifamily Electrification
Customer Journey

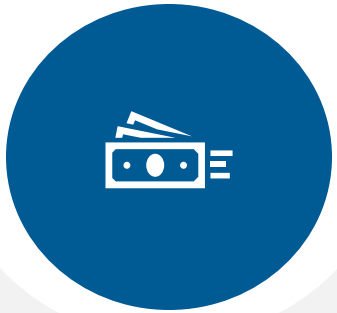
Start



Program Priorities

Outreach & Screening

Electrification Assessment



Bill Impact Modeling

Installation & Support

Finish

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Program Priorities

Decision Points

- **Full vs partial in-unit electrification**
  - Prefer FULL in order to remove gas bill fixed costs
  - Open to partial if tenant has positive bill impact
  - Phasing consideration for property manager
- **Full vs partial (some units) building electrification**
  - Open to either, but tenant must have a positive bill impact
  - Phasing consideration for property manager
- **In unit vs central plant electrification**
  - Prioritize in unit measures only due to technical feasibility*
  - Not likely to replace central boiler
- **Customers with existing energy efficiency projects**
  - Bundling in-unit EE if it helps tenant bill impact
  - Properties that have done common area EE are a good pool to pull from

** Note on weatherization – a common area measure, but it DOES have in-unit savings impacts*

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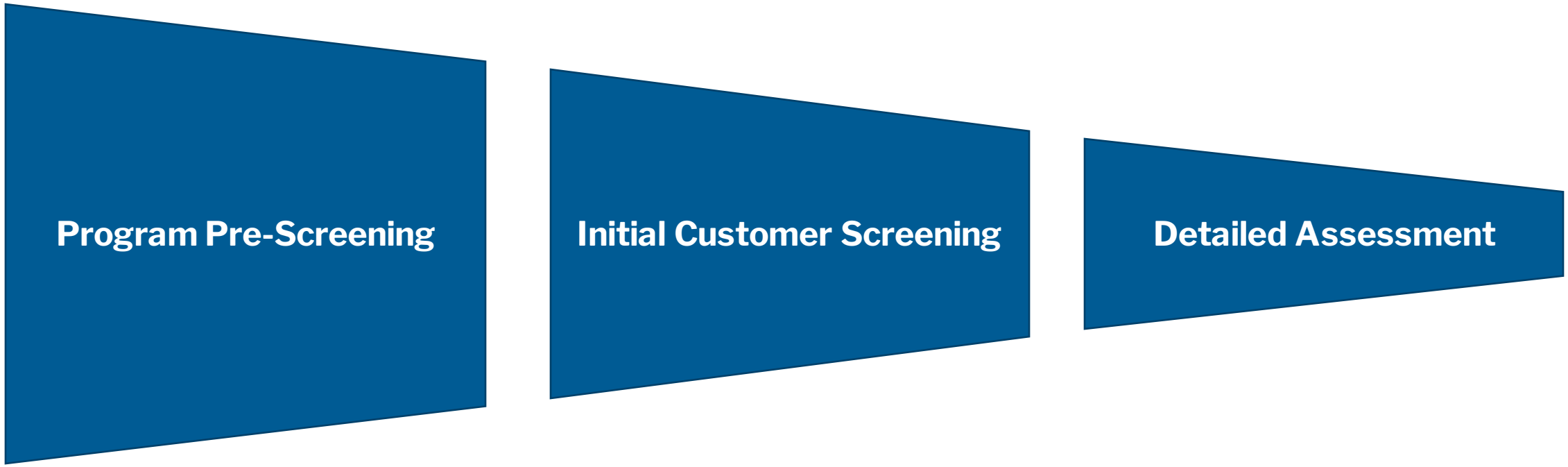
Outreach & Customer Screening



- Define ideal building characteristics
- Right measure mix
- Limit obvious barriers
- Proactive targeting

- Customer goals/interest
- Bill/metering structure
- Building characteristics
- Potential measure mix
- Equipment age/lifecycle

- EEE specific assessment
- Technical feasibility
- Physical feasibility
- Economic feasibility

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Building Assessment

Available / Prioritized Measures

- Measures that directly provide tenant bill savings

- In Unit Measures
  - Stove/Oven – Conventional or Induction
  - Water Heater
  - Clothes Dryer
  - Furnace to Heat Pump

- Common Area Measures
  - Weatherization / Shell

Other Measures

- Electric-to-electric
  - Not electrification - resistance to heat pump
  - If it helps with total bill impact? Do they count towards the calculation?

- Common area lighting
  - No impact to tenant bills

- Boilers / central DHW
  - Requires building transformation to go from central to in unit systems

- Solar
  - Does it help?
  - Metering structure

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Building Assessment

Assessment Process

- Leverage similar process and skillset as core MFES assessment
- Additional training needed, but current Energy Advisor role/process can be used
- More focused/targeted assessment
- Additional data points, pictures to use in detailed evaluation
- EEE specific customer report

Expanded Data Collection

- Name plates on all appliances and equipment for sizing and load calculation
- Service panel size
- Metering structure for building (unit vs building)
- Apartment square footage
- HVAC location/layout (proximity to exterior)
- Envelope (wall construction, insulation, windows)

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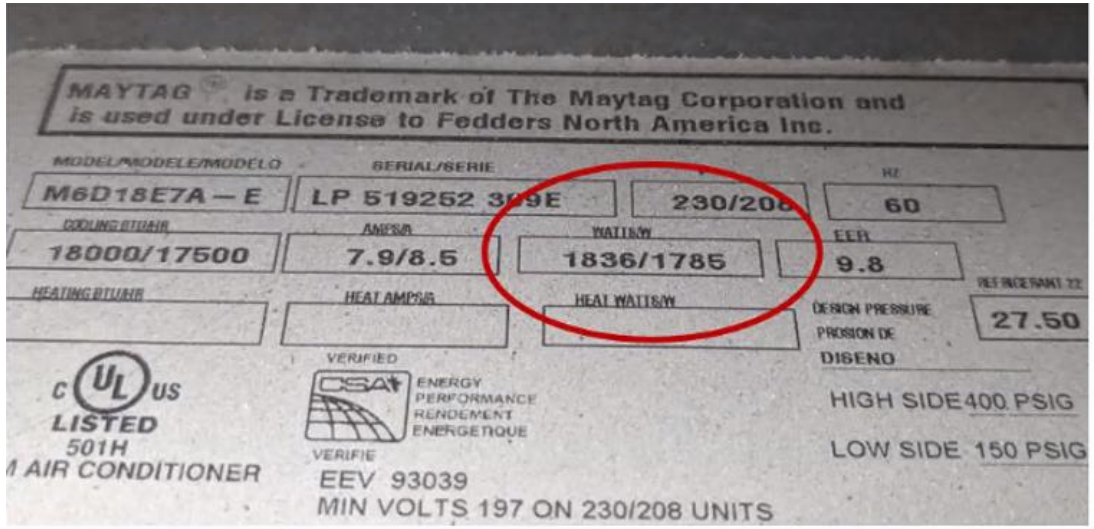
Building Assessment

Electric Panel Review

- Inspect existing in unit electric panel
  - Size, amperage, available space
  - Breaker types (for combined loads)
  - Photos
- Document specs for all appliances from nameplates
  - Loads, capacity, etc.
  - If no nameplate found, leverage typical load per appliance type
- Panel upgrades
  - Will be common
  - Plan for all future electrification loads, not just the next/current upgrade



This air conditioning unit uses 1836W at 230V, or 1785W at 208V

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Building Assessment

Health & Safety

- Unique electrification considerations – count as H&S?
  - Panel upgrades
  - Orphaned gas equipment (pipes, flues, vents)
  - Gas utility shutoff/disconnections (cost?)
  - Wiring Upgrades
  - Miscellaneous
- Items may not be identified during assessment. Will encounter more once work begins.

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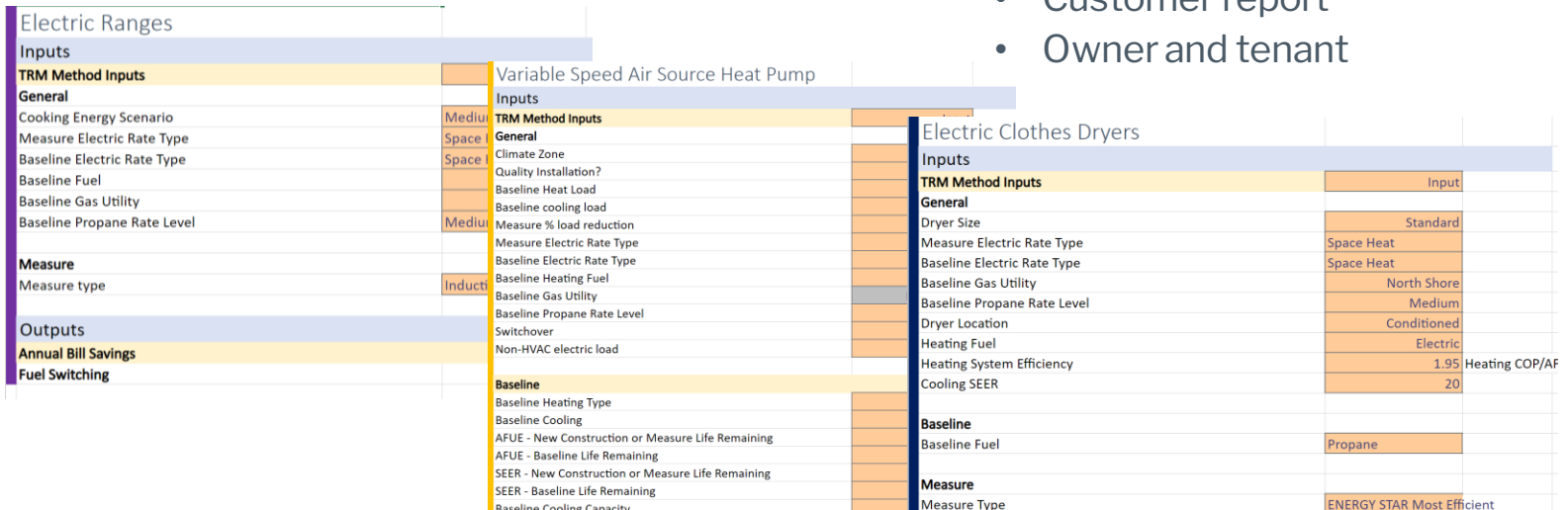
Bill Impact Modeling & Messaging

Bill Impact Approach

- Build off provided CEE tool
  - Tenant only measures, tenant only bill impact calcs
  - Not focusing on common area / main account
- Run sample scenarios through tool to determine ideal characteristics / measure packages and limitations
  - Natural Gas vs Propane



Electric Ranges

Inputs	
TRM Method Inputs	
General	
Cooking Energy Scenario	Mediu
Measure Electric Rate Type	Space
Baseline Electric Rate Type	Space
Baseline Fuel	
Baseline Gas Utility	
Baseline Propane Rate Level	Mediu
Measure	
Measure type	Inducti
Outputs	
Annual Bill Savings	
Fuel Switching	

Variable Speed Air Source Heat Pump

Inputs	
TRM Method Inputs	
General	
Climate Zone	
Quality Installation?	
Baseline Heat Load	
Baseline cooling load	
Measure % load reduction	
Measure Electric Rate Type	
Baseline Electric Rate Type	
Baseline Heating Fuel	
Baseline Gas Utility	
Baseline Propane Rate Level	
Switchover	
Non-HVAC electric load	
Baseline	
Baseline Heating Type	
Baseline Cooling	
AFUE - New Construction or Measure Life Remaining	
AFUE - Baseline Life Remaining	
SEER - New Construction or Measure Life Remaining	
SEER - Baseline Life Remaining	
Baseline Cooling Capacity	

Electric Clothes Dryers

Inputs		
TRM Method Inputs	Input	
General		
Dryer Size	Standard	
Measure Electric Rate Type	Space Heat	
Baseline Electric Rate Type	Space Heat	
Baseline Gas Utility	North Shore	
Baseline Propane Rate Level	Medium	
Dryer Location	Conditioned	
Heating Fuel	Electric	
Heating System Efficiency	1.95	Heating COP/AF
Cooling SEER	20	
Baseline		
Baseline Fuel	Propane	
Measure		
Measure Type	ENERGY STAR Most Efficient	

Discussion

- Bill impact
  - “Typical” tenant or “current” tenant
  - Actual/sample bills vs generic assumptions
  - First year or lifetime savings
- Interactive effects
- Communicate benefits
  - Customer report
  - Owner and tenant

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Installation and Support

Contractor Strategy

- Leverage existing joint MFES network
  - Confirm ability to complete new measures, or if additional contractors needed
- Consider 1-2 multi-trade top tier contractors for 2022
  - Closer coordination and support during initial projects
  - Key learnings for future year ramp up
- Multi-trade collaboration
  - Gas shutoff
  - New/moved/updated electrical

Post Install Support

- Maintenance staff education
- Tenant behavior, education, other impacts
- Switch to electric space heat rate
- Shutoff gas account

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QUESTIONS AND ANSWERS SESSION

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