Guidehouse

Xcel Energy Colorado Stakeholder Meeting

November 10, 2021

On the call today

Divya Iyer
Project Manager/Measure Characterization

Scott Robinson
Quality Assurance

Stuart Schare
Executive Oversight

Robin Maslowski
Project Director

Jack Cullen
Modeling

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Project Progress

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Project Progress

Completed

Guidehouse has completed the following for Xcel Energy's Colorado territory:

1. Residential and C&I data collection
2. Draft technical and economic potential results for Residential Energy Efficiency (EE)
3. Technical potential results for Beneficial Electrification (BE) measures

In Progress

Guidehouse is in the process of:

1. Finalizing economic potential results for BE measures
2. Finalizing achievable results for the Residential sector
3. Creating EE and BE results for the Commercial sector, and
4. Demand Response (DR) results for all sectors

Project Progress

Project Timeline

Q2 2021 **1st stakeholder meeting**

Q2 2021 Complete research plan and complete primary data collection

Q3 2021 **2nd stakeholder meeting**

Q3 2021 Complete C&I data collection. Draft Residential (EE & BE) technical and economic potential

Q4 2021 **3rd stakeholder meeting**

Q4 2021 Draft EE, BE, DR technical, economic, achievable potential for all sectors analysis

Q1 2022 **4th stakeholder meeting**

Q1 2022 Reporting

Data Collection

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Commercial Data Collection: Maximizing participation

Our team launched **a virtual verification effort from May 2021 to September 2021** where customers responded to questions about density, saturation, and willingness to pay for energy efficiency, beneficial electrification and demand response measures. We took the following steps to **increase the response rate** of our commercial survey:

Designed survey to be as short and user friendly as reasonably possible and **increased maximum incentive** from **$70 to $100** for commercial & industrial customers.

Multiple working sessions with account managers to contact large commercial & industrial customers.

Guidehouse sent **20,571 emails** to business accounts. Out of these, **1,850 personal links were generated for managed accounts.** We also sent multiple reminder emails to participants.

After all these efforts, we received **212 full completes**, **61 partial completes**

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Defining Technical, Economic and Achievable Potential

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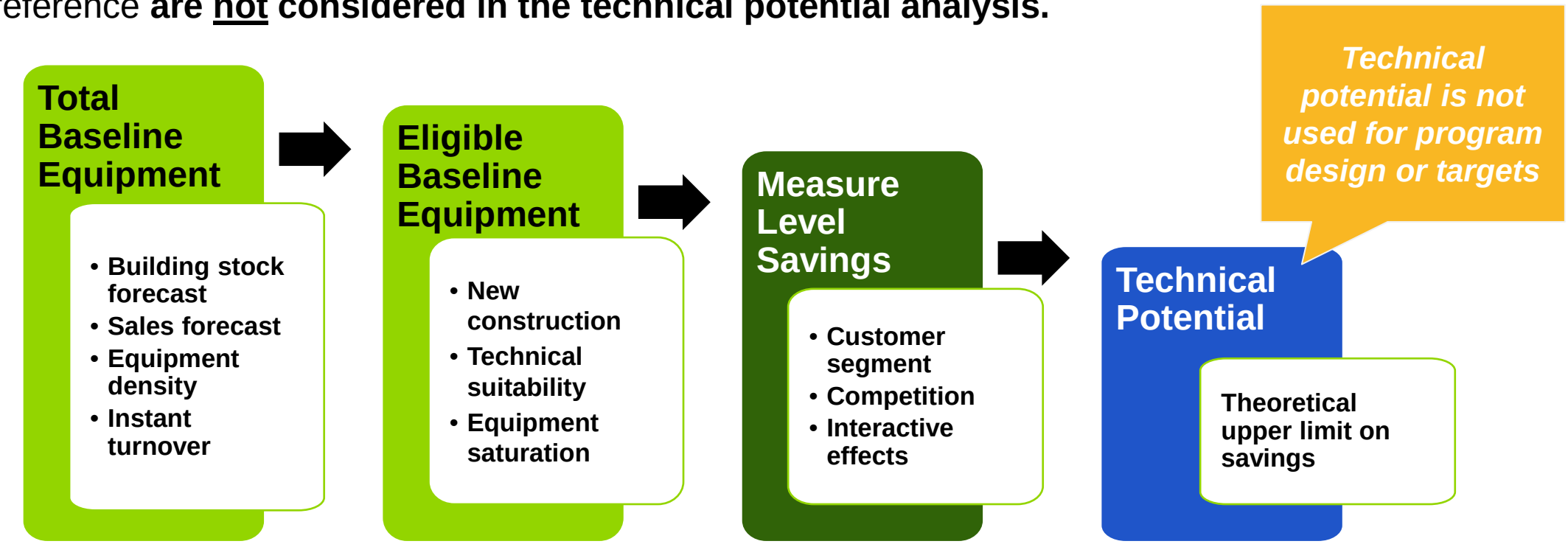
Defining Technical Potential

- The maximum possible savings regardless of cost and customer preference, represents the hypothetical upper-most boundary for potential energy efficiency savings.
- All equipment is **instantly replaced** with the highest saving measure.
- **Critical limiting factors** such as economics, stock turnover, program administration costs, incentives, and customer preference **are <u>not</u> considered in the technical potential analysis.**

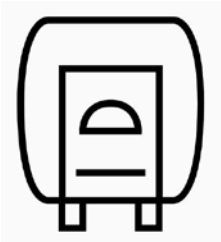


Defining Technical Potential

- As efficient technologies saturate the market, potential is necessarily reduced.
- For measures in competition with each other, **the measure with the highest savings** is used in the technical potential calculation.

Competition Group Example – Water Heating

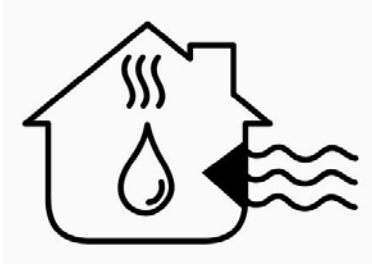
Baseline Storage Water Heater



VS.

Savings

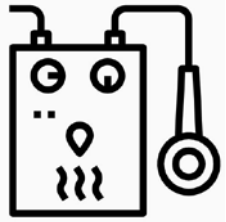
Heat Pump Water Heater



VS.

Savings

Efficient Storage/Tankless Water Heater



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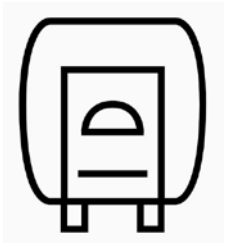
Defining Technical Potential

- For measures in competition with each other, **the measure with the highest savings** is used in the technical potential calculation **regardless of customer economics.**

Competition Group Example – Water Heating

Cost

Baseline Storage Water Heater



VS.

Cost

Savings

Heat Pump Water Heater

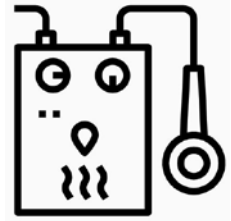
Technical Potential

VS.

Cost

Savings

Efficient Storage/Tankless Water Heater



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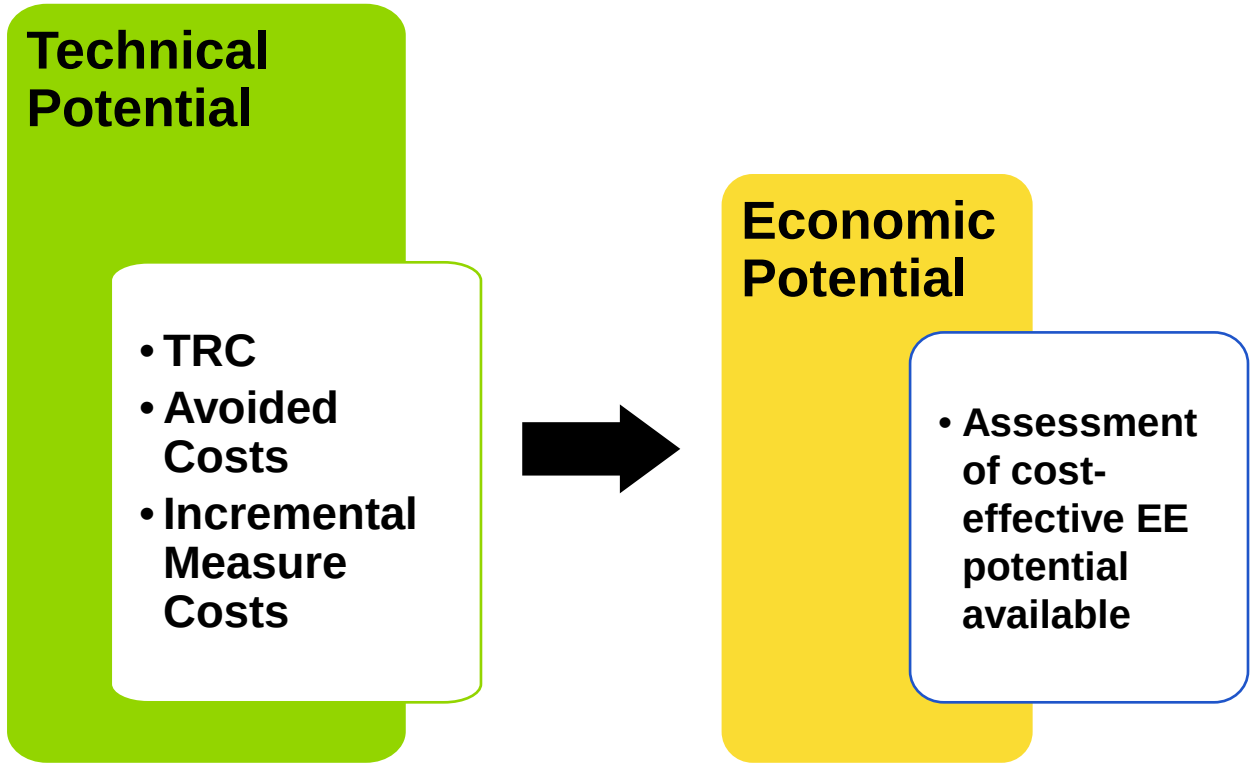
Defining Economic Potential

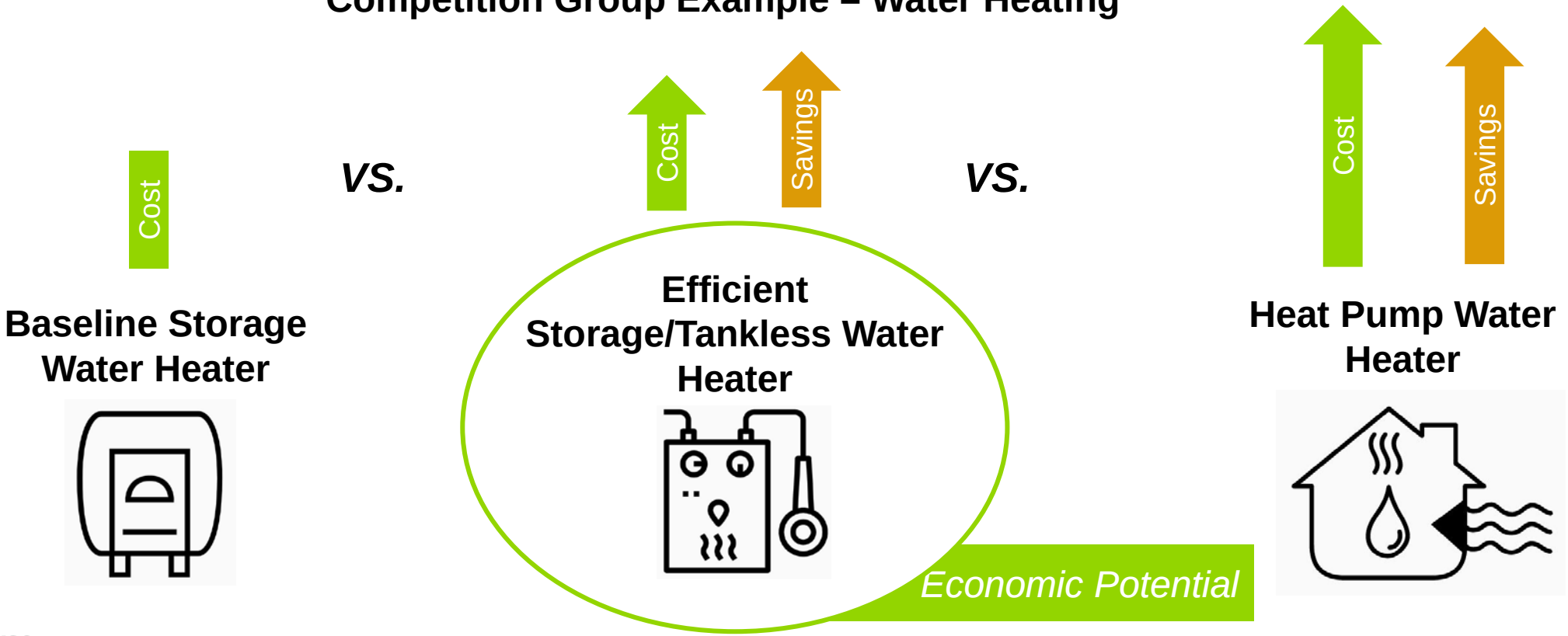
- **Economic Screening Threshold:** Only measures with benefit to cost ratios ≥ threshold are considered for economic potential (E.g., mTRC ≥ 1.0)
- **Avoided Costs:** Avoided costs of fuel previously consumed (and produced) and supporting infrastructure
- **Discount Rates**
- **Line Losses:** Percent loss in delivery of energy affects avoided costs of energy
- **Incremental Measure Costs:** Price difference between efficient and baseline measures
- **Operations and Maintenance Savings:** Efficient measures often have reduced operations and maintenance costs, increasing the value of the measure



Defining Economic Potential

- Among competing measures, each measure in CG estimated individually. Only the measures passing the economic screen contribute to economic potential.
- If two competing measures pass the economic screen, the measure with the highest technical potential contributes to economic potential.

Competition Group Example – Water Heating

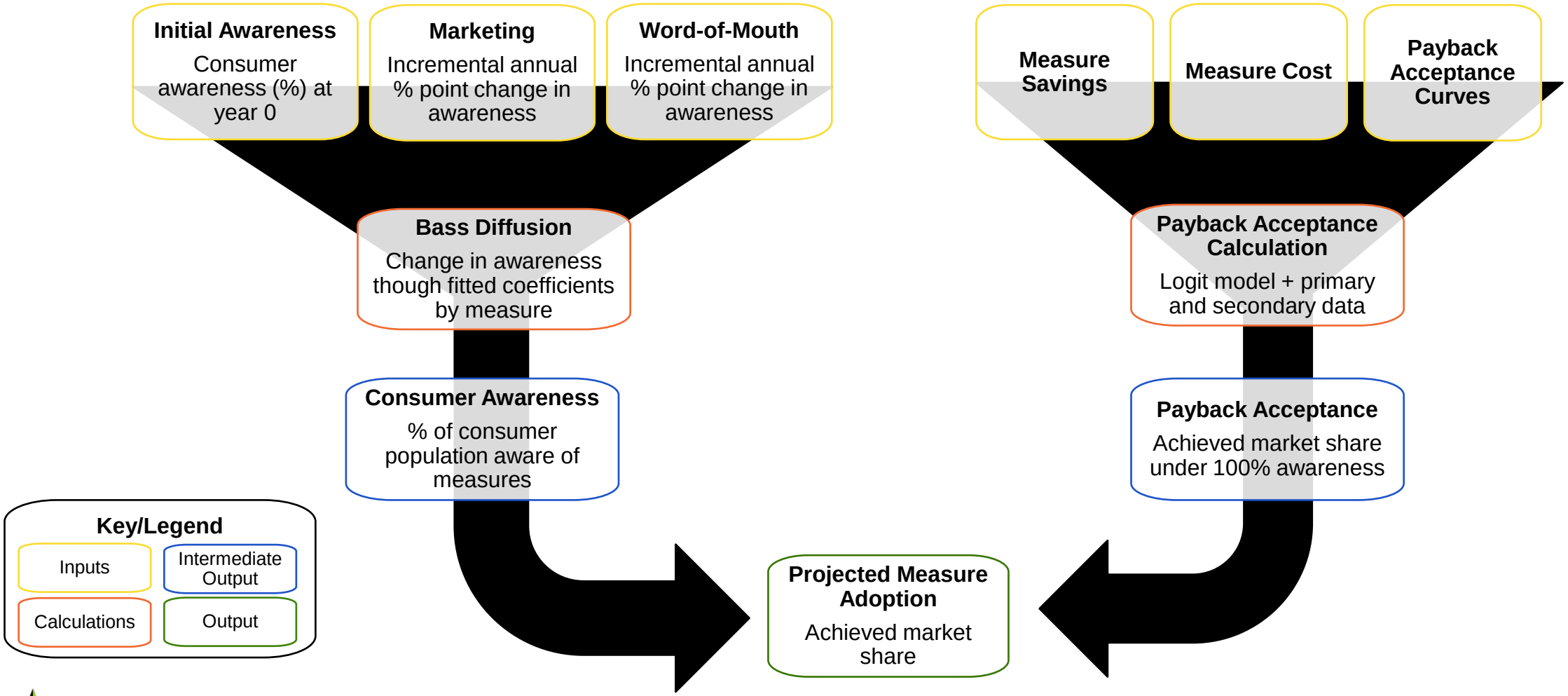


Defining Achievable Potential: Scenarios

Criteria	Reference Scenario	Max Achievable Scenario
Economic Threshold	Economic threshold of mTRC =1 for all electric measure and mTRC =0.5 for gas measures that helps account for social cost of carbon and screen additional measures as economically viable for consideration in achievable	No economic threshold for electric or gas measures, i.e., all measures are eligible
Bass Diffusion	Calibrated bass diffusion coefficients	Upper bound bass diffusion coefficients
Incentive Levels	Uses historic incentive levels	Incentive levels tuned such that the levelized cost of energy by measure is equal to the avoided cost
Budget Constraint	Yes	No

Defining Achievable Potential

Cost Effective Potential Constrained by Market Conditions



Draft Residential Technical and Economic Potential Results: Energy Efficiency Measures

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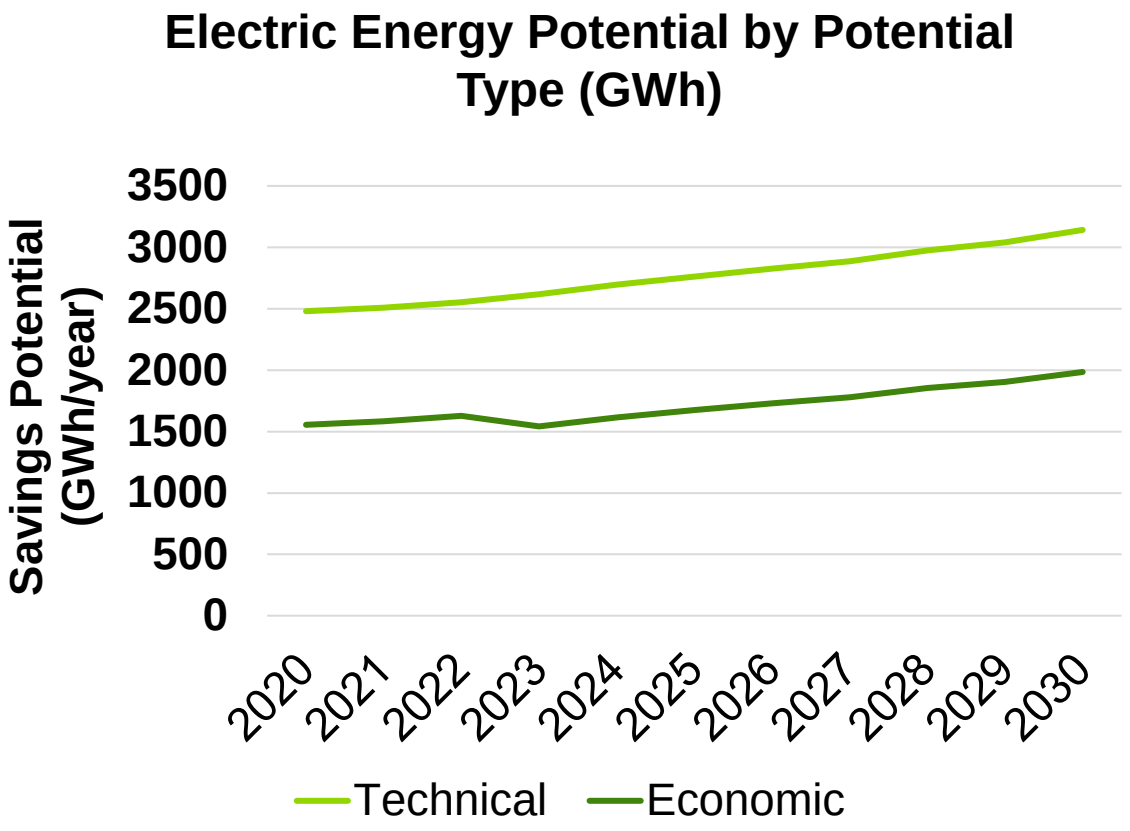
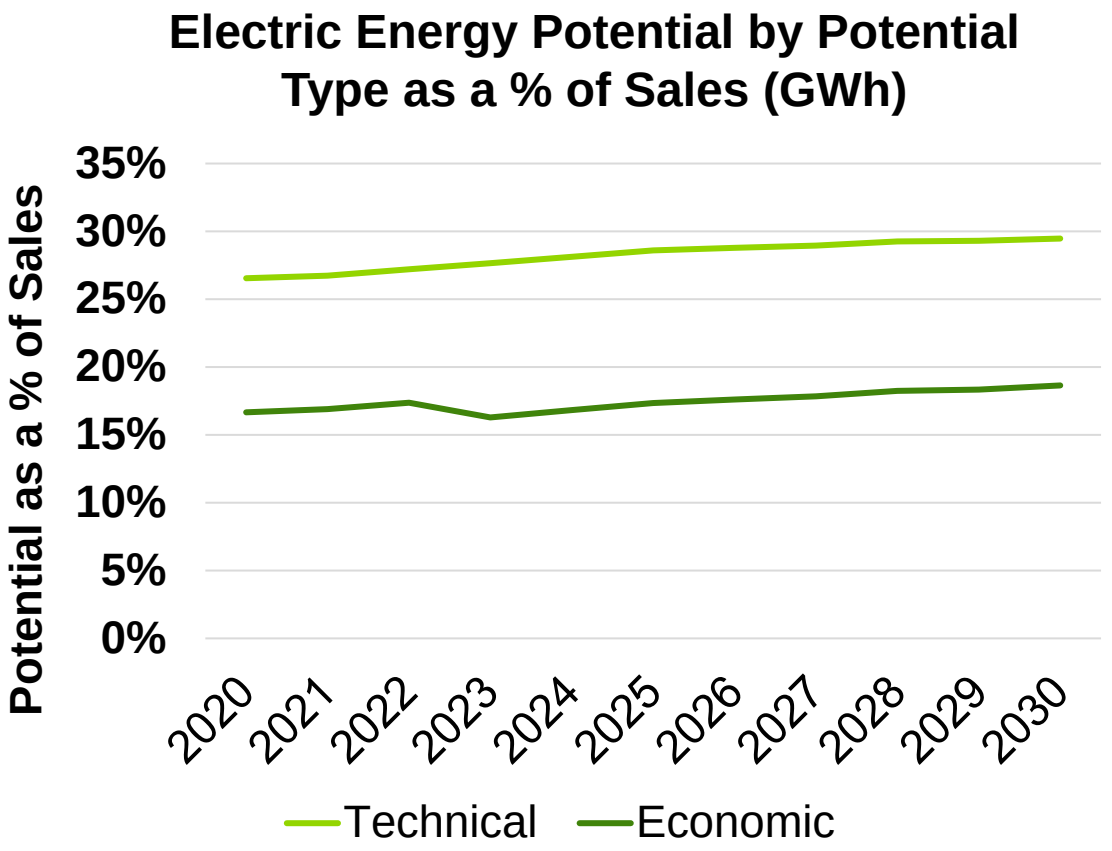
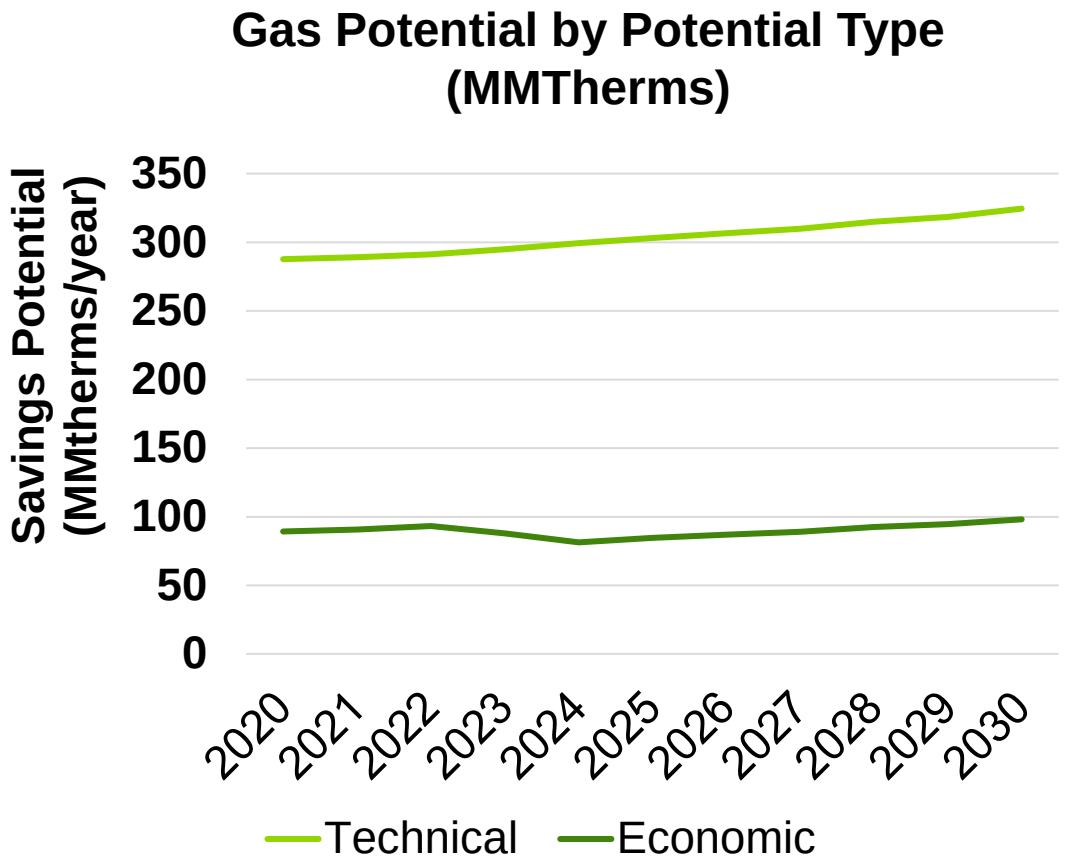
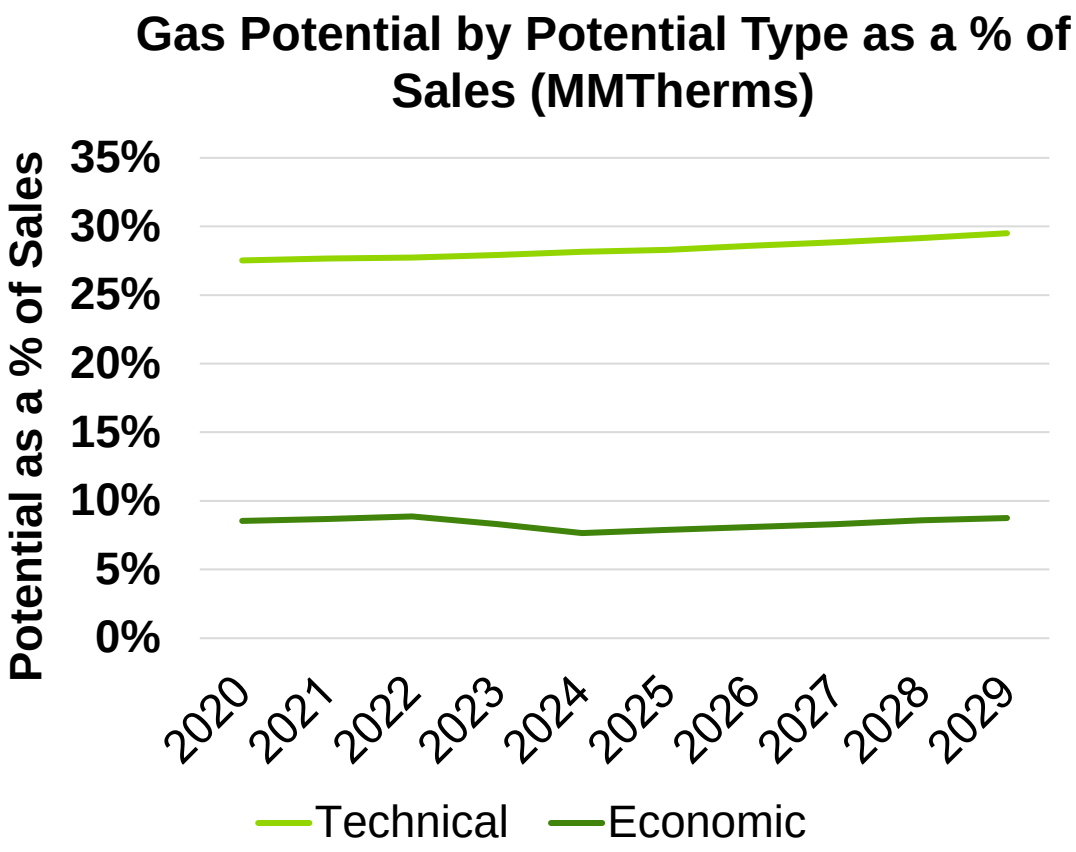
Draft Residential Electric Technical and Economic Potential





Draft Residential Gas Technical and Economic Potential

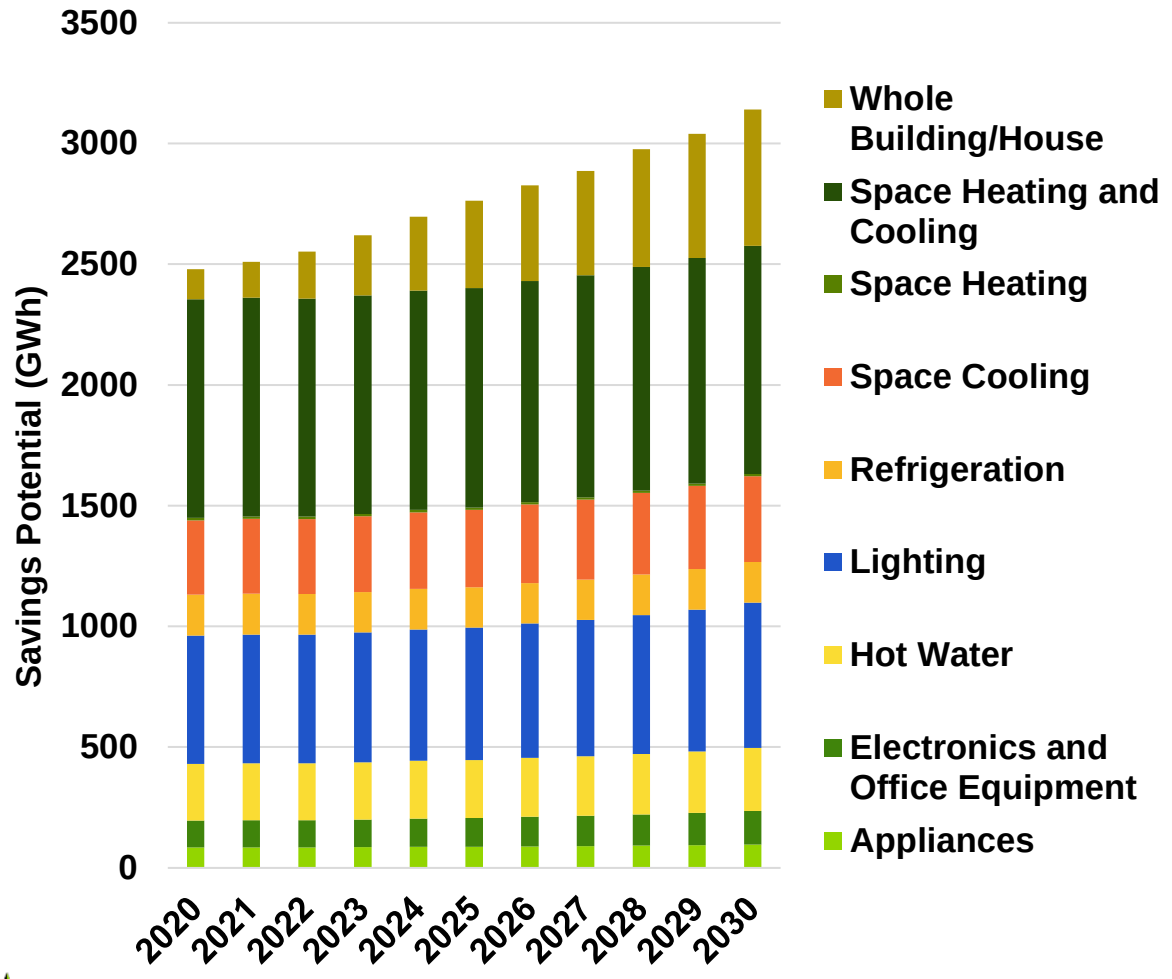




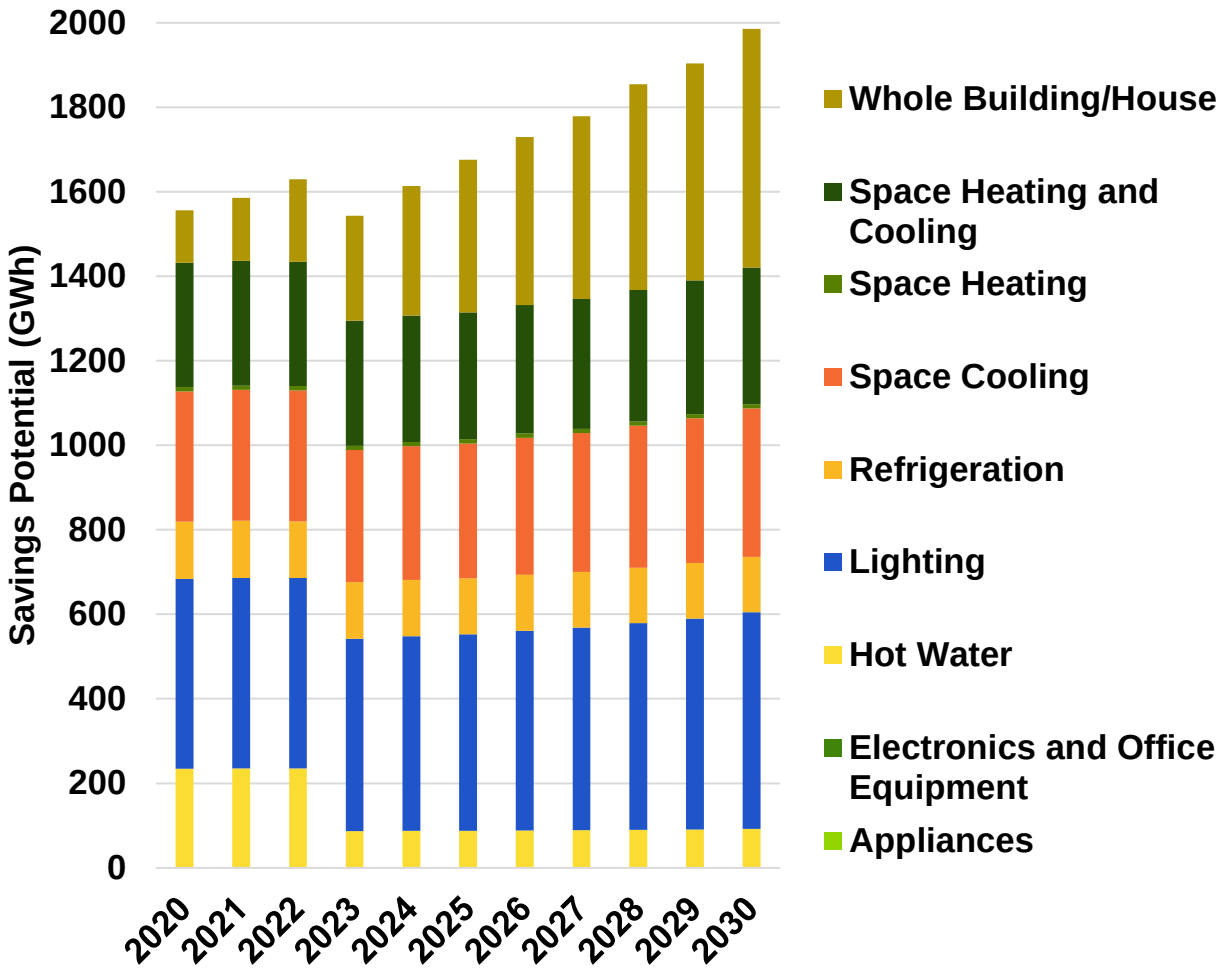
Note: A lower economic screen of 0.5 is being used for the reference achievable scenario which will include gas potential being dropped out in the economic potential calculation.

Draft Electric Technical and Economic Potential by End Use

Electric Energy Technical Potential by End Use (GWh/year)

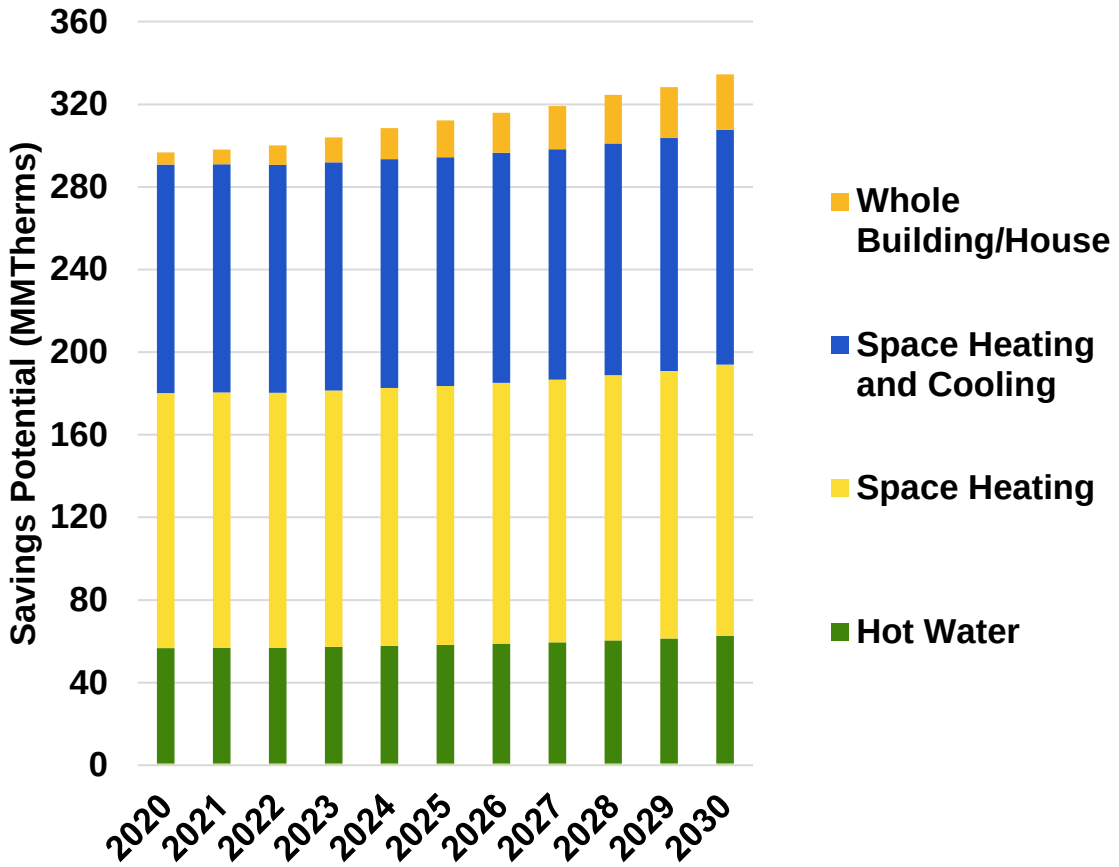


Electric Energy Economic Potential by End Use (GWh/year)

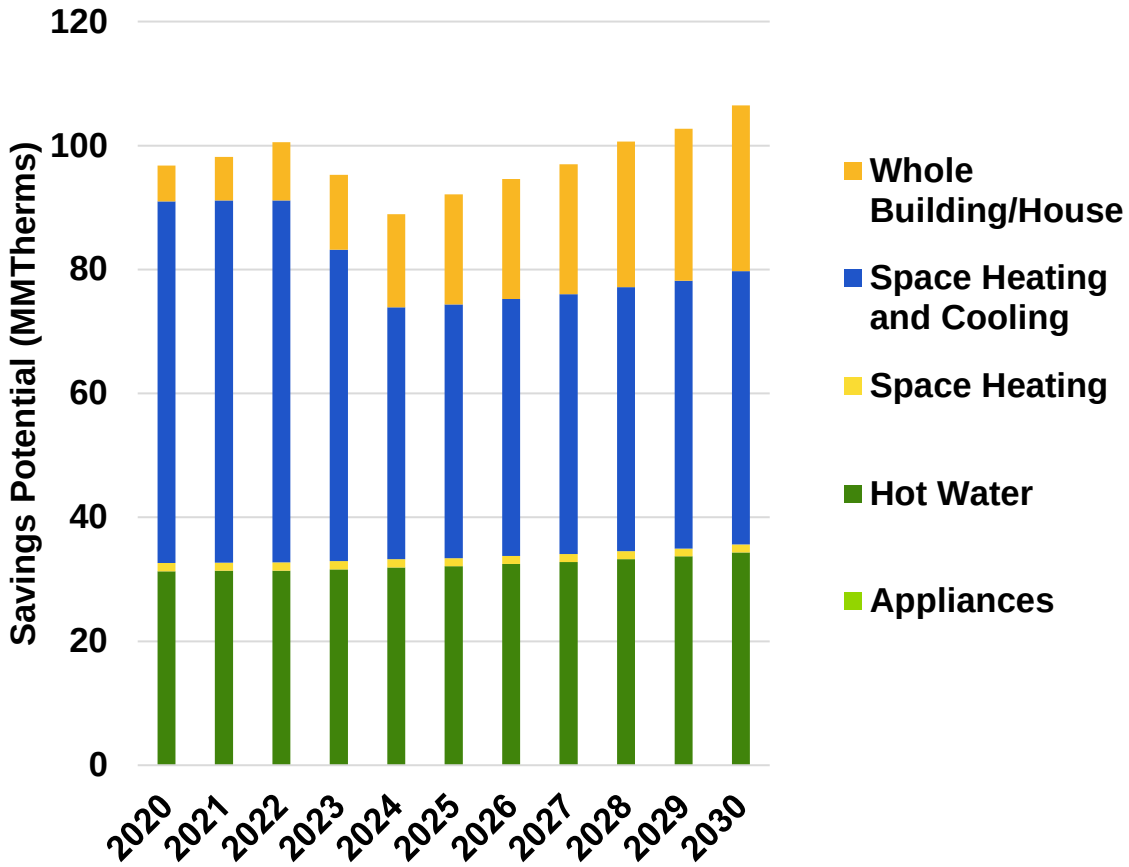


Draft Gas Technical and Economic Potential by End Use

Gas Technical Potential by End Use (MMTherms)



Gas Economic Potential by End Use (MMTherms)



Draft Residential Technical Potential Results: Beneficial Electrification Measures

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Beneficial Electrification: Residential Measure List

Guidehouse is characterizing potential savings and customer economics for the following beneficial electrification measures:

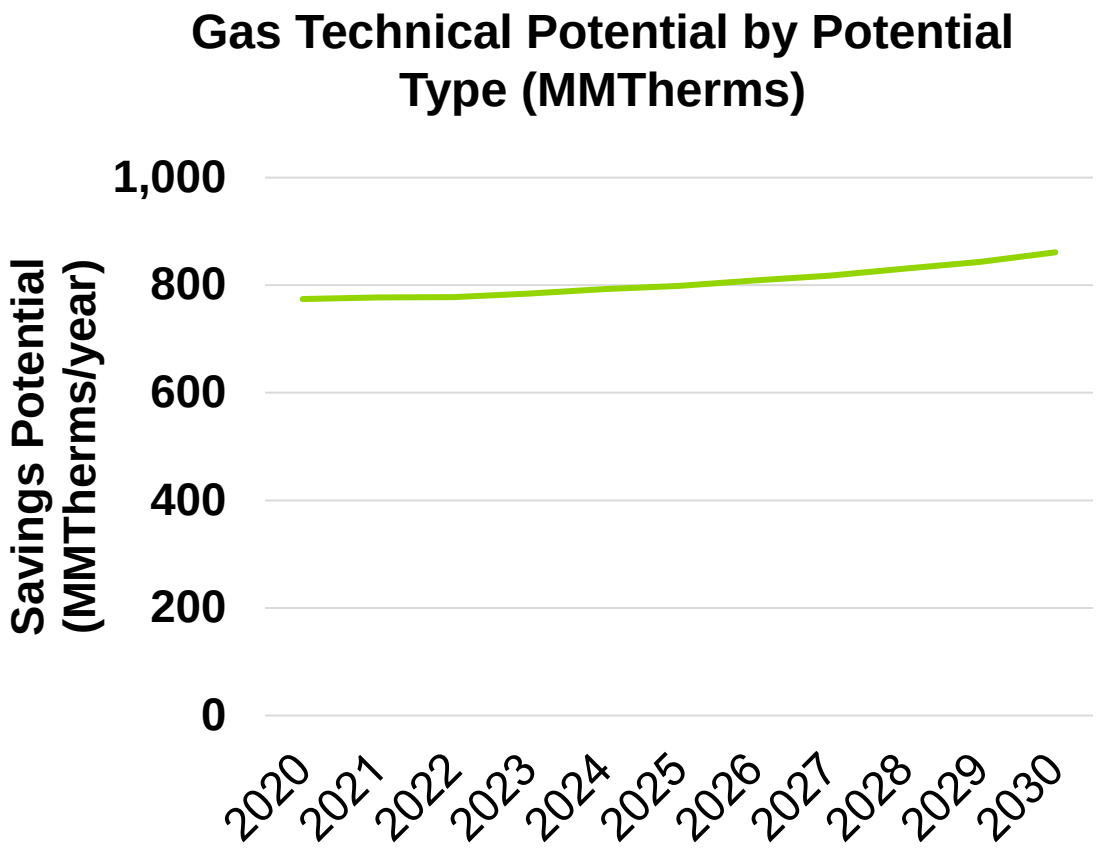
For Xcel Energy Electric and Gas Customers:

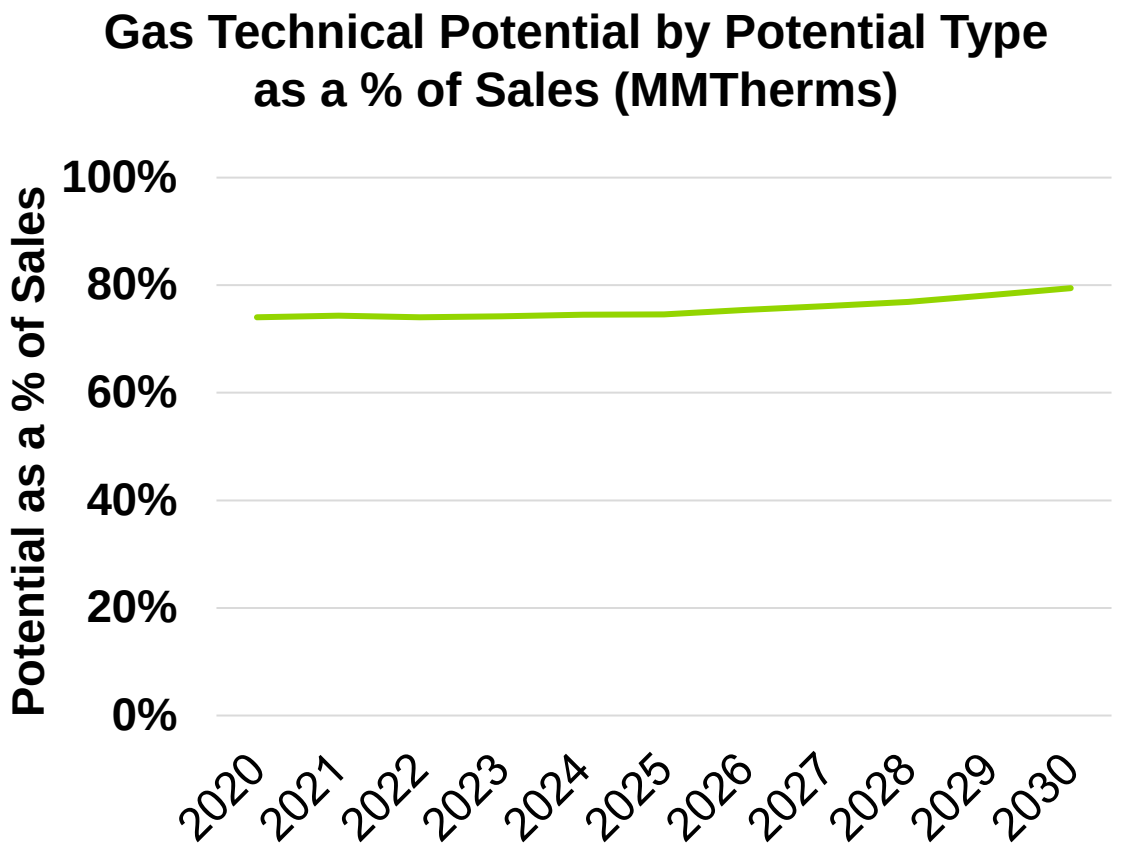
1. Gas Furnace + Baseline A/C Blend --> Central Heat Pump (Full Replacement)
2. Gas Furnace + Baseline A/C Blend --> Gas Furnace + Central Heat Pump (Partial Displacement)
3. Gas Boiler + Baseline A/C Blend --> Central Heat Pump (Full Replacement)
4. Gas Boiler + Baseline A/C Blend --> Gas Boiler + Ductless Mini-Split Heat Pump (Partial Displacement)
5. Gas Furnace --> Central HP (Full replacement)
6. Gas Boiler --> Central HP (Full replacement)
7. Gas Storage Water Heater --> Electric Heat Pump Water Heater

For Xcel Energy Gas Customers only:

1. Gas Furnace --> Central Heat Pump (Full Replacement)
2. Gas Boiler --> Central Heat Pump (Full Replacement)
3. Gas Storage Water Heater --> Electric Heat Pump Water Heater

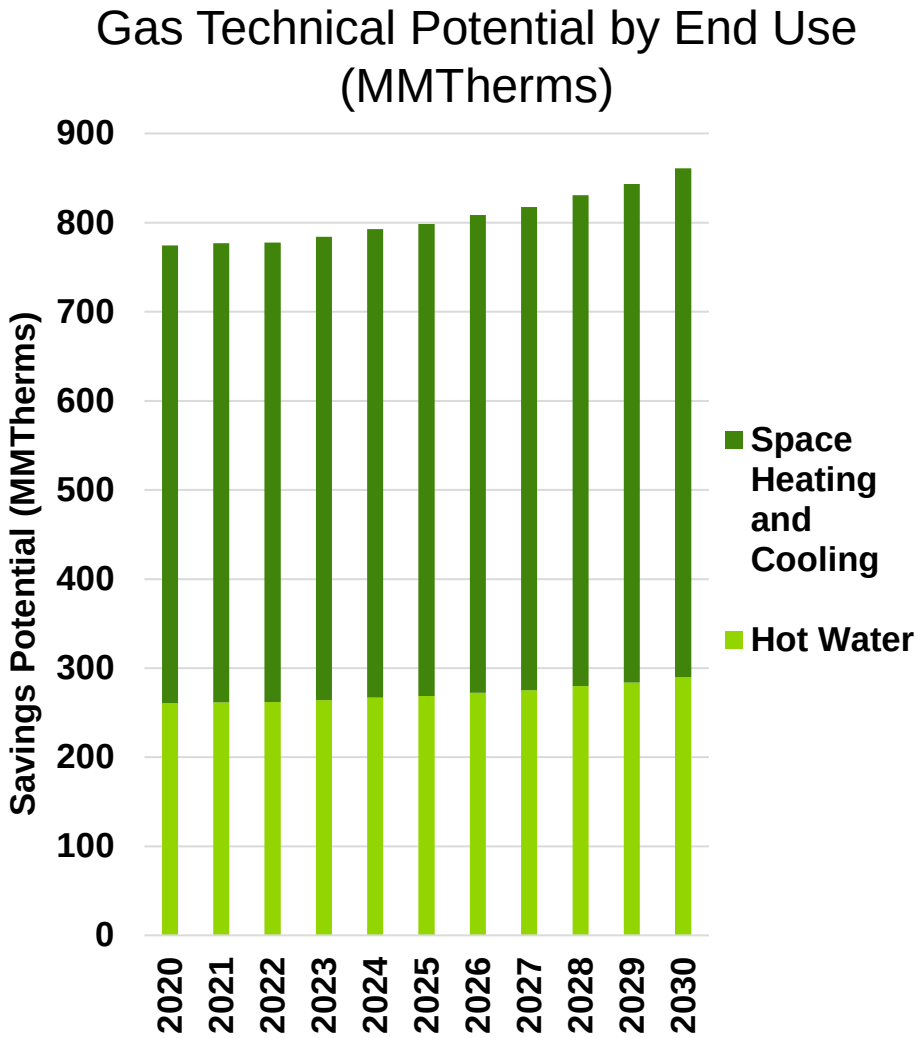
Draft Residential Gas Technical Potential

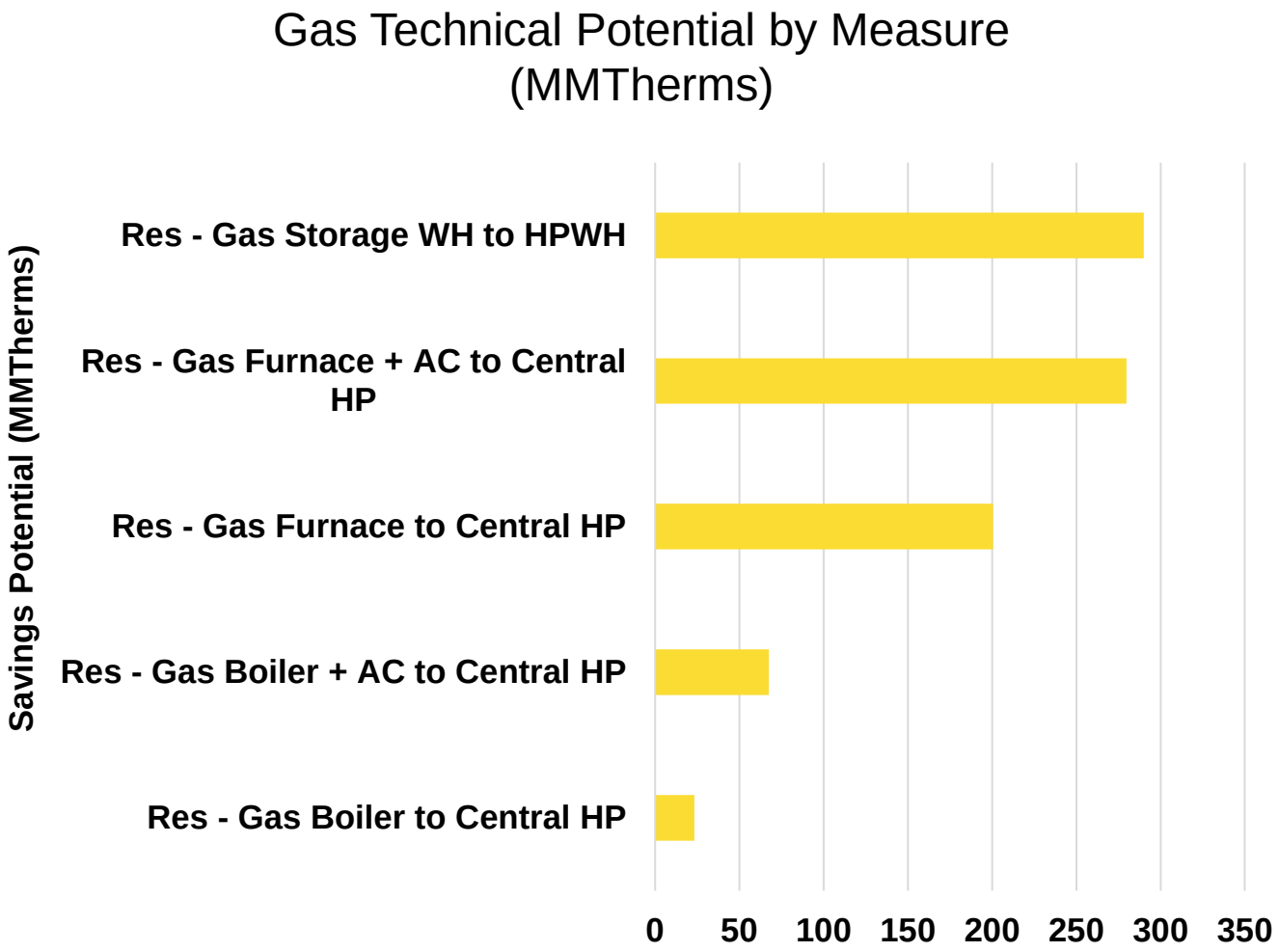




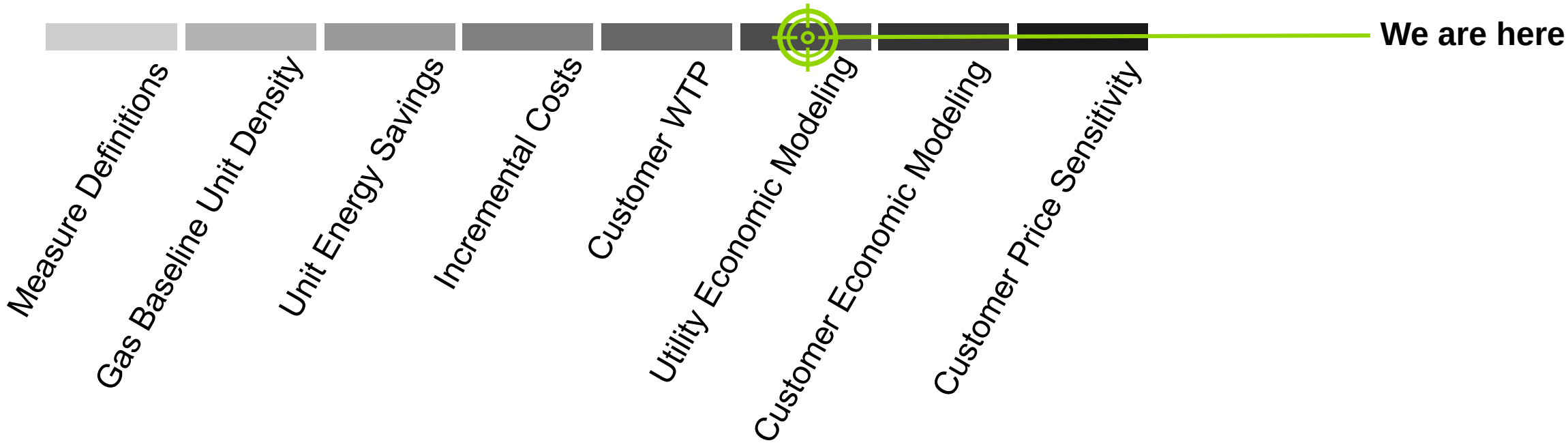
Note: The beneficial electrification potential is not included in the energy efficiency results presented in the earlier slides.

Draft Gas Technical Potential by End Use and Measure





Where are we with Beneficial Electrification?



Key considerations in modeling Beneficial Electrification:

1. Gas vs Electric territory differences
2. Loadshape applicability for emerging rates & technologies
3. Partial Displacement vs Full Replacement
4. Replacement of multiple baseline technologies + fuels

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Questions?

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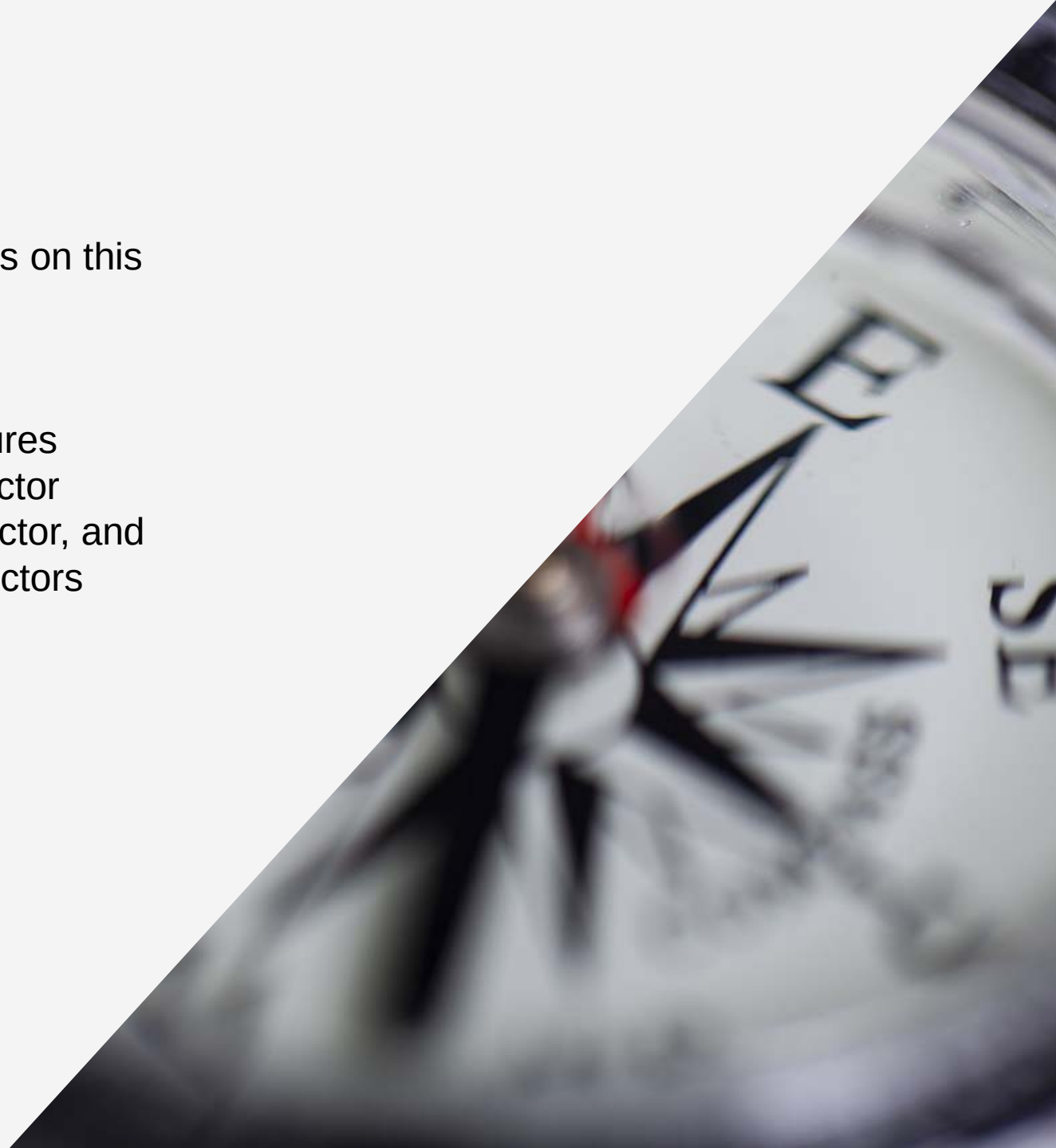
Next Steps

- Please provide any feedback, comments, or questions on this presentation by November 30, 2021.

- Guidehouse will:
  - Finalize economic potential results for BE measures
  - Finalize achievable results for the Residential sector
  - Create EE and BE results for the Commercial sector, and
  - Create Demand Response (DR) results for all sectors



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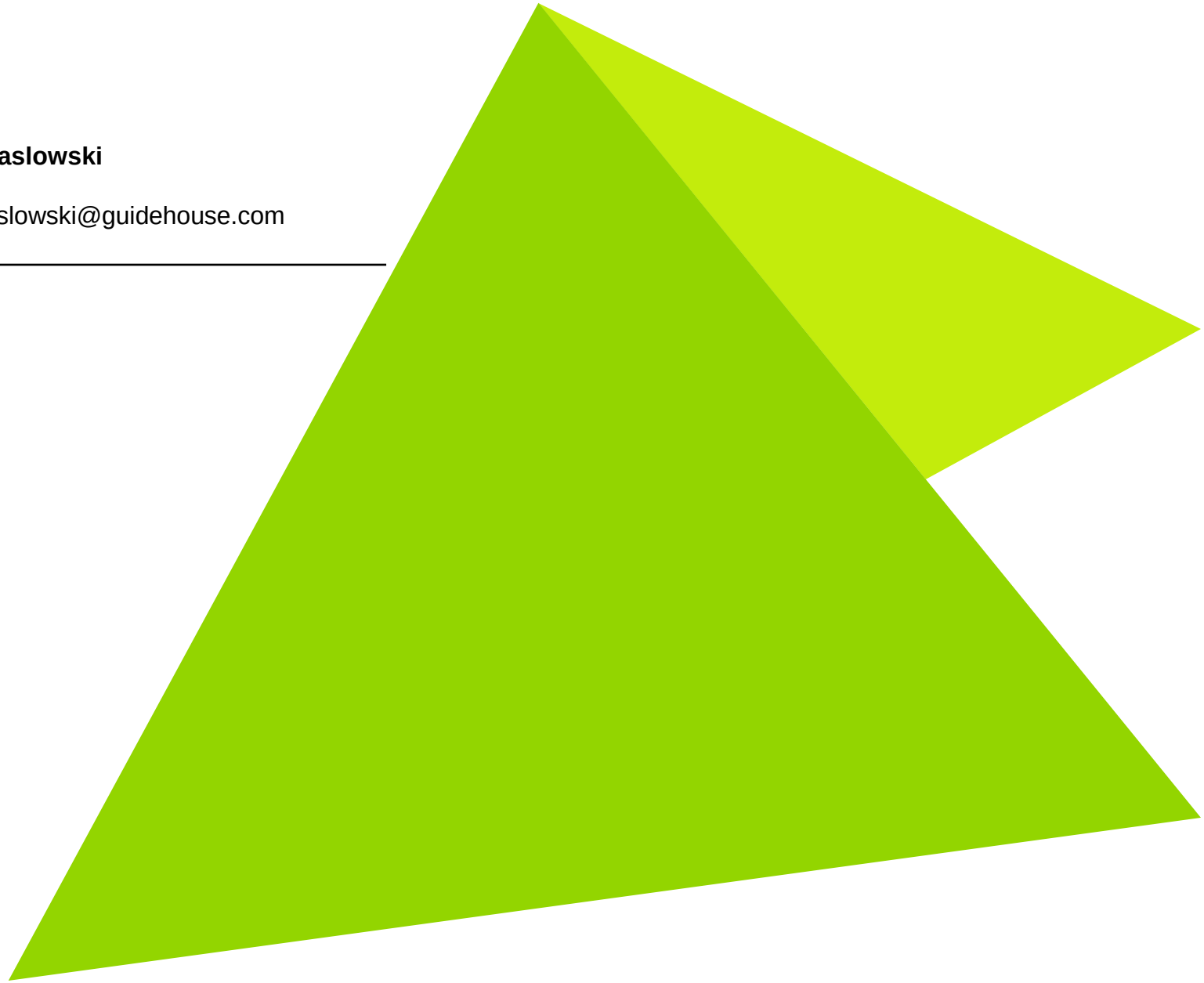

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Appendix

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Defining Achievable Potential

Calibration

Guidehouse will calibrate to Xcel CO historical achievements in 2016 - 2020 by **sector, end-use** and **measure**

Unit costs and spending will be examined

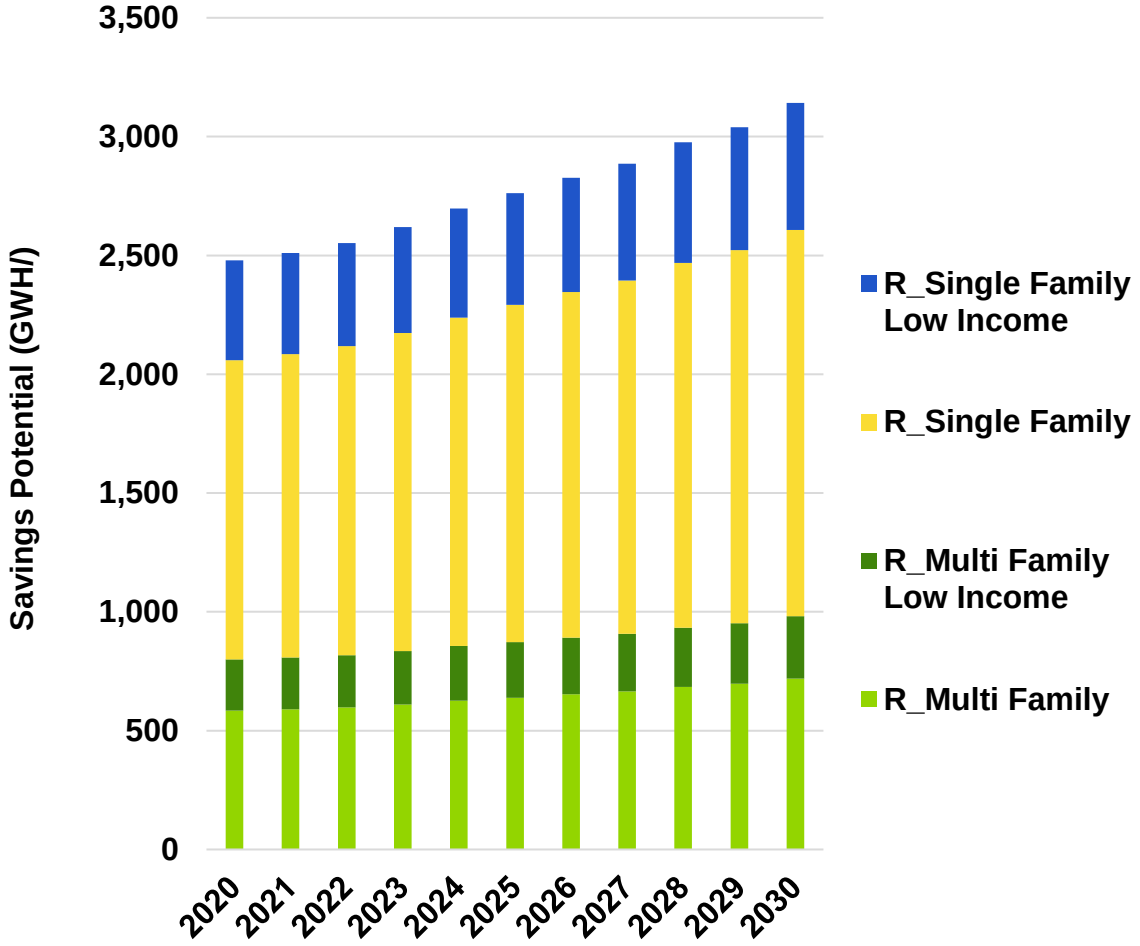
Because some historical measures were dropped from the potential study measure, the mutually occurring subset of measures (inner join) was used for calibration

Because of this subset, first year savings can be higher or lower than actual achievements

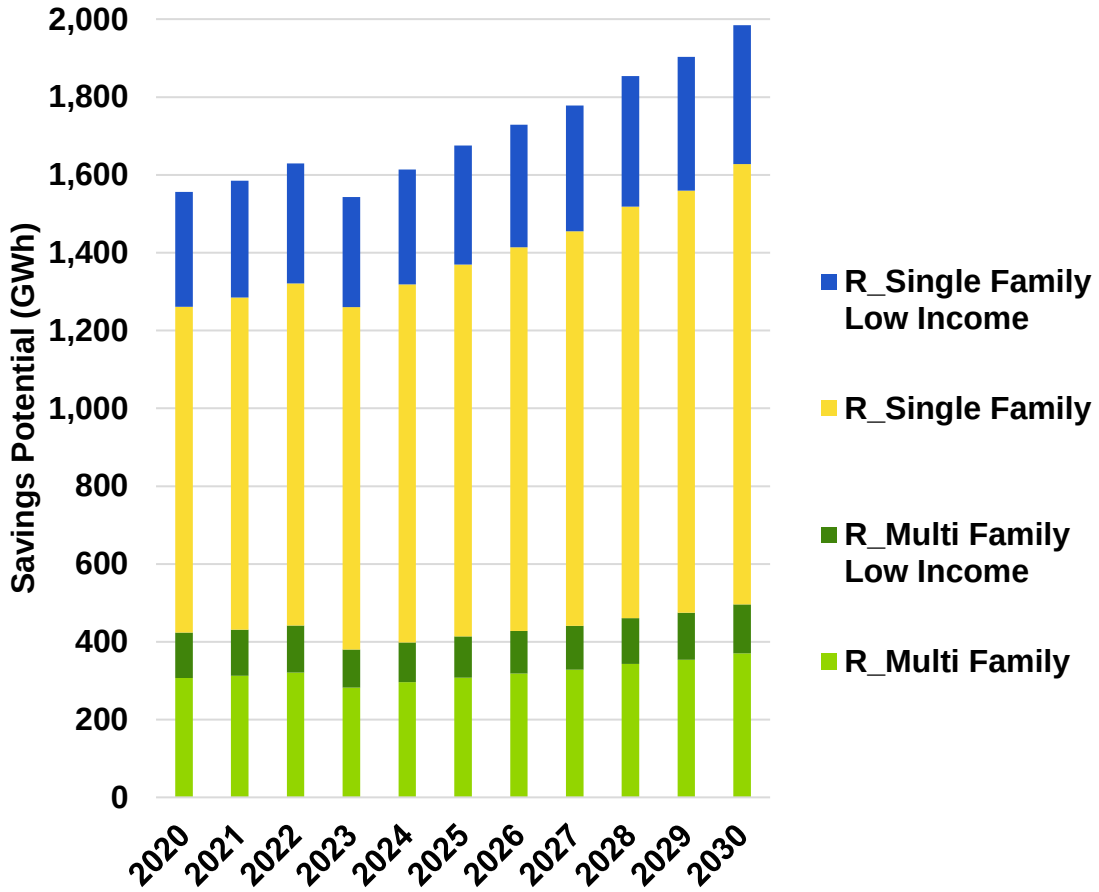
Xcel CO Program Measure	Potential Study Measure	Calibration Set
A	A	A
B	B	B
C	C	C
	D	
E		

Draft Residential Technical and Economic Potential by Segment

Electric Energy Technical Potential by Segment (GWh/year)

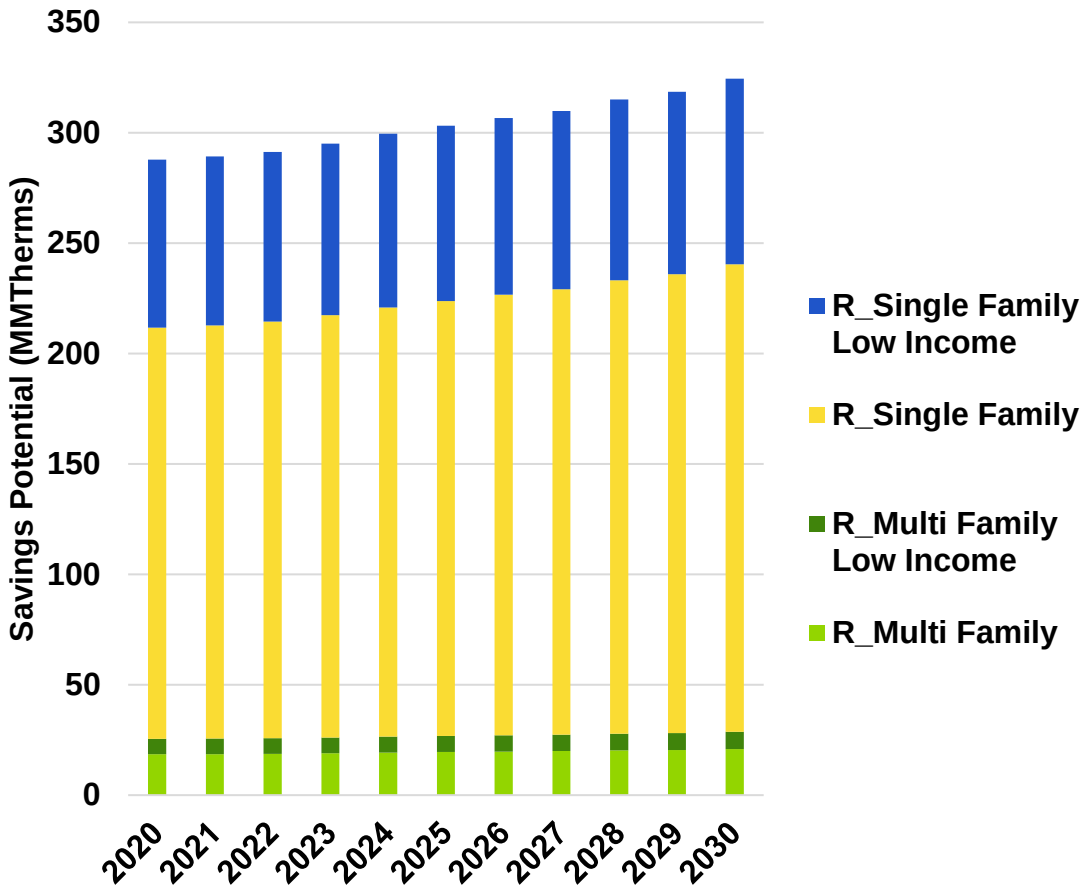


Electric Energy Economic Potential by Segment (GWh/year)

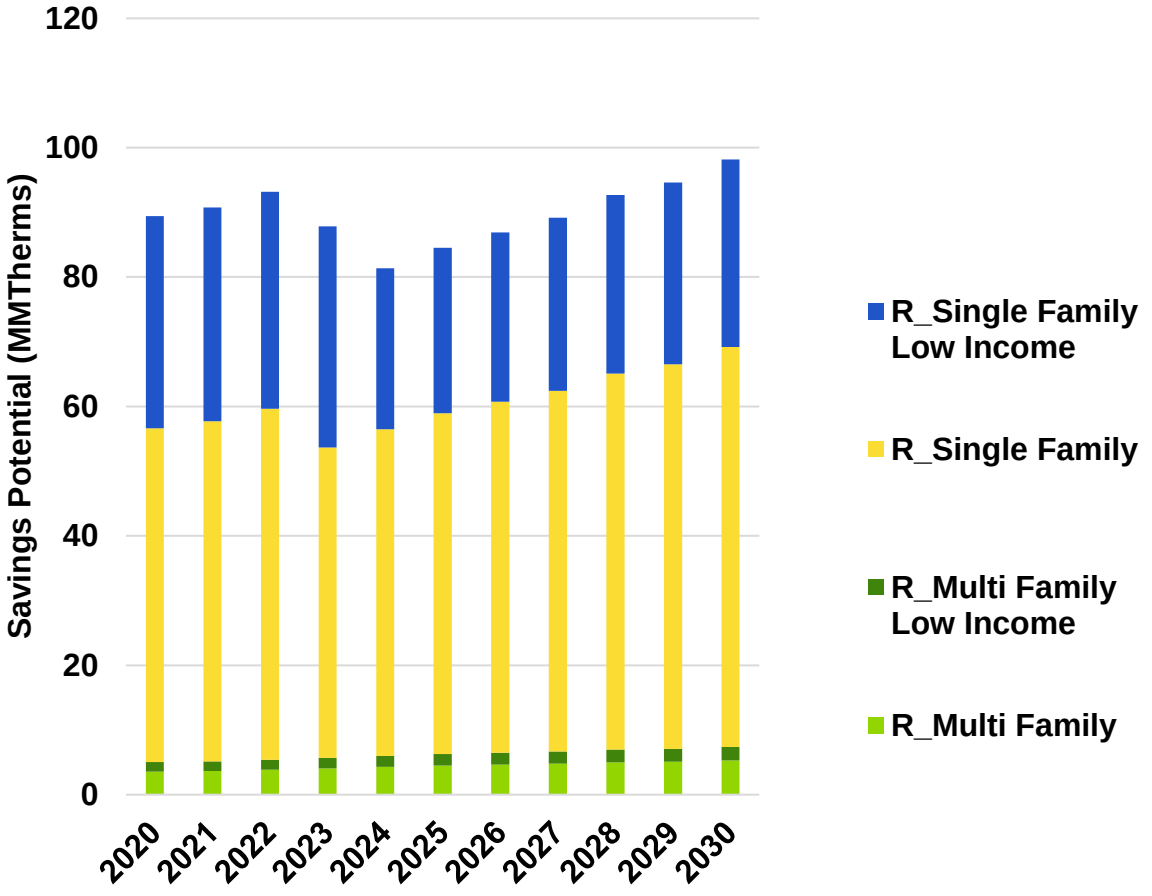


Draft Residential Technical and Economic Potential by Segment

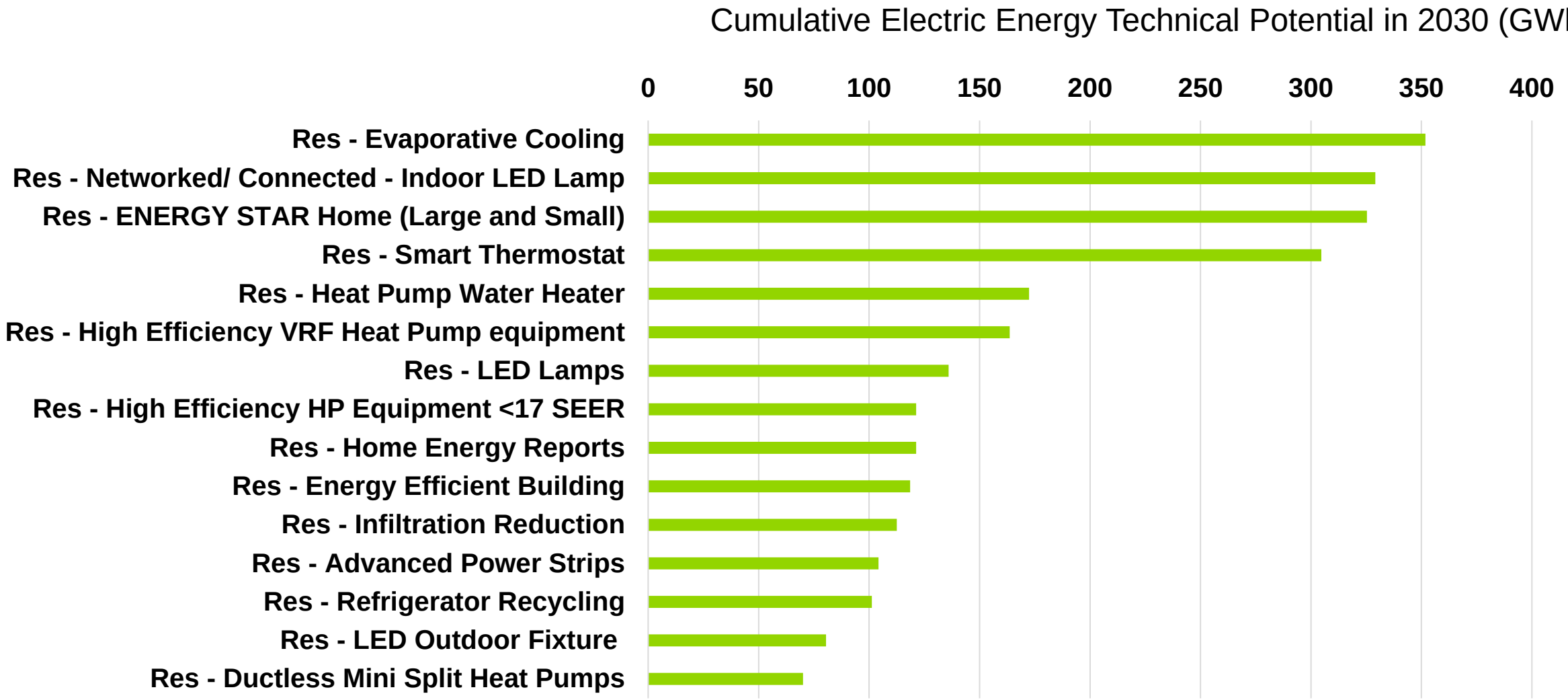
Gas Technical Potential by Segment (GWh/year)



Gas Economic Potential by Segment (GWh/year)



Draft Technical Potential Top 15 Residential Electric Measures



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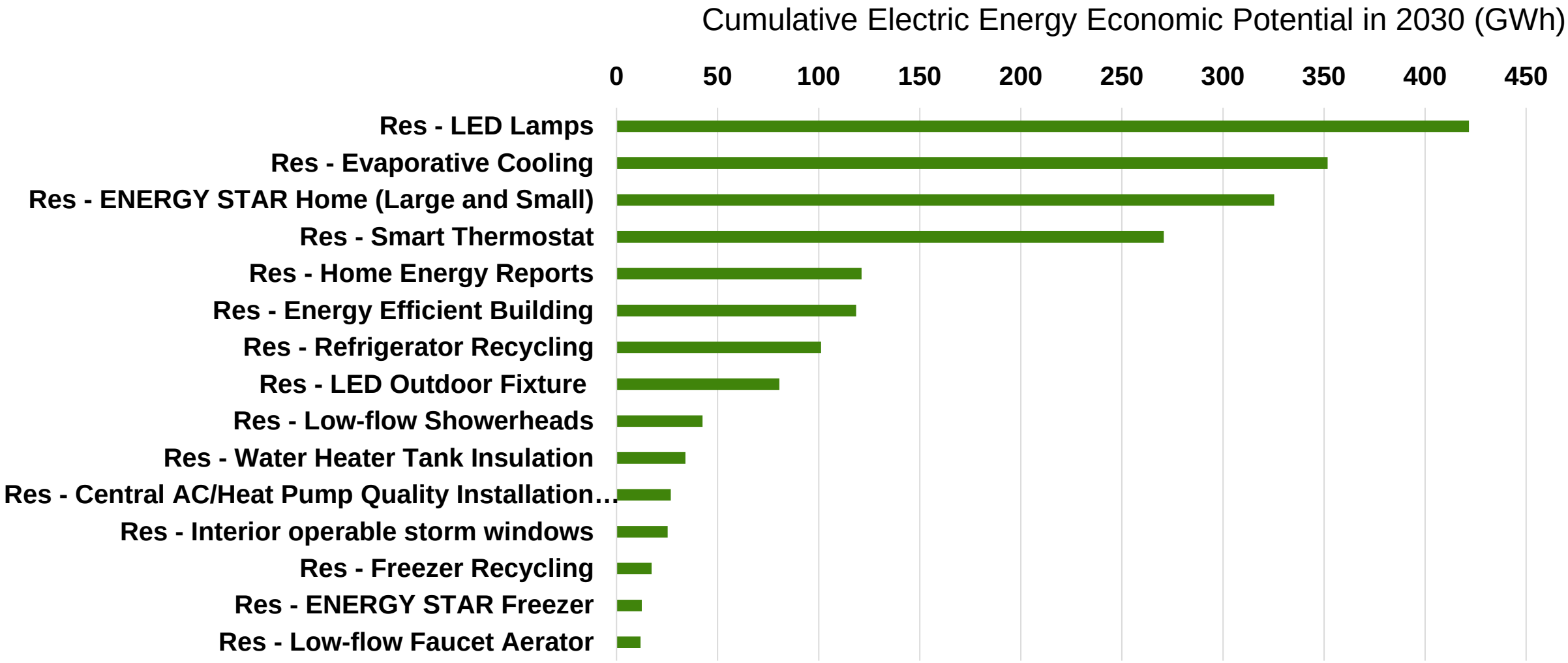
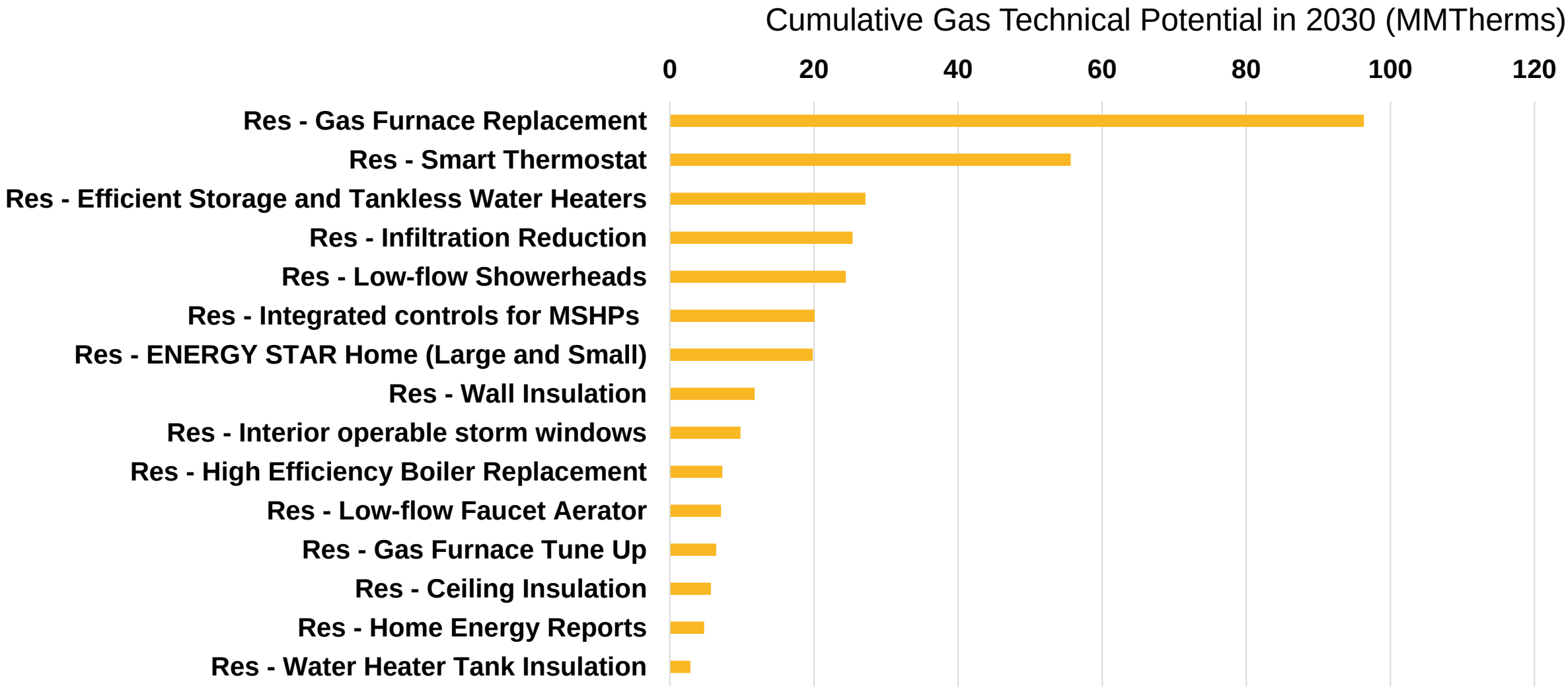
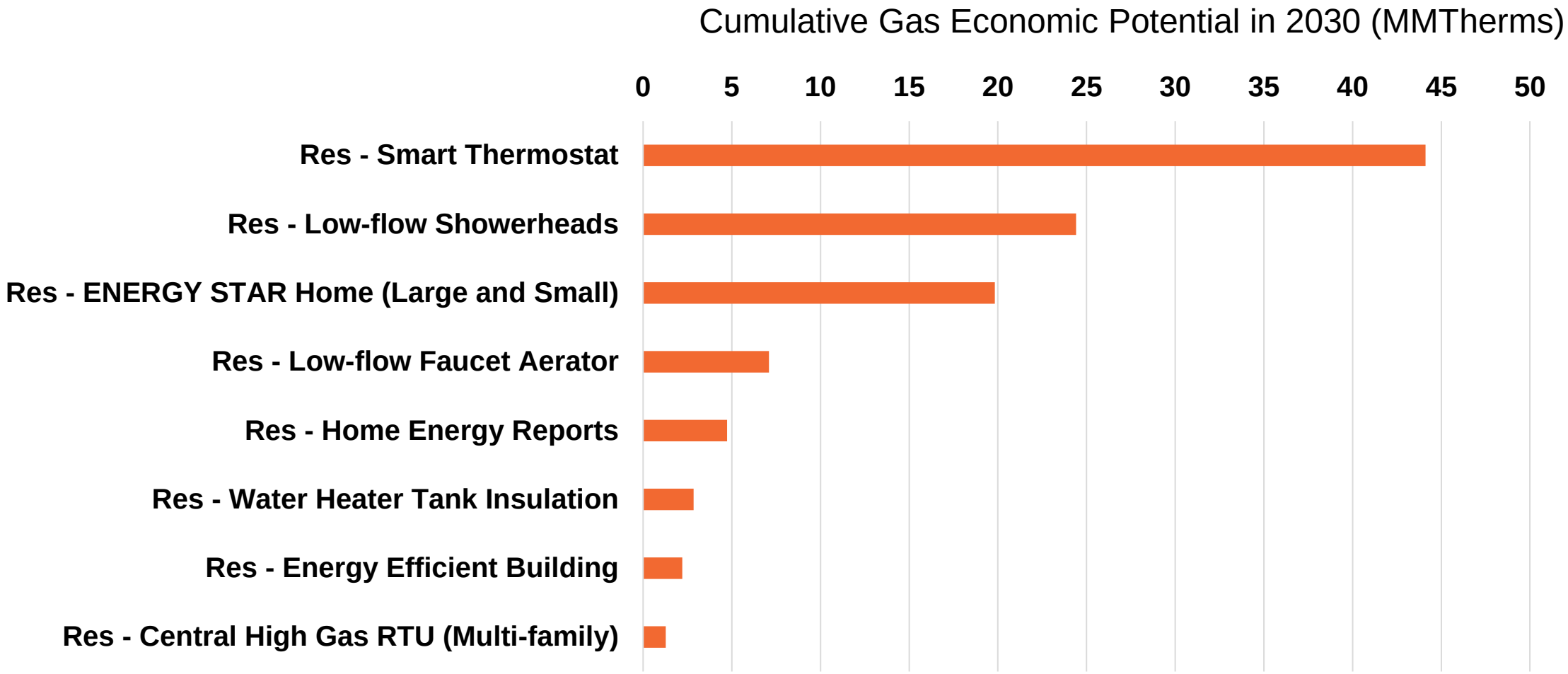


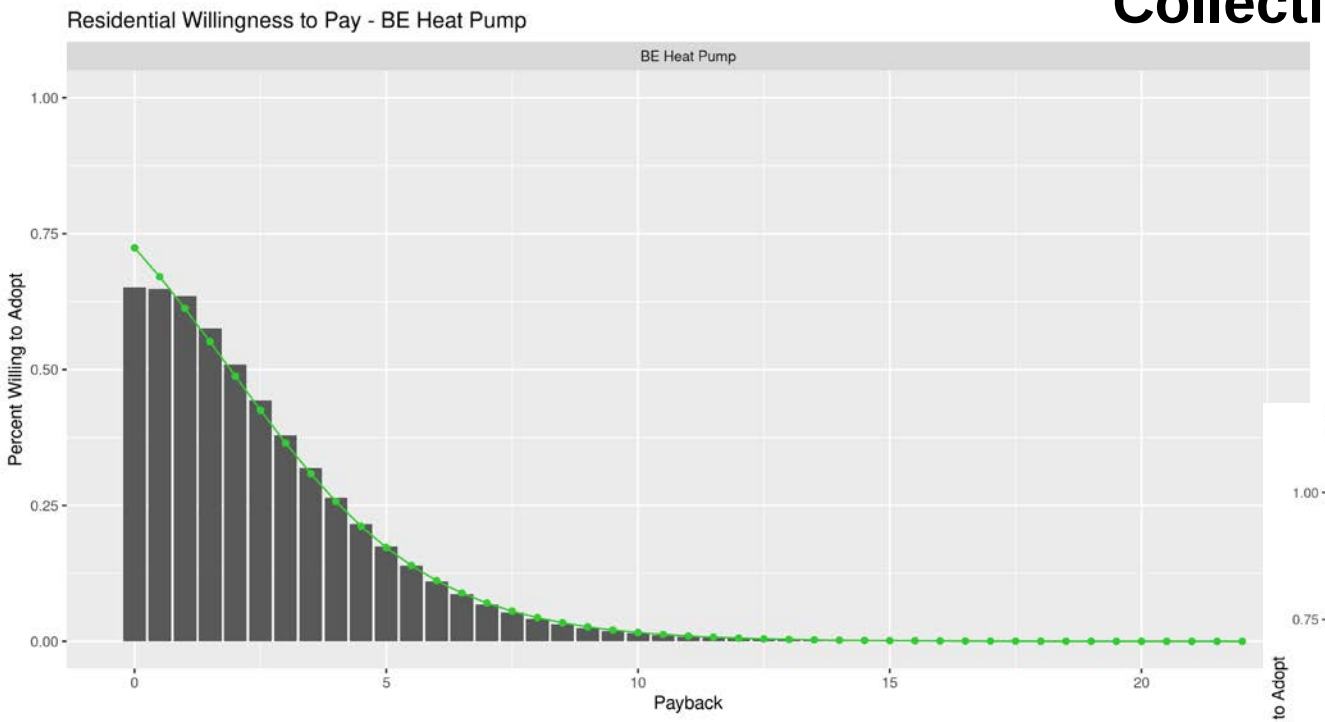
Draft Technical Potential Top 15 Residential Gas Measures

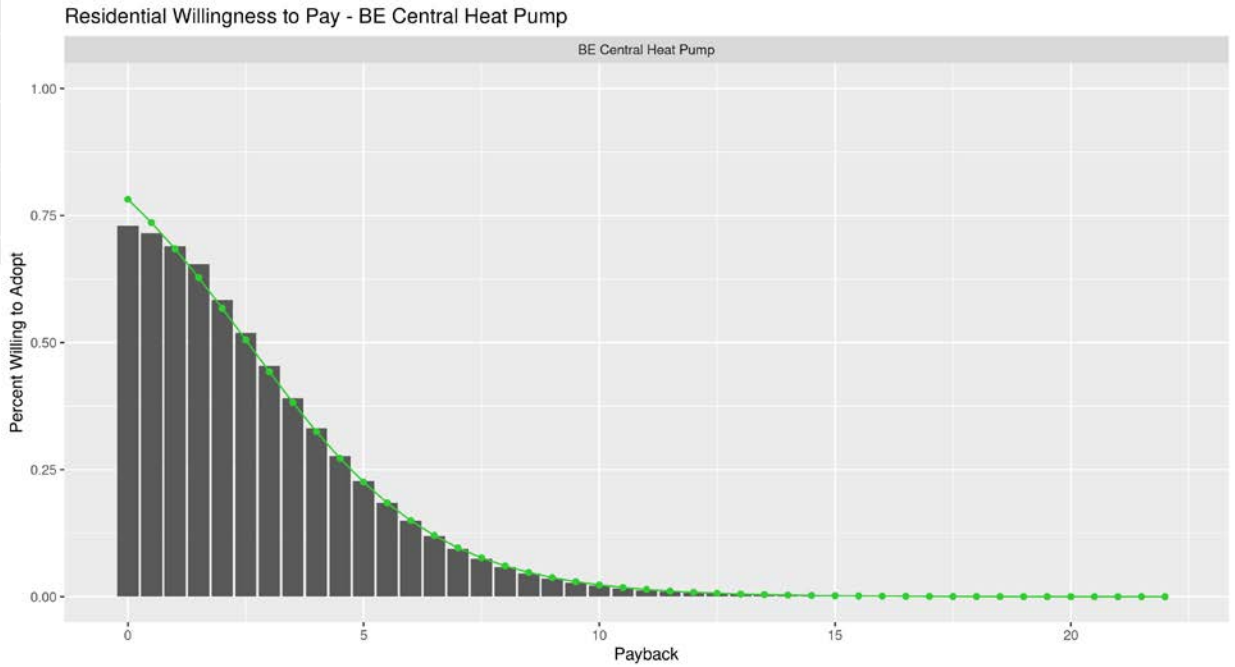


Draft Economic Potential Top 15 Residential Gas Measures



Beneficial Electrification: Willingness to adopt Curves for Heat Pumps (Primary Data Collection)





Beneficial Electrification: Willingness to adopt curve for Water Heaters (Primary Data Collection)