Minnesota Statewide Energy Efficiency and Carbon Saving Potential Study

Advisory Committee Meeting #4

Rochester Public Utilities
Rochester, MN

May 15, 2018, 10:30 am – 1:30 pm

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Agenda Overview

10:30	**Policy Discussion and Draft Recommendations** *(Carl Nelson)*
11:45	**Lunch**
12:00	**Lunch presentation** (*Kevin Bright, Destination Medical Center)*
12:30	**Economic Potential, Preliminary Results** *(Matt Socks)*
1:15	**Discussion of Program Sensitivity Analysis** *(Carl Nelson)*
1:30	**End**

POLICY DISCUSSION AND DRAFT RECOMMENDATIONS

Carl Nelson, Center for Energy and Environment

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Policy Discussion Agenda

- DSM Potential Study Policy Stakeholder Process Status Update
  - What we've done so far
  - Where we are today
  - Next steps
- Topic Areas for Policy Recommendations
- Initial Feedback from Advisory Committee

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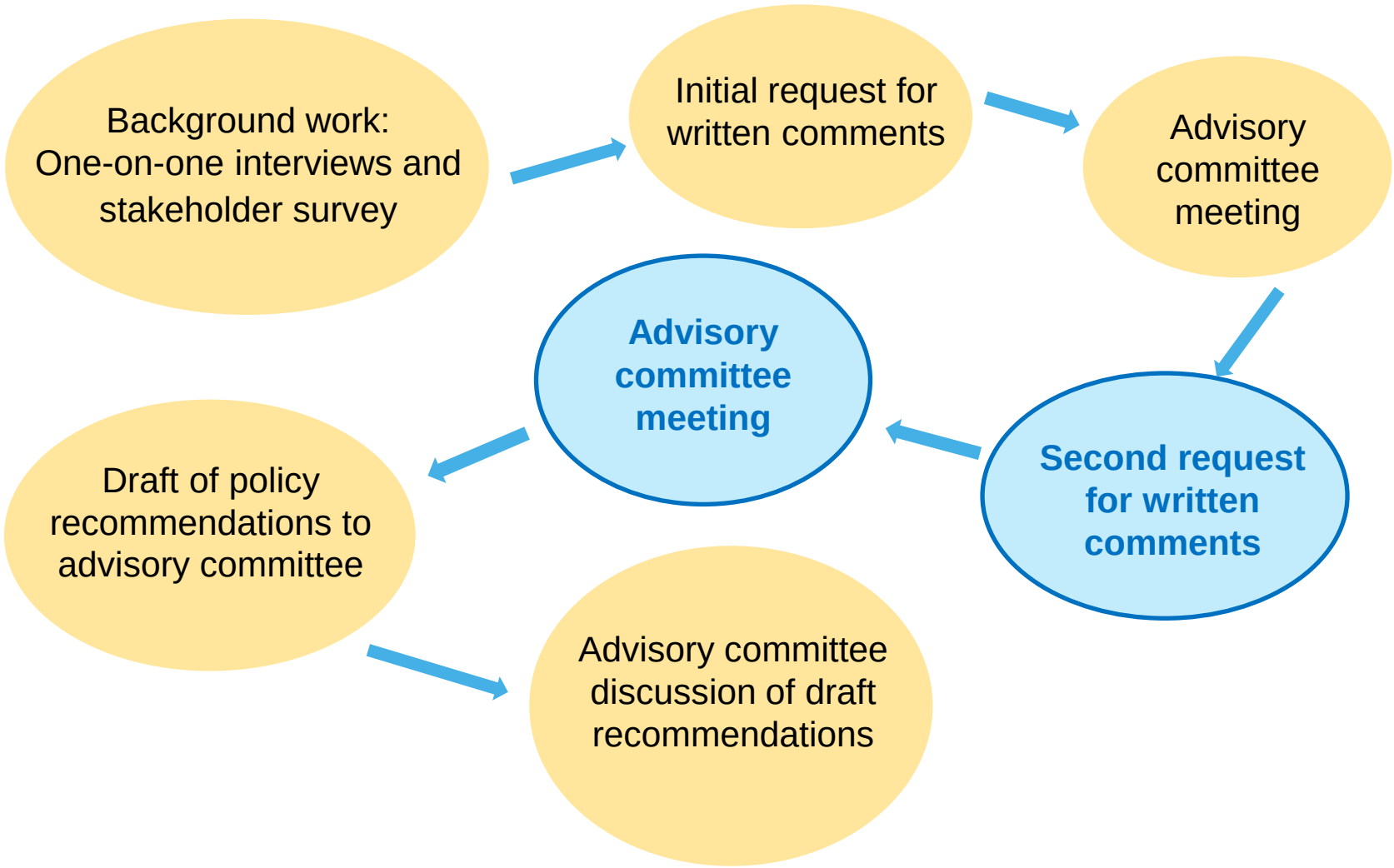
Stakeholder Process for Policy Section



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Round 2 Request for Written Comments

- Behavioral and Operational Programs
- Demand Response, Carbon Reductions, and Electrification in/outside of CIP
- Lifetime Benefits of Energy Savings
- Methods for Setting CIP Targets
- Counting Energy Savings for Changes to Codes and Standards
- (Bonus) DSM Potential Study Informing the IRP Process

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Policy Rec's: A Work in Progress

- We are still receiving and digesting responses from the second round of comments
- Today we will discuss our current thoughts on topic areas for policy recommendations and get your feedback
- We will bring interested advisory committee members together again to discuss draft policy recommendations
- Our goal is to come as close to consensus recommendations as possible

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Recommendation Topic #1

- Create a standing advisory committee of CIP stakeholders to provide input to Commerce on CIP policy/regulatory issues
- The advisory committee could begin by reviewing the following topics:
  - How best to maximize net benefits, such as recognizing the time value of energy savings (e.g. not all units of savings are equal)
  - How best to account for operational savings
  - How to account for code compliance toward CIP targets
- Stakeholder conversations on fuel-switching already planned

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Recommendation Topic #2

- Policy makers should review utility CIP savings targets and consider how to place greater emphasis on lifetime energy savings
  - Not a wholesale shift away from first year savings method currently in place
  - But something more than just reflecting lifetime savings in IOU financial incentives

Recommendation Topic #3

- For electric utilities serving primarily residential customers, approved annual CIP goals should better reflect the cost-effective energy efficiency potential available to a utility
  - Utility customer profiles play a significant role in the achievable potential savings
  - We expect the potential study will show a reduction in cost-effective electric efficiency potential for the residential sector
  - Unsure about how to do this yet

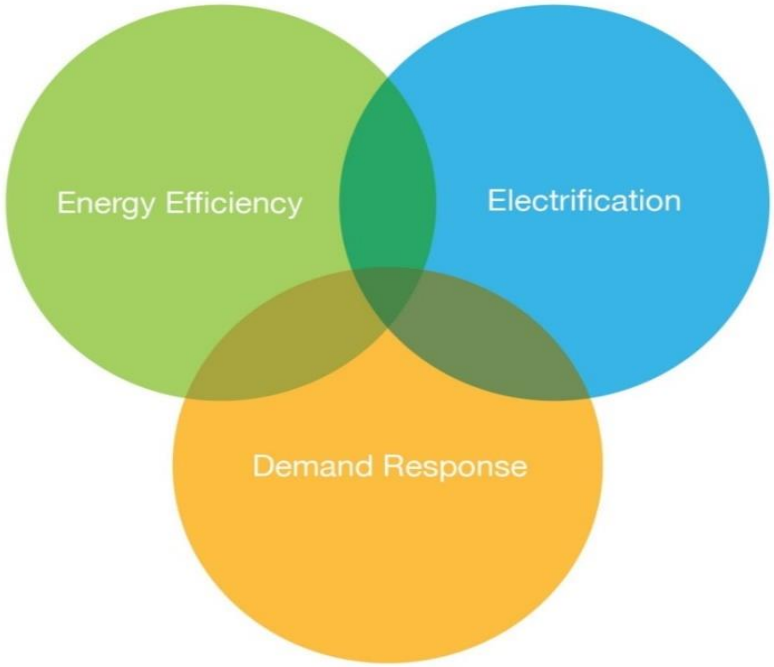
Before we get to Recommendation #4…

- We've had a lot of discussion of what activities belong "in CIP" … what does "in CIP" mean?
- "CIP" means different things to different stakeholders.
  - CIP is a regulatory framework overseen by Commerce
  - CIP is a tracker accounting and cost-recovery pathway
  - CIP is a portfolio of cost-effective customer-facing utility programs
  - CIP is the Energy Efficiency Resource Standard
    - i.e., the 1% -1.5% CIP goals and what counts toward those

Recommendation Topic #4

- Electrification and demand response utility programs could be incorporated into the CIP regulatory framework
  - Department regulatory oversight, tracker cost-recovery, etc.
- But these activities should be separate from the energy efficiency component of CIP, unless they cost-effectively reduce energy use
  - Separate metrics and criteria
- Significant number of issues to be worked through

Opportunities for Synergy



- Demand Response and Electrification are also customer-facing activities that can provide customer, system, and environmental benefits
- These activities may benefit from similar cost recovery and regulatory treatment as efficiency
- In addition, putting all three within the same regulatory framework may provide opportunities for synergy

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Advisory Committee Feedback

- What do you think – are we on the right track?
- If we were able to work through the details of these recommendations, would you see CIP as more beneficial to you?
- What are we missing?

LUNCH PRESENTATION:

KEVIN BRIGHT,
DESTINATION MEDICAL CENTER

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ECONOMIC POTENTIAL, DRAFT PRELIMINARY RESULTS

Carl Nelson, Center for Energy and Environment
Matt Socks, Optimal Energy

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Electric Avoided Costs

Data Sources

- Marginal energy (kWh) and generation capacity (MWh) avoided costs were provided by several utilities
  - Transmission and distribution (kW-yr) avoided costs were taken from the Department decision dated September 29, 2017 (Docket No. E999/CIP-16-541)

- None of the data extended to 2059, the final analysis year of this study

- All costs were provided in nominal USD

Electric Avoided Energy Costs

Load Periods

- Throughout our analysis of marginal energy avoided costs (kWh), we used standard load periods, described in the table below

Period	Period Definition
Summer On-Peak	June - August, weekdays 9 AM – 10 PM
Summer Off-Peak	June - August, weekdays 10 PM - 9 AM
Winter On-Peak	November - March, weekdays 8 AM - 10 PM
Winter Off-Peak	November - March, weekdays 10 PM - 8 AM
Shoulder On-Peak	April-May and September-October weekdays 7 AM – 11 PM; all weekend days 9 AM – 11 PM
Shoulder Off-Peak	April-May and September-October weekdays 11 PM - 7 AM; all weekend days 11 PM - 9 AM

Electric Avoided Energy Costs

- For avoided electric energy costs, we received data from Xcel, Otter Tail, Minnesota Power, GRE, SMMPA, and CMPAS
- Where possible, we used both the dollar values and time varying energy costs from each utility's hourly data
- If hourly forecast was not available, we used the load period allocation from the most similar utility available and adjusted the relative price level

Scenarios	Xcel	Otter Tail	Minnesota Power	North Coop	South Coop	North Muni	South Muni
Price Level From:	Xcel	Otter Tail	Minnesota Power	Otter Tail	GRE	SMMPA/CMPAS	SMMPA/CMPAS
Load Period Allocation From:	Xcel	Otter Tail	Minnesota Power	Otter Tail	GRE	Otter Tail	SMMPA/CMPAS

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Avoided Electric Generation Capacity Costs

- Where possible, we used avoided generation capacity costs specific to each utility
- For scenarios where we did not have high-quality primary data, we used a sales-weighted average of data from similar utilities.

Scenarios	Xcel	Otter Tail	Minnesota Power	North Coop	South Coop	North Muni	South Muni
Used Data From:	Xcel	Weighted Average	Minnesota Power	Weighted Average	Weighted Average	Weighted Average	Weighted Average

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Avoided Transmission and Distribution Costs

- Avoided T&D costs specified in a decision issued by the Department on September 29, 2017
  - Decision was based on joint avoided T&D cost study commissioned by the Department

- We used the values determined through the continuous valuation methodology

- Used weighted average of available data for coops and munis

Scenarios	Xcel	Otter Tail	Minnesota Power	North Coop	South Coop	North Muni	South Muni
Use Data From:	Xcel	Otter Tail	Minnesota Power	Weighted Average	Weighted Average	Weighted Average	Weighted Average

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Gas Avoided Cost Methodology

- Start with Department approved gas commodity cost ($/Mcf) from 2017-2019 inputs to BENCOST decision dated February 19, 2016
- Add avoided demand costs ($/Mcf/Year)
- Escalate DER value prices using escalation rate derived from EIA Annual Energy Outlook price forecast for Henry Hub spot prices through 2050
- For the years from 2050-2059, we estimate prices using the annual geometric growth rate between 2020 and 2050 as a proxy for the annual growth rate

Environmental Damage Factors

- We used electric ($/MWh) and gas ($/MCF) environmental damage factors calculated using the methodology employed in the Department's Inputs to BENCOST decision dated February 19, 2016.

- Updated environmental damage factors to reflect current values for the following inputs:
  - Emissions Rates (SO2, PM2.5, CO, etc)
  - Pollutant Costs ($/ton)
    - Most significant change was a result of the 1/3/18 PUC order that determined the Federal Social Cost of Carbon ($9.05 - $42.46) is the best representation of the costs associated with the emissions of carbon dioxide. We use the midpoint of this range ($25.76)

Economic Potential Defined

- ***Economic potential represents the total, cost-effective energy savings possible, without regard for customer willingness, or any other market barriers.***

- Cost-effectiveness determined with the **Societal Cost Test**

- Depending on the scope of the technical potential, typically significantly lower than technical potential

- Serves as a stepping stone to calculating achievable potential

Avoiding Double Counting

- ***We use a "winner take all" approach for economic potential***

- When measures are mutually exclusive, we assume 100% penetration of the highest saving, cost-effective measure
  - For example, the analysis includes three tiers of residential thermostats (Tiers 1, 2, 3). If Tier 3 were to fail the cost-effectiveness screening, but Tier 2 passed, the Tier 2 measure would be included in the analysis and all other thermostats excluded.

- When we model achievable potential scenarios, we will allocate achievable penetrations among all competing measures as appropriate based on assumptions about programs, barriers, customer preferences, etc.

Economic Potential Penetrations

- ***By definition, economic potential penetrations are 100% of the eligible, cost-effective market.***

- We provide the full 10 year technical potential for all markets
  - For retrofit (including early retirement) measures, penetrations spread evenly over 10 years (10%/year)
  - Approach better aligns economic potential with technical and achievable potential results

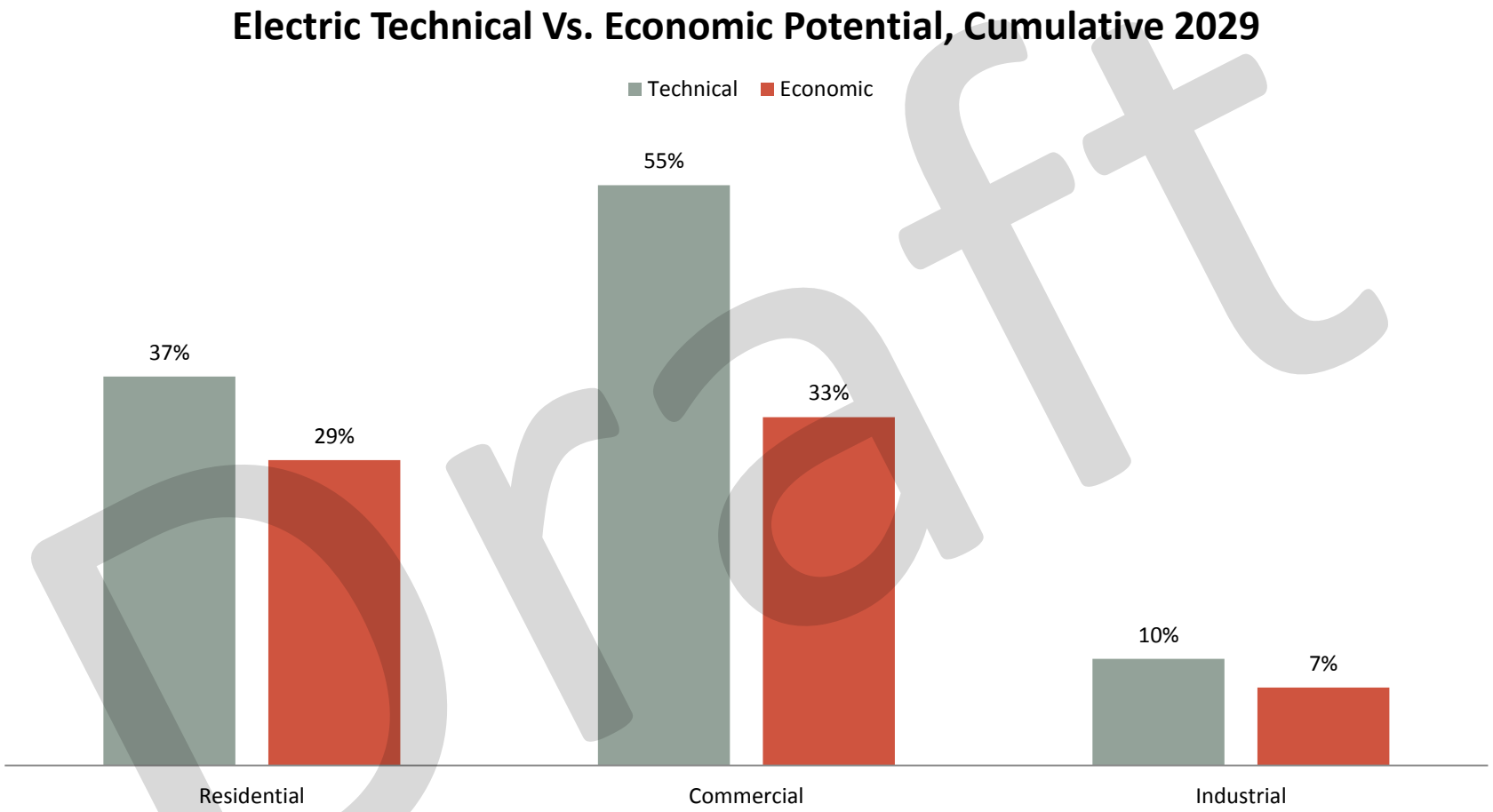
What we modeled

- ***Xcel electric territory model***
  - Integrated electric and gas study, so includes estimated gas sales within Xcel's electric service territory
  - After QA/QC we can then model individual utility scenarios

- The analysis includes:
  - Over 300 Separate technologies/measures
  - Three markets – retrofit, replacement, and new construction/renovation
  - 21 segments (6 for residential, 15 for C&I)
  - Total of 3,400 measure permutations

- Some additional measures will be added that have not been completed to reflect custom and commercial refrigeration opportunities

Economic Potential Results (DRAFT)



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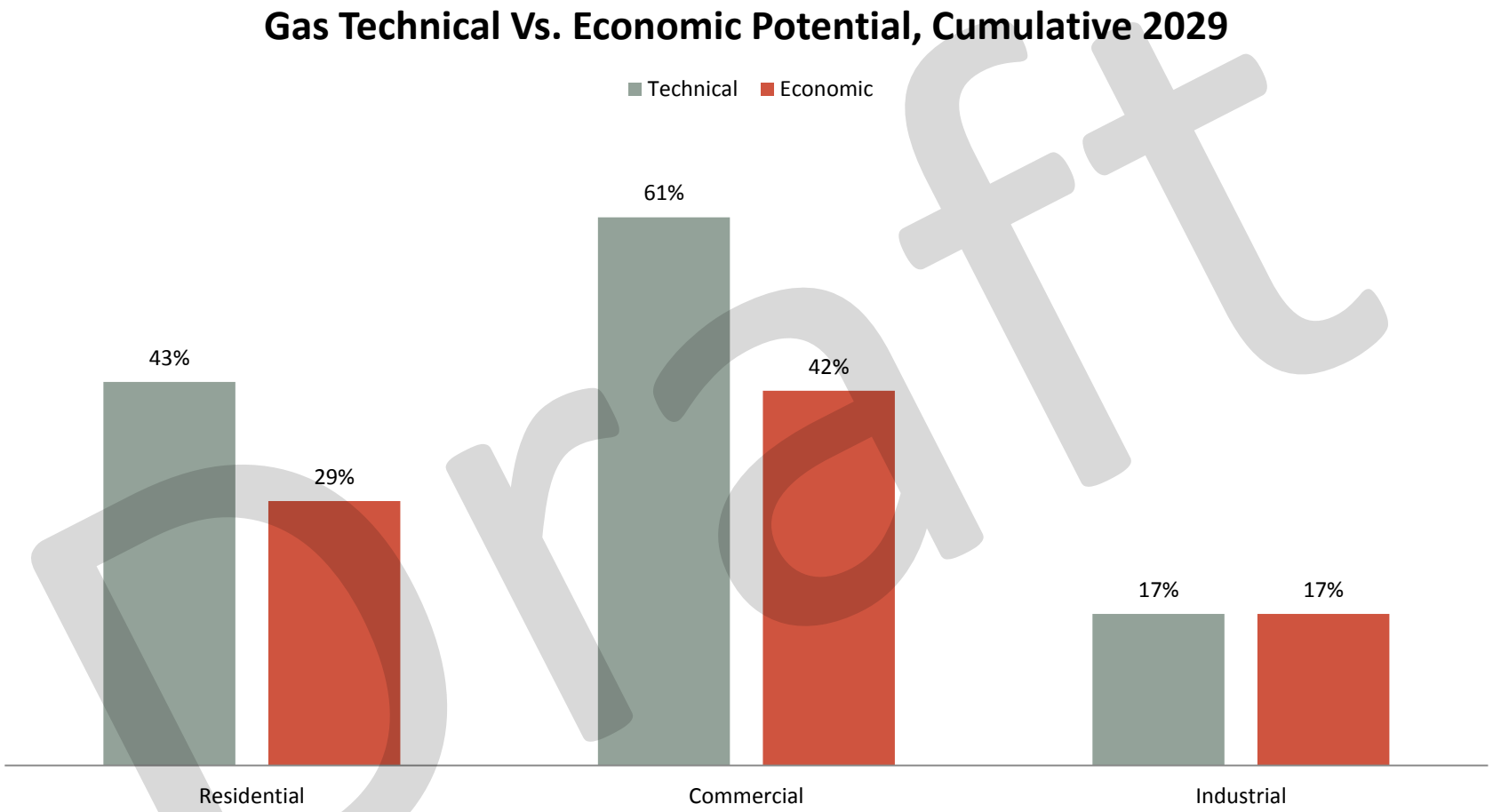
Economic Potential Results (DRAFT)



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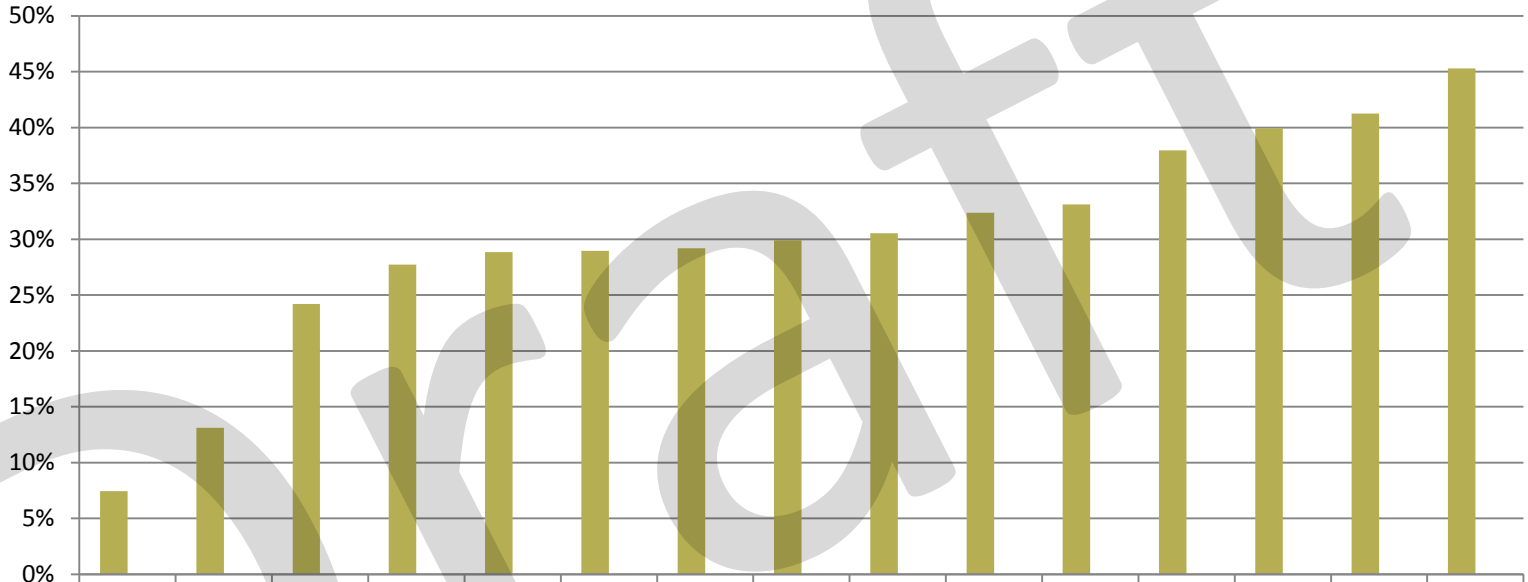
Economic Potential Results (DRAFT)

Commercial & Industrial Economic Electric Potential as a Percent of Total Segment Sales, Cumulative 2029



	Industrial	Agriculture	Street lighting	Lodging	Healthcare	Public Assembly	Small office	Education	Other commercial	Large office	Small retail	Large retail	Warehouse	Food service	Food sales
Savings % Total Segment Sales	7%	13%	24%	28%	29%	29%	29%	30%	31%	32%	33%	38%	40%	41%	45%
Segment Sales, % of Sector	38%	1%	1%	1%	14%	2%	7%	7%	2%	5%	4%	2%	2%	9%	5%

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Economic Potential Results (DRAFT)

Residential Economic Electric Potential as a Percent of Total Segment Sales, Cumulative 2029

	Multifamily (2-4 units)	LI Multifamily (2-4 units)	Single Family	LI Single Family	Multifamily (5+ units)	LI Multifamily (5+ units)
Savings % Total Segment Sales	23%	25%	29%	29%	31%	33%
Segment Sales, % of Sector	3%	2%	65%	11%	10%	9%

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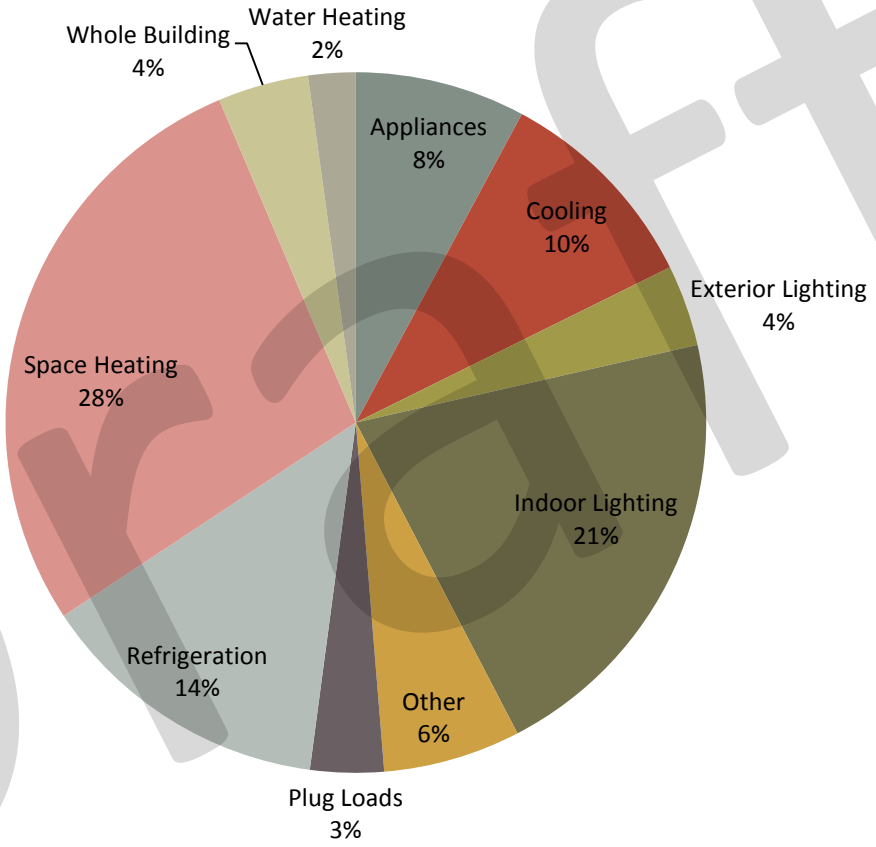
Economic Potential Results (DRAFT)

Residential Economic Electric Potential by End-Use, Cumulative 2029



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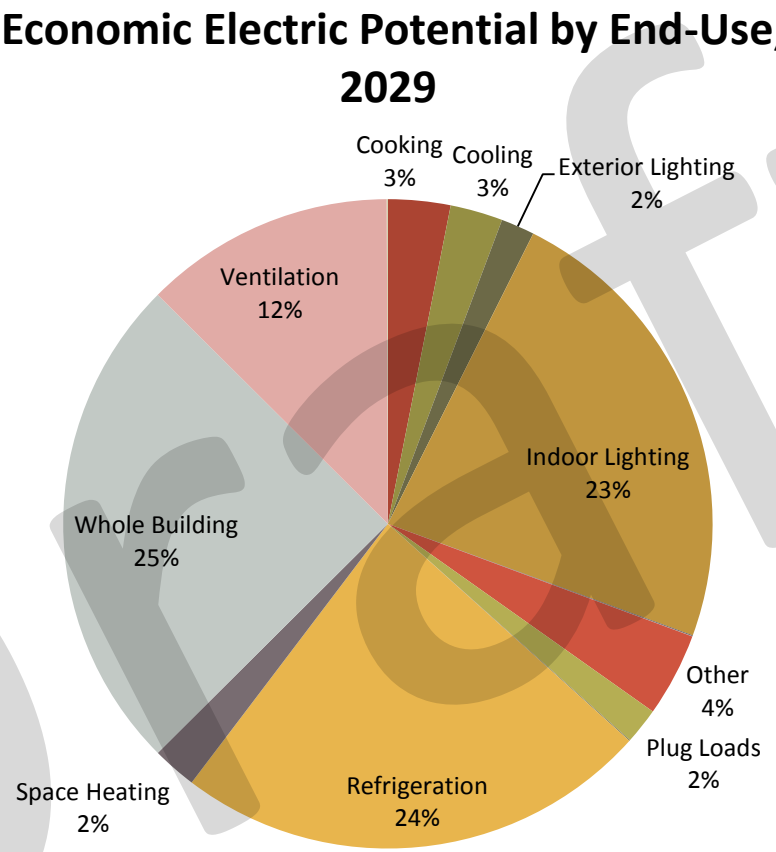
Economic Potential Results (DRAFT)



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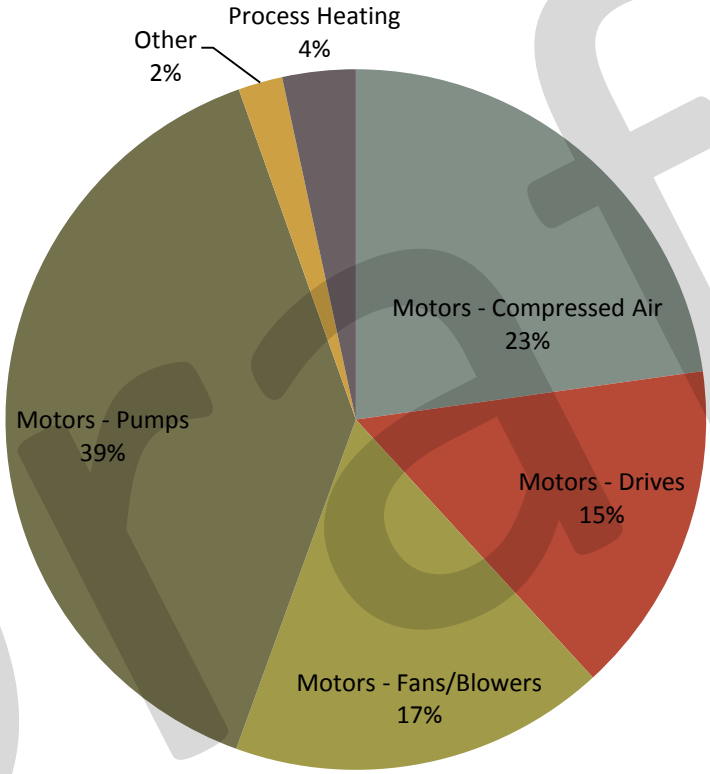
Economic Potential Results (DRAFT)

Industrial Economic Electric Potential by End-Use, Cumulative 2029



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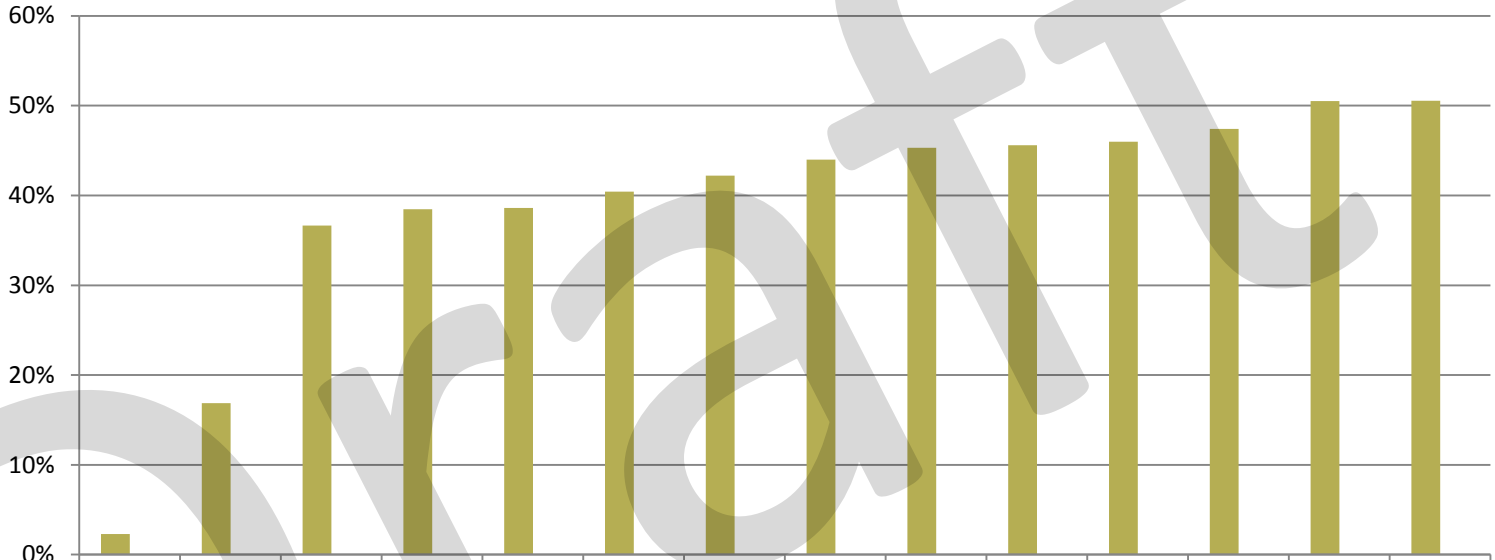
Economic Potential Results (DRAFT)

Commercial & Industrial Economic Gas Potential as a Percent of Total Segment Sales, Cumulative 2029



	Agriculture	Industrial	Small retail	Small office	Healthcare	Warehouse	Food service	Education	Other commercial	Large office	Lodging	Large retail	Food sales	Public Assembly
Savings % Total Segment Sales	2%	17%	37%	38%	39%	40%	42%	44%	45%	46%	46%	47%	51%	51%
Segment Sales, % of Sector	0%	49%	4%	4%	15%	1%	9%	5%	4%	2%	0%	1%	2%	2%

Savings % Total Segment Sales

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Economic Potential Results (DRAFT)

Residential Economic Gas Potential as a Percent of Total Segment Sales, Cumulative 2029

	Multifamily (2-4 units)	LI Multifamily (2-4 units)	Multifamily (5+ units)	LI Multifamily (5+ units)	Single Family	LI Single Family
Savings % Total Segment Sales	24%	25%	27%	28%	30%	32%
Segment Sales, % of Sector	3%	2%	6%	5%	73%	12%

Savings % Total Segment Sales

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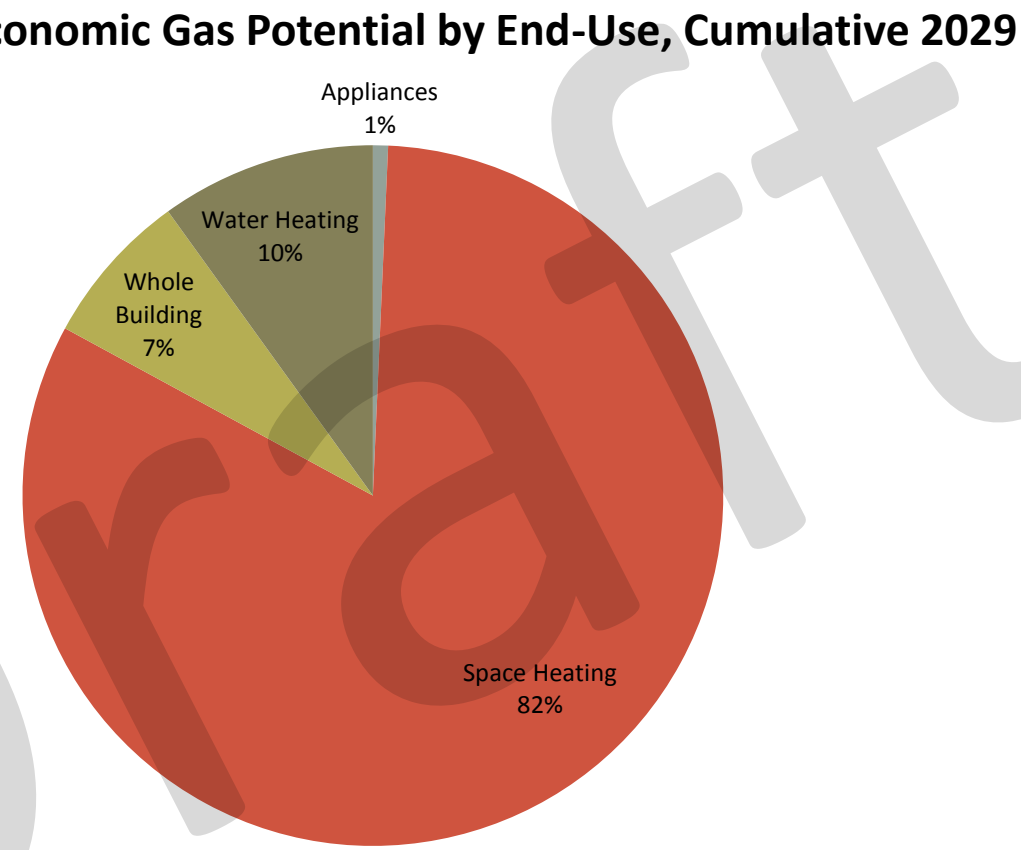
Economic Potential Results (DRAFT)



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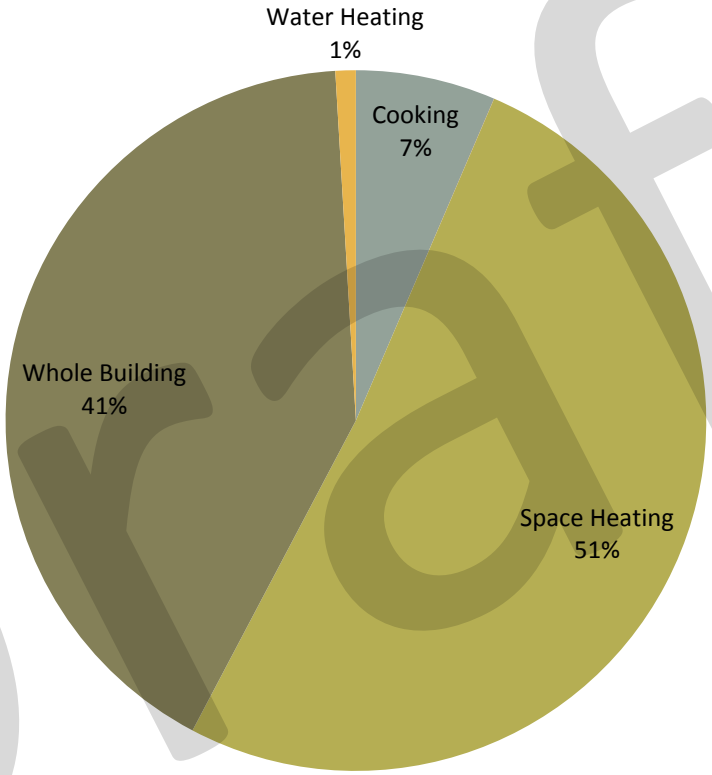

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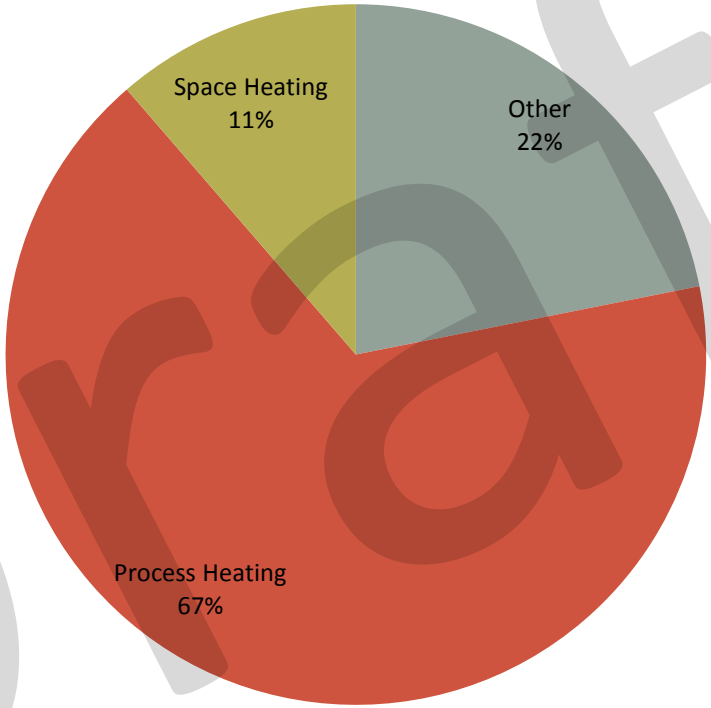
Economic Potential Results (DRAFT)

Industrial Economic Gas Potential by End-Use, Cumulative 2029



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Data Available for Review (DRAFT)

												Societal Cost Test			
Meas#	Links With	#	Measure Name	nary Fuel	lude in Calc's	Program	Measure ID1 ctor	Building Type /Segment	Primary Fuel End Use	Market (e.g., RET, NC, RENO PL)		Societal Benefits	Societal Costs	Societal Net Benefits	Societal BCR
33	256	259	DMSHP Rep ElecH,AC (Heat)	E	P	RRepl	Res	Multifamily (2-4 units)	Space Heating	REPL		$ 1,101,378	$ 558,963	$ 542,414	1.97
34	N/A	260	ECM Circulators - DHW	E	P	RNC	Res	Multifamily (2-4 units)	Other	NC		$ 24,561	$ 7,357	$ 17,204	3.34
34	N/A	261	ECM Circulators - DHW	E	P	RRepl	Res	Multifamily (2-4 units)	Other	REPL		$ 92,960	$ 27,846	$ 65,114	3.34
36	N/A	262	ECM Circulators - HW	E	P	RNC	Res	Multifamily (2-4 units)	Other	NC		$ 30,054	$ 11,398	$ 18,656	2.64
36	N/A	263	ECM Circulators - HW	E	P	RRepl	Res	Multifamily (2-4 units)	Other	REPL		$ 113,748	$ 43,139	$ 70,609	2.64
37	N/A	264	ECM Blower Motor	E	M	RRet	Res	Multifamily (2-4 units)	Ventilation	RET		$ 2,693,159	$ 3,104,552	$ (411,393)	0.87
38	266	265	Duct Sealing, E (Cool)	E	P	RRet	Res	Multifamily (2-4 units)	Cooling	RET		$ 225,294	$ -	$ 225,294	9,999.00
39	265	266	Duct Sealing, E (Heat)	E	P	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 21,421	$ 27,999	$ (6,579)	0.77
40	268	267	Duct Sealing, G (Cool)	E	P	RRet	Res	Multifamily (2-4 units)	Cooling	RET		$ 11,880,522	$ -	$ 11,880,522	9,999.00
41	267	268	Duct Sealing, G (Heat)	G	P	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 354,972	$ 1,322,160	$ (967,188)	0.27
42	356	269	Wall Insulation, Ext - Heat	G	P	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 12,566,254	$ 17,804,355	$ (5,238,101)	0.71
43	357	270	Wall Insulation, Int - Heat	G	M	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 12,261,737	$ 29,782,120	$ (17,520,383)	0.41
44	358	271	Attic Insulation - Heat	G	P	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 17,602,941	$ 23,820,684	$ (6,217,743)	0.74
45	N/A	272	Air Sealing	G	M	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 22,638,792	$ 32,550,572	$ (9,911,780)	0.70
47	N/A	273	Furnace (90-94)	G	P	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 13,347,677	$ 12,507,298	$ 840,379	1.07
47	N/A	274	Furnace (90-94)	G	P	RRepl	Res	Multifamily (2-4 units)	Space Heating	REPL		$ 565,912	$ 258,078	$ 307,834	2.19
49	N/A	275	Furnace (94)	G	M	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 16,006,761	$ 17,842,962	$ (1,836,201)	0.90
49	N/A	276	Furnace (94)	G	P	RRepl	Res	Multifamily (2-4 units)	Space Heating	REPL		$ 1,070,612	$ 491,999	$ 578,613	2.18
53	N/A	277	Boiler (84-90)	G	M	RNC	Res	Multifamily (2-4 units)	Space Heating	NC		$ 55,022	$ 66,533	$ (11,510)	0.83
53	N/A	278	Boiler (84-90)	G	M	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 2,654,742	$ 6,491,087	$ (3,836,345)	0.41
53	N/A	279	Boiler (84-90)	G	M	RRepl	Res	Multifamily (2-4 units)	Space Heating	REPL		$ 159,348	$ 192,682	$ (33,334)	0.83
54	N/A	280	Boiler (90)	G	P	RNC	Res	Multifamily (2-4 units)	Space Heating	NC		$ 147,692	$ 75,463	$ 72,229	1.96
54	N/A	281	Boiler (90)	G	P	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 7,125,886	$ 5,869,652	$ 1,256,234	1.21
54	N/A	282	Boiler (90)	G	P	RRepl	Res	Multifamily (2-4 units)	Space Heating	REPL		$ 427,724	$ 218,546	$ 209,179	1.96
56	N/A	283	Furnace Tune Up	G	M	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 317,846	$ 3,495,415	$ (3,177,569)	0.09
57	N/A	284	Boiler Tune Up	G	M	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 146,366	$ 1,609,616	$ (1,463,250)	0.09
59	285	285	Tier 1 Tstat, E - Heat	E	P	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 157,929	$ 22,238	$ 135,691	7.10
60	N/A	286	Tier 1 Tstat, G	G	P	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 3,213,566	$ 634,297	$ 2,579,269	5.07
62	287	287	Tier 2 Tstat, E - Heat	E	M	RNC	Res	Multifamily (2-4 units)	Space Heating	NC		$ 540	$ 2,857	$ (2,318)	0.19
62	288	288	Tier 2 Tstat, E - Heat	E	P	RRet	Res	Multifamily (2-4 units)	Space Heating	RET		$ 296,148	$ 157,536	$ 138,611	1.88

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PROGRAM SENSITIVITY ANALYSIS

Matt Socks, Optimal Energy

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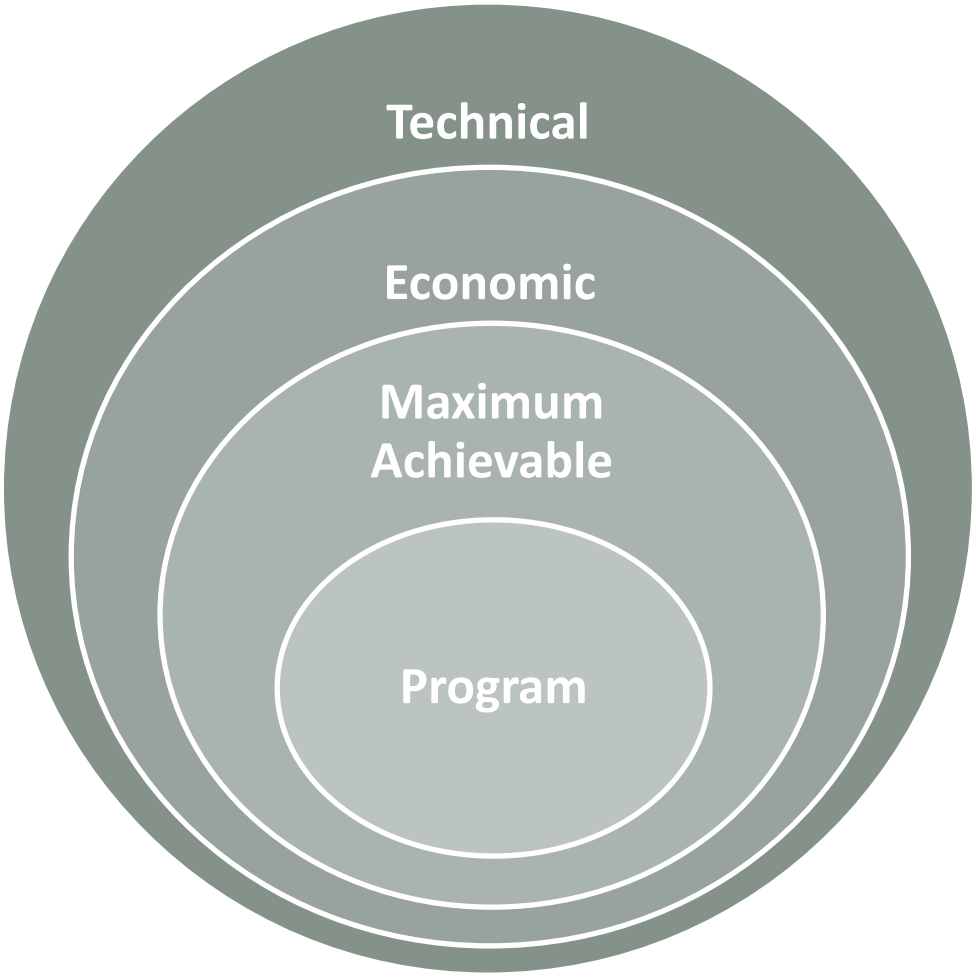
Program Potential: The Next Step



- After economic potential, calculating program potential as a subset of economic potential is the next step
- "Maximum Achievable Program Potential" will be the baseline model run for program potential:
  - Rebates set at 100% of incremental cost
  - Market penetration (for individual measures) is assumed to be the highest that is possible to achieve

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Program Potential Sensitivity Run

- This represents a subset of “maximum achievable potential”, given a set of constraints to achieving this theoretical level

- What should those constraints be?

Options for Program Potential

- Reduce the incentive levels
- Constrain the overall budget
- Constrain the overall savings target

(only budgeted to do one of these scenarios)

Option 1: Reduce incentive level

- Reduce the incentive level for capital projects from 100% of incremental cost, to 50% of incremental cost
  - Market penetration would decrease
  - Costs would also decrease

Option 2: Constrain the budget

- Hold the budget at the average of last 3 years (2015-2017) of actual spending
  - Savings level is then how much savings could be achieved at that level of spending

Option 3: Constrain the savings target

- Set the savings at 1.5% (or, whatever level is cost-effective that is less than 1.5%)
  - Spending levels and net benefits are then calculated for this level of savings
  - Would help to answer the question of how much it might cost utilities to achieve their statutory goals

Feedback?

- Which of these scenarios would be the most useful?

- Project team will need to finalize which scenario to use over the next 2-3 weeks

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Next Steps

- Model maximum achievable and program potential
- Incorporate Stakeholder Review
- Refine Policy Recommendations
- Final Advisory Committee Meeting (July)
  - Plan to send draft report to Advisory Committee members in advance of meeting

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Thank you!

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