

CADMUS



Energy Efficiency Potential Study Draft Results Meeting

April 29, 2021

Webinar Logistics & Guidelines



All parties except presenter muted to avoid unnecessary noise distraction

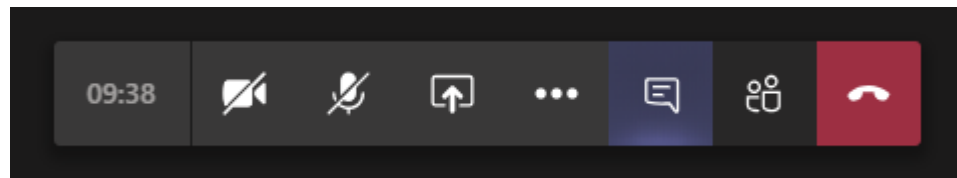


If you have an immediate question, or audio or video is poor please send an instant message to the moderator



We will stop today's presentation several times to take questions

Your Settings



Agenda

1

Recap on Potential and Methods

- Definitions of potential
 - High-level recap of methods
-

2

Technical Potential Draft Results

- Draft results across sectors
 - Comparison to 2017 study
 - Drivers of change
-

3

Economic Potential Draft Results

- Draft results across sectors
 - Comparison to 2017 study
 - Drivers of change
-

4

Ramp Rate Sub-Group Results

- Refresher on ramp rate expert engagement
 - Stakeholder engagement results
 - Changes made on ramp rates
-

5

Optimized & Current Policy Potential Draft Results

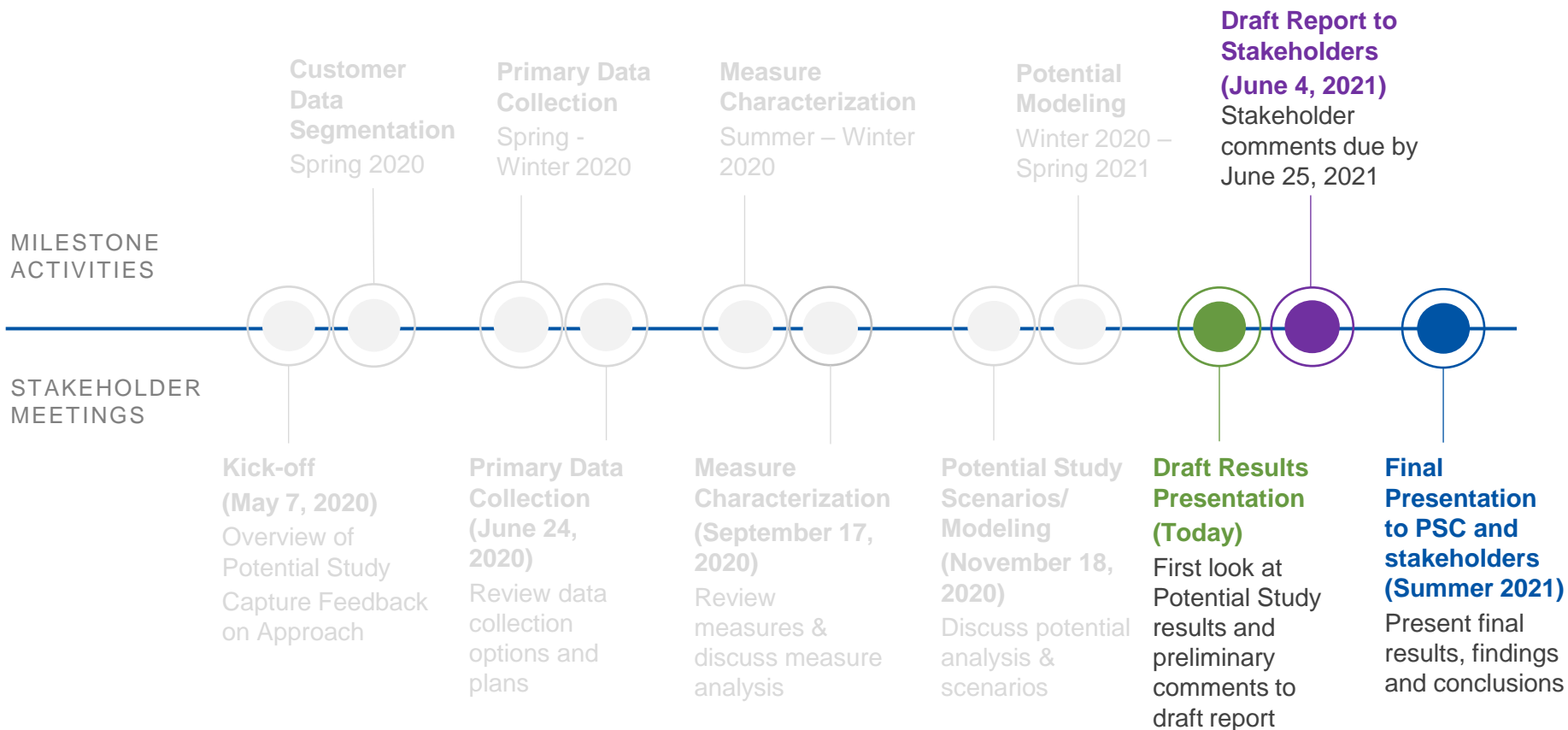
- Draft results across sectors
 - Comparison to 2017 study
 - Drivers of change
-

6

Scenario Draft Results

- Draft results across sectors

Timeline of Milestones and Meetings



Report Structure

1st Draft Report will include:

Executive Summary
Potential Study Approach
Technical and Economic Potential Results
 Cross-Sector Overview of Results
 Residential Sector Results
 Commercial and Government Sector Results
 Industrial Sector Results
 Agricultural Sector Results
Optimized and Current Policy Potential
 Maximum Adoption
 Ramp Rates
 Optimized Potential by Scenario
 Scenario Analysis and Results
Potential Benchmarking
Conclusions and Recommendations

Will include
Income-
Qualified
Results and
Barriers
Discussion



2nd Draft Report will add on:

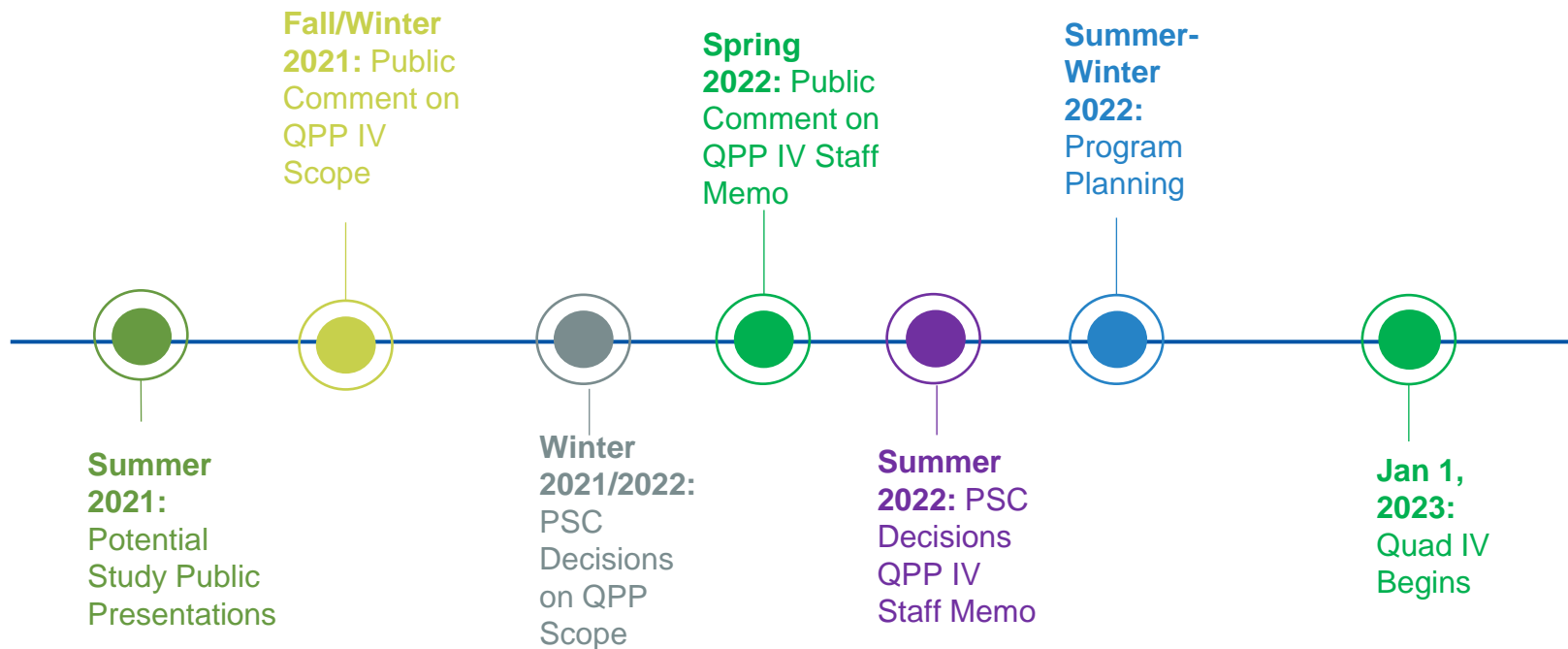
Appendices

- Analysis Methodology
- Survey and Site Visit Findings
- Baseline Data
- Detailed Assumptions and Energy Efficiency Potential
- Detailed Results from Scenario Analysis
- Industrial Expert Interview Findings
- Community Action Partner Stakeholder Interview Findings
- Benchmarking Sources
- Sector Survey Instruments
- Industrial Expert Interview Guide
- Community Action Partner Stakeholder Interview Guide

Potential Study Integration With Program Planning



Potential Study and Stakeholder Engagement 1st Step in multi-year Quadrennial IV Planning Process (QPP IV), PSC Docket 5-FE-104



Types of Potential Estimated

Not Technically Feasible	Technical Theoretical maximum energy that can be displaced by efficiency			
Not Technically Feasible	Not Cost-Effective	Economic Economically cost-effective compared to supply side alternatives		
Not Technically Feasible	Not Cost-Effective	Market Barriers	Optimized Accounts for real-world barriers and non-measure costs of delivering programs	
Not Technically Feasible	Not Cost-Effective	Market Barriers	Budget Constraints	Current Policy Constrained to Focus budget and balance of ratepayer funding

Potential Study does not provide program targets

Program targets developed through comprehensive quad planning process

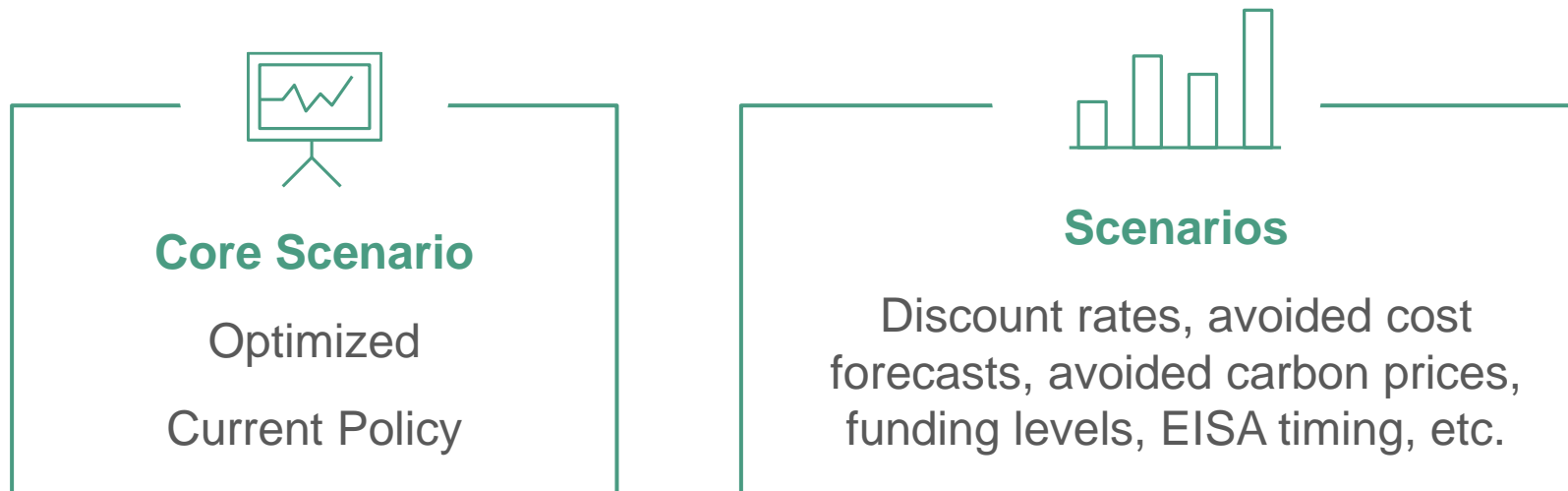
Reminder of Primary Reporting

Optimized potential is the cost-effective EE savings attainable without implementation constraints (analogous to maximum achievable potential from 2017)

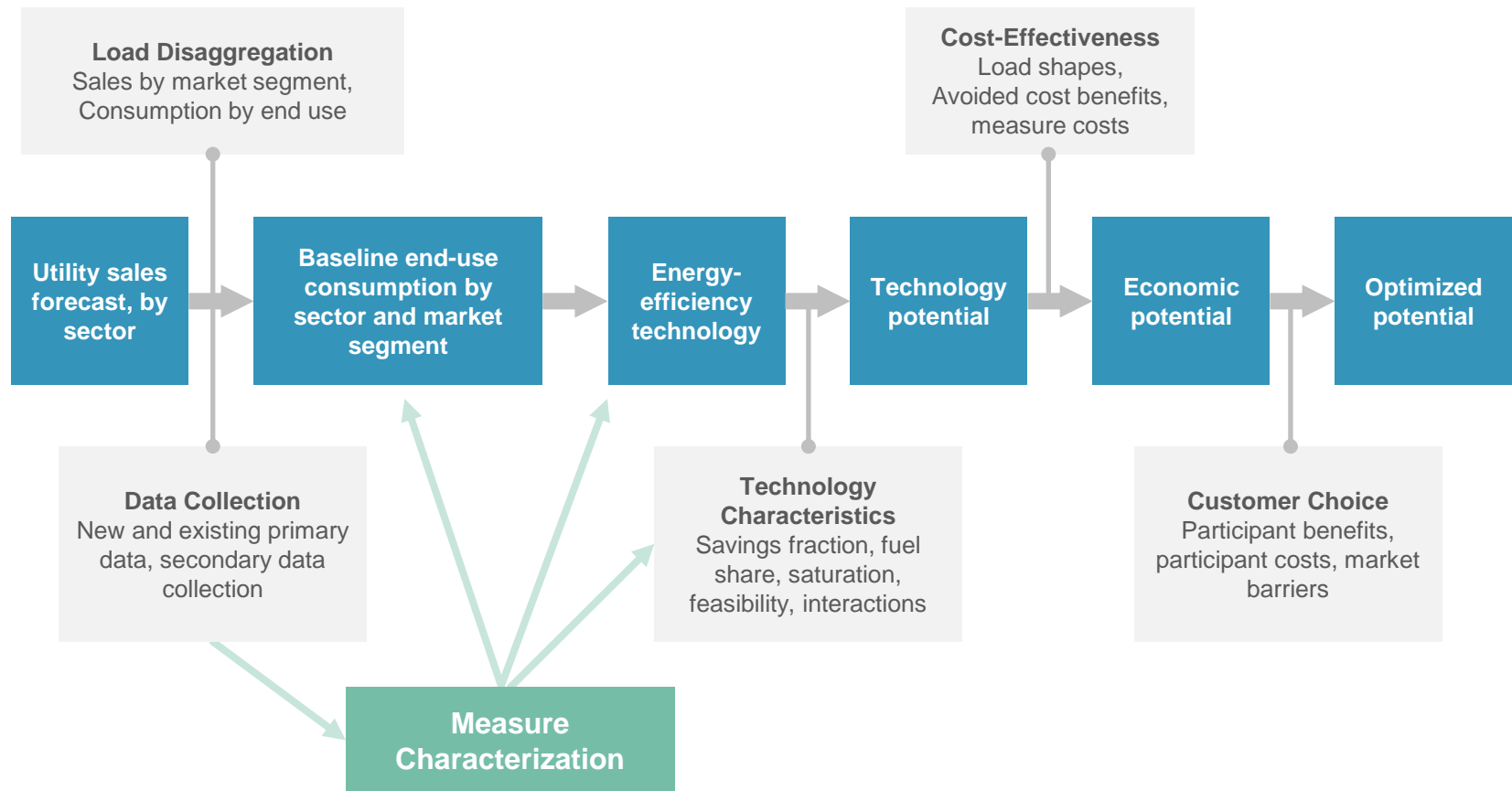
Current policy potential will be a subset of optimized potential, constrained by annual budget amounts, based on current Focus on Energy funding levels.

Core Potential Scenarios

12-Year Study Horizon (2023 – 2034) with focus on Quad IV (2023 – 2026)



Methodology Overview





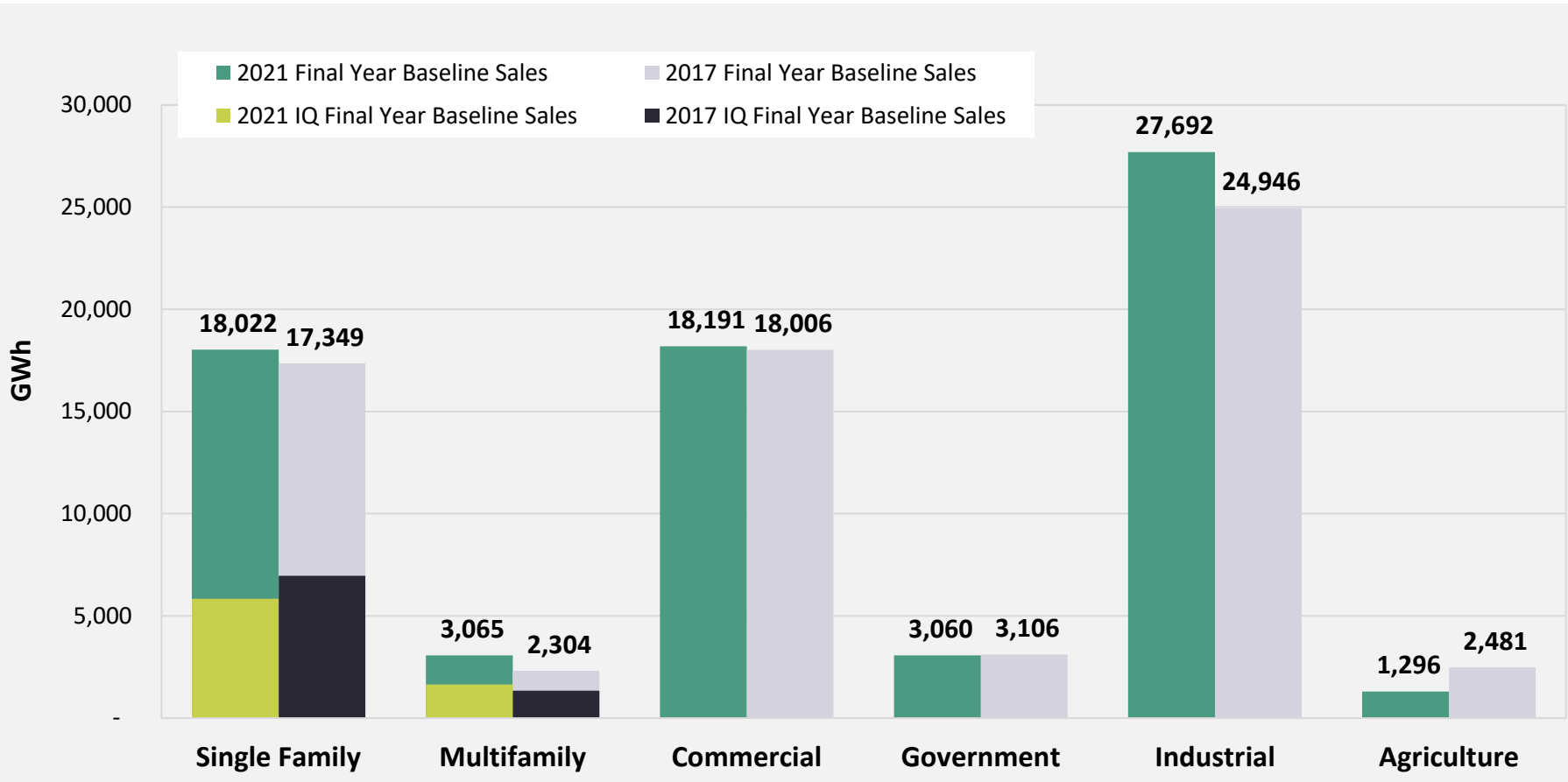
2. Technical Potential Draft Results

Draft Sector Level Final Year Baseline Sales

Electric Final Year Baseline Sales

2021 Study: 71,325 GWh (in 2034)

2017 Study: 68,192 GWh (in 2030)

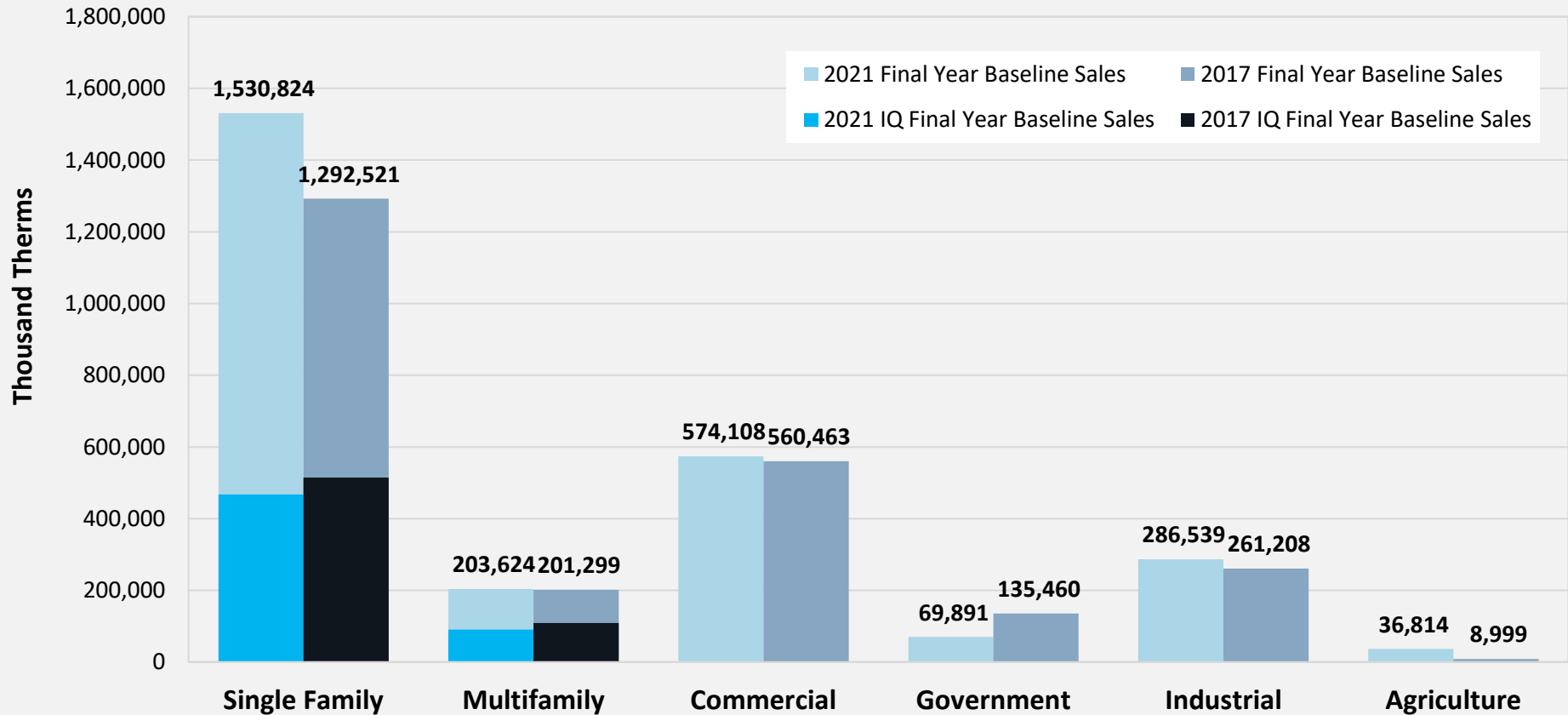


Draft Sector Level Final Year Baseline Sales

Natural Gas Final Year Baseline Sales

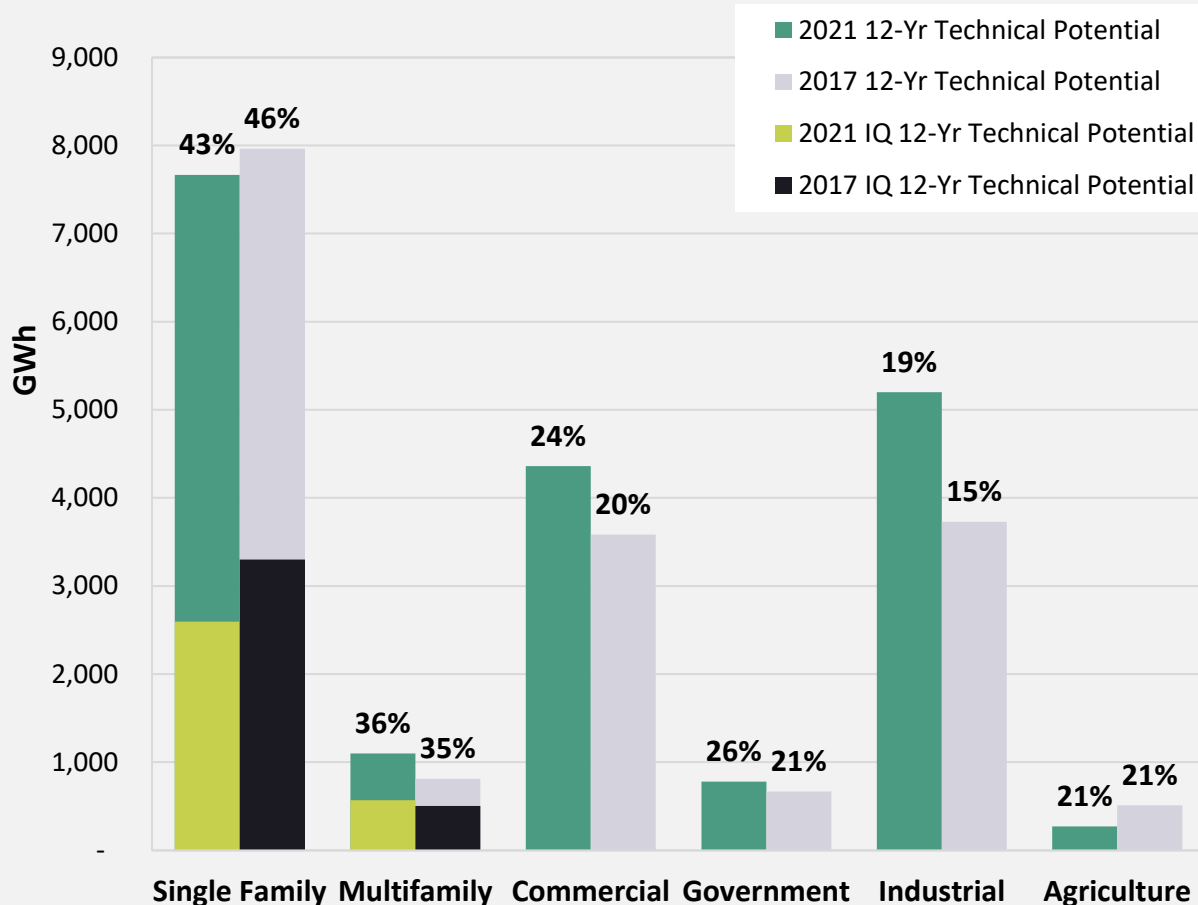
2021 Study: 2,701,800 Thousand Therms (in 2034)

2017 Study: 2,459,950 Thousand Therms (in 2030)



Draft Sector Level Electric Technical Potential

Percentages indicate 12-Year Cumulative, Technical Potential as a Percentage of Final Year Baseline Sales



12-Year Cumulative Technical Potential Relative to Baseline

2021: 27%

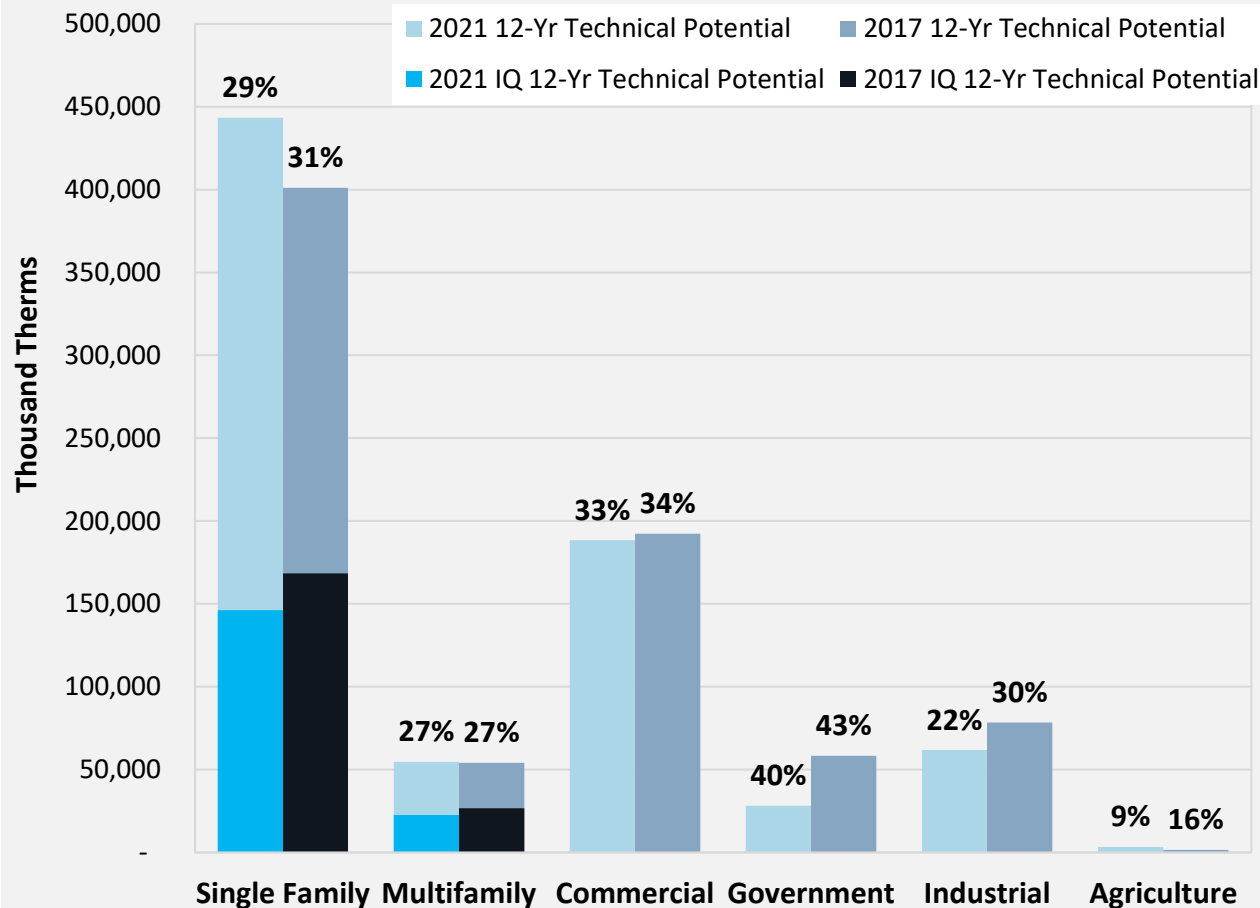
2017: 25%

Key Changes

- Updated fuel shares saturations with 2020 survey data
- Updated timing of commercial screw base lighting phase out
- Updated phase out timing and LED saturation of residential lighting
- Updated industrial data sources and end use savings percentages to align with recent program achievements

Draft Sector Level Gas Technical Potential

Percentages indicate 12-Year Cumulative, Technical Potential as a Percentage of Final Year Baseline Sales



12-Year Cumulative Technical Potential Relative to Baseline

2021: 29% 2017: 32%

Key Changes

- Updated fuel share and saturation data based on most recent survey data
- Primary data collection of fuel shares found lower natural gas commercial and government heating equipment compared to prior study
- Updated industrial data sources and improved outlier screening methodology for industrial survey data

The Floor is Open – Feedback Welcome!



Questions/Comments?

- Technical potential draft results
- Comparison to previous study
- Drivers of change
- Other questions or comments?



Please add your questions to the meeting chat: we will address questions in the order that they are received & provide opportunity for clarification

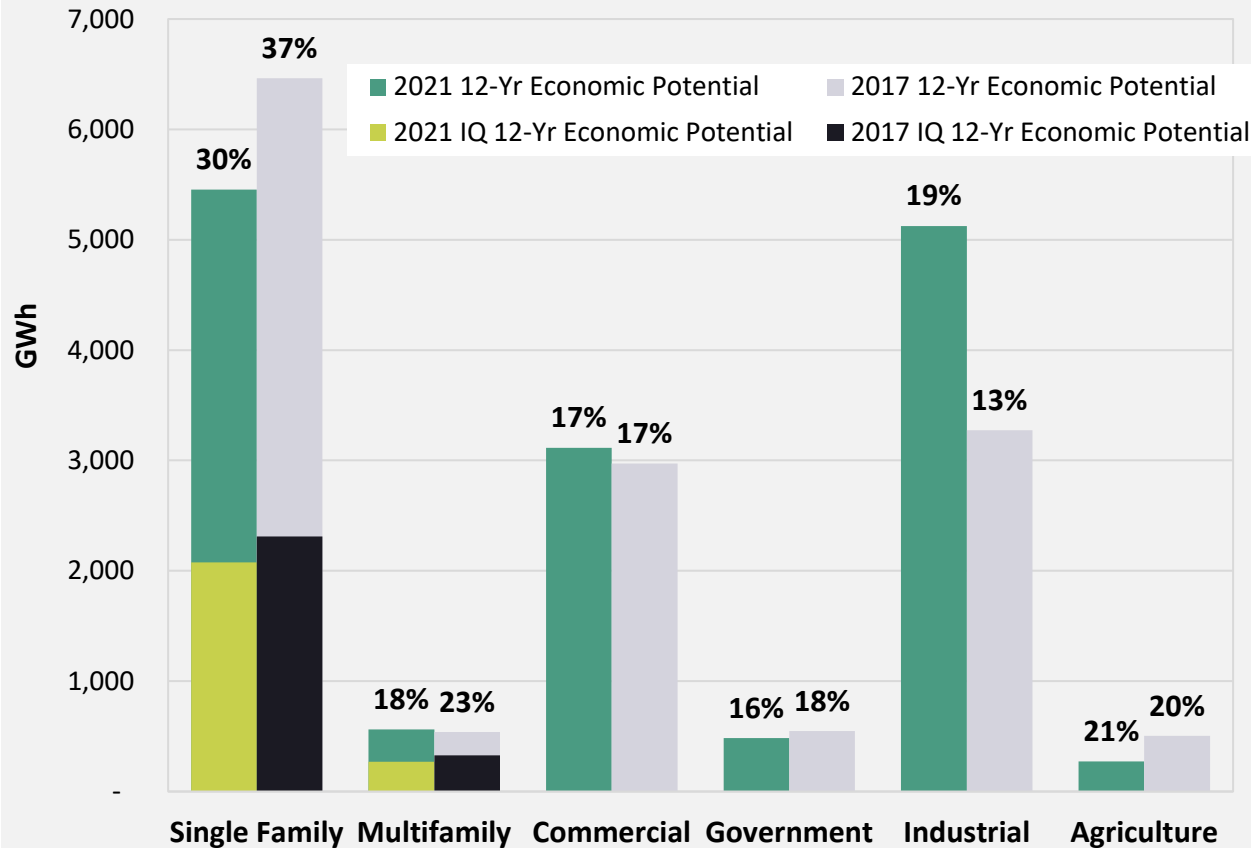
Please remain muted until your question is announced



3. Economic Potential Draft Results

Draft Sector Level Electric Economic Potential

Percentages indicate 12-Year Cumulative, Economic Potential as a Percentage of Final Year Baseline Sales



12-Year Cumulative Economic Potential Relative to Baseline

2021: 21% 2017: 21%

Proportion of 12-Year Technical Potential that is Economic

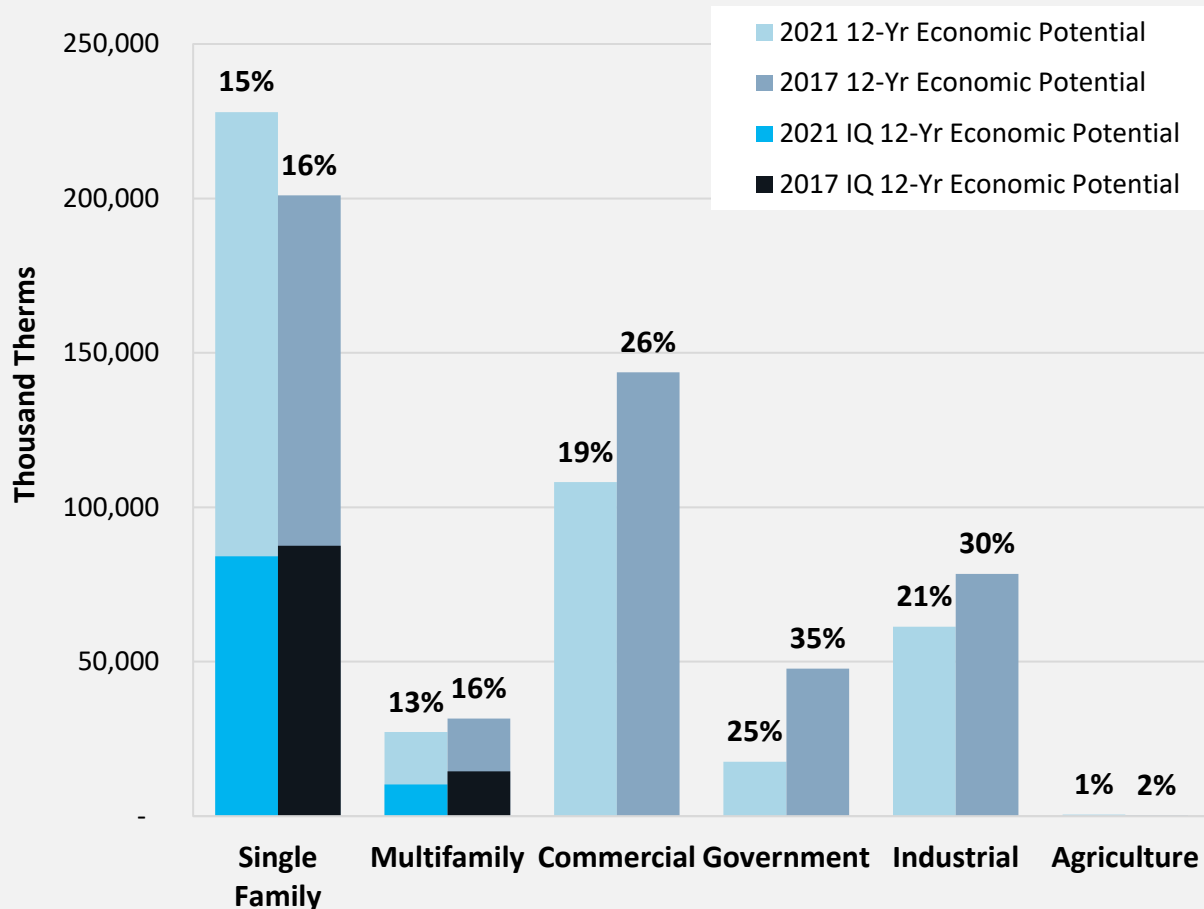
2021: 77% 2017: 83%

Key Changes

Avoided energy costs 30% lower than in 2017, resulting in fewer measures being cost-effective

Draft Sector Level Gas Economic Potential

Percentages indicate 12-Year Cumulative, Economic Potential as a Percentage of Final Year Baseline Sales



12-Year Cumulative Economic Potential Relative to Baseline

2021: 16% 2017: 20%

Proportion of 12-Year Technical Potential that is Economic

2021: 57% 2017: 64%

Key Changes

- Avoided energy costs 30% lower than in 2017, resulting in fewer measures being cost-effective
- Many large saving measures are on the borderline of being cost-effective

Borderline Cost-Effective Measures

Borderline: Measures with a modified TRC ratio of **less than 1** but **greater than 0.75**

Electric

Residential TLED
Fluorescent Lamps

Residential Advanced
Entertainment Power
Strip

Commercial Advanced
Rooftop Unit Controller

Commercial Floating
Condenser Head Pressure
Controls

Natural Gas

Residential Basement Wall
Insulation

Residential Infiltration Control

Residential Air-to-Air Heat
Exchanger

Residential Wall Insulation

Residential Rim And Band Joist
Insulation

Residential & Commercial
Re-Commissioning

Commercial Automated
Ventilation VFD Controller

Commercial Direct Digital
Control System

Commercial Integrated
Space and Water Heating

Commercial Energy Star
Most Efficient Furnace

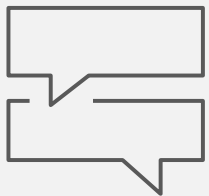
Agriculture Efficient Natural
Gas Grain Dryer

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4. Ramp Rate Sub-Group Results

Ramp Rate Review Process

STEP 1 Cadmus...

Assigned individual potential study measures to specific technology groups.

Reviewed available market data and historical Focus on Energy program performance data.

Made initial assignments of ramp rates based on our review and summary of these data.

STEP 2 Experts...

Reviewed assigned technology groups in a provided workbook.

Reviewed preliminary measure group ramp rates assigned by Cadmus to technology groups.

Provided expert feedback on reasonableness and appropriateness and suggest changes to Cadmus, if necessary.

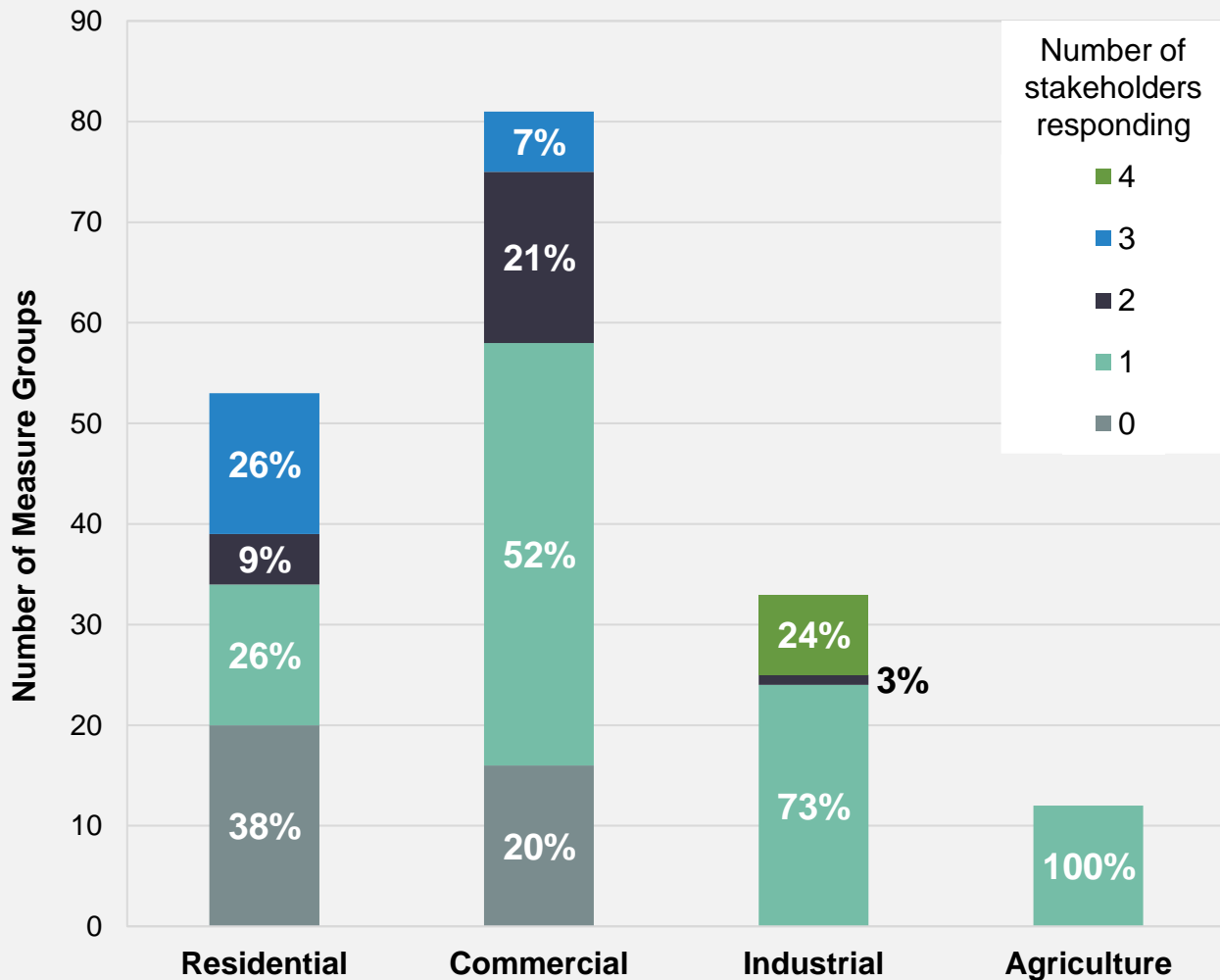
STEP 3 Cadmus...

Reviewed all feedback.

Summarized comments, feedback, recommended changes, and other suggestions.

Consulted with PSC on proposed changes to preliminary ramp rates based on expert input.

Ramp Rate Sub-Group Response Rate



Requested from:
31 Experts

Received from:
25 Experts

Experts were identified based on experience in the energy industry and technology subgroup knowledge

Ramp Rate Adjustments



Increased Speed of Ramp Rate

- Residential Advanced Power Strips
- Residential Electronics
- Residential EV Chargers
- Residential Tune Ups
- Commercial Computers, Servers, IT Systems, and Data Centers
- Commercial Display Case LED, Control, and Cover
- Commercial New Construction Lighting
- Commercial Office Equipment
- Commercial Plug Load Energy Reduction
- Commercial Refrigerator Measures



Decreased Speed of Ramp Rate

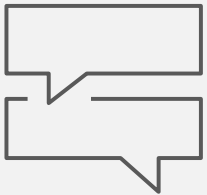
- Residential Indirect Water Heat
- Residential Showerheads
- Residential & Commercial Boilers
- Residential & Commercial Furnaces
- Commercial Chillers
- Commercial Cool/Green Roofs
- Commercial Efficient Windows
- Commercial Fan Motors
- Commercial Lighting Controls
- Commercial Solar Assisted Water Heaters
- Industrial Behavioral Measures
- Industrial Process Water Reduction

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Questions/Comments?

- Ramp rate results
- Other questions or comments?



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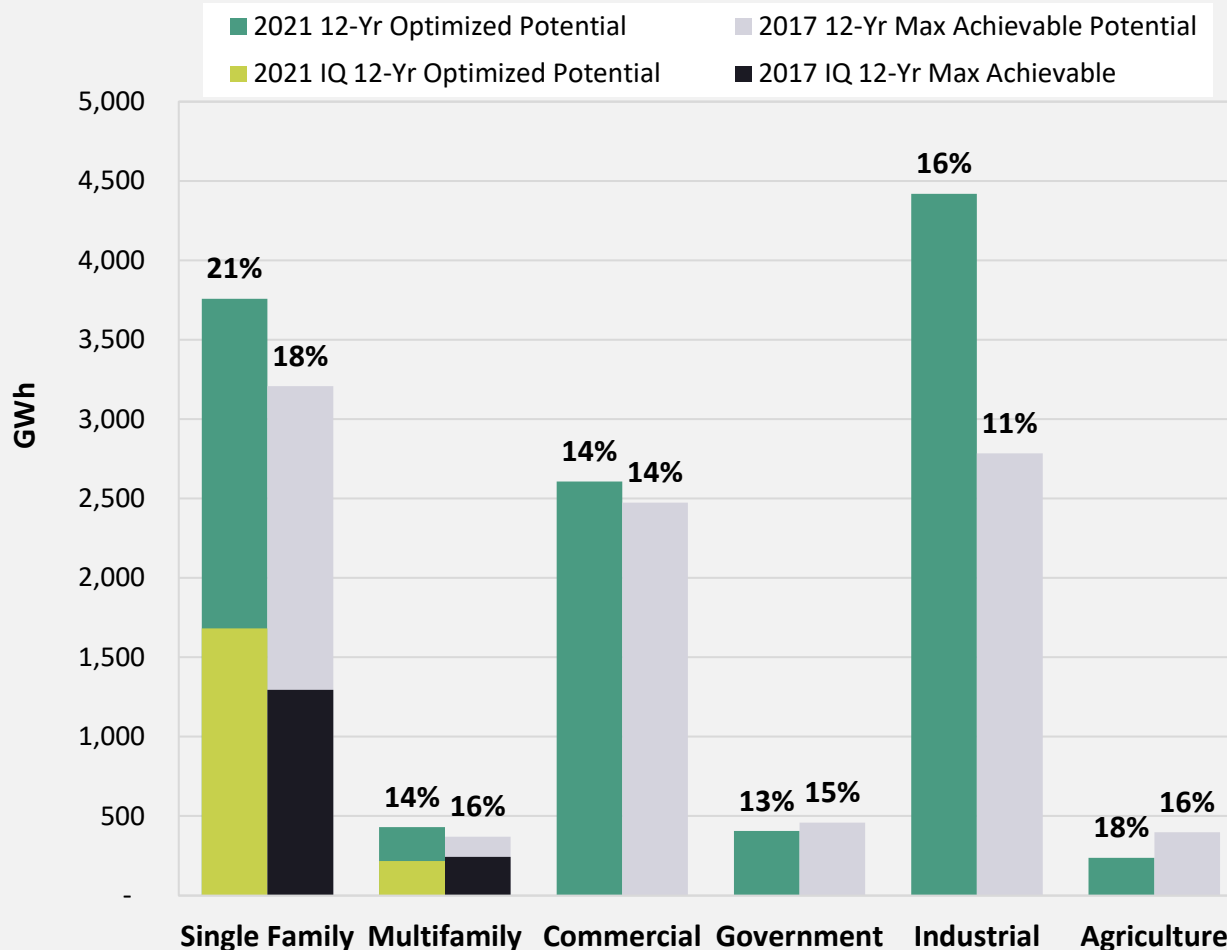
Please remain muted until your question is announced



5. Optimized & Current Policy Potential Draft Results

Draft Sector Level Electric Optimized Potential

Percentages indicate 12-Year Cumulative, Optimized Potential as a Percentage of Final Year Baseline Sales



12-Year Cumulative Potential Relative to Baseline

2021 Draft Optimized: 17%
2017 Max Achievable: 14%*

*2017 Maximum Incentive Achievable scenario methodology and assumptions are not completely in line with 2021 Optimized Potential.

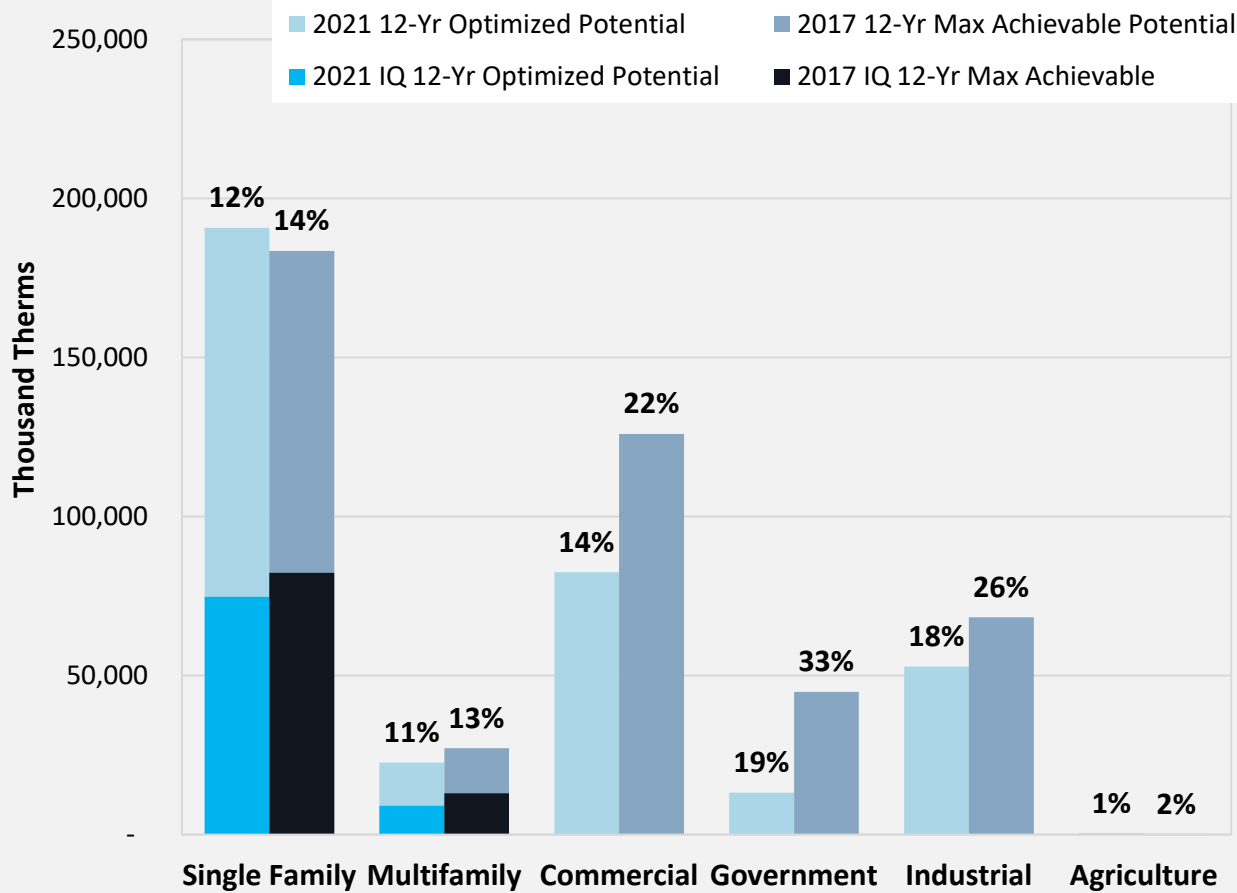
38% of 12-year cumulative draft optimized potential occurs in the **first four years** of the study

Average Annual Budget
~ \$90M

Average Annual Potential
988 GWh

Draft Sector Level Gas Optimized Potential

Percentages indicate 12-Year Cumulative, Optimized Potential as a Percentage of Final Year Baseline Sales



12-Year Cumulative Potential Relative to Baseline

2021 Draft Optimized: 13%
2017 Max Achievable: 18%*

*2017 Maximum Incentive Achievable scenario methodology and assumptions are not completely in line with 2021 Optimized Potential.

34% of 12-year cumulative draft optimized potential occurs in the **first four years** of the study

Average Annual Budget
~ \$47M

Average Annual Potential
30,170 Thousand Therms

Current Policy Potential Genesis

1

Developed annual optimized potential and associated incentive and administrative budgets

2

Aggregated optimized potential budgets based on sector and fuel type

3

Determined 4-Year and 12-Year current policy budgets by sector and fuel type

4

Applied a ratio to optimized potential in years 1-4 so that the 4-year budget did not exceed the current policy 4-year budget, by sector and fuel type

5

Applied a ratio to optimized potential in years 5-12 so that the 12-year budget did not exceed the current policy 12-year budget and the 4-year budget was maintained

Current Policy Potential Funding Constraints

Average
Annual Budget
~ **\$87.3M**



Electric
70%



Natural Gas
30%



Commercial
and Industrial
50%



Residential
40%

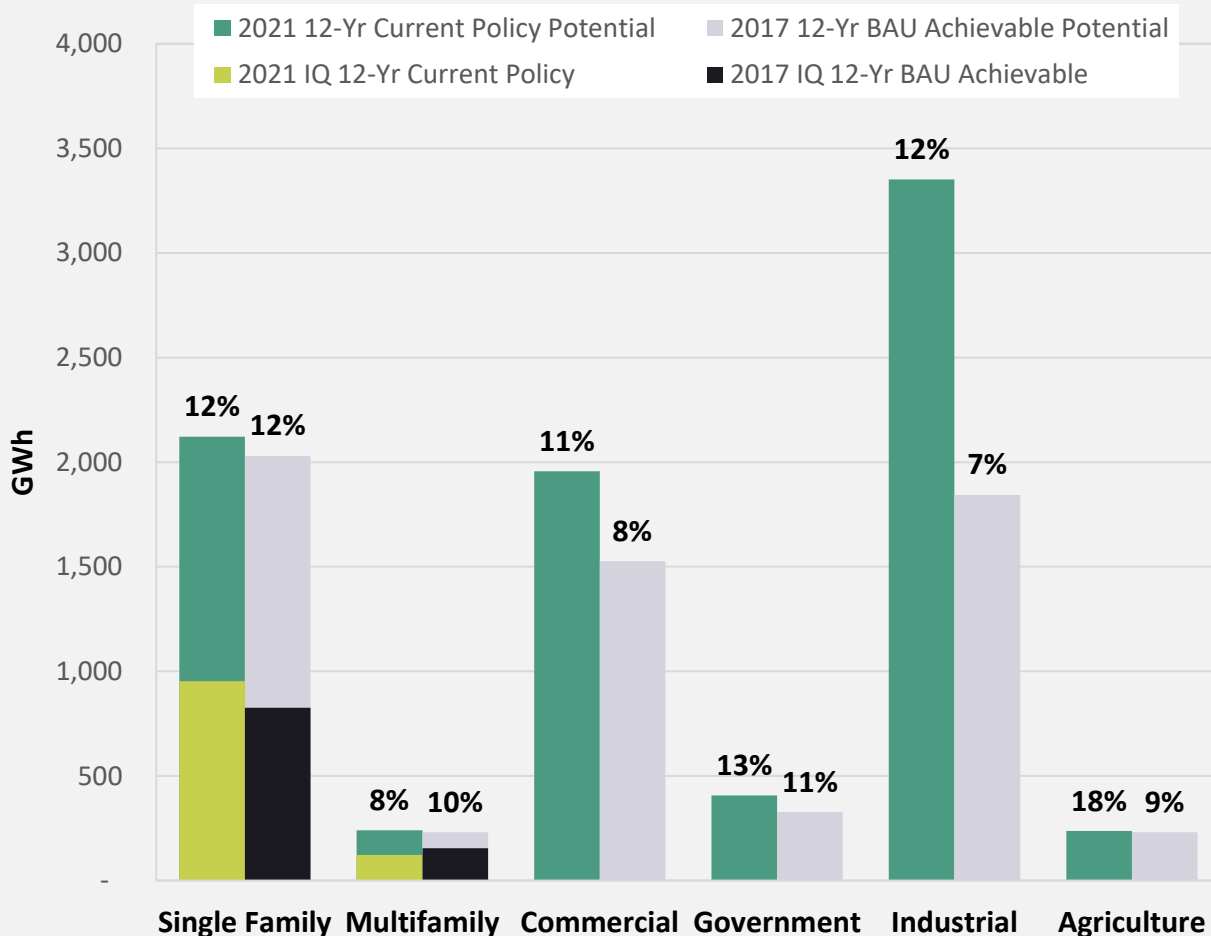


Public & Ag
10%



Draft Sector Level Electric Current Policy Potential

Percentages indicate 12-Year Cumulative, Current Policy Potential as a Percentage of Final Year Baseline Sales



12-Year Cumulative Potential Relative to Baseline

2021 Draft Current Policy: 13%
2017 BAU Achievable: 9%*

*2017 BAU Incentive Achievable scenario methodology and assumptions are not completely in line with 2021 Current Policy Potential.

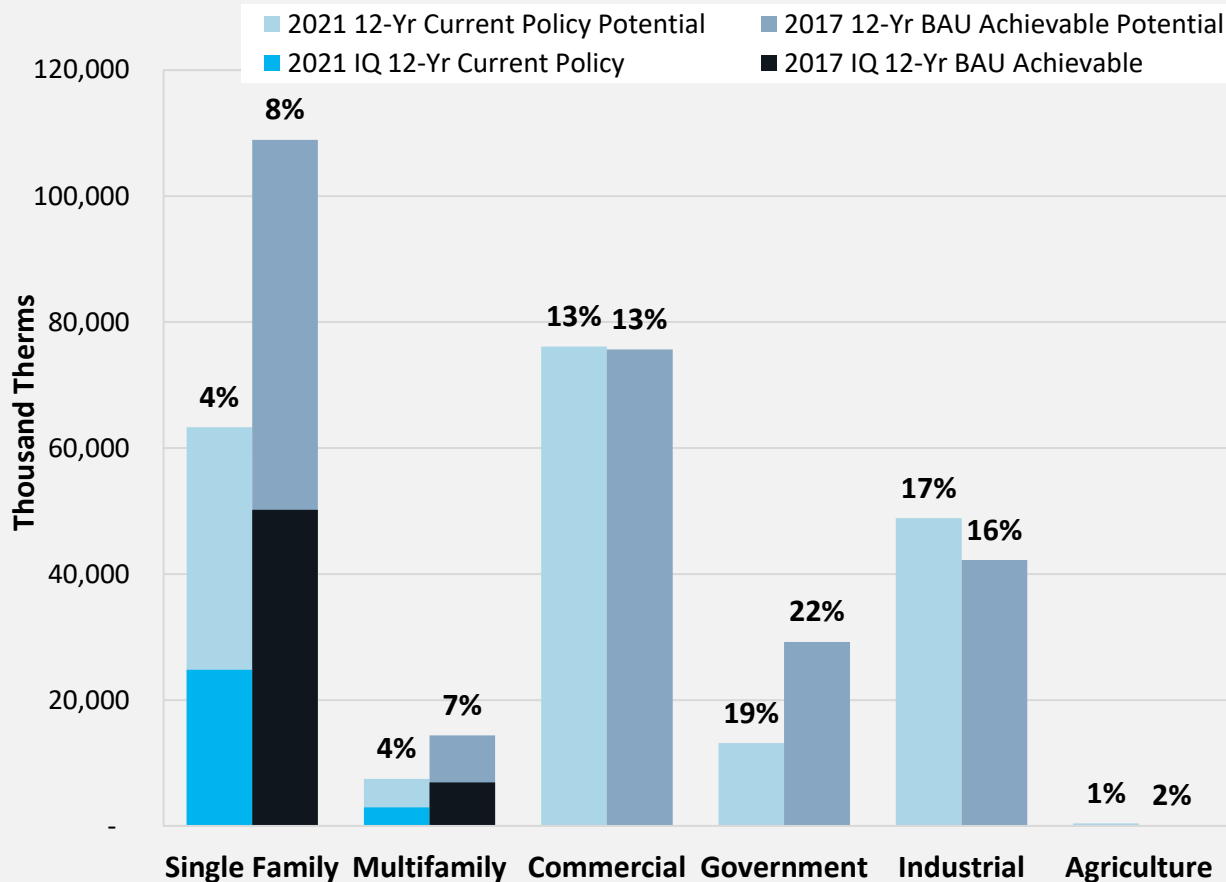
34% of 12-year cumulative draft current policy potential occurs in the first four years of the study

Average Annual Budget
~ \$61M

Average Annual Potential
693 GWh

Sector Level Gas Current Policy Potential

Percentages indicate 12-Year Cumulative, Current Policy Potential as a Percentage of Final Year Baseline Sales



12-Year Cumulative Potential Relative to Baseline

2021 Draft Current Policy: 8%
2017 BAU Achievable: 11%*

*2017 BAU Incentive Achievable scenario methodology and assumptions are not completely in line with 2021 Current Policy Potential.

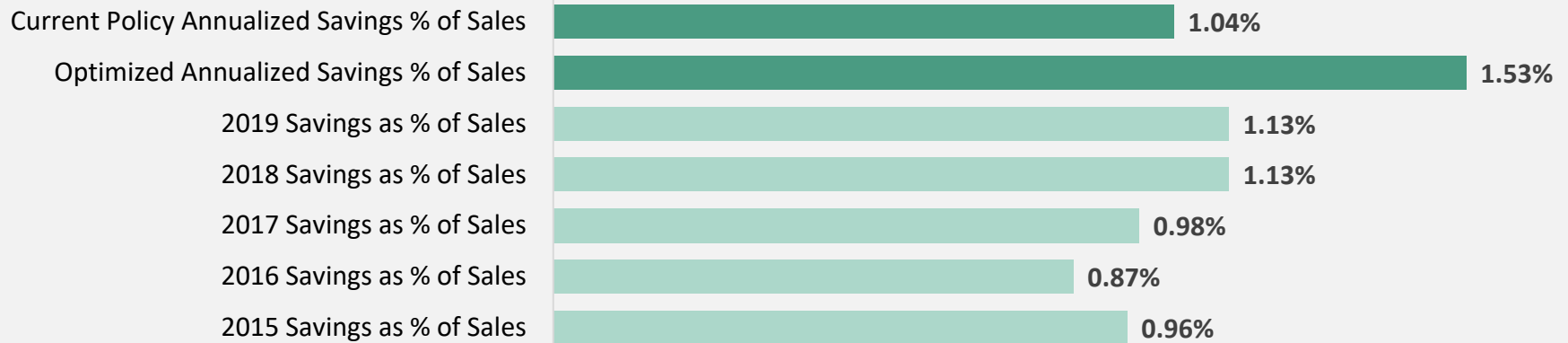
34% of 12-year cumulative current policy potential occurs in the first four years of the study

Average Annual Budget
~ \$25M

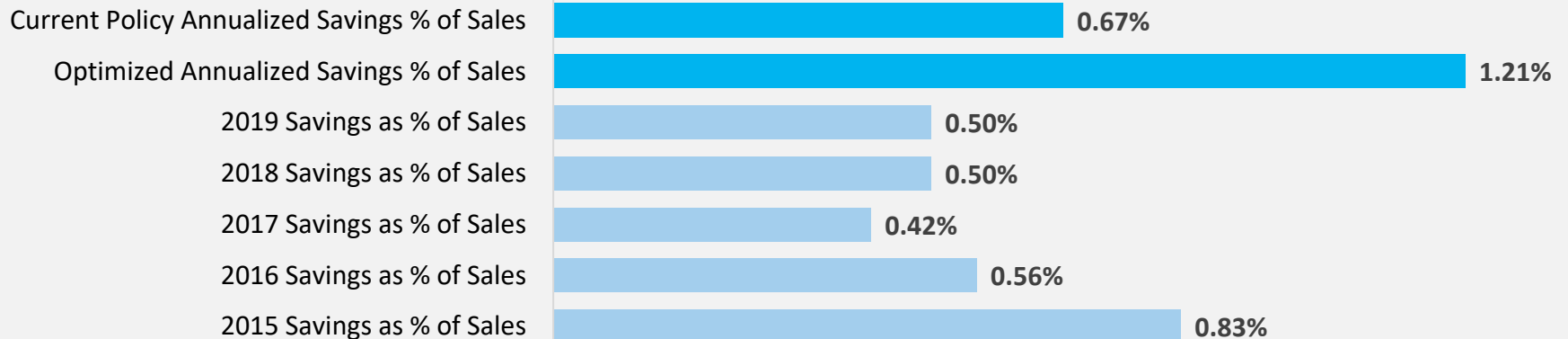
Average Annual Potential
17,449 Thousand Therms

Historical Program Accomplishments

Electric Energy Efficiency



Natural Gas Energy Efficiency

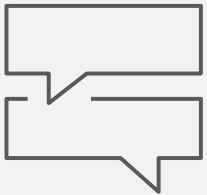


The Floor is Open – Feedback Welcome!



Questions/Comments?

- Optimized potential draft results
- Current policy potential draft results
- Comparison to previous study
- Drivers of change
- Other questions or comments?



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6. Scenario Draft Results

Focus Funding Scenarios



Current Policy

Annual Budget
~ \$87.3M



+50% Funding

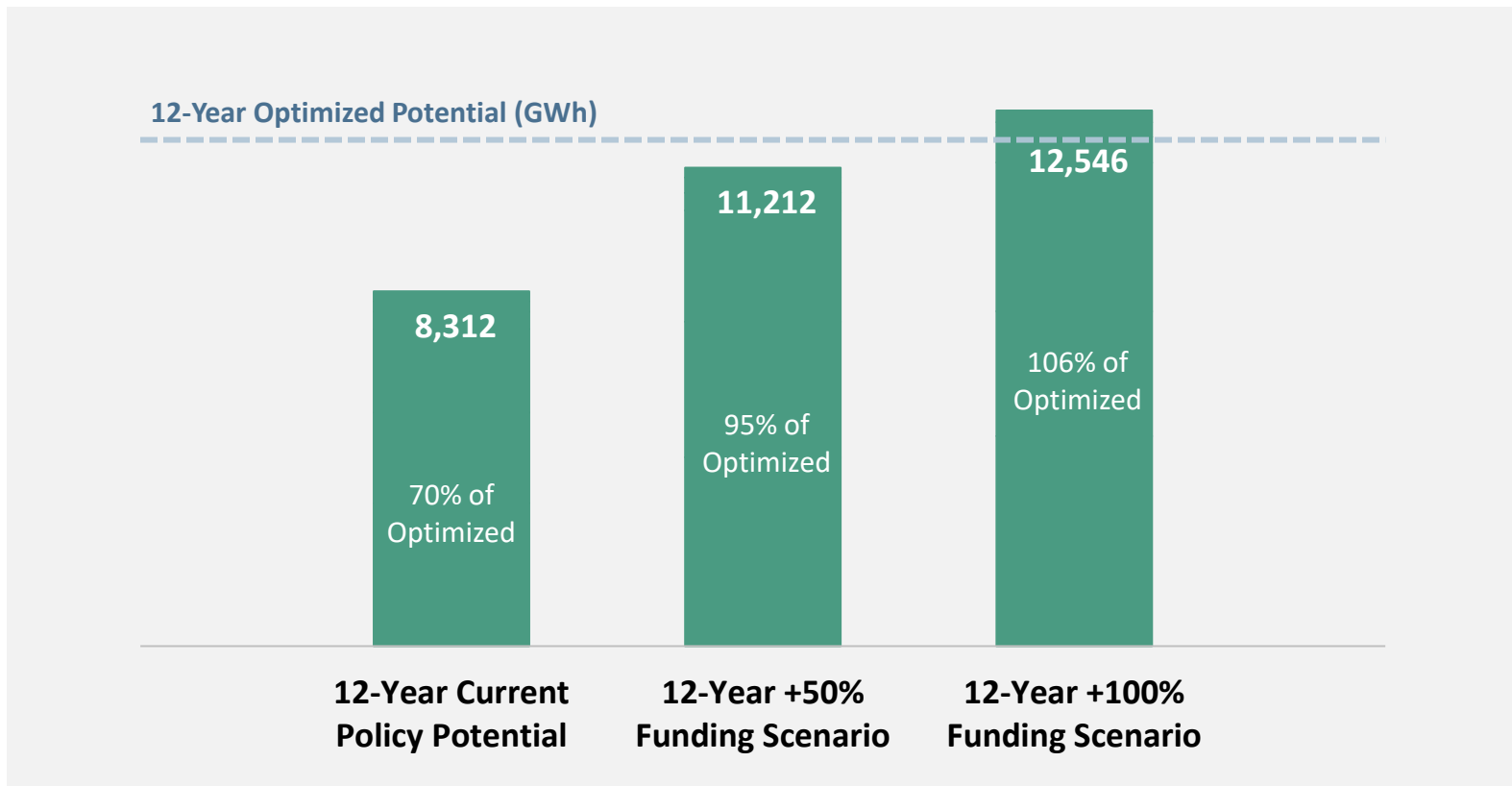
Annual Budget
~ \$131M



+100% Funding

Annual Budget
~ \$175M

Electric Focus Funding Scenarios (Draft)



Changes compared to Cumulative 12-Year Current Policy Potential

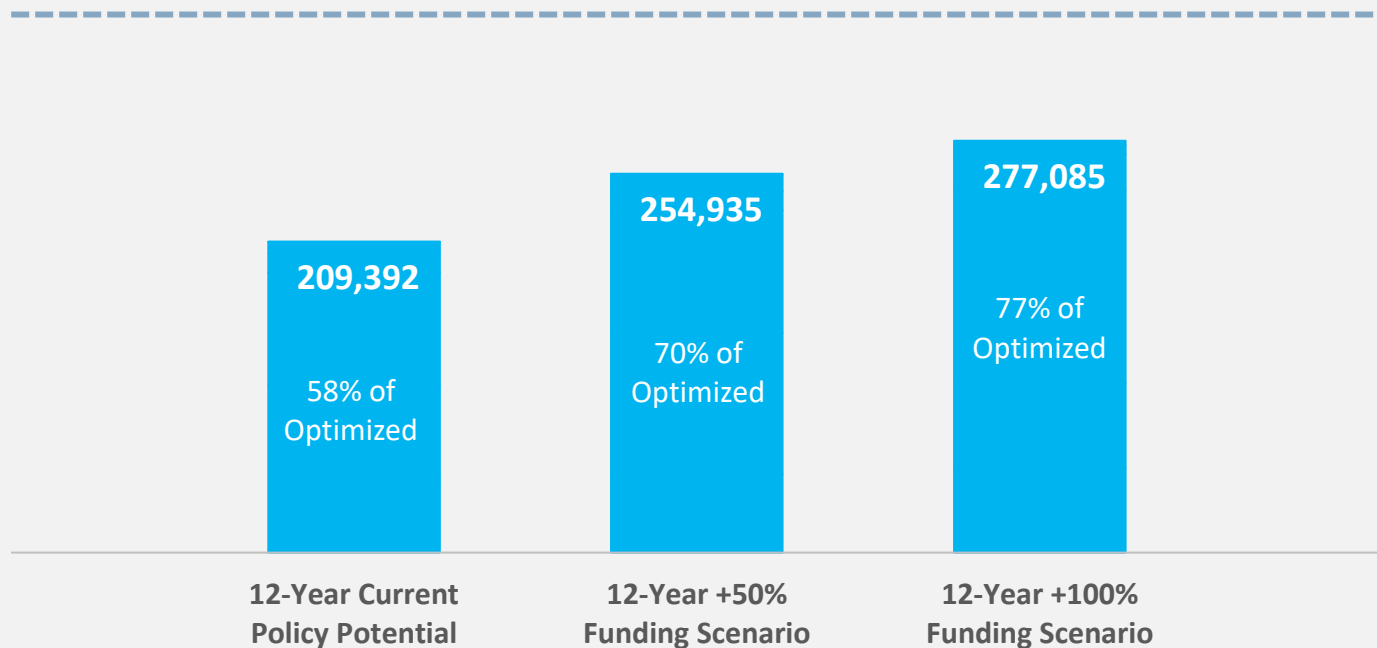
+50% Funding Scenario: +35%
+100% Funding Scenario: +51%

Annual Savings as a Percent of Sales

Current Policy: 1.04%
+50% Funding Scenario: 1.44%
+100% Funding Scenario: 1.63%

Gas Focus Funding Scenarios (Draft)

12-Year Optimized Potential (Thousand Therms)



Changes in Cumulative 12-Year Current Policy Potential

+50% Funding Scenario: +22%
+100% Funding Scenario: +32%

Annual Savings as a Percent of Sales

Current Policy: 0.67%
+50% Funding Scenario: 0.83%
+100% Funding Scenario: 0.91%

Alternate Economic Assumption Scenarios

Base

2%

Discount Rate

Cost of Carbon: **\$15/ton**
(market rate)

T&D Benefits: **Excluded**

Alternate Scenarios*

5%

Discount Rate

0%

Discount Rate

Social Cost of Carbon: **\$69/ton**
(levelized)

T&D Benefits of
\$67-\$70 per kW-Year

*Alternate Scenarios did not consider combined effects

Average Annual Economic Potential Relative to Baseline Sales

Electric Energy Efficiency

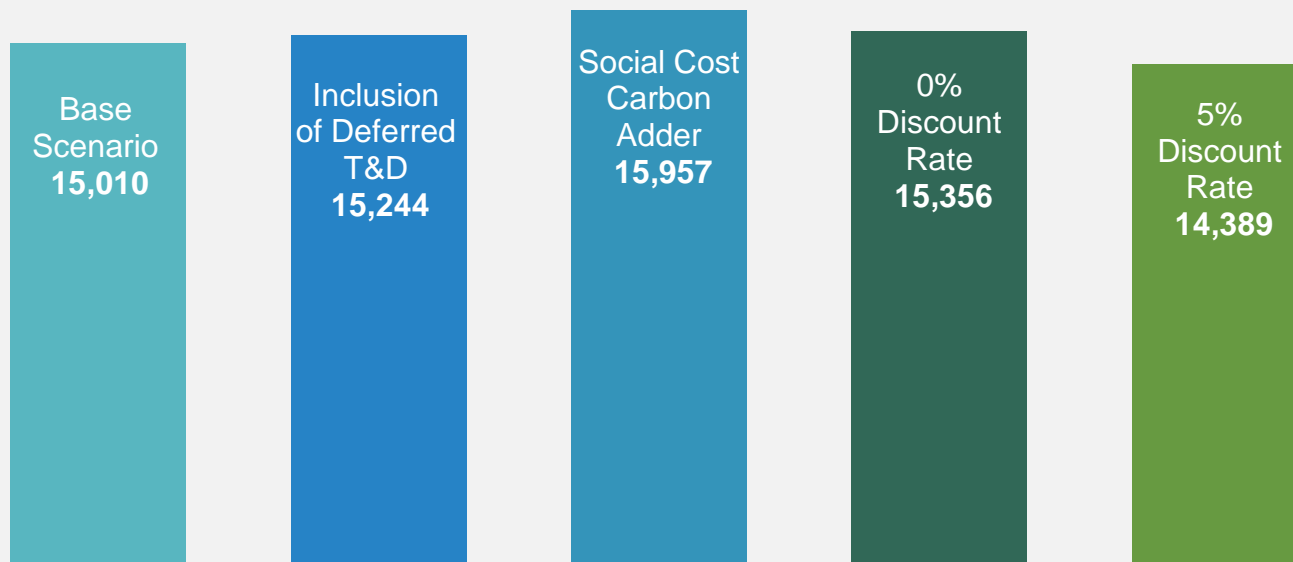


Natural Gas Energy Efficiency



Electric Alternate Economic Assumption Scenarios

12-Year Cumulative Economic Potential (GWh)



12-Year Cumulative Economic Potential as a Percentage of 2034 Sales

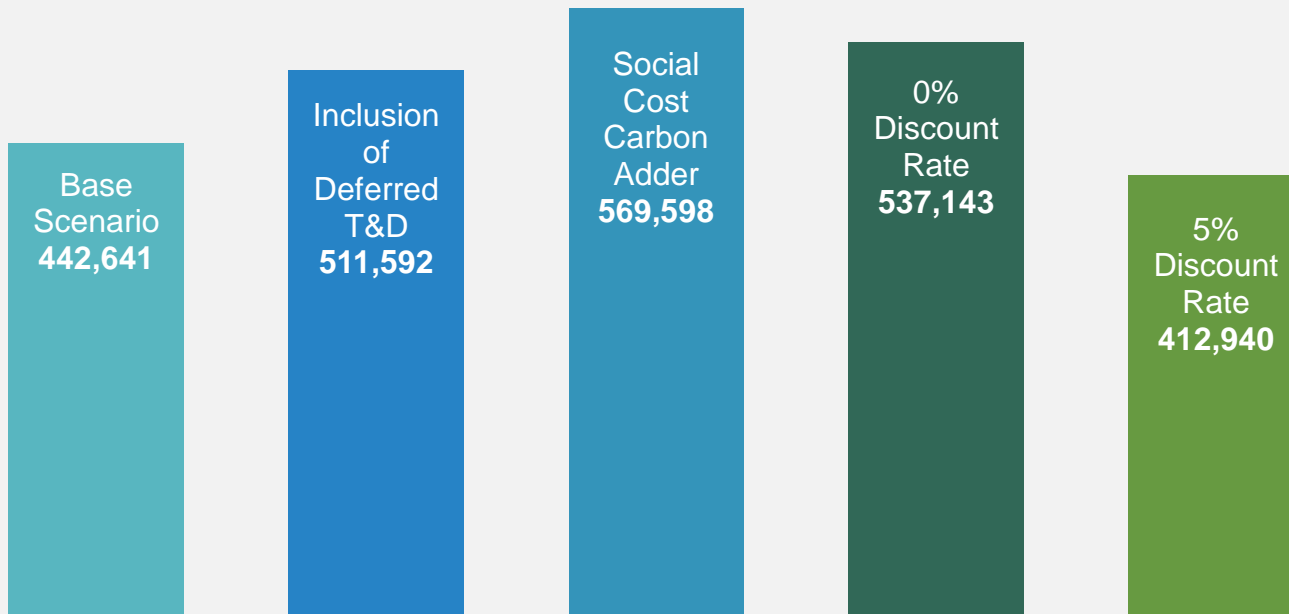
Base: 21.0%
5% Discount Rate: 20.2%
0% Discount Rate: 21.5%
Social Cost of Carbon: 22.4%
Inclusion of T&D: 21.4%

Changes in Base Scenario Cumulative 12-Year Economic Potential

5% Discount Rate: -4.1%
0% Discount Rate: +2.3%
Social Cost of Carbon: +6.3%
Inclusion of T&D: +1.6%

Gas Alternate Economic Assumption Scenarios

12-Year Cumulative Economic Potential (Thousand Therms)



12-Year Cumulative Economic Potential as a Percentage of 2034 Sales

Base: 16.4%
 5% Discount Rate: 15.3%
 0% Discount Rate: 19.9%
 Social Cost of Carbon: 21.1%
 Inclusion of T&D: 18.9%

Changes in Base Scenario Cumulative 12-Year Economic Potential

5% Discount Rate: -6.7%
 0% Discount Rate: +21.3%
 Social Cost of Carbon: +28.7%
 Inclusion of T&D: +15.6%

Alternate Cost-Effectiveness Scenarios

Base

Cost Test:
Modified TRC

Benefits:
Avoided Energy &
Carbon Emissions

Costs:
Equipment and Admin

Includes O&M Cost:
No

**10% Conservation
Benefit:**
No

CE Threshold:
1

Utility Cost Test

Cost Test:
UCT

Benefits:
Avoided Energy

Costs:
Incentive and Admin

Includes O&M Cost:
No

**10% Conservation
Benefit:**
No

CE Threshold:
1

Societal Cost Test

Cost Test:
SCT

Benefits:
Avoided Energy & Non-
Energy Benefits

Costs:
Equipment and Admin

Includes O&M Cost:
Yes

**10% Conservation
Benefit:**
Yes

CE Threshold:
1

0.5 mTRC Threshold

Cost Test:
Modified TRC

CE Threshold:
0.5

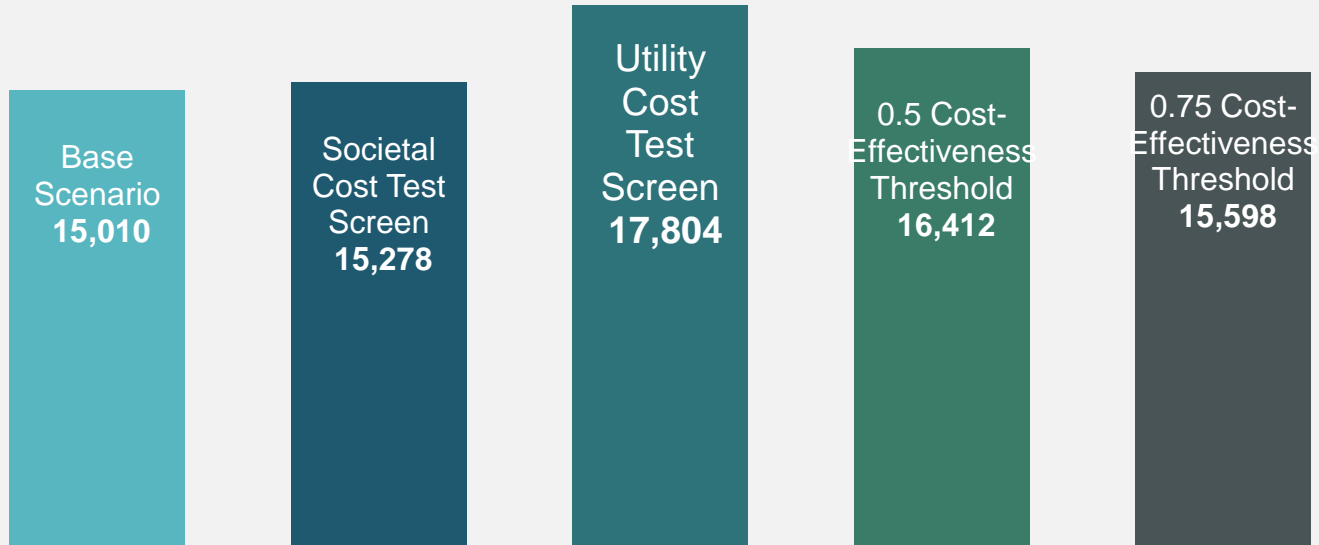
0.75 mTRC Threshold

Cost Test:
Modified TRC

CE Threshold:
0.75

Electric Alternate Cost-Effectiveness Scenarios

12-Year Cumulative Economic Potential (GWh)



12-Year Cumulative Economic Potential as a Percentage of 2034 Sales

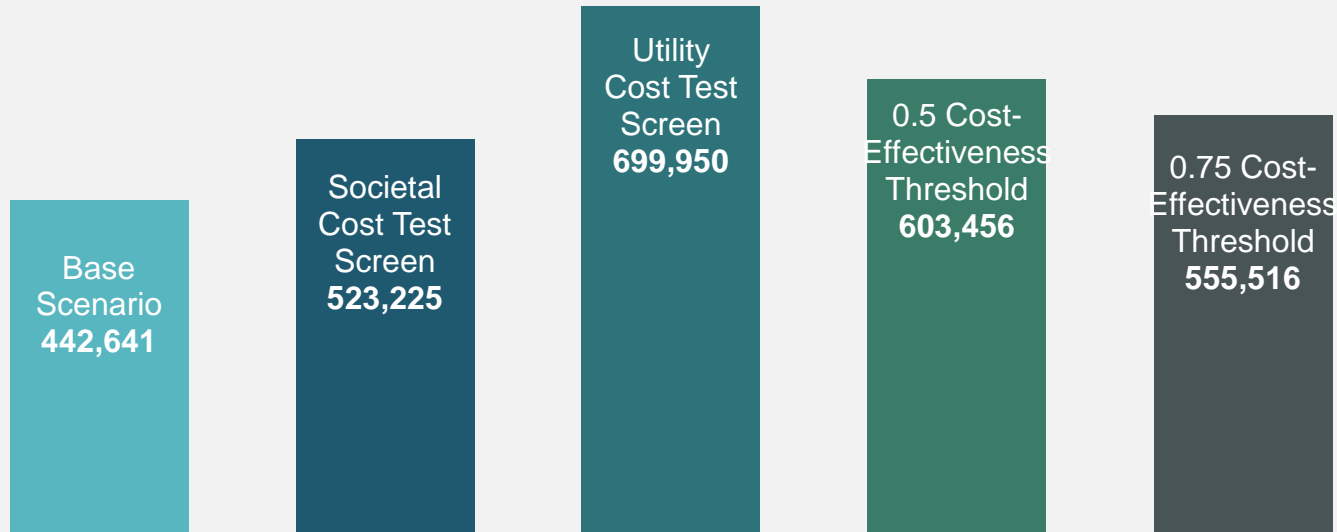
Base: 21.0%
Societal Cost Test: 21.4%
Utility Cost Test: 25.0%
0.5 CE Threshold: 23.0%
0.75 CE Threshold: 21.9%

Changes in Base Scenario Cumulative 12-Year Economic Potential

Societal Cost Test: **+1.8%**
Utility Cost Test: **+18.6%**
0.5 CE Threshold: **+9.3%**
0.75 CE Threshold: **+3.9%**

Gas Alternate Cost-Effectiveness Scenarios

12-Year Cumulative Economic Potential (Thousand Therms)



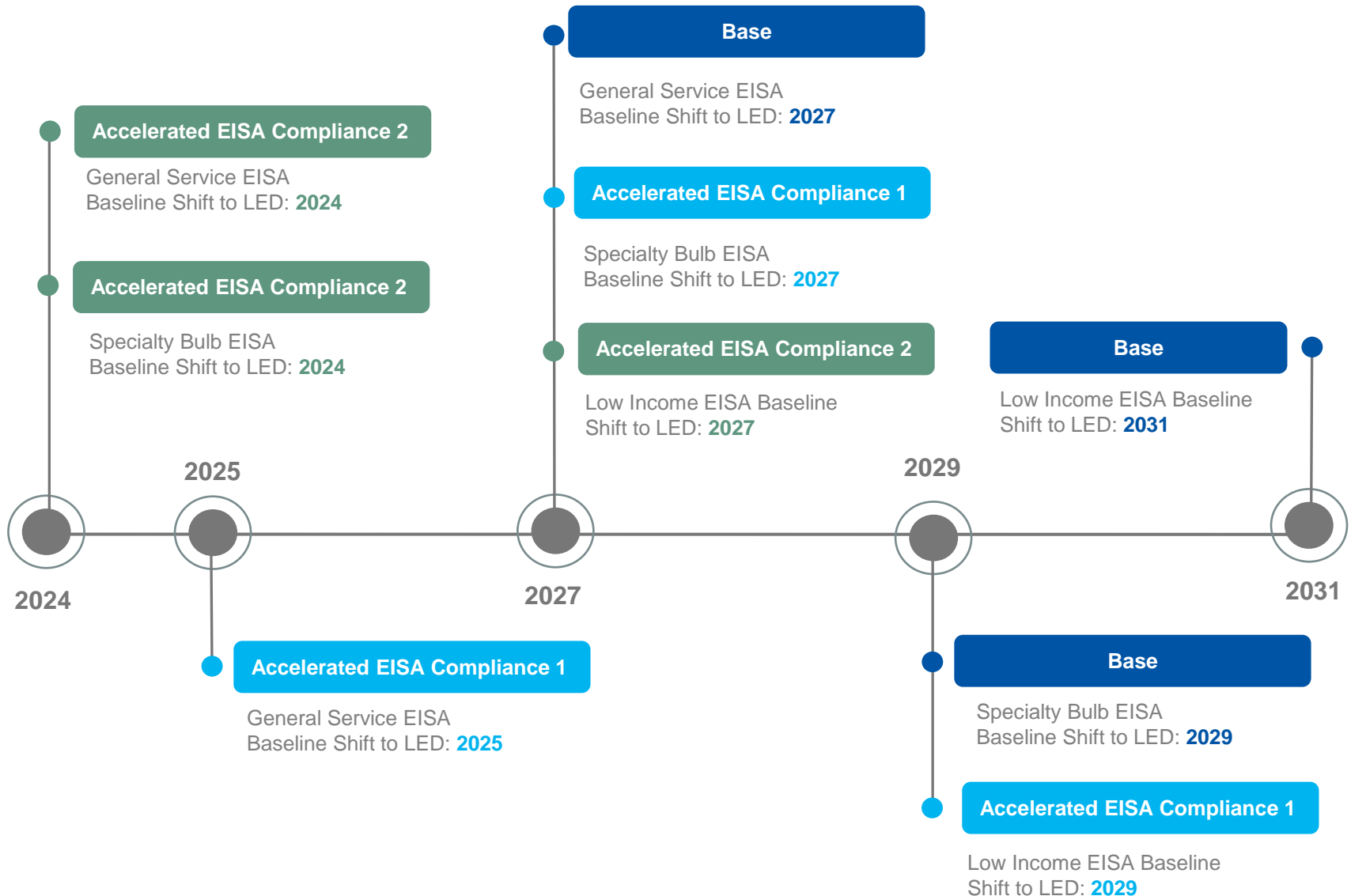
12-Year Cumulative Economic Potential as a Percentage of 2034 Sales

Base: 16%
Societal Cost Test: 19%
Utility Cost Test: 26%
0.5 CE Threshold: 22%
0.75 CE Threshold: 21%

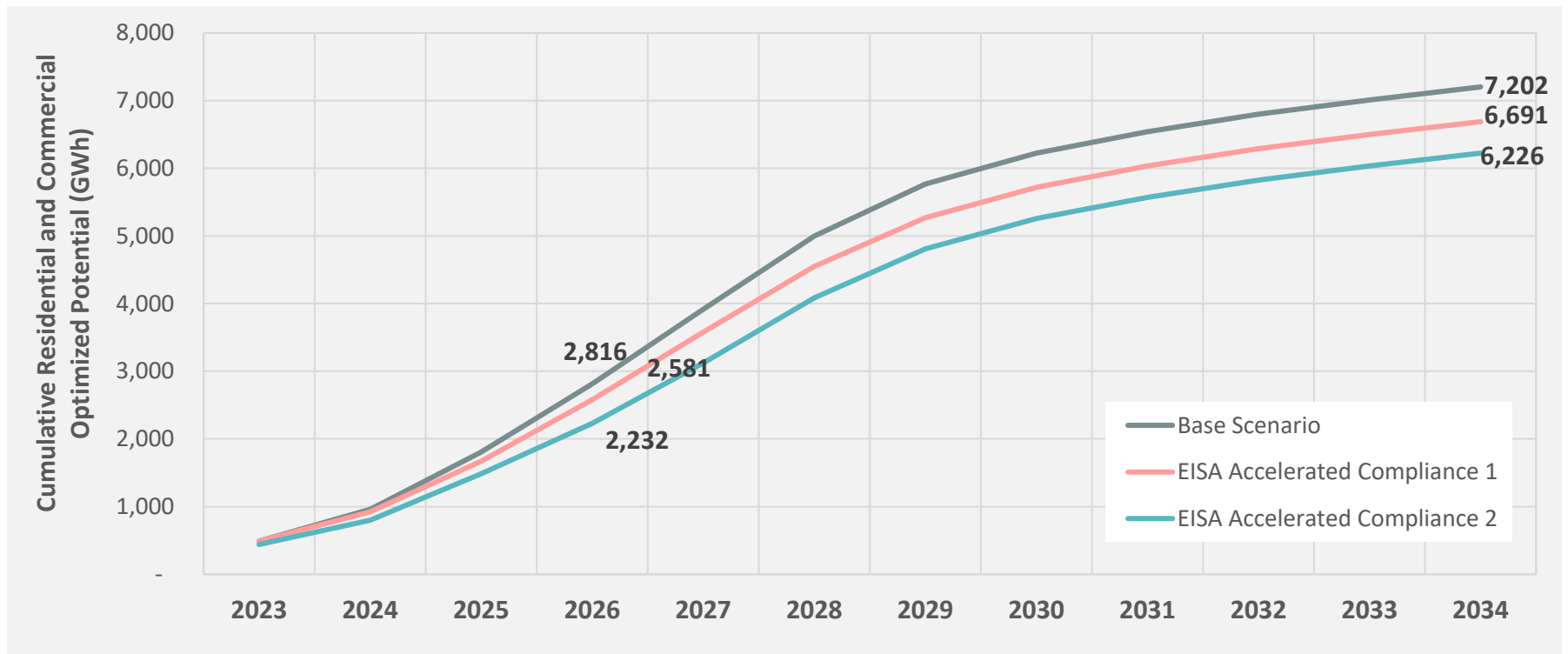
Changes in Base Scenario Cumulative 12-Year Economic Potential

Societal Cost Test: **+18%**
Utility Cost Test: **+58%**
0.5 CE Threshold: **+36%**
0.75 CE Threshold: **+25%**

EISA Compliance Scenarios



EISA Compliance Scenarios (Draft)



Accelerated EISA Scenario 1
Commercial and Residential
12-Year Optimized Potential is **7%**
Lower than the Base Scenario

Accelerated EISA Scenario 2
Commercial and Residential
12-Year Optimized Potential is **14%**
Lower than the Base Scenario

4-Year as a % of 12-Year Cumulative
Commercial and Residential
Optimized Potential

Base: 39.1%
EISA Accel 1: 38.6%
EISA Accel 2: 35.8%

12-Year Optimized Potential as a %
of 2034 Commercial and Residential
Sales

Base: 17%
EISA Accel 1: 16%
EISA Accel 2: 15%

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Questions/Comments?

- Scenario draft results
- Other questions or comments?



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Q & A and Next Steps



Please add questions and comments to the meeting chat.

Anything that we have or have not discussed today?

Next Steps:

1st Draft Report to Stakeholders (June 4, 2021)

3-Week Report Review Period for Stakeholders (June 4 to June 25, 2021)

Your feedback and input is important, please send us feedback

Other feedback opportunities

Email **Jeremy Eckstein** at Cadmus
(jeremy.eckstein@cadmusgroup.com)

or contact **Mitch Horrie** at PSC
(Mitch.Horrie@wisconsin.gov)