Planning Study
Sixth Stakeholder Meeting –
Final Results

December 11, 2025

focus on energy
Partnering with Wisconsin utilities

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PSC Introduction

Quadrennial Planning Process V Update

Subscribe to PSC Docket 5-FE-105 to receive email notifications

Thank you for your feedback on the pre-scoping request for comments!

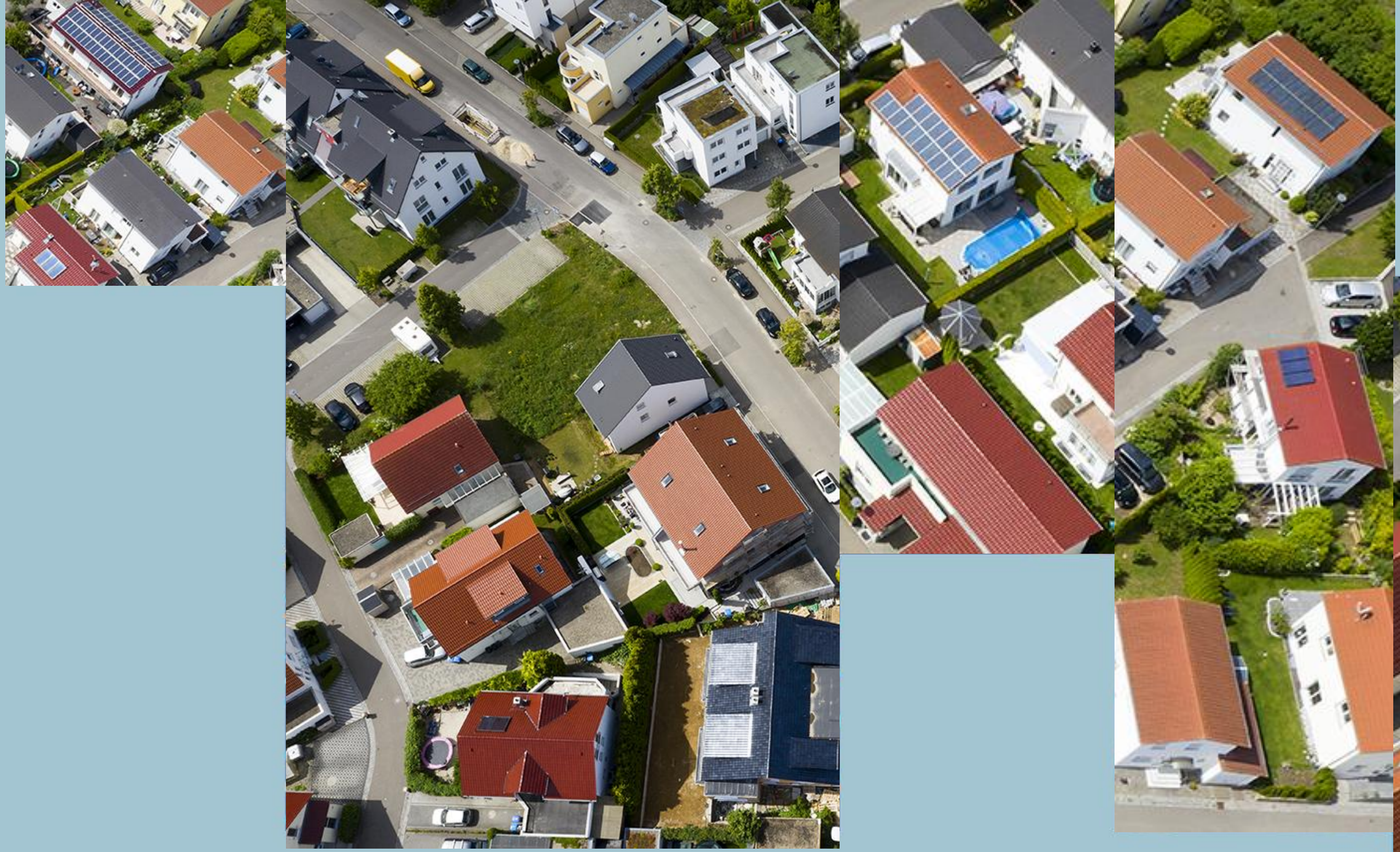
Quad V Scoping Memorandum and Comment Period in early 2026

OEI

Wisconsin Office of Energy Innovation

Agenda

1. Stakeholder Feedback from Draft Results / Changes to Study
2. Analysis Levels and Reporting Metrics
3. End-Use Forecast
4. Technical Potential
5. Economic Potential
6. Program Scenarios
7. Optimized Potential
8. Key Study Takeaways / Considerations for Quad V Planning
9. Study Dashboard
10. Q&A



Stakeholder Feedback from Draft Results / Changes to Study

Questions from Stakeholder Meeting 5

QUESTIONS / COMMENTS/ DISCUSSION	RESPONSE / ACTION
It is challenging to design a double program budget scenario without having insight into how additional funding would be allocated (between sectors, programs, etc). A realistic double budget scenario would require information about how additional funding would be allocated.	Removed double budget scenario from study. Study will discuss qualitatively potential impacts of increasing the Focus on Energy budget. Added an additional summer peak scenario.
A scenario to optimize peak energy demand reduction across four peak demand types (electric: summer PM, winter AM, winter PM and gas: winter therm-day) provides no insights, given many trade-offs between measures.	Peak-focused scenario designed to maximize summer PM electric demand reduction.
How does the study calculate coincident peak impacts?	Focus on Energy (and the planning study) measures peak impacts as the average impact across peak hours during summer and winter. Focus on Energy may revisit its approach in the future.
Why does the planning study report first year energy savings when Focus on Energy primarily measures energy savings based on measure lifecycles?	Report (and presentation) reports lifecycle savings. The results dashboard can present results in first year impacts.
Will the option in the scenarios to "maintain sector level budgets" assume current market prices and not account for potential market volatility?	Overall budget allocations for planning scenarios are consistent for each scenario, and each Quad (2027-2030, 2031-2034, 2035-2038).
How will this study determine how much the measure incentives will be increased for scenarios?	Baseline and scenario incentive assumptions were discussed with the Focus on Energy program administrator to ensure that they are realistic.

Analysis Levels and Reporting Metrics

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Analysis Levels and Reporting Metrics

End-Use Forecast

Forecast of sector, segment, end-use energy consumption at sector, segment based on utility data

Technical Potential

Theoretical maximum energy impact from energy efficiency and fuel switching

Adoption Simulation

Simulates **customer adoption** of technically feasible measures for **six scenarios**

Considers **financial incentives**, **project economics**, **technological maturity** & **human behavior**

Economic Potential

Cost-effective from three perspectives

Program Scenarios
(4-year)

Translates adoption simulations into **feasible program scenarios** leveraging program data to estimate participation

Optimized Potential
(12-year)

Translates adoption simulations into **energy savings** from study measures, accounting for **interactive effects**

Planning Study does not provide program targets

Program targets are developed through a comprehensive planning process

Hourly Impact Measurements

Reporting Metrics / Measures

Electric Energy Efficiency and Rooftop Solar

BBtu, MW Winter / Summer Peak, CO_2 emissions, incentive and program budgets, cost effectiveness ratios

Electrification

BBtu (electric and gas impacts), MW Winter / Summer Peak and therm-day Peak, CO_2 emissions, incentive and program budgets, cost effectiveness ratios

Gas Energy Efficiency

BBtu, therm-day Peak, CO_2 emissions, incentive and program budgets, cost effectiveness ratios

Electric to Gas Fuel Switching Considerations

Study accounts for the increases in electric load and decreases in gas load in impact reporting and cost-effectiveness testing

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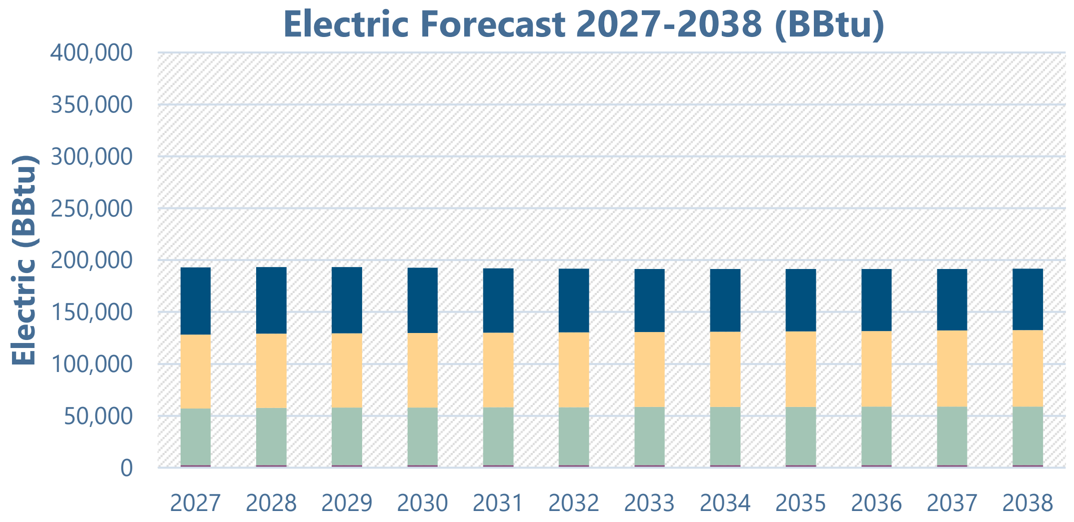
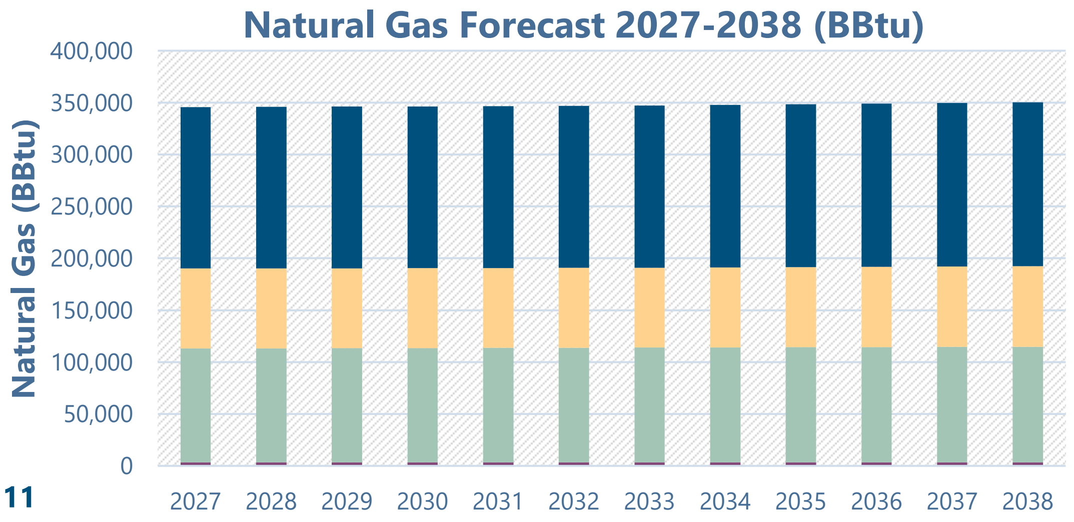
Approach

- End-use forecast foundational for potential estimate
- Total load estimated from utility data, including number of accounts, total load, and load growth
- Incorporates known changes to equipment standards
- Segment and end-use segmentation from primary and secondary research
- Does not account for data center load

Fuel Type / Sector Sales





Industrial sector highly customized and energy consumption end-uses heterogenous. Residential buildings have most standard energy consumption profile

Top 5 Energy-Consuming End Uses

Agriculture

1. Process heat (92% G)
2. Water heat (92% G)
3. Pumps (100% E)
4. Process refrigeration and cooling (100% E)
5. Ventilation (100% G)

Commercial

1. Gas rooftop unit (100% G)
2. Plug loads (100% E)
3. Boilers (100% G)
4. Lighting (100% E)
5. Furnace (100% G)

Residential

1. Furnace (95% G)
2. Water Heat (79% G)
3. Boiler (100% G)
4. Large appliances (89% E)
5. Electronics (100% E)

Industrial

1. Boiler / CHP (98% G)
2. Process heat (88% G)
3. Machine drives (92% E)
4. Facility HVAC (65% G)
5. Process refrigeration and cooling (97% E)

Graph colors align with sector boxes above | G = gas | E = electric

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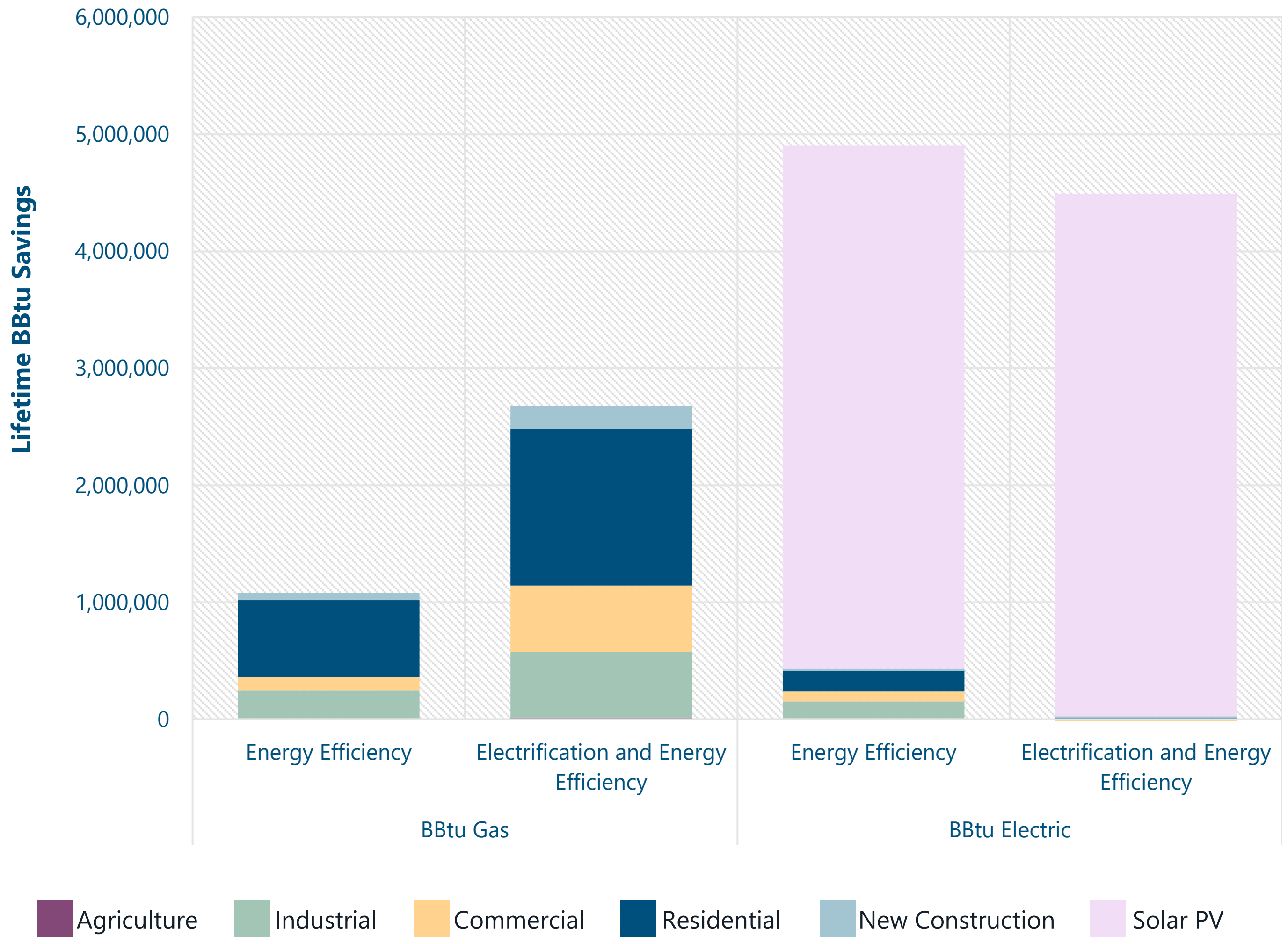
Approach

- Most efficient option of multiple possibilities installed
- All feasible opportunities for upgrades taken
- Equipment installations dependent on turnover (2027-2038)
- 2 scenarios: energy efficiency and electrification & energy efficiency
- Electrification accounts for fuel of space heating in weatherization
- Accounts for interactions between measures

Technical Potential Lifecycle Energy Savings by Sector



Discussion / Findings

- Solar potential = high percentage of electric savings potential
- Electrification increases total lifecycle savings due to very high efficiency of residential and commercial heat pumps
- Increased electric loads also increases opportunities for additional electric savings, such as from weatherization. Without this interaction electrification would create additional electric load (negative savings)
- Overall EE and electrification savings roughly proportional to sector loads: residential highest opportunity, followed by industrial and commercial. Agricultural very small opportunity
- New construction substantial gas savings potential

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Top Technical Potential Measure Groups

Agriculture

EE	EE & Ele.	
Grain Dryer	Water Heat Electrification	●
Process Heat	Grain Dryer	▼
Water Heat	Process Heat Electrification	●
Ventilation Fan	Ventilation Fan	=
High Speed Fan	High Speed Fan	=
Efficient Irrigation	Efficient Irrigation	=

Commercial

EE	EE & Ele.	
Advanced RTU controller	Ele. Heat Pump – Gas Backup	●
HVAC Commissioning	Ele. Heat Pump – Cold Climate	●
Direct Digital Controls	Ele. Heat Pump - Ductless	●
Lighting Controls	Advanced RTU controller	▼
Ventilation Sensors	Ele. Heat Pump - Standard	●
Variable Speed Pump / Fan	Lighting Controls	▼

Industrial

EE	EE & Ele.	
Process Heat Recovery	Ele. Heat Pump	●
New Construction Design	Ele. Resistance Heat	●
Custom Process Project	Process Heat Recovery	▼
Custom Boiler Project	New Construction Design	▼
Boiler Heat Recovery	Custom Process Project	▼
Boiler Management	Ele. Infrared Heaters	●

Residential

EE	EE & Ele.	
Weatherization	Ele. Heat Pump – Cold Climate	●
Efficient Window	Weatherization	▼
Gas Water Heat	Efficient Window	▼
Sill Box Insulation	Ele. Heat Pump Water Heat	●
Gas Furnace	Ele. Heat Pump - Standard	●
Energy Recovery Ventilator	Ele. Heat Pump - Ductless	●

Discussion / Findings

- **Agriculture:** emissions, and electric and gas peak reduction potential corresponds generally with energy savings rank
- **Commercial**: heat pumps become top savers in electrification & EE scenario, but add to electric peak demand (especially in winter)
- **Industrial:** energy efficiency highest saver: process heat recovery; electrification heat pump has over double that potential
- **Residential:** weatherization top electric, gas, emissions and peak EE savers. Electrification heat pumps top energy savers and emissions savers, but add to electric peak demand

Ele. = Electrification measure **EE= Energy Efficiency** **Change in position between EE and EE & Ele. =** ▼ **down** ● **new** = **no change**

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Approach

- Technical potential subset to cost-effective measures
- Accounts for interactions between measures, which can impact potential of measures groups
- Avoided energy supply costs consider both reduction in fossil fuel usage and the increase in electric energy usage

Planning Study Economic Potential

Modified Total Resource Test (mTRC)

Costs: incremental measure equipment cost and program administrative cost

Benefits: avoided energy supply costs, emissions benefits, new construction market effects

Program Administrator Test (PAT)

Costs: incentive cost and program administrative cost

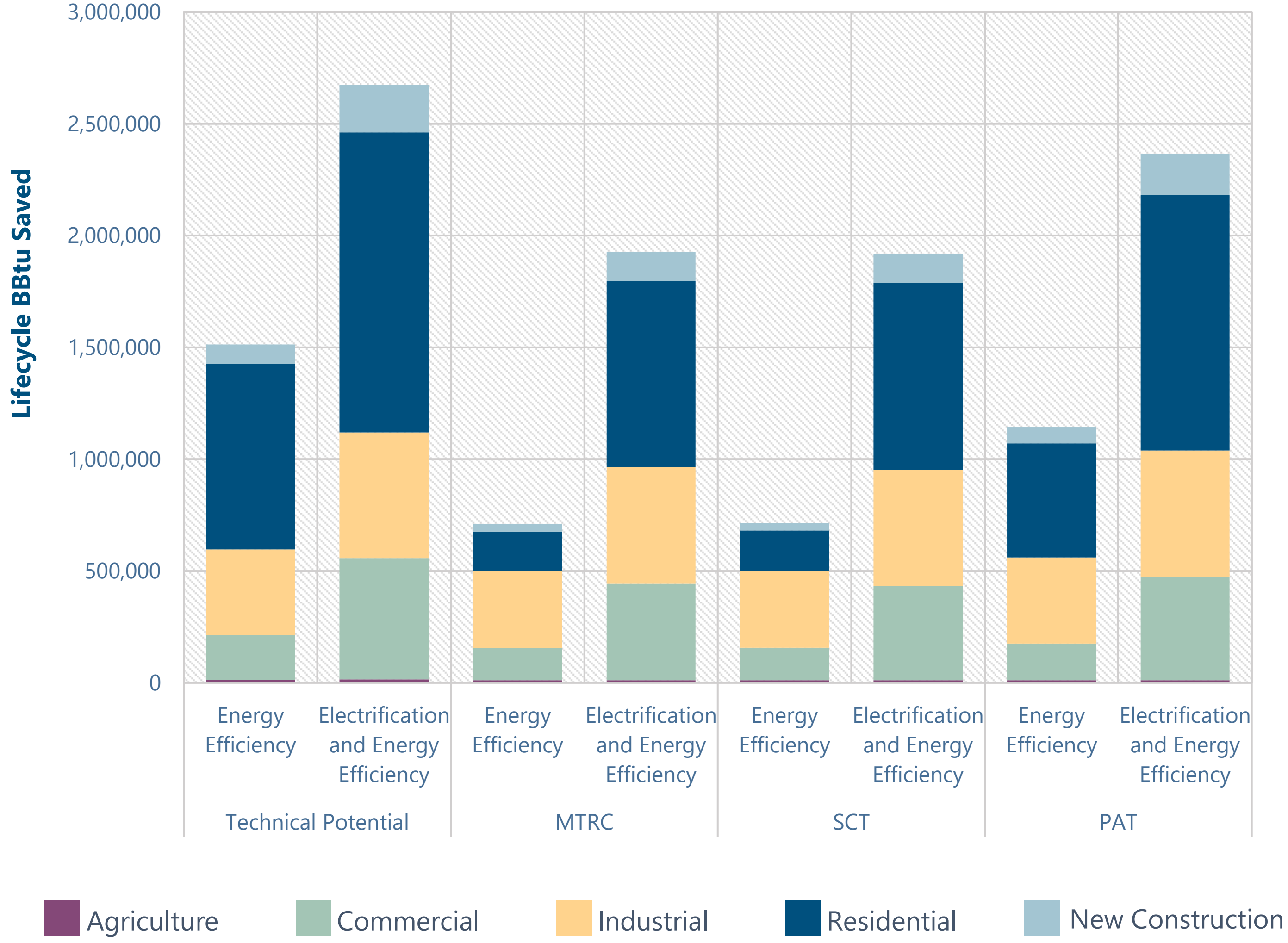
Benefits: avoided energy supply costs

Societal Cost Test (SCT)

Costs: incremental cost and program administrative cost

Benefits: avoided energy supply costs, emissions & health & water benefits, economic impacts and new construction market effects

Economic Potential



Discussion / Findings

- Distribution of EE and EE & electrification scenario like technical potential for each cost test
- mTRC: 39% of technical EE, 50% technical EE & Ele. economic. Most ele. heat pumps cost-effective, despite relatively high incremental cost
- SCT: similar result to mTRC, except solar (not shown) where residential systems become cost effective
- **Residential:** largest decreases from energy efficiency technical potential due to weatherization measure incremental costs
- **Industrial:** all technical potential cost effective: 1) high net-to-gross ratios, 2) long measure life, 3) large savings for relatively small number of projects

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Top Technical Potential Measure Groups with Economic Potential

Commercial Energy Efficiency

Technical Potential	mTRC	SCT	PAT
Advanced Rooftop Unit Controller	0	0	0
HVAC Commissioning	22,500	22,400	20,800
Direct Digital Control System	19,600	19,600	18,500
Lighting Controls	11,600	12,400	14,400
Automated Ventilation CO_2 Sensors	0	0	11,300

Residential

Technical Potential	mTRC	SCT	PAT
Weatherization Project	0	0	184,000
Insulation - Window	0	0	0
Water Heat LE 55 Gal	5,100	5,100	77,100
Insulation - Sill Box	0	0	39,600
Gas Furnace	37,600	37,600	34,600

Findings

- Measure groups include multiple measures, allowing potential to vary within group
- **Commercial:** top saving energy efficiency measure not cost effective from any perspective. None-the less, 72% (mTRC) to 83% (PAT) of technical potential cost effective
- **Residential:** 22% (mTRC) to 62% (PAT) technical potential cost effective due to high incremental costs, particularly for high-saving weatherization measures

Program Scenarios

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Approach

- Baseline scenario calibrated to current Focus on Energy accomplishments
- Scenarios increase incentives for scenario-focused measures and reduce incentives / remove non-focused measure
- Measures identified based on impact per incentive spent
- Analysis based on deemed savings, conducted at the sector and program-level

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Program Scenarios

Scenario Design Principles

Scenarios reflect realistic and possible program designs while exploring study research objectives and stakeholder priorities (changes to scenarios focused on most impactful measures on margins)

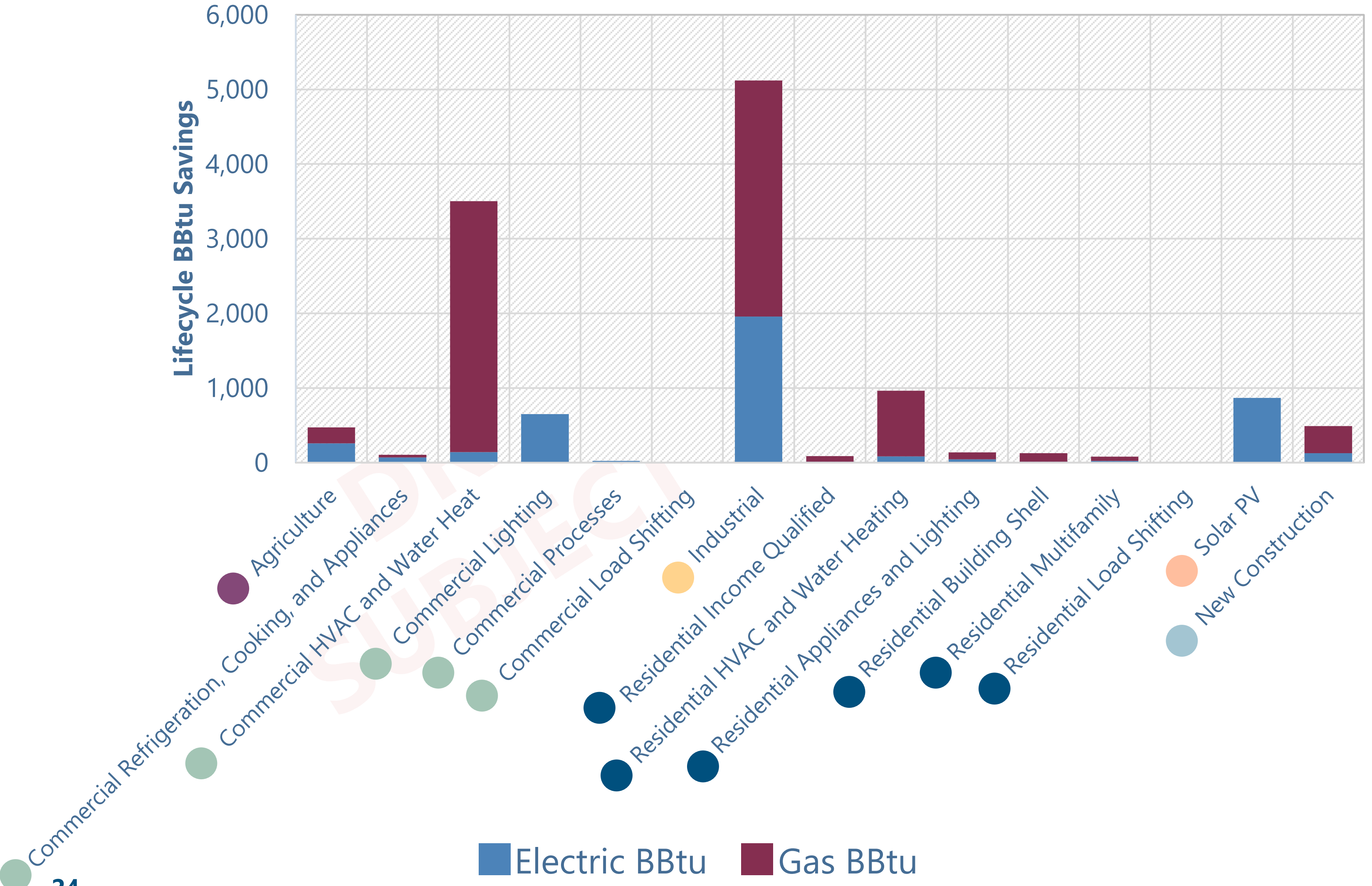
Baseline scenario designed as realistic portfolio maintaining current Focus on Energy budget and measure mix

Scenarios

0	1	2	3	4	5
Baseline	Emissions-Focused	Summer Electric Peak-Focused	Summer Electric Peak-Focused (with load shifting)	Electrification	Cost Effectiveness-Focused

Scenarios 0: Baseline Energy Savings

Cumulative 4-Year (Quad 2027-2030)



Discussion / Findings

- Baseline scenario calibrated to 2024 portfolio performance. Baseline scenario 17% less electric savings and 1% more gas savings. Baseline mTRC = 1.5, 2.5 in 2024. Acquisition cost $1.4 / MMBTU, higher than 2024. Differences driven by increasing cost and new measures (consistent with trends in other utilities)
- **Industrial:** 40% of portfolio savings, disproportionate to technical potential, scenario potential accounts for expansion projects
- 63% of portfolio savings gas, 71% of technical potential gas

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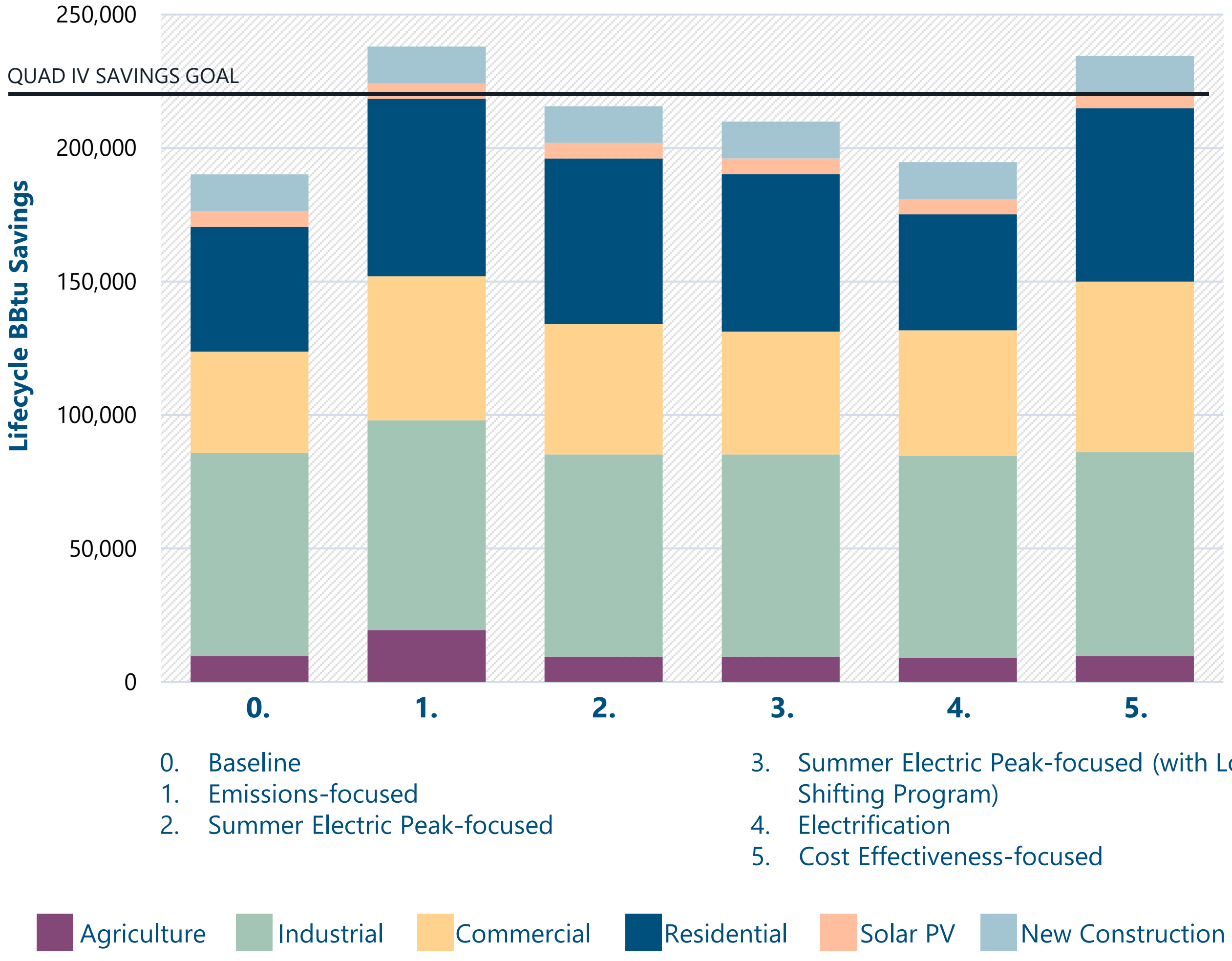
Scenarios Overview: Total Lifecycle BBTU - Quad V



0. Baseline
1. Emissions-focused
2. Summer Electric Peak-focused
3. Summer Electric Peak-focused (with Load Shifting Program)
4. Electrification
5. Cost Effectiveness-focused

Discussion / Findings

- Biggest increases (approx. 25%) from emissions and cost-effectiveness-focused scenarios, driven by commercial and residential sectors
- Savings in electrification scenario like baseline, despite increased adoption of high-efficiency heat pumps
- Impacts across all scenarios limited because: 1) portfolio maintains a diverse measure mix 2) increasing incentives for some measures uses budget for other impactful measures (study maintained fixed program budgets)
- Emissions reductions follow a similar trend to energy savings (% increases relative to baseline)
- Summer peak savings in electrification scenario decrease 12% due to added electric load

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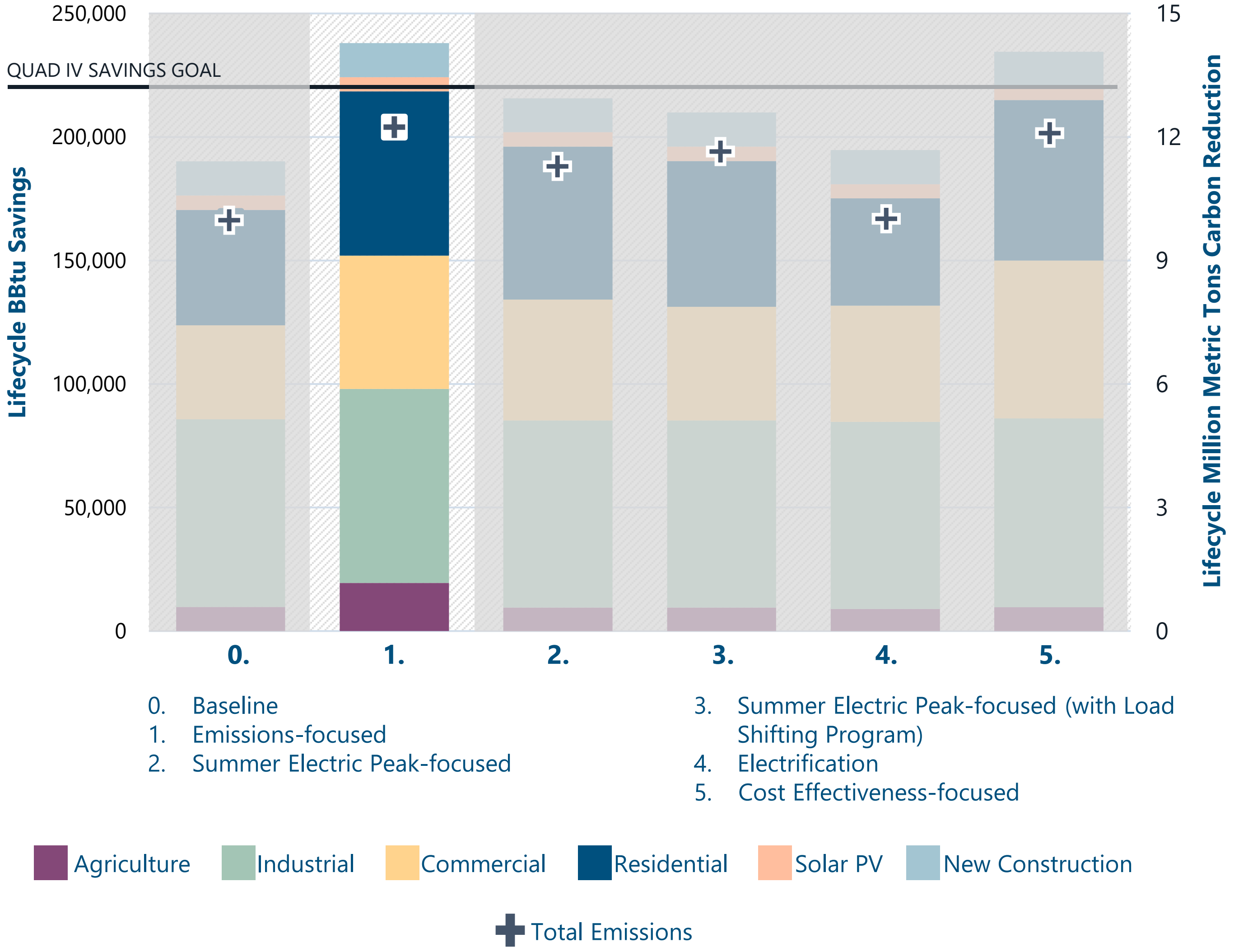
Scenario 1: Emissions-focused



Discussion / Findings

- Scenario increases lifecycle carbon emissions reduction by 23%, energy savings by 25%. Acquisition cost decreases by \$0.28 / MMBTU
- Emissions from gas-fueled space and water heating equipment slightly lower per unit of energy consumed than emissions associated with electric energy
- Emissions associated with gas do not vary by hour, emissions from electric equipment depend hours of use. Electric grid is generally less carbon intensive in the summer: measures with winter electric savings have higher emissions impacts than measures that save electricity in the summer
- Not realistic to design portfolio that optimizes emissions reductions only by maximizing winter electric savings

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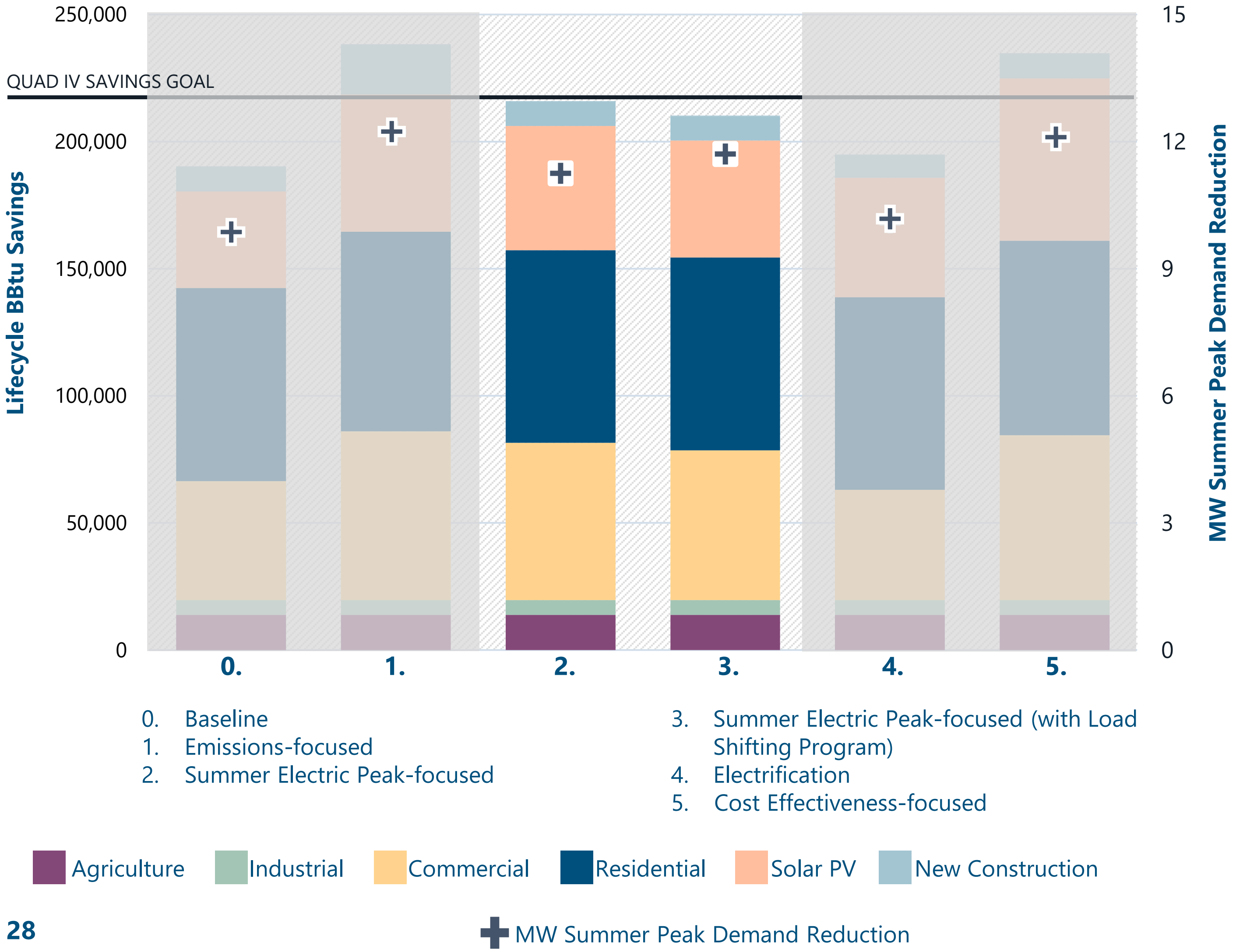
Scenario 1: Emissions-focused

Sector	Adjustments	
	Accelerated	Removed
Agricultural	Greenhouse climate controls, greenhouse perimeter insulation, process heat improvements	Circulation fans and ventilation, custom dairy projects, custom lighting improvements, high efficiency water heat, irrigation pressure reduction
Commercial	Air source heat pump, ECM evaporator fans, insulation, efficient boilers, LED lighting and controls	Advanced rooftop units, building automation, heat pump water heaters, chillers, cooking equipment, commissioning, DX Package, equipment tune-ups and maintenance, ground source heat pumps, package terminal air conditioner, tankless water heaters, variable refrigerant flow systems
Industrial	Boiler controls, boiler draft fan variable frequency drives, compressed air leak reduction, cooling tower fan upgrade, pump upgrades and drives, fan upgrades and drives, steam traps, strategic energy management and operations and maintenance	Advanced lighting controls, advanced rooftop unit upgrades, air conditioners, commissioning, compressed air mist eliminator, heat pump and economizer upgrades, radiant heat
Residential	Advanced cold climate and enhanced efficiency heat pumps (including electrification systems), boiler reset controls, building shell insulation, efficient furnaces, low-flow water fixtures, water pipe insulation	Advanced condensing water heat, advanced efficient air conditioner, condensing water heaters, efficient appliances, efficient electric vehicle charger, efficient windows, heat pump water heaters, LED connected lighting, tune-ups

Scenario 2 & 3: Summer Peak Demand-Focused



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3. Summer Electric Peak-focused (with Load Shifting Program)
4. Electrification
5. Cost Effectiveness-focused

Discussion / Findings

- Scenario 2 increases adoption of peak-reducing measures and Scenario 3 adds additional load-shifting program. No measures removed, because least impactful measures are gas-saving and portfolio will maintain diverse offerings
- Scenario increases summer peak demand savings by 32%, increases electric savings by 19%, decreases gas savings by 10%
- Peak demand reductions by accelerating adoption of summer-electric saving measures, but considers relative cost of reductions
- Load shifting programs small impact on peak summer electric savings because:
    - Focus on Energy evaluates peak reduction based on average impacts over peak hours across seasons and many load-shifting measures designed to have targeted impacts
    - Load-shifting program will take several years to ramp up with high administrative cost in early years. Thus, load shifting program reduces budget allocation for other impactful measures

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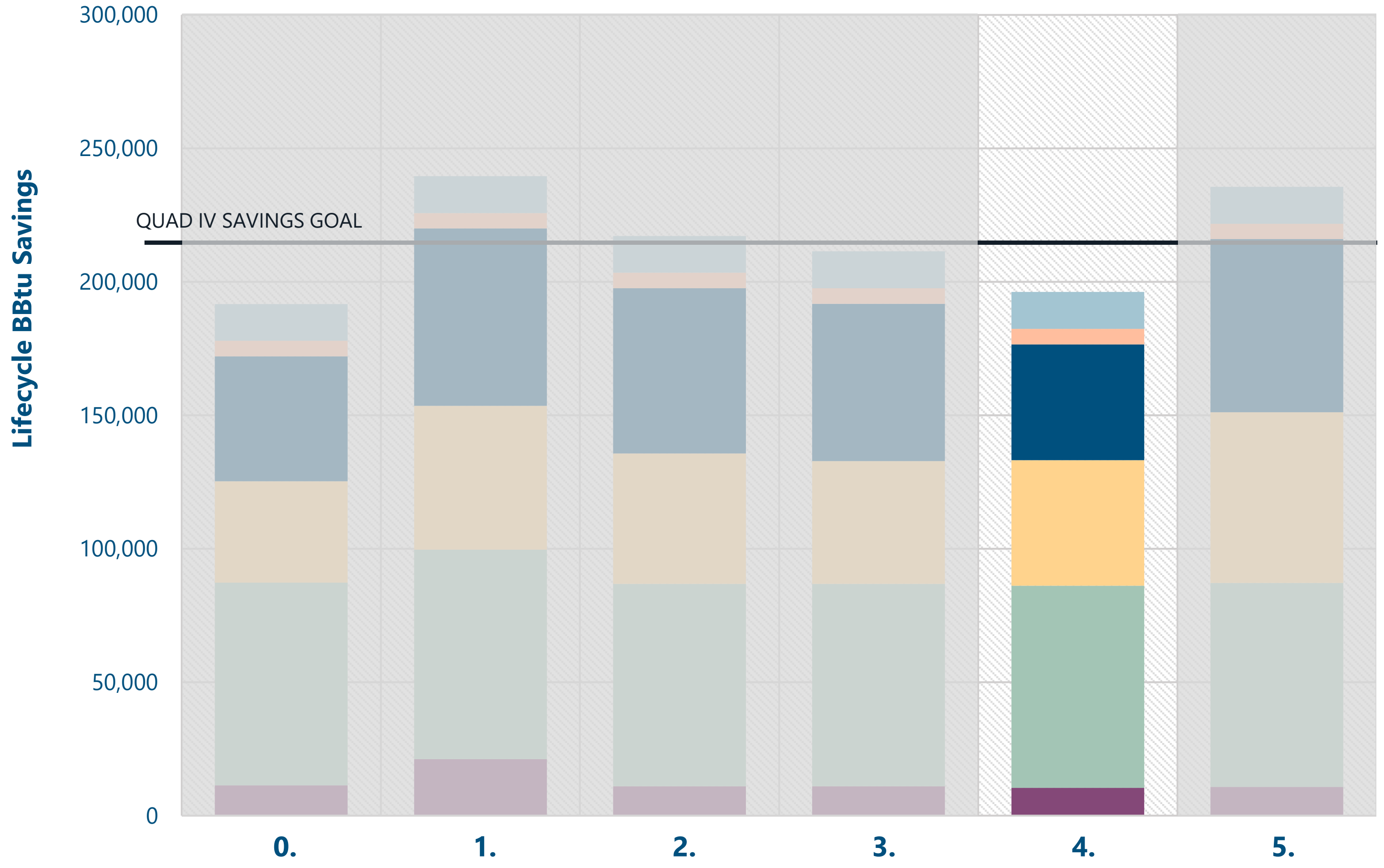
Scenario 2 & 3: Summer Peak Demand-Focused

Sector	Adjustments	
	Accelerated (Scenario 2 & 3)	Load Shifting (Scenario 3)
Agricultural	Engine block timer, greenhouse climate controls, high-volume low-speed fan, irrigation improvements, linear LED packages, variable frequency drives	None
Commercial	Cooling tower fan, daylighting controls, dishwashers and dryers, ECM evaporator fans, IT system efficient rectifier, variable speed control on HVAC pump system	Electric vehicle load shift, thermal storage, thermostat load control
Industrial	Boiler draft fan, building duct system improvements, compressed air leakage reduction, cooling tower fan, injection mold machines, lighting controls, operations and maintenance, pump and fan upgrades and drives, variable speed pump	None
Residential	Efficient air conditioners, efficient dehumidifiers and air purifiers, heat pump pool heaters, water flow measures	Battery storage, electric vehicle load shift, thermal storage, thermostat load control

Scenario 4: Electrification-Focused



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3. Summer Electric Peak-focused (with Load Shifting Program)
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5. Cost Effectiveness-focused

Agriculture | Industrial | Commercial | Residential | Solar PV | New Construction

Discussion / Findings

- Despite high technical potential, electrification scenario increases overall energy savings and emissions reduction by only 2% (8% electric savings reduction, 8% gas savings reduction). Acquisition costs and cost effectiveness very similar to baseline
- Relatively modest impacts of electrification scenario due to low predicted adoption
- Attitudes, particularly in the residential sector less favorable towards electrification compared to energy efficiency (resistance to change)
- Higher cost of electricity compared to gas, when normalized to Btu, make electrification projects less economical
- Perceptions in the industrial sector that 1) electrification projects are more costly than energy efficiency projects, 2) they would pay for needed electric distribution system upgrades, 3) electrification upgrades could disrupt operations
- Increased incentives to spur adoption of electrification use program budgets that could be spent on other impactful measures

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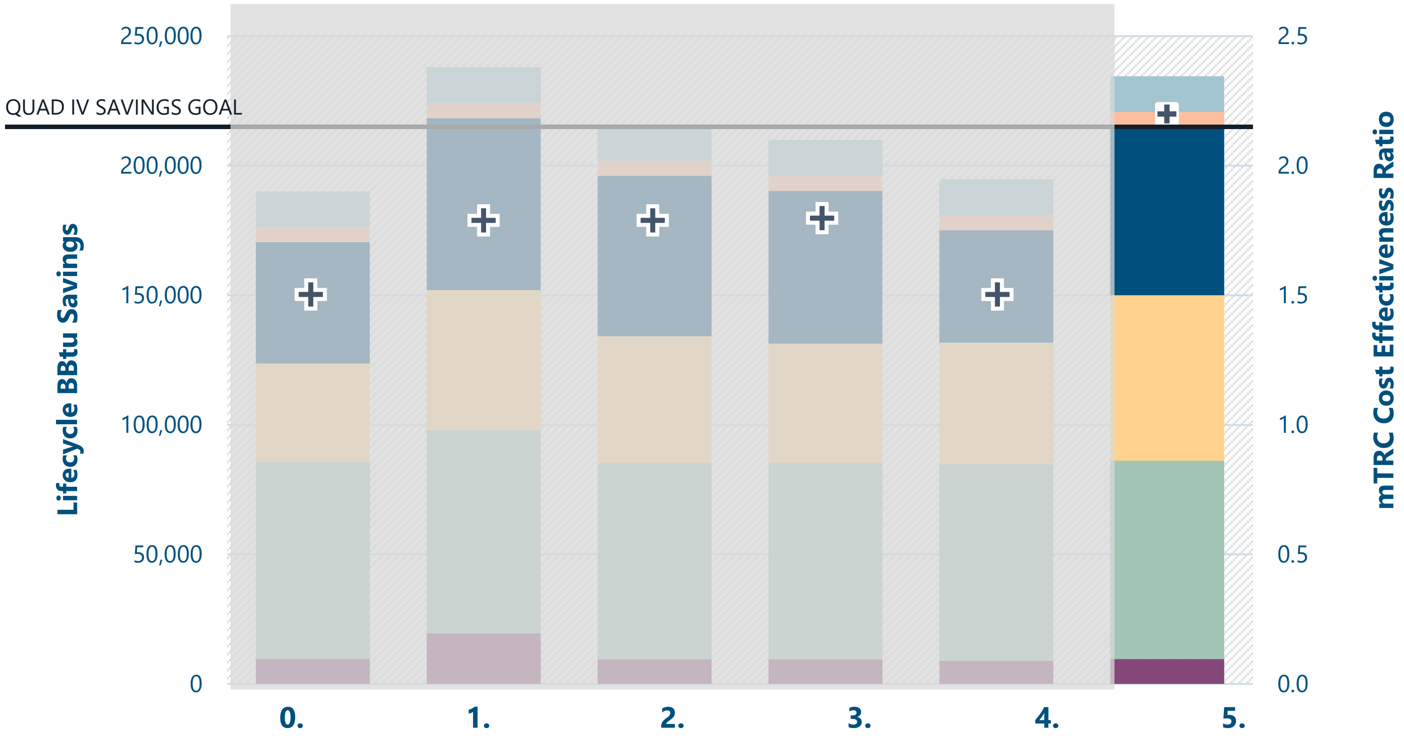
Scenario 4: Electrification-Focused

Sector	Adjustments	
	Accelerated	Added Electrification
Agricultural	No existing electrification offerings	High efficiency water heat electrification, process heat electrification
Commercial	No existing electrification offerings	Space and water heating heat pumps, cooking equipment
Industrial	No existing electrification offerings	Infrared heaters, electric induction melting, heat pumps for space heating, radio frequency heating, resistance heating
Residential	Heat pumps for space heating electrification	Clothes dryers, high efficiency cooking equipment, heat pump water heaters

Scenario 5: Cost Effectiveness-Focused



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Agriculture | Industrial | Commercial | Residential | Solar PV | New Construction

Portfolio mTRC Cost-Effectiveness Ratio

Discussion / Findings

- Scenario increases lifecycle carbon emissions reduction by 22%, energy savings by 23%, summer peak-reduction by 26%. mTRC increases 47%.
- Impact due to correlation of incentive cost with incremental cost: removing measures with high incremental cost (generally less cost effective) increases available budget for other measures.

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Scenario 5: Cost Effectiveness-Focused

Sector	Adjustments	
	Accelerated	Removed
Agricultural	Engine block heater timer, greenhouse climate controls, greenhouse unit heater, low speed fan, irrigation improvements, LED lighting, low energy livestock waterer, variable frequency drive for processes, variable speed control vacuum pump for dairy fans	Level 1 circulation fan, high efficiency gas water heat
Commercial	Air source heat pumps, boiler measures, efficient evaporator fans, energy management systems, IT System efficient rectifier, variable speed cooling tower fan, package terminal heat pumps, premium ductless air conditioner, variable speed control, water pipe insulation	Advanced rooftop units, building automation, heat pump water heaters, chillers, cooking equipment, commissioning DX package, Equipment tune-ups and maintenance, ground source heat pumps, package terminal air conditioner, tankless water heaters, variable refrigerant flow systems
Industrial	No specific measures accelerated due to the high cost-effectiveness of most industrial measures	Air conditioning upgrade, air source heat pump, chiller upgrades, electric induction melting, electric infrared heaters, HVAC commissioning, heat pumps, radio frequency heating, resistance heating
Residential	Small appliances, furnaces, heat pump pool heaters, heat pump water heaters, water flow measures and pipe insulation	Advanced efficiency dishwashers, heat pumps, and clothes washers, efficient windows, bathroom fans, energy recovery ventilators, induction cooking range, LED connected lighting, WIFI water heater controller, electric vehicles chargers, tune-ups, weatherization projects

Optimized Potential / Adoption Simulations

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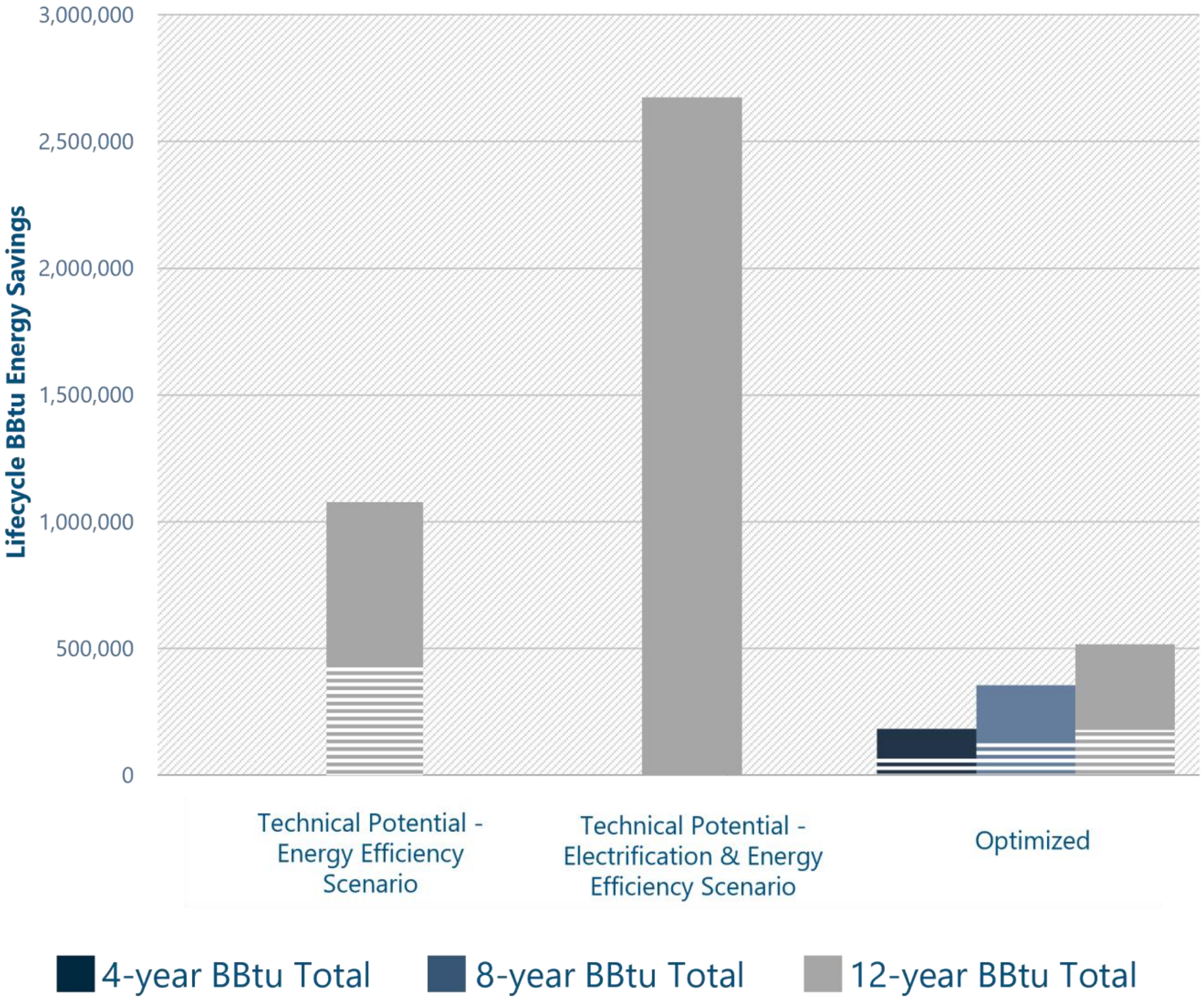
Approach

- Optimized potential uses same incentive and program budget assumptions as scenario potential and predicts long-term impacts, accounting for measure interactions and changing codes and standards
- Optimized potential similar to baseline program scenario, but not calibrated to past program accomplishments

Optimized Potential / Adoption Simulations



*** Striped = Electric Savings; Solid = Gas Savings**

Discussion / Findings

- By 2038 Focus on Energy achieve approximately 50% of EE scenario technical potential, for both electric and gas savings
- Predicted savings are significantly lower relative to technical potential when including electrification measures
- While the study includes a 12-year planning horizon, both technical potential and optimized potential will change as new technologies introduced and market conditions change

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Key Study Takeaways / Considerations for Quad V Planning

Key Takeaways and Quad V Planning Considerations

- Program planning choices heavily dependent on Focus on Energy's objectives and priorities between saving energy, reducing emissions, or managing demand. Competition between priorities can reduce overall impacts, as measures "compete" for fixed budgets. Increasing program budgets can reduce this competition

- The business-as-usual approach (baseline scenario) offers most diverse measure mix, other scenarios with fewer options have higher energy savings, emission reductions and demand reduction, but fewer offerings.

- The emission-focused program scenario best option for achieving both overall energy savings and for capturing the greatest reduction in emissions. Scenario also reduces acquisition costs and increases portfolio cost effectiveness. However, scenario removes large number of measures, some of which are impactful for reducing summer peak demand.

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Key Takeaways and Quad V Planning Considerations

- Electrification scenario offers limited energy and emissions savings. Customers' willingness to adopt is lower than for energy efficiency projects, making it more difficult and costly to spur customers to act. However, should electrification measures be adopted, they offer very substantial energy and emissions savings, but will increase peak electric demand (especially in winter).

- Increased electric peak demand could be mitigated by energy efficiency measures, as illustrated in the peak-focused scenarios. Adopting a broad set of programmatic options focused on proven summer peak electric energy reduction and demand management strategies can be beneficial for grid management.

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Key Takeaways and Quad V Planning Considerations

- Cost-effectiveness-focused scenario has substantial impacts on energy and emissions savings, peak reduction, and cost effectiveness. However, designing a portfolio focused on cost-effective measures limits program participant choice, including many measures that customers may value.

- Less cost-effective measures can serve as “door openers” for customers to engage with energy efficiency programs. Limited focus on fewer measures may reduce opportunities to cross promote programs and measures within the portfolio. However, focusing on measures with the lowest incremental costs and removing those with the highest costs maximizes the budget available for high-saving measures, and could enable Focus on Energy to invest in higher incentives and more targeted and higher touch marketing strategies.

- Offering comprehensive measures and a diversity of program options is likely most beneficial for customers and the easiest approach to get customer engagement.

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Key Takeaways and Quad V Planning Considerations

- Designing an entire portfolio focused on a single objective, such as only promoting emission reduction measures, limits offering diversity of options. To address this limitation consider:
  - Design program attributes that focus on key objective by increasing incentives or decreasing incentives on existing measures (rather than fully removing measures from the portfolio)
  - Develop separate programs or program components with its primary goal to promote a single objective with enhanced incentives or market strategies (rather than redesigning an entire portfolio)
  - Promoting a new objective may require developing new tracking metrics such as $ / emission reduction
  - Regional benchmarking shows that program budgets and acquisition costs increasing, suggesting that increased budgets likely necessary to maintain current level of impact

CADMUS

Study Dashboard

Thank You / Q&A