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focus on energy℠
Partnering with Wisconsin utilities

Planning Study
Fifth Stakeholder Meeting – Draft Results

July 31, 2025

Agenda

PSC Updates

Recap of Study Objectives and Timeline

Recap of Levels of Potential, Study Metrics, Study Scenarios

DRAFT Results

- Technical Potential (Energy, Peak Demand, Emissions)
- Cross-Cutting Program Scenarios
- Program Scenario Details

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PSC UPDATES

Quadrennial Planning Process V, Docket 5-FE-105

Pre-Scoping request for comments due by Monday, August 11, 2025, at 1:30 PM CT

Purpose:

- **Receive stakeholder feedback on priority topics for consideration in the scope of QPP V.**
- **Identify issues to emphasize that build upon prior Commission decisions for Focus.**
- **Identify stakeholder priorities that may cause the Commission to consider revisiting past decisions or taking up new or emerging issues.**
- **Inform Commission staff's development of a proposed scope for QPP V.**

Wisconsin Office of Energy Innovation

Questions from Stakeholder Meeting 4

Questions / Comments	Response
How does the budget in the Quad V baseline assumption chart compare to the current budget?	The proportions for each budget area in the Quad V study baseline budget assumptions are aligned with the current Focus budget. The total budget is larger, due to assumptions made about the allocation for Quad V.
In Scenario 1, how will the measures that have the "lowest emissions reduction potential" be identified?	Study focuses on the per measure impacts to identify measures with the lowest emissions reduction potential.
How will the emissions be characterized in Scenario 1?	Emissions include both gas combusted on-site and impacts from electric generation. For example, for a furnace that electrifies the study counts both the reduced gas emissions and the emissions from the corresponding increase in electric generation.
Are you using carbon dioxide or carbon dioxide equivalent?	The study measures emissions as CO_2. For electricity, it is the emissions factor from the Strategic Energy Assessment, calculated on an hourly basis.
Are the emissions lifecycle or first year emissions? It is getting difficult because the electric grid is changing and becoming less predictable than gas emissions.	Emissions are calculated based on a measure's lifetime, up through the end of the study period. The source for electric generation emissions is the Wisconsin Strategic Energy Assessment. Electric generation data is available through 2030.
Since the Focus budget is 60% business and 40% residential, what does the benefit-to-cost ratio look like between the two?	The budget allocation for the study scenarios is approximately 60% non-residential, 40% residential. Cost effectiveness varies by program within those sectors.
How will this study determine how much the measure incentives will be increased?	For residential measures incentive costs are based on current program offerings. For non-residential measures incentives are set as a fraction of measure incremental cost. The study will finalize incentive levels in coordination with the Program Administrator for final results.
Will these scenarios include assumptions about the need for customers who participate in the incentives to also see reductions in energy usage?	Simulation of uptake is based on adoption simulations that take into account bill impacts, customer price sensitivity and consumer perceptions. The study collected this data through surveys with all customer segments.
Would you be willing to share some of the assumptions that go into the model? For example, assumptions about how residential customers are sensitive to paying for an energy efficiency measure that would not decrease their bills over time.	The adoption model uses a curve that relates a market cap to payback period. These curves are based on survey data collected for this study. Each measure and population segment has its own curve. This data can be made available as part of final reporting.

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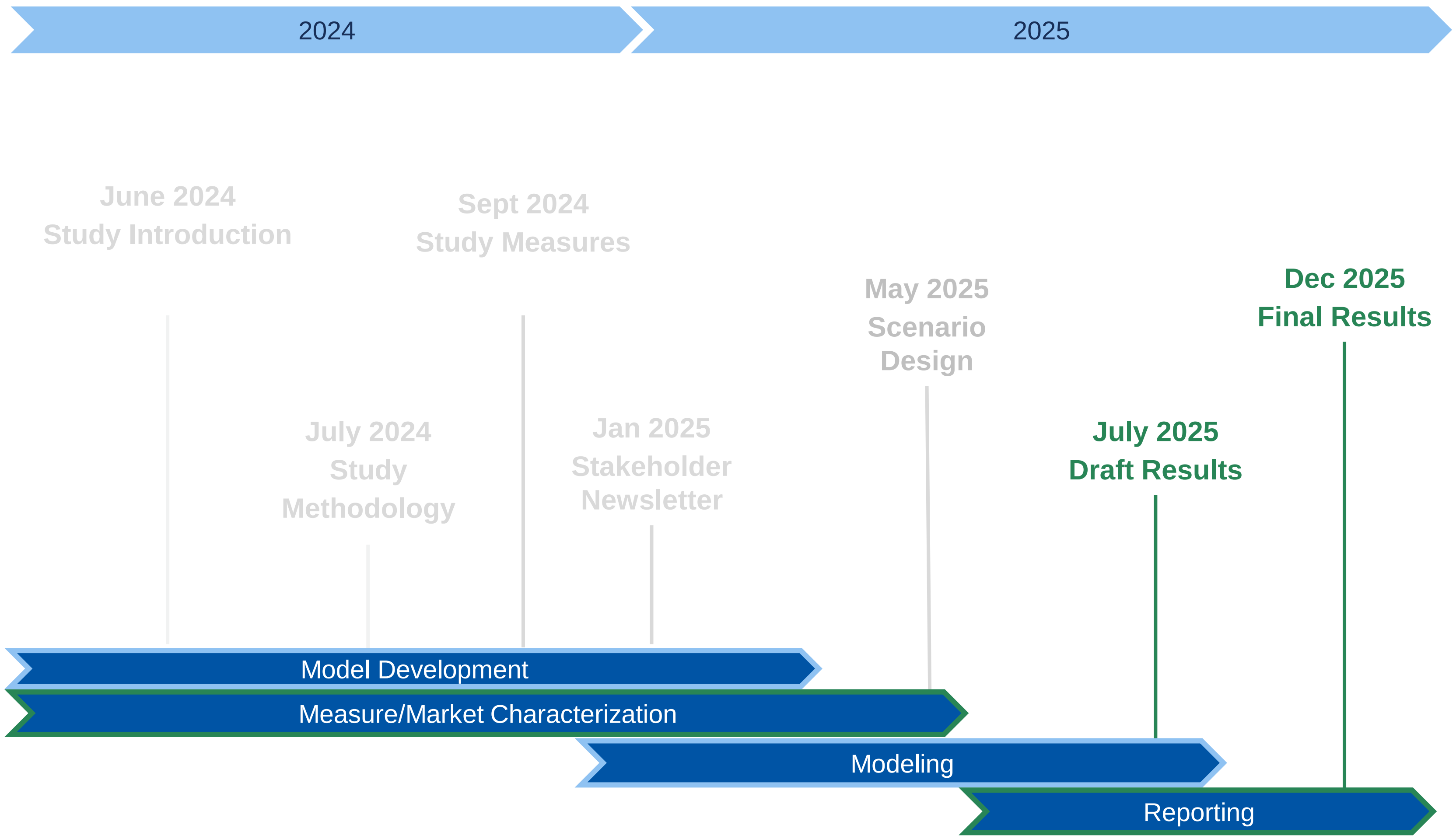
Study Objectives and Timeline

Study objectives to understand:

- How focusing on **emissions reductions** could impact energy savings
- The value of / tradeoffs between focusing on **demand reduction** versus energy savings
- Potential energy, demand, and emission reductions in Wisconsin **across customer segments**, particularly for income-qualified households
- Options for and potential benefits of policy and programmatic changes that promote further **fuel switching**



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Analysis Levels and Impacts Measured

Technical Potential

Theoretical maximum energy impact from energy efficiency and fuel switching

Economic Potential

Cost-effective compared to supply side alternatives

Adoption Simulation

Simulates **customer adoption** of technically feasible measures for **six scenarios.** Considers **financial incentives** (Focus on Energy and federal), **codes and standards, technological maturity** & **human behavior**

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 impacts** from study measures, accounting for **uptake outside of Focus on Energy** and **interactive effects**

Potential Study does not provide program targets

Program targets are developed based in part on optimized potential through comprehensive planning process

Hourly Impact Measurements

Reporting Metrics / Measures

Electric Energy Efficiency and Distributed 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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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)

Scenarios primarily changed incentive levels on margin of program offerings, leaving core measures consistent with baseline / status quo scenario

Draft Scenarios Overview

Scenario Number	0	1	2	3	4	5
Scenario Name	Baseline / Status Quo	Emission Reduction-Focused Program Design	Summer and Winter Demand Reduction-Focused Program Design	Electrification-Focused Program Design	Focus Funding Doubled	Cost Effectiveness-Focused Program Design

Draft Results

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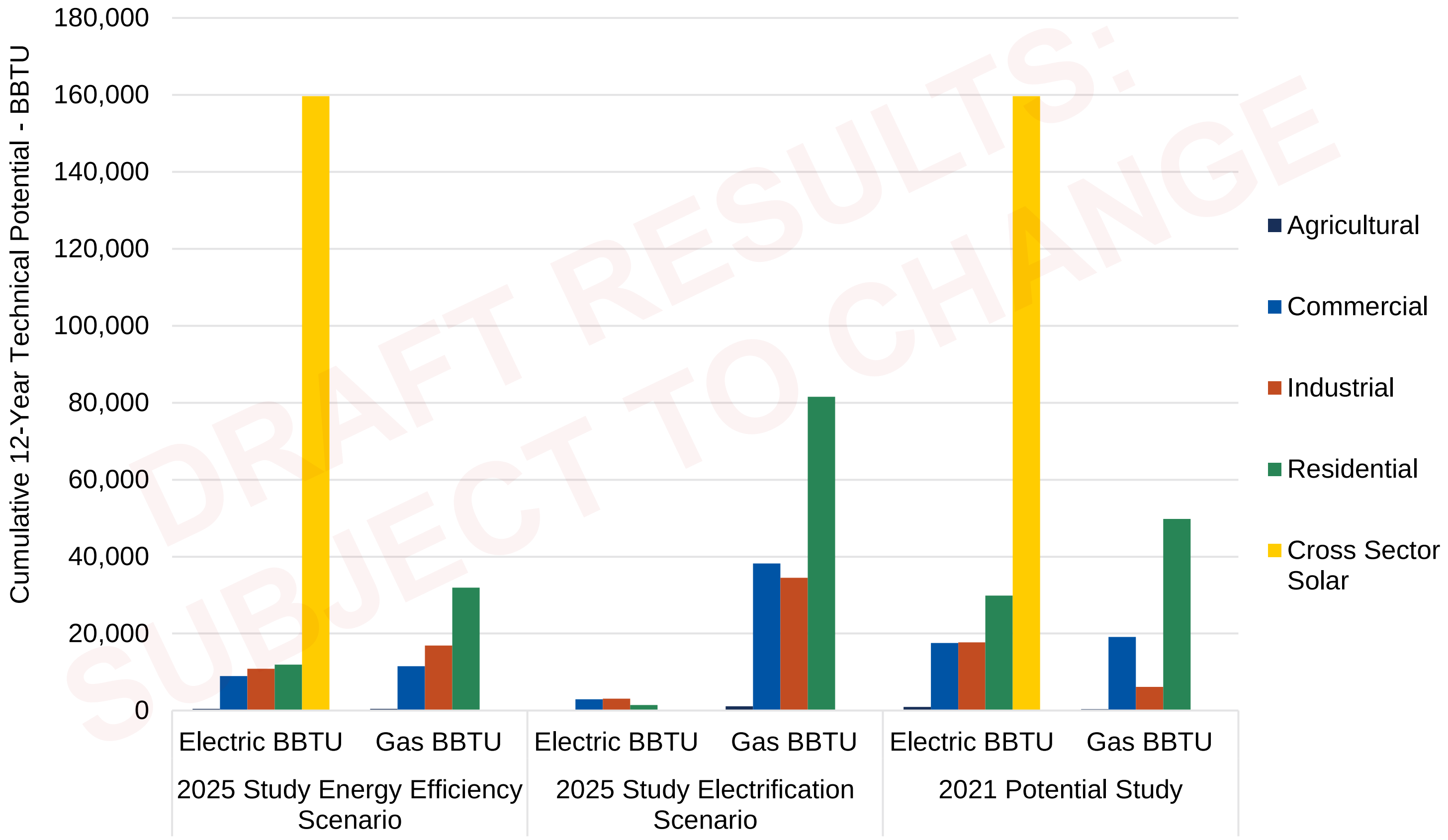
Technical Potential – Energy Impacts

Represents the total technical energy impact if every opportunity to make upgrades is taken

Energy Efficiency and Electrification reported separately because some equipment can take either pathway



Observations

- 2025 electric and gas technical potential less savings compared to the 2021 study
- 2025 characterized fewer measures while focusing on program measures
- Electrification scenario shows large potential shifts between electric and gas use
  - Energy efficiency savings convert fuels as end uses electrify
- While electrification technical potential is high, study research found significant hurdles to fuel-switching, including infrastructure investments

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Technical Potential – Energy Impacts

Energy Impacts – Percentage Reduction of 2026 Energy Sales – extrapolated from Utility Data

Cumulative 12-Year	*Energy Efficiency*		*Electrification*	
	% of Baseline Electric Sales	% of Baseline Gas Sales	% of Baseline Electric Sales	% of Baseline Gas Sales
Agricultural	0.2%	0.1%	0%	0.2%
Commercial	4%	3%	1%	11%
Industrial	5%	5%	2%	10%
Residential	6%	9%	1%	24%
Cross-Sector Solar	79%			

Technical Potential – Peak Demand Impacts

Peak Demand Impacts (12-Year)

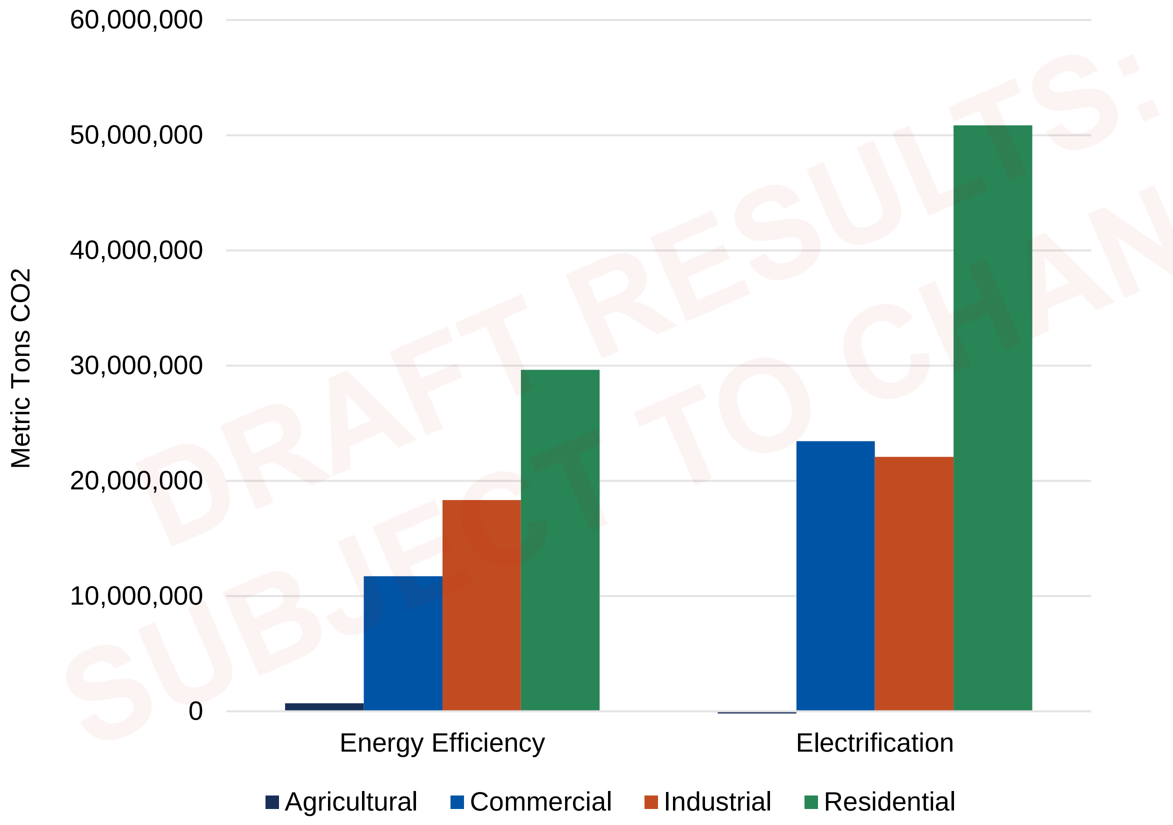
	Summer MW	Winter AM MW	Winter PM MW	Winter Therm-day
Energy Efficiency				
Agricultural	34	0	0	9
Commercial	484	467	345	714,094
Industrial	601	583	583	371,980
Residential	549	529	518	1,782,636
Electrification				
Agricultural	34	0	0	5
Commercial	608	587	428	313,294
Industrial	173	168	168	759,861
Residential	508	44	62	2,151,138

Observations

- Peak impacts measured as average over weekday hours during summer and winter months
- Energy Efficiency Scenario - Total summer electric peak demand reduction of 1,668 MW
- Electrification Scenario - Total net summer electric peak demand reduction of 1,323 MW due to increase in electrified summer loads
- Winter MW reductions mostly offset by added load from electrification

Technical Potential – Emissions Impacts

12-Year emissions impacts measured over a measure's lifecycle over study period



Observations

- Impacts account for changes to WI grid using current Strategic Energy Assessment through 2030
- Electric generation still highly natural gas dependent in near term, longer-term generation changes can improve carbon reduction of electrification, as indicated in this long-term perspective
- WI 2018 total statewide carbon emissions were 154 million metric tons

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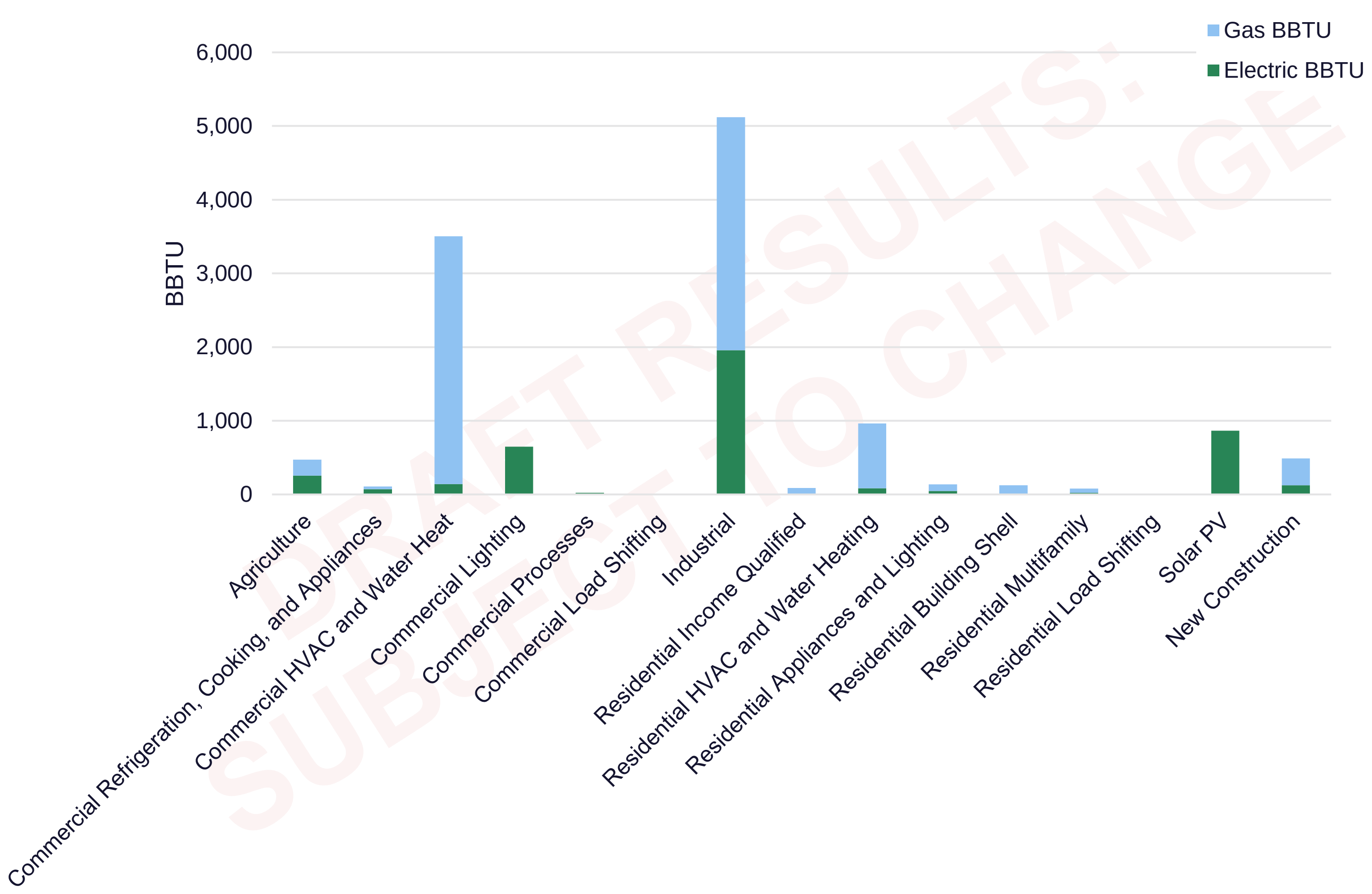
Scenarios 0: Baseline Energy Impacts

Cumulative 4-Year (Quad 2027-2030)



Observations

- Baseline energy savings aligned with current program delivery (further refinement needed for final results)
- Industrial program accounts for 42% of energy savings in baseline program design
- Commercial programs: 38% of portfolio
- Residential: 23% of portfolio
- Distributions of energy savings do not align perfectly with budget distribution, non-residential measures can more efficiently achieve savings

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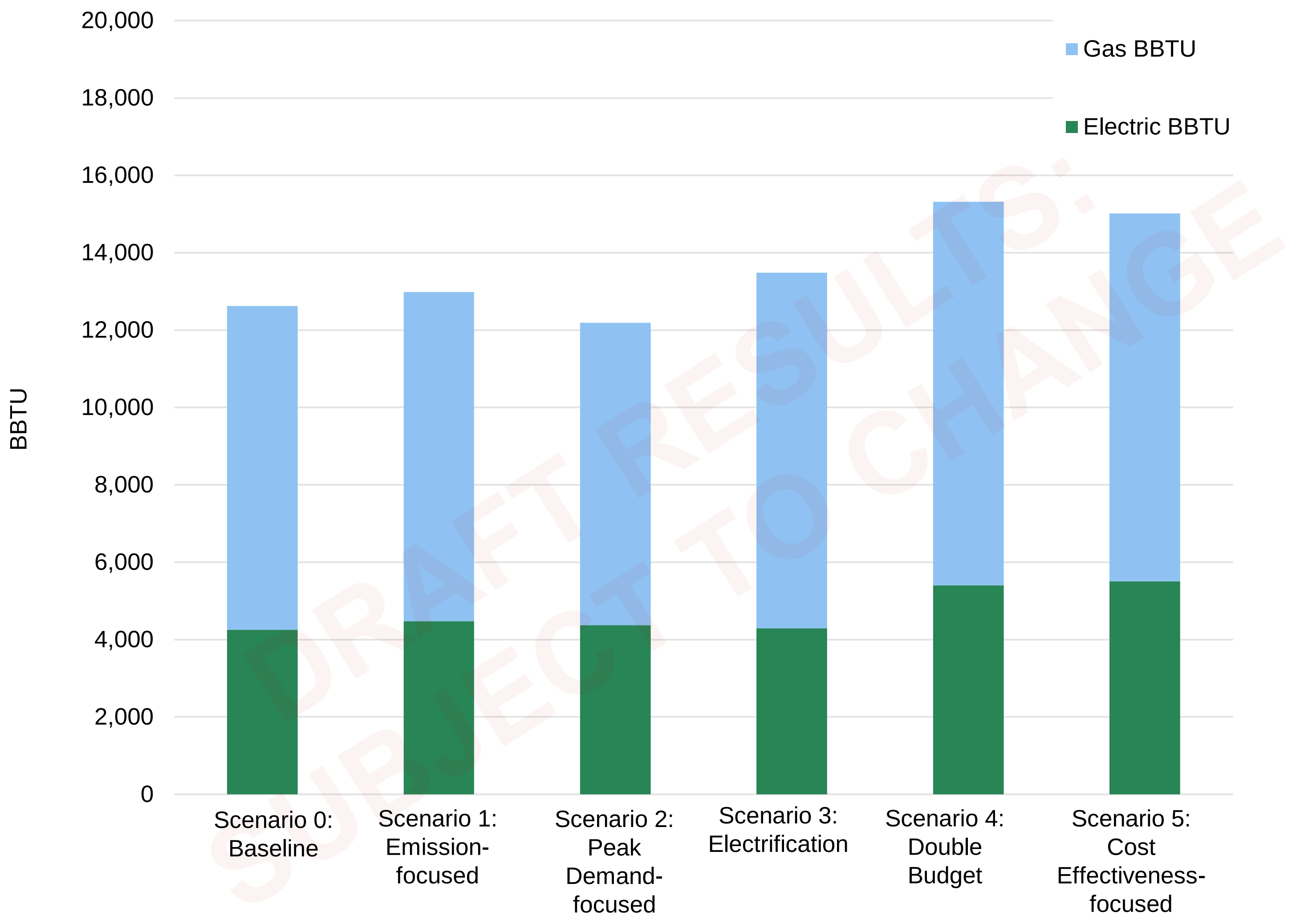
Program Scenarios – Energy Impacts

Cumulative 4-Year (Quad 2027-2030)



Observations

- Normalized energy impacts primarily from natural gas savings in all scenarios (savings approximately 0.5% of energy sales). Electric and gas savings roughly proportional energy sales distribution (statewide there is more building gas than electric energy consumption)
- Baseline scenario optimized to align with current program design: marginal measure changes have relatively small impact on energy
- Scenario 3 increase driven almost exclusively by residential electrification – commercial and industrial impacts very limited
- Doubling program budget does not result in doubling energy impacts due to modeling approach for draft results, including budget allocations to programs and market adoption assumptions

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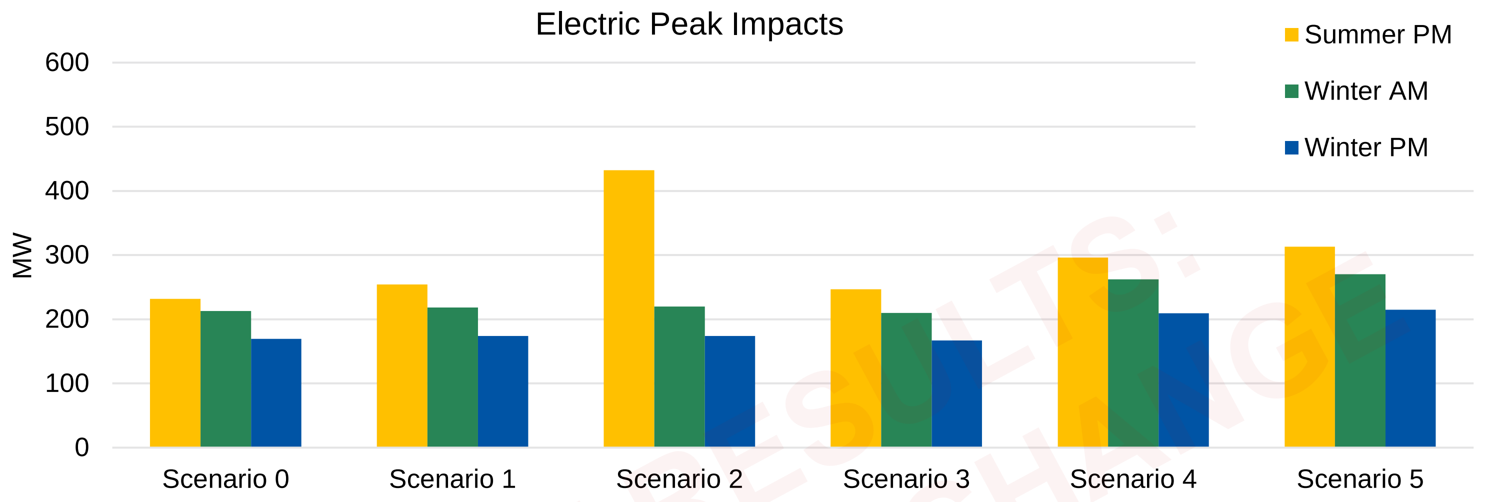
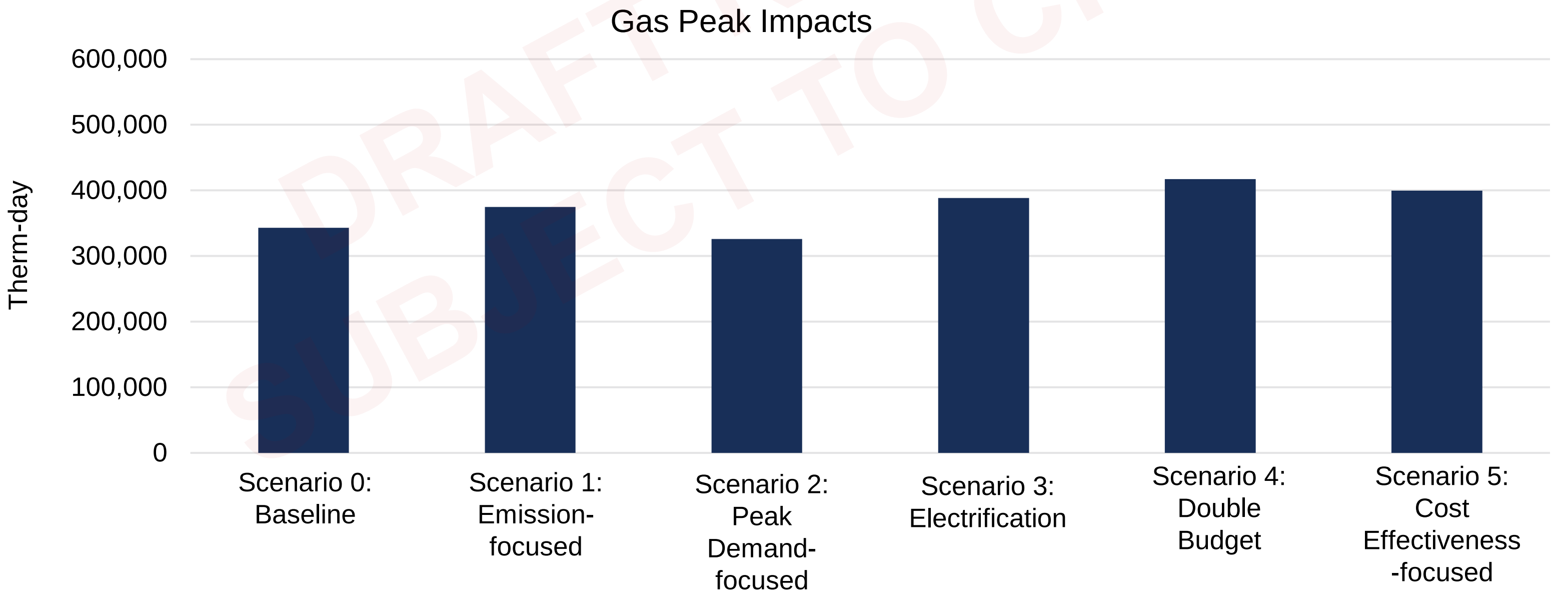
Program Scenarios – Peak Demand Impacts

Cumulative 4-Year (Quad 2027-2030)





Observations

- Scenario 2 has the biggest impact on summer demand
- Doubling budget has less impact than Scenarios 2 and 5, indicating measure mix is more influential than program budget for MW reduction
- Adding a load-shifting program can reduce peak demand significantly (44% of summer peak impacts from load shifting program)
- Attempting to optimize peak performance across various peak definitions results in trade-offs that make a net-peak impact small
- Optimizing scenario for a single peak impact may yield more impactful overall results

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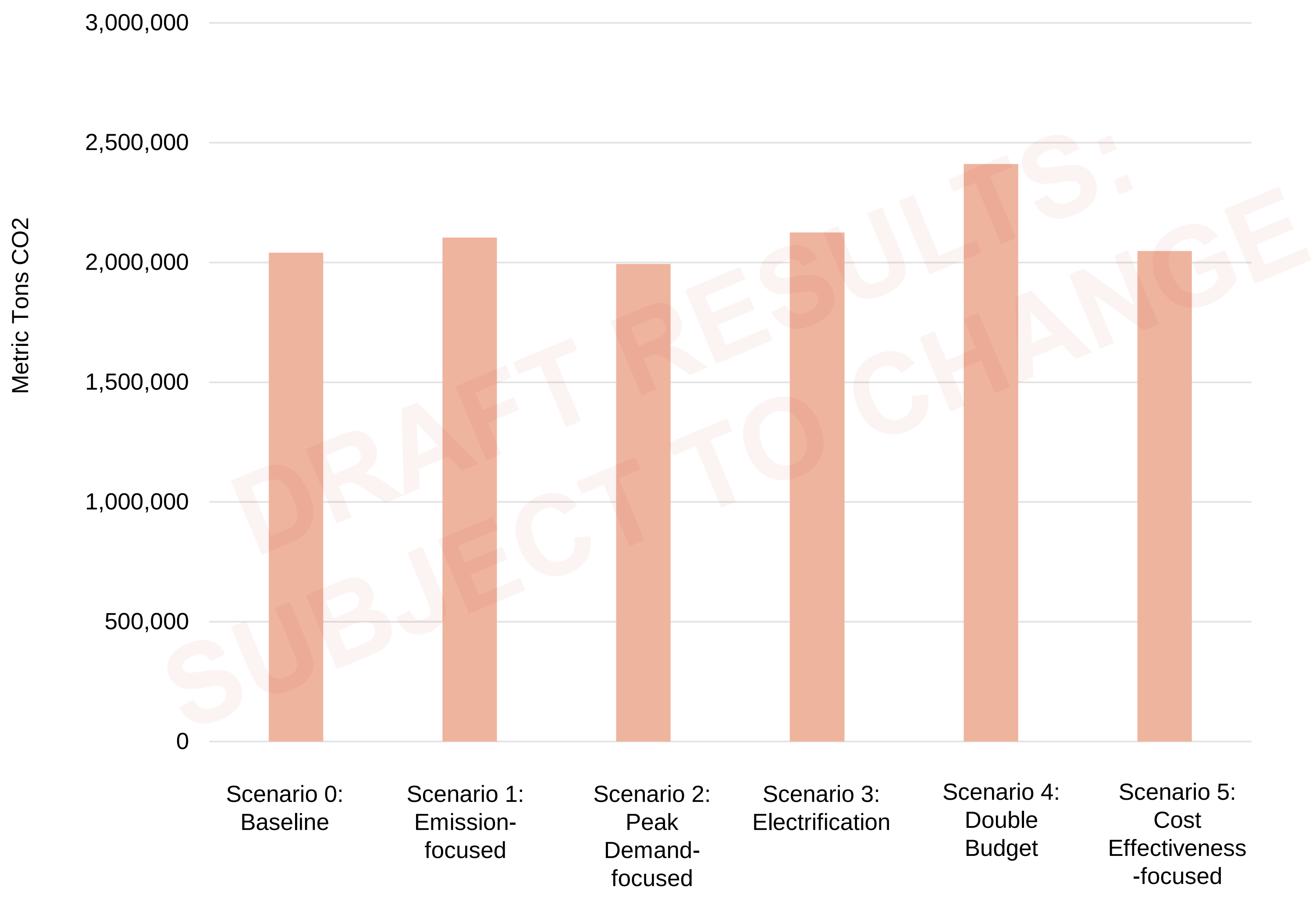
Program Scenarios – Emissions Impacts

Cumulative 4-Year (Quad 2027-2030)



Observations

- Scenario 1 shows a relatively small increase in CO2 savings, partially due shifting program offerings on margins
- Emissions impacts spread across a wide range of measures, including electrification, natural-gas and electric savings measures, suggesting that core/traditional energy efficiency measures are effective at achieving emissions reductions under current / projected grid conditions
- Building shell improvements can impact building stock emissions across fuels

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Scenario 1: Emissions-focused

Sector	Adjustments		Outcomes
	Incentives Removed	Incentives Increased	
Commercial	Non-boiler HVAC, water heating, and cooking measures	TLEDs, EMS, and several boiler upgrades	3% increase in CO_2 savings with small shift of fuel mix to electricity. Changing mix of measures reduced sector cost effectiveness by 4%
Residential	Primarily electrification measures	Gas furnaces and water heating, weatherization measures with both gas and electric savings	62% increase in CO_2 savings, primarily from HVAC and water heating. Increase in electric (60%) and gas (30%) savings. 25% reduction in cost-effectiveness due to changed measure mix
Industrial	HVAC Commissioning, Air Conditioning Upgrade, Air Source Heat Pump Upgrade, Compressed Air - Mist Eliminators, Economizer Upgrade, Radiant Heater, Advanced Rooftop Unit Controller, Ventilation Upgrade, Spline Upgrade	High Efficiency Injection Mold Machines, Strategic Energy Management, Pump Upgrades and Drives, Operations and Maintenance, Fan Upgrades and Drives, Boiler Draft Fan VFD, Variable Speed ECM Pump - HVAC Space Cooling Recirculation, Boiler Controls, Cooling Tower Fan Upgrade	1% increase in CO_2 savings, primarily from electric saving measures. Small increase due to budget cap. Like baseline scenario, decrease in savings seen in the fourth year of each quad when the budget exhausted. Changing measures mix increased sector cost effectiveness by 5%
Agricultural	Grain dryer tune-ups, engine block heaters, water heaters, horticultural lighting, livestock waterers, crate heaters, and reduced other low-carbon-impact measures	Process heat improvements and dairy refrigeration tune-up	Even after rebalancing the mix of measures, adjustment had limited impact on emissions

Scenario 2: Peak Demand-focused

Sector	Adjustments: Incentives Removed	Adjustments: Incentives Increased	Outcomes
Commercial	Most non-gas HVAC and water heating upgrades	Added load shifting program and increased incentives for lighting, VSDs, boiler upgrades, and refrigeration	Increased gas peak savings 2% and gas savings 3%. Significant increase in summer peak reduction due to load shifting program. Cost effectiveness increased due to low incremental cost of thermostat controls
Residential	Electrification measures	Added load shifting program and increased incentives for diverse HVAC and shell measures	Load shifting program is primary driver of electric peak impacts (>100% increase Summer PM peak savings, primarily due to thermostat controls)
Industrial	Measures with low gas savings to increase available budget for high-electric saving measures: Compressed Air - Heat Recovery, Steam Trap, Pulper Rotors, Compressed Air - Mist Eliminators.	All scenarios run with increased incentives led to lower electric savings due to meeting budget cap faster	Increased electric peak demand savings compared to baseline. Based on unique nature of industrial facilities' processes maximum demand savings likely achieved with customized approaches
Agricultural	All agricultural measures currently have the same load shape		

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Scenario 3: Electrification

Sector	Adjustments: Incentives Removed	Adjustments: Incentives Increased	Outcomes
Commercial	None	Added electrification measures not already offered in residential protfolio, increased incentives for existing electrification measures. Relatively modest uptake in non-residential sectors due to economic and behavioral barriers.	Minimal uptake of electrification measures in commercial sector with small impact on study metrics
Residential			Initial adoption simulation show steady uptake of electrification measures with positive impacts on gas savings and negative impacts on cost effectiveness. Draft results require further QC and review.
Industrial			1% increase in gas savings over first four years due to limited adoption. 4% percent increase in gas savings and 14% reduction in electricity savings over 12 years. Budget cap reached in the fourth year of quad, limiting uptake further.
Agricultural			Modest uptake of electrification measures Electric savings decrease mostly from less efficient use of funds

Scenario 4: Double Program Budget

Sector	Adjustments	Outcomes
Commercial	Across all sectors doubled incentive budget and made marginal increases to incentives Increased admin budget by 50% for each program Maintained baseline scenario measure mix	56% increase in electric savings and no impact on gas savings. Cost effectiveness decreased 28% due to changes to measure mix
Residential		Approximately 60% increase in electric and gas savings, but cost effectiveness decreased by 6% due to resulting changes in measure mix
Industrial		Increased savings by 20% compared to baseline. Budget no longer constrains the savings that can be achieved. Other scenarios have a decrease in savings in the fourth year of a quad because budget runs out. Savings potential is limited by customer adoption – not the budget (not all extra budget spent).
Agricultural		Increased savings by 60% with minimal impact to the sector cost effectiveness

Impacts, when reported by sector and fuel may appear larger than in total, due to distribution of sector and fuel savings across the portfolio

Scenario 5: Cost Effectiveness-focused

Sector	Adjustments		Outcomes
	Incentives Removed	Incentives Increased	
Commercial	Removed incentives for 18 measures, including tune-ups, chiller upgrades, some refrigeration, and VRF	Increased incentives for 20 measures, including lighting, boiler upgrades, and EMS	5% increase in electric savings and 17% increase in gas savings
Residential	Removed incentives for highest-cost weatherization measures	Increased incentives for measures with highest cost-effectiveness, including furnaces	Increased electric and gas savings by 60% and 65%, increased cost effectiveness by 6%
Industrial	Removed 11 measures that were not cost effective, mainly gas saving measures - Air Conditioning Upgrade, Air Source Heat Pump Upgrade, Boiler – Custom, Boiler Controls, Boiler Management, Boiler Pipe Insulation, Cooling Chillers Upgrade, Lime Kiln Improvements, Process Heat Recovery, Radiant Heater, Ventilation Upgrade	None	Increased electric savings by 53% but decreased gas savings by 5%. Increased cost effectiveness by 17%. Industrial electric measures higher cost effectiveness than gas measures
Agricultural	Removed incentives for 3 high-cost, low-saving measures (circulation fan, water heaters, and irrigation pressure reduction)	Increased incentives for 6 measures, including lighting and greenhouse upgrades	4% increase in electric savings and 12% increase in gas savings. Cost effectiveness increased by 25%

Thoughts for Final Analysis

Scenario Design Principles

Scenario optimization may be achieved through shifting budgets between programs. For example, most scenarios did not adjust solar or new construction program budgets. Study team will continue to work with Program Administrator staff to ensure modeling assumptions are reasonable for operating a future program

Varying Budget Impacts

Budget increases can have distinct impacts in different sectors and for different measure types. For example, maximizing cost effectiveness had a similar energy savings impact as increasing program budget

Measure Targeting

Introduction of load shifting program had significant impact on summer peak demand. Focusing more on specific measure groups in existing programs could increase scenario impacts. Increasing incentives for measures that are already attractive can impact overall savings negatively by consuming program budgets

Longer Term Analysis of Program Impacts

12-year trends may show higher scenario impacts as adjusted measure adoption rates mature. Timing of measure mix changes may matter particularly for electrification

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Thank You and Discussion

Next Steps:

- Slides and recording will be posted to the Study website
- Stakeholders please provide written feedback by **August 31**
- Cadmus will circulate summarized stakeholders feedback by September 30
- To develop final results Cadmus will continue to conduct QC and adjust model inputs as needed

Last Stakeholder Meeting:

- December 2025: Final Results

Your input is important, please send us feedback

Jeremy Eckstein at Cadmus (Jeremy.Eckstein@cadmusgroup.com)

Casandra Guillen at Cadmus (Casandra.Guillen@cadmusgroup.com)

Mitch Horrie at PSC (Mitch.Horrie@wisconsin.gov)