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Analyzing Alternate Compliance Options for Restaurants: Energize Denver

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EXECUTIVE SUMMARY

The Energize Denver Building Performance Policy requires buildings 25,000 square feet and larger to meet energy efficiency targets based on building type. One of these building types is "restaurant" with a 2030 energy efficiency target of 194.1 energy use intensity (EUI). Through multiple years of engagement with stakeholders and refinement of the policy over time, and the Denver's Office of Climate Action, Sustainability and Resiliency (CASR) completing one final rules update in the spring of 2026, the city wanted to analyze restaurant energy efficiency measures to design an alternate compliance option for these building spaces.

Energetics Consulting Engineers LLC, with support from NORESCO and oversight from CASR, led an effort to develop an alternate compliance option for restaurant spaces under the Energize Denver Policy. The project was structured around four tasks:

1. Researching best practices for restaurant energy efficiency
2. Conducting a technical analysis of restaurant energy efficiency measures (EEMs) and compliance impact
3. Engaging restaurant owners and stakeholders through a survey and focus groups
4. Integrating findings into a final pathway recommendation

The technical analysis estimated EEM savings across five end-use categories — lighting, domestic hot water, heating and cooling, refrigeration, and cooking equipment — using established Technical Reference Manual (TRM) and ENERGY STAR references. Combined, these measures are estimated to reduce restaurant space energy use by approximately 11%, translating to a 1% reduction in whole-building EUI. An estimated 30 out of 199 Denver buildings with benchmarked restaurants will meet their final compliance target as result of implementing the EEMs.

Informed by this analysis and stakeholder input, CASR adopted the Restaurant Target Adjustment that will increase a building's final target adjustment between 4 to 25 kBtu/ft²/yr, based on restaurant gross floor area. The target adjustment is available to buildings when restaurants demonstrate completion of six of seven prescriptive efficiency measures, or electrify one major piece of kitchen equipment currently powered by fossil fuel. The adjustment is estimated to increase applicable EUI targets by an average of 13.4%.

This white paper documents the research, technical analysis, stakeholder engagement, and final pathway design behind this recommendation.

BACKGROUND & PURPOSE

Energize Denver Overview

Energize Denver Building Performance Policy requires buildings 25,000 square and larger to meet an energy efficiency target by building type by a certain date or face penalties for non-compliance. Targets are set by building type at the 15th percentile of performance within that type, using either Denver benchmarking data or national Commercial Building Energy Consumption Survey (CBECS) data where local sample sizes are limited. The 'Restaurant' and 'Other – Restaurant/Bar' building types have a target of 194.1 kBtu/ft²/yr, reflecting the energy intensity of commercial food service.

The national median restaurant energy use intensity (EUI) reported in CBECS is 325.6 kBtu/ft²/yr. Denver's restaurants report a very wide range of EUI scores, which makes it very difficult for all to meet a specific target. Only five buildings in Denver greater than 25,000 square feet are standalone restaurants. Most restaurant square footage sits inside larger buildings, such as office or retail properties, that lease space to a restaurant tenant.

Project Scope & Approach

The project scope of work included four tasks:

- Task 1 – Research and Best Practices for the Restaurant Industry: Compile and review resources on energy efficiency best practices in commercial kitchens, in-house audit reports, and evaluate restaurant specific compliance considerations.
- Task 2 – Impact Assessment: Determine savings estimates for identified Energy Efficiency Measures (EEMs) to verify potential impact on restaurant and whole building EUIs as related to Energize Denver targets
- Task 3 – Stakeholder Engagement: Gather input from restaurant owners, restaurant associations, and building owners through a survey and focus group sessions.
- Task 4 – Final Pathway Development: Integrate research findings and technical analysis with stakeholder feedback to define, refine, and finalize an alternate compliance option.

TASK 1: RESEARCH AND BEST PRACTICES FOR THE RESTAURANT INDUSTRY

Industry Resources Reviewed

The project team compiled and reviewed established energy efficiency resources for commercial kitchens and food service facilities, including Technical Reference Manuals (TRMs) from Xcel Energy, Massachusetts, New York City, Illinois, and the Wisconsin Focus on Energy program; U.S. Department of Energy and EPA ENERGY STAR guidance for commercial kitchen equipment; and the CBECS restaurant energy use data. These resources provided industry standard energy savings estimates for the efficiency measures considered for the pathway.

Restaurant Database

To characterize typical restaurant space attributes relevant to pathway design, the team assembled a reference database for restaurants within buildings that included total gross floor areas, kitchen and dining gross floor area spaces, EUI benchmark, and an energy breakdown by function derived using CBECS restaurant data and available Denver benchmarking information. This database, together with the above resources, was used during the technical analysis stage to estimate savings and impact of potential EEMs, and to inform the selection of prescriptive measures for the final pathway and the target adjustment tiers described below.

Drivers of EUI Variance

Restaurants vary significantly in EUI mostly due to the differences in operational hours and kitchen to dining area ratios in addition to equipment energy efficiency. For example, a 24/7 diner uses cooking appliances, kitchen exhaust fans, and HVAC continuously, plus requires refrigeration and freezer capacity to support varied breakfast, lunch, and dinner menus leading to a high EUI. In contrast, a dinner-only restaurant operates for limited hours, requires less refrigeration capacity to store daily food deliveries for that evening's limited menu, plus can turn off unused equipment and adjust HVAC temperature settings during idle hours, resulting in a lower EUI despite comparable peak energy use during operation.

There are prescriptive upgrades that all restaurants can implement including LED lighting, smart thermostats, exhaust fan timers, reduced hot water temperature settings, tight refrigeration door seals, and fan motor upgrades in walk-in refrigeration equipment. The higher energy use diner would have a larger potential energy savings compared to the dinner-only restaurant due to the inherent differences in operations, yet may remain out of compliance using today's EUI limit for all restaurants. The wide range of restaurant EUIs highlights the necessity to consider operational factors and kitchen/dining area configurations when setting building performance energy targets using an alternate compliance option.

Structural vs. Addressable Factors

Several restaurant building characteristics are effectively fixed and unlikely to change before the compliance deadline:

- Kitchen-to-dining square footage ratio: major reconfiguration is costly and disruptive to ongoing restaurant operations.
- Kitchen hood and exhaust configuration: typically governed by fire code, with duct routing often constrained by the building's structure.
- Walk-in cooler/freezer shell: panels are frequently integrated in tight, back-of-house layouts.
- Utility infrastructure: gas piping, electrical service capacity, and ventilation shaft routing can limit electrification options depending on available utility service.

Outside of these structural constraints, addressable efficiency opportunities fall into three general categories, distinguished by cost and operational disruption:

1. Operational measures (no cost, ongoing improvements
2. Immediate (low cost, minor disruption, if any, to operations)
3. End-of Life replacement (high cost, disruptive to operations)

The project intended to focus on low-cost and operational improvements to develop an economically sound and approachable pathway for restaurants, such as those listed in Table 1.

Tier	Measure	Description
Immediate	Sub-metering / interval metering	Identify where and when energy is used
Immediate	LED lighting upgrades	Add occupancy/daylight controls where applicable
Immediate	Ventilation optimization	Demand-controlled kitchen ventilation; VFDs on hood fans
Operational	Operating schedule optimization	HVAC setbacks, exhaust scheduling, defrost cycles matched to hours of operation
Operational	Preventive maintenance program	Formal maintenance schedule for kitchen and HVAC equipment

Tier	Measure	Description
Operational	Staff behavior & training	Closing doors, shutting down idle equipment, using lids
End-of-Life	High-efficiency HVAC replacement	Replace aging Rooftop Units (RTUs) with high-efficiency units or heat pumps where feasible
End-of-Life	Induction cooking equipment	Replace gas ranges/fryers with electric alternatives, where service allows
End-of-Life	Heat pump water heating / refrigeration upgrades	Replace gas water heaters and aging refrigeration with high-efficiency electric options

Table 1. Addressable Measures By Ease of Implementation

TASK 2: TECHNICAL ANALYSIS

Analysis Approach

Using the restaurant reference database described in Task 1, together with national average restaurant EUI data, TRMs, and utility case studies and industry guidance, the team estimated typical energy savings for each prescriptive measure by end use and evaluated the resulting impact on both restaurant space EUI and whole-building EUI relative to Energize Denver targets. The analysis prioritized operational and equipment-based improvements that minimize capital investment, do not require major renovations, avoid significant labor increases, and can be implemented broadly across restaurant spaces.

End-Use Categories Evaluated

The technical analysis estimated EEM savings across five restaurant end-use categories:

- **Lighting** – Upgrade fixtures to LED, add controls
- **Domestic Hot Water** – Reduce temperature set-point, use faucet aerators and low-flow pre-rinse spray valves
- **Heating & Cooling** – Add smart thermostats to set back temperatures during off-hours
- **Refrigeration** – Clean coils, replace door seals, calibrate thermostats
- **Cooking Equipment** – Controls to stop operation during idle time

Combined, implementation of these measures across the restaurant database is estimated to reduce restaurant space energy use by approximately 20%, translating to an approximate 12% reduction in whole-building EUI for buildings containing restaurant space.

Impact on Building-Level Compliance

The team applied these savings estimates across the restaurant database of buildings with restaurant space citywide to evaluate the potential impact of the prescriptive measures on Energize Denver compliance, shown in Table 2.

Metric	Current Status (2025)	After Prescriptive Measures
Buildings with Restaurant Space Reviewed	199	199
Buildings Meeting Final Target	80 (40.2%)	113 (56.8%)
Average Energy Reduction Still Needed to Comply	22.1%	18.3%

Table 2. Estimated impact of prescriptive restaurant measures on building compliance

Overall, implementing prescriptive restaurant measures is estimated to increase the number of buildings with restaurant space reaching the 2030 energy efficiency target by 16.6%

Simple Payback Analysis

Simple payback estimates were compiled to support the recommendation of these EEMs for the alternate compliance option, using the TRM and ENERGY STAR references described in Task 1. Across all seven measure categories, paybacks are short, reinforcing that these are low-cost, low-disruption improvements that restaurant owners can reasonably implement to work toward compliance, shown in Table 3.

Measure	Primary End Use	Typical Simple Payback
Lighting Upgrade (LED)	Lighting	2–5 years
Domestic Hot Water setpoint reduction	Domestic Hot Water	< 1 year
Smart Thermostats / HVAC setback	Heating & Cooling	1–3 years
Refrigeration Tune-Up	Refrigeration	1–3 years
Kitchen Equipment Idle Controls	Cooking / Ventilation	1–2 years
Faucet Aerators / Low-Flow Pre-Rinse Valves	Domestic Hot Water	< 1 year
EC Motor Retrofit	Refrigeration / Ventilation	2–3 years

Table 3. Typical Simple Paybacks of Recommended EEMs

TASK 3: STAKEHOLDER ENGAGEMENT

Survey Methodology & Findings

A multiple-choice survey was distributed by email to restaurant owners and operators, property managers, and building owners, designed to be quickly completed while capturing key operating characteristics, familiarity with the Energize Denver policy, recent equipment upgrades, and interest

in future efficiency measures (see Appendix A). The survey received 13 responses. Key findings included:

- Most respondents (9 of 13) operate seven days a week, and most serve two or more meal periods.
- Nearly all respondents (12 of 13) lease their restaurant space rather than own it.
- Most respondents reported limited to no familiarity with the Energize Denver policy and its EUI targets prior to the survey.
- Respondents most frequently identified kitchen-to-dining area ratio, refrigeration capacity, and cooking equipment intensity as the factors that should matter most when setting restaurant energy targets.
- The efficiency measures respondents were most willing to consider were smart thermostats and refrigeration door/gasket replacement (9 of 13 each), followed by dishwashing chemical use and refrigeration controls (5 of 13 each).
- The most cited barriers to making energy upgrades were upfront cost, business disruption, and limited staff time.
- Refrigeration and ice maker equipment were the most replaced equipment types in the past five years.

Focus Group Feedback

The team convened focus group sessions with restaurant owners and operators, property managers, energy managers, and building owners to discuss compliance challenges and gather feedback on the results of the Technical Analysis from Task 2. Recurring themes from these sessions included:

- Participants expressed support for meeting the five prescriptive measures.
- Multiple participants were glad this issue was being addressed for restaurants.
- Identified potential additional prescriptive measures for future consideration.
- Noted that submetering restaurants is difficult due to shared HVAC systems and lighting circuits, though estimates for shared systems could be developed.
- Expressed interest in options to either isolate the restaurant EUI or have it contribute to a higher building-level EUI for compliance.
- Observed that dining area square footage has a significant impact on energy use.
- Suggested treating restaurants like an MAI space, using metrics such as table count or meals served to set EUI targets.
- Proposed normalizing EUI based on restaurant size and operating hours.

TASK 4: FINAL PATHWAY DEVELOPMENT

Informed by the research, technical analysis, and stakeholder input summarized above, Energetics and CASR worked together to establish a function that worked within the existing framework of standard target adjustments instead of breaking out restaurants into a separate alternate compliance pathway, as most restaurants are part of mixed-use buildings. The Restaurant Target Adjustment was created and adopted as part of the Energize Denver Building Performance Policy Rules And Regulations, effective August 27, 2026, outlined in the Energize Denver Benchmarking and Energy Building Performance Requirements for Buildings 25,000 Square Feet and Larger Technical Guidance (Section 5.4.3, v4.0, September 1, 2026), and summarized below. Using the same framework, an alternate compliance option was also created for buildings 5,000-24,999 square feet in the same rules update.

Eligibility

Eligibility for this adjustment applies to buildings that are data verified through the Data Verification or Standard Target Adjustment Submission, and benchmark the entire building or a portion of the building as the "Restaurant" or "Other – Restaurant/Bar" building type.

Adjustment Calculation

The target adjustment is based on the total gross floor area of all restaurant spaces in a building, not just one space. For example, if there is one restaurant in the building that is 5,000 sq. ft., the adjustment is based on that 5,000 sq. ft. If there are two restaurants in the building that complete the prescriptive requirements below, one at 5,000 sq. ft. and one at 8,000 sq. ft., the total adjustment would be based on a total of 13,000 sq. ft. All restaurants within a building must complete either option listed below for the building to receive the adjustment, partial credit will not be given.

The calculations for the restaurant target adjustment are as follows:

Restaurant Square Footage Range	EUI Adjustment (kBtu/ft²/yr)
< 1,000	4
1,000 to 2,499	6
2,500 to 7,499	8
7,500 to 14,999	10
15,000 to 19,999	12
20,000 to 24,999	13
25,000 to 29,999	14
30,000 to 39,999	18
40,000 to 99,999	20
100,000 +	25

Table 4. Restaurant Target Adjustment by square footage tier

The building owner has two options available for the restaurant(s) in their building to earn the target adjustment for the building: all restaurants must complete a list of typical kitchen energy efficiency measures (EEMs) or electrify a major kitchen appliance that is currently powered by fossil fuel.

Prescriptive Energy Efficiency Measures (Option 1)

A building owner must complete 6 out of the 7 energy efficiency categories listed below. Within the target adjustment application, the submitter must include supporting documentation that demonstrates these items have been completed.

Measure Category	Requirement
Lighting Upgrade	Upgrade fixtures to LED; add lighting controls where applicable
Domestic Hot Water	Reduce water heater temperature set-point to 140°F
Faucet Aerators / Low-Flow Pre-Rinse Spray Valves	0.5 GPM lavatory faucets; 1.28 GPM pre-rinse spray valve
Smart Thermostat(s)	Program off-hours setbacks: 85°F cooling / 60°F heating
Refrigeration Tune-Up (past 12 months)	Clean coils, replace door seals, calibrate thermostats
Kitchen Equipment Idle Control	Staff training and posted instructions to power down cooking equipment during off-hours
Electronically Commutated (EC) Motor Retrofit	Replace at least one single-speed motor in walk-in/reach-in refrigeration or exhaust ventilation equipment with a variable-speed EC motor

Table 5. Prescriptive Energy Efficiency Measure Categories

Note: CASR will address restaurants that cannot complete an energy efficiency measure due to a unique situation, such as historical building status or health code compliance, on a case-by-case basis.

Electrification Alternative (Option 2)

The restaurant or building owner may electrify a major kitchen appliance in the following list that is currently powered by fossil fuel, replacing it with an electric-powered unit. This action could have happened any time after November 22, 2021, provided there is proof that the previous equipment was powered by fossil fuel. The new appliance must be ENERGY STAR rated, if applicable. CASR reserves the right to consider additional equipment proposed by the owner on a case-by-case basis.

- Fryer
- Griddle
- Combination Oven
- Convection Oven
- Steam Cooker
- Domestic Water Heater serving the kitchen or restaurant

CONCLUSION

The Restaurant Target Adjustment reflects a deliberate effort to balance Denver's citywide energy efficiency and greenhouse gas reduction goals with the practical realities of restaurant operations. By combining an accessible set of prescriptive measures with a square-footage-based target adjustment, the pathway gives restaurant and building owners a clear, achievable route to compliance that recognizes the structural and operational factors that make restaurants unique.

APPENDIX A: SURVEY INSTRUMENT

The following survey was administered online and distributed to restaurant owners and operators, property managers, and building owners as part of Task 3 stakeholder engagement. The survey received 13 completed responses.

1. Choose your restaurant type:

Casual Dining / Fast Casual / Fast Food / Fine Dining / Family Style / Cafeteria / Other

2. How many tables?

0 / 1–5 / 6–10 / 11–20 / More than 20

3. How many days per week are you open?

Less than 5 / 5 / 6 / 7

4. Which meals are you open for? (check all that apply)

Breakfast / Lunch / Dinner / After 10 PM

5. Do you own or lease the space?

Lease / Own / Other

6. How familiar are you with Energize Denver and the energy efficiency targets established for your building?

Very familiar – I understand the requirements and how they apply to my business / Somewhat familiar – I've heard of it and have a general understanding / Not familiar – I have only vaguely heard of the program or not at all

7. What do you think makes the biggest difference in energy use in restaurants? (choose the top 3)

Size of kitchen compared to dining area / Type or intensity of cooking equipment / Total refrigeration capacity (cu.ft. of refrigerators and freezers) / Hours of operation / Types of restaurants (for example, quick-service vs. full-service) / Other

8. Which of the following cost-saving changes would you consider if they were financially feasible for your business? (check all that apply)

Smart thermostats to reduce HVAC use during off-hours / Timers to turn off exhaust fans during kitchen downtime / Use of chemicals for dishwashing to reduce hot water temperatures / Replace aging appliances with ENERGY STAR high efficiency units / Replace refrigeration door and drawer gaskets for improved seals / Upgrade walk-in evaporator motors for higher efficiency / Add refrigeration controls to optimize runtime

9. Are most of your lighting fixtures already LED?

Yes / No / Not sure

10. What are the primary barriers you face in making energy-related upgrades? (choose top 3)

Upfront cost / Business disruption/downtime / Limited time or staff / Lease or landlord restrictions / Utility or infrastructure limitations / Not sure what changes would help / Other

11. Have you upgraded any of the following systems or equipment types in the last five years? (check all that apply)

Cooking equipment (ovens, fryers, cooktops) / Kitchen ventilation (hoods/exhaust fans/make-up air units) / Refrigeration (walk-ins or reach-ins) / Ice Maker / Dishwasher / Hot Water Systems / Heating or Cooling systems

12. Do you currently have a maintenance program for appliances, refrigeration, and HVAC equipment?

Yes – we follow a formal maintenance schedule / Somewhat – maintenance is done occasionally, but not on a set schedule / No – maintenance is primarily done when something breaks

APPENDIX B: GLOSSARY OF TERMS

Term	Definition
CASR	Denver's Office of Climate Action, Sustainability and Resiliency
CBECS	Commercial Buildings Energy Consumption Survey (U.S. Department of Energy)
EC Motor	Electronically Commutated Motor (variable-speed)
EEM	Energy Efficiency Measure
EUI	Energy Use Intensity (kBtu per square foot per year)
GFA	Gross Floor Area
GPM	Gallons Per Minute
MAI	Manufacturing/Agricultural/Industrual (a building space type used elsewhere in Energize Denver)
TRM	Technical Reference Manual

APPENDIX C: TECHNICAL REFERENCE MANUAL CITATIONS

The following Technical Reference Manuals (TRMs) and supporting resources were reviewed during Task 1 to establish industry-standard energy savings estimates for the measures evaluated in this pathway.

Xcel Energy TRM

General reference for lighting, HVAC, and refrigeration measure savings applicable to Colorado.

Massachusetts TRM

- Motor VFDs

New York City TRM

General reference for commercial kitchen equipment savings estimates.

Illinois TRM

- ENERGY STAR Appliances
- ENERGY STAR Combination Oven
- ENERGY STAR Steam Cooker
- ENERGY STAR Dishwasher
- High-Efficiency Pre-Rinse Spray Valve
- Kitchen Demand Control Ventilation
- Pressure Fryers
- Efficient Cooktops
- High-Efficiency Water Heaters
- Heat Recovery Grease Trap Filter
- Water Boiler/Heater Tune-Up
- Q-Sync Motors in Refrigerators/Freezers

Wisconsin Focus on Energy TRM

- Lighting Controls
- Low-Flow Aerators
- ENERGY STAR Commercial Ice Machines
- Strip Curtains for Walk-In Refrigerators/Freezers
- Demand Controlled Kitchen Ventilation
- Demand Controlled Ventilation RTU
- Smart Thermostat

CBECS Restaurant Data

National restaurant energy use data, reviewed across multiple percentiles to characterize a realistic range of high-EUI restaurant profiles beyond the median.