



September 8, 2026

Via www.regulations.gov

Mr. Peter Cochran
Deputy Assistant General Counsel
Office of the General Counsel
Office of Critical Minerals and Energy Innovation
U.S. Department of Energy
1000 Independence Avenue SW
Washington, DC 20585-0121

Re: Joint Comments on DOE's Request for Information, Energy Conservation Program:
Review of DOE's Analytic Methods for Setting Energy Conservation Standards; Docket
No. EERE-2022-BT-OT-0004; 91 Fed. Reg. 41578 (July 7, 2026)

Dear Mr. Cochran:

The American Lighting Association (ALA); Air-Conditioning, Heating, and Refrigeration Institute (AHRI); Air Movement and Control Association (AMCA) International; Association of Home Appliance Manufacturers (AHAM); Consumer Technology Association (CTA); Heating, Air-Conditioning, Refrigeration Distributors International (HARDI); National Association of Manufacturers (NAM); North American Association of Food Equipment Manufacturers (NAFEM); Outdoor Power Equipment Institute (OPEI); Plumbing-Heating-Cooling Contractors Association (PHCC); Plumbing Manufacturers International (PMI); and Pool & Hot Tub Alliance (PHTA) (collectively, Joint Commenters) write to provide comments on the U.S. Department of Energy's (DOE or Department) Request for Information titled "Energy Conservation Program: Review of DOE's Analytic Methods for Setting Energy Conservation Standards" (Analytic Framework RFI); Docket No. EERE-2022-BT-OT-0004; 91 Fed. Reg. 41578 (July 7, 2026).

The Joint Commenters previously submitted comments on analytic methodology topics in response to prior DOE rulemakings and appreciate the opportunity to elaborate further on those topics in response to this Analytic Framework Request for Information (RFI). These comments present the Joint Commenters' broader assessment of the philosophical and structural foundations of DOE's analytic approach to setting energy conservation standards under the Energy Policy and Conservation Act ("EPCA"), rather than provision-by-provision technical recommendations, which the Joint Commenters may address in subsequent, more technical comments as appropriate.

Summary

The Joint Commenters believe that DOE's analytical approach has not kept pace with a changed marketplace, where successive rounds of standards have already captured most readily available energy savings, consumers have far more product information than when the framework was built, and underlying energy economics have shifted substantially. Building on the National Academies of Sciences, Engineering, and Medicine (NASEM) peer review report DOE commissioned, the Joint Commenters argue that DOE should demonstrate market failure before setting standards, better capture consumer value and distributional effects, fully account for manufacturer compliance costs, characterize and disclose uncertainty in its data and models, and increase the transparency of its life-cycle cost and national impact analysis models.

The comments frame this recommendation as consistent with the administration's deregulatory priorities under Executive Order 14154 and the "Gold Standard Science" criteria of Executive Order 14303, positioning a structural rebuild as an opportunity to reduce regulatory complexity and burden while producing a more defensible, transparent analytic foundation for future rulemakings.

I. The Analytic Framework Has Not Kept Pace With a Changed Marketplace.

The Joint Commenters agree with DOE's premise for this RFI: the analytic approach that DOE uses to set minimum energy conservation standards under EPCA warrants updating to ensure it is transparent, objective, and credible. We support DOE conducting a genuine review and adopting wholesale, durable, common-sense changes.

The core purposes of EPCA's minimum standards program remain sound. The statute is designed to conserve energy while correcting market failures, increasing consumer welfare, and minimizing the impact of federal standards on manufacturers and consumers alike. EPCA's preemption of state and local standards serves that same purpose: creating a stable, predictable national market rather than a patchwork of inconsistent requirements. The Joint Commenters support these core purposes and goals.

The marketplace these tools were built to analyze has changed significantly since EPCA's passage, and DOE's analytical approach needs to change accordingly. Across the product categories the Joint Commenters' members manufacture and distribute, successive rounds of DOE standards have already captured most of the energy savings that were readily available to capture.

For example, residential refrigerators have gone through four rounds of federal standards since 1989, and per-unit energy consumption has fallen by roughly three-quarters since 1972 even as average unit volume grew by about 30 percent. By DOE's own calculation, its most recent refrigerator standard, finalized in 2024, achieves only a modest efficiency gain relative to the least efficient models currently on the market, a far smaller increment than earlier rounds delivered. Residential dishwashers tell a similar story: after three rounds of standards since 1994, DOE's own December 2016 Final Determination concluded that further tightening would not be economically justified, and DOE's most recent dishwasher standard is projected to reduce covered product energy use by only about 2.6 percent, down from roughly 1.6 quadrillion Btu captured by the first federal standard. Central air conditioners and heat pumps have seen three rounds of increasingly modest gains since 1992, and the plumbing fixture standards enacted in the Energy Policy Act of 1992 remain the federal floor more than 30 years later. These examples illustrate a pattern across long-regulated product categories in which the marginal savings available from further standards have meaningfully diminished.

The information available to consumers has also changed substantially since EPCA's framework was first established. The Federal Trade Commission's EnergyGuide label has been mandatory since 1979. The ENERGY STAR mark, launched in 1992, is recognized today by roughly 89 percent of consumers.¹ ASHRAE Standard 90.1 informs commercial equipment specification and itself incorporates federal minimum equipment standards. Utilities now spend billions of dollars annually on rebate, audit, and demand-side management programs that did not exist in anything like their current form when the current analytic approach was first developed. Consumers today have access to a density of information about the products they buy that the original architects of DOE's analytic framework could not have assumed.

The economics underlying energy production and consumption have shifted as well. The shale gas revolution reduced the domestic price of natural gas by an estimated 63 percent and wholesale electricity prices by an estimated 45 percent since the early 2000s, according to the Council of Economic Advisers, fundamentally altering the cost relationships EPCA's framework originally assumed. DOE's own treatment of these questions continues to evolve, including through the Department's proposal, in the companion 2026 Process Rule Notice of Proposed Rulemaking, to no longer treat environmental factors as part of its economic justification determination.

An analytic apparatus built for a marketplace that existed 30 or more years ago cannot be assumed to correctly weigh the costs and benefits of standards today. The sections that follow identify where that mismatch shows up most clearly and explain why the Joint Commenters believe this RFI is best used as an opportunity for structural reconsideration of DOE's analytic framework rather than piecemeal adjustment.

¹ U.S. Environmental Protection Agency, *National Awareness of ENERGY STAR, 2022: Analysis of 2022 CEE Household Survey* (2023), <https://www.energystar.gov/about/energy-star-brand/star-consumer-awareness>.

II. DOE Should Rigorously Establish Market Failure Before Setting Standards.

The National Academies of Sciences, Engineering, and Medicine (NASEM) prepared a peer review report that DOE commissioned in 2019, covering the analytic methods, models, and assumptions the Department uses to set energy conservation standards under EPCA.² The recommendations of that peer review study form the basis for this RFI.

The Joint Commenters support the central instruction running through the NASEM report's market-failure recommendations:

- DOE should identify and characterize an actual market failure before concluding that a standard is economically justified, rather than presuming one exists.
- Consistent with NASEM Recommendation 2-2, DOE should find a significant failure of private markets, or irrational consumer behavior, in the no-standards case before concluding that a standard meets EPCA's economic justification requirement.
- Consistent with Recommendation 4-13, this is particularly true for commercial goods, where market actors should be presumed to behave rationally absent evidence to the contrary.
- Consistent with Recommendation 4-14, DOE's evaluation of market failure should look beyond demand-side assumptions to a broader set of potential supply-side effects, including how standards might affect the number of competing firms, price discrimination, technological diffusion, and collusion risk.

DOE's RFI poses the question of market failure separately for residential and for commercial and industrial products, and the Joint Commenters agree that it is important to evaluate market failures separately for residential and commercial products, as there can be fundamental differences in the way these consumers make purchasing decisions. The academic literature on the so-called “energy efficiency gap” has itself developed disproportionately around residential markets, with comparatively little attention paid to commercial and industrial purchasing behavior. Where a genuine, well-documented market failure has been identified in the residential space, it tends to be a specific and identifiable structural problem, such as the “split incentive” that arises when the party selecting a product, a landlord, does not bear the cost of operating it, a tenant does, rather than a general finding of consumer irrationality.

By contrast, commercial and industrial purchasers of the Joint Commenters' members' products, including foodservice operators evaluating commercial refrigeration equipment, typically bear the operating costs of their own purchasing decisions directly and evaluate equipment using established total-cost-of-ownership practices, conditions that support treating rational purchasing behavior as the reasonable default DOE's own recommendations already contemplate.

The Joint Commenters also encourage DOE, as it responds to NASEM's technology assessment recommendations, to maintain a clear distinction between a minimum standards program and a program designed to advance pre-commercial innovation. A minimum standard is, by statutory

² National Academies of Sciences, Engineering, and Medicine. 2021. *Review of Methods Used by the U.S. Department of Energy in Setting Appliance and Equipment Standards*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25992>.

design, a floor whereby EPCA directs DOE to prescribe maximum efficiency improvement that is technologically feasible, economically justified, and draws on technology that is proven in the marketplace. This excludes technology still at the research and development stage.

As DOE considers NASEM's recommendations on screening analysis and technology readiness taxonomies, the Joint Commenters urge DOE to continue limiting the pool of technologies it analyzes to those that are well proven in the marketplace, acceptable to consumers, reliable over time, capable of consistent high-volume manufacture, and free of proprietary constraints. Maintaining this focus is consistent with, and reinforces, the emphasis on market-driven innovation and consumer choice reflected in Executive Order 14154 by ensuring that DOE's standards keep pace with what the market has proven and what consumers want as they make purchasing decisions.³

III. DOE's Models Must Better Capture Consumer Value, Choice, and Distributional Effects.

DOE's recognizes, and the Joint Commenters agree, that consumers purchase bundles of attributes, not energy efficiency alone. This drives two conclusions related to the analytical framework:

1. DOE's models should better reflect what consumers value; and
2. Averaging costs and benefits across the consumer population can obscure who bears them.

Consistent with NASEM Recommendation 5-1 and Recommendation 4-3, the Joint Commenters agree that energy savings are not the only, and often not the determining, attribute consumers weigh when purchasing covered products. Cycle time, cleaning and rinsing performance, capacity, noise, and other features factor into a purchasing decision alongside operating cost. The Joint Commenters support DOE's interest in discrete choice modeling as a genuine improvement over point estimate approaches to life-cycle cost, provided DOE commits the data collection resources necessary to make such modeling meaningful rather than adopting the concept without the underlying data to support it; DOE's own RFI acknowledges that building this analytic capacity will take time and resources, and the Joint Commenters encourage DOE to treat that investment as a priority rather than a formality.

DOE itself has recognized the dynamic created if it fails to correctly view how consumers make purchasing decisions. A standard that reduces energy or water use but degrades product performance can shift consumer behavior in ways that offset the intended savings, for example through more frequent re-washing, use of more energy or water intensive cycle settings, or a shift toward non-regulated product features. Although DOE has considered this factor in the screening analysis, joint commenters believe it warrants more careful consideration and weight in assessing potential energy conservation standards. DOE should more fully evaluate the performance attributes that provide actual value to consumers and consider any lessening of utility or performance related to those factors as it evaluates increasing minimum efficiency requirements.

³ Exec. Order No. 14154, "Unleashing American Energy," 90 Fed. Reg. 8353 (Jan. 29, 2025).

A related concern involves how DOE's current methodology treats the distribution of costs and benefits across the consumer population. Under DOE's present approach, for example, a standard that saves one consumer \$100, while imposing a net cost of \$90 on another, yields apparent savings of \$5. This outcome conceals two very different real-world results for two different consumers. DOE does not currently articulate a policy on what share of consumers experiencing a net cost from a standard would be considered acceptable, nor does its current analysis reliably measure that share.

The Joint Commenters raise this not to press for a specific numeric threshold, but to illustrate why averaged results, without accompanying disclosure of their distribution, can understate the real consequences of a standard for a meaningful segment of consumers. Notably, DOE's own discussion of its discretion under the EPCA's seventh statutory factor already gestures toward this concern, raising the possibility that a standard whose costs, including consumer welfare losses, exceed its benefits could presumptively be considered not economically justified. The Joint Commenters encourage DOE to build on that existing discussion by ensuring that consumer subgroup net-cost information is disclosed as a matter of course alongside aggregate results, rather than left to case-by-case discretion.

IV. DOE's Analysis Should Fully Account for Manufacturer Effects.

DOE's manufacturer impact analysis captures direct compliance costs, but the Joint Commenters believe it does not fully account for several real costs manufacturers bear when a new or amended standard takes effect. Manufacturers incur direct costs of redesigning, re-testing, and re-tooling products to meet a new standard, but they also face constraints on engineering capacity and the time required to bring redesigned products to market. Compliance timelines can require significant capital investment on a schedule set by the rulemaking rather than by a manufacturer's normal capital planning cycle, and DOE's models do not appear to account for the effect of compliance-driven spending on capital availability during periods of reduced or negative operating cash flow.

The Joint Commenters support the Government Regulatory Impact Model and Manufacturer Impact Analysis transparency improvements identified in NASEM Recommendation 4-2, including publishing financial parameters and cost of capital assumptions from public sources, reporting adjusted values after manufacturer interviews are considered, and reporting ranges rather than single point estimates.

Compliance also carries a cost that is real but more difficult to quantify because engineering and product development time redirected toward regulatory compliance is time not spent developing the features and benefits that create value for consumers. This is properly understood as an opportunity cost of compliance, not merely a direct expense, and the Joint Commenters do not believe DOE's current manufacturer impact analysis captures it. As DOE considers NASEM Recommendation 3-5's call to expand the Cost Analysis segment of the Engineering Analysis, the Joint Commenters encourage DOE to consider whether that expansion could include some accounting, even initially a qualitative one, for the value of engineering capacity redirected away from consumer-facing product development.

Finally, the Joint Commenters note that when a standard does not provide full preemption of state and local requirements, manufacturers face the added cost of complying with a patchwork of divergent requirements, a cost that runs counter to the market-stability rationale federal preemption is intended to serve. A state-by-state patchwork of energy conservation standards and test procedures is itself a significant regulatory burden, and federal preemption is the primary tool for eliminating it. DOE's analytic framework should treat avoidance of this burden as a significant, explicit factor when evaluating preemption for a given product category. This is consistent with EPCA's original preference for a national approach to energy policy, and DOE should be mindful that a state-by-state patchwork is already emerging in a number of product categories.

V. DOE Must Rigorously Characterize and Disclose Uncertainty.

DOE's RFI directly invites comment on how the Department should characterize uncertainty in its analysis, and names the Residential Energy Consumption Survey ("RECS") and Commercial Buildings Energy Consumption Survey ("CBECS") among its principal data sources. The Joint Commenters believe this is one of the most consequential issues DOE's analytic framework updates can address.

RECS and CBECS were designed to produce aggregate measures of national or regional energy consumption, not to serve as point-by-point inputs into product-specific models, which is how DOE's life-cycle cost and national impact analyses use them. Neither survey publishes uncertainty bands around its individual data points, so DOE has no way of knowing whether any given data point reflects a typical condition or a statistical outlier. Specific Joint Commenters have raised this concern in prior rulemakings, including in comments on DOE's dehumidifier rulemaking, where DOE itself acknowledged that estimating the uncertainty of every end use represented in every RECS housing unit is impractical.

The practical effect, as has been documented by certain Joint Commenters across multiple rulemakings, is that mean life-cycle cost savings estimates run persistently higher than median estimates at a given standard level, a pattern that should not arise in a well-behaved distribution and that signals the outsized influence of unverified outlier values. To that end, the Joint Commenters support NASEM Recommendation 4-15's call for DOE to represent uncertain parameters as probability distributions, disaggregate parameters that vary geographically or along other relevant dimensions, and properly propagate, rather than simply add, uncertainty and correlation throughout its calculations.

DOE's current use of Monte Carlo simulation does not resolve this underlying problem. Running repeated simulations over an input that itself lacks a documented confidence interval does not produce a meaningful measure of uncertainty but instead lends an unwarranted appearance of statistical rigor to results built on data never designed for that purpose. Multiple sources of uncertainty, including data quality, model structure, and behavioral assumptions, compound throughout DOE's analysis into a total uncertainty that DOE has never quantified or disclosed.

The Joint Commenters urge DOE, in response to the specific questions posed in this RFI, to identify which inputs most warrant prioritized attention to variability, to explain how it will propagate probabilistic assessment through its analysis, to present results in a way that conveys

the resulting uncertainty rather than obscuring it, and to guard specifically against practices such as Monte Carlo simulation drawn from small or unverified sample sizes, a concern DOE itself raises in this RFI.

Rigorous, disclosed uncertainty characterization is consistent with the “Gold Standard Science” criteria set out in Executive Order 14303,⁴ which specifically calls for science that is communicative of error and uncertainty. The Joint Commenters recommend that any revised analytic framework require disclosure of relevant data source limitations, including instances where survey data is being used at a finer grain than it was designed to support, alongside the results themselves, rather than relegated to a technical appendix that few readers will consult.

VI. The Life-Cycle Cost and National Impact Analysis Models Have Become Overly Complex and Opaque.

DOE has asked directly how it might present the analytic steps underlying its life-cycle cost analysis more clearly. DOE's life-cycle cost and national impact analysis models are not well documented, and they do not readily allow even well-informed stakeholders to test alternative assumptions and offer thoughtful, substantive comments. These models contain errors and questionable assumptions that have been extensively documented through the comment process across numerous rulemakings, yet have not, in the Joint Commenters' experience, been meaningfully addressed.

The Joint Commenters urge DOE to adopt and apply a clear transparency standard going forward under which any model DOE relies upon should be fully accessible and comprehensible to well-informed parties and the general public, should be thoroughly documented, and should be structured so that any interested party can operate it and test its underlying assumptions. Any report DOE issues based on such models should include functioning versions of the models themselves, not narrative results alone.

The Joint Commenters recognize DOE's interest, reflected in NASEM Recommendation 4-17 and related data collection recommendations, in conducting more routine *ex post* analysis to validate the assumptions underlying prior standards and to improve future rulemakings iteratively. *Ex post* review is appealing in concept, but it is difficult and costly—to DOE and stakeholders like the Joint Association's members—to execute well, and it is of limited value absent underlying model transparency. The reliability of such analysis is inherently constrained when the models being validated are themselves undocumented and difficult for outside parties to test.

The Joint Commenters view this as a sequencing consideration rather than an objection to retrospective review in principle and recommend that DOE prioritize making its models transparent and testable, since doing so is a precondition for *ex post* review to be worth its cost, not a substitute for it. Model transparency of the kind described above also goes directly to reproducibility, one of the Gold Standard Science criteria the Joint Commenters discuss above, and the Joint Commenters encourage DOE to treat the two objectives as mutually reinforcing.

⁴ Exec. Order No. 14303, "Restoring Gold Standard Science," 90 Fed. Reg. 22601 (May 29, 2025).

VII. The Joint Commenters

AHRI represents more than 330 manufacturers of heating, ventilation, air-conditioning, and refrigeration (HVACR) and water heating equipment. It is an internationally recognized advocate for the HVACR industry and certifies the performance of many of the products manufactured by its members. In North America, the annual economic activity resulting from the HVACR industry is more than \$211 billion. In the United States alone, AHRI member companies, along with distributors, contractors, and technicians employ more than 700,000 people.

ALA represents over 1,200 member companies in the residential lighting, ceiling fan and controls industries in the United States, Canada and the Caribbean. Member companies are manufacturers, manufacturers' representatives, retail showrooms, and lighting designers that have the expertise to educate and serve their customers.

AMCA is a not-for-profit association of manufacturers of fans, dampers, louvers, air curtains, and other air-system components for commercial HVAC, industrial-process, and power-generation applications. With programs such as product testing and certification, laboratory accreditation, and international-standards development, its mission is to advance the knowledge, growth, and integrity of the movement and control industry on behalf of more than 400 member companies worldwide.

AHAM represents more than 150 member companies that manufacture 90% of the major, portable and floor care appliances shipped for sale in the U.S. Home appliances are the heart of the home, and AHAM members provide safe, innovative, sustainable and efficient products that enhance consumers' lives. The home appliance industry is a significant segment of the economy, measured by the contributions of home appliance manufacturers, wholesalers, and retailers to the U.S. economy. In all, the industry drives nearly \$200 billion in economic output throughout the U.S. and manufactures products with a factory shipment value of more than \$50 billion.

CTA is North America's largest technology trade association, representing more than 1200 companies, 80 percent of which are startups and small businesses. CTA also owns and produces CES®, which convened tech leaders and over 4100 exhibiting companies in Las Vegas in January. Our members are the world's leading innovators, helping support more than 17 million American jobs.

HARDI is a trade association made up of over 1,100 member companies, more than 560 of which are U.S.-based wholesale distribution companies. Over 80 percent of HARDI's distributor members are categorized as small businesses that, together, employ more than 60,000 U.S. workers. These members represent over \$40 billion in annual sales and an estimated 75 percent of the U.S. wholesale distribution market for heating, ventilation, air conditioning, and refrigeration (HVACR) equipment, supplies, and controls.

NAM is the largest manufacturing association in the United States, representing manufacturers of all sizes, in every industrial sector and in all 50 states. Manufacturing drives American prosperity, the industry employs 13 million people in the U.S., contributes \$2.94 trillion annually to the U.S. economy and accounts for nearly 53% of all private sector research and development in the nation.

NAFEM is a trade association of more than 600 commercial foodservice equipment and supply manufacturers, a \$17 billion industry. These businesses, their employees, and the products they manufacture, support the food-away-from-home market, which includes more than one million locations in the U.S. and countless more around the world. NAFEM supports, and its members actively seek, opportunities to engage with DOE in the regulatory process to assure certainty and clarity to its regulated members that manufacture equipment relied upon by our society to safely provide food away from home.

OPEI is an international trade association representing more than 100 manufacturers and their suppliers of gas and electric-powered outdoor power equipment, golf carts, and personal transport and utility vehicles. OPEI member products are ubiquitous in U.S. households and businesses, including equipment such as lawnmowers, garden tractors, grass trimmers, chain saws, snow throwers, generators, utility vehicles and other similarly powered lawn and garden and vehicle applications. The industry currently contributes approximately \$16 billion to U.S. GDP, domestically ships nearly 40 million products each year, estimates as many as 250 million legacy products in service across the U.S., and sells and services these products through a diverse network of service-provider and retail channels.

PHCC is the oldest construction trades association in the country representing approximately 3,200 plumbing and HVACR contractors employing over 64,000 professionals across the United States. Since 1883, this organization and its members have been focused on the safe installation and maintenance of plumbing and HVAC systems.

PMI is the nation's leading trade association for plumbing product manufacturers. Its members produce 90 percent of the plumbing products sold in the United States and employ thousands of workers in over 70 locations in 30 states. PMI member companies' plumbing products are found in the majority of homes, commercial buildings, schools, restaurants, manufacturing facilities, hospitals, and hotels across the nation, and continue to raise the bar in developing the most advanced water-efficient plumbing products.

The Pool & Hot Tub Alliance (PHTA), a nonprofit organization with more than 4,000 members from around the world, was established in 1956 to support, promote, and protect the common interests of the \$62 billion pool, hot tub, and spa industry. PHTA provides education, advocacy, standards development, research, and market growth initiatives to increase members' professionalism, knowledge, and profitability. Additionally, PHTA promotes the use of pools by expanding swimming, water safety, and related research and outreach activities aimed at introducing more people to swimming, making swimming environments safer, and keeping pools open to serve communities.

The Joint Commenters appreciate the opportunity to submit these comments on DOE's Analytic Framework RFI and would be glad to discuss these matters in more detail should you so request.

Respectfully submitted,

Air-Conditioning, Heating, and Refrigeration Institute

Air Movement and Control Association International

American Lighting Association

Association of Home Appliance Manufacturers

Consumer Technology Association

Heating, Air-Conditioning, & Refrigeration Distributors International

National Association of Manufacturers

North American Association of Food Equipment Manufacturers

Outdoor Power Equipment Institute

Plumbing-Heating-Cooling Contractors Association

Plumbing Manufacturers International

Pool & Hot Tub Alliance

APPENDIX

I. Consumer/Purchaser Segmentation and Choice

A. Market Failure

Minimum standards rest on a finding that existing markets are not functioning correctly. The burden of demonstrating that rests with the Department of Energy ("DOE" or the "Department"). For purposes of this analysis, only two sources of failure are relevant to consumer or purchaser behavior: separation of the purchaser from the user or ratepayer, and inadequate or asymmetric information. Neither is present in every regulated product, nor is present uniformly within a single product category. Segment-level analysis, not a single finding for an entire product class, is necessary before DOE concludes that a standard is justified.

DOE's own record in the commercial refrigeration equipment rulemaking illustrates the point. Manufacturers surveyed by the Air-Conditioning, Heating, and Refrigeration Institute ("AHRI"), the North American Association of Food Equipment Manufacturers ("NAFEM"), and the National Automatic Merchandising Association ("NAMA") reported directly to DOE that "the consumers of [commercial refrigeration equipment] products are not residential homes; they are restaurants, educational institutions, military institutions, healthcare facilities, prisons, grocery/convenience stores, supermarkets, and supercenters."⁵ Grocery chains and large supercenters are sophisticated, informed purchasers with the scale and expertise to evaluate cost, features, and energy consumption; a large share of convenience stores are chain-owned or franchised with similar purchasing sophistication; and foodservice equipment dealers work directly with customers on product selection. Neither DOE's final rule nor its technical support document analyzed these segments separately or considered whether market failure existed within any of them individually.⁶

A second example comes from commercial and industrial fans and blowers. DOE's record documents at least three distinct purchaser channels: standalone fans purchased by facilities managers and industrial end users, standalone fans purchased by original equipment manufacturers ("OEMs") for incorporation into larger equipment, and fans embedded within HVACR equipment. The Air Movement and Control Association ("AMCA") documented on the record that DOE's initial sales data "included some standalone fans purchased by OEMs for incorporation into larger HVACR equipment but was not representative of sales of embedded

⁵ AHRI, NAFEM, and NAMA, "Commercial Refrigeration Equipment Survey Results," submitted to DOE (Feb. 2023).

⁶ Energy Conservation Program: Energy Conservation Standards for Commercial Refrigerators, Freezers, and Refrigerator-Freezers, 90 Fed. Reg. 7464 (Jan. 21, 2025), Docket No. EERE-2017-BT-STD-0007. This rule was subsequently disapproved by Congress under the Congressional Review Act (joint resolution signed May 9, 2025) and withdrawn by DOE effective May 20, 2025.

fans," forcing DOE to revise its analytical sample to better represent both markets.⁷ DOE ultimately withdrew its proposed fans and blowers rule in January 2025.⁸

The residential appliance market covered by the Association of Home Appliance Manufacturers ("AHAM") is more complex still, but it too can be segmented — at minimum into new construction, failed-appliance replacement, renovation, and rental or apartment channels, each with further subsegments depending on whether the landlord or the tenant pays the utility bill. This segmentation matters because the channels are not equally sized. There is no single, clean public statistic giving a precise national breakdown of replacement versus new-construction purchases across major appliances generally. The most authoritative public anchor is DOE's own shipments-analysis methodology, which explicitly models shipments as the sum of replacements and new installations and states that replacements "typically constitute the majority of shipments."⁹

This is corroborated by the U.S. Census Bureau's American Housing Survey¹⁰ and by Home Innovation Research Labs' 2017 Annual Builder Practices Survey, which found that builders install refrigerators in roughly two-thirds of new single-family homes and dishwashers in 93 percent, figures that bound the new-construction channel's share.¹¹ For refrigerators specifically, the Energy Information Administration ("EIA") reported, citing Appliance Magazine, that "more than 90% of new refrigerators go to replace existing units" — a figure whose underlying data are from 2009, and which is corroborated, though not superseded, by DOE's own December 2023 refrigerator technical support document methodology.¹² The absence of a precise, current public figure is itself informative: it reflects the same absence of granular market analysis this appendix is describing.

Because DOE has never undertaken segment-level analysis of this kind for the products discussed above, it has not demonstrated market failure for any of them as a whole. Where a model shows large projected savings from a new standard despite an absence of demonstrated market failure in the relevant purchasing segment, the more likely explanation is that the model

⁷ Energy Conservation Standards for Commercial and Industrial Fans and Blowers: Availability of Provisional Analysis Tools, 81 Fed. Reg. 75742 (Nov. 1, 2016), Docket No. EERE-2013-BT-STD-0006.

⁸ Energy Conservation Program: Energy Conservation Standards for Fans and Blowers, 90 Fed. Reg. 5748 (Jan. 17, 2025) (withdrawing the proposed rule published at 89 Fed. Reg. 3714, Jan. 19, 2024), Docket No. EERE-2022-BT-STD-0002.

⁹ DOE, Technical Support Document: Residential Clothes Washers, Ch. 9 (Shipments Analysis), Docket No. EERE-2008-BT-STD-0019.

¹⁰ U.S. Census Bureau, "Differences in Fuel Usage in the United States Housing Stock," H150-19 (2019), based on the 2017 American Housing Survey.

¹¹ Home Innovation Research Labs, 2017 Annual Builder Practices Survey, as reported by the National Association of Home Builders.

¹² U.S. Energy Information Administration, "Today in Energy" (Sept. 12, 2011), citing Appliance Magazine (2009 data); DOE, Technical Support Document: Energy Conservation Standards for Refrigerators, Refrigerator-Freezers, and Freezers (Dec. 2023), Docket No. EERE-2017-BT-STD-0003.

itself is misspecified or omitting a relevant factor, not that an untapped consumer benefit has gone unrealized by informed market participants.

B. Consumer/Purchaser Values

Manufacturers introduce products consumers actually buy, and products stay on the market because consumers continue buying them. Absent compelling evidence otherwise, removing products from the marketplace reduces consumer welfare by eliminating some bundle of features, attributes, and price points the market has already validated. Only where a standard produces a clearly commanding increase in consumer net present value is there a real probability that welfare increases despite that removal; otherwise, the burden falls on DOE to demonstrate that removal does not reduce welfare.

EPCA itself directs DOE to consider "any lessening of the utility or performance" of covered products likely to result from a standard — the fourth statutory factor.¹³ DOE's practice, however, defines utility narrowly, and as a result fails to capture the true range of considerations consumers and purchasers weigh. This is closely tied to market segmentation, discussed above: different purchaser segments have different needs and priorities, and without accurate segmentation DOE cannot identify or evaluate the factors underlying choice. Without understanding choice, DOE cannot determine whether markets are behaving rationally, nor assess whether, and at what level, a minimum standard is appropriate.

The Joint Commenters recommend that DOE begin any standards analysis with a robust market analysis for the relevant product, including:

1. Identifying all major purchaser segments and subsegments and their relative size;
2. Using surveys and interviews with manufacturers, retailers, distributors, and contractors to understand what actually creates consumer or purchaser value;
3. Understanding capital and liquidity constraints on purchasers and their practical ability to pay a higher first cost for a more efficient product, as distinct from whether a purchase is worthwhile on a net-present-value basis;
4. Determining whether the conditions creating market failure actually exist, or are likely to exist, within each identified segment; and determining whether non-standards approaches might address any identified failure more effectively.

This analysis must be conducted product by product; analogizing from one product's market structure to another's, or resorting to theory alone, is not a substitute for actual segment-level evidence. While this may seem like a significant undertaking, purchaser markets do not typically change rapidly, and a wise investment of analytical time early can save DOE time and resources later.

¹³ 42 U.S.C. § 6295(o)(2)(B)(i)(IV).

II. Consumer Benefit Modeling

A. Complexity and Uncertainty in the Life-Cycle Cost Model

DOE's consumer economics modeling rests on its Life-Cycle Cost ("LCC") model, which takes a conceptually simple comparison, increased first cost versus savings over time, and has grown increasingly complex through more granular cost and savings calculation, attempts to model usage variation, and attempts to capture demographic segmentation. In response, DOE built a Monte Carlo simulation drawing on individual responses to the Residential Energy Consumption Survey ("RECS") and Commercial Buildings Energy Consumption Survey ("CBECS"), both produced by EIA.

This approach produces four distinct problems:

1. The resulting model is highly complex and opaque, even to experienced commenters, let alone the general public, and for a variety of reasons, including reasonable DOE control of the model's structure, it is extremely difficult for commenters to test alternative assumptions.
2. DOE has carried forward a series of specific incorrect assumptions and analytical steps across many rulemakings.
3. The model does not adequately account for the uncertainty inherent in its underlying data, particularly around individual RECS and CBECS data points.
4. The model focuses on demographic and climate segmentation rather than on the behavioral and purchaser segmentation discussed in Section I above.

In multiple comments across multiple rulemakings, AHAM and AHRI have identified a series of incorrect assumptions in DOE's LCC model. DOE's use of incremental, rather than average, retail and distribution channel markups has been challenged repeatedly, including in a dedicated AHRI submission, "Incremental Markups – A Critical Review of Theory and Practice," and in AHAM comments containing direct quotations from retailers describing their actual markup practices.¹⁴ DOE's application of learning-curve cost reductions to entire products, rather than to only the new or changed components a standard requires, and its use of improper analog products to set learning-curve rates, such as assuming electronic component costs decline at semiconductor-industry rates, has likewise been challenged, with the underlying learning-curve methodology traceable to a 2011 Lawrence Berkeley National Laboratory ("LBNL") paper DOE itself relies upon.¹⁵ DOE's random assignment of RECS and CBECS survey instances between the base and standards cases in its Monte Carlo simulation has also been challenged as

¹⁴ AHRI, "Incremental Markups - A Critical Review of Theory and Practice," Comments on DOE's NOPR for Small, Large, and Very Large Air-Cooled Commercial Package Air Conditioning and Heating Equipment, Docket No. EERE-2013-BT-STD-0007 (Dec. 22, 2014); AHAM, Comments on DOE's NOPR for Residential Dishwashers, Docket No. EERE-2014-BT-STD-0021, at 10-11 & Attachment A (Mar. 25, 2015).

¹⁵ LBNL, "Using the Experience Curve Approach for Appliance Price Forecasting" (Mar. 16, 2011); AHAM Comments, Miscellaneous Refrigeration Products NOPR, Docket No. EERE-2020-BT-STD-0039, at Section IV.C (May 30, 2023) ("AHAM MREF Comment").

amounting to "outcome modeling" rather than modeling of an actual purchase decision, and as treating outlier, high-consumption households as equally likely as any other household to have purchased an efficient product even absent a standard.¹⁶

The Joint Commenters raise two related, but new, concerns for DOE's consideration. First, DOE's LCC model does not appear to account for the tax deductibility of operating costs for commercial customers, even though for many commercial and industrial purchasers, operating costs, including energy costs, are ordinary and currently deductible business expenses, while the incremental equipment cost from a standard is a capital cost recovered over time through depreciation. The after-tax burden of a standard's increased purchase price and the after-tax value of its operating-cost savings are therefore not symmetric, and DOE's model does not appear to capture that asymmetry.

Second, DOE develops its consumer discount rate as a weighted average across household debt and equity classes, using shares drawn from the Federal Reserve's Survey of Consumer Finances; independent analysis places this average real rate at approximately five percent.¹⁷ This average, however, is not the marginal cost of capital a purchaser actually faces when financing an incremental first-cost increase. A substantial share of consumers finance even modest purchases at far higher cost: roughly 45 percent of credit card holders carry a balance month to month,¹⁸ paying an average annual percentage rate on interest-accruing balances of approximately 22 percent as of the second quarter of 2026;¹⁹ store and retail cards, a common point-of-sale financing channel for major appliances, average over 30 percent.²⁰ For this population, DOE's average discount rate understates the real marginal cost of financing a standard's incremental first cost by a factor of four to six.

This is directly relevant to a related concern: DOE's LCC model tests whether an investment is worthwhile in net-present-value terms, but it does not test whether a purchaser can afford or finance the higher first cost. LBNL's own methodology documentation confirms this design choice directly, explaining that the LCC "does not model a... consumer's purchase decision," and that first cost is treated as an operationally sunk cost, excluded from the calculation of future

¹⁶ AHAM MREF Comment, *supra*, at Section IV.A, IV.D.

¹⁷ Desroches, Garbesi, Kantner, Van Buskirk & Yang, "A retrospective investigation of energy efficiency standards," *Environmental Research Letters* 9:114010 (2014).

¹⁸ Federal Reserve Board, Report on the Economic Well-Being of U.S. Households in 2025 (2026), Savings and Investments chapter.

¹⁹ Federal Reserve Board, G.19 Consumer Credit release, series "Commercial Bank Interest Rate on Credit Card Plans, Accounts Assessed Interest" (TERMCBCINTNS), Q2 2026.

²⁰ Bankrate, Retail Credit Cards Study (2025); Consumer Financial Protection Bureau, "Issue Spotlight: The High Cost of Retail Credit Cards."

value.²¹ Federal Reserve survey data indicate that 37 percent of U.S. adults could not cover a \$400 emergency expense using cash or its equivalent, a share that fell to roughly 29 percent among adults without a high school degree.²² A model that ignores both a purchaser's ability to finance a purchase and the real cost of doing so cannot reliably determine whether a standard's higher first cost is, in practice, a benefit or a burden for a meaningful share of the population it is meant to protect.

The LCC model uses Monte Carlo simulation to measure potential variability, such as climate differences, household size, and usage patterns. It does not, however, analyze the uncertainty surrounding its underlying data. This is true for all major LCC inputs, but it is a particular problem for RECS and CBECS. Because uncertainty compounds when multiple uncertain values are combined, the total uncertainty around each individual data point in DOE's Monte Carlo simulation is almost certainly significant.

There are three distinct causes of this uncertainty:

- **Sampling error:** whether the RECS or CBECS sample is representative of the nation as a whole. EIA does publish measures of sampling uncertainty for both surveys, expressed as relative standard errors.²³
- **Inaccurate reporting:** whether respondents accurately report the equipment they own, their usage patterns, and equipment age. This concern has grown as RECS and CBECS have shifted toward self-administered online and paper collection, a change from earlier survey cycles that relied on in-person interviewers.²⁴
- **Uncertain energy allocation:** EIA allocates total reported or metered energy consumption across specific end uses, such as clothes washing, cooking, heating, cooling, and dishwashing, through a combination of engineering models and statistical calibration.²⁵ This creates a recursive problem for DOE's LCC model: DOE uses RECS and CBECS estimates as inputs to its own engineering models, even though those same RECS and CBECS estimates are themselves partly the output of a different set of engineering models.

²¹ K. Sydney Fujita, LBNL, Commercial Discount Rate Estimation for Efficiency Standards Analysis, OSTI 1249499 (2016); DOE, Technical Support Document: Residential Dishwashers, Ch. 8 (2022) (describing DOE's consumer discount rate methodology).

²² Federal Reserve Board, Report on the Economic Well-Being of U.S. Households in 2024 (2025), Savings and Investments chapter; Federal Reserve Board Data Visualization, "Unexpected Expenses" table.

²³ U.S. Energy Information Administration, 2020 RECS Technical Documentation Summary; 2018 CBECS Relative Standard Error documentation.

²⁴ U.S. Energy Information Administration, RECS Webinar Slides, "Estimating Heating and Other End Uses in the 2020 RECS" (Aug. 29, 2023); EIA, 2009 RECS Methodology.

²⁵ U.S. Energy Information Administration, "How We Estimated Energy End-Use Consumption in the 2018 CBECS" (Apr. 12, 2023).

As AHAM has previously put it to DOE directly, "there is a recursive, circular aspect to DOE's use of the RECS data to justify its analytical work since RECS now uses engineering models to establish energy use by application and by RECS building and DOE is using the RECS data to justify those same engineering models."²⁶ Compounding the problem, EIA does not publish confidence levels or other statistical measures of accuracy for its end-use allocations, stating plainly that "estimating the uncertainty for every end use present in every home in the RECS sample is impractical."²⁷ Without such measures, it is not possible to determine the uncertainty surrounding the individual data points DOE's LCC model relies upon.

RECS and CBECS are designed to estimate energy consumption on a national or large-subsegment basis, where end-use allocation uncertainty is substantially averaged out. That uncertainty, however, is not averaged when the same data are used as point-level inputs to DOE's LCC model, and DOE needs to identify and account for it.

B. Distribution of Benefits

DOE's principal measure of consumer benefit is the mean change in life-cycle cost across the population analyzed. This ignores any change in consumer or purchaser value from changes to other product features and attributes, discussed in Section I.B above, and it averages results across the whole population being modeled. If one Monte Carlo instance shows a positive one-hundred-dollar change in life-cycle cost and another shows a ninety-dollar net cost, the mean increases by five dollars and DOE records a positive impact, even though the consumer bearing the ninety-dollar net cost plainly does not experience the standard as a benefit. At a minimum, DOE needs to state what share of consumers experiencing a net cost it considers an acceptable outcome of a standard.

This is not a hypothetical concern as it is DOE's own consistent finding across a wide range of covered products:

- In DOE's 2011 rule for room air conditioners, DOE's own analysis found that 56 percent of consumers would experience a net cost for the product class with the largest market share, and the Secretary cited that figure directly as the basis for concluding that a higher trial standard level was not economically justified. Across the room air conditioner product classes analyzed in that same rule, the share of consumers experiencing net costs ranged as high as 64.6 percent.²⁸
- In DOE's 2017 rule for split-system central air conditioners, DOE projected that between 25 and 45 percent of households would bear a net cost, depending on region, with the

²⁶ AHAM MREF Comment, *supra*, at Section IV.D.

²⁷ U.S. Energy Information Administration, 2020 RECS Consumption and Expenditures Technical Documentation Summary.

²⁸ Energy Conservation Program: Energy Conservation Standards for Room Air Conditioners, 76 Fed. Reg. 22453, 22531-22533, 22556 (Apr. 21, 2011).

most adversely affected regions containing six of the nation's fifteen most populous states and representing nearly 30 percent of the total United States population.²⁹

- For furnace fans, DOE estimated that between 24 and 33 percent of consumers of the four most widely used types, representing 80 percent of projected shipments, would experience net costs.³⁰
- For gas-fired and electric storage water heaters, DOE estimated net-cost shares of 27 and 33 percent, respectively.³¹
- For gas-fired pool heaters, DOE's own table found that 78 percent of consumers would either feel no effect or bear a net cost, with only 22 percent actually benefiting.³² For refrigerators, DOE estimated that 46 percent of top-mount and 42 percent of side-by-side refrigerator-freezer consumers would bear net costs.³³
- And for dishwashers, DOE's 2012 rule found an 18.7 percent net-cost share; a subsequent 2014 proposal, which DOE ultimately abandoned after adverse comment, would have imposed net costs on 53 percent of consumers, a majority of the affected population.³⁴

DOE has never applied a consistent threshold for how much net cost is too much. In 2011, the Secretary treated a 56 percent net-cost share for one room air conditioner product class as disqualifying. Yet in 2015, DOE proposed, before ultimately abandoning, a dishwasher standard with an even higher, 53 percent net-cost share, and initially treated it as consistent with economic justification. This inconsistency itself demonstrates the absence of any stated DOE policy on an acceptable net-cost threshold, precisely the gap this appendix identifies.

The situation becomes more complicated once uncertainty, discussed in Section II.A above, is factored in. Given the non-trivial uncertainty in RECS and CBECS data points, compounded by uncertainty in other model inputs, the total uncertainty surrounding any individual result is almost certainly significant. DOE therefore cannot be confident that even its own estimate of the share of consumers experiencing a net cost is accurate.

²⁹ Energy Conservation Program: Energy Conservation Standards for Residential Central Air Conditioners, Heat Pumps, and Furnaces, 82 Fed. Reg. 1832 (Jan. 9, 2017), Table V-3.

³⁰ Energy Conservation Program: Energy Conservation Standards for Furnace Fans, 78 Fed. Reg. 64111-64113 (Oct. 25, 2013).

³¹ Energy Conservation Program: Energy Conservation Standards for Water Heaters, 75 Fed. Reg. 20112, 20186 (Apr. 16, 2010).

³² Energy Conservation Program: Energy Conservation Standards for Water Heaters, 75 Fed. Reg. 20112, 20188 (Apr. 16, 2010), Table VI.16 (Gas-Fired Pool Heaters).

³³ Energy Conservation Program: Energy Conservation Standards for Residential Refrigerators, Refrigerator-Freezers, and Freezers, 76 Fed. Reg. 57516, 57565-57566 (Sept. 15, 2011).

³⁴ Energy Conservation Program: Energy Conservation Standards for Residential Dishwashers, 77 Fed. Reg. 31917, 31956 (May 30, 2012); Proposed Rule, 79 Fed. Reg. 76141, 76171 (Dec. 19, 2014); Final Rule, 81 Fed. Reg. 90072 (Dec. 13, 2016) (declining to finalize amended standards).

Given the absence of careful market segmentation, discussed in Section I above, and the lack of demonstrated market failure, DOE should proceed cautiously unless and until it has high confidence that the share of consumers experiencing a net cost is low. A more appropriate approach would measure the cumulative uncertainty band around DOE's estimates and determine what share of consumers experience a net cost at a defined confidence level, rather than relying on a single point estimate. Given how little savings potential remains for products that have already undergone multiple rounds of standards, discussed in the body of these comments, it is entirely possible that DOE currently has little real assurance that this share is not quite high for a number of covered products.

The Joint Commenters recommend that DOE fundamentally restructure its consumer and purchaser cost-benefit modeling to:

1. Focus on the segments identified through the market analysis proposed in Section I above;
2. Simplify its cost-benefit approach in recognition of the fact that a complex model is not warranted given the underlying uncertainty;
3. Identify segments where there appear to be a meaningful share of consumers experiencing a net cost and estimate that share directly;
4. Determine the factors that create that outcome and identify approaches that limit or ameliorate those causes; and
5. Disclose, as a standard element of every rulemaking, the share of consumers projected to experience a net cost together with DOE's basis for finding that share acceptable.

This last recommendation is not novel. Independent analysts have separately proposed that DOE or Congress establish a rebuttable presumption that a standard imposing net costs on 30 percent or more of relevant consumers is not economically justified, precisely the kind of disclosed, consistent threshold DOE currently lacks.³⁵

III. Manufacturer Impact

Under the general principles of EPCA, impacts on manufacturers have equal footing with national energy savings and effects on consumers and purchasers. In practice, impact on manufacturers has been treated largely as an afterthought. DOE should develop a more comprehensive view of manufacturer impact and set minimum standards that preserve industry value, prevent major negative cashflow drains on investment capability, and preserve manufacturers' opportunity to pursue product development.

To date, DOE principally measures manufacturer impact by assessing change in industry value using the Government Regulatory Impact Model ("GRIM"). DOE has, across decades of rulemakings, consistently described GRIM as "an industry cash-flow model" adapted for each product under review, populated substantially through confidential manufacturer interviews

³⁵ Sofie E. Miller, "Reforming the Energy Policy and Conservation Act: Learning from Experience on Energy Efficiency," George Washington University Regulatory Studies Center Working Paper (June 27, 2017), at 15-16.

conducted as part of DOE's three-phase manufacturer impact analysis process, a structure that has remained essentially unchanged since at least the late 1990s.³⁶

The Joint Commenters support the continued use of manufacturer interviews to populate GRIM's cost and pricing assumptions and support the industry-value approach as one part of assessing manufacturer impact. Simply focusing on industry value, however, is too limited a perspective, and GRIM's basic architecture as an industry cash-flow spreadsheet, rather than a purpose-built economic model of manufacturer behavior, is itself a limitation the Department should address as part of any broader reconsideration of its analytic framework.

In addition to industry value, DOE should explicitly consider:

- The implications of standards on multiple products produced by a single company in terms of engineering capacity, testing capability, and factory design and modification capability;
- The potential for a single or multiple products to create negative cash flow and constrain a manufacturer's ability to finance necessary investment, particularly where compliance timelines require capital spending on a schedule set by the rulemaking rather than by a manufacturer's normal capital planning cycle; and
- The diversion of engineering and product-development resources away from features and capabilities that would otherwise increase value to consumers and purchasers, a real, though admittedly difficult to quantify, opportunity cost that DOE's current manufacturer impact analysis does not appear to capture.

The Department can and should develop metrics defining what constitutes an unacceptable drain on industry resources and use such metrics to set threshold levels that no proposed minimum standard may breach.

DOE's manufacturer impact analysis has repeatedly failed to account for the interaction between overlapping federal regulatory timelines affecting a single product, and this is not a concern raised in only a single rulemaking. In the commercial refrigeration equipment rulemaking, AHRI documented that "there is a cumulative burden associated with the regulatory initiatives of multiple federal agencies and standards setting bodies," describing DOE's efficiency standard, the Environmental Protection Agency's refrigerant phasedown under the American Innovation and Manufacturing Act, and Underwriters Laboratories' safety standard changes as proceeding simultaneously and consuming the same limited pool of manufacturer engineering and testing resources.³⁷

³⁶ DOE, Appendix 13C, "Government Regulatory Impact Model (GRIM)," Technical Support Document, Docket No. EERE-2006-STD-0127; DOE, Chapter 12, "Manufacturer Impact Analysis," Technical Support Document, Docket No. EERE-2012-BT-STD-0041; DOE, Chapter 13, "Interim Manufacturer Impact Analysis," Technical Support Document, Docket No. EERE-2010-BT-STD-0043 (describing DOE's three-phase manufacturer impact analysis process).

³⁷ Comments of AHRI, Commercial Refrigeration Equipment NOPR, Docket No. EERE-2017-BT-STD-0007 (2023).

A separate commenter in that proceeding noted that DOE's baseline analysis "only accounts for one refrigerant," leaving the post-transition energy baseline unaddressed for equipment that must transition to A2L refrigerants.³⁸ DOE itself acknowledged the problem, stating in its final rule that it "acknowledges the concerns raised by manufacturers regarding the cumulative regulatory burden from the October 2023 EPA Final Rule and DOE energy conservation standards rulemakings, which is compounded by changes to Underwriters Laboratories... safety standards," and extending the compliance period in response.³⁹ That rule was subsequently disapproved by Congress under the Congressional Review Act and withdrawn by DOE effective May 20, 2025; it is cited here for DOE's acknowledgment of the underlying burden, which DOE has not retracted, not as an example of a standard currently in effect.⁴⁰

This is not an isolated problem. In the residential central air conditioners and heat pumps test procedure proceeding, AHRI documented that the complexity introduced by the intersection of DOE's rating requirements and the Environmental Protection Agency's refrigerant transition rules is "significantly greater" than that of the 2010 hydrochlorofluorocarbon refrigerant ban.⁴¹ And in the air-cooled commercial package air conditioners and heat pumps rulemaking, DOE's own final rule acknowledged that AHRI and multiple individual manufacturers raised concerns regarding cumulative regulatory burden from overlapping refrigerant regulation, new efficiency metrics, and pending test procedure changes.⁴² Across each of these proceedings, DOE's standard practice has been to acknowledge the burden without demonstrating that its underlying manufacturer impact analysis actually accounts for it.

Finally, one key aspect of the Appliance Standards program is the preemption of state and other standards by federal ones. Maintaining this preemption is critical to manufacturers, preventing excessive burden from complying with multiple, potentially incompatible state and local requirements. Controlling costs to consumers and purchasers and maintaining global competitiveness requires manufacturing, product development, logistics, and marketing at meaningful scale, scale that a fragmented, state-by-state regulatory landscape undermines. The Joint Commenters strongly support DOE's use of "no standard" standards where appropriate, and support preemption extending to products directly related to currently covered products, preventing a patchwork of state or local regulation of closely adjacent product categories federal standards do not yet formally cover.

³⁸ Comments of Hussmann Corporation, Commercial Refrigeration Equipment NOPR, Docket No. EERE-2017-BT-STD-0007 (Dec. 11, 2023).

³⁹ Energy Conservation Program: Energy Conservation Standards for Commercial Refrigerators, Freezers, and Refrigerator-Freezers, 90 Fed. Reg. 7464 (Jan. 21, 2025).

⁴⁰ See Note 2, *supra*.

⁴¹ Comments of AHRI, Residential Central Air Conditioners and Heat Pumps Test Procedure, Docket No. EERE-2022-BT-TP-0028 (June 4, 2024).

⁴² Energy Conservation Program: Energy Conservation Standards for Air-Cooled Commercial Package Air Conditioners and Heat Pumps, Direct Final Rule, 89 Fed. Reg. 44052 (May 20, 2024), confirmed at 89 Fed. Reg. 79374 (Sept. 30, 2024), Docket No. EERE-2022-BT-STD-0015.

This is not a hypothetical request as AHRI, NAFEM, and NAMA jointly recommended that DOE issue a "no (new) standard standard" given the uncertainty created by the overlapping refrigerant transition and standards timeline.⁴³ DOE's subsequent extension of the compliance period in that rulemaking reflects a partial, though incomplete, acknowledgment of that recommendation.

The Joint Commenters recommend that DOE create a more robust approach to measuring manufacturer impact, including:

1. Measures that go beyond industry value alone to incorporate the factors identified above;
2. That DOE set maximum levels of cumulative impact that cannot be exceeded by any set of proposed standards; and
3. That DOE maintain a robust approach to preemption, including continued use of "no standard" standards where warranted by regulatory uncertainty or overlapping compliance timelines.

⁴³ AHRI, NAFEM & NAMA, Ex Parte Presentation to DOE (June 16, 2023), "Exhibit 1 - AHRI/NAFEM/NAMA Commercial Refrigeration ECS Memo."