DEPARTMENT OF ENERGY

[EERE–2020–BT–DET–0017]

Final Determination Regarding Energy Efficiency Improvements in ANSI/ASHRAE/IES Standard 90.1–2019

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notification of determination.

SUMMARY: The U.S. Department of Energy (DOE) has reviewed ANSI/ASHRAE/IES Standard 90.1–2019: *Energy Standard for Buildings, Except Low-Rise Residential Buildings* and determined the updated edition would improve energy efficiency in commercial buildings subject to the code. DOE analysis indicates that buildings meeting Standard 90.1–2019, as compared with buildings meeting the 2016 edition, would result in national site energy savings of 4.7 percent, source energy savings of 4.3 percent, and energy cost savings of approximately 4.3 percent of commercial building energy consumption. Upon publication of this affirmative determination, each State is required to review the provisions of their commercial building code regarding energy efficiency, and, as necessary, update their codes to meet or exceed Standard 90.1–2019. Additionally, this notice provides guidance on state code review processes and associated certifications.

DATES: Certification statements provided by States shall be submitted by July 28, 2023.

ADDRESSES: A copy of the supporting analysis, as well as links to the Federal docket and public comments received, are available at: *https://www.energycodes.gov/development/determinations.*

Certification Statements must be addressed to the Building Technologies Office—Building Energy Codes Program Manager, U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, 1000 Independence Avenue SW, EE–5B, Washington, DC 20585.

FOR FURTHER INFORMATION CONTACT:

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For legal issues, please contact Matthew Ring; U.S. Department of Energy, Office of the General Counsel, 1000 Independence Avenue SW, GC–33, Washington, DC 20585; (202) 586–2555; *Matthew.Ring@hq.doe.gov.*

SUPPLEMENTARY INFORMATION:

I. Background

Title III of the Energy Conservation and Production Act, as amended (ECPA), establishes requirements for DOE to review consensus-based building energy conservation standards. (42 U.S.C. 6831 *et seq.*) Section 304(b), as amended, of ECPA provides that whenever the ANSI/ASHRAE/IESNA [1] Standard 90.1–1989 (Standard 90.1–1989 or 1989 edition), or any successor to that code, is revised, the Secretary of Energy (Secretary) must make a determination, not later than 12 months after such revision, whether the revised code would improve energy efficiency in commercial buildings, and must publish notice of such determination in the **Federal Register**. (42 U.S.C. 6833(b)(2)(A)) If the Secretary makes an affirmative determination, within two years of the publication of the determination, each State is required to certify that it has reviewed and updated the provisions of its commercial building code regarding energy efficiency with respect to the revised or successor code and include in its certification a demonstration that the provisions of its commercial building code, regarding energy efficiency, meet or exceed the revised Standard. (42 U.S.C. 6833(b)(2)(B)(i)) Standard 90.1–2019, the most recent edition, was published in October 2019, triggering the statutorily required DOE review process. The Standard is developed under ANSI-approved consensus procedures,[2] and is under continuous maintenance under the purview of an ASHRAE Standing Standard Project Committee (commonly referenced as SSPC 90.1). ASHRAE has an established program for regular publication of addenda, or revisions, including procedures for timely, documented, consensus action on requested changes to the Standard. More information on the consensus process and ANSI/ASHRAE/IES Standard 90.1–2019 is available at *https://www.ashrae.org/technical-resources/bookstore/standard-90-1.*

In addition, on January 20, 2021, the President issued Executive Order 13990, ''Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis.'' 86 FR 7037 (Jan. 25, 2021). The Executive Order directed DOE to consider publishing for notice and comment a proposed rule suspending, revising, or rescinding the final technical determination regarding the ASHRAE Standard 90.1–2016 by May 2021. *Id.* at 86 FR 7038. In response, DOE has reviewed the current Standard 90.1–2019 so that DOE's determination under section 304(b) of ECPA reflects the most recent version of Standard 90.1, and to facilitate State and local adoption of the Standard, which will improve energy efficiency in the nation's commercial buildings.

To meet the statutory requirement, and to satisfy the directive issued under Executive Order 13990, DOE issued a preliminary determination and published supporting analysis to quantify the expected energy savings associated with Standard 90.1–2019 relative to the previous 2016 version. The preliminary determination and analysis are available at: *https://www.regulations.gov/document/EERE-2020-BT-DET-0017-0001.*

II. Public Participation

In an April 21, 2021 **Federal Register** notice, DOE requested public comments on its preliminary analysis of Standard 90.1–2019. (82 FR 34513) DOE received eight public comments, all of which DOE considered in arriving at its final determination. DOE has now issued the final analysis of the expected energy savings associated with Standard 90.1–2019 as compared to Standard 90.1–2016. A summary of public comments received, and DOE responses, is included in Appendix A of this Notice. The final analysis is available at: *https://www.energycodes.gov/development/determinations.*

III. Determination Statement

Commercial buildings meeting Standard 90.1–2019 (compared to the previous 2016 edition) are expected to result in the following savings on a weighted national average basis:

- 4.7 percent *site* energy savings
- 4.3 percent *source* energy savings
- 4.3 percent energy *cost* savings

DOE has rendered the conclusion that Standard 90.1–2019 will improve energy efficiency in commercial buildings, and, therefore, receives an affirmative determination under Section 304(a) of ECPA. States can experience significant benefits by updating their codes to reflect current construction

[1] ANSI—American National Standards Institute; ASHRAE—American Society of Heating, Refrigerating, and Air-Conditioning Engineers; IES—Illuminating Engineering Society.

[2] See *https://www.ansi.org/american-national-standards/info-for-standards-developers/standards-developers.*

standards, a total estimated $63.80 billion in energy cost savings and 476.77 MMT of avoided CO_2 emissions in commercial buildings (cumulative 2010 through 2040), or $2.80 billion in annual energy cost savings and 21.16 MMT in annual avoided CO_2 emissions (annually by 2030). These benefits, including emissions reductions, are estimated in a revised 2021 interim report addressing building code impacts.[3] Though not quantified in the interim report, there may also be costs to regulated entities as a result of updated commercial building codes.

IV. State Certification

Upon publication of this affirmative determination, each State is required to review and update, as necessary, the provisions of its commercial building energy code to meet or exceed the provisions of the 2019 edition of Standard 90.1. (42 U.S.C. 6833(b)(2)(B)(i)) This action is required not later than 2 years from the date the final Notice of Determination is published in the **Federal Register**, unless an extension is provided.

State Review & Update

DOE recognizes that some States do not have a State commercial building energy code, or have a State code that does not apply to all commercial buildings. States may base their certifications on reasonable actions by units of general-purpose local government. Each such State must review the information obtained from the local governments, and gather any additional data and testimony in preparing its own certification.

The applicability of any State revisions to new or existing buildings would be governed by the State building codes. States should be aware that the scope of Standard 90.1 includes high-rise (greater than three stories) multi-family residential buildings, and hotels, motels, and other transient residential building types of any height, as commercial buildings for energy code purposes. Consequently, commercial buildings, for the purposes of certification to DOE, would include high-rise multi-family residential buildings, hotels, motels, and other transient residential building types of any height.

State Certification Statements

Section 304(b) of ECPA, as amended, requires each State to certify to the Secretary of Energy that it has reviewed and updated the provisions of its commercial building energy code regarding energy efficiency to meet or exceed the Standard 90.1–2019. (42 U.S.C. 6833(b)) The certification must include a demonstration that the provisions of the State's commercial building energy code regarding energy efficiency meets or exceeds Standard 90.1–2019. If a State intends to certify that its commercial building energy code already meets or exceeds the requirements of Standard 90.1–2019, the State should provide an explanation of the basis for this certification (*e.g.,* Standard 90.1–2019 is incorporated by reference in the State's building code regulations). The chief executive of the State (*e.g.,* the governor), or a designated State official (*e.g.,* director of the State energy office, State code commission, utility commission, or equivalent State agency having primary responsibility for commercial building energy codes), would provide the certification to the Secretary. Such a designated State official would also provide the certifications regarding the codes of units of general purpose local government based on information provided by responsible local officials.

The DOE Building Energy Codes Program tracks and reports State code adoption and certification.[4] Once a State has adopted a new commercial energy code, DOE typically provides software, training, and support for the new code as long as the new code is based on the national model code (*i.e.,* ASHRAE Standard 90.1–2019). DOE has issued previous guidance on how it intends to respond to technical assistance requests related to implementation resources, such as building energy code compliance software. (79 FR 15112) DOE Secretary is required to provide incentive funding to States to implement the requirements of section 304, and to improve and implement State residential and commercial building energy efficiency codes, including increasing and verifying compliance with such codes. (*See* 42 U.S.C. 6833(e)) Some States develop their own codes that are only loosely related to the national model codes, and DOE may not be able to provide technical support for those codes. DOE does not prescribe how each State adopts and enforces its energy codes.

Requests for Extensions

Section 304(c) of ECPA requires that the Secretary permit an extension of the deadline for complying with the certification requirements described previously, if a State can demonstrate that it has made a good faith effort to comply with such requirements and that it has made significant progress toward meeting its certification obligations. (42 U.S.C. 6833(c)) Such demonstrations could include one or both of the following: (1) A plan for response to the requirements stated in Section 304; or (2) a statement that the State has appropriated or requested funds (within State funding procedures) to implement a plan that would respond to the requirements of Section 304 of ECPA. This list is not exhaustive. Requests are to be sent to the address provided in the **ADDRESSES** section, or may be submitted to *BuildingEnergyCodes@ee.doe.gov.*

Appendix A

DOE received comments on its preliminary determination and supporting analysis of Standard 90.1–2019 from the following stakeholders:

- U.S. Army
- U.S. Air Force
- Responsible Energy Codes Alliance (RECA)
- Edison Electric Institute (EEI)
- Air-Conditioning, Heating, and Refrigeration Institute (AHRI)
- Three individual commenters

The comments are summarized below and are available at: *https://www.regulations.gov/document/EERE-2020-BT-DET-0017-0001/comment.* DOE responded to all comments received. Several issues raised by commenters are distinct from the energy efficiency analysis DOE has undertaken pursuant to its statutory obligations. These include the social cost of carbon, life-cycle cost, and cost effectiveness; among these issues, social cost of carbon garnered the most attention from commenters and is therefore emphasized in the responses below.

Comment: The anonymous submitter of comment ID EERE–2020–BT–DET–0017–0002 stated that the reduction in emissions is low for a five-year code cycle and the standards should be stricter.

DOE response: DOE notes that the reported savings estimates represent a 3-year code cycle—Standard 90.1–2019 compared to the 2016 edition—and not 5 years as stated by the commenter. The stringency of each version of 90.1 is determined by the ANSI consensus process used to revise Standard 90.1, as administered by ASHRAE. While DOE is directed to participate in the ASHRAE consensus process, the Department holds no special status. DOE's role in code review and consensus processes for commercial energy codes, including Standard 90.1, is further described at *https://www.energycodes.gov/development/commercial/codes.*

Comment: The U.S. Army stated that some of the requirements are not ''reasonable'' or ''practicable'' and that requirements should

[3] See *https://www.pnnl.gov/main/publications/external/technical_reports/PNNL-31437.pdf* for the 2021 interim code impact report. Financial benefits are calculated by applying historical and future fuel prices to site energy savings and by discounting future savings to 2020 dollars. Historical and future real fuel prices are obtained through EIA's AEO 2015 report (EIA 2015).

[4] Available at *https://www.energycodes.gov/adoption/states.*

be operable and maintainable with typical maintenance staff and budgets.

DOE response: DOE notes that, in making its determination, its directive under ECPA is to assess whether updated editions of Standard 90.1 would improve *energy efficiency* in commercial buildings. DOE believes that the issue of whether code provisions are ''reasonable'' and ''practicable'' is complex and most appropriately addressed directly by the established code development process, as administered by ASHRAE, used for Standard 90.1. That process is inclusive of a wide range and variety of stakeholders, and features a robust public comment process to ensure that the concepts evaluated for inclusion in new versions of Standard 90.1 are indeed reasonable, practicable, feasible and cost effective, among many other considerations.

Comment: The anonymous submitter of comment ID EERE–2020–BT–DET–0017–0004 asked, for buildings that are already using 100% renewable energy, whether the source energy and CO_2 savings are going to be zero.

DOE response: DOE's determination is focused on a typical new building meeting the minimum requirements of ASHRAE Standard 90.1–2019. A building that is using 100% renewable energy was not contemplated in DOE's analysis.

Comment: The anonymous submitter of comment ID EERE–2020–BT–DET–0017–0005 asked why DOE shows building-only savings for natural gas and building plus upstream savings for electricity. The commenter suggested DOE should account for regional variations in gas and electricity production.

DOE response: Both gas and electricity savings are expressed as both site energy and source energy. The source energy factors for natural gas and electricity are shown on pages 16 and 17 of the technical support document referenced in the preliminary determination notice. The source energy emissions for electricity include both the losses in terms of generation as well as losses in transmission and distribution. For natural gas, the source energy factor of 1.088 includes losses due to both pipeline leakage and transmission energy (compression) and the derivations are documented in the technical support document. Regarding regional variation in production, DOE considers use of national assumptions for gas and electricity production the most appropriate way to estimate the national energy impact of one edition of a model standard compared to the previous edition, which is consistent with DOE's directive under ECPA.

Comment: The U.S. Air Force's first comment stated that the determination does not address institutional, industrial, or campus buildings that often have mass walls and reduced window area.

DOE response: The suite of prototype building models relied upon by the Standard 90.1 development committee and applied in DOE's analysis of ASHRAE Standard 90.1–2019 represents approximately 76% of U.S. new non-residential construction volume and includes mass walls, steel framed, metal building, and wood frame construction. Window-to-wall ratio varies in these models from 1% to 40%, as is commonly the case in the commercial building stock, as represented by the prototype models. While the prototypes cannot address every possible combination of building type and building construction types in the analysis, they do include a representative range of building construction types, and are relied upon by established decision-making processes, including the Standard 90.1 development process.

Comment: The U.S. Air Force also recommended that the life-cycle cost analysis (LCCA) should not use U.S. average utility rates.

DOE response: In making its determination, DOE's directive under ECPA is to assess whether updated editions of Standard 90.1 would improve *energy efficiency* in commercial buildings. 42 U.S.C. 6833(b)(2)(A) With respect to the energy cost savings calculation, DOE considers use of a national average utility rate the most appropriate way to estimate the national energy cost savings of one edition of a model energy standard compared to the previous edition, which is consistent with DOE's directive under ECPA. The range of utility tariffs available in the U.S. numbers in the thousands, and DOE is ultimately charged with issuing a national determination. DOE notes that it does apply more specific rates in other analyses, where appropriate, such as in estimating energy code impacts at the state level.

Comment: The U.S. Air Force's final comment stated it does not appear that maintenance tail expenses for mechanical requirements such as enthalpy wheels were incorporated into the LCCA.

DOE response: In making its determination, DOE's directive under ECPA is to assess whether updated editions of Standard 90.1 would improve *energy efficiency* in commercial buildings. 42 U.S.C. 6833(b)(2)(A) Concepts such as life-cycle cost and cost effectiveness represent economic analysis and are distinct from the energy efficiency analysis that DOE is directed to assess through its determination. However, DOE recognizes the value of such analysis in informing state and local decisions surrounding code review and update processes, as well as design decisions associated with specific buildings and systems. DOE provides a variety of additional analysis, including cost-effectiveness analysis, outside the scope of DOE's determination, and in response to the Department's separate directive to provide technical assistance to support state code implementation. When conducting analysis such as cost-effectiveness analysis, DOE does indeed rely upon a life-cycle perspective and accounts for costs associated with the maintenance and replacement of building systems and components.

Comment: RECA's first comment recommended that DOE provide technical support for Standard 90.1.

DOE response: DOE is directed under ECPA to provide technical assistance supporting the implementation of building energy codes. Consistent with this directive, DOE intends to continue providing robust technical assistance supporting state and local implementation of buildings energy codes. DOE recognizes the importance of supporting the states and local governments who ultimately adopt and implement codes, as well as the wide range of industry stakeholders who rely upon energy codes and strive to achieve compliance in practice.

Comment: RECA's second comment recommended that DOE provide cost-effectiveness analysis.

DOE response: As outlined in previous responses, DOE notes that the current determination is focused solely on whether the revised Standard would improve energy efficiency in commercial buildings. However, DOE recognizes the value of additional forms of technical analysis supporting building energy codes to support the implementation of state building energy codes (42 U.S.C. 6833(d)), and intends to continue to provide both national and state-level cost-effectiveness analysis of Standard 90.1–2019 in the future.

Comment: RECA's third comment recommended that DOE provide state-level energy and cost analyses.

DOE response: Consistent with the previous comment response, DOE intends to provide state-level energy and cost analyses in the future.

Comment: RECA's fourth comment recommended that DOE compare 90.1–2019 to the 2021 IECC.

DOE response: DOE recognizes that adopting states and local governments often review the commercial provisions of the International Energy Conservation Code (IECC), and can benefit from knowing how the IECC compares to Standard 90.1 (*i.e.,* the model energy code established under ECPA). DOE has provided such analysis in the past and intends to prepare similar analysis in the future.

Comment: RECA's fifth comment recommended that DOE remove old versions of Standard 90.1 from COMcheck.

DOE response: In maintaining its compliance resources, such as the COMcheck software [5], DOE typically supports the three most recent editions of the model codes. (79 FR 15112) Following the current determination, and in accordance with established DOE policy, this will include the 2019, 2016 and 2013 editions of Standard 90.1, which represents the range of recent code editions, and helps ensure limited federal resources remain focused on the latest model codes. DOE intends to maintain consistency with this approach.

Comment: RECA's sixth comment recommended that DOE provide implementation support for 90.1–2019.

DOE response: Consistent with previous comment responses, DOE intends to continue providing robust support for states and local governments implementing building energy codes. DOE notes that several resources, including training on Standard 90.1–2019, are already available via the DOE Building

[5] COMcheck is a software tool developed and maintained by DOE for the purpose of verifying compliance in commercial buildings. Learn more at *https://www.energycodes.gov/comcheck.*

Energy Codes Program technical assistance website, *https://www.energycodes.gov.* DOE intends to provide additional resources supporting Standard 90.1 implementation in the future.

Comment: RECA's seventh comment recommended that DOE find new opportunities to support model code adoption, compliance, and enforcement.

DOE response: DOE appreciates RECA's support in seeking new opportunities to support code adoption and implementation. DOE intends to continue to explore new and innovative means of supporting code implementation and welcomes additional suggestions in this area.

Comment: RECA's eighth comment stated that RECA agrees with and supports DOE's positive determination.

DOE response: DOE appreciates the support.

Comment: EEI's first comment stated that the EPA greenhouse gas equivalencies calculator overstates the emissions impact.

DOE response: As outlined in previous responses, DOE notes that the current determination is focused solely on whether the revised Standard would improve energy efficiency in commercial buildings. However, DOE recognizes the value of additional forms of technical analysis supporting state implementation of building energy codes, including emissions analyses. DOE relies on greenhouse gas emission coefficients established by the Environmental Protection Agency (EPA) in estimating current year CO_2 savings. EPA's emission coefficients are designed to reflect marginal CO_2 savings from electricity savings occurring on the building site, which DOE considers appropriate for evaluating the carbon savings stemming from an improved energy standard. This approach is consistent with how DOE has performed similar calculations in previous determinations.

Comment: EEI's second comment recommended that DOE's determination should take into account the commitments utilities have made to reduce carbon emissions.

DOE response: As outlined in previous responses, DOE notes that the current determination is focused solely on whether the revised Standard would improve energy efficiency in commercial buildings. However, DOE recognizes the value of additional forms of technical analysis supporting state implementation of building energy codes, including emissions analyses. DOE's analysis is based on several metrics—energy cost, site energy, source energy—and in addition reports the corresponding carbon emissions on a first-year basis. DOE recognizes the progress being made by utilities in decarbonizing the electric grid, and emphasizes that estimates provided in the supporting technical analysis are based on current emission levels and are subject to change in the future.

Comment: AHRI, p. 2–5. AHRI commented that historically DOE did not estimate emission reductions or apply a value to emission reductions as part of the results and basis for the determination. They further stated that including emission reductions or their value, including the SCC, as part of the basis for determination was outside DOE's authority to consider (42 U.S.C. 6833(b)(2)(A)), because EPCA is an energy conservation statute and excludes environmental objectives (see 42 U.S.C. 6312 which excludes environmental objectives), and that DOE does not have the statutory authority to consider greenhouse gas estimates in determinations regarding commercial building codes. AHRI opined that the SCC should only be included for rulemakings where DOE has clear statutory authority to do so and stated that it lacks such statutory authority as to building energy codes.

DOE response: In making its determination, DOE's directive under ECPA is to assess whether updated editions of Standard 90.1 would improve *energy efficiency* in commercial buildings. 42 U.S.C. 6833(b)(2)(A) DOE emphasizes that the estimates pertaining to CO_2 are provided only as supplemental information and are not considered as part of the final determination, which is based on energy efficiency as required under 42 U.S.C. 6833(b)(2)(A). DOE's analysis includes an estimate of a one-year reduction in CO_2 emissions on a normalized per square foot basis for buildings constructed to 90.1–2019 versus those constructed to 90.1–2016. Climate benefits associated with the expected CO_2 emissions reductions are monetized using estimates of the social cost of carbon (SC–CO_2) presented in the *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990* (''February 2021 TSD'').[6]

DOE has determined that the estimates from the February 2021 TSD are based upon sound analysis and provide well founded estimates for DOE's analysis of the impacts of CO_2 related to the reductions of emissions from updating the 90.1 Standard to the 2019 edition. However, DOE emphasizes that DOE is reporting estimates related to CO_2 only because information on the carbon emissions associated with buildings are valued by many stakeholders, including states and local governments who ultimately implement building codes, and who have expressed a need for this information. These estimates are not considered as part of DOE's ultimate determination of whether Standard 90.1–2019 will improve energy efficiency.

Comment: AHRI, p. 2, 5. AHRI stated that DOE is ignoring clear Congressional intent in including emissions in the narrowly scoped building energy code review defined in the statutory text (42 U.S.C. 6833(b)(1). It further stated that Congress could have added global climate change as a variable to weigh in the determination, but did not do so and so DOE should not include this in the determination.

DOE response: See response to previous AHRI comment.

Comment: AHRI, p. 2. AHRI requested that DOE remove carbon emissions from the determination for building energy codes, including ASHRAE 90.1–2019.

DOE response: See previous response to AHRI comment.

Comment: AHRI p. 2. Irrespective of the authority consideration, AHRI requested that DOE must act to remedy inaccurate assumptions and conclusions on the SC–CO_2 benefits analysis. AHRI opined that the benefits claimed from full fuel cycle and global impact of emissions and SCC are speculative and tangential and that these are calculated over a time period (100 years) that greatly exceeds that used to measure economic costs.

DOE response: In making its determination, DOE's directive under ECPA is to assess whether updated editions of Standard 90.1 would improve *energy efficiency* in commercial buildings. 42 U.S.C. 6833(b)(2)(A). DOE emphasizes that the estimates pertaining to CO_2 are provided only as supplemental information and are not considered as part of the final determination, which is based on energy efficiency as required under 42 U.S.C. 6833(b)(2)(A).

In calculating related CO_2 impacts, DOE used the estimates for the SC–CO_2 from February 2021 TSD. DOE has determined that the estimates from the February 2021 TSD, as described more below, are based upon sound analysis and provide well founded estimates for DOE's analysis of the impacts of CO_2 related to the reductions of emissions from updating the 90.1 Standard to the 2019 edition. The SC–CO_2 estimates in the February 2021 TSD are interim values developed under Executive Order (E.O.) 13990 for use until an improved estimate of the impacts of climate change can be developed based on the best available science and economics. The SC–CO_2 estimates used in this analysis were developed over many years, using a transparent process, peer-reviewed methodologies, the best science available at the time of that process, and with input from the public. Specifically, an interagency working group (IWG) that included DOE, the EPA and other executive branch agencies and offices used three integrated assessment models (IAMs) to develop the SC–CO_2 estimates and recommended four global values for use in regulatory analyses. Those estimates were subject to public comment in the context of dozens of proposed rulemakings as well as in a dedicated public comment period in 2013.

The SC–CO_2 estimates were first released in February 2010 and updated in 2013 using new versions of each IAM. In 2015, as part of the response to public comments received to a 2013 solicitation for comments on the SC–CO_2 estimates, the IWG announced a National Academies of Sciences, Engineering, and Medicine review of the SC–CO_2 estimates to offer advice on how to approach future updates to ensure that the estimates continue to reflect the best available science and methodologies. In January 2017, the National Academies released their final report, Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide, and recommended specific criteria for future updates to the SC–CO_2 estimates, a modeling framework to satisfy the specified criteria, and both near-term updates and longer-term research needs pertaining to various components of the estimation process (National Academies 2017). On January 20, 2021, President Biden

[6] For more information on DOE's use of the estimates from this document, please section 4.2 and 5 of the TSD for the final determination.

issued Executive Order 13990, which directed the IWG to ensure that the U.S. Government's (USG) estimates of the SC–CO_2 and other greenhouse gases reflect the best available science and the recommendations of the National Academies (2017). The IWG was tasked with first reviewing the estimates currently used by the USG and publishing interim estimates within 30 days of E.O. 13990 that reflect the full impact of GHG emissions, including taking global damages into account.[7] The interim SC–CO_2 estimates published in February 2021 are used here to estimate the climate benefits associated with this determination and related model building energy code updates.

DOE acknowledges that there are a number of challenges in attempting to assess the incremental economic impacts of CO_2 emissions. The science and economic understanding of climate change and its impacts is improving over time; research focused on the assessment of climate damages and socioeconomic emissions projections is particularly important for reducing uncertainty in the calculation of the social cost of greenhouse gases (SC–GHG),[8] as is quantifying and being transparent about where key uncertainties in the models remain.[9] But contrary to AHRI's suggestion that uncertainty should cause DOE to discount or abandon monetization of the social benefits of reducing CO_2 emissions, as stated by the interagency working group (''IWG'') that performed the review described in the February 2021 TSD, due to a number of sources of uncertainty, there is a likelihood that the social cost of greenhouse gases (SC–GHG) is an underestimate of the true social cost of emissions.[10] Despite the limits of both quantification and monetization, SC–CO_2 estimates can be useful in estimating the social benefits of reducing CO_2 emissions. As a result, DOE has used the IWG's SC–CO_2 estimates in monetizing the social benefits of reducing CO_2 emissions. However, as discussed in previous comments, DOE's SC–CO_2 analysis using these estimates was not considered in DOE's ultimate determination of whether Standard 90.1–2019 will improve energy efficiency.

Comment: AHRI p. 2, 3. As part of the rationale for not including SCC, AHRI further commented that DOE has acknowledged the uncertainty of SCC estimates and stated that these are both provisional and revisable. Further, they noted that the interagency working group developing the SCC noted that the underlying models were imperfect and incomplete and notes that the intergovernmental panel on climate change (IPCC) which the IWG relied on also stated in 2013 that no best estimate for equilibrium climate sensitivity could then be given because of the lack of agreement on values across assessed lines of evidence and studies.

DOE response: In making its determination, DOE's directive under ECPA is to assess whether updated editions of Standard 90.1 would improve *energy efficiency* in commercial buildings. 42 U.S.C. 6833(b)(2)(A) DOE emphasizes that the estimates pertaining to CO_2 are provided only as supplemental information and are not considered as part of the final determination, which is based on energy efficiency as required under 42 U.S.C. 6833(b)(2)(A).

As noted previously, DOE determined that the estimates from the February 2021 TSD are based upon sound analysis and provide well founded estimates for DOE's analysis of the impacts of CO_2 related to the reductions of emissions from updating the 90.1 Standard to the 2019 edition. As explained in the February 2021 TSD and while the IWG works to assess how best to incorporate the latest, peer reviewed science to develop an updated set of SC–GHG estimates, the IWG has determined that it is appropriate for agencies to revert to the same set of four values drawn from the SC–GHG distributions based on three discount rates as were used in regulatory analyses between 2010 and 2016 and subject to public comment. For each discount rate, the IWG combined the distributions across models and socioeconomic emissions scenarios (applying equal weight to each) and then selected a set of four values for use in benefit-cost analyses: An average value resulting from the model runs for each of three discount rates (2.5%, 3%, and 5%), plus a fourth value, selected as the 95th percentile of estimates based on a 3 percent discount rate. The fourth value was included to provide information on potentially higher-than-expected economic impacts from climate change, conditional on the 3% estimate of the discount rate. As explained in the February 2021 TSD, this update reflects the immediate need to have an operational SC–GHG for use in regulatory benefit-cost analyses and other applications that was developed using a transparent process, peer-reviewed methodologies, and the science available at the time of that process. Those estimates were subject to public comment in the context of dozens of proposed rulemakings as well as in a dedicated public comment period in 2013. However, as discussed in previous comments, DOE's SC–CO_2 analysis using these estimates was not considered in DOE's ultimate determination of whether Standard 90.1–2019 will improve energy efficiency.

Comment: AHRI, p. 3,5. AHRI commented that EPCA's focus is on benefits accruing with this nation, hence incorporation of SCC at the global level is beyond the scope and authority of DOE. See 42 U.S.C. 6833(b)(2)(B)(I). They further noted that EPCA originally arose out of the 1970's oil embargo and that nothing in the subsequent amendments suggests a different statutory focus other than improving the energy economics within the United States. AHRI notes that DOE analyzes expected national [domestic] energy savings, but does not scale back reported SCC calculations to reflect domestic impacts only.

DOE response: In making its determination, DOE's directive under ECPA is to assess whether updated editions of Standard 90.1 would improve *energy efficiency* in commercial buildings. 42 U.S.C. 6833(b)(2)(A) DOE emphasizes that the estimates pertaining to CO_2 are provided only as supplemental information and are not considered as part of the final determination, which is based on energy efficiency as required under 42 U.S.C. 6833(b)(2)(A). As to the use of a SC–CO_2 value that includes impacts outside the boundaries of the United States, the February 2021 TSD provides a complete discussion of the IWG's initial review conducted under E.O. 13990. In particular, the IWG found that a global perspective is essential for SC–GHG estimates because climate impacts occurring outside U.S. borders can directly and indirectly affect the welfare of U.S. citizens and residents. Thus, U.S. interests are affected by the climate impacts that occur outside U.S. borders. Examples of affected interests include: Direct effects on U.S. citizens and assets located abroad, international trade, and tourism, and spillover pathways such as economic and political destabilization and global migration. In addition, assessing the benefits of U.S. GHG mitigation activities requires consideration of how those actions may affect mitigation activities by other countries, as those international mitigation actions will provide a benefit to U.S. citizens and residents by mitigating climate impacts that affect U.S. citizens and residents.

As noted previously, DOE determined that the estimates from the February 2021 TSD are based upon sound analysis, and therefore, in analyzing the impacts of CO_2 related to the reductions of emissions from updating the 90.1 Standard to the 2019 edition, DOE has focused on a global measure of SC–GHG. As noted in the February 2021 TSD, the IWG will continue to review developments in the literature, including more robust methodologies for estimating SC–GHG values based on purely domestic damages, and explore ways to better inform the public of the full range of carbon impacts, both global and domestic. As a member of the IWG, DOE will likewise continue to follow developments in the literature pertaining to this issue. However, as discussed in previous comments, DOE's SC–CO_2 analysis using these estimates was not considered in DOE's ultimate determination of whether Standard 90.1–2019 will improve energy efficiency.

Comment: AHRI, p.3,4. AHRI stated that DOE wrongly assumes that SCC values

[7] The E.O. instructs the IWG to undertake a fuller update of the SC–GHG estimates by January 2022.

[8] The social cost of greenhouse gases (SC–GHG) is the monetary value of the net harm to society associated with adding a small amount of that GHG to the atmosphere in a given year and, therefore, should reflect the societal value of reducing emissions of the gas in question by one metric ton. The marginal estimate of social costs will differ by the type of greenhouse gas (such as carbon dioxide, methane, and nitrous oxide) and by the year in which the emissions change occurs. The estimates of the social cost of carbon (SC–CO_2), social cost of methane (SC–CH_4), and social cost of nitrous oxide (SC–N_2O) published in the February 2021 TSD allow agencies to understand the social benefits of reducing emissions of each of these greenhouse gases, or the social costs of increasing such emissions, in the policy making process. Collectively, these values are referenced as the ''social cost of greenhouse gases'' (SC–GHG).

[9] National Academy of Sciences, Engineering, and Medicine, *Valuing Climate Damages: Updating Estimation of the Social Cost of Carbon Dioxide,* National Academies Press: Washington, DC, 2017.

[10] See Interagency Working Group on Social Cost of Greenhouse Gases, *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide. Interim Estimates Under Executive Order 13990,* Washington, DC, February 2021.

increase over time in real dollars and states that this is contrary to ''historical experience and to economic development science'' and that the more economic development that occurs, the more adaptation and mitigation efforts a population living in a growing economy can afford to undertake (AHRI cites the IWG indicating that developed countries can eliminate 90% of the economic impacts and developing countries could eventually eliminate 50% of the economic impacts of climate change). They comment that they see no indication that DOE considered this separately.

DOE response: In making its determination, DOE's directive under ECPA is to assess whether updated editions of Standard 90.1 would improve *energy efficiency* in commercial buildings. 42 U.S.C. 6833(b)(2)(A) DOE emphasizes that the estimates pertaining to CO_2 are provided only as supplemental information and are not considered as part of the final determination, which is based on energy efficiency as required under 42 U.S.C. 6833(b)(2)(A).

The model scenarios reported by the IWG demonstrate that the damage assessments and corresponding valuation (SC–CO_2), adjusted for inflation, increase through time. As explained in the February 2021 TSD, ''[the SC–GHG estimates increase over time within the models—*i.e.,* the societal harm from one metric ton emitted in 2030 is higher than the harm caused by one metric ton emitted in 2025—because future emissions produce larger incremental damages as physical and economic systems become more stressed in response to greater climatic change, and because GDP is growing over time and many damage categories are modeled as proportional to GDP.'' As noted previously, DOE determined that the estimates from the February 2021 TSD are based upon sound analysis and provide well founded estimates for DOE's analysis of the impacts of CO_2 related to the reductions of emissions from updating the 90.1 Standard to the 2019 edition in its building codes impact analysis. Accordingly, DOE incorporated the IWG's considerations in its analysis. However, as discussed in previous comments, DOE's SC–CO_2 analysis using these estimates was not considered in DOE's ultimate determination of whether Standard 90.1–2019 will improve energy efficiency.

Comment: AHRI, p. 4. AHRI argued that it is arbitrary and capricious to use different timeframes and assumptions for costs and benefits and notes that DOE must clarify precisely why and how it believes it has statutory authority under 42 U.S.C. 6833(b) to consider SCC issues and cites why such action is legally arbitrary without sufficient documented reason for treating similar situations differently. AHRI notes that DOE, in clarifying why it believes it has such authority, can establish how it is acting consistently in terms of the analysis of benefits.

DOE response: See previous response to AHRI comment on the issue of authority. On the issue of costs and benefits, DOE reemphasizes that its determination analysis is not assessing the costs and benefits associated with the updated Standard 90.1, that the determination is solely based on energy efficiency, and that the reported carbon emissions are reported only as supplemental information for the benefit of interested parties and in support of the directives of Executive Order 12866. To clarify the issue of timeframe, the emission estimates are based on a one-year time period (*i.e.,* the annual energy consumption estimated via the energy efficiency analysis). However, the step of projecting the associated CO_2 impacts captures the longer-term impact of those single-year emissions, as they persist in the atmosphere (and drive the damage impacts over the time they persist), which is then discounted to present value for the year when the emissions occur. DOE does not find an economic inconsistency in this approach to reporting emission benefits. Such a calculation is similar to life-cycle analysis, for instance, which is performed in a similar fashion, where a single year event occurs (*e.g.,* a purchase of more efficient equipment), but the energy savings are calculated over the time they exist (*e.g.,* the life of the equipment), and discounted back to the present value to reflect an overall life-cycle cost. DOE's reporting here of discounted damage impacts is consistent with that general approach.

Signing Authority

This document of the Department of Energy was signed on July 19, 2021, by Kelly Speakes-Backman, Principal Deputy Assistant Secretary and Acting Assistant Secretary for Energy Efficiency and Renewable Energy, pursuant to delegated authority from the Secretary of Energy. That document with the original signature and date is maintained by DOE. For administrative purposes only, and in compliance with requirements of the Office of the Federal Register, the undersigned DOE Federal Register Liaison Officer has been authorized to sign and submit the document in electronic format for publication, as an official document of the Department of Energy. This administrative process in no way alters the legal effect of this document upon publication in the **Federal Register**.

Signed in Washington, DC, on July 22, 2021.

Treena V. Garrett,

Federal Register Liaison Officer, U.S. Department of Energy.

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DEPARTMENT OF ENERGY

[Case Number 2020–003; EERE–2020–BT–WAV–0020]

Energy Conservation Program: Notification of Petition for Waiver of Hussmann Corporation From the Department of Energy Commercial Refrigerators, Freezers and Refrigerator-Freezers Test Procedure and Notification of Grant of Interim Waiver

AGENCY: Office of Energy Efficiency and Renewable Energy, Department of Energy.

ACTION: Notification of petition for waiver and grant of an interim waiver; request for comments.

SUMMARY: This notification announces receipt of and publishes a petition for waiver and interim waiver from Hussmann Corporation (''Hussmann''), which seeks a waiver for specified Commercial Refrigerator, Freezer, and Refrigerator-Freezer (''CRE'') basic models from the U.S. Department of Energy (''DOE'') test procedure used for determining the energy consumption of CRE. DOE also gives notification of an Interim Waiver Order that requires Hussmann to test and rate the specified CRE basic models in accordance with the alternate test procedure set forth in the Interim Waiver Order. DOE solicits comments, data, and information concerning Hussmann's petition, its suggested alternate test procedure, and the alternate test procedure required under the Interim Waiver Order so as to inform DOE's final decision on Hussmann's waiver request.

DATES: Written comments and information are requested and will be accepted on or before August 27, 2021.

ADDRESSES: Interested persons are encouraged to submit comments using the Federal eRulemaking Portal at *https://www.regulations.gov.* Alternatively, interested persons may submit comments, identified by docket number EERE–2020–BT–WAV–0020, by any of the following methods:

- *Federal eRulemaking Portal: https://www.regulations.gov.* Follow the instructions for submitting comments.
- *Email:* to *HussmannCRE2020WAV0020@ee.doe.gov.* Include docket number EERE–2020–BT–WAV–0020 in the subject line of the message.

No telefacsimilies (''faxes'') will be accepted. For detailed instructions on submitting comments and additional information on this process, see the **SUPPLEMENTARY INFORMATION** section of this document.