National Association of State Energy Officials

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U.S. Department of Energy
Office of Energy Efficiency and Renewable Energy
1000 Independence Avenue SW, EE-5B
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RE: Docket No. EERE–2021–BT–BC–0013, NASEO Comments on the Future of Energy Codes Workshop

Dear Mr. Williams,

Thank you for the opportunity to comment on the US. Department of Energy's (DOE) Future of Energy Codes docket and stakeholder workshop. The National Association of State Energy Officials (NASEO) represents the governor-designated energy directors and their offices from the 56 States, Territories, and District of Columbia. The nation's state energy offices have led the nation's development and advancement of building energy codes for more than 40 years.

1. The current model codes—2021 IECC and 90.1-2019—should serve as the basis for future code advancement

Is this an appropriate baseline? How should future editions of the model codes be handled?

The 2021 International Energy Conservation Code (IECC) and ANSI/ASHRAE/IES Standard 90.1-2019 are appropriate baselines for future editions of energy codes for residential and commercial buildings, respectively. The IECC and ASHRAE 90.1 model codes are the basis of most jurisdictions' existing codes and are familiar to jurisdictions, code officials, and the building industry. The most recent versions of these model codes make sense as a basis for future editions of model codes, which should offer steady, predictable paths forward to advance cost-effective energy efficiency in alignment with state energy policy objectives, climate, and economic development goals, as well as energy affordability, resilience, and emissions reductions. While each state's energy, resilience, and climate goals and needs differ, most states are steadily moving forward to keep pace with building energy technology innovations that deliver greater value to building owners, lower overall energy system costs for all residents, and speed progress toward their policy goals. In response, future energy codes developed at the national level for potential adoption by states should provide a steady, predictable level of progress toward cost effective energy efficiency measures, in addition to supporting states work to meet emissions reduction targets they select or are required to attain.

NASEO supports the development of a voluntary model energy code and stretch code by DOE. The state energy offices would offer their expert comments on such a code. The code would be voluntary for the states to consider adopting, and we are confident DOE would ensure a fair process not dominated by one private interest group.

2. **Future codes should orient around a goal of net-zero energy buildings by 2030**
   Is this the appropriate target? Timeline? NZE vs. NZE- "Readiness"? What metrics? What should DOE's role be in supporting such a goal?

DOE has historically provided high quality technical assistance and analytical skill to the energy code development process and should continue to do so. In addition, DOE should build on that legacy by taking the following actions:

- Develop a model energy stretch code that could be voluntarily adopted by states and relevant jurisdictions to assist them in achieving net-zero and zero-energy readiness by 2030;
- Take steps to develop model stretch codes and/or develop proposals to the IECC standard development committees that support progress towards the goal of net zero by 2030;
- Take a holistic view of energy management to encompass time-of-use, demand flexibility and zero emitting distributed energy resources (DERs), such as renewable generation and energy storage, which all can have important impacts on costs, emissions, reliability, and resilience;
- Consider capabilities or "make-ready" provisions for electrification, demand-flexible and grid-interactive energy management, and generation and storage (thermal and electrical);
- Leverage the analytic and technical capabilities of the National Laboratories, such as the Pacific Northwest National Laboratory (PNNL), to deliver model codes.
- Continue to provide technical assistance to states to support adoption, enforcement, and compliance with the three most recent editions of the model energy codes (IECC, 90.1). Bipartisan support from Congress for such technical assistance for states is strong as evidenced by a $225 million building energy code provision contained in the Bipartisan Infrastructure bill (S. 2377, reported by the Senate Energy and Natural Resources Committee on July 19, 2021).

If the model codes (IECC, ASHRAE 90.1) fail to make steady progress towards the net zero target, U.S. DOE should publish a model code (in language which can be adopted by a State or other authority having jurisdiction) that will be based upon the 2021 edition of the IECC.

3. **How should a target like NZE be applied?**
   NZE for all buildings and climates? Net positive? What balance of efficiency, renewables and demand flexibility?

The net-zero target should be applied with a variety of flexible solutions that consider buildings as a part of the energy system and integrate the opportunity for demand-flexible grid-interactive efficient building (GEB) technology (e.g., demand flexibility, demand response, onsite generation, energy storage [thermal and electrical]). Including GEB technologies in future codes will enable all structures to contribute to smooth operation of a high renewable energy penetration grid, even when individual buildings are unable to achieve on-site net-zero energy performance. DOE should offer pathways for buildings that are unsuitable for sufficient onsite renewable energy to achieve high levels of energy efficiency and offer grid services as an alternative to a NZE compliance path. NZE targets should also be developed with careful consideration of climate zones and impact on existing energy infrastructure.

A net-zero target should be applied holistically and flexibly but with rigor to assure benefits will be achieved. Energy efficiency should remain central to energy codes as it provides large benefit in and of itself as well as lowering the cost and enhancing the effectiveness of other energy management approaches, including demand flexibility and onsite generation and storage. It is the base.

As noted above, model codes moving toward net-zero targets should consider temporal factors (*when* energy is used or saved) and opportunities to flexibly manage energy use to reduce emissions, reduce costs, and strengthen both energy reliability and resilience.

Model energy codes should consider provisions for buildings to include or "make ready" for distributed energy resources (DERs), such as controls that allow participation in demand response and grid-interactive programs, onsite renewable generation, and energy storage (thermal and electrical), and electrification of appliances/equipment and vehicles.[1]

4. **Both prescriptive and performance-based compliance options should be included in future energy codes, but new formats are needed to enable advanced savings levels.**
   Role of prescriptive vs performance, new metrics? How should system performance be applied, does the role of prescriptive & performance pathways need to change in pursuit of advanced goals?

Both, prescriptive and performance paths should continue to be available. Prescriptive paths provide a surer route for compliance, but a performance path can allow space for greater innovation by allowing multiple—and new—routes to achieve compliance. To the extent feasible, metrics should consider time-differentiated impacts. Two buildings with the same modeled or even actual energy use intensity (EUI) can have quite different cost and emission impacts based on when energy is used or saved.

While a model code does not compel participation in demand response programs, managed electric vehicle (EV) charging, and other grid-interactive services—which may not even be available in a given jurisdiction--it could require the capability to do so.[2] For example, recent

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[1] NASEO offers suggestions for inclusion of demand flexibility and grid-interactive functionality criteria in building energy codes as well as for building performance standards and other building energy policies and programs in NASEO, "State and Local Building Policies and Programs for Energy Efficiency and Demand Flexibility" (February 2021).

[2] NASEO, ibid.

versions of ASHRAE Standard 90.1 model code prescriptive requirements for commercial buildings specify various active controls for HVAC, lighting, hot water, elevators, and other systems but they do not address automation to effect time-differentiated control of energy use, demand response, and, more broadly, demand flexibility.[3] Portions of the GridOptimal suite of metrics may be useful, particularly for commercial buildings, for establishing demand flexibility capabilities under codes and for measuring performance in building operations.[4]

5. **A life-cycle cost perspective is the most effective means of balancing incremental costs of energy efficiency vs. longer-term savings**
   How does analysis better characterize environmental impacts? How to balance consumer benefits with societal benefits, does cost effectiveness need to change to meet advanced goals?

Cost-effectiveness analytic approaches should be updated to reflect the benefits that accrue to the owners and occupants of buildings over the long term, rather than short term, simple payback. Life-cycle cost analysis would be a more appropriate method for calculating cost-effectiveness. Buildings last for decades or more and permanent measures like envelope efficiency requirements should be evaluated with this in mind.

DOE should consider including time differentiation in evaluating cost and cost-effectiveness of provisions rather than fixed, blended utility rates. Franconi, et al. (2020) found that using time-differentiated rates rather than a blended fixed national electricity rate had significant impact in the cost-effectiveness calculated for several energy efficiency, storage, and demand flexibility measures in simulated office buildings in several U.S. cities.[5] DOE should also study California's use of Time Dependent Valuation in its Title 24 building energy code to see if there are sections appropriate for adaptation or adoption for national model energy codes.

6. **Building energy codes need to support increased diversity, equity, inclusion and social justice in housing and the built environment.**
   How do codes help ensure more positive outcomes in disadvantaged communities? Do current economic analysis methods represent LMI households? How do we increase diversity in building code activities? Other ideas?

Building energy codes can result in buildings that are more efficient, comfortable, resilient, and less expensive to operate compared to buildings that are not built to up to date codes. Building energy codes reduce the "split incentive" between landlords and tenants to help occupants of the building accrue benefits of energy efficiency over the lifetime of the structure.

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[3] Franconi, E., J. Lerond, C. Nambiar, D. Kim, M. Rosenberg, and J. Williams, 2020, "Opening the Door to Grid-Interactive Efficient Buildings with Building Energy Codes," 2020 ACEEE Summer Study on Energy Efficiency in Buildings.

[4] https://newbuildings.org/wp-content/uploads/2020/11/NewMetricsForEvaluatingBuildingGridIntegration.pdf

[5] Franconi, et al., op cit.

One immediate way to enhance the input from diverse communities in building code activities is for DOE to consider financially supporting participation by low- to moderate-income and disadvantaged communities in the code development process and in state or local adoption processes. Such support could include capacity building to increase understanding of building systems, including interactions among building energy codes, first cost, life cycle cost, and energy affordability. Redesigning participation so that it does not require specialized training would make it more appealing to participants. DOE should provide methodologies that would provide code development organizers ways to understand, interpret, and incorporate priorities of local communities in the code.

DOE should expand the priority of diversity to be one of inclusion; one where priorities and opinions of under-represented groups are elevated and valued. DOE can provide guidance on creating an environment where new participants feel welcomed and confident that their input will be seriously considered.[6]

7. **Building decarbonization and model energy codes**
   - Should the IECC and 90.1 embrace carbon-based metrics?
   - What's the appropriate allocation of energy efficiency vs. renewables?
   - Should the IECC include prescriptive requirements for onsite PV?
   - How should the codes address (beneficial) building electrification?
   - What is the role of energy storage and grid-interactive technologies?

Building decarbonization efforts should prioritize long-term, permanent energy efficiency features, many of which are among the lowest cost measures, such as envelope insulation and air sealing as compared to measures such as appliances and renewable energy measures which have long lives but can be removed or replaced by the building owner at any time and which may have a higher initial cost. However, "make ready" provisions allowing the option for DERs (generation and storage) and electrification of heating, hot water, cooking, and vehicles should be considered. Renewable energy requirements in the building code must make allowances for the substantial number of structures for which on-site renewable energy will be infeasible or impractical due to shading or other factors, as well as other environmental and energy infrastructure considerations. In addition, renewable energy requirements should avoid including requirements for renewable energy certificates or off-site generation, as these elements are extremely difficult for code officials to enforce and will likely reduce compliance. Grid-interactive technologies and energy storage (both electrical and thermal) are likely to serve an important role in decarbonizing buildings. However, before determining if grid-interactive technology requirements are appropriate for inclusion in energy codes, DOE and other stakeholders should determine whether updated appliance standards are a more appropriate avenue for establishing grid-interactive requirements for applicable technologies.

8. **Relationship between building performance standards and building energy codes**
   - How should they complement one another?

[6] For additional discussion on meeting design see "Designing Equity-Focused Stakeholder Engagement to Inform State Energy Office Programs and Policies" by NASEO, Facilitating Power, and the Minnesota Department of Commerce, Energy Division."

- What types of support are needed to support their uptake and implementation?
- What is the potential application of a BPS in the residential sector?

Building performance standards (BPS, which apply to certain existing buildings) and building energy codes both establish minimum legal levels of modeled (codes) or actual (BPS usually) energy performance for structures. In most cases, performance standards and energy codes have a defined time cycle of updates (e.g., three years for the IECC and ASHRAE 90.1).
BPS are a new policy approach that start to address the critical need for enhancing existing building energy performance to meet energy, emission, and resilience objectives. They are critical complements to each other and to other related policies (for example, some local benchmarking and disclosure requirements require periodic building retrocommissioning or "tune-ups" or particular upgrades [e.g., New York City required certain buildings to do one-time lighting upgrades and certain spaces to be submetered]).

Most existing BPS policies (e.g., New York City, St. Louis, Washington, DC, Washington State) apply to larger commercial/institutional buildings and sometimes large multifamily buildings. Other jurisdictions, including the U.S. federal government for its buildings, are developing BPS too. There are also a few BPS-like policies—such as Boulder (CO) SmartRegs and Burlington (VT) rules—applicable to residential rental properties, designed to assure some minimum level of efficiency (1999 IECC equivalent under SmartRegs).

The large building BPS policies are still nascent, not yet fully implemented, requiring upfront work in characterizing buildings, classifying them into cohorts of similar types, developing appropriate standards for each type, and developing systems for implementation, reporting and tracking, compliance, and enforcement. DOE and sister agencies developing the federal building BPS system should engage state, local, nongovernmental organizations, industry, and other stakeholders to gather lessons from state and local initiatives and to understand needs, including areas where federal support can be useful. Potential areas for federal support include building data and analytics; performance modeling of components, systems, and whole buildings; financial and economic analyses of upgrade costs and benefits; existing building energy upgrade research, development, demonstration, and validation; and estimation and modeling of current and projected emission (criteria pollutant and greenhouse gas) impacts, among other areas.

Most existing BPS use the ENERGY STAR Portfolio Manager platform and EUI as bases for performance, which does not account for temporal use (and savings) of energy with their differing cost, emissions, reliability, and resilience implications. New York City's BPS, however, uses a carbon dioxide-equivalent (CO_2e) emission metric, which initially is based on fixed emission factors but allows the option for time differentiated emission factors, offering an incentive for using demand flexibility to reduce building emissions to comply with the BPS.[7, 8] NASEO offers suggestions for incorporating into BPS demand flexibility and time differentiation factors, including time differentiated emissions, peak demand, coincident peak

[7] City of New York, Local Law No. 97, https://www1.nyc.gov/assets/buildings/local_laws/ll97of2019.pdf and City of New York, Local Law No. 147, https://www1.nyc.gov/assets/buildings/local_laws/ll147of2019.pdf.
[8] Rocky Mountain Institute, The Carbon Emissions Impact of Demand Flexibility (2021)

demand, demand response and demand flexibility capabilities, and demand response program participation criteria as well as suggesting pertinent metrics, such as GridOptimal.[9]

As previously noted, with few exceptions (Boulder SmartRegs and similar Burlington, VT requirements), BPS and related existing building performance policies have been applied to larger buildings (including some large residential). With BPS so nascent in larger, mostly professionally managed buildings, additional research and analyses are needed on potential design and implementation of BPS-type requirements for smaller residential and commercial buildings. The SmartRegs experience may offer good precedent; that policy coordinates regulatory requirements with provision of technical assistance and utility and government incentives, and has cost-effectiveness and technical feasibility criteria, to effect upgrades of poor performing properties to "reasonable" efficiency rather than to very high efficiency. Additional pilots would be instructive.

9. How can states and local governments continue to have a strong voice in the code development process?

ICC should return to the inclusive system in which ICC's governmental members (including State Energy Offices and other subnational government stakeholders) were permitted to vote on the final content of the building energy codes. The number of votes should be allocated according to population and voting should take place online as it occurred in the 2021 development cycle. Governmental members of the ICC should have the authority to reject the decisions of the committee if they do not represent the needs of the majority of Governmental Voters. The new ICC process puts control of the building energy code development process into the hands of 93 ICC-selected representatives, rather than allowing qualified, state government votes from all 50 states. Each state's energy and building needs and goals differ and the new ICC process makes it particularly difficult for more rural states with smaller population centers and resources to engage in the only codes process available. In addition, state and local officials can generally not afford the time to serve on the standards committee, while other special interests with deep pockets are free to do so.

10. What type of technical assistance can best support states and local governments?

State governments need additional, more timely technical support to better understand the impact of amendments to building energy codes, and how amendments impact the energy performance of structures built to comply with amended codes. DOE should consider providing more timely support (e.g., during state building code technical advisory group deliberation periods) such as modeling of proposed amendments to energy codes to assist states to understand the impact of amendments and how those amendments may impact the state's ability to meet energy efficiency goals.

State governments will also need technical assistance to advance energy justice and energy equity considerations in energy code development. During code deliberations, state governments may need assistance identifying and recruiting new stakeholders to the process. They may also

[9] NASEO, ibid.

need guidance on enhancing and encouraging access to the code development process by individuals and organizations that have not been previously engaged, including helping those interested stakeholders that lack technical expertise. Additional support and guidance on opportunities to compensate participants in the code development process may also be appreciated. DOE should consider offering all of these as part of energy codes technical assistance.

11. What are the priorities for states and local governments when it comes to future energy codes?

Future energy code priorities for states include incorporation of new technology, such as electric vehicle charging, electric space and water heating, as well as resilience to address flooding and extreme weather and temperature events. Consideration of affordability for both the building owner and the overall energy system, emissions reductions benefits and requirements must also be incorporated with future codes.

Thank you for the opportunity to comment on the future of energy codes docket.

Best regards,

David Terry
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