The Alliance to Save Energy comments on the National Definition for Zero Emissions Building: Part 1 Operating Emissions
Version 1.00 Draft Criteria

Section A: Overall

5. Are the draft criteria clear and appropriate for the definition of a zero-emissions building? Should any other criteria be considered for Part 1? Please provide specific feedback about this draft definition.

The Alliance to Save Energy comments only on the energy efficiency-related provisions and supports the substance of the proposed national definition, specifically, the inclusion of energy efficiency as the first criterion and the recognition that energy efficiency is fundamental to achieving zero operating-emissions buildings. By incorporating energy efficiency first as the primary criterion of the Department of Energy's zero-emissions building definition, DOE will not only maximize cost-effectiveness and accelerate building decarbonization but also create a more equitable and resilient path towards reducing energy burden and ensure long-term affordability for building users.

The Alliance to Save Energy (Alliance) is a leading non-profit, bipartisan energy efficiency policy organization, consisting of a coalition of manufacturers, utilities, technology companies, environmental advocates, and others who are committed to advancing the role of energy efficiency in U.S. energy policy, and its value in achieving energy affordability, grid reliability, emissions reductions, and energy security.

The Alliance to Save Energy strongly supports the Department of Energy's ("DOE") decision to focus Part 1 of the proposed definition of zero-emissions buildings on operational energy, which recognizes that the reduction of emissions associated with buildings starts with the reduction of energy use. We also support DOE's recognition that energy efficiency is a pillar for the definition of a zero-emission building. This is consistent with both federal and state policy frameworks governing building energy use. For example, DOE's policy guidance to states for implementation of the Inflation Reduction Act's Home Energy Rebate programs encourages states to adopt an "envelope first/envelope only" approach.[1]

The Alliance provides technical recommendations in the responses below, including comments regarding the metrics used for energy efficiency, clean energy generation, and procurement. As an overall comment, the Alliance recommends that zero emissions building criteria also include demand-responsive controls for HVAC, water heating, and lighting equipment to enable grid interactivity, including virtual power plants. The Alliance further proposes that DOE expand its

[1] https://www.energy.gov/scep/slsc/home-energy-rebate-program/maximizing-home-energy-performance-when-using-home-energy

reliance on building energy codes and standards that already exist and promote pathways to achieve zero-emission buildings.

We thank you for your attention to these critical issues. If you have any questions or need additional information, please contact Sapna Dowla of the Alliance to Save Energy at sgdwola@ase.org.

Section B: Energy efficiency criteria.

6. Should energy efficiency be considered a criterion for the definition of a zero-emissions building? If the efficiency of an existing building should be considered, do you agree that requiring energy performance in the top 25% of similar buildings is an appropriate measure of energy efficiency for this definition? (ENERGY STAR® score of 75 or above.) Should it be higher or lower? Are there other benchmarks or approaches that should be considered? For an existing building, is one year of measured energy performance appropriate for demonstrating efficiency, or is another approach appropriate?

The Alliance to Save Energy, a bipartisan nonprofit coalition of business, government, environmental, and consumer leaders advocating to advance energy efficiency adoption, write to urge prioritization of including energy efficiency as a criterion for the Department of Energy's standardized, consistent, measurable basis for the zero-emissions buildings definition, as energy efficiency plays an indispensable role in achieving ambitious climate goals.

The purpose of this RFI is to establish a broadly accepted national definition of a Zero Emissions Building, and further establish a pathway to transition buildings in the U.S. inventory to zero greenhouse gas emissions. As highlighted by the comprehensive Lawrence Berkeley National Laboratory (LBNL) and Brattle Group study, nearly half (45%) of total 2050 CO2 reductions could come from building energy efficiency/ demand-side measures, demonstrating efficiency's immense contribution alongside clean energy sources.[2] Focusing on key areas like envelope and lighting upgrades, HVAC/R improvements, and water heating electrification, as the study highlights, can significantly cut emissions. As the study recommends, early retrofits and aggressive efficiency policies can unlock even greater long-term benefits and pave the way for a smooth transition.

Decarbonization:
In the US, building energy consumption is a substantial driver of the CO_2 emissions from energy end-use sectors, accounting for 1.7 Gt CO_2 in 2022, or 35% of the US total.[3] Buildings also account for 74% and 42% of annual US electricity sales and end-use natural gas consumption, respectively.[4]

[2] https://emp.lbl.gov/us-buildings-sector-decarbonization-scenarios-2050
[3] EIA Monthly Energy Review, Tables 2.1a-b, 2.2-2.5. 2023: 11.1-11.3 https://www.eia.gov/totalenergy/data/monthly/
[4] *Id*.

Energy efficiency has been a powerful catalyst for decarbonization as carbon emissions would have been 78% higher in 2021, but for energy efficiency investments made since 1980.[5] That said, energy efficiency investments since 1980 have resulted in significant bill savings, equaling approximately $800 billion annually through 2020.[6] According to the International Energy Agency (IEA), energy efficiency alone can achieve 40% of the emission reductions required by the Paris Agreement. The same IEA recently stated that "net zero by 2050 hinges on a global push toward energy efficiency."[7] The LBNL and Brattle Group study also finds potential for "up to a 91% reduction in building CO2 emissions from 2005 levels by 2050 without corresponding increases in building sector electricity use, given aggressive deployment of demand-side measures and full decarbonization of the electricity supply by 2035."[8]

Reliability and Resilience:
Energy efficiency is often identified as the "first fuel" in the transition to clean energy, in that efficiency provides some of the fastest and most cost-effective CO2 mitigation options while also lowering energy bills and strengthening energy security, according to the IEA.

Energy efficiency is also the single largest measure to avoid energy demand and additional system buildout from U.S. energy systems in the Net Zero Emissions by 2050 (NZE) Scenario, making these systems more reliable, and helping to keep energy rates low for residents living in existing and new construction buildings. [9]

According to DOE's own research, energy efficiency reduces the electricity on the grid simultaneously, minimizing grid stress and thus preventing power disruptions as well.[10] Additionally, because energy efficiency reduces overall demand, energy efficiency can reduce reliance on energy imports, thus playing a critical role in long-term and short-term energy security.[11]

Building end-use efficiency and flexibility can also reduce the cost of decarbonizing the power sector by reducing overall electricity consumption and peak demand, and shifting usage to hours when it is less costly to serve, according to the LBNL and Brattle study. "The result is a reduction both in fixed generation and transmission costs (i.e., capital investment and fixed operations and maintenance) and in variable generation costs (i.e., fuel and variable operations and maintenance) that were otherwise incurred to serve demand under the power sector decarbonization targets, before taking into account building efficiency and flexibility." The study estimates up to $107 billion in annual power system cost savings through efficiency measures, offsetting over a third of the incremental cost of full grid decarbonization and highlighting its economic value. Additionally, by lowering baseline energy needs, efficiency first ensures optimal utilization of clean energy sources, maximizing the impact of net-zero efforts.[12]

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[5] https://energyefficiencyimpact.org/dashboard/.
[6] *Id*.
[7] https://www.iea.org/articles/net-zero-by-2050-hinges-on-a-global-push-to-increase-energy-efficiency
[8] https://escholarship.org/content/qt9x89z514/qt9x89z514.pdf
[9] https://www.iea.org/energy-system/energy-efficiency-and-demand/energy-efficiency
[10] https://www.energy.gov/eere/energy-efficiency-buildings-and-industry.
[11] https://www.iea.org/reports/multiple-benefits-of-energy-efficiency/energy-security.
[12] https://emp.lbl.gov/us-buildings-sector-decarbonization-scenarios-2050

Impact On Building Owners: Jobs, Equity and Affordability:
In addition to the environmental and economic benefits of a zero-emissions building definition, it's crucial to consider how embracing energy efficiency as a core pillar aligns with building owners, particularly regarding jobs, equity, and affordability. Energy efficiency investments since 1980 have resulted in significant bill savings, equaling approximately $800 billion annually, through 2020.[13] As the largest employer in the clean energy sector, with over 2.1 million jobs in 2021, based on the 2022 U.S. Energy Employment Report (USEER) and median wages surpassing the national average being 28% higher at $24.44, efficiency investments support good-paying careers across diverse communities.[14] Retrofitting and maintaining efficient buildings require specialized skills, fostering opportunities for training programs and upskilling the workforce as well.

Efficient buildings require less energy to operate, translating to reduced maintenance costs and improved asset value in the long run, reducing or eliminating energy burden. Energy burden represents the percentage of household income used for energy expenses. According to DOE, low-income households have energy burdens that are three times higher than for non-low-income households, and approximately 44% of all U.S. households are considered low-income.[15] By incorporating energy efficiency first as the primary criterion of the Department of Energy's zero-emissions building definition, DOE will not only maximize cost-effectiveness and accelerate building decarbonization but also create a more equitable and resilient path towards reducing energy burden and ensuring long-term affordability for home and building owners.

In regard to existing building energy performance, requiring energy performance in the top 25% of similar buildings is an appropriate measure of energy efficiency for this definition, and the proposal also drives deeper efficiency measures and fosters innovation. Diversifying benchmarks ensures wider applicability and avoids favoring specific building types as there are multiple tools that can demonstrate similar energy efficiency. In terms of measured energy performance as an appropriate requirement for demonstrating efficiency, one year of measured data is the industry standard[16]. One year is an appropriate benchmarking period for demonstrating energy efficiency performance, allowing for variations in building use over the year, assuring definitional requirements are being met, and remaining consistent with the minimum number of energy bills needed to achieve an ENERGY STAR score for commercial buildings. Further, this approach is consistent with the requirements of the measured energy savings approach in the Inflation Reduction Act Home Efficiency Rebates (HOMES) program.

7. For existing buildings, are the draft criteria appropriate for single-family homes? Are there other benchmarks that should be considered for single-family homes?

The Alliance to Save Energy agrees that the definitional criteria are applicable for single-family homes. The codes, standards and other tools used to demonstrate compliance will need to vary by building type. An alternative metric to consider for existing single-family homes is the Home Energy

[13] https://energyefficiencyimpact.org/dashboard/
[14] https://www.energy.gov/sites/default/files/2023-06/2023%20USEER%20REPORT-v2.pdf
[15] https://www.energy.gov/scep/slsc/low-income-community-energy-solutions#:~:text=According%20to%20DOE%27s%20Low%2DIncome,be%20as%20high%20as%2030%25.
[16] https://worldgbc.org/thecommitment/commitment-reporting/

Score value, and the Alliance suggests that DOE compare alternative metrics for existing single-family homes and engage building experts to determine the most appropriate measure.[17]

8. For new construction, are the draft criteria appropriate? The modeled building performance is at least 10% lower than the energy use according to the latest version of IECC or ASHRAE 90.1 (*e.g.* model energy code) and the building is designed to achieve an ENERGY STAR design score of at least 90 (for eligible buildings). Are there other benchmarks that should be considered?

The Alliance to Save Energy agrees that the definitional criteria are applicable for new construction. The 10% reduction target pushes builders beyond the bare minimum set by energy codes, encouraging deeper efficiency measures. Additionally, regardless of the compliance path chosen or the additional efficiency measures selected under the latest IECC or ASHRAE 90.1 model code, the building should also meet or exceed the 2021 IECC prescriptive thermal envelope requirements for air leakage and roof/ceiling, wall, floor, and slab insulation (envelope backstop). Utilizing the familiar ENERGY STAR scoring system provides a recognized benchmark for design performance and potential energy savings. Furthermore, the criteria can be applied to various single-family home designs and sizes, offering some adaptability. While design scores are helpful, we also encourage the inclusion of post-construction energy use monitoring to ensure buildings meet the expected performance as opposed to only evaluating the building design.

9. For new construction, are the draft criteria appropriate for single family homes? Are there other benchmarks that should be considered for single family homes?

For new construction criteria, Alliance to Save Energy encourages beyond-code features, such as the adoption of innovative technologies and practices like high-performance building envelopes, heat pumps, and smart energy management systems. Similar to what was said above, regardless of the compliance path chosen or the additional efficiency measures selected under the latest IECC or ASHRAE 90.1 model code, the building should also meet or exceed the 2021 IECC prescriptive thermal envelope requirements for air leakage and roof/ceiling, wall, floor, and slab insulation (envelope backstop). Doe may also take into consideration different benchmark options for new single-family homes, such as Passive House standards and Zero Energy Ready Homes,[18] also used in the Inflation Reduction Act ‘s Section 45L Tax Credits.

<u>Section E: Documentation is important for effective implementation.</u>

14. Should organizations leveraging the definition be able to determine whether buildings have to meet it annually, one time, or on a different frequency?

Annual reassessment ensures adherence to the definition and tracks performance trends closely. (Supported by EPA's ENERGY STAR guidelines).[19] The Alliance to Save Energy recommends the industry standard timeframe for GHG emissions reporting across most sectors, including buildings, which is annual. While specific regulations and protocols might allow for or encourage

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[17] https://betterbuildingssolutioncenter.energy.gov/home-energy-score#:~:text=Home%20Energy%20Score%20is%20like,cut%20costs%2C%20and%20improve%20comfort.
[18] https://www.energy.gov/eere/buildings/zero-energy-ready-home-program
[19] https://www.energystar.gov/buildings/building_recognition/building_certification

more granular reporting (e.g., monthly, quarterly), annual reporting remains the most common practice. The Greenhouse Gas Protocol (GHG Protocol) framework for corporate and organizational GHG accounting recommends annual reporting as the baseline, acknowledging the practicality and data availability for most entities.[20] Additionally, the World Green Building Council (WorldGBC) recognizes the value of starting with readily achievable actions like annual reporting, paving the way for more granular assessments in the future.[21] The EPA's Greenhouse Gas Reporting Program (GHGRP) mandates annual reporting for large emitters across various sectors, including buildings, setting the standard for many facilities as well.[22] Tracking tools such as the EPA's ENERGY STAR Portfolio Manager tool helps measure and track the greenhouse gas emissions in buildings, and returns metrics for each property on a monthly, quarterly, or annual interval between a start and end date that was specified to identify under-performing buildings, set investment priorities, verify efficiency improvements, and receive EPA recognition for superior energy performance.[23] For example, in France, the Tertiary Decree requires that companies annually declare the energy performance of their buildings. This came into effect in 2019 and requires a 60% energy saving by 2050.[24] Organizations leveraging the definition should meet the building requirements annually with ongoing verification to assure that net-zero benefits are actually being achieved. This will allow for widespread market reliance on the definition to inform investments and related policies as well.

16. Are licensed professional and third-party certification bodies the appropriate parties to independently verify the documentation that a building has met the definition? Beyond existing government resources such as EPA's ENERGY STAR Portfolio Manager, are there other methods to verify meeting the zero emissions building definition?

The Alliance to Save Energy recommends that third-party verification is essential for a robust and credible zero-emissions building definition, fostering market trust and ensuring buildings achieve net-zero status. These independent professionals bring expertise in energy performance assessment, emissions accounting, and verification protocols. This is also in line with the EPA ENERGY STAR certification for buildings as their certification application must be verified by a licensed Professional Engineer (PE) or Registered Architect (RA) to be eligible for approval.[25] Additionally, licensed professionals, certified energy auditors, and accredited green building raters are well-positioned to leverage their established expertise and utilize the methodologies and rigorous review processes established in the new zero-emissions buildings' definition criteria. Going back to the France examples we mentioned in question 15, the annual reporting is uploaded and vetted by the country's Environment and Energy Management Agency.[26] The chosen documentation and verification methods should be feasible, transparent, and scalable to support the widespread adoption of the zero-emissions building definition effectively.

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[20] https://ghgprotocol.org/corporate-standard
[21] https://worldgbc.org/thecommitment/commitment-reporting/
[22] https://www.epa.gov/ghgreporting
[23] https://www.energystar.gov/sites/default/files/tools/Portfolio%20Manager%20Custom%20Reporting%20Guide_May%202019_Final_508.pdf
[24] https://www.demeure-historique.org/dispositif-eco-efficacite-tertiaire/#:~:text=Objectif%20du%20DEET,2050%2C%20par%20rapport%20%C3%A0%202010.
[25] https://www.energystar.gov/buildings/building_recognition/building_certification
[26] https://www.demeure-historique.org/dispositif-eco-efficacite-tertiaire/#:~:text=Objectif%20du%20DEET,2050%2C%20par%20rapport%20%C3%A0%202010.

17. What time frame should be used for GHG calculations (i.e. hourly, monthly by year, annually)? Explain how this would be implemented effectively across the market.

(SAME AS 14) The chosen timeframe and methodology for GHG calculations should work with the verification process to ensure the accuracy and credibility of a building's zero-emissions status. The Alliance to Save Energy recommends the industry standard timeframe for GHG emissions reporting across most sectors, including buildings, which is annual. While specific regulations and protocols might allow for or encourage more granular reporting (e.g., monthly, or quarterly), annual reporting remains the most common practice. The Greenhouse Gas Protocol (GHG Protocol) framework for corporate and organizational GHG accounting recommends annual reporting as the baseline, acknowledging most entities' practicality and data availability.[27] Additionally, the World Green Building Council (WorldGBC) recognizes the value of starting with readily achievable actions like annual reporting, paving the way for more granular assessments in the future.[28] The EPA's Greenhouse Gas Reporting Program (GHGRP) mandates annual reporting for large emitters across various sectors, including buildings, setting the standard for many facilities as well.[29] Tracking tools such as the EPA's ENERGY STAR Portfolio Manager tool help measure and track the greenhouse gas emissions in buildings and returns metrics for each property on a monthly, quarterly, or annual interval between a start and end date that was specified to identify under-performing buildings, set investment priorities, verify efficiency improvements, and receive EPA recognition for superior energy performance.[30]

Section F: Use Cases

20. Is it important for a national definition to cover all building types, including commercial, multifamily, and single-family?

Yes, the Alliance to Save Energy considers it crucial for a national zero-emissions building definition to encompass all building types, including commercial, multifamily, and single-family homes. This ensures comprehensive and equitable decarbonization across the entire building sector.

All building types contribute to the total national greenhouse gas footprint. Excluding any category undermines the definition's effectiveness and slows overall progress toward climate goals. Additionally, a unified definition incentivizes and encourages innovation across all building segments, leading to advancements in design, technology, and construction practice to create a standardized, consistent, measurable basis for zero emissions building stock. Including all building types promotes fair competition within the marketplace by ensuring everyone operates under the same Zero Emissions Building standards. However, the definition should include appropriate variations to reflect the fundamental differences between building types and provide accommodations that reflect those differences.

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[27] https://ghgprotocol.org/corporate-standard
[28] https://worldgbc.org/thecommitment/commitment-reporting/
[29] https://www.epa.gov/ghgreporting
[30] https://www.energystar.gov/sites/default/files/tools/Portfolio%20Manager%20Custom%20Reporting%20Guide_May%202019_Final_508.pdf

22. While Part 1 of the definition focuses on operating emissions, what other areas should be considered in future parts of the definition, such as embodied carbon, refrigerant, and grid interactivity?

The Alliance to Save Energy believes that while Part 1 focuses on operational emissions, the important step of addressing embodied carbon, refrigerants, and grid interactivity is crucial for a comprehensive and future-proof definition. Buildings play a vital role in a clean energy future through smart grid integration, demand response, and on-site renewable energy generation. The Alliance to Save Energy encourages the inclusion of features and practices that optimize grid interaction. The newly released study by DNV, mentions that in the United States, demand-side solutions can create up to 200GW of capacity quicker and for billions of dollars less than generation and infrastructure. "There are several trends creating tailwinds for demand-side grid benefits such as the deployment of advanced metering infrastructure (AMI), high-speed internet, and the increasing affordability and prevalence of residential technology."[31] Next-generation technologies, such as virtual power plants (VPP), grid-interactive efficient buildings (GEBs), and active energy efficiency (AEE) that leverage the ability to communicate grid needs to consumer devices offer the promise of taking demand flexibility to the next level to optimize grid operations.[32]

Furthermore, Virtual Power Plants (VPPs) are emerging as a powerful tool for grid modernization and decarbonization. By aggregating and coordinating distributed energy resources (DERs) like smart thermostats, solar panels, and electric vehicle batteries, VPPs offer several key benefits such as demand management, Renewable integration, Cost-effectiveness, and Grid resilience. VPPs can shift energy consumption away from peak hours, reducing reliance on fossil fuel peaker plants and lowering overall grid stress. This can be achieved by, for example, strategically scheduling EV charging or utilizing rooftop solar generation during peak periods, as emphasized in the Department of Energy's report VPP Liftoff.[33] VPPs also facilitate the integration of renewable energy sources by absorbing excess generation during periods of high supply and dispatching it to the grid when needed. This helps to overcome challenges like curtailment and optimizes the utilization of clean energy resources. Research by Brattle supports the cost-effectiveness of this approach, showing VPPs to be 40%-60% cheaper than natural gas peakers while delivering additional benefits across emissions, distribution, and transmission.[34] As electric vehicles and other clean technologies come online, distribution systems face potential strain. VPPs can alleviate this pressure by strategically shifting demand, enabling smooth and affordable electrification of vital sectors like transportation and heating.[35] By addressing these additional areas, the zero-emissions building definition can take a holistic approach to building sector decarbonization, driving innovation, and shaping a sustainable future for the built environment.

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[31] https://www.ase.org/sites/ase.org/files/demand_is_the_new_supply-_white_paper__0.pdf
[32] *Id.*
[33] https://liftoff.energy.gov/wp-content/uploads/2023/10/LIFTOFF_DOE_VVP_10062023_v4.pdf
[34] https://www.brattle.com/wp-content/uploads/2023/04/Real-Reliability-The-Value-of-Virtual-Power-Full-Report.pdf
[35] https://liftoff.energy.gov/wp-content/uploads/2023/10/LIFTOFF_DOE_VVP_10062023_v4.pdf