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IMT Response to US Department of Energy (DOE) request for information related to proposed Zero Emissions Building Definition

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Note: Question numbers are aligned to the RFI. We omitted 1-4 for this public document as those request contact information.

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.

IMT congratulates the White House, DOE, EPA, and other partners on the draft zero emissions building definition. There is a clear need in the marketplace for this definition. Moving us toward net zero buildings requires permanent, economy-wide changes to how buildings are capitalized, built, managed, and valued. A definition provides consistency in evaluating and planning for the decarbonized, resilient buildings we need.

At its core, the definition is very simple and globally applicable: a zero operating emissions building is a building that is "highly energy efficient, free of on-site emissions from energy use, and powered solely by clean energy sources." To our minds, this sentence is the "definition," and the full "Part 1 definition" is more precisely the proposed approach to measure each aspect of the definition. This distinction helped us to understand the definition, especially in the context of fixed versus relative metrics.

We agree with including "highly energy-efficient, free of on-site emissions from energy use, and powered solely from clean energy" as the core criteria of the definition. A unified federal net zero definition that defines an ultimate target and includes minimum efficiency requirements for both new and existing buildings will help to align the U.S. market towards the same targets over time.

For existing buildings that currently utilize fossil fuel systems, retrofits are often not as simple as switching out one piece of equipment for another. Whole system replacements may be required and infrastructure such as piping, ductwork, and power supply may need to be replaced or upgraded – a costly and invasive process. A defined goal that covers multiple aspects of building systems, including direct and indirect efficiency and fuel use, will provide a roadmap for long-term capital planning.

In general, IMT supports the metrics and measurement approaches included. We do think that grid interactivity needs to be more clearly addressed, that there needs to be a stronger distinction between a building that is "designed to be zero emissions" and a building that actually is zero emissions, and that future versions should set more aggressive energy efficiency expectations.

6. Should energy efficiency be considered a criteria 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 an appropriate requirement for demonstrating efficiency or is another approach appropriate?

We agree that energy efficiency should be considered a criteria for the definition. Zero emission buildings must also be energy efficient, as this reduces energy demand on the grid and thus supports more optimal use of renewable energy supply. In practical terms, efficiency enables temperature regulation in extreme weather events and power outages, so the benefits of including it extend beyond carbon. Moreover, as this definition becomes dominant, it will be seen as the key element of being a high-performance building–and any high-performance building should also be energy-efficient.

However, translating an abstract idea like “energy efficiency” into practice creates tension: A definition should provide consistency and certainty; yet, energy efficiency has traditionally been assessed relative to other buildings and/or evolving standards and datasets. (There are some notable exceptions, such as Passive House and ILFI Zero Energy/Living Building Challenge.)

ENERGY STAR updates the reference points for Portfolio Manager and the ENERGY STAR score periodically as new national reference data become available. In effect, this means that over time, a building that used to meet the zero emissions definition might cease to do so even if its energy usage does not change. While this is aligned with the foundational way that the ENERGY STAR program and many building performance standards works, it is not a “definition,” just one approach to evaluation. Certifications may make ongoing improvement part of the expectation per performance, but this should not be core to the definition per se. For building owners to recoup their investments and increase market value, an asset defined as net zero emissions would ideally be perceived in the market as a terminal point in high performance for buildings.

For the alternate requirement of having an EUI 35% below the median, it should be specified whether median EUI is national or climate-zone-specific, and whether it means “Site EUI” or “Source EUI.”. IMT generally prefers Site EUI because of its support for electrification and its alignment with evolving Building Performance Standards. However, we recognize that Source EUI would be better aligned with the ENERGY STAR score approach and ASHRAE 228. The difference is likely marginal for most buildings–but it is significant for edge cases such as buildings with large onsite solar systems or connected to district steam, so clarity is critical.

Annual reporting and verification is appropriate, in line with both ENERGY STAR certification, and is important to ensure continued acquisition of clean electricity.

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?

Given the anticipated importance of the ZEB definition to federal and private financing, and the scale of the existing single family home sector, the definition should be able to be applied to single family homes. However, the proposed method of measurement against the criteria of "highly energy efficient" will not work for single family homes (and may have some verification challenges for renewable electricity).

As written, the definition would rely on the ENERGY STAR score, with the 35% better than median being a backstop for buildings 'ineligible for the ENERGY STAR score." While there is now an ENERGY STAR score for single family homes, it is not widely used, and no certification based on that score is available–which means that the verification process outlined for other property types earning the ENERGY STAR Score is not appropriate, and that the score is likely insufficiently rigorous for this use case. (In addition, there is a brand confusion issue: for the single-family market, "ENERGY STAR" is generally understood to mean the "ENERGY STAR Single Family New Homes," an entirely separate system, and not appropriate for existing buildings. Using the default fallback of "35% better than median" also runs into challenges in the single family home sector, where EUI is not a commonly understood metric and varies far more dramatically by climate zone, household size, and heating system type.

Therefore, we think an alternative approach needs to be added to the definition for single-family homes. The closest appropriate analogue with the top 25% metric is a Home Energy Score of 8 or better. However, Passive House Renew and similar deep efficiency standards for existing buildings should be considered. We encourage the federal government to engage further with industry experts on this aspect of the definition.

For renewable energy, it is important that verification accommodates aggregation and community solar, as most homeowners do not purchase RECs directly.

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?

Model energy codes are updated on three-year cycles, which means the performance requirement for new buildings will effectively become more stringent over time. So, buildings that once met the definition of net zero would not over time. The definition should make clear what is meant by "latest" model code–is it the latest code to receive a DOE determination?

The proposed requirement that the building perform in the top 10% of similar buildings is a good addition. It is in line with the European Union's Green Bond requirements, which similarly expect new buildings to perform 10% better than national requirements for "near-zero energy buildings" and to be in the top 15% compared to existing buildings. As written, it appears that buildings not eligible for the ENERGY STAR score need only be 10% better than the latest model code–this should be clearer, and alternative bar-raising requirements should be considered.

We think it would be useful to provide the market with clearer guidance on how much of an added lift this second requirement is. (IMT analysis suggests that some prototype buildings 10% better than code would earn an ENERGY STAR score of 90 or above while others would fall well below 90.). We request that EPA and PNNL collaborate to run more analysis on expected scores for various prototype buildings and share findings.

One challenge of relying on estimated performance is that actual measured energy performance rarely matches energy models created for code compliance. (And such models are not always made in the first place.) This misalignment is one of the reasons that existing green building certifications for zero emissions (e.g., ILFI, LEED Zero) rely on actual performance. However, IMT also recognizes that knowing a building meets the definition before construction is complete is important for unlocking the financing needed to build zero emission buildings at scale. Clean energy procurement is also complicated for not-yet-built buildings.

While continuous regular improvement makes sense for existing buildings, and is the norm for new construction codes today, the goal is to move towards an ultimate end point of net zero-aligned efficiency. While retrofitting an existing building to be all-electric and zero carbon is complex and expensive, 'getting it right the first time' with new construction is cost-effective. New construction zero emissions buildings should maximize all efficiency opportunities, including having strong standards for building envelopes that improve resilience and passive survivability.

We recommend that the definition state that a new building meeting the definition based on modeled energy use would be "designed to be zero emissions," with any actual "zero emissions" building designation needing at least one year of actual, verified energy performance. With this addition, we endorse the proposed approach for the current version. We encourage periodic re-evaluation of the standard, including updating the efficiency approach in the definition by 2028 to align with terminal state energy efficiency performance exemplified in standards like Passive House or ILFI Zero Energy, or NBI's Zero Energy Performance Targets.

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?

There is a clear market need for this definition for new homes. The 45L tax credit is increasing the supply of high performing homes. The details of the proposed definition are not appropriate for new single family homes. Fortunately, there is a ready-made federal definition that can be adapted. A zero emissions home can and should be a net zero home, built for resilience and passive survivability. For new construction of single family homes, the definition should align with the DOE Zero Energy Ready Homes program (ZERH version 2) on efficiency, plus a requirement for all power to come from onsite or local renewable electricity, with battery backup for resilience. (The ZERH standard is designed to yield a home that can meet its generation needs with onsite renewables, and a focus on onsite renewables would resolve significant verification challenges around offsite energy / RECs in this sector.) As with larger buildings, we recommend that the definition states that a new building meeting the definition based on modeled energy use is "designed to be zero emissions," with any actual "zero emissions" building designation needs at least one year of real, verified energy performance data.

10. Should there be an exemption allowed for emission producing emergency generation? Are there any other exemptions needed?

Some buildings require fossil emergency generation to maintain mission critical operations. Buildings like hospitals, which have federal legal requirements around emergency backup generation supply, commonly require on-site fossil fuels. The exemption is appropriate given current technologies, and is defensible in that emergency backup is not part of normal building operation. It is very good that offsets are not allowed in the definition, and one additional benefit of the emergency backup exclusion is helps eliminate what might otherwise be an argument for offsets. We also know that fear around this issue can be a barrier for owners to commit to zero emissions.

In time, battery storage or other technologies may be able to fill this gap for many buildings, but batteries are not yet cost-effective at the scale needed for full backup. We strongly encourage periodic reevaluation of this exemption, and a future narrowing to critical facilities.

11. Should biofuels consumed on-site be allowed? If so, how?

No. The supply of biofuels is finite and is best reserved for applications where electrification is less appropriate, like Sustainable Aviation Fuel and heavy industry. Therefore, as a general principle, we believe that the federal zero emissions building definition should not encourage or allow the use of biofuels. More specifically, including biofuels would open the door to the potential inclusion of biogas. While there are scenarios where biogas is directly piped from supplier to the building or campus, the biogas market generally operates like the REC market, but with both less rigor and more limited supply. As for solid and liquid biofuels, the line between appropriate and inappropriate fuel sources often depends less on the fuel type than on the sourcing. For example, is the fuel truly from a waste product and how far was it transported? Evidence shows that market pressures often drive suppliers that start out using waste feedstocks to add in virgin wood to meet demand. Verifying feedstocks would be very difficult at any scale, and so it is best to simply exclude biofuels from the definition.

Finally, we would emphasize that it is also important that the definition's exclusion of biofuels must also extend upstream to district energy facilities.

12. Are the clean energy criteria provided appropriate for this definition? Are there other clean energy criteria that should be considered? Should community solar qualify for the requirement? If so, how?

In general, the criteria are appropriate. The requirement that any RECs be retired, and be surplus to regulations like Renewable Portfolio Standards is very important. In the details for verification, we note a few points of divergence from the forthcoming EPA NextGen standard. As we understand it, while the proposed ZEB definition requires the renewable power be surplus to regulation, it does allow the use of existing zero-emissions generation assets, such as hydroelectric power or nuclear power–while the NextGen program will only recognize recent-vintage renewable electricity sources. The ZEB approach is appropriate, but the nuance is not sufficiently clear.

The definition would also benefit from additional clarity for how to treat grid electricity in jurisdictions with RPS, especially as RPS and carbon-free-electricity regulations reach 100% in the 2030s, making existing carbon-free electricity no longer surplus to the regulatory requirement.

Community Solar, community choice aggregation, and other programs that simplify utility procurement should be accepted and encouraged, so long as the upstream supplier meets the same clean energy requirements as other renewable electricity sources. This proviso is critical for the definition to actually work for residential homes and for less sophisticated commercial and institutional owners.

For existing buildings, it is important that any RECs are temporally close to the period for the energy use data, with at least a six-month overlap. For new construction, REC purchase requirements are more complicated. If the definition is updated to base performance on the energy use outcomes for a new construction building–as we have recommended above–then RECs can be required to be from approximately the same time period. If the definition continues to base new construction performance on modeled data, then we would advise an increased focus on onsite generation and long-term power purchase agreements or long-term REC purchase contracts.

The requirement that district energy come from clean, emission-free sources is of critical importance. There are very few or no emissions-free district energy systems in operation. So, this definition provides a good opportunity to get ahead of the market and to define green district energy. For example–does the whole network need to be decarbonized or are green energy credits acceptable? It is worth noting that existing BPS policies in jurisdictions with district energy systems have taken different approaches to this question. IMT prefers full system decarbonization but recognizes the market benefits of "green steam" credits–so long as those credits come from the same system, and are not an offset by another name.

In line with comments below regarding whole building data, it is important to ensure clean power purchases for all grid electricity serving the building, even electricity that passes through tenant meters. Green leases can ensure clear accounting of renewable energy credits associated with tenant-paid electricity use, among other benefits.

13. Should there be a proximity requirement for off-site power used to meet the clean power criterion? If so, how should a proximity requirement be implemented (e.g., regional definition, phase-in, etc.)?

IMT has no comment on this question.

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

For new construction buildings, third parties should be able to determine this—for instance, some entities may allow use of modeled data, but others will continue to expect one year of real, verified outcome data. For existing buildings, any verification should be tied to a single 12-month period (technically up to an 18-month period, after accounting for a 50%+ overlap in REC vintage).

15. If the definition is extended to single family homes, what documentation should be required?

Per our recommendations above, documentation requirements should align with the Zero Energy Ready Home, HERS, and Home Energy Score programs, plus proof of renewable supply.

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 definition spec as currently worded reads like a certification program, even though neither EPA nor DOE is proposing to offer any certification. The reliance on ENERGY STAR Portfolio Manager limits use of the full definition and verification to the United States and Canada. We suggest the definition should be reworded to include the broader meaning of ENERGY STAR scores and latest codes, to better align the definition with international systems. The use of the ENERGY STAR Portfolio Manager system does provide substantial transparency and simplicity benefits, but other third party systems should be able to be used (so long as they connect to the Portfolio Manager Web Services API for score calculation).

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.

At present, GHG calculations should be annualized. The data needed to calculate emissions is still only available at the annual level in some parts of the country, and often lags by a year or more. We support efforts to move toward true 24/7 carbon-free electricity and matching of renewable generation supply with demand on an hourly basis (with annual assumptions as a backup).

18. What other verification criteria are necessary to make this definition useful for the marketplace?

IMT has no additional comments on this question.

19. Are there any issues regarding conflict or synergy with regional, state or local energy and climate programs that ought to be addressed?

The definition is mostly aligned with how many state and local building performance standards (BPS) evaluate emissions. This is important because the market should have confidence that a zero emissions building complies with an emissions-based BPS. The main point of misalignment relates to EUI-based BPS. Almost all building performance standards that consider EUI use site EUI. (The District of Columbia Building Energy Performance Standard is the only exception–and the implementing department has proposed moving away from source EUI by no later than 2032.). Moreover, all efficiency-based BPS systems set custom, building-type-specific thresholds, and for some building types, those thresholds are already more stringent than an ENERGY STAR Score of 75 and 35% better than the national median. Given that local BPS programs are responding to local needs, no easy solution is apparent, but it merits attention. As discussed further below, the definition is very much not aligned with international approaches to market-based GHG accounting around tenant energy and emissions. We agree that the focus on whole building carbon neutrality is critical. So, this international misalignment is actually useful and will help move the market in the right direction.

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

Yes, it is important that it works for all commercial, institutional, multifamily, and single-family buildings. The definition should also cover warehouses and storage facilities. It is not and need not be appropriate for true manufacturing and agricultural facilities. (Most BPS requirements also exclude industrial and agricultural buildings.)

21. Are there any other recommendations that would help clarify and improve the definition?

There is one critical element that underlies the whole definition, but is not as clearly stated in the summary text as it could be: for a “building” to be a zero emissions building, the energy use and emissions must be assessed at the whole building level. ENERGY STAR benchmarking is based on measurements of whole building energy use and their associated emissions, as are most green building certifications and building codes; energy modeling typically also looks at the whole building. IMT supports the definition’s focus on whole building energy use. The proposed definition’s treatment of emissions from energy paid for by tenants is fundamentally better than the way that much of the corporate real estate sector tracks emissions. Thus, the proposed definition contributes to better alignment across the board and so is ultimately better for the industry.

So why does the whole-building lens need to be called out more clearly in the summary definition? Because it is not in fact how much of the real estate industry is currently calculating net zero (at least at the portfolio scale). Under the GHG Protocol, GHG emissions reporting is sorted into Scopes 1, 2, and 3. For companies, there are several ways to draw the boundary and assign portions of emissions of a building scopes, based on operational control, financial control, or equity share. Under some of these approaches, the emissions from tenant spaces where tenants pay their own bills are considered Scope 3 emissions. (Community and

national inventories take a different approach to the scopes, based on geography.) Many current corporate net-zero and science-based-target commitments only address Scopes 1 & 2.So, for a substantial portion of their portfolios, many companies account for GHG from only central systems and common areas. At the portfolio and global levels, these GHG scope boundaries are useful, as they reduce double-counting between GHG inventories of different companies. But this accounting has limited relevance to the emissions of a single, whole building—precisely why efficiency and green building standards also don't reference them. The definition currently uses Scope terms as synonyms for fuel sources ("Direct or Scope 1"). To avoid confusion, the definition should emphasize its whole building lens and remove any mentions of GHG emission "scopes."

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?

IMT agrees that omitting refrigerants and embodied carbon makes sense at this time. While there are some refrigerants on the market with low Global Warming Potential (GWP), few truly zero-carbon options are in widespread use. Similarly, the movement to address embodied carbon is appropriately focused on reducing high carbon sources as an urgent first step.

While there are also limitations in the area of grid-interactivity, buildings being able to adjust when they use energy is critical to limiting strain on the grid, and will become more so as we near our goal of eliminating onsite emissions in buildings. IMT views expanding the definition to address this important aspect of decarbonization as something that should be undertaken sooner rather than later.

Such capabilities will help to balance supply and demand, integrate a higher proportion of renewable energy sources, and reduce greenhouse gas emissions associated with electricity generation. Incorporating grid interactivity (where allowed by local utility regulation) will help drive market adoption of these technologies and practices, and support a future move toward wider grid optimization and 24/7 carbon-free electricity.

To incorporate grid interactivity effectively, by 2028, the definition should evolve to include criteria or guidelines on the use of smart building technologies, demand response programs, and energy storage systems, and to use performance metrics such as coincident peak demand. Such requirements would need to vary by building type and size, as they would have very different applications for smaller commercial and multifamily buildings, or single family homes.

Incorporating grid interactivity into the definition would also require careful consideration of technological, regulatory, and economic circumstances to ensure that buildings can effectively contribute to a more resilient and sustainable energy system. This could involve setting standards for interoperability, data security, and privacy, as well as developing incentives and support mechanisms to encourage the adoption of grid-interactive technologies in buildings.

Integrating the principles of zero emission and grid interactivity in buildings will create a powerful synergy. A zero emission building focuses on reducing its own environmental impact, while a grid-interactive building extends its focus to playing an active role in the wider energy system.

As governments and utilities strive to decarbonize the electricity sector, regulatory frameworks and policies increasingly support or require grid interactivity. Buildings designed with these capabilities can better align with future regulations and benefit from incentives for smart energy management and grid support services. Utilities around the country will move at different speeds to partner with building owners to shift load, assure grid reliability, and share real time information regarding strain on the grid. Unavoidably, some buildings will develop capabilities to respond to signals from their electric utilities before those utilities are capable of sending such signals. Rather than succumbing to the chicken-or-egg quandary and moving at the pace of the slowest utility, by 2028, the definition should require grid flexibility of buildings even though some utilities will need more time to leverage such capabilities.

23. Other questions or comments not included above.

We have no further comments at this time. IMT appreciates the opportunity to comment on this important definition, and hope our responses help strengthen it further. Once again, we congratulate and thank you for your work. We expect this definition will have a huge impact on the market, and we look forward to working together to build a carbon-free, resilient, and healthy future for all people.