



UK Net Zero Carbon Buildings Standard

Technical Update & Consultation

14 June 2023

BBP BETTER BUILDINGS PARTNERSHIP



The Institution of **StructuralEngineers**



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Hello!

Through the determination and hard work of members of our task groups, sectors groups, and data providers we have been able to meet our next important milestone. On behalf of the team, I am delighted to report that we are now at the stage where we can provide you with a Technical Update & Consultation, which forms our second Quarterly Update.

This consultation document describes the technical fundamentals behind the Standard, sharing the metrics that buildings will be assessed against to demonstrate that they are aligned with what is required for the UK built environment to achieve Net Zero Carbon.

It then describes the work that has been undertaken to gain an understanding of the current operational energy and embodied carbon performance levels that will provide the context of technical feasibility for various sectors. This is the main focus of the consultation.

Finally, the consultation outlines the approach being taken to determine relevant budgets for carbon and energy, which inform the limits that will follow in later stages of work.

I also wanted to take the time to thank you for being involved in our consultation – and helping to shape the future definition of a Net Zero Carbon building.

This is an extremely important initiative that I am hugely passionate about. We have a lot of people giving up their time on this and I am grateful for all their hard work.

By completing our questionnaire, you can make a real difference to sustainability across the built environment, so I ask that you take the time to do so.

Thank you again for being a part of our consultation and I hope you find our Technical Update useful.

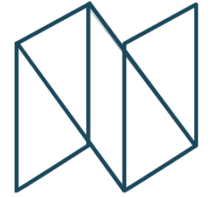


Clara Bagenal George
Chair, Technical Steering Group



**UK Net Zero Carbon
Buildings Standard**

Purpose of this Technical Update & Consultation



We want your views on:

- **The overall technical proposals for the Standard**
- **The achievability of the new build performance levels**
 - These levels will be used to inform the final NZC limits

Aims

The team developing the Standard have spent the last 9 months developing its **technical basis**, and establishing **new build performance levels** for a wide range of sectors.

We are sharing this Technical Update & Consultation document to allow the wider industry to review the proposals and performance levels, and provide us with feedback.

The performance levels do not represent the energy and embodied carbon limits that buildings would have to meet. They provide the context of technical feasibility for the various sectors and provide a summary of the data received in the call for evidence.

Who should respond?

We are interested in the views from across all built environment stakeholders, and interested we have broken the consultation into various themes.

How to engage with the consultation

Responding to the consultation

There are a series of talking points raised within this document which are posed as questions in our [online survey](#). Please submit your responses to these for our consultation.

Given the technical nature of certain sections of the consultation document, it is expected that not all stakeholders will want to respond to all sections.

We are expecting a high volume of responses to this consultation. Please ensure you use the online survey for your comments to ensure we are able to process and incorporate your feedback.

The team will also be conducting a webinar at **12pm on Monday 10 July 2023** to provide industry with answers to pertinent issues raised throughout the consultation. You can sign up [here](#).

Consultation period

Please submit your views on the consultation between **Wednesday 14 June - Thursday 31 August 2023.**

Data and performance levels

We are particularly interested to get your feedback on the performance levels which have been provided in answer to our Call for Evidence, for both operational energy and embodied carbon, and we encourage responses from those who have an understanding of technical achievability for these levels.

Please also note that we are collecting more embodied carbon data – please refer to **6. New Build Embodied Carbon Performance Levels** for more information.

These levels provide technical evidence for what is currently being achieved by individual sectors within the built environment, based on benchmarking, case studies and modelling.

They are not intended to be limits or targets, but will be used to inform the NZC limits and targets in the next stage of our work.

3. Technical Requirements

Metrics and Limits of the Standard



UK Net Zero Carbon
Buildings Standard

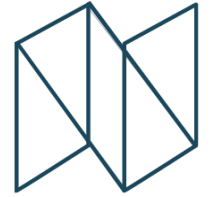
Technical Requirements



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Overview of Metrics



The Standard will set requirements within each of the following areas to define what is needed for a NZC building. The specific numerical targets and limits will vary by sector, and in some cases by sub-sector.



Operational Energy Limits will be set that define a building's required operational energy performance, to be demonstrated in operation.



Upfront Embodied Carbon (A1-A5)* limits will be set, defining a building's required embodied carbon performance in kgCO₂e/m² GIA.



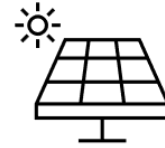
Lifecycle embodied carbon emissions (A1-A5, B1-B5, C1-C4*) will be required to be reported, but will not be limited in this version of the Standard. The metric will be kgCO₂e/m² GIA over the building's Reference Study Period (default being 60 years, in according with the RICS Professional Statement).



Fossil fuel free New buildings with on-site plant will be required to be fossil fuel free, with certain exceptions. This will also be the end goal for existing buildings.



Demand management No limits or targets will be set with regards to demand management / flexibility, however the standard will require reporting of peak demand and time of peak. The embodied carbon of all demand management solutions, including batteries will be counted as part of the overall building's embodied carbon



Onsite renewables

All buildings will be required to report on renewable electricity generated by on-site systems, how much is used on site and how much is exported kgCO₂e/kWp. New buildings are required to meet a target for provision of on-site renewables, measured in kWh/m² of building footprint/yr. The embodied carbon of onsite renewables will not be counted within the A1-A5* total, but will be subject to separate limits, measured in kgCO₂e/kWp.



Renewable procurement & offsetting

If these form part of the Standard, acceptable forms of renewable procurement and offsetting will be defined. This will be steered by Industry guidance including the UKGBC's current update to their renewable procurement and offsetting guidance.



Refrigerant & Leakage

Refrigerant emissions will be accounted for within embodied carbon. A limit will be set for Global Warming Potential (GWP), aligning with F gas regulations and EU taxonomy. In addition, the Standard will require refrigerant leak detection to be installed, and for refrigerant leakage to be reported

*lifecycle stages

Proposed Requirements



Carbon emission sources	Limits/ targets	Reporting and disclosure	Offsetting
Upfront carbon	Meet Embodied carbon limits	Measure and report emissions after PC	Offset EC after PC
Life cycle embodied carbon (A-C ex B6-7)		Measure and report emissions after PC	
Operational energy	Meet Operational Energy limits	Measure and report emissions annually	Offset OE annually
Operational water		Measure and report emissions annually	Offset annually
Fugitive refrigerant gases	Meet GWP limits	Measure and report emissions annually	Offset annually
Demand Management		Measure and report annually	
Onsite renewables	Meets minimum onsite target and embodied carbon limit	Measure and report annually	
Reportable (significant) in use embodied carbon		Measure and report emissions annually	Offset annually
Embodied Carbon of fit outs (offices, hotels and retail)	Meet EC limits for fit out (if data is available and provided to the standard))	Measure and report emissions annually	Offset annually

3. Technical Requirements

Talking points

12. In general do you agree with the proposals put forward for the metrics for the Standard?



Embodied Carbon Limits



Embodied carbon limits will be set, defining a building's required embodied carbon performance in $\text{kgCO}_2\text{e}/\text{m}^2$ GIA. These limits will be set based on both top-down budgets and bottom-up performance levels, the same approach as operational energy.

Upfront Embodied Carbon (A1-A5) limits will be set, defining a building's required embodied carbon performance in $\text{kgCO}_2\text{e}/\text{m}^2$ GIA.

Lifecycle embodied carbon emissions (A1-A5, B1-B5, C1-C4) will be required to be reported, but will not be limited in this version of the Standard. The metric will be $\text{kgCO}_2\text{e}/\text{m}^2$ GIA over the building's Reference Study Period (default being 60 years, in accordance with the RICS Professional Statement).

The reporting for A1-A5 will require measured, as-built quantities. Product-specific EPDs are to be used where available - where not, the standard will set out the hierarchy of other carbon factor options that can be used instead.

Both the material quantity and embodied carbon will need to be reported for each building element. Additional reporting on material efficiency will be required to be completed and published to encourage designs to meet A1-A5 limits through efficient use of material.

A1-A5 limits will decrease over time, as materials are expected to decarbonise and material efficiency will increase. The limit applied to a specific project will be that in place during the year the project was completed. Therefore, adherence with the standard will be based upon the submission year for the data and the current limits in place within the Standard.

No further requirements are to be placed on material flows or circularity for the first version of the Standard.

Embodied Carbon Limits



Whilst the approach to reporting and limiting embodied carbon for a new-build project is clear (see previous page), the requirements on reporting and limiting embodied carbon in other circumstances will depend on the extent of the work. The following approach is proposed on reporting and limiting for different levels of intervention:

- **In existing buildings verified to the Standard:**

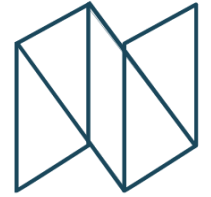
- Non-reportable works:** For the most minor works, (e.g. changing a single lightbulb), embodied carbon does not need to be measured, reported or limited.
- Reportable works (most sectors):** Where work is more substantial than the cut-off limit <level tbc>, embodied carbon is to be measured and reported, but is not limited.
- Reportable works (office, retail and hotels only):** For these sectors, the ambition is also to set embodied carbon limits if enough data can be found to substantiate these.

- **In retrofit or new-build projects looking to meet the Standard:**

- Retrofit:** If more than 25% of the building envelope undergoes renovation, or if a substantial replacement of building services occurs, then embodied carbon must be measured and reported, and '*Retrofit*' embodied carbon limits met.
- New-build:** For a building that is clearly a new-build, and for intensive reuse projects where more than 50% of the existing slab area is demolished, embodied carbon must be measured and reported, and '*New-build*' embodied carbon limits met.
- Mixed new/retrofit:** Where less than 50% of the existing slab area is demolished, and the building is extended, a floor area weighted average limit may be set based on the equation below, where GIA_{total} is the combined Gross Internal Area (GIA) of the completed building project including all retained areas and extensions.

$$\left[(GIA_{total} - GIA_{existing}) \times limit_{EC,newbuild} + (GIA_{existing} \times limit_{EC,retrofit}) \right] / GIA_{total}$$

Embodied Carbon Limits



Talking points

13. What are your views on the approach to limiting embodied carbon?
Do you have any comments on the proposed approach?

14. We are only able to work on setting upfront embodied carbon (A1-A5) limits at this time, due to the data we received. What is your opinion on this?

15. The embodied carbon limits will be set for 2024 based on current levels of performance (before ratcheting down in the future). How would you expect to see the initial starting point for the limits set?





Embodied Carbon Retrofit Limits

Approach to limit-setting

Setting retrofit limits is complex as the level of intervention varies significantly between projects. The priority of the Standard is to encourage retrofitting where possible, whilst avoiding overly carbon-intensive works to take place.

Various options were considered for setting such limits. The options are shown here, with the middle (bold) option selected as the way in which limits will be set going forwards.

Final limits will be reviewed against the retrofit data submitted in the call for evidence, to check for achievability.

Approach considered	Advantages	Disadvantages
Limits are the same as new build.	Simplest option. Promotes retrofit-first approach.	Limits likely to be too easy to meet, so serve little purpose and thus doesn't incentivise efficient retrofit design.
Limits are sector-specific, based on a % of new-build, calculated for a reasonable allowance for typical replacements required by retrofit projects.	More stringent than new build limits. Incentivise efficient design for larger retrofit schemes. Still simple for the user.	Very easy to meet for lighter-touch retrofit schemes. 'Reasonable allowance' is subjective and must be well-reviewed.
Bespoke limits for every project based on the nature of retrofit and elements replaced, developed using a formula provided.	If done well, creates stringent limits for all retrofits, so most effective way of minimising embodied carbon.	Most complicated option for the user. Open to manipulation, requires careful management / implementation. Limits may change as design progresses.

Embodied Carbon Retrofit Limits



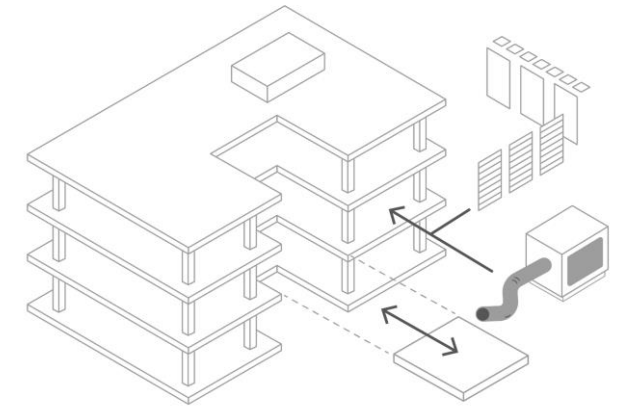
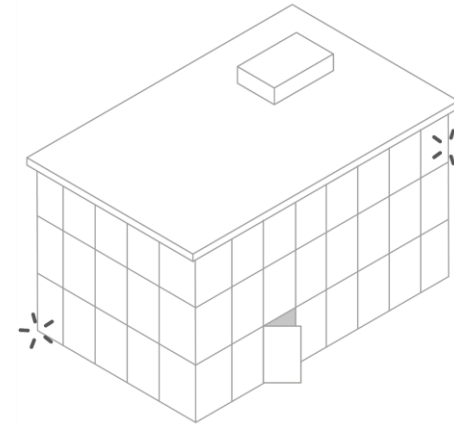
Applying the limit-setting approach

These figures demonstrate how the approach outlined on the previous page will be applied, once new-build limits have been set for each sector.

For each element (substructure, facade, etc) within each sector, a Retrofit Factor (RF) will be determined for that element, based on the typical replacement scenarios during retrofit works. The RF represents expected upper-bound emissions during retrofit, as a proportion of original emissions for an equivalent new-build.

For example, the RF for facades in the Office sector might be 1.0 (complete replacement) but for Single-Family Homes might be 0.5 to represent the addition of insulation and replacement of the doors and windows.

New-build limits are prorated down to give elemental limits based on typical % split between elements. RFs are applied to these, before summing the factored elemental limits, to give a total retrofit limit for each sector.



New-build_{office}

$$\text{Limit}_{\text{EC}} = \sum_{\text{Tota}} \begin{bmatrix} \text{Limit}_{\text{structure}} \\ \text{Limit}_{\text{MEP}} \\ \text{Limit}_{\text{etc...}} \end{bmatrix}$$

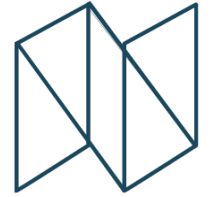
Individual limits based on element performance levels and sector embodied carbon budget

Retrofit_{office}

$$\text{Limit}_{\text{EC}} = \sum_{\text{Tota}} \begin{bmatrix} \text{RF} \times \text{Limit}_{\text{structure}} \\ \text{RF} \times \text{Limit}_{\text{MEP}} \\ \text{RF} \times \text{Limit}_{\text{etc...}} \end{bmatrix}$$

Retrofit Factors based on expected upper-bound emissions during retrofit, as a proportion of original emissions for an equivalent new-build

Refit Embodied Carbon



Need for consideration

Whilst the Standard is being created solely for setting out Net Zero requirements across whole buildings, it is recognised that the cumulative embodied carbon footprint of regularly refitting buildings can be significant.

The Office, Retail and Hotel sectors have been identified as having exceptionally high materials turnover and high wastage for fit-out (typically Cat B, in the case of offices).

As such, we wish to understand whether sufficient refit embodied carbon data exists, to enable a decision to be made as to whether this should be limited within buildings that have been verified against the Standard.

Talking Points

16. To set Embodied Carbon limits in retrofits, we intend to follow the process outlined in the consultation document, creating bespoke targets for each sector based on typical retrofit interventions. What is your opinion of this?

Do you have any other comments regarding the retrofit limit-setting process?

17. Whilst the Standard is being created solely for setting out Net Zero requirements across whole buildings, it is recognised that the cumulative embodied carbon footprint of regularly refitting buildings can be significant, particularly in the Office, Retail and Hotel sectors.

Do you believe that the Standard should include refit limits (for buildings already certified to the Standard) for these sectors?



Refit Embodied Carbon



Call for data

To help us make the decision as to whether or not refit embodied carbon limits should be set, we are researching to find existing data covering the refit of these sectors during a building's life.

If you have refit data from UK projects in the Office, Retail or Hotel sectors, please get in touch by emailing TG1b@NZCbuildings.co.uk.

Thank you!



Operational Energy Limits



The Standard will set limits for the operational energy use of buildings.

Rationale

The limits will be informed by both UK-wide carbon budgets (i.e. the Top Down modelling) and by an assessment of what is achievable (i.e. the Bottom-Up performance levels), aiming to strike a balance between both.

Performance levels have been produced for some sectors, on which we are inviting feedback. In other sectors, they are not yet available and their development is on-going. See details in Operational Energy Performance Levels section. Once performance levels and UK carbon budgets are available, a balancing exercise will be carried out to determine the limits.

Verification based on actual outcomes

Verification will require evidence of metered energy use and associated information (e.g. parameters such as occupancy hours or density of use, as relevant to each sector), to demonstrate the Operational Energy limits have been met in operation. Other actions will be required for verification.

Talking Points

18. What are your views on the approach to verification of operational energy based on actual outcomes?

19. Do you have any comments on the rationale?



Scope of energy uses covered

In general, all electrical and thermal energy uses are covered by the Standard. However, a small number of exceptions apply:

Electric vehicle charging is excluded.

Heavy process loads may be excluded in some cases:

- By default, they will be included and covered by energy use limits (either as part of the overall energy use limit, or treated as an additional special end use with its dedicated limit)
- Some process loads may be excluded and not covered by energy use limits, **if** the carbon emissions from these processes are already managed as part of that industry's carbon emissions and do not come under the 'built environment' heading. It is not sufficient for carbon to be *counted* elsewhere in an industry: such exceptions will only apply where there is evidence that the relevant industry is actively managing and enforcing reduction limits.

Emissions from refrigerants use

These are considered in-use **embodied carbon** emissions for the purpose of carbon accounting. Refer to the section on refrigerant leakage for more information.

Operational Energy Limits ⚡



New build limits

New build limits will be set at an ambitious level. This will avoid the need for future re-works and provide more flexibility to the existing stock, where deep operational carbon savings are more costly, both financially and in embodied carbon terms.

Limits for new buildings applying for certification may be revised over time as part of the Standard's regular reviews, but on a given building they will not change over time: a building certified as "NZC New Build" will retain the same limit in future years (it will just need to regularly show it continues to meet that limit).

Existing building and retrofit limits

A number of considerations apply when setting limits for existing buildings and retrofit:

- Feasibility due to technical or other constraints e.g. heritage
- Whole life carbon impacts: energy use reduction is needed across the stock, and energy efficiency works will bring other important benefits (e.g. longevity, comfort for occupants), but a balance needs to be struck between operational carbon and other benefits (e.g. comfort), and the embodied carbon expenditure of the works.

The current proposals are that Operational Energy (OE) limits for existing buildings and for retrofits should be the same. Therefore if an OE limit can be met with more limited works, this should be encouraged. This does not apply to buildings already verified as NZC New Build - in that case, the limits will remain those of a new building. *A number of options are available for how these limits will be set, and we are seeking views on this - see consultation question.*

Talking Points

20. Should the end point (2050) limits be the same for new and existing buildings & retrofits?

21. Should the operational energy limits for existing buildings & retrofits tighten over time?



Fossil Fuel Free



New and existing buildings with on-site plant

Buildings with on-site plant (e.g. heating, cooking, generator) will be required to be **fossil fuel free**, with the exceptions of:

- Energy uses that are not covered by the Standard
- Emergency and back-up: see right.

This includes plant serving several users, but within a single owner site e.g. hospital campus, university campus, block of flats with communal heating, commercial centre with central heating or cooling.

Talking Points

22. Do you agree with the proposed exemptions for 'fossil-fuel free' requirements? Please select all that you agree with:

- **Emergency and life safety uses** i.e. back-up power in healthcare sector, or specific uses in other sectors where they are critical to health and safety (e.g. fire fighting and evacuation lifts)
- **Back-up to essential functions in buildings and sites "of vital importance for civil protection"** i.e. Class IV in BS EN 1998:2004+A1:2013 e.g. hospitals, fire stations, power plants"
- **Back-up power in datacentres**, on the condition that reliance on fossil fuels has been minimised.
- Other



Exceptions for emergency and back-up

Fossil fuel plant will only be allowed for the following uses:

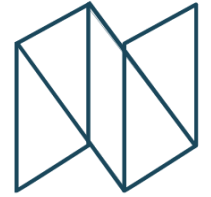
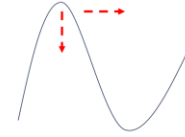
- **Emergency and life safety uses** i.e. back-up power in healthcare sector, or specific uses in other sectors where they are critical to health and safety (e.g. fire fighting and evacuation lifts)
- **Back-up to essential functions in buildings and sites defined of critical importance.** For example, this could apply to Class IV buildings as defined in BS EN 1998:2004+A1:2013 ("buildings whose integrity during earthquakes is of vital importance for civil protection e.g. hospitals, fire stations, power plants etc").
- **Back-up power in datacentres**, on the condition that reliance on fossil fuels has been minimised. An approach to this is proposed in the Datacentre Sector Group report.

This is an area that will be regularly reviewed as part of the Standard development to incorporate opportunities for fossil fuel free solutions, while ensuring life safety and critical functions are maintained where satisfactory fossil fuel free alternatives do not exist.

Buildings connected to district heating or cooling

For information on this, go to Page 41.

Demand Management / Flexibility



Rationale

The Standard recognises that buildings cannot be viewed in isolation from the wider system, and that they must play their part to support grid decarbonisation. There are three ways in which buildings can do this:

- **Reducing annual energy use:** this is at the core of the approach to operational carbon. Measures that reduce annual energy use will also usually reduce peak demand.– see page 32 on operational energy limits.

- **Contribution to the generation of zero carbon energy,** through on site renewables (see pages 37-39) or offsite renewables.

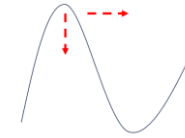
- **Reduce the burden on the grid at times of high demand,** which are also often times when grid electricity is higher carbon. This can be achieved through reducing peak demand both through passive and efficiency means, and through management, or flexibility, solutions e.g. smart controls, thermal storage, and electrical storage.

Performance metrics

The Standard team are developing a view on what the best metrics for demand management should be. Metrics considered include:

- Peak demand, and time of that peak; possibly differentiating between summer and winter
- Proportion of the peak that can be shifted
- Thermal or electrical storage, in absolute (e.g. kWh/m²) or relative terms (e.g. % thermal load)
- More qualitative approaches e.g. “smart readiness indicator”

Demand Management / Flexibility



The Standard team will continue to engage with built environment professionals and the industry, as well as consulting those in the wider system, including CCC and National Grid, to ensure the Standard best supports system-level decarbonisation. In the meantime, the following requirements are proposed:

Requirements – Operational energy and carbon

No limits or targets will be set with regards to demand management and/or flexibility but they may be proposed in some sectors.

Reporting against a range of metrics will be required, to support the ongoing review and future development of the Standard. As a minimum, this will require reporting of peak demand and time of peak. Other metrics may apply at least in some sectors.

Requirements – Embodied carbon

The embodied carbon of all demand management solutions, including batteries will be counted as part of the overall building's embodied carbon i.e. demand management solutions such as batteries will not be provided a dedicated allowance or limit, and instead be considered altogether as part of the building's overall embodied carbon limit.

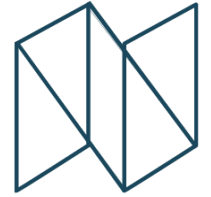
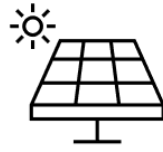
Talking Points

23. What is your view on the approach to Demand Management / Flexibility?

Do you have any further comments on the proposed approach?



Onsite renewables



Rationale

Renewable electricity generation needs to be encouraged in order to support grid decarbonisation and ensure a sufficient supply of nationwide zero carbon electricity. However, the embodied carbon of creating such electricity must be considered, and so the standard must set embodied carbon limits on such electricity-generating equipment.

Renewable electricity generating systems

Operational Energy

Reporting requirements for all buildings

All buildings (new **and** existing / retrofits) will be required to annually report on renewable electricity generated by on-site systems, how much is used on site and how much is exported.

Provision of renewable electricity generation on new builds

In addition, the Standard proposes that **new buildings should be required to provide on-site renewable electricity systems.**

The renewable electricity generation requirement would be expressed as a target (i.e. minimum), in annual kWh/m² of building footprint/yr.

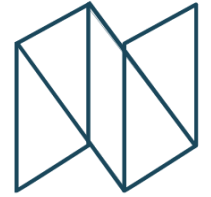
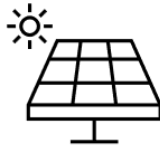
For indication, the target is currently proposed to be within the following range, to be confirmed with further analysis:

- at least 150-200 (tbc) kWh/m² building footprint per year for 1- or 2-storey industrial buildings
- at least 80-120 (tbc) kWh/m² building footprint per year for all other building types
- A smaller provision would be allowed, if this was sufficient to meet all the building's energy uses on an annual basis. This may be the case for houses and some low rise buildings.

Flexibility would be provided in the following conditions, with evidence:

- **Planning or legal constraint preventing on-site renewables e.g. heritage building or conservation area:** this would not be a blanket relaxation for all heritage buildings or all buildings in conservation, but would need to be evidenced as a constraint applying to that specific building or conservation area
- **Impractical to provide generation:** The available area has suitable solar exposure, but is very limited and only very small or impractical systems could be installed.
- **Target cannot be met due to practical constraint:** The area is suitable in its solar exposure, but limited so that even systems maximising the use of the available area cannot meet the target.
- **Poor conditions for generation:** The available area may be large, but is not optimum for PV generation (e.g. northern UK, overshadowed), so annual output from PVs would be small.

Onsite renewables



Renewable electricity generating systems

Alternative metrics for setting onsite renewable generation targets have been explored, but are not currently preferred:

- kWh/sqm of site footprint/yr: this would place unduly large requirements on sites with external areas used for valuable purposes such as sports and leisure, biodiversity etc
- % of annual energy use: this has the benefit of encouraging reductions in annual energy use (since the required renewable energy system is then smaller), but does not necessarily reflect a building's potential e.g. a low rise and high rise buildings with the same area of roofs would have different requirements, when in fact the rooftop area available for PVs is similar.

These proposals are based on an initial review of precedents (e.g. technical feasibility studies for local authorities including Greater Cambridge, Cornwall, and Newham).

Further work is required to finalise the approach and numerical targets.

Feedback is sought on this - see consultation question.

Please share with us any research about the embodied carbon implications of onsite PV, and the efficiency of PV over wind in Northern England and Scotland. We are currently reviewing if it is appropriate that any targets for on-site renewable energy generation be varied across geographical regions of the UK (to reflect the regional availability of solar and wind, for example), or should a single set of targets be applied?

Talking Points

24. Do you agree that a requirement for onsite renewables should be set for new builds?

25. For this requirement, do you agree that kWh/sqm building footprint/yr is the right metric?

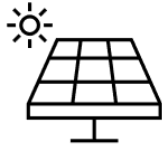
26. Do you think the proposed target ranges for onsite renewable generation are broadly right i.e. ambitious but reasonable?

27. Do you have comments on the proposed flexibility conditions for onsite renewable generation, where the target would not have to be met?

28. Do you have any other comments on the proposed approach?



Onsite renewables



Renewable electricity generating systems

Embodied Carbon

The embodied carbon of renewable electricity-generating systems (including all additional structure / fixture / fittings / technology, but excluding batteries) will not be counted within the A1-A5 total when proving that a building meets embodied carbon limits, but will be subject to separate limits of their own.

The metric for these EC limits will be $\text{kgCO}_2\text{e/kWp}$, based on preventing the use of the poorest-performing electricity-generating systems out there. This metric is considered the simplest to use. Efficiency of installation is encouraged through the Standard's approach to operational energy limits.

The Standard hasn't yet determined whether on-site renewable heat-generating systems will be treated the same as electricity-generating ones, or as non-renewable heat-generating systems.

Renewable heat-generating systems

Operational carbon

They will be treated as other heat-generating systems.

Embodied carbon

The Standard hasn't yet determined whether on-site renewable heat-generating systems will be treated the same as electricity-generating ones, or as non-renewable heat-generating systems.

Electricity Storage

See page 35 on Demand Management / Flexibility.

Talking Points

29. What is your view on the approach to embodied carbon of renewables

Do you have any further comments on the proposed approach?



Refrigerant & leakage



Rationale

As we move towards more refrigerant based systems, emissions from Module B1 grow in proportion to others. Poorly managed refrigerant systems can produce greater emissions than gas-based heating system. Therefore the Standard will place limits on refrigerants.

Refrigerants will be accounted for within embodied carbon calculations. This is because operational energy is being measured on EUI basis, and it is not possible to measure refrigerant-related emissions in this way.

The Standard will place a limit on the Global Warming Potential (GWP) of refrigerants. A GWP limit is universally applicable across system types and aligns with BREEAM. The F-gas regulations and EU taxonomy also refer to the GWP of refrigerants.

Limits will be selected based on their GWP, as well as their current availability on the market. It is not the intention to preclude VRF systems that could disadvantage smaller projects and budgets.

Performance metrics

The initial proposal for the GWP limit is based on R32: 675 GWP. The Standard will also require the GWP of refrigerants to match the most recently published IPCC publications, as per the RICS Professional Statement on Whole Life Carbon Assessment for the Built Environment.

In addition to a limit on the GWP of refrigerants, the Standard will also require the following:

- Refrigerant leak detection to be installed
- Refrigerant leakage to be reported

Talking Points

30. What is your view on this approach?

Do you have any further comments on the proposed approach?



District Heating & Cooling Networks



“District” network is used here to encompass schemes serving several buildings (e.g. a multi-block residential development, a mixed-use scheme), except if all buildings are within a site owned and occupied in large majority by a single party (e.g. university campus, hospital campus).

An “existing” network follows a similar definition to Building Regulations, i.e. a scheme that is either in operation or under construction, meaning any of: the building to house the energy centre has been constructed; there is a heat (or coolth) offtake agreement signed between the network and a third party; excavation for pipework has been completed.

Operational performance of the district networks

Operational emissions from district energy networks will need to be considered in the building’s emissions (i.e. overall carbon content of heat or coolth, in kgCO₂ / kWh of supplied heat or coolth measured at the user interface). *We are seeking views on this, and whether to set a limit to the carbon content of heat - see consultation question.*

There would not be performance requirements on individual elements, such as distribution losses (other than what may be required in the future through other means e.g. the government’s upcoming Heat Networks Technical Assurance Scheme). This is consistent with the overall approach of the standard i.e. focusing on performance outcomes rather than individual design elements. *We are seeking views on this - see consultation question.*

Talking Points

31. Do you think there should be a limit on the carbon content of heat from district energy schemes?

- No: schemes should just report the carbon content of heat, and buildings would account for emissions as they would for on-site plant.
- Yes, there should be a limit, no worse than an on-site air source heat pump
- Yes, there should be a limit, no worse than a district scheme served by air source heat pump and with CP1 “Best Practice” distribution losses
- Yes, there should be a limit, but a different one than the options above: please specify what you think it should be

32. For the above, do you think the limit should be the same for new and existing schemes?

- Yes
- No
- Don’t know / not sure

33. Do you think there should be performance requirements on the district energy scheme, beyond carbon content of heat?

- Yes, as per CP1 “Best Practice”
- Yes, other - please specify
- No



District Heating & Cooling Networks



Fossil Fuels

Buildings connected to a **new** district heating or cooling scheme will only be able to certify if the scheme is fossil fuel free.

Buildings connected to an **existing** district heating or cooling scheme using fossil fuels may be able to certify, **if**:

- The scheme has a decarbonisation plan in place, and
- There is a limit to the contribution from fossil fuels.

We are seeking views on this approach - see consultation question.

The scheme's **decarbonisation plan** should include:

- Future plant, distribution efficiencies, operating temperatures, storage plant requirements etc, and associated design implications.
- Calculations for the resulting carbon content of heat, showing that the network will then meet the limit carbon content of heat
- Commitment by the network or the building to cover renewable energy and offset requirements.
- Incorporation in the network's business model (including how capitals will be made available, future revenue streams, impacts on energy bills and other implications for energy consumers).
- Commitment to implementation.
- Timeline for implementation. At this stage, a deadline of 2030 is being considered i.e. no reliance on fossil fuels after 2030, but this will be reviewed as part of the balancing of carbon budgets.

Talking Points

34. Do you agree that buildings connected to an existing district network using fossil fuels could qualify as Net Zero, if the network has a decarbonisation plan compatible with UK Net Zero and there is a limit on fossil fuel contribution (you can comment on the detail of these conditions in the next questions) ?

- No, if networks burn fossil fuels then buildings connected to them should not be able to qualify as Net Zero Carbon
- Yes, but only if connection to a network is a legal / planning requirement
- Yes, as proposed i.e. with decarbonisation plan and limit on fossil fuel contribution
- Yes, but only requiring a decarbonisation plan
- Yes, but only requiring a limit to fossil fuel contribution
- Yes, but with different conditions - please specify
- Don't know / Unsure

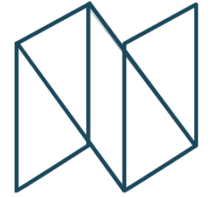


35. Do you have comments on the proposed decarbonisation plan conditions?

36. What should be the limit to fossil fuel contribution to the district scheme?

- No specific limit: this should simply be covered by the overall limit to carbon content of heat, as for all networks whether or not they use fossil fuels
- A limit on the proportion of heat (%) produced from fossil fuels, compared to the total heat produced by the network - if so, please specify that limit (%)
- Other - please specify.

District Heating & Cooling Networks



Energy-from-Waste

We are seeking views on how to approach Energy-from-Waste schemes (i.e. the burning of waste, where heat is used to feed into a network) - see consultation question.

Biomass

We are seeking views on how to approach networks burning biomass - see consultation question.

Energy sharing, and energy from waste heat

The carbon impacts will be allocated following standard accounting rules, to avoid double counting e.g. in the case of a district scheme utilising heat rejected by a datacentre or supermarket cooling plant:

- the energy use and associated emissions by the datacentre supermarket's cooling plant are allocated to the supermarket .
- That rejected heat is counted as "zero emissions" energy source by the district energy scheme - but energy use and associated emissions to utilise that heat (i.e. in a heat pump, in distribution etc) is allocated to the district scheme.

Talking Points

37. How do you think that heat networks that recover energy from waste should be treated from an energy and carbon perspective?

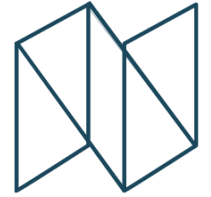
- They should be treated as networks using fossil fuels (*rationale: there is a lot of plastic, i.e. fossil fuel based materials, in the waste being burnt*)
- Their carbon content of heat should be accounted for, as for all networks, but they should not be treated as fossil fuel networks (*rationale: they make use of waste which may otherwise end in landfill or other detrimental routes*).
- Don't know / not sure

38. How do you think that heat networks that burn biomass should be treated from an energy and carbon perspective? Tick all that apply

- Their carbon content of heat should be accounted for, as for all networks
- There should be criteria on sustainable sourcing of the biomass fuel
- There should be criteria on air quality emissions
- Other - please specify
- Don't know / not sure



District Heating & Cooling Networks



Performance of buildings connected to district networks

Buildings connected to a district heating or cooling network will be subject to the same energy performance limits as buildings with on-site systems, accounting for all energy uses in generation, distribution and storage (as for buildings with on-site systems).

There are precedents for this accounting of the network's energy use within a building's energy performance limit, for example in NABERS and in options being explored by some local authorities.

This could be done by a simple apportionment of the network's energy use to each user on the basis of the heat delivered annually to that user, or in more sophisticated ways for example to account separately for secondary and primary losses, using metering at heat sub-stations.

An alternative would be to apply adjusted energy performance limits to the buildings (i.e. electrical uses + thermal energy demand), alongside a carbon content of heat requirement applying to the network. This is not the preferred option at this stage, as it is considered this would not be sufficient to encourage energy efficient networks.

The team developing the Standard will liaise with BEIS and the Department for Energy Security and Net Zero (DESNZ) on this issue, and particularly the Heat Network Technical Assurance Scheme, to provide guidance on compatibility of performance and reporting requirements.

Talking Points

39. Do you agree with this approach to energy performance limits?

- Yes, energy performance limits for buildings should be the same as with on-site systems, including energy used by the network
- No, the limits should be adjusted to stop "at the heat meter" (with separate requirements on the performance of the network)
- No, another approach should be taken - please specify
- Don't know / not sure

40. Do you have further comments, for example on how you think that network energy use should be apportioned across users (e.g. how metering arrangements could work, whether to apportion to something else than annual kWh, such as kWp or floor area)?



District Heating & Cooling Networks



Embodied carbon impacts of the network

The embodied carbon related to creating the district heating and cooling network will need to be reported as part of Standard.

However, it hasn't yet been concluded as to the format of this. The working assumption is that the approach of the Standard will align with the approach outlined in the consultation version of the updated RICS Professional Statement on Whole Life Carbon Assessments in the Built Environment whereby the embodied carbon of the district network is included in B6, with an embodied carbon factor/ kWh of heat.

Talking Points

41. Do you have an opinion on how district heating and cooling networks should be treated from an embodied carbon perspective?

- Yes, I think the Standard should follow whatever is agreed in the updated RICS PS
- Yes, but I think something else - Please specify
- No
- Don't know / Unsure

