Greater Cambridge Local Plan

UK Net Zero Carbon Buildings Standard summary

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Summary of the UK Net Zero Carbon Building Standard (UKNZCBS)

The UK Net Zero Carbon Building Standard (UKNZCBS) is the first unified approach to defining the performance in all major UK building types that would ensure the built environment supports the UK's 2050 net-zero goal and carbon budgets aligned to the Paris Agreement (limiting warming to 1.5°C).

The UKNZCBS does not necessarily make a building 'net zero carbon', rather it aligns the building's performance to fit with the UK's carbon goals as above. It offers two different levels of certification:

- Net Zero Carbon Aligned: Meeting all mandatary targets and reporting.
- Net Zero Carbon Aligned + Offsets: Offsetting any carbon remaining after meeting the above.

The UKNZCBS was developed collaboratively by a coalition of various industry organizations and professionals (RIBA, IStructE, CIBSE, RICS, and others) using an evidence-based reporting methodology. The pilot version of the UKNZCBS was published on September 2024 which expands on and supersedes guidelines from existing frameworks – such as the UKGBC Net Zero Carbon Building Framework, the RIBA Climate Challenge, and LETI design guides – by addressing known problems and providing a broader range of targets and limits specific to certain building types.

Topics for which the UKNZCBS provides clear targets, limits, and guidelines include: operational energy use intensity; space heating and cooling; embodied carbon; on-site renewable energy generation; operational water use; fossil fuel free; electricity demand management; district heating and cooling networks; refrigerants; carbon offsetting. Further details are given in the subsections below.

Overall, the UKZCBS aims to enable buildings to demonstrate 'Net Zero Aligned' status, through achieving performance levels that align a 1.5°C trajectory (with some exceptions). The UKNZCBS can be applied to approximately 30 building types, and sets requirements across four types of building project:

- New build
- One-go retrofit
- Stepped retrofit.

The UKNZCBS cannot be applied to buildings outside of the UK, infrastructure projects, assets other than buildings, and buildings that cannot be classified under the identified sectors.

As the UKNZCBS is in its pilot version, it is anticipated that it will adapt and develop according to the findings from the beta-testing that is being conducted in the pilot period.

Operational energy

The UKNZCBS sets clear requirements and defined limits on operational energy use, which become more stringent over time, measured in kWh/m^2 floorspace/year, for a wide range of building types and project scenarios.

Operational energy use – also known as total energy use or Energy Use Intensity – will be measured at the meter, with verification of target achievement only granted following 1 year of building occupation. Instead of granting verification at the design or as-built stage, the UKNZCBS ensures that the building operates in practice as it was intended to at design and as-built stages. This aids mitigation of any performance gap where inadequate construction practices may not deliver actual in practice building performance that aligns with design stage calculations.

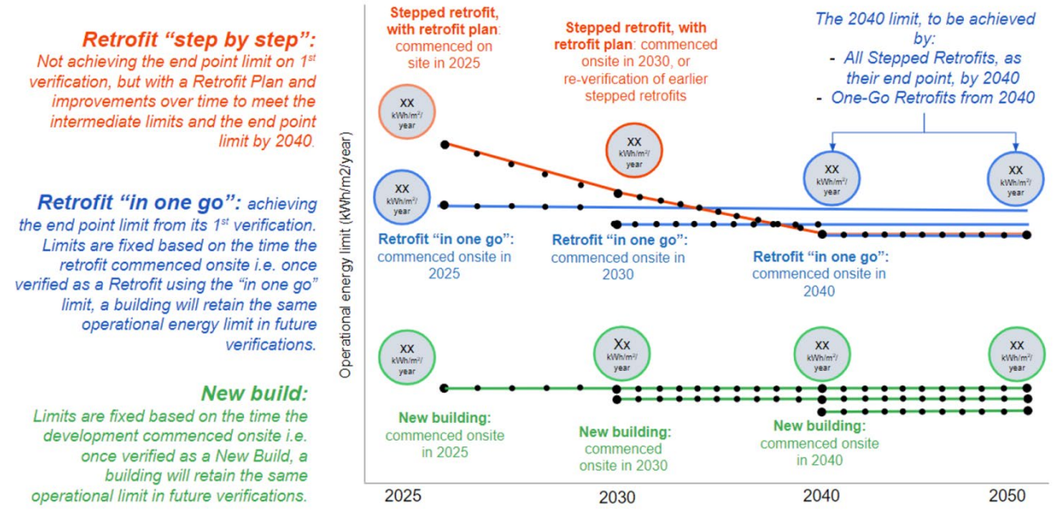

Figure 1: Graph demonstrating operational energy use target trajectories varying by project type.

Figure 1 demonstrates the difference between different project types and the operational energy use targets that must be met and verified each year. New development faces the strictest operational energy limits as it is more feasible to achieve higher performance in a new build than in retrofit (and because in theory new builds have more lifetime ahead of them, therefore more years of potential energy use). For all project types, operational energy use targets, become more stringent according to the year of commencement, to reflect technological and design approach improvements over time.

The three project types, and the UKNZCBS broad expectations of these, are as follows:

Stepped retrofit

- Commitment to a retrofit plan that will meet energy targets that get progressively stricter through to 2040 as shown on Figure 1.
- Phased retrofit works to progressively improve energy performance over time.
- Commit to a specific energy use limit at point of construction.

One-go retrofit

- The goal of this approach is to reduce the energy use of existing buildings through deep retrofit without any further improvements in the future.
- Commit to energy use limit applicable to the year that the retrofit commences on site, meet that limit by the end of the retrofit works, and maintain that same limit throughout the building's lifetime.

New build

- Has more stringent efficiency requirements to align to the UK's transition to net zero
- Commit to an energy use limit when the construction commences; meet this on completion of the building and maintain this throughout the lifetime of the building.

Embodied carbon

Following decades of industry efforts to improve building design to reduce operational energy use, there is a recently growing focus on the impacts of embodied carbon as it is increasingly realised to be a major share of whole life carbon. The UKNZCBS sets embodied carbon limits for upfront carbon (RICS Whole Life Carbon Assessment method, modules A1-A5), expressed as $kgCO_2e/m^2$ floorspace.

These limits become more stringent over time and are tailored to a range of building types and scenarios. The UKNZCBS also differentiates its embodied carbon targets by 3 types of project:

1) New works
2) Retrofit works
3) Reportable works

There is also a separate limit on embodied emissions of solar PV, to avoid excessive embodied carbon emissions from the technology. This value is set at 750 $kgCO_2e/m^2$ for solar PV.

Unlike operational energy use targets, embodied carbon limits in the UKNZCBS are verified on completion of construction. This is because upfront carbon (RICS modules A1-A5) does not assess any emissions past the point of building completion. Additionally, UKNZCBS requires upfront carbon to be reported with a generic material specification.

Separately, UKNZCBS also requires reporting of buildings' life cycle embodied carbon emissions (which would also include, maintenance and end-of-life emissions as well as this up-front carbon), but does not impose any limiting targets for that.

On-site renewable electricity generation

The UKNZCBS sets minimum targets for on-site renewable electricity generation, expressed as $kWh/m^2_{building\ footprint}/year$). These targets vary by the project type and location of the site to account for variation in solar irradiance. The metric ensures that a reasonable amount of roof space is dedicated to generating renewable energy, such as solar photovoltaics (PV), and that efficient panels are selected. While solar PV will be the most relevant technology for renewable energy generation for the majority of buildings, wind turbines or hydroelectric turbines would also count towards this target.

The UKNZCBS accepts reduced targets for situations where valid feasibility constraints have been evidenced through a statement with appropriate supporting calculations to justify as not possible:

- Planning or legal constraints (e.g. heritage and conservation considerations)
- Available space on site
- Overshadowed roofs
- Grid connectivity constraints

Operational water use

Although the UKNZCBS does not set limits for operational water use, it does require reporting and defines the methods to do so. For all water use within the immediate surrounding of a building, annual operational water use ($m^3/year$), annual operational water use (m^3/m^2 GIA/year), and annual operational water use carbon emissions ($kgCO_2e/m^2$ GIA/year) are to be reported. Additionally, the UK government conversion factors for company reporting of greenhouse gas emissions must be used for the relevant carbon emissions factors of water supply and water treatment.

Included in the requirements for water use reporting are:

- Homes/offices [litres/person/day]
- Schools – annual water use per pupil per year [m^3/pupil/year]
- Data centre [water use effectiveness (WUE)]

Fossil fuel free

The UKNZCBS states that developments need to be fossil fuel free on-site with no fossil fuel usage within regular operations. While developments need to be fossil fuel free, the UKNZCBS recognises scenarios of exceptions and exemptions:

- Exceptions- EV charging, heavy processing loads, external lighting and external services, energy used within car parks.
- Exemptions- essential systems for life safety, backup systems in critical infrastructure buildings, essential back up systems in data centres and offices, and fossil fuels that are used only in the construction phase.

Compliance is met through documentation and meter readings if fossil fuels are present.

Electricity demand management

The UKNZCBS introduces a set of requirements that apply across all sectors (except single-family homes and buildings with a total floor area of 500m^2 GIA or less) for assessing electricity demand management. The requirements cover all electricity used by buildings, excluding EV charging, heavy processing loads, and external works.

The UKNZBS requires the electricity use to be recorded and assessed across the Operating Reporting Period (ORP; 1 year), with a resolution of 1 hour or less between readings, focusing on these 3 metrics:

- Peak demand – maximum electricity demand in the top 1% of all recorded periods
- Typical demand – median value of all recorded periods in the 50th percentile
- Low demand – minimum electricity demand in the bottom 1% of all recorded periods

Once sufficient data is made available, it is the intention that electricity demand management limits will be set in future versions of the Standard.

District heating and cooling networks

For all buildings that are connected to district heating/cooling networks, UKNZCBS requires measurement of the associated operational energy use, carbon emissions, and carbon content of heat/coolth. This involves measuring heat/coolth supply with heat meters, and using carbon emission factors specific to the heating or cooling network. While existing networks must plan to transition away from fossil fuels by 2040, new networks are required to be fossil-fuel free with stricter carbon limits.

UKNZCBS sets limits on the carbon content of heat and coolth supplied from networks, but these limits vary by type of network, status of network and date of assessment. The factors that feed into the UKNZCBS network carbon content limits are as follows.

- Carbon content of networked heat:
    - For both existing and new networks: Equivalent of using an air-source heat pump with a seasonal efficiency (SCOP) of 2.8.
    - Existing networks – additional limits of 20% for network losses and 2% for parasitic energy
    - New networks – additional limits of zero network losses and parasitic energy
    - Where the network is CHP (combined heat and power) and the building also uses electricity from that CHP, the carbon factor for the CHP heat is established by calculating the total generation and distribution emissions from the CHP plant and then deducting the emissions associated with the electricity using same carbon factor as grid electricity.
- Carbon content of networked coolth: Both existing and new networks have a limit of SEER (seasonal energy efficiency ratio) of 3.0.
- For all fuels used by the heating/cooling network (e.g. fossil fuel, biofuel, grid energy etc), the calculation must use the current carbon conversion factors corresponding to the assessment period, as published by the UK government.

The metric used for these limits is carbon content ($kgCO_2e/kWh$) of the heating/cooling network.

UKNZCBS also requires reporting of the following metrics:

- Energy use by the district heating scheme ($kWh/m^2/year$) associated with the heat/coolth supplied to the building
- Carbon emissions ($kgCO_2e/year$) associated with the heating/coolth supplied to the building.

Space heating and cooling

The UKNZCBS requires all building types to report the data for space heating and cooling using the annual energy load ($kWh/m^2GIA/yr$) and peak demand (W/m^2GIA) delivered to the building. All new builds are required to comply with the limits for space heating and cooling energy use shown as a pass/fail measurement, except data centres which are not subject to a space heat demand limit but must meet all their heat demand through heat reuse within the building.

Part of the pass/fail limits includes that all sectors measure the space heating and cooling energy use through the floor space area as GIA (NIA for offices).

UKNZCBS pilot version sets limits on annual space heat demand for 7 out of the 35 listed subsectors (all are 15 $kWh/m^2GIA/year$, except single family houses whose limit is 20 $kWh/m^2GIA/year$). Future versions of the UKNZCBS are expected to set equivalent limits for the remainder of the listed subsectors, and also to set additional limits on peak space heating/cooling energy demand and annual space cooling demand for all sectors.

Refrigerants

Refrigerants are used in heat pumps for producing heating, cooling, and hot water as well as cold storage. The UKNZCBS defines limits on the GWP these refrigerants with the exclusion of refrigeration equipment used as a part of industrial processes.

The UKNZCBS defines the following requirements regarding refrigerants:

- Refrigerants used must have a GWP 677 $kgCO_2e/kg$ or lower. This limit reflects the GWP value of refrigerant 'R32' and is subject to any future changes that may be made to R32's GWP.
- Total building refrigerant charge must be declared and expressed in $kgCO_2e$
- Buildings that contain an amount of refrigerant that equates to over 3,000 $kgCO_2e$ of refrigerant must adhere to additional leakage reporting, set maintenance standards, and report refrigerant measurements throughout its lifetime.

Carbon offsetting

The UKNZCBS does not require carbon offsetting, but it is offered as an additional level of verification for those that choose to offset. Where this path is chosen, the applicant must first meet all of the mandatory on-site performance targets described previously, and then the use of offsetting then allows the building to claim a status of "net zero carbon aligned plus offsets", as opposed to only "net zero carbon aligned". For this 'Net Zero Carbon Aligned + Offsets' verification, the scope of the required offsets covers all up-front carbon and in-use operational emissions and emissions associated with refrigerant leakage associated with the development.

There are two options for offsetting that the UKNZCBS recognises:

1) **Carbon credits** – must meet the ICROA endorsed voluntary carbon market standards and Code of Best Practice or the ICVCM principle labelled credits and their Core Carbon Principles.
2) **Renewable energy procurement** – an option for Scope 2 emissions (operational energy) only and offers 3 routes (electricity rating, electricity supply contract, and power purchase agreement contract).

Evidence behind the UKNZCBS

The development of the UKNZCBS has been informed by:

- UK carbon and energy budget to remain on a 1.5°C degrees trajectory[1]
- Required actions for the built environment to align with these budgets.

To determine appropriate limits across the various requirements, a tool was created to model the UK building stock to 2050, which was used to inform the science-led limits. The tool modelled and balanced limits from two approaches:

1. **Top-down** – energy and carbon budgets for the built environment
2. **Bottom-up** – energy and carbon expenditure from the UK building stock

The top-down budgets have been balanced with the bottom-up performance levels through scenario testing of interventions on the built environment and developing and understanding of what is required at the building level to meet the top-down budgets.

Top-down approach

The top-down approach focused on aligning building-level targets with broader national and global climate goals, particularly to ensure limits are suitable for a 1.5°C degrees trajectory. It provided a high-level, systems-based perspective using various datasets and modelling tools.

Whilst the UKNZCBS primarily aligns to a 1.5°C degrees trajectory, as per the Paris Agreement 2015, the UK's 6th Carbon Budget (produced by the Climate Change Committee, CCC) was also referenced and considered as part of its evidence base. This was to ensure that the pathway associated with a 1.5°C degrees trajectory fit within the UK's own carbon budgets, which was expected to be the case anyway given that there is a more aggressive carbon reduction trajectory involved in the 1.5°C degrees pathway[2].

By aligning with the Paris Agreement, and broadly being 'science-led', the UKNZCBS limits fall within both national and international climate goals. This is especially important as aligning with the Paris Agreement ensures that the limits set by the UKNZCBS are sufficient to match the rate of action to achieve the UK's legally-binding 2050 net zero target.

The UKNZCBS methodology reports state that a comprehensive literature review indicated that no universally accepted method exists for defining a sectoral carbon or energy budget for the built environment, either in the UK or internationally. Analytical efforts were undertaken to develop reliable carbon and energy budgets, separated between operational and embodied carbon. The top-down budgets for operational carbon and electricity are based on the National Grid ESO Future Energy Scenarios 2024 (FES), "Electric Engagement" scenario, which are not directly taken from the CCC budgets because these CCC budgets do not separately identify electricity used by buildings. Nonetheless, the FES is understood to still be aligned with the 2050 UK Net Zero decarbonisation pathway. For the purpose of the UKNZCBS balancing model, 'Electric Engagement' is the FES scenario with the highest electricity demand, and therefore, the highest electricity budget[3]. The UKNZBCS team also tested an additional scenario that estimated the impact of the Government's stated (2024) ambition for a near net zero grid by 2030.

For top-down embodied carbon budgets, the figures were derived from the CCC's budget. These budgets have been adjusted to account for consumption-based emissions, encompassing embodied emissions from materials produced outside the UK, rather than focusing solely on territorial emissions (as the UK's legislated carbon budgets devised by the CCC are territorial-only). This was done by starting with the total emissions from the Manufacturing and Construction category in the CCC budget and then extrapolating the part associated with the built environment (approximately 15% of the M&C CCC budget). An amount was then added to this budget that accounts for extra-territorial embodied carbon (46% is estimated to be emitted within the UK, therefore the added extra-territorial amount makes up the remaining 54%). Finally, a deduction was made from this budget to exclude in-use embodied carbon, so that only upfront carbon was included.

Finally, an allowance was made within the model to represent leakage of F-gases in space heating and cooling. This was based on the CCC budget's assumptions about F-gases, which include an assumption about the increasing use of heat pumps in coming years.

Bottom-up approach

The bottom-up approach to setting the UKNZCBS was led by empirical data from real-world examples of best practice buildings' operational energy and embodied carbon performance. Building project teams had an opportunity to submit building energy and carbon performance data to the UKNZCBS for assessment. Data was requested for all building typologies, to ensure the breadth of different development types was accounted for when it came to setting final targets and limits for the pilot version of the UKNZCBS.

More than 500 stakeholders participated in the stakeholder engagement process, which led to over 4000 projects being submitted for analysis into UKNZCBS targets and limits. Of these projects, 500 were new works, 10% were a mix of new/retrofit, and only 6% were retrofit works (see Figure 2 overleaf). As the dataset for retrofit works was smaller, the limits for retrofits under the UKNZCBS is determined by using the new build limits, placing a retrofit factor representing expected upper bound emissions during retrofit as a proportion of original emissions which is expected to be the equivalent to new build. As new build limits under the UKNZCBS are prorated and subdivided to give elemental limits by a percentage split, the retrofit factors are applied to these before summing the factored elemental limits to generate a total Retrofit Works limit per sector.

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[1] As per the more ambitious of the two goals set within the Paris Agreement, to which the UK is a signatory.
[2] This is partly because the UKNZCBS' 1.5°C pathway aligned to the Paris Agreement does not rely on future emergence of carbon capture technology, and includes explicit consideration of the Paris Agreement's equity principle when determining the UK's share of the global carbon budget. By contrast, the UK's *legislated* carbon budgets are in theory intended to help fulfil the Paris Agreement, but have been estimated by some to be twice the size that they would need to be to fulfil the Paris Agreement's equity principle without relying on the future emergence of carbon capture technologies.
[3] FES scenarios with higher overall energy demands are more reliant on other fuels, including hydrogen. It is worth noting that the UKNZCBS methodology report indicates that there is a possibility for this to evolve in future iterations of the modelling.

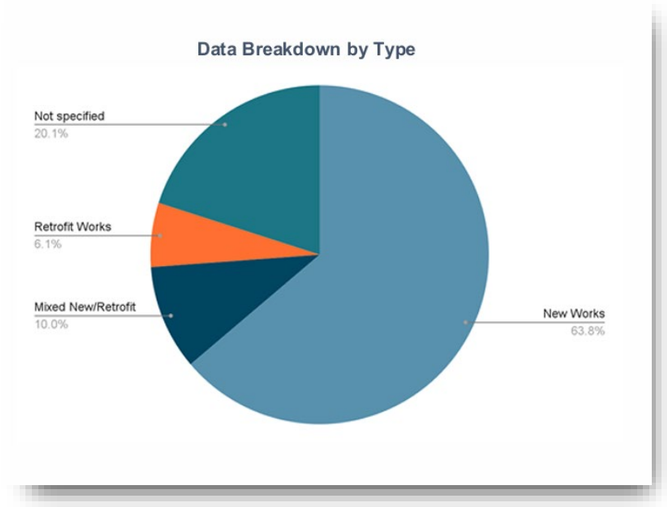


Figure 2: Types real projects submitted to UKNZCBS Call For Evidence. From '[Input Evidence Report](#)'.

Synthesis

The development of the UKNZCBS targets and limits involved comparing top-down emissions reduction targets with bottom-up sectoral data to ensure the proposed pathways were both ambitious and achievable. An iterative validation process, supported by scenario modelling, was used to confirm that the recommendations aligned with carbon budget constraints while remaining practical and implementable for stakeholders. The scenarios tested ranged from assuming only existing policies in place (such as current and nationally signalled future building regulations) and current industry practice, through to more ambitious assumptions on policy framework and industry practices improvements. Additionally, sensitivity analysis was carried out to stress-test key assumptions, taking into account uncertainties related to energy grid decarbonisation, advancements in low-carbon materials, uptake and depth of retrofit.

Additionally, the UKNZCBS scenario modelling did not assume that *all* buildings uptake the best practice energy use intensity or embodied carbon targets that it is setting. Rather, they tested a range of combinations of different uptake rates and also different levels of the 'best practice' that is taken up. This analysis created a 'balanced scenario' that assumed the trajectory of uptake of new build best practice standards and retrofit in existing buildings shown in Figure 3.

This two-tier approach ensures that the UKNZCBS targets and limits are feasible in practice, while also aligning with the rate of action required to align with the UK's legally binding 2050 net zero target and the UK's commitment to the goals set within the Paris Agreement (Figure 4).

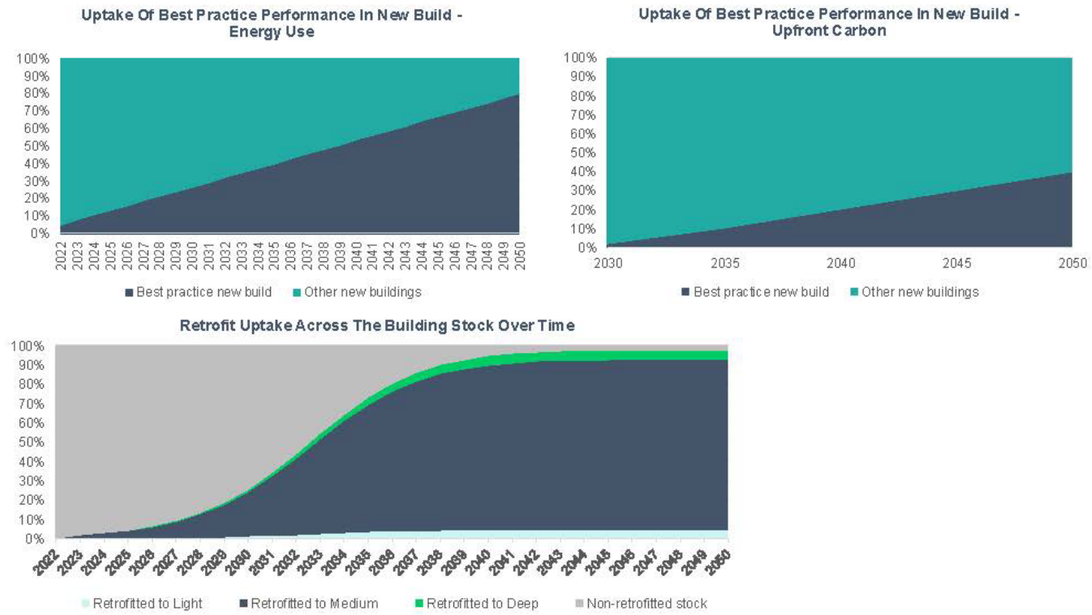
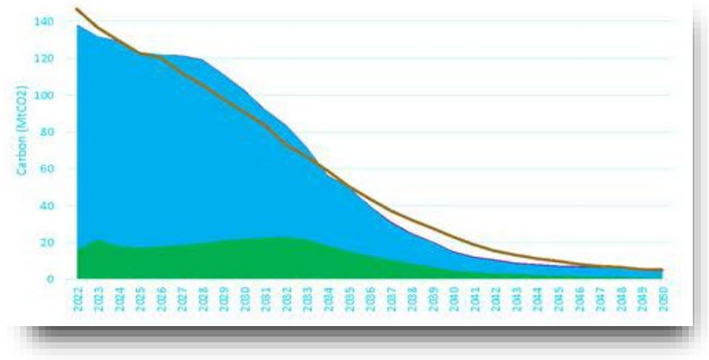


Figure 3: UKNZCBS uptake rate of new build energy use targets, new build upfront embodied carbon targets, and retrofit in existing buildings, in the UKNZBCS 'balanced scenario'.



	Bottom up – Operational
	Bottom up – Embodied
	Bottom up – F-gases
	Top down – Total carbon

Figure 4: UK buildings' emissions in UKNZCBS 'balanced scenario', versus their total carbon budget for a 1.5°C future. From '[How the UKNZCBS Limits Were Set](#)'.

Whilst the feasibility of targets and limits set by the UKNZCBS are supported by evidence, to demonstrate building-level performance that is aligned with national and international climate goals, no evidence has been provided on capital or operational costs associated with achieving performance levels that would be granted with UKNZCBS verification.

As the UKNZCBS is a voluntary standard, there is no requirement for any cost evidence to be provided. By contrast, any standards being proposed as local plan policy would need a robust cost evidence base to feed into the viability assessment would be required to demonstrate deliverability. However, a key opportunity presents itself throughout implementation of the UKNZCBS to collect valuable data on the capital costs to deliver UKNZCBS-verified buildings.

Assessment of utilising the UKNZCBS for local policy

Before discussion of suitability of the UKNZCBS as a local policy mechanism, it is important to note that the UKNZCBS was created as a voluntary verification process to promote best practice building design. The primary intention of the UKNZCBS is not to operate as a policy mechanism, at local or national level. However, we now consider the suitability of utilising elements of the UKNZCBS in local policy.

Process of UKNZCBS validation versus planning compliance

Given the standard's requirement for a year of operational energy use data to win accreditation, it does not align with the time-sensitive nature of planning decisions. Planning conditions on build quality typically have to be discharged before the building is sold or occupied, thus before any of UKNZCBS' operational targets can be verified. Once a development is built and occupied, planning influence is largely diminished as are the opportunities to improve building energy performance. There are significant risks in using the UKNZCBS as a policy mechanism for operational energy use targets as the UKNZCBS verification process will commence after the planning process has finished.

One potential benefit of using the UKNZCBS in local policy – as with any third party certification system – is the possibility of reducing administrative workload for local authorities, as compliance could be assessed through the standard's verification process. However, since no design-stage verification exists yet in the UKNZCBS, an evaluation of a building's performance during planning cannot be undertaken through the UKNZCBS. Also as the UKNZCBS certification must be updated annually, it is uncertain what enforcement action could be taken by the development management team if the UKNZCBS certification is not achieved once the building is already occupied. Therefore to seek the UKNZCBs via planning would in fact mean setting policy that replicates all the UKNZCBs targets for energy use, space heating demand, and on-site renewables, and development management officers would need to spend time determining whether the planning application pack sufficiently demonstrates that these will be met, and then again on completion of the building for discharge of conditions.

For embodied carbon limits, there is more scope for the mechanisms of the UKNZCBS to be utilised to verify embodied carbon performance. This is because embodied carbon calculations are able to be verified at the as-built stage, where planning still holds some control. However, UKNZCBS verification is granted for projects where all requirements have been achieved (including the annual operational energy targets), rather than a specific verification for only embodied carbon performance.

Offsetting approaches in UKNZCBS versus local policy

Offsetting is a feature of both the UKNZCBS and the draft GCLP policy approach for operational energy. However, offsetting for the UKNZCBS is an additional voluntary mechanism to offset any residual operational and embodied carbon emissions to zero. In contrast, offsetting used in local policy is a compliance mechanism where on-site building performance does not meet core policy requirements.

In voluntary offsetting, the UKNZCBS requirements (discussed previously) are appropriate and justified. However, from a mandatory perspective, offsetting in local policy should deliver off-site projects that achieve precisely what was not achieved on-site, typically solar PV installations on other buildings elsewhere in the local plan area. Local plan carbon or energy offsetting is raised through 'developer contributions', and in order to be able to raise these developer contributions they must meet certain criteria: being directly related to the development, fairly and reasonably related in scale and kind to the development, and necessary to make the development acceptable in planning terms. Raising contributions in this way and spending those on delivering the equivalent carbon reduction actions in the local area would seem to meet those tests and is in the local authority's power to deliver.

By contrast, UKNZCBS' criteria for offsets are either ICROA-compliant carbon credits or certain renewable energy purchasing:

- The only ICROA-compliant credits in the UK at the time of writing appear to be Woodland Carbon Code (WCC) credits – this may be an option for spending of developer contributions, but would only contribute to a net zero Carbon Greater Cambridge if there are enough WCC credits available in the local plan area. Also, tree planting carbon credits are generally not recommended as a substitute for delivery of renewable energy, given the relative uncertainty in the long-term survival and carbon savings of trees and that UK carbon budget analysis shows that afforestation needs to occur as well as, not instead of, the growth of renewable energy.
- A plan policy requirement for renewable energy *purchasing* (as opposed to generation) would likely be unenforceable as the choice of tariff is up to the energy bill payer, not the developer.

Therefore, the offsetting mechanism for the UKNZCBS is not appropriate for integration in local policy.

Other aspects of UKNZCBS

The UKNZCBS water use requirements are out of scope for our report, as our focus is energy policy.

The UKNZCBS refrigerants criteria are out of scope for our report as refrigerants would be part of the scope of embodied carbon (RICS Whole Life Carbon Assessment module B1 and potentially C1), not operational energy carbon, whereas GCLP team chose not to pursue an embodied carbon policy in their draft plan. However, the UKNZCBS refrigerants criteria may be of interest if Greater Cambridge were to adopt an embodied carbon policy in the future that includes targets for life cycle embodied carbon instead of just upfront embodied carbon. In theory, the UKNZCBS refrigerants criteria would then be presented as detailed guidance to sit alongside the future local plan itself or incorporated into an embodied carbon policy itself. If Greater Cambridge does consider adopting an embodied carbon policy in the future, work will need to be conducted to evidence of the feasibility and viability impact.

The UKNZCBS criteria for district heating/cooling networks have relevance for any local plan policy requiring developments to connect to heat networks, in that it would be beneficial to draft the policy to waive the requirement to connect to networks that fail the UKNZCBS criteria. However, the most recent draft GCLP (2021) does not include such a policy. Meanwhile the GCLP draft policy stipulation that "all heating should be provided through low carbon fuels (not fossil fuels)" may be interpreted to apply to networks too and thus cover the UKNZCBS criteria on carbon content of networked heat.

While the UKNZCBS approach is improving the quality of 'net-zero' claims by directly addressing the performance gap via only granting verification in the occupational phase of a building, the UKNZCBS reporting timeline may limit its adoption as a standard in local policy.

At present, the UKNZCBS is not tailored to use in planning policy, although workshops have explored its potential use with local authorities. Future versions of the standard may benefit from clearer guidance on how it can be embedded in local planning policy to ensure more consistent, effective, and practically enforceable implementation in policy.

Recommendations for the GCLP

At this stage, it is not recommended for the Greater Cambridge Local Plan (GCLP) to set the UKNZCBS as a policy requirement. The main reason is that the UKNZCBS' required reporting periods do not support verification of operational energy performance at the planning stage, which is critical for the effectiveness of local plan policy. UKNZCBS verification is only granted once all requirements are met, which occurs after construction and post-occupancy assessment. UKNZCBS does not offer verification for individual criteria, such as embodied carbon performance, without meeting UKNZCBS in its entirety.

Additionally, despite its title, **meeting the targets set by the UKNZCBS does not necessarily mean that a building is net zero carbon in operation** – whereas the existing draft policy targets for GCLP would. Introducing the UKNZCBS is therefore likely to cause confusion among developers and the public due to the misleading title. Readers may (understandably but wrongly) assume that the UKNZCBS means a building is net zero, which may lead to confusion over why the UKNZCBS' targets for energy use intensity or renewable energy differ from those of the existing draft GCLP policy.

Furthermore, the GCLP already benefits from a robust evidence base for the costs and feasibility of meeting the policy standards for carbon and energy in residential and school archetypes. This evidence base is currently being updated to reflect current cost data, which is a key aspect of the evidence base to support robust and defensible policy at examination. In contrast, the **UKNZCBS does not provide a cost evidence base**. Commissioning such work would require additional resources if the standard were to be used as a requirement in plan policy.

It is also important to note that the UKNZCBS remains in a pilot phase. As such, key elements such as emissions targets and performance limits are likely to evolve as the standard is tested and refined. Its current purpose is to serve as a voluntary benchmark for the private development sector, rather than as a tool for local policy enforcement. For this reason, adopting components of the UKNZCBS into the GCLP at this stage could risk misalignment with planning needs and policy deliverability.

Nevertheless, the UKNZCBS can still serve as a valuable role in supporting the direction of local policy. Its use as an evidence source can help demonstrate that the draft GCLP policy requirements, particularly those related to operational energy and embodied carbon, are consistent with national and international climate goals. In this way, the GCLP can show alignment with best practice standards in the industry, without relying on the UKNZCBS as a formal compliance mechanism.

If the policy were to be adapted to reflect, for example, the UKNZCBS changes in energy use and space heat demand targets over time, this would muddy the clarity of the feasibility and cost modelling evidence that is in place for the draft GCLP policy, which sets static targets that do not change over time. Meanwhile, elements of the **existing draft GCLP policy are already towards the more ambitious/future end of most UKNZCBS energy efficiency targets** (see table on the next page**).**

However, there may be a justification to somewhat amend some of the Greater Cambridge policy targets in light of the UKNZCBS:

- The Greater Cambridge Local Plan draft policy's EUI targets for homes and schools were based on robust evidence from those archetypes having been fully explored in the energy and cost modelling. These are also within the range of targets the UKNZCBS sets for those archetypes. There is therefore no need to amend these.
- By contrast, the policy's guideline EUI targets for all non-residential building types except schools were *not* based on the same level of robust evidence, as these had not been part of the energy and cost modelling undertaken in the previous or current Greater Cambridge work. Instead they were based on broad indicative potential aspirational targets indicatively provided in that 2020-21 Greater Cambridge evidence work. (The draft GCLP policy did respond to this by including a caveat of "where feasible" for those archetypes, unlike the robustly-evidenced homes & schools targets).
- That means for those non-residential archetypes, the UKNZCBS is likely to be based on more realistic feasibility estimates than the Greater Cambridge indicative ones from several years ago.
- Furthermore, almost all the Greater Cambridge draft policy targets for those archetypes are much tighter than those set by the UKNZCBS – sometimes even the UKNZCBS future targets through to 2050. This could pose some concerns that the original Greater Cambridge EUI targets for those archetypes may not in fact be as feasible as previously hoped.
- For this reason, it is now recommended to make changes to the EUI targets for those non-residential archetypes (other than schools) to reflect the UKZNCBS 2030 targets (see the right hand column of the table overleaf). Because the UKNZCBS targets do not come with cost uplift information, it is also recommended to insert a "where viable" clause alongside the existing draft policy's "where feasible" clause.
    - The year 2030 is selected because it will be the first year when we might expect buildings subject to the new GCLP policy to come into operation (as the GCLP timetable shows submission to the Inspectorate in December 2026, and we could anticipate a further 18 months for the process of inspector allocation, examination, modifications, time to produce the inspector's final verdict report and adoption process, then several more months before applications are received that reflect the new plan, and a further 12 months of construction). Again, we note that the GCLP previous draft policy for EUI in non-modelled archetypes was intended to be a broad encouragement and not a fixed requirement precisely because of the lack of feasibility modelling for those archetypes.

The table overleaf compares the UKNZCBS EUI targets to those of the draft GCLP policy. This may support editing the policy to be flexible for supermarkets, food/beverage, call centres and trading floors, where the exact use is known at application stage. However, given that many applications only give a broad use class (e.g. class E for a wide range of retail, offices/services and light industry), it is recommended that the policy simply refer to "meet UKNZCBS 2030 target most relevant to proposed use type". Alternatively, the policy could still apply a specific EUI and have the energy calculation assume a more generic unregulated energy profile for the most relevant building type. We note that another recent local emerging plan policy (South Oxfordshire & Vale of White Horse) alternatively dealt with this issue by allowing certain types of proposal with unavoidably high unregulated energy use to instead meet a regulated-only energy intensity target of 30-40kWh/m^2/year, reflecting energy modelling evidence. However, even regulated energy uses can vary significantly by occupancy profile (e.g. 24hr logistical warehouses versus daytime staffing, which changes the internal heat gains). This means that such a regulated-only EUI target would still benefit from guidance on what standard occupancy profile developers should input during energy modelling for such developments, if that approach were adopted in the GCLP policy.

Energy metric	Existing draft GCLP policy CC/NZ target	When does UKNZCBS hit this level or lower?	Recommended alignment to UKNZCBS 2030 targets (subject to feasibility and viability)
Space heat demand (SHD)	All new builds: 15-20 kWh/m²/year	Non-residential & flats: 15 kWh/m²/year; 2025 onwards.	*[not quoted here as no change recommended]*
		Single family homes: 20 kWh/m²/year; 2025 onwards.	*[not quoted here as no change recommended]*
Energy use intensity (EUI)	All homes: 35 kWh/m²/year	2040	*[not quoted here as no change recommended]*
	Offices: 55 kWh/m²/year	General offices: 2037	72 kwh per m2 (GIA) per year
		Call centres: Never (lowest is 64 in 2050)	106 kWh/m² (GIA)/year
		Trading floors: Never (lowest is 74 in 2050)	123 kWh/m² (GIA)/year
	Schools: 65 kWh/m²/year	Early years: 50 kWh/m²/year from 2025	*[not quoted here as no change recommended]*
		Primary: 45 kWh/m²/year from 2025	*[not quoted here as no change recommended]*
		Secondary: 60 kWh/m²/year from 2025	*[not quoted here as no change recommended]*
	Retail: 55 kWh/m²/year	Supermarket: Never (lowest is 110 in 2050)	170 kWh/m²/year
		High street & department store: 2032	59 kWh kWh/m²/year
		Food/beverage without catering: Never (lowest is 115 in 2050)	182 kWh/m²/year
		Food/beverage with catering: Never (lowest is 220 in 2050)	327 kWh/m²/year
		Landlord areas: 2025	50 kWh/m²/year
		Retail warehouse: 2035	67 kWh/m²/year
	Multi-residential: 35 kWh/m²/year	Student: Never (50 kWh/m²/year in 2050)	67 kWh/m²/year
		Care homes: Never (100kWh/m²/year in 2050)	134 kWh/m²/year
	Leisure: 100 kWh/m²/year	Dry: 80 kWh/m²/year in 2025	74 kWh/m²/year
		Wet: Never (250kWh/m²/year in 2050)	317 kWh/m²/year
		Fitness: Never (110kWh/m²/year in 2050)	137 kWh/m²/year
	Research: 150 kWh/m²/year	Never ("Science & tech" lowest is 180kWh/m²/year, 2050)	264 kWh/m²/year
	Higher Education: 55kWh/m²/year	Never (lowest is 60kWh/m²/year in 2050)	87 kWh/m²/year
	Light industrial: 110kWh/m²/year	Varies by whether space is conditioned/chilled	Storage & distribution: 30, 67 or 129 kWh/m²/year (unconditioned, conditioned or cold storage respectively)
	Hotel: 55 kWh/m²/year	Never (lowest is 80kWh/m²/year in 2050)	110 kWh/m²/year

Table key: Colour and indication
GCLP draft policy is behind UKNZCBS on plan adoption
GCLP draft policy broadly in line with UKNZCBS (within 2 years before/after plan adoption)
GCLP draft policy is ahead of UKNZCBS on plan adoption, but would be caught up by UKNZCBS
GCLP policy target is never reached by UKNZCBS

Please note: It can be seen here that the UKNZCBS also differentiates building types to a wider array of sub-types than the draft GCLP policy did.

To avoid overcomplicating and overlengthening the policy (and because these are cited from the pilot version of the UKNZCBS and therefore may be subject to future change), it is therefore recommended that for the building types where it is recommended to amend the GCLP policy guideline EUI target, the policy would simply refer to "UKNZCBS 2030 target for most relevant typology" rather than specifying all the exact differentiated EUI values within the policy.

Tracked changes version of recommended amendments to the existing draft GCLP policy (extract of relevant parts only)

"4. Part B: Total Energy Use Intensity (EUI) targets are achieved as per building type (set out in kWh per m2 per year), as follows:

- All dwellings should achieve an EUI of no more than 35 kWh per m2 per year.
- Non domestic buildings should achieve the following EUI of no more than the following, where technically feasible and viable, by building type:
    - ~~o~~ Offices: ~~55 kWh per m2 per year~~ Equivalent to the UK Net Zero Carbon Buildings Standard 2030 targets (and sub-typologies where available)
    - Schools: 65 kWh per m^2 per year
    - ~~o~~ Multi-residential: ~~(e.g. Student accommodation): 35kWh per m2 per year~~ Equivalent to the UK Net Zero Carbon Buildings Standard 2030 targets (and sub-typologies where available)
    - ~~o~~ Retail: ~~55 kWh per m2 per year~~ Equivalent to the UK Net Zero Carbon Buildings Standard 2030 targets (and sub-typologies where available)
    - ~~o~~ Leisure: ~~100 kWh per m2 per year~~ Equivalent to the UK Net Zero Carbon Buildings Standard 2030 targets (and sub-typologies where available)
    - Research facility: ~~150 kWh per m2 per year~~ Equivalent to the UK Net Zero Carbon Buildings Standard 2030 targets (and sub-typologies where available)
    - Higher education teaching facilities: ~~55 kWh per m2 per year~~ Equivalent to the UK Net Zero Carbon Buildings Standard 2030 targets (and sub-typologies where available)
    - Light industrial uses: ~~110 kWh per m2 per year~~ Equivalent to the UK Net Zero Carbon Buildings Standard 2030 targets (and sub-typologies where available)
    - ~~GP surgery: 55 kWh per m2 per year~~
    - Hotel: 55 kWh per m2 per year Equivalent to the UK Net Zero Carbon Buildings Standard 2030 targets (and sub-typologies where available)".

Please note: The reason the GP surgery EUI target is entirely struck out and not replaced is that because UKNZCBS only refers to NHS Net Zero Carbon Buildings Standard. That NHS standard sets different EUI limits for "low, medium, high and ultra-high tech" buildings, then differentiates these into up to four different "types", and then further differentiates these by four different geographical zones none of which specifically names Cambridgeshire or East Anglia. Therefore across the wide number of possible combinations of these different factors, we don't have evidence to prove which of these will be universally applicable to GP surgeries in Greater Cambridge, if any. Meanwhile, the NHS document says this standard will apply to things it builds anyway, while for any non-NHS healthcare facilities we anticipate that the development management officers will not be able to verify which NHS EUI target is the relevant one. In any case, we suspect non-NHS GP facilities are likely to be small and rare, so the impact of such development probably doesn't warrant a complicated policy compliance process.

Next steps for Greater Cambridge consideration

As mentioned above, the Greater Cambridge Local Plan draft policy's guideline EUI targets for all non-residential building types may not be as feasible as previously hope. For this reason, we are providing the consideration for the following four options:

a) **Keeping the EUI targets listed in the draft policy the same.**

   This option is not recommended as there is not a cost modelling for the non-residential buildings except schools and the targets are not aligned with the UKNZCBS.

b) **Remove the EUI targets for non-domestic (except for primary schools) and replace them with the UKNZCBS 2030 targets**.

   This option means that the targets would be less ambitious than the current EUI targets in the draft policy, but are aligned with other targets and, thus, will not contribute to a proliferation of standards. However, it is important to note that the UKNZCBS targets are subject to change as it is still in the pilot stage. To address this, we recommend a general statement on the UKNZCBS targets instead of listing out all the target values.

   The recommended policy wording would be as shown on the previous page tracked changes version.

c) **As per item 'b' until EUI numbers from further evidence from external work gets published**.

   This option makes a consideration for unpublished work that is currently being developed further externally (as part of the next London Plan by some of the same consultancy team as the Greater Cambridge work) which looks into more detail at technical and cost feasibility of some non-domestic typologies. This evidence is anticipated to be published in the autumn. Thus, the recommendation is to replace the UKNZCBS 2030 targets with the EUI values published in the external work in autumn as it would be backed with evidence developed to support them.

d) **As per item 'b' and conduct further technical and cost feasibility studies on the right EUI levels for the selected typologies of Greater Cambridge**

   This option makes a consideration for using the UKNZCBS 2030 target values in the interim as further technical and cost feasibility studies are conducted to produce EUI levels for the selected typologies for Greater Cambridge.

Acknowledging the local plan decision making timescales, we recommend Option 'b,' amending the draft policy EUI targets by replacing them with the UKNZCBS targets following the recommended policy wording listed under option b.

However, if there were no restrictions in timescales for local plan decision making, our recommended options for Greater Cambridge would have been options 'c' or 'd.' The benefits of options 'c' and 'd' are that there would be less proliferation of local standards and there may be an option for London and Cambridge to have the same standards. Options 'c' and 'd' could also lead to a strengthening of the policy wording as there would be a technical evidence and cost evidence base. Finally, the more typologies are included in the categories for residential and schools, where they are required to meet the targets, there will be reduced work for policy officers in reviewing if a development scheme is technically feasible and financially viable.