Why do we need local plan policies for net zero carbon buildings?

At national level, in 2019 the UK Government declared a climate emergency and updated the legally binding carbon reduction goal for 2050 enshrined in the Climate Change Act 2008. The new goal for 2050 is for the UK to achieve net zero carbon status, rather than the original goal of an 80% reduction on the carbon emissions of 1990. The Act also comes with interim 5-yearly carbon budgets that are periodically devised by the independent Committee on Climate Change and then passed into law by Parliament.

The UK is also a signatory to the international Paris Agreement 2015, brokered via the United Nations. This commits all signatories to ensure global average temperatures do not rise by more than 2˚Celsius on pre-industrial levels, and to pursue a limit of 1.5˚C. This would require very fast and drastic cuts to global carbon emissions, as there is a limited 'carbon budget'[1] to be emitted before the 1.5C and 2C limits will be reached – and a rise of 1 ˚C has already happened. The Paris Agreement also commits that the extent of each country's carbon reductions is related to wealth and technological ability. As a rich and technologically advanced country, the UK is responsible for faster and deeper cuts. Given the speed and scale of carbon cuts [2]needed in existing buildings, transport and other energy use, we cannot afford for new buildings to add to the burden. Neither current nor incoming building regulations (2013 and 2021 respectively) will deliver sufficient carbon reductions to achieve this. Even the Future Homes Standard and Future Buildings Standard (building regulations from 2025) will not guarantee that buildings are net zero carbon from first operation, and although it will implement some improvements to energy efficiency, these are not to the maximum extent that the construction industry is already capable of achieving.

Recognising such pressing issues, Warwick District Council declared a climate emergency in 2019, and in 2021 it adopted some shared ambitions[3] with Stratford-on-Avon DC. These ambitions include:

1. By 2025, the councils themselves to be net zero carbon (and contracted services by 2030)
2. By 2030, the whole of South Warwickshire to have carbon emissions 55% lower than in 2017, and have a plan to achieve net zero carbon by 2050
3. By 2050, enable South Warwickshire's environment and communities to be ready to adapt to a future climate in which the global temperature rises by 3˚C by the end of the century.

Subsequently, Warwick DC has agreed a Climate Change Action Programme (CCAP) to build momentum towards those ambitions. The plan for Ambition 2 is here: Document.ashx (warwickdc.gov.uk)[4]. Two key pieces of local analysis have shaped the Ambitions and CCAP:

1) **Warwick Climate Change People's Inquiry** (Citizens Jury) which met during 2020 and 2021. The Inquiry's recommendations and Council response is available here[5]. Recommendation 2 (the second highest ranked proposal out of a total of 36 proposals) was for all new buildings to be carbon neutral in construction and use, while recommendation 7 was to refuse all planning applications that fail to achieve net zero carbon (albeit the Council takes the view that it cannot support the latter at present). Also relevant is recommendation 4, council finance for recapture of carbon using planting.

2) **A report[6] by specialist carbon pathways consultant Anthesis**, which looks at Warwick District's carbon emissions drawing on data from the nationally recognised SCATTER Tool. (SCATTER aligns with the required carbon reductions to fulfil the Paris Agreement and follows the globally best-recognised carbon reporting methodology). This generated the target of 55% reduction by 2030.

Findings from specialist analysis of Warwick's carbon emissions (Anthesis, 2021)

Domestic Buildings

- Excluding embodied carbon, residential buildings are responsible for 21.7% of carbon emissions across Warwick District (approx. 273,000 tonnes of carbon dioxide equivalent tCO_2e per year)
- Part of achieving the necessary 55% overall reduction in district emissions is that emissions from domestic buildings must fall by an assumed 58%
- Achieving this ambition assumes new homes will be built to higher standards of carbon reduction than national building regulations (Anthesis assumed Passivhaus standard as the ideal)
- To achieve the above carbon reductions from domestic buildings, Anthesis recommends a range of actions including improving performance of new buildings. These interventions do not constitute an action plan, but do provide some broad possibilities that are within the Council's control.
- Retrofit is also a crucial part of achieving the targeted emissions reductions: 47% of buildings (including existing stock) would need to be electrically heated by 2030, i.e. no longer using gas heating (ideally heat pumps) – and Warwick should aim to be achieving deep energy retrofits of 18,800 existing homes per year by 2030 (a range of measures achieving an 83% reduction in energy demand) and 'medium energy retrofits' (a 66% energy demand reduction) of 2,300 homes/year
- The Council has adopted a Climate Change Action Programme to progress towards reduction in emissions from domestic buildings. Adopting the net zero carbon DPD is an important element in this.

Based on the above, Warwick District Council notes that:

- Around 10,000 new dwellings are expected to be built in the district before 2030
- A new-build home in Warwick causes an estimated 1.6 tonnes of CO_2 per year[7] from regulated energy (permanent uses e.g. heat, light, ventilation), plus[8] at least a further ~63% due to unexpected errors in building performance, and unregulated energy (total 2.608 tCO_2).
- The new homes could therefore add 26,080 tCO_2 to the district's annual emissions unless carbon reduction measures are required through planning. By applying onsite carbon reduction requirements and local carbon offsetting, the DPD therefore has the potential to reduce carbon emissions in the district by up to 26,080tCO_2 per year.

Non-domestic Buildings

- Non-domestic buildings cause 20.1% of emissions in Warwick District (252,000 tCO_2e /year)
- The Council is committed to reducing the district's carbon emissions by 55% by 2030
- Part of achieving this will require emissions from non-domestic buildings to fall by 38%
- This would need new nondomestic buildings to be built to better carbon standards than national building regulation, and retrofit of existing ones (e.g. 39% shifted to all-electric heating by 2030)
- Given the more varied energy needs of non-domestic buildings and the less certain amount of new non-domestic construction, it is difficult to estimate the amount of carbon the DPD could save
- Anthesis recommends various actions including improving performance of new nondomestic buildings. These are not an action plan, but provide some possibilities within the Council's control.

Anthesis' identifies that an overall reduction of 55% in Warwick's carbon emissions can and should be achieved by 2030. The Council has committed to this and adopted a Climate Change Action Programme to progress towards the reduction in carbon emissions from buildings. Adopting the DPD is a key part of this.

The following sections of this report lay out the recommended ways in which the Net Zero Carbon DPD policies could be made more effective and justifiable in order to help achieve the above aims.

[1] IPCC Special Report on impacts of global warming Global Warming of 1.5 ºC — (ipcc.ch)
[2] Setting Climate Commitments for Warwick . Local and Regional Implications of the UN Paris Agreement on Climate Change
[3] Warwick and Stratford-on-Avon DC Shared ambition on climate change
[4] Ambition 2: Low Carbon South Warwickshire 2030
[5] Warwick District People's Inquiry into Climate Change - WDC response and recommendations
[6] Warwick & Stratford-on-Avon District Councils – South Warwickshire Climate Action Support
[7] Average all homes, all quarters since 2013 (when current building regulations on carbon were introduced). MHCLG Live EPC Tables, NB7
[8] Study of the energy performance gap in UK low energy housing. ECEEE.org

1. Minimum improvements per stage of the energy hierarchy

The energy hierarchy is the principle that certain first steps should be taken to reduce energy use and carbon emissions, before other steps are taken, in order to get the best overall long-term outcome.

The energy hierarchy is usually expressed as follows:

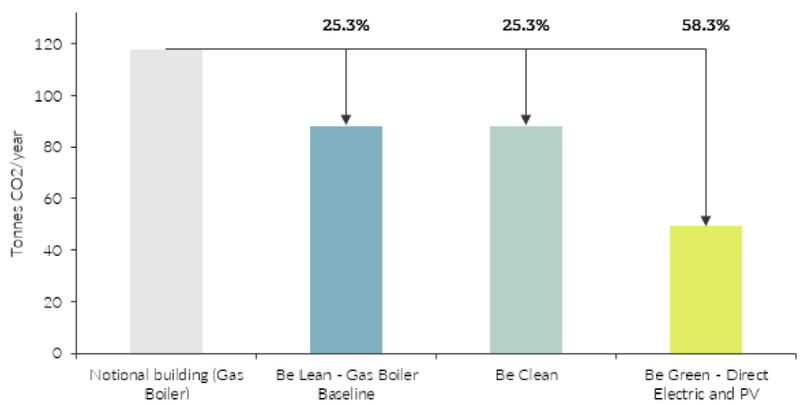
1. Reduce energy demand (also known as 'be lean')
2. Supply energy efficiently (also known as 'be clean')
3. Supply renewable energy (also known as 'be green').

The logic is that if energy demand is minimised first, this reduces not only the burden that the new building places on our limited fuel and energy resources, but also the amount of new equipment needed to generate and distribute energy to meet that demand. This reduces the amount of energy, materials, carbon and cost involved in producing and installing that equipment (and saves ongoing energy bill costs for occupants).

A policy requiring specific minimum improvements in each stage of the energy hierarchy makes the developer demonstrate that they have really applied the energy hierarchy before resorting to offsets to reach zero carbon. Local plans usually express this as a requirement for the developer to show that they have made a minimum percentage improvement in the building's carbon emissions rate through measures taken at each stage. For example[9], a 10% reduction to be achieved by reducing energy demand; a 5% reduction by supplying energy efficiently, and a 20% reduction achieved by adding renewable energy. These figures sit within a wider requirement for an overall percentage reduction in carbon emissions from all measures.

In precedent local plan policies, these reductions are made against a baseline carbon emissions rate set by the current building regulations (Part L 2013 target emissions rate, 'TER'). The percentages could be set according to demonstrable industry best practice, or future new standards announced by government, or they could echo other existing local plans which can be presumed feasible having been inspected and adopted.

Policy compliance is demonstrated in an energy statement submitted with the planning application. An example below is from the real energy statement for a recent application in Cambridge for a block of flats that firstly achieves a 25.3% emissions reduction by upgrading building fabric to a level close to the Future Homes Standard. It then reaches a total 58.3% reduction by changing gas boilers to direct electric heating and adding solar panels. No savings are achieved at 'be clean' stage as no local heat network was present.



[9] These percentage figures are illustrative only, but are within a reasonable range of achievable reductions

The required reduction percentages against the building regulations baseline would need to be adjusted to reflect imminent changes to Part L of the building regulations (which will happen in mid-2022 and 2025).

Alternatively, requirements under Step 3 can instead be expressed as 'include enough renewable energy generation on site to meet a certain *% of the building's own energy demand*' (rather than a *reduction in emissions*). This is known as a 'Merton Rule'. This can apply to regulated energy only (i.e. permanent energy uses such as heat, light, ventilation, hot water, fans, pumps) but sometimes covers unregulated energy too (plugin appliances). This is enabled by powers granted to local authorities by the Planning & Energy Act 2008.

Some local authorities break down the steps further. These breakdowns have variously included:

1. Reduce energy demand by:
   - 1.1. Optimising the building's form (for compactness – reducing the surface area through which heat can be lost) and orientation and glazing (to get free light and warmth from the sun)
   - 1.2. Upgrade the fabric of the building (so it is better insulated in walls, roofs, floors, windows)
   - 1.3. Improving air tightness (to avoid heat leaks) and using energy-efficient ventilation (which can either be passive by opening windows, or mechanical with heat recovery)
   - 1.4. Use efficient building services (ventilation, space and water heating, lighting, cooling)
   - 1.5. Managing demand to reduce peaks, such as with energy storage or smart controls.
2. Supply energy efficiently – usually this covers one or more of the following:
   - 2.1. Exploiting locally available waste heat sources
   - 2.2. Connecting to an existing heat distribution network that is able to achieve economies of scale from the heat supply that it uses (if there is such a network present).
3. Meet the energy requirements with renewable energy:
   - 3.1. Add renewables on site to meet as much as possible of the building's energy demand, which can also include energy storage (batteries or thermal stores) to bridge the time gap between renewable energy is generated and when it is needed for use
   - 3.2. Use renewable energy supply from off-site to meet any remaining energy demand.

We have not found any local plan precedents that break down the required percentage carbon reductions across these finer-scale measures – presumably because not all measures are applicable to every site, and because this could introduce unnecessary complexity and inflexibility. The fine-grained steps are intended more as guidance for the developer, who can show compliance through narrative in their energy statement.

The pages overleaf explore how specific percentages have been set and justified in other local plans. However: even without in-depth local analysis, it is justified and feasible to require a certain amount of on-site carbon reductions before letting developers meet the net zero carbon requirement by offsetting. The key evidence is that the government's Future Homes Standard consultation response notes a **31% reduction** in carbon emissions (compared to the current Part L baseline) is **already feasible and viable on a national scale** (via a mix of energy efficiency and renewable energy onsite). Government confirmed on 19/01/2021 that this 31% improvement will be enforced in building regulations in 2022, perhaps before the Warwick DPD.

Crucially: We should not be designing and building homes that will need retrofitting later to be fit for the UK's legally binding net zero carbon future. Analysis by expert quantity surveyors Currie & Brown (on behalf of the Committee on Climate Change) found that **retrofitting a house with the necessary insulation and low carbon heating** (to be fit for a net zero carbon future) is **five times more expensive** than simply building to those standards in the first place. There is no reason why such an inflated cost should be borne by homeowners when it is much easier, feasible and viable to include such measures in construction today.

Recommended draft policy wording for overarching net zero carbon policy and energy hierarchy (NZC1)

Policy NZC1: Achieving Net Zero Carbon Development

- "New development should achieve net zero operational regulated carbon emissions by implementing the energy hierarchy. To demonstrate application of the energy hierarchy, developments must submit an Energy Statement as follows:
    - In homes, a minimum 63% reduction in carbon emissions is achieved by on-site measures, as compared to the baseline emission rate set by Building Regulations Part L 2021 (SAP 10.2)
    - In nondomestic buildings, achieve at least a 35% reduction in carbon emissions through on-site measures compared to the rate set by Building Regulations 2013 (or equivalent percentage reduction on Building Regulations 2021)
    - In all new buildings, demonstrate use of the energy hierarchy through compliance with the energy efficiency and renewable energy provisions set by other policies within this DPD (policy NZC2(A) & (B)) and by presenting the carbon savings achieved across each step of the energy hierarchy (demand reduction, efficient supply, renewable and other low-carbon technology).
- … unless demonstrably unviable (shown through open-book accounting) or demonstrably unfeasible due to site-specific issues. Where full compliance is not feasible/viable, proposals must pursue carbon reductions to the greatest extent feasible and viable, and must still submit an energy statement demonstrating this. Where there are such constraints, proposals are expected to implement fabric energy efficiency and low carbon heating (not gas) before moving on to renewable electricity generation or offsetting.
- This carbon reduction should be calculated using the most up-to-date version of SAP or SBEM as applicable to building type. The developer must also show that the three steps the energy hierarchy have been considered holistically …" *[continue with existing draft DPD wording thereafter]*
- The achievement of required carbon reductions will be set as a condition, which will be discharged on provision of as-built SAP calculations identical to those submitted to Building Control for legal compliance.
- "The requirement for a demonstrable onsite 63% reduction on building regulations Part L 2021 will be waived if the development can be demonstrated to meet the Passivhaus standard with accompanying PHPP calculations submitted within the energy statement, and does not use fossil fuels on site including gas. A condition will be applied that the finished building must be shown to meet this standard. If the completed building fails to meet the conditioned standard, the developer must take reasonable remediation measures to still meet the 63% reduction on Part L 2021 based on BRUKL data for the completed building."
- "New development will be expected to offset all remaining carbon emissions (over the course of 30 years) to zero in accordance with policy NZC2(D). Offsetting will only be considered an acceptable solution to net zero carbon requirements after the initial above reductions are achieved via on-site measures (and near-site renewables) unless the onsite reduction is demonstrably unfeasible or unviable."
- Supporting text should *explain how the percentage was set (e.g. to reflect the national Future Homes Standard).*

The total onsite emissions reduction percentage against 2013 building regulations baseline could be set on any of the following bases:

TOTAL minimum carbon reduction on Part L 2013 through onsite measures	**Justification**
Recommended option: 75% (in homes) (Equivalent: 63% reduction on Part L 2021 with SAP10.2)	Approximate percentage carbon reduction estimated (BEIS) to be delivered by the incoming Future Homes Standard uplift to building regulations, which will be in force nationally from 2025. Demonstrably feasible in Warwick through local case study Gallows Hill council housing scheme (77-80% reduction on Part L 2013). By the time this policy is in place, Part L 2021 (with SAP10.2) will be in force for building control purposes. To avoid requiring developers to make two calculations (one for Part L 2013/SAP2012, and one for Part L 2021/SAP10.2), and to ensure the policy remains enforceable, it makes sense to set Part L 2021 as the baseline. Using a compound percentage based on government statements about the carbon reductions that will be achieved in 2021 and 2025 compared to 2013: • If Part L 2021 is a 31% reduction on Part L 2013, • and the Future Homes Standard is a 75% reduction on Part L 2013, • then the FHS is a 63.8% reduction on Part L 2021. • Rounded down to 63% so as not to exceed the requirements of the Future Homes Standard and thus remain within the national policy approach.
41% in major residential proposals	Demonstrably feasible, representing the average total emissions reduction in recent Milton Keynes applications based on BRUKL analysis (see precedent). Not recommended because it is based on existing standard best practice, and therefore it will not deliver much difference on carbon and energy (certainly insufficient to align with WDC's overarching carbon targets or national commitment to Paris Agreement).
Recommended option for non-residential 35% in all major development	This precedent, delivering 35% reduction on part L for all major developments from the London Plan (a different context) has been demonstrably feasible for several years prior to the adoption of the plan; 2013-2017)
Custom % reflecting typical existing best practice in Warwick	BRUKL/SAP analysis of recent successful applications in Warwick DC (energy statements, or building control) thus demonstrably feasible locally. Not recommended because it will not deliver much difference on carbon and energy savings compared to existing standard best practice, therefore insufficient to deliver the required carbon savings to meet climate commitments at local or national levels.
Custom % reflecting Passivhaus assumptions in South Warwickshire climate action plan evidence base	Anthesis/SCATTER report is the source of the 2030 55% reduction target for overall emissions, adopted by Warwick DC Climate Change Action Program. SCATTER reflects carbon budget for the Paris Agreement & overall net zero carbon transition. This would require an energy specialist to model how Passivhaus standard would translate into savings on Building Regulations 2013 for new builds in Warwick, as Passivhaus and Part L/SAP work very differently. Additionally the NPPF para. 154 requires local requirements for the sustainability of buildings to reflect the Government's policy for national technical standards i.e. Future Homes Standard. Not recommended for this DPD due to the required timeline for adoption.

Reducing Energy Demand / Improving Energy Efficiency

In order to achieve the UK Government's target of net zero carbon by 2050, we must reduce our total energy consumption as well as meeting the remaining energy demand with expanded renewable generation. In the country's transition to net zero carbon, increased demand will be placed on the electricity grid as fuel sources are switched to electricity (e.g. electrification of heat in existing buildings as well as new buildings, and EV charging). Upgrading the electricity grid and expanding renewable generation is already a huge but necessary challenge, involving a great deal of national cost and embodied carbon to produce that infrastructure. It is therefore vital to minimise the additional burden that new buildings place on our energy infrastructure.

Improving the energy efficiency of new homes (minimising their energy demand) is a very cost-effective way to minimise the new infrastructure that will be required to support them in a future zero-carbon energy system. New homes should therefore target reductions in energy demand to reduce the amount of total energy that must be supplied, both from the electricity grid and from other renewable energy sources. Put simply, optimising the efficiency of the building fabric is the starting point for the whole net zero journey.

As previously mentioned, it is crucial to minimise carbon emissions from new homes if the Government's net zero emission target is to be met. Given the urgency and the timing of the DPD we think that a thermal performance target exceeding current national standards should be explored and implemented.

It is critical to set higher fabric energy efficiency standards to ensure buildings do not need to be retrofitted expensively at a later date (e.g. if the Government proceeds with the recent Committee on Climate Change proposal that no home should be able to be sold unless it reaches EPC Band C by 2028). Fabric efficiency (insulation and airtightness) is particularly pertinent for housing schemes that use heat pumps and MVHR, as these will require highly insulated and draught-proofed buildings to operate efficiently. The previously referenced costs report also found that if a very high of thermal efficiency is reached, the whole construction can become more cost-effective because the developer can then save money on smaller-sized heating systems (pipes, radiators, heat pumps, etc.).

A further final justification for including a minimum improvement on energy efficiency is that it helps with the social needs of affordable living, fuel poverty and healthy homes. An energy-efficient home saves energy bill costs for the home occupiers and also often helps make the home interior more comfortable and conducive to good health (warmer, less draughty, and with less condensation on cold spots on walls or windows thus reducing the chance of respiratory harm from mould growth).

How can we set and justify requirements for improvement at the *energy efficiency* stage of the hierarchy?

The Planning and Energy Act 2008 grants Local Planning Authorities the power to require "energy efficiency standards that exceed the energy requirements of building regulations". It defines "energy efficiency requirements" as standards that are endorsed by national regulations, national policies, or guidance issued by the secretary of state. It defines 'energy requirements' as regulated energy only (the energy affected by Part L of building regulations – this does not include plug-in appliances).

Precedent adopted plans generally require a **carbon saving to be achieved through energy efficiency** ranging from circa 5-15% against the emissions rate set by Building Regulations Part L 2013. In the precedents we have examined, these percentages were set according to the typical 'best practice' already being achieved in recent local new developments, based on energy statements submitted with proposals.

An **alternative** would be a percentage improvement on the **'Target fabric energy efficiency' (TFEE)** set by Part L and SAP. This TFEE limits how much energy per m^2 that a home should need, which varies depending on the shape, location and orientation of the building. New homes must not exceed the TFEE as a basic legal requirement. An improvement on the TFEE would demonstrate effort at this stage of energy hierarchy.

Justifying local plan energy efficiency requirements

The first precedent we are aware of is the **New London Plan**. A topic paper on energy efficiency (within the New London Plan evidence base) explains the evidence that justified how this was set.

London's requirement for a total 35% reduction in carbon emissions in major developments had been in place since 2013. However, the Greater London Authority (GLA) knew that not much of this was currently being delivered through energy demand reduction (instead, developers were showing the reduction through energy supply, expedited by grid carbon reductions). In 2017 the GLA commissioned engineers Buro Happold to study the carbon savings achieved through energy efficiency across major developments' energy statements submitted to the GLA in 2013-2017 to understand what was already possible with best practice. It found that:

- The **average** carbon saving achieved from energy efficiency alone was only 3.5% (in homes), 11.6% (in non-residential) or 6.3% (in mixed-use schemes) – this evidenced a need to raise the ambition
    - But much **higher performance was achieved in many cases** (37% of new home projects achieved at least a 5% reduction, and 13% achieved a 10% reduction)
- For **homes**, the following achievements were possible and could be considered for target-setting:
    - a target of **5% reduction was generally achievable** without significant technical changes
    - a target of **10% was technically achievable** and would help lock in long-term carbon reductions, rather than relying on shorter-life heat generation technologies
- For **non-domestic** buildings, a target of **15% is technically achievable** in many cases, but there is **significant variance** across non-domestic building types.

Engineers AECOM were then commissioned to conduct a detailed evaluation of the implications of achieving an energy efficiency target of this sort for a set of typical domestic and nondomestic development types. For each development type, AECOM explored what savings could be reasonably made through fabric, energy services, and a combination of the two. It found that:

- For **homes**, energy efficiency carbon savings of **10% could be achieved in all three development types simply with the then-current best practice**, except in tall buildings with a lot of glazing which might need to be triple-glazed to achieve the 10% target
- In **non-domestic schemes**, a **15% target was easily achieved by air-conditioned offices**, while a school would fall just short of the target. Hotels fell significantly short of the target, due to hot water.
- Viability testing found that the costs of achieving the **10% (domestic)** and **15% (nondomestic)** via energy efficiency measures alone were **viable for most development** types in London.

The New London Plan therefore adopts these 10% and 15% targets. Flexibility is maintained in that the topic paper states "The GLA will consider this on a **case-by-case basis in particular for specific non-domestic typologies**, like hotels, that can clearly demonstrate how and why this target cannot be met" – and that greater reductions will be expected in typologies that should be able to achieve it, e.g. offices.

London energy guidance requires that the carbon savings at the energy efficiency stage are calculated "excluding the proposed heating system and renewable energy". This means the energy savings achieved by fabric, efficient lighting and other efficient services will be clearly revealed – and that the developer cannot conceal an inefficient 'leaky' building just by including low-carbon heat or renewables.

Recognising that the London setting is different to other regions, a non-London precedent is explored next.

Milton Keynes Local Plan (adopted 2019) includes a requirement for a reduction of **19% on the building regulations carbon emission rate**, followed by a ***further*** **reduction of 20% through the use of renewable energy** and low/zero carbon technologies.

The latter 20% would fall under step 3 of the energy hierarchy ('be green'), implying that the **first 19% must be achieved through the first two steps of the hierarchy (reducing energy demand, and supplying energy efficiently)[10].** Milton Keynes draft Sustainable Construction Supplementary Planning Document 2020 explains why the overall requirement is considered to be feasible:

> "We do not anticipate that the requirement to exceed the TER[11] by 19% will be unduly onerous for developers, as our analysis of BRUKL[12] data for consented schemes in Milton Keynes indicates that on average an improvement of 41% over the TER is already being achieved at the design stage."

The SPD does not clarify the period of planning application years within which 41% was the average achievement. It also refrains from explaining how that average 41% reduction was split across energy efficiency measures, and renewable/low-carbon energy measures. Therefore it remains unspecified exactly how the split of 19% and 20% were set (at least in the documents where we might expect this evidence to appear[13]) - but it is likely that the different percentages for two different parts of the energy hierarchy might reflect an overall pattern identified in Milton Keynes' aforementioned BRUKL analysis.

The Milton Keynes whole-plan viability testing study did not differentiate between the costs of energy efficiency and renewables. Instead it applied a blanket £cost per m^2 of development to cover the overall policy requirements on carbon, plus an average cost for offsetting (presumably based on experience from MK's longstanding requirements for carbon offset payments by new development). It found that with the full suite of local plan policies (including carbon policies), **most residential development types in Milton Keynes will remain viable** and many have a significant cushion above the viability threshold.

The overall viability picture for non-residential development types was more mixed, reflecting not only the policies in the MK Plan but general economic conditions across the borough and England: large-scale office developments were viable and were coming forward, whereas smaller non-residential developments and industrial schemes were not. Schemes that were coming forward were usually existing businesses seeking to expand or relocate, not property developers seeking to make a return. As a final point, the MK viability study also notes that "building to higher standards that result in lower running costs does result in higher values"[14].

How can our energy efficiency policy remain effective after changes to building regulations?

By the time the Warwick DPD is adopted, the new "Part L 2021/22" of the Building Regulations will apply. This includes improvements to fabric which will change the 'target fabric energy efficiency' that all new homes must legally achieve. Part L 2021 will also come with a new version of SAP (SAP10.2) for homes which will apply much lower carbon factors to electricity. If we set our requirement as a carbon % reduction on Part L 2013 borrowed from existing local plan precedents, developers may be able to 'comply' without making any actual energy efficiency improvements on the basic legal minimum they must do for Part L 2021/SAP10.2. For homes, it therefore is **more effective to seek an improvement against the new TFEE of Part L 2021**. We suggest this improvement should reflect the 2025 Future Homes Standard notional building fabric (based on % change to fabric values between the 2021 and the 2025 specifications). This can be viability assessed using nationally stated cost uplifts for this fabric. Unfortunately, for non-residential buildings no such information is yet available on 2025 fabric or the costs to achieve this (and non-residential has no TFEE).

Therefore: What level of carbon reduction could Warwick Net Zero DPD require through energy efficiency?

Percentage reduction on Part L 2013 through energy efficiency (demand reduction and efficient supply)	Justification
10% in homes 15% in nondomestic buildings (except hotels and schools, to be considered case-by-case)	Shown to be feasible and viable across London in 2013–2017 via BRUKL analysis of consented schemes; adopted as minimum policy across London. Although London's viability is different from Warwick, this performance was achieved several years ago and should have disseminated to other regions via ongoing industry advances. Not recommended as Part L 2013 baseline is about to become obsolete in 2022.
19% in major residential proposals	Shown to be feasible in Milton Keynes through analysis of recent consented schemes' energy statements; evidently acceptable in planning terms being part of the requirements of the adopted MK local plan. As above, 2013 baseline soon obsolete.
Custom % reflecting typical best practice in Warwick	BRUKL and/or SAP analysis of recent successful applications in Warwick DC (energy statements, or building control) thus demonstrably feasible locally. Not recommended as this will not deliver much improvement on existing practice.
Custom % reflecting Passivhaus assumptions in South Warwickshire climate action plan evidence base	Anthesis/SCATTER report is the source of the 2030 55% reduction target adopted by Warwick DC Climate Change Action Program. Relies on Passivhaus. SCATTER trajectory reflects Paris Agreement & overall net zero carbon transition. Additionally the NPPF para. 154 requires local requirements for the sustainability of buildings to reflect the Government's policy for national technical standards i.e. Future Homes Standard Not recommended as this would take time not available in the required timescale for DPD adoption.

If the planning policy is designed to achieve Warwick's Anthesis/SCATTER trajectory, the policy must not err towards the lower reductions in the table above. Warwick's Anthesis/SCATTER trajectory depends on new homes being built to Passivhaus standard. A reduction on the building regulations baseline has not been calculated, but would be much more than the percentages in London and Milton Keynes. Anthesis notes that Passivhaus heat demand is 90% less than typical buildings, but other energy uses may not be much different.

Recommended option	Justification
Homes: 10% improvement on the Target Fabric Energy Efficiency Rate set by Part L 2021 / SAP10.2 Non-residential buildings: Energy efficiency measures (fabric and supply) to achieve a 19% reduction in carbon emissions compared to Part L 2013 or equivalent reduction on Part L 2021.	The overall NZC1 policy approach is based on reaching for the Future Homes Standard 2025, and the new national baseline will be the new Part L 2021. This 10% figure for homes represents the approximate difference in fabric (average of all building element U-Values and airtightness) between Part L 2021 and Future Homes Standard 2025 as outlined in the Government's FHS consultation response. Unfortunately the 2025 figures for *non-residential* buildings have not been released and therefore no equivalent percentage can be calculated at present. Our recommended requirement for non-residential buildings therefore falls back on what has been demonstrably feasible and viable in Milton Keynes.

[10] This is within reason. Bioregional recently worked on a mixed-use planning application in Milton Keynes whose homes achieved a carbon emissions reduction of approximately 26% using energy efficiency measures only. For the non-residential parts of the scheme this figure was 25%. The scheme then adds renewable/low carbon measures to achieve a further 20% site-wide carbon emissions reduction. The site-wide total carbon emissions reduction is 51.39%. Homes were flatted blocks. Non-residential spaces were office, retail and gym.
[11] Building regulations Target Emission Rate for carbon dioxide
[12] BRUKL is Building Regulations UK Part L: the energy data that must always be submitted in order to pass building control.
[13] Documents reviewed: sustainability appraisals, Imagine MK 2050 strategy, whole plan viability assessment, MK Futures Working Paper 17 (low carbon city), and Topic Paper on Climate & Sustainability. Link to evidence base.
[14] Citing a 2013 DECC study which found that per square metre, "compared to dwellings rated EPC G, dwellings rated EPC F and E sold for approximately 6% [more], dwellings rated D sold for 8% more and dwellings rated EPC band C for 10% and A/ B sold for 14% more". "The price effects … tend to be higher for terraced dwellings and flats [versus] detached and semi-detached dwellings" and "the percentage premium commanded by [energy-efficient] properties … is higher in regions where house price levels are low" because "similar energy [cost] savings across regions had quite different relative effects on house prices".

Recommended policy wording for energy hierarchy – step 1+2, energy efficiency

Policy NZC2(A) Making buildings energy efficient:

- "New build residential proposals are expected to demonstrate a 10% improvement on the Part L 2021 Target for Fabric Energy Efficiency (set by SAP10.2)
- New build non-residential development proposals are expected to demonstrate that they achieve a 19% reduction in carbon emissions compared to Part L 2013 through energy efficiency measures (fabric efficiency, efficient services and efficient energy supply; steps 1 and 2 of the energy hierarchy).
- Proposals that do not meet these requirements will not be accepted unless it is demonstrably non-feasible due to building use class, or demonstrably unviable with open book accounting. All energy statements must also lay out the U-values and airtightness of the proposed building in comparison to the notional values in the Future Homes Standard or Future Building Standard (indicative specification, or final, as available at time of application)."

Supporting text: The 10% improvement in homes is set to reflect the approximate uplift to building fabric (U-values and airtightness) between Part L 2021 and the indicative Future Homes Standard 2025. There is national government estimated cost data on the achievement of these fabric measures, which is being / has been taken into account in the whole-plan viability assessment. Only hotels and schools are likely to struggle to achieve the 19% carbon reduction from energy efficiency measures, due to high peak hot water demand. Hotels and schools will therefore be assessed on a case-by-case basis and differentiated benchmarks may be set in future supplementary planning documents, based on aggregation of energy statements submitted to the planning department in coming years.

Low/Zero Carbon Energy Supply

Following the energy hierarchy, it is important to decarbonise energy supply: both electricity and heat. This is critical, as the CCC 2019 report ('UK housing: Fit for the future') highlighted the importance of grid decarbonisation in the trajectory towards net zero. Onsite renewable generation supports this in two ways. First, it drives investment in additional renewable electricity, and second, it can simultaneously reduce peak and annual demand on the grid.

Reductions in carbon emissions thanks to renewable and low-carbon energy supply can be expressed as:

- A further percentage reduction in carbon emissions against the building regulations baseline, in addition to the percentage achieved through fabric (*see precedent from Milton Keynes*), **or**
- A 'Merton Rule'[15]; where the proposal must include renewable energy generation equipment on-site or near-site, sufficient to meet a certain proportion of the building's own energy demand (see precedents below from Solihull and Oxford). This can be total energy, or regulated energy only.

The value of onsite generation has long been recognised in local planning policy, but has not been without its critics. The prescriptive nature of these type of policies are sometime not applicable for all and can occasionally lead to the installation of inefficient onsite renewables. Some sites may not be able to meet the requirement if it is set very high, such as if they are overshadowed (and therefore solar panels would not work well), or if it is a tall building where there is a larger amount of internal floor space demanding energy and a relatively smaller roof space for solar panels.

We would therefore recommend including enough flexibility to accommodate unique site constraints, whilst still seeking an ambitious amount of appropriate onsite LZC technologies in all proposals where this is feasible. As shown in the precedents below, there is a growing number of adopted policies that include specific targets for onsite renewable generation towards net zero target. However, in practice these policies are often applied flexibly where the developer is able to show how and why it was not possible to meet the required metric and that they have nevertheless pursued renewable energy measures to the greatest reasonable and practical extent. (See Oxford precedent, below).

It will be necessary to define the types of measures that will count as 'renewable / low and zero carbon technologies'. Some technologies, such as solar PV panels, solar thermal and turbines, clearly do count. Some other technologies – in particular heat pumps – may need clarification to help the developer understand where to count these in their energy statement.

Heat pumps are not zero carbon – they still use mains electricity to run. But they can be a low carbon heating system provided they run at high efficiency (they can deliver about three times as much heat energy as they consume in electrical energy, because they work by taking ambient heat from outdoor air, rather than creating it – therefore there is a renewable element to the heat they deliver). To achieve this level of efficiency, they need to provide heat at a relatively low temperature. A developer is more likely to be able to do this if the heat pump is used in combination with improved thermal efficiency and reduced air permeability. (Read more)

The developer could make the heat pump zero carbon by supplying its electricity from a renewable source such as rooftop solar panels, so long as they are generating the renewable electricity at the same time the heat pump is running or if the building can store the solar electricity in a battery for later use. You will need less energy from your solar panels to run your 300% efficient heat pump, compared to using your solar panels to run direct electric heating which can only ever be 100% efficient – therefore you don't need as many solar panels, resulting in savings in embodied carbon.

Carbon savings from heat pumps are usually treated in planning guidance as a step that should be included under the same step of the energy hierarchy as renewables – that is Step 3/'Be Green'. For example, London Plan energy guidance asks that heat pumps be accounted for as a Step 3 measure, unless they are powering a heat network, in which case all heat from the heat network would be a Step 2 ('be clean') measure.

Counting heat pumps as a Step 3 / 'be green' measure' gives more flexibility in options for buildings to achieve carbon reductions at this stage even if the building is not suitable for solar panels due to shadow or orientation.

However, a heat pump is already part of the specification for the notional building in Part L 2025 (Future Homes Standard) and therefore it is expected that developers will need to already use a heat pump (or near-zero-carbon heat network connection) to achieve the overall 63% reduction stated in draft policy NZC1.

For this reason, the policy wording below also refers to *additional* renewable energy that is deployed after the initial 63% reduction has been achieved.

[15] The original Merton Rule (introduced in 2003) required only 10%, but more recently adopted and emerging local plans aim higher.

What is the justification for requiring a certain percentage improvement at the *renewable and low carbon* stage of the energy hierarchy?

If our requirement is *expressed as a reduction in carbon emissions* compared to the building regulations baseline, this is supported by local plan precedents for requiring up to a 20% reduction to be achieved by low and zero carbon energy technologies (Milton Keynes; Oxford). In Milton Keynes, this is on top of a 19% reduction that should be achieved before the renewable and low/zero-carbon technologies were added.

As noted under 'energy efficiency' section above, neither the Milton Keynes local plan evidence base nor the accompanying SPD makes it clear how the 20% reduction via renewables was set and justified. However, the SPD notes that the council analysed the energy and carbon calculations (BRUKL) made by recent consented schemes within Milton Keynes and found that there was an average *total 41%* reduction in carbon compared to the building regulations baseline (we assume this means total reduction across all energy measures). It logically follows that the figure of 20% carbon reduction from renewables is likely to have been set according to the average contribution of renewable energy measures toward that average total 41% carbon reduction.

If our requirement is *expressed as a percentage of energy demand to be met with renewables*, this can be supported by other recent local plan precedents ranging from 15 to 20% (see precedents: Solihull and Oxford).

Oxford's 2020-2036 adopted local plan requires a 40% onsite carbon reduction in total which can be achieved through any range of onsite measures for efficiency and/or renewable energy. It explains that if this were entirely achieved with renewables, it would translate to renewable energy generation equivalent to approximately **25%** of the building's energy demand (although it is not obligatory that the developer delivers all the savings only through renewable/low-carbon energy). The evidence base documents also show that:

- The previous Oxford Local Plan already included a requirement for developments* to meet 20% of their energy needs on site with low and zero carbon energy generation (e.g. renewables) (*major developments only, i.e. 10+ homes or 2000m^2+ non-residential space)
- The **previous requirement for 20% onsite renewable/low-carbon energy is demonstrably feasible** in that it was almost always met or exceeded in successful planning applications between 2014 – 2016. Of 36 proposals in which the requirement would apply, most developments achieved a figure of 20-25%; several achieved 30-40% and one achieved 53%. Only one relevant proposal failed to meet the requirement, but was still accepted because it explained clearly why it could not do so, and still provided 10% by pursuing the low/zero carbon energy measures that were feasible and viable.

The current overall 40% carbon reduction requirement (rising to 50% from 2026 and 100% in 2030) was not challenged by the inspector's report other than to request clarification of the baseline. As a further precedent, South Oxfordshire's local plan (adopted 2020) includes identical requirements. Oxford's evidence base[16] does not explain how the specific figure of 40% carbon reduction was selected in the current Local Plan, nor how the previous local plan's requirement for 20% renewable energy was selected. However, the lack of challenge by the inspector indicates that no further justification was needed in planning terms.

Recommended policy wording for energy hierarchy – step 3, renewables and low/zero carbon energy technology

Policy NZC2(B+C) Zero or Low Carbon Energy Sources and Zero Carbon Ready Technology

- "Proposals for new development must include an energy statement which should demonstrate that additional renewable, zero and low carbon energy technologies have been provided on-site* sufficient to **match the remainder of the building's annual regulated energy needs,** subsequent to the achievement of the 63% reduction detailed in Policy NZC1. (*or near-site if directly serving the development).
    - If this requirement cannot be met, the reasons must be robustly demonstrated in the energy statement, utilities statement or open-book viability assessment as relevant. The energy statement must still show how such technologies have been incorporated as far as feasible and viable.
    - Proposals for new development heated by on-site fossil fuels will not be considered acceptable.
    - Proposals incorporating onsite heat technologies claimed to be 'zero carbon ready' (as opposed to immediately 'low/zero carbon' technologies) will only be accepted where that technology is already available and its transition to zero carbon is based on realistic current projections of the time period in which its carbon will be eliminated. 'Zero carbon ready' heat technologies that rely on speculative future technological advances and use onsite fossil fuels meanwhile, will not be accepted."

In supporting text:

- This policy is written with the view that it is likely that heat pumps or near-zero-carbon heat networks will have already been deployed in the design to achieve the required initial 63% carbon reduction against Part L 2021. The policy therefore aims to encourage on-site or near-site renewable electricity generation. Warwick District Council recognises that not all sites will be suitable for large-scale wind and solar for reasons of grid constraints, shadow or heritage, in which case off-site renewables, partial compliance, or offsetting under NZC2(D) can be acceptable.
- The wording regarding 'zero carbon ready' technologies is designed to avoid relying on gas boilers that are marketed as 'hydrogen-ready' but will use fossil fuel gas for the foreseeable future. This should be avoided because there is no robust national or local timeline for transitioning the gas system onto hydrogen or other green gas at the time of writing, and current hydrogen production technology is vastly inefficient (taking multiple units of electricity to produce each unit of hydrogen). It therefore is prudent to simply use the electricity as it is, rather than converting it to hydrogen.
- Currently, the only proven heating technology with a realistic and time-bound projected transition to zero carbon is electricity, whether direct electric or heat pumps. This has a clear trajectory to zero carbon in the form of the national Treasury Green Book projections on electricity grid carbon.
- Nevertheless, the policy wording is designed to be flexible towards future technological innovation, for example if a low-carbon, non-wasteful way to produce hydrogen is developed, along with a realistic national timeline for converting the gas system away from fossil fuels.

The requirement above is designed to encourage developers to include enough solar panels (or connection to a renewable electricity scheme) to bring the development's regulated carbon emissions to zero on site. Flexibility is offered by recognising site-specific constraints and permitting off-site solutions or offsetting. Bioregional has supplied cost uplift data to WDC and its viability consultant showing that the costs of on-site solar panels would be comparable to the cost to offset a typical home's carbon over 30 years.

[16] Documents reviewed: Local Plan to 2036; Sustainability Appraisal (final); Energy Conservation Act Report; Background Paper 4 (Carbon, Climate Change and Fuel Poverty); Inspector's Report; Technical Advice Note 2 – Energy Statements (2013); Technical Advice Note 14 – Sustainable Design & Construction (June 2021); Sustainability Strategy 2011-2020; previous Local Plan 2001-2016; Supplementary Planning Document on Natural Resource Impact Analysis (2006); Carbon Reduction Topic Paper (for next emerging local plan to 2040.

Precedents

Sutton Local Plan (adopted 2018) Policy 31

All proposed development must apply the Mayor's energy hierarchy in the following order:

1. being built to 'the highest standards of energy efficient design and layout',
2. supplying energy efficiently (low or zero-carbon heat networks and cooling networks),
3. using on-site renewable energy to achieve a reduction in total CO^2 emissions (regulated and unregulated) of 20% in major developments or 10% in minor developments.

Solihull Metropolitan Borough Council – Solihull Local Plan: Draft Submission Plan 2020

At a site level, development must apply the 'energy hierarchy' to reduce energy demand for heating, lighting and cooling and minimise carbon dioxide emissions as follows:

- All new dwellings to achieve 30% reduction in energy demand/carbon reduction improvement over and above the requirements of Building Regulations Part L (2013) at the time of commencement up to March 2025.
- From April 2025 for all new dwellings to be net zero carbon.
- Minor non-residential development will conform to at least BREEAM Very Good and major non-residential development will conform to at least BREEAM Excellent.
- Provide at least 15% of energy from renewable and/or low carbon sources for all major housing developments and non-residential developments of 1000sqm or more

Oxford City Council – Local Plan 2036 ADOPTED (link)

Policy RE1: Sustainable design and construction

Planning permission will only be granted where it can be demonstrated that the following sustainable design and construction principles have been incorporated, where relevant:

- Maximising energy efficiency and the use of low carbon energy.
- Energy Statements: An Energy Statement will be submitted to demonstrate compliance with this policy for new-build residential developments (other than householder applications) and new-build non-residential schemes over 1,000 m^2. The Energy Statement will include details as to how the policy will be complied with and monitored
- Carbon reduction in new-build residential developments (other than householder applications): Planning permission will only be granted for development proposals for new build residential dwelling houses or 1,000 m^2 or more of C2 (including student accommodation), C4 HMO or Sui Generis HMO floorspace which achieve at least a 40% reduction in carbon emissions from a 2013 Building Regulations (or future equivalent legislation) compliant base case. [*This increases to a 50% reduction from 2026, and zero carbon from 2030*.]
- [*The same reductions are also required in non-residential proposals of 1,000m^2 or more, but without the rise to zero carbon from 2030*.]
- This reduction is to be secured through on-site renewable energy and other low carbon technologies (this would broadly be equivalent to 25% of all energy used) and/ or energy efficiency measures.

Precedents cont'd

London Plan 2021 (adopted) (link)

1. Policy SI 2: Minimising Greenhouse Gas Emissions. All developments should be net zero carbon, minimising both energy use and carbon emissions using the following hierarchy: be lean, be clean, be green, be seen.
   - Within this, a minimum of 35% reductions in carbon emissions on-site must be achieved, from a baseline of Building Regulations 2013. This must include a **10% reduction achieved through energy efficiency measures** (in homes) or **15%** in non-residential developments.

Milton Keynes Local Plan 2019 (adopted) (link)

- All proposals of 11+ dwellings or non-residential space over 1,000m^2 must apply the energy hierarchy to achieve:
  - 3.1. a ≥19% reduction on Building Regulations 2013 carbon emissions,
  - 3.2. and also a ***further*** ≥20% reduction through renewables (onsite or a local network),
  - 3.3. The developer must then pay to offset remaining carbon emissions (regulated and unregulated – see 'carbon offsets' section further on in this brief).

Bristol City Council - Bristol Local Plan Review 2019 (Link)

Development will be expected to achieve:

2. A minimum 10% reduction in regulated CO_2 emissions through energy efficiency measures; and
3. A minimum 35% reduction in regulated CO_2 emissions through a combination of energy efficiency measures and on-site renewable energy generation.
4. After applying on site measures, development is expected to achieve a 100% reduction in its remaining regulated and unregulated emissions through the use of carbon offsetting as set out below.

South Cambridgeshire District Council – Adopted Local Plan 2018 (link)

Policy CC/3: Renewable and Low Carbon Energy in new developments

1. Proposals for new dwellings and new non-residential buildings of 1,000m^2 or more will be required to reduce carbon emissions by a minimum of 10% (to be calculated by reference to a baseline for the anticipated carbon emissions for the property as defined by Building Regulations) through the use of on-site renewable energy and low carbon technologies.

2. Minimising the energy performance gap, and verifying performance

The Standard Assessment Procedure (SAP) is the methodology used by the Government to assess and compare the energy and environmental performance of dwellings.

The energy efficiency of buildings has a significant part to play in achieving the Council's net zero aims, but it also carries wider benefits for consumers and the country at large. We know that, in addition to reducing CO2 emissions, energy efficient homes minimise energy bills, provide healthier and more comfortable environments to live in, and ensure that we are making the best use of energy resources which in turn will help facilitate a faster transition to low carbon energy sources for all.

As a District that can demonstrate levels of development viability that can accommodate energy efficiency measures that go beyond the 2021 Part L building regulations, Policy NZC2 requires developments to achieve building performance that is broadly consistent with national ambitions as set out in the proposed Future Homes Standard to be introduced in 2025.

To provide clarity, consistency and confidence in the way energy efficiency measures and resulting carbon reductions are incorporated and calculated in developments, developers are required to use a certified building performance standard.

To demonstrate compliance with this policy, development proposals should provide data that is consistent with the building performance metrics set out in the Government's response to the Future Homes Standard consultation. The use of these metrics will ensure consistency and clarity in the way data is collated and set out.

The UK government's future buildings strategy proposes updates to the statutory approved document Part L1A to deliver homes which emit 75-80% less CO2 in operation than the equivalent home assessed under the current 2013 Part L regulations. As an interim step within this process, an updated approved document Part L is scheduled for release in June 2022, alongside an updated calculation methodology: Standard Assessment Procedure (SAP) 10.2.

New residential developments are currently required to demonstrate compliance with Part L 2013 using SAP 2012. This is a statutory requirement. Some councils, such as the Greater London Authority, have included within their local plan additional policy requirements for homes to be assessed and achieve defined emission reductions using the SAP 10.1 methodology.

About the energy performance gap

The energy performance gap is the difference between the predictions for a designed building's energy use, and the amount of energy it actually uses in operation. This gap arises from a combination of three factors:

1. Poor methods used to predict the energy use of a building (including poor calculations, incorrect assumptions, and exclusion of 'unregulated' energy loads)
2. Errors in construction which lead to worse airtightness or thermal envelope
3. Errors in system operation, and user behaviour different to assumptions (for example, residents turning up space heating while opening windows to dry laundry or not using heat system as intended, or spending more time in the building than anticipated, or retail tenants leaving bright lighting on overnight).

Unfortunately, the calculation methods used in Building Regulations Part L (SAP and SBEM) are very poor predictors of the actual energy use of a building. SAP and SBEM are compliance tools, not really tools to predict energy and carbon performance (even though they purport to be). This is not only due to out-of-date carbon factors used for different energy sources, but the entire methodology. This is a key reason for point (1).

For this reason, recalculating SAP on completion[17] will not confirm that the building *performs* to the same metrics as in the SAP output (kWh/m^2 and CO_2/m^2), only that it is *built* as designed in terms of installed specification of insulation, heating system and renewable energy generation. The nation-wide lack of post-occupation energy monitoring means that both developers and planning/building control enforcers are often unaware of the scale of difference between SAP outputs and actual performance.

Point (2) above relates to how imperfections in the construction process can lead to worse energy performance than predicted, even if an accurate energy prediction methodology were used. For example, a building may leak a lot of heat if insulation is incorrectly installed, or if a hatch to a cold loft is put in the wrong place and has to be moved, resulting in unexpected holes in the air tightness membrane. Another risk is that lower-spec products may be used or poor substitutions made in the building – whether for cost-cutting reasons, supply difficulties, or simply because the right person was not available on site at the right time to make the decision within a set deadline.

Methods to minimise energy performance gap

There are energy modelling methods that are offer much more accurate predictions than SAP/SBEM – for example, the Passivhaus Planning Package and the CIBSE TM54 method. However, local planning may not be legally empowered to require conformance with standards set in relation to these alternative calculation methods[18]. The Local Plan may be able to **require *reporting* of energy use predictions using these methods** (subject to viability linked to the cost of the modelling itself), but it is questionable whether it would be legal to require new developments to *achieve* a certain metric using them (see UKGBC Policy Playbook for new homes, 2021).

There are also several quality assurance processes that can be applied during construction to avoid the unnecessary errors that can cause the building to perform worse than expected. Examples include:

- BEPIT (Building Energy Performance Improvement Toolkit) – a set of checks during construction that identify and remedy defects in the construction at every stage up to completion
- Passivhaus – in addition to using a much more accurate building energy modelling method, a certified Passivhaus building project undergoes a series of stages during design and construction which improve the quality of the building (in addition to post-completion testing of air tightness etc.)
- NEF/GHA Assured Performance Process™ – the APP maps to the five stages of the RIBA Plan of Work (inception through to verification) and involves expert impartial review by accredited assessor.
- Soft Landings – recommended by the UKGBC (as above) but discounted by some local planning authorities as an acceptable 'quality assurance' method (see precedent of Milton Keynes, below).

[17] As-built SAP calculations have been used by several local authorities to determine the final amount of offset payments the developer must provide, but it does not verify performance or change the energy performance gap. Relying only on SAP will always mean the developer offsets far less carbon than the building will actually emit – although it does simplify the offset decision-making and data gathering process for both LPA and developer, given that as-built SAP calculations must be submitted to building control anyway.

[18] The Planning and Energy Act 2008 paragraph 1 gives the local plan the power to impose "reasonable requirements" for new developments to: (a+b): supply a portion of their energy from renewable or low-carbon sources, and (c) have 'energy efficiency standards' that exceed national building regulations. However, the Act defines 'energy efficiency standards' as ones that are 'set out or referred to in regulations made by the [Secretary of State]' or 'set out or endorsed in national policies or guidance issued by the [Secretary of State']. This is also repeated in National Planning Policy Framework paragraph 154. The only' energy efficiency standard' currently set out or endorsed in this way is SAP/SBEM.

There may be other suitable quality assurance processes. These **must** be based on quality of energy performance, not just generic building quality. Warwick DC would need to decide whether these are acceptable based on their individual merits and evidence that they do actually reduce the performance gap (verified by track record of previous projects' post-completion testing or post-occupation energy monitoring).

The Local Plan **could require the use of these processes, subject to viability** (again relating to the cost of appointing qualified professionals to undertake these processes). **Evidence** of this could be submitted as follows:

- **Modelling methods:** evidence to be submitted within Energy Statement along with planning application, and recalculation of this if any relevant details are changed at reserved matters / amendments
- **Quality assured construction:** evidence to be submitted along with whatever other documentation is required to gain sign-off on completion from building control and discharge of planning conditions from the Local Planning Authority.
- The UKGBC (as above) recommends requiring that "a recognised performance gap / assured performance tool will be used to minimise the potential performance gap between design aspiration and the completed development. The effectiveness of measures will be reviewed and ratified as part of the post-completion discharge of conditions".

We must note that, where local plans require offsetting to 'net zero' we have not found any examples that use a non-SAP / non-SBEM method to calculate the *regulated* portion of the carbon emissions that must be offset (although several local plans also require offsetting of the *unregulated* portion using a different method – see offsetting section below).

Verifying energy performance post-completion

Post Completion certificates can be issued once Planning Conditions are discharged.

Local Authorities can condition to ensure that buildings are performing as anticipated after occupation; however, this would require engagement with the main contractor outside of their practical completion contract. Most precedents demonstrate this being delivered through an Area Action Plan and site-specific allocations.

There is debate about whether it is reasonable to hold developers accountable for carbon impacts of unregulated energy use which would be untested by design methods such as SAP and largely out of their influence in terms of: unconfirmed occupant fit-out design standards, operational hours, occupancy, third party handover delivery and ongoing post-occupancy support.

The following testing requirements are recommended prior to completion. Guiding costs are provided below as a guide for further viability analysis[19]:

- Air tightness testing ~£1000 per property
- Thermographic testing[20] ~£400 per property
- U Value testing ~£400 for a dwelling (3 weeks per property)[21]

Post-occupancy evaluation testing requirement may be used on developments which are scalable e.g. developments >c.50 dwellings, the economy of scale would reduce the cost burden where sample testing would suffice.

- Post-occupancy evaluation ~£5000[22]

Precedents – Verifying Energy Performance

UK Green Building Council, New Homes Policy Playbook (Jan 2019) .p29

"It is recommended that local authorities require developers to demonstrate that they will act to close the performance gap. This may be done through:

> Demonstration that the principles of Soft Landings will be followed, and a recognised performance gap / assured performance tool will be used to minimise the potential performance gap between design aspiration and the completed development. The effectiveness of measures will be reviewed and ratified as part of the post-completion discharge of conditions."

Mayor of London 'Be Seen' energy monitoring guidance (April 2020)

> "CIBSE TM54 analysis, which recommends using a tailored Part L model for the estimates of regulated and unregulated loads, should be undertaken and its findings should be reported in the 'be seen' spreadsheet. The CIBSE TM54 findings should therefore also be used to represent the regulated and unregulated energy requirements for non-residential uses."

[19] Communities and Local Government (2008), Performance Testing of Buildings BD 2535
[20] Thermographic surveys can only be completed during the heating season. Where building completion occurs outside of the heating season, the applicant must submit a signed commitment to perform testing at the earliest opportunity and perform remedial measures where defects are detected at own cost. Homeowners must be fully informed of this situation.
[21] Accredited construction details are to be checked through thermographic testing performed according to BS EN 13187: 1999 Thermal performance of buildings. Qualitative detection of thermal irregularities in building envelopes. Infrared method. Identified locations with deviations from expected performance are further investigated through a borescope survey and remedial works performed if practical.
[22] https://www.pollardthomasedwards.co.uk/download/PTEpost-occupancy_evaluation2015_LR.pdf

Precedents – Energy Performance Gap Policies

Milton Keynes Local Plan 2019, Policy SC1 includes that:

- All proposals of 11+ dwellings or non-residential space over 1,000m^2 must "implement a recognised quality regime, which assures that 'as built' performance (energy use, carbon emissions, indoor air quality, and overheating) matches the calculated design performance".
    - The Draft Sustainable Construction SPD explains that a 'recognised quality regime' must include (1) an appropriate metering and monitoring strategy, (2) modelling of different scenarios at design stage and issuing a performance target (which should ideally include Dynamic Simulation Modelling and must include unregulated assets and their heat gains), (3) a post-occupancy evaluation that includes a performance gap metric, and (4) suitable reporting on metrics for energy use, carbon emissions, indoor air quality and overheating risk.
    - The draft SPD (annex F) also notes that one suitable regime is BREEAM for new construction, and that several others have been ruled out (BREEAM in-use, QUANTUM, LEED, NABERS, Design for Performance, Soft Landings, Home Quality Mark, and EPCs).
- The above specified requirement for the 'quality regime' means that the developer must also test the 'as-built' performance and submit data to the council. A report is then submitted to both occupiers and to Milton Keynes Council, which states the performance gap metric and identifies any reasons for deviation from predicted energy usage, carbon emissions, indoor air quality and overheating performance, as well as specific actions that have or will be taken to reduce the gap., Ongoing energy use and carbon monitoring is submitted to the building control department for the first 5 years of occupation. The draft SPD notes that in this case, 'as-built' means 'actual post-occupancy performance'.
- This is in addition to a ≥19% reduction on Building Regulations 2013 carbon emissions, and a **further** ≥20% reduction through renewables (onsite or a local network). Developers must then pay to offset remaining emissions.

Solihull Draft Local Plan 2021 (emerging – currently with inspector) Policy P9 requires that:

- All major developments must "implement a recognised quality regime that ensures the 'as built' performance (energy use, carbon emissions, indoor air quality, and overheating risk) matches the calculated design performance of dwellings as specified above [a 30% reduction on Part L 2013 commencing from now, and net zero carbon for all new development commencing from April 2025]"

Recommended policy wording for energy performance gap (New policy):

To ensure the performance gap between design and construction is minimised, applicants will be required to perform SAP calculations at the following points of the design:

1. Pre-planning, using design values
    i. On submission of application
    ii. Updated calculations as a result of changes negotiated through the assessment of the planning application
    iii. Updated calculations resulting from any amendments that could affect energy performance, (including amendments that are otherwise considered 'nonmaterial' or 'minor material')
2. Post-construction, using figures from the building as constructed, incorporating all of the following.
    i. Any specification changes to design values made to any SAP regulated building element during construction (including if the change is otherwise considered to be a nonmaterial or minor amendment)
    ii. The measured air-permeability, tested in accordance with the procedures set out in CIBSE TM23, and reported as statutory compliance in Section 7 Part L.
    iii. Accredited construction detail performance as confirmed by infra-red thermographic survey and selective borescope surveys
    iv. Commissioning logbooks provided to demonstrate that ventilation and heating systems are operating as intended.

Applicants are required to correct significant deviations from design specification where practical. Where deviations are demonstrated to be impractical to correct, and which don't lead to significant building performance issues, the applicant must calculate the additional carbon emissions of the deviation using the SAP 10.2 methodology. For additional carbon emissions over and above those identified in the design, Policy NZC2(D) will apply.

Further, applicants are required to produce a home user guide in accordance with the updated approved document L template.

Proposed additional supporting text:

To demonstrate compliance with the policy NZC2(A), calculations should be performed using the latest version of the SAP 10.2 methodology (current version 20.08.2021). Government has confirmed that this calculation will become the statutory methodology by June 2022 along with the interim uplift to Part L. This calculation should be provided as part of any reserved matters application, full application, Section 73 application or section 96a (non-material amendment) application, to evidence the passive and energy efficient design for building performance.

3. Carbon offsets as a solution to 'net zero' in local plans

Carbon offset payments from developers were pioneered by Milton Keynes in 2008 and later adopted by Ashford and Islington, then across London, and now also Reading. These funds are meant to deliver actions that will prevent or remove the same amount of carbon that the development is calculated to emit over a certain number of years. Several key differences arise in how this kind of policy is applied:

- **Calculation and scope**
- **Pricing**
- **Collection and spending.**

Calculation and scope

Key differences here are:

- Whether to offset only **regulated** carbon emissions as calculated by SAP or SBEM (national calculation methods), or **also unregulated** emissions (and if so, how these should be calculated)
- **Number of years** of carbon emissions that the developer should pay for.
- **When the calculation should be performed** – i.e. at the time of planning application, or on completion or post-occupation to ensure the offset amount reflects reality

In the London Plan 2021, only regulated emissions must be offset (as calculated by SAP/SBEM). Some local authorities in London and elsewhere choose to also require offsets for unregulated emissions.

Pricing

- Either tied to a **nationally recognised 'carbon price'** such as the BEIS carbon valuation,
- Or the **cost of delivering local projects** that would remove or prevent the same amount of carbon.

The recommended London offset price is supported by a 2017 study by AECOM. This explored the range of costs to enact projects that would save carbon, minus the amount of 'copayment' that can be secured (e.g. if homeowners pay part of the cost towards insulating their home, and the fund pays the rest). It concluded:

> "Given the wide variability in the costs and carbon savings for potential carbon offsetting projects combined with the uncertainty in the percentage copayments that could be secured, it would be difficult to assemble sufficient evidence … to analytically derive a robust [London-wide] carbon price based on the cost of offsetting projects. As such, the approach adopted in this study is to … base [offset] prices … on a **nationally recognised carbon pricing mechanism**".

The study then identifies a **range of projects that could deliver carbon savings at the same cost per tonne** that would be set by the nationally recognised carbon price. Many of these projects would actually deliver carbon savings at a lower cost per tonne. This would enable some other projects to be pursued at a higher cost per tonne so that the **fund delivers carbon savings at an average cost per tonne that is the same as the payment per tonne** that would be received from developers at the nationally recognised price.

The study notes that offsetting must be considered in viability studies, and could be varied by the location in the same way that CIL zones differ. The London Plan 2021 lets boroughs to set their own price, noting that "a nationally recognised non-traded price of £95/tonne has been tested as part of the viability assessment for the London Plan". 2018 Mayoral guidance notes some LPAs have based their price on the average cost of local projects to save carbon, e.g. Lewisham (£104/tonne), which is re-tested in a local viability assessment. We note that it is important not to 'double count' the viability impact of net zero carbon policy, in that the assessment should consider the cost of achieving a degree of carbon reductions on-site as a result of reasonable improvements to the building, and then only apply the cost of offsetting the *remaining* carbon.

Precedent: London Plan 2021 (adopted) (link):

Policy SI2 allows offset payments to partially meet the net zero carbon requirement. It applies to:

- **Major development** only
- Any **regulated** residual emissions over a period of 30 years, after enough upgrades have been designed-in to result in at least a 35% on-site reduction in the regulated emissions (using SAP/SBEM calculation).

There is no London-wide requirement to offset **unregulated** emissions, but major developments must still "calculate and minimise" these.

At least one London Borough (Islington) does additionally require an offset for unregulated emissions (as of a 2016 review of practices across London).

The same NEF review found that most London local planning authorities (LPAs) require that the carbon is **calculated at the time of the planning application**. However, several of these LPAs then **update the calculation later**:

- Recalculation at detailed design stage or discharge of planning conditions (Croydon, Hackney, Islington, Hillingdon, Kingston)
- Recalculation at 'as built' stage, on completion (Brent, Enfield, City).

The London Plan Policy SI2 requires that each borough must maintain its own fund to hold and use these offset payments. This must be

- Ring-fenced for carbon reducing actions, and
- Its activities monitored and reported on annually.

Mayoral guidance (2018) requires that the **local carbon offset price** per tonne is based on

- either a nationally recognised carbon pricing mechanism (starting at £60/ton as the nationally recognised non-traded price, although the Plan 2021 raises this to £95/tonne)
- or the cost of offsetting carbon emissions across the local planning authority area.

Milton Keynes

A 2016 review of offsetting practices noted that both Ashford and Milton Keynes originally established their local carbon price in 2008 using an estimate of typical costs of making carbon savings elsewhere in their respective districts. This was set at £200/tonne in 2008, plus inflation.

Milton Keynes draft Sustainable Construction SPD (2020) explains that the offset must cover total energy use: both regulated emissions (calculated by SAP in homes or SBEM in non-domestic buildings) and unregulated emissions (calculated by BREDEM for homes; in nondomestic buildings this can be calculated using CIBSE Guide F, CIBSE TM54, or metered evidence from previous work).

This draft SPD notes that the price remains at £200/tonne plus 'indexation fluctuations' which will be decided at the time of calculation. The developer must only offset 1 year of emissions, but the SPD notes that they may apply an annual multiplier in future iterations of the local plan.

Collection and spending of carbon offsets

London mayoral guidance (2018) notes that offset payments should be collected via Section 106 agreements in the usual way and by the same team, and that:

> "LPAs generally choose to take **payment on commencement of construction** on site. Some choose to **split the payment**, with 50 per cent paid post-construction and **50 per cent prior to occupation**. This is up to the LPA to determine. However, taking payment later than commencement of works can mean a high degree of uncertainty as to when funding will be received and is unlikely to enable carbon savings from the offset fund to be delivered before the development is occupied, creating a delay in offsetting a development's carbon impact. LPAs should also **note the time limits that apply to discharging Section 106 agreements and ensure funds are collected and spent in this time period**."

One potential pitfall is that carbon offset payments received via S106 agreements have sometimes had to be returned after not being spent in the allotted timescale. National Planning Practice Guidance notes that:

> "[Section 106] agreements should normally include clauses stating when and how the funds will be used by and allow for their return, after an agreed period of time, where they are not."

This can be avoided. London's 2019 annual survey of the use of offset funds notes that in that financial year, "No LPAs reported returning offset payments to developers" and also that "The GLA would not expect offset payments to be returned in any instance and expects LPAs to be collecting offset payments for all applicable developments and identifying suitable projects for spending funds."

The Centre for Sustainable Energy notes that developers can ask for a refund of carbon offset payments that are unspent within 5 years. To avoid this, it recommends setting up:

> "defined structures and processes to stimulate new markets and opportunities for carbon saving measures … [Creating] an open application process to stimulate and attract carbon saving projects from council departments, the market and community that would be unviable without subsidy, for example community energy projects or insulation schemes. Applications should be proportionate to the scale of the funding provided, the emissions to be saved and the risk profile of projects. Programmes of standardised measures, low unit cost, low risk and lower variability of carbon savings (such as the many domestic insulation programmes, run by council housing departments) should be required to apply to the fund just once as a whole programme, with detailed implementation targets, specifications, predicted carbon savings and reporting processes and timetables. Once approved, it should be as simple as possible for residents, communities or businesses to access funding through these programmes."

The 2018 London mayoral guidance encourages LPAs to pool Section 106 carbon offset payments rather than committing to spend them on specific projects. When the guidance was written, local planning authorities were only permitted to pool up to five S106 payments towards the same project, but this restriction was removed in 2019 and this can now be pooled with CIL payments too. Councils using either CIL or S106 must publish an infrastructure funding statement annually. When setting the carbon price, the LPA should factor in a cost to administer the fund and set up a pipeline of projects to be funded.

Recommended policy wording for offsetting policy: NZC(2)(D): Carbon Offsetting

- "Where a development proposal cannot demonstrate that it is net zero carbon at the point of determination of planning permission, it will be required to address any residual carbon emissions by:
  - 1) a cash in lieu contribution to the District Council's carbon offsetting fund

and/or
  - 2) at the Council's discretion, a verified local off-site offsetting scheme. The delivery of any such scheme must be local, guaranteed and meet relevant national and industry standards. If it is a nature-based carbon sequestration scheme, then it must be backed by the national government's Woodland Carbon Code initiative (or future replacement/equivalent national scheme) and meet the Warwickshire ecosystem service market trading protocol.
- Contributions to an offsetting scheme shall be secured through Section 106 Agreements.
- The amount of carbon to be offset will be according to the SAP or SBEM carbon emissions submitted in the energy statement as per policy NZC(1), plus a calculation for unregulated energy using BREDEM. This must then be multiplied to reflect emissions over a period of 30 years from completion. Where "zero-carbon ready" technology is proposed, associated carbon emissions should be calculated in accordance with the stated national trajectory for carbon reduction of the energy source (i.e. annual Treasury Green Book BEIS projections of grid carbon intensity or future national equivalent).
- The initial carbon offset amount will be calculated at the time of submission. It must then be recalculated at completion, and an adjusted payment made if necessary.
- The payment will initially be priced at £245/annual tCO_2 but may rise annually in line with nationally recognised carbon prices. Funds raised through this means will be ringfenced and transparently administered by the Council to deliver a range of projects that achieve measurable carbon savings as locally as possible, at the same average cost per tonne. The fund's performance will be reported in the Authority Monitoring report on: amount of funds spent; types of projects funded; amount of CO_2 saved.

In supporting text, add the following (in addition to existing text and further suggestions by EHEL):

- The carbon offset price of £245/tonne is the central figure for 2021 from the nationally recognised non-traded valuation of carbon, released annually as part of the Treasury Green Book data by BEIS. This is the same approach precedented in other local plan carbon offset schemes. Although the price for 2021 is higher than previous national prices adopted in by other local plans, the offset payment will nevertheless be small after the on-site reductions have been achieved and grid decarbonisation reductions are applied.
- Some carbon-saving interventions are more expensive while others will be cheaper, so the actual cost per tonne of carbon saved will vary between different projects. The council's S106-based offset fund will support a portfolio of projects that delivers measurable carbon savings at an average cost per tonne equal to that paid per tonne by developers. This approach is precedented in other planning areas such as London. This average cost of carbon savings delivered by the fund will consider the cost of fund administration, project identification and setup, and insurance against failure/reversal of delivered projects). Projects are yet to be formalised by Warwick District Council, but will deliver carbon-saving interventions that would otherwise not be deliverable with other available funds. Projects could include but are not limited to: renewable energy generation; energy retrofitting in existing buildings; large-scale tree planting. Projects will be delivered within Warwick District wherever possible but could include cross-border initiatives where there is a benefit to doing so (e.g. deliverability; economies of scale; social benefits) so long as the carbon savings can still be ascribed to Warwick District (for example, if there were an opportunity for a renewable energy generation facility that directly supplies premises in Warwick).

Precedent: Other 'net zero carbon' local plan offset requirements

Reading Local Plan 2019, Policy H5 (Standards for New Housing) includes that:

- Major residential development must be zero carbon unless it can be clearly demonstrated that this would render the development unviable.
- Non-major residential development must achieve a 19% reduction on the carbon emissions set by Part L 2013 and calculated by SAP.
- Supporting text to the policy notes that in general, 'zero carbon' will involve a 35% onsite reduction in carbon against the Building Regulations 2013 (SAP calculations), and the rest offset at £60/tonne x 30 years via Section 106. Non-major development can also fulfil the 19% reduction through an offset contribution if it cannot be done on site.
- The accompanying SPD notes that this carbon price is set because it is the nationally recognised carbon price (and refers to the London and AECOM studies as above). It gives the example of a recent 68m^2 mid-floor flat complying with the 35% onsite reduction and offsetting the rest, resulting in an offset payment of only £1280.91. It also notes that the price of carbon may be adjusted in future to account for inflation or other changes.
- The SPD also explains that applicants should provide a projected SAP report and calculation of the required offset payment at the time of planning submission (along with the Energy Statement and Sustainability Statement). The purpose of this is to "provide confidence to the LPA that the requirements of the Local Plan have been considered and can be met".
- A condition will then be applied requiring submission of the final SAP report (demonstrating policy compliance) after completion of development, and no later than 6 months after first occupation. This final SAP report is what determines the offset payment amount.

Sutton Local Plan 2018 (adopted), Policy 31 (Carbon and Energy)

2. Sutton applies the London Plan requirement for a 35% reduction in on-site carbon emissions (calculated with SAP against a baseline of Part L 2013) before requiring offsets for the remaining emissions of £60/tonne over a 30-year period.
3. This matches the nationally recognised carbon price recommended by the London/AECOM study mentioned above.
4. The offsetting requirement only applies to homes, while non-residential developments only have to achieve the 35% on-site reduction.
5. As an alternative to the S106 offset payment, the developer can instead offer a 'unilateral undertaking' (usually an additional, non-negotiated payment that does not come with a mutual obligation for the council to deliver anything in particular unlike S106 payments)
6. Planning applications must come with an Energy Statement laying out how the development will comply with the requirement to apply the energy hierarchy and achieve this minimum 35% reduction (SAP calculation 'as designed', not 'as built).
7. The 'as designed' SAP calculation contained in this Energy Statement forms the basis for the calculation of the offset payment.

4. Embodied carbon (EC) – a potential new policy for Warwick ZC DPD

This topic was not in original DPD but has been suggested by many consultees as a gap which should be addressed given its significance for the overall carbon emissions.

Building Regulations will reduce operational emissions from buildings towards zero, however as operational emissions reduce, the embodied carbon (EC) emissions can be as much as 50% of total emissions over a building's lifetime. Despite this, national policy does not currently require embodied carbon emissions to be measured. Most embodied carbon emissions occur near the start of a building project, so local authorities have an important role to play in filling the gap left by national policy by setting their own requirements.

New Residential Buildings

Residential buildings would be best targeted on the size of developments, rather than the size of individual dwellings. This would improve efficiency of EC reduction measures, targeting the larger developments. It would also currently be cost prohibitive for one-off and small developments to undertake embodied carbon assessments.

Smaller developments could however be required to reduce EC, through targeting and cost-effective EC reduction measures, such as lower carbon concrete, increased use of natural materials, timber frame, eco-paints, higher recycled content carpets, timber flooring…etc. This approach would be most effective with clear and concise guidance, written for a public audience, outlining a series of simple and cost-effective embodied carbon reduction measures that they could implement.

New Non-Domestic Buildings

For new non-domestic buildings, consideration should be given to setting a threshold on size, such as m^2 floor area, or construction value, £, to require EC measurement. Larger developments are increasingly completing building life cycle assessments for the building rating system *BREEAM* credits. These developments should also be required to reduce EC.

New Infrastructure

When implemented correctly, EC can also reduce costs of infrastructure. This should also consider operational carbon, known as whole life carbon. It was concluded that “reducing carbon reduces costs” in the Infrastructure Carbon Review 2013, published by HM Treasury.

An isolated carbon assessment cannot be expected to achieve this. Instead, carbon reduction needs to be embedded within an infrastructure project and organisation, such as compliance with the standard PAS 2080, Carbon Management in Infrastructure.

Conclusion and reasons for recommendation

It is recommended to consider a policy for embodied carbon reduction and embodied carbon measurement.

This should be based upon a threshold of above a specified floor area, m^2, and / or construction spend, £.

Thresholds should be considered in local context to capture schemes and applicants who would have most opportunity to take advantage of alternative materials use e.g. large-scale developers and strategic commercial developments. Requirements on embodied carbon reduction, could be increased on a future timeline. For example:

- This approach is recommended to target the larger developments, which have a good opportunity to reduce embodied carbon.
- The opportunity to reduce embodied carbon needs to be taken at the start of the project prior to construction. Once the building is complete, it is no longer possible to reduce embodied carbon of the construction.

Other options considered and reasons rejected

Embodied carbon assessment for all buildings was considered, but judged unfeasible for small, one-off residential buildings and refurbishments. However, those could be targeted by requiring effort to reduce embodied carbon. Particularly if presented with clear guidance on targeted and cost-effective embodied carbon reduction measures.

Recommended policy wording for new policy on embodied carbon: NZC(3)

Development should address the type, life cycle and source of materials to be used at application.

Proposals for super-major development should be accompanied by a whole-life assessment of the materials used prior to construction.

Proposed additional supporting text:

New development should demonstrate through its Sustainability Statement how the embodied carbon of materials used on the development will be reduced.

The materials used in development should use and manage resources as efficiently as possible accounting for the energy, carbon emissions and other environmental impacts arising from construction and end of life demolition and disposal. Use of environmental assessment methods such as BREEAM or HQM pre-assessments with reference to the BRE Green Guide would be suitable such a statement.

Proposals for super-major development should be accompanied by a whole-life assessment of the materials used.

N.B 'Super-major' development in the context of this DPD refers to >50 homes or 1000sqm.

n.b. The threshold 'super-major' has been amended from precedents to reflect the relative size of larger scale development applications likely to be received in Warwick.

Precedent: Other 'embodied carbon' initiatives

Royal Institute of British Architects (RIBA) 2030 climate challenge, which sets ambitious EC reduction targets for 2025 and 2030.

Residential RIBA challenge targets, compared with 2020:

- 2025 = 25% lower EC.
- 2030 = 50% lower EC.

Non-domestic RIBA challenge targets, compared with 2020:

- 2025 = 19% lower EC.
- 2030 = 37.5% lower EC.

These targets are designed as a challenge, but could be implemented more gradually on a timeline.

Scotland is currently developing a Net Zero Carbon method for Public Sector buildings, as a voluntary initiative.

Netherlands has required all residential and office buildings over 100m^2 to have a building Life Cycle Assessment (LCA) since 2013. Although a larger threshold is recommended, to target larger developments which can accommodate the resource.

Bristol draft Local Plan 2019 policy CCS4 details requirements for new developments to demonstrate consideration in the Sustainability Statement with super-major developments including a whole-life assessment. **Super Major developments are 100 residential units and above, and 10,000sq m of commercial floorspace and above** in the **Pre Application Advice for planning and related applications** document.

Greater London Authority – The London Plan: Intend to Publish 2019

Policy SI 2 Minimising greenhouse gas emissions

F. Development proposals referable to the mayor should calculate whole life-cycle carbon emissions through a nationally recognised Whole Life-Cycle Carbon Assessment and demonstrate actions taken to reduce life-cycle carbon emissions.

Greater Manchester Combined Authority – GM Plan for Homes, Jobs and the Environment 2019

Policy GM-S 2 Carbon and Energy

e. Include a carbon assessment to demonstrate how the design and layout of the development sought to maximize reductions in whole life CO2 equivalent carbon emissions.

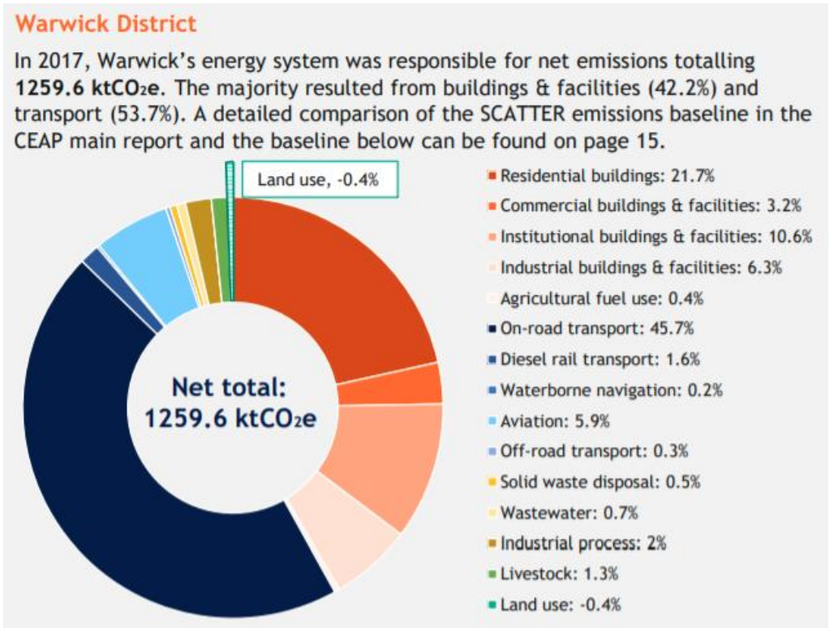
5. Existing buildings – a potential new policy for Warwick ZC DPD

This policy was not in original DPD but has been suggested by many consultees as a gap which should be addressed given its significance for the overall carbon emission.

While the Development Plan Documents does not have a great deal of ability to influence carbon reduction in existing buildings, conservation policies should be reviewed for compatibility with the zero-carbon agenda. The documents' influence over existing emissions is more limited, or indirect. The biggest impact the development plan document can have on existing emissions is facilitating new renewable energy generation – as this will help to bring down emissions in all sectors where electricity is used.

The future for existing buildings

South Warwickshire Climate Action Support (2021) calculated that existing residential and commercial buildings currently account for 24.9% of GHG emissions in Warwick District.



SCATTER emissions inventory for Warwick District, 2017. From: Warwick & Stratford District Councils South Warwickshire Climate Action Support (2021), Anthesis

Carbon Budget Reports present recommended climate change commitments for UK local authority areas that are aligned with the commitments in the United Nations Paris Agreement, informed by the latest science on climate change and defined by science based carbon budget setting.[23] If we allocate existing buildings a share of Warwick's carbon budget[24], they would consume their budget within 5 years. It is clear, therefore, that tackling carbon emissions from existing buildings is of paramount and urgent importance.

There are 58,700 homes in Warwick, to stay within their carbon budget gas boilers would need to be removed in the 2020s peaking at around 14,000 replacements per year – any slower pace could not stay within carbon budgets.

The Committee on Climate Change concluded that at least 90% of existing buildings should have energy efficient retrofits for the UK to meet its zero carbon targets.

Buildings in Warwick

Existing buildings in Warwick should be made zero carbon where possible. This must be achieved through:

1. Energy efficient retrofits for the majority of buildings;
2. replacement of fossil fuel heating with low carbon heating sources;
3. zero carbon electricity (through either on-site renewables or through off-site renewables).

Policy should be reviewed in a pragmatic manner with regards to listed buildings and conservation areas. The question of whether their heritage asset value truly warrants 'absolute' preservation will need consideration. For example, by the addition of solar panels or upgrading of windows. Consideration could also be given to whether some buildings can be re-purposed to house functions more suitable to their energy profile.

Barriers to retrofit

It will not be possible to retrofit existing buildings to the same levels of fabric efficiency and so it has to be accepted that these buildings will take a disproportionate share of carbon budgets. Many will require a larger upfront cost per floor area of the building than new build as rely on installation of onsite energy generation.

Disruption to existing building occupants needs to be managed effectively. Costs for relocation vs elemental phasing should be considered as well as offsite manufacturing.

A significant barrier to adoption of high-performance design and construction in the UK is the current industry skills gap in delivering ultra-low energy buildings. While design professionals may lack proficiency in design strategies and terminology, construction professionals and Building Control bodies may not fully understand their practical application.[25]

[23] https://carbonbudget.manchester.ac.uk/

[24] https://carbonbudget.manchester.ac.uk/reports/E07000222/
[25] LETI Climate Emergency Design Guide, LETI, 2020

What the development plan document should do

The ability of the development plan document to influence the carbon emissions of existing buildings is limited. However, there are areas in which policy can impact existing buildings: listed buildings; buildings in conservation areas; buildings which are undergoing a "change-of-use".

Policies as listed in the precedents here (Wokingham and Milton Keynes) help give planning officers and council members more certainty about how they should weigh up the climate and heritage impacts of proposals for changes to existing buildings that require planning permission. Such policies also help give more certainty to existing building owners that their proposals for change are more likely to be accepted if they put the effort into devising measures for energy efficiency and renewable energy, so long as these are designed with a suitable degree of sensitivity to the building and its context.

Mechanisms such as Supplementary Planning Guidance, supportive policies and Local Development Orders could be considered to facilitate emissions reductions from existing buildings by taking a permissive stance towards the addition of certain carbon-reducing interventions that building owners might otherwise consider would be opposed in the planning process. These can also lay out ways to implement such interventions in a way that can be acceptable in heritage terms, giving building owners ideas that they might not have otherwise known about, and improving the overall quality of proposals for change to existing buildings.

Recommended policy wording for existing buildings: NZC(4)

All developments should demonstrate a consideration for sustainable construction and alternatives to conventionally fuel gas boilers. This should be explored through a Low Zero Carbon assessment of low carbon options within the submitted application documents (e.g. the energy statement).

Development proposals which would result in considerable improvements to the energy efficiency, carbon emissions and/or general suitability, condition and longevity of existing buildings will be supported, with significant weight attributed to those benefits.

The sensitive retrofitting of energy efficiency measures and the appropriate use of micro-renewables in historic buildings, including listed buildings and buildings within conservation areas will be encouraged, providing the special characteristics of the heritage assets are conserved in a manner appropriate for their significance.

Proposed supporting text

Proposals for alterations and extensions to existing buildings should target an average heating energy demand of 40kWh/m². Detailed guidance for existing buildings is provided by LETI's Climate Emergency Retrofit Guide.

Notes on standards and thresholds:

The LETI Climate Emergency Retrofit Guide[26] provides retrofit fabric, system and energy use intensity targets for best practice and exemplar projects.

The Building Regulations Approved Document L 2010(2021 Edition) Part 1B and 2B for Domestic and Non-Domestic Buildings provides a threshold for major renovation: "A major renovation is when more than 25% of the surface area of the external building envelope is renovated."[27]

Precedent: Other 'existing buildings' requirements

Wokingham draft local plan update

Draft Climate Change Policy SS8 confirms the local plan will "support retrofitting existing buildings with measures to improve their energy efficiency and generate onsite renewable energy".

Supporting text notes that "Proposals to sensitively refurbish or retrospectively improve the performance to reduce their energy use and improve comfort will be supported. Interventions to upgrade historic buildings should be undertaken sensitively in recognition of their heritage value."

This is supported by policy DH7 (Energy) which includes that:

> "Development proposals which would result in considerable improvements to the energy efficiency, carbon emissions and/or general suitability, condition and longevity of existing buildings will be supported, with significant weight attributed to those benefits[*]. The sensitive retrofitting of energy efficiency measures and the appropriate use of micro-renewables in historic buildings, including listed buildings and buildings within conservation areas will be encouraged, providing the special characteristics of the heritage assets are protected."

*Please note: This first sentence is identical to **Milton Keynes adopted local plan 2019 Policy SC1** (point N), therefore is supported by that precedent.

Wokingham draft **Policy SS9, Adaptation to Climate Change** also provides that**:**

> "Proposals involving both new and existing buildings should demonstrate how they have been designed to maximise resistance and resilience to climate change, for example by including measures such as solar shading, thermal mass, heating and ventilation of the building and appropriately coloured materials in areas exposed to direct sunlight, green and brown roofs, green walls, etc; …"

[26] https://www.leti.london/retrofit

[27] https://www.gov.uk/government/publications/conservation-of-fuel-and-power-approved-document-l