South Oxfordshire and Vale of White Horse Joint Local Plan: Net Zero Carbon Study

Task 5: Offsetting

12 December 2023

Written by: Alex McCann (Senior Analyst)
Checked & edited by: Marina Goodyear (Senior Consultant)

Contents

Introduction 3

Overview of offsetting 4

South & Vale scope of offsetting 5

Downfalls of carbon offsetting and benefits of energy offsetting 6

Core principles of offsetting 6

Price estimation and recommendations 7

Existing prices 7

Appropriate pricing 8

Example scenarios 8

Embodied carbon offsetting 10

Recommended pricing 10

Embodied carbon offset projects 10

Offset fund mechanisms 11

S106 mechanism 11

Alternatives to S106 11

Fund administration and management 11

Offsetting projects 13

Small scale local schemes vs large-scale 13

Acceptability of example projects for offsetting of operational energy 13

Acceptability of projects for embodied carbon offsetting 14

Project delivery 14

Summary of recommended offsetting approach 15

Introduction

Bioregional, Transition by Design and Currie & Brown have together been appointed to provide South Oxfordshire and Vale of White Horse (South & Vale) District Councils with an assessment of options available within the local planning system to achieve net zero carbon development in South Oxfordshire and Vale of White Horse to inform the emerging South & Vale Joint Local Plan.

The full scope of this suite of work comprises:

1. **Scoping Report**
2. **Carbon Reduction targets and policy recommendations**
3. **Feasibility Assessment**
4. **Costs Report**
5. **Offsetting Report**
6. **Renewable Energy Spatial Assessment** (not relevant to this document)

Tasks 1 (Scoping Report) and 2 (Carbon Reduction) set the scene of what the local plan is able to achieve and importantly what it must do within the context of net zero carbon obligations and commitments at both local and national scales. It is accompanied by an appendix of policy recommendations. The exploration of policy precedents in Tasks 1 & 2 sets the scene of what ambitious policies have been implemented to date elsewhere, which form a baseline that the South & Vale local plan can emulate or work to improve upon[1].

Tasks 3 (Feasibility Assessment) and 4 (Costs Report) enable specific policy requirements to be tested in their ability to be feasibly and viably deliverable in practice. Results from both these tasks are critical to the success of policy adoption via the examination process, due to the provision of locally-specific cost and feasibility evidence to support the policy's robustness against the examination 'tests of soundness'[2] (especially in 'justification' and 'effectiveness').

Task 5 (Offsetting Report) sets out the recommended approach for offsetting in term of policy integration, implementation of mechanisms and project delivery.

This document is Task 5: Offsetting.

Local planning authorities (LPA) have a legal duty to deliver carbon reductions (mitigation of climate change) through the planning process[3], and national planning policy[4] confirms this should be done in line with the Climate Change Act. The Climate Change Act includes both the 2050 goal for a net zero carbon UK, and sharply declining five-yearly carbon budgets between today and 2050.

This report initially sets out what 'offsetting' could mean and the functions it could have – subject to certain caveats – in bringing forward the goals that the Local Plan policies is trying to achieve with regards to net zero carbon buildings. Pros and cons of existing and potential policy mechanisms for offsetting are explored, including legal mechanisms within the planning system and certain legal tests that the approach must meet if using these. This report also includes reference to how the justification for the 'offsetting' mechanism would interact with feasibility and costs evidence being produced by the separate reports (3) and (4) respectively.

Throughout this exploration, certain recommendations are made with regards to:

- When an offsetting approach should be required or permitted
- What conditions an offsetting mechanism must be subject to in order to be effective
- Types of projects that should or shouldn't be considered acceptable

These recommendations provided in this report reflect findings emerging from the following elements of the evidence base for the South & Vale Joint Local Plan as per Tasks 1 – 5 noted here.

In particular, this report should be read in conjunction with Tasks 1 & 2 (as these define the concepts of 'net zero carbon', the scope of carbon emissions for which new buildings are responsible, and the contextual carbon reduction trajectory context in line with which the local plan policy is attempting to act. This provides important background for the conditions and caveats about offsetting in this report, which form the basis for the recommendations about the use of offsetting in policy.

[1] This study and its findings were accurate prior to the release of the Written Ministerial Statement entitled 'Planning - Local Energy Efficiency Standards Update' dated 13 December 2023. The Councils will be reviewing their approach to Net Zero Carbon Buildings in light of the Written Ministerial Statement.

[2] National Planning Policy Framework (2021), paragraph 35.
[3] Planning & Compulsory Purchase Act 2004, Section 19, 1(A).
[4] National Planning Policy Framework (2021), paragraph 153, footnote 53.

Overview of offsetting

Whilst it is important to have specific and widely achievable requirements for net zero carbon performance on-site, there may be some exceptional cases where an overall net zero balance cannot be achieved on site. Such exceptional circumstances could relate to buildings above 3-storeys that have insufficient roof space for required solar PV outputs or a specific non-residential building use that has a high, but justified, unregulated energy use. In these cases, it is appropriate to have a robust and effective offsetting policy in place, to allow those unmet requirements to be delivered elsewhere.

Carbon offsetting as a concept can be defined as a reduction or removal of greenhouse gas emissions to compensate for emissions elsewhere. In the context of this study, offsetting is used as a mechanism to compensate for a shortfall in on-site performance of a development in terms of on-site renewable energy (energy offsetting) and embodied carbon emissions (carbon offsetting). The distinction between the two types of offsetting is further explained later in this report.

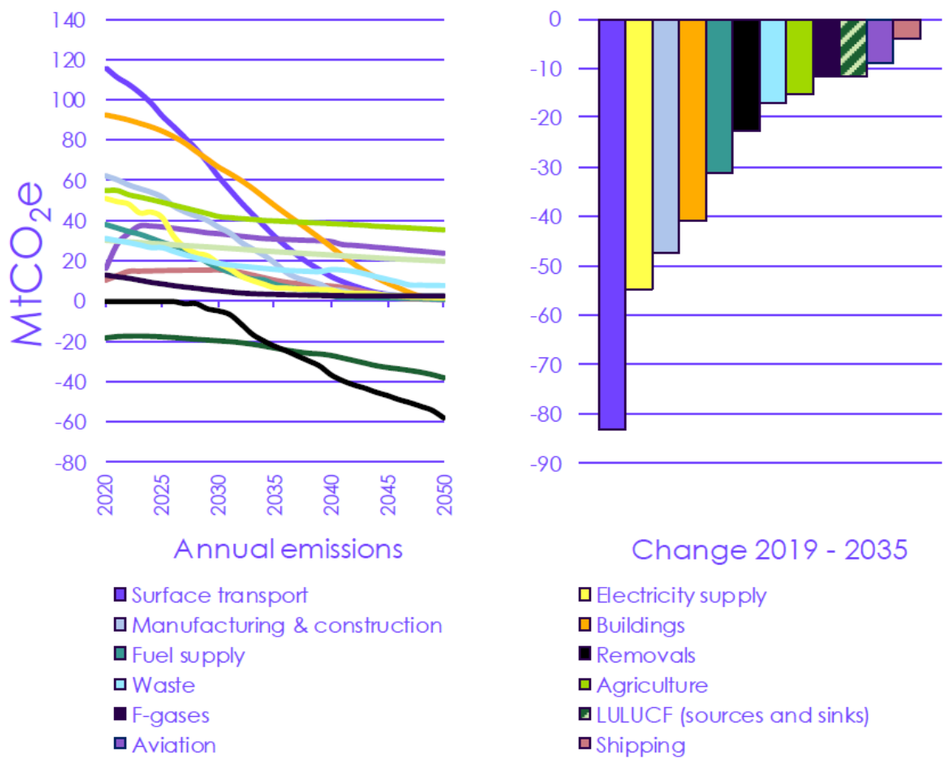

Figure 1: Sectoral emissions trajectories needed in the 'Balanced Pathway'. CCC (2020), The Sixth Carbon Budget.

It is vital to firstly understand that given the speed and scale of the carbon reductions required in *all* sectors in order to hit the UK's legislated carbon targets, there is very little room for underperforming sectors to have their slack picked up by other sectors. Committee on Climate Change analysis suggests that 'electricity supply', 'manufacturing/construction', 'buildings' and 'transport' need to reach close to zero carbon by circa 2040, 2045 and 2047 respectively), as the UK's capacity for carbon capture or sequestration will barely be enough to balance the emissions of sectors that cannot reach zero (agriculture, aviation, waste). The emissions relevant to the Local Plan – i.e. due to development – occur mainly in those sectors that should get close to zero with little or no offsetting. Therefore, a local plan offsetting policy may fail to drive the legislated carbon trajectories if the offset mechanism works outside the sector where the emissions occur, or if in-sector 'offsetting' is delivered via interventions that needed to happen *as well as* net zero carbon development, rather than *instead of*.

Therefore, as a concept, offsetting is problematic for a number of reasons. Most importantly, developments should be focusing on on-site measures to achieve net zero and not rely on the role of offsetting. Second, reputationally the industry is not yet audited well enough to have full trust in the projects. Prominent issues involved with offsetting are:

1. Trust, transparency and validity

Voluntary market credits, purchased by businesses to offset emissions through carbon reduction projects, have been shown to be of questionable effectiveness. The lack of a standardised framework for voluntary markets to provide traceable carbon reductions hinders the reputation of such measures, which creates justified public scepticism of offsetting to drive the carbon savings it sets out to achieve. Tree-planting schemes in particular are vulnerable to failure via poor land maintenance and management, jeopardising their ability to permanently deliver the promised carbon removals. Also, most market carbon credits are from overseas, thus not contributing to local or national targets.

This lack of standards brings great uncertainty about 'additionality' (that the carbon saving project wouldn't occur without the offset payment) and failure to measure rebound effects (e.g. if a fuel efficiency beneficiary spends their bill savings on other carbon-heavy goods).

For these reasons, market-based offsetting solutions should ***not*** be accepted by South & Vale as an offset solution. Similarly, as explored later, tree-planting is generally unsuited to the scope of improvements the emerging local plan 'net zero' policy aims for. Projects must be selected to directly relate to what is being offset (in most cases renewable energy). Consistent reporting on offset projects' validity and effectiveness increases trust and transparency.

2. Lack of innovation

The use of offsetting delays investment into technologies and processes that must be the focus for sectoral decarbonisation. Such investments should be made today, instead of delaying tangible action until the price of offsetting is driven high enough to force companies

to invest. This can only be driven by financial incentives to enhance innovation. For example, if a developer can offset emissions to avoid installing a heat pump, then sales of the technology are not driven up, installation skills remain rare, prices remain high, and innovation is slowed.

3. Easy route to compliance

Offsetting has for too long been used as an overly easy mechanism for policy compliance as the offset price is often cheaper than the cost of delivering on-site measures. It has been used in absence of guaranteeing strong energy efficiency. This problem is avoided which under the energy-based policy approach recommended for South & Vale, which requires energy use and space heat demand limits regardless of the proposed level of on-site renewable energy.

Recent UKGBC Carbon Offsetting and Pricing Guidance expressed an opinion that offsetting must not become the easy route to compliance, stating that offsetting at individual asset/project level is only credible if energy use and embodied carbon limits are first achieved.

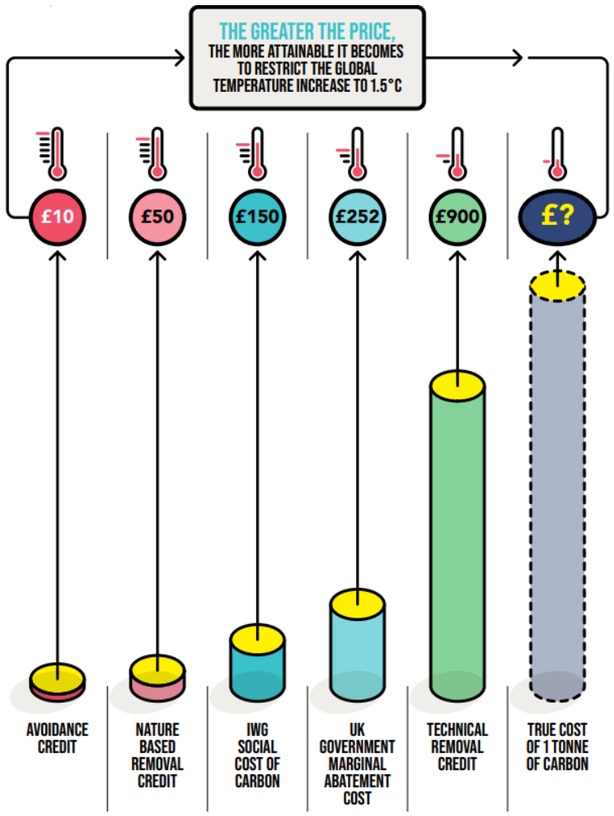

Figure 2: Various scopes of carbon pricing. Source: UKGBC.

South & Vale scope of offsetting

As explored in Tasks 1 & 2, offsetting in planning policy precedents works either in relation to **operational carbon**[5] or **operational energy**[6].

Carbon offsetting typically requires that a financial contribution is made to offset any residual operational carbon dioxide emissions that fall short of a certain % CO_2 reduction target (e.g. net zero regulated[7] emissions, or net-zero total[8] operational emissions). This is priced per tonne of carbon predicted to be emitted over a certain timeframe (typically 30 years).

Energy offsetting typically requires the developer to offset any shortfall in on-site renewable energy capacity needed to achieve an on-site net zero energy balance. This is priced per kilowatt hour (kWh) of operational energy demand that is not matched by on-site renewable energy provision. Another approach could be to offset any additional kWh above a certain Energy Use Intensity threshold (again priced per kWh), but this is not the preferred option in this report.

The recommended policy approach for operational energy (in the separate reports 'Task 1+2' and their policy recommendations) requires offsetting through an *energy* metric, therefore carbon-based offsetting mechanisms are not considered extensively here.

The role of energy offsetting in the context of new build residential and non-residential operational energy policy, is to enable development to maintain net-zero status in cases where an on-site energy balance is not achieved due to feasibility issues – for example where space or shade prevent sufficient rooftop solar PV capacity, or where heritage impacts of PV cannot be made acceptable. In other words, it allows a development to still be deemed policy compliant in exceptional circumstances where all on-site measures have been clearly demonstrated to the council's satisfaction. This flexibility is particularly valuable for developments that provide other climate benefits, e.g. the desirability of encouraging urban infill (the rededication of land in an urban environment to new construction) and denser/taller urban development which help create walkable settlements that avoid the need to drive.

The potential role of **embodied carbon offsetting** is also explored in this report. Although no direct precedents have been identified that have yet been legally tested at examination, embodied carbon offsetting could offer a mechanism to negate any residual embodied carbon emissions above the targets set out in the 'Policy recommendations' appendix of Tasks 1 & 2.

Embodied carbon offsetting does not have a 'net zero' scope as this would negatively impact development viability, yet the principle of maximising on-site action (before offsetting) applies in the same way as it does to operational energy.

[5] Greenhouse gases emitted due to the operation (in-use phase) of a building. Typically calculated based only on energy use because this is the cause of the vast majority of operational emissions, but some calculations may also include other sources of emissions such as refrigerant leakage from the building's heating/cooling systems.
[6] The building's energy use during its operational phase – that is, its in-use lifespan.
[7] Emissions associated with energy uses that are regulated by Building Regulations (Part L). This does not cover all the actual energy uses of a building – see Task 1 for explanation of the energy uses that are in or out of scope for Part L regulation, and the problems associated with the calculation used for regulated emissions.
[8] Emissions associated with *all* energy uses within the building, whether these are 'regulated' or not.

Downfalls of carbon offsetting and benefits of energy offsetting

More detail comparing the relative merits of energy versus carbon offsetting approaches is given in Tasks 1 & 2 ('Carbon offset payment' and 'Energy offsetting' sections). However, the key points are outlined in this table.

Pitfalls of carbon offsetting	Benefits of energy offsetting
Calculations reliant on potentially inaccurate carbon factors[9] relating to grid decarbonisation rates now and in the future	Agnostic to carbon intensity of the grid
Previously has been used as a routine mechanism to achieve net zero carbon (to the detriment of design improvements), instead of a last resort	Only used a last resort option in exceptional circumstances and still requires that energy and fabric efficiency targets are met
Can be hard to measure and track against off-site savings, depending on the projects delivered with the offset fund	Easy to measure and track against off-site savings
Not necessarily clear exactly what the sources of residual emissions are	Easy to identify residual shortfall in on-site renewable energy generation, that must be delivered offsite instead through offsetting
Difficult to guarantee that the price set will be sufficient to fund projects that achieve carbon savings equal to on-site emissions	Clearer approach to setting offset price based on cost of off-site renewable energy generation

[9] A measure of how much carbon was emitted to produce and distribute a kWh of grid energy.

Core principles of offsetting

Drawing together the 6 key principles outlined here is essential to the success of responsible offsetting. The success of achieving all principles is the responsibility of South & Vale, and these should inform how the Councils decide to administer and manage the offset fund.

1. Equivalent emissions (or equivalent energy)	Ensure emissions reductions (or renewable energy provision) achieved through offsetting are equivalent to residual emissions (or residual energy use) on-site. If this is not made clear by the relevant offset project linked to the specific development that is offsetting, it cannot be claimed that the development is truly net zero.
2. Additionality	Be sure that the selected offset project would not have occurred anyway and the necessary share of carbon savings is assigned exclusively to the relevant development. This is paramount to the core principles of responsible offsetting. It must be certain that the project funded by offset finance is new to the pipeline, and not double-counted (e.g. no sale of REGO certificates or BNG credits to third parties).
3. Ensure permanence and minimise time-lags	Ensure that the offset project is underway prior to the initiation of operational emissions on the development site. Carbon removals must be permanent (or renewable energy generation maintained for the development's operational lifetime). Collating a pipeline of offset projects ready for delivery as soon as the offset fund is available is the key to avoid a time lag. Timing is key to the actual climate impact of CO_2.
4. Maximise co-benefits	Seek co-benefits with local communities wherever possible, alongside the primary aim of equivalent emissions reductions. An example could be improving quality of life and reducing bills by installing solar PV on low-income households, social housing or key public institutions (e.g. NHS; schools)
5. Proximity to development	Aim to select and develop an offset project as close to the development as possible. South & Vale may wish to require that offset projects must take place within either of the Districts.
6. Transparency and measurability	Produce annual reports on projects funded by offset contributions, importantly including statistics on performance.

Price estimation and recommendations

Limited potential to deliver sufficient on-site PV generation (due to space, shadow or heritage as previously noted) is likely to be the key feasibility obstacle to compliance with the emerging operational energy policy. Therefore, to make the offset price directly relevant to the development, as required by S106 legal tests, the offset price should be set according to the cost of solar PV installations off-site. We next explore how the price can be set accordingly.

Although our review notes potential £/tonneCO_2 prices that are defensible in planning terms, this is not recommended as it would rely on carbon factors and may not reflect the true cost of solar PV. Carbon intensity factors are determined on the grid energy generation mix (which rely on future predictions that may not come true, coupled with a somewhat arbitrary assumption about the lifetime of the home) and are not directly linked with costs of solar PV. By contrast, a £/kWh price avoids unnecessary complexity and uncertainty.

Existing prices

The Greater London Authority (GLA) and Department of Business, Energy and Industrial Strategy (BEIS) Green Book carbon prices have dictated the standard price for carbon offsetting since the concept was established at a local level in 2017, following a report produced by AECOM that explored an carbon offset price for the GLA. The price set was £95/tCO_2, which was also set as the 'high' scenario price in the 2017 update to the BEIS Green Book values. Since the initial development of carbon pricing for local authority carbon offsetting, the Green Book values have been updated, most recently in 2021. The equivalent value of £95/tCO_2 (2017) now stands at £378/tCO_2. This is largely because it is based on the 'cost of abatement' needed to reach the UK's carbon targets. Not only did the UK in 2019 raise its ambition to 'net zero', but many of the cheaper actions have already been implemented.

Although BEIS (now known as the Department of Net Zero and Energy Security (DESNZ) now view the £95/tCO_2 as outdated, some local authorities particularly in London still use this price and some other areas have copied London's price. An increasing number of authorities have acknowledged the 2023 Green Book value, which better reflects the true cost of carbon. However, even at £378/tCO_2, this may not necessarily reflect the true cost of carbon and may still remain an insufficient incentive to ensure on-site measures are prioritised over offsetting.

For example, the 2023 BEIS high-scenario price of £378/tCO_2 is nationally recognised and tested, yet in most cases, it is insufficient for an offsetting project to deliver the equivalent carbon or energy savings that would have been achieved on site. This was demonstrated for Bath & North East Somerset (B&NES) where the local cost to offset via solar PV was determined to be £652/tCO_2. B&NES however selected the 2022 Green Book value (£373/tCO_2) as the higher local price was only based on one existing solar PV installation.

Importantly, leading local authorities, such as Cornwall, have begun to set energy offset prices using appropriate metrics that can be directly compared against the cost of solar PV. Bristol City Council have also proposed embodied carbon offsetting in its Reg18 consultation.

The examples given below represent the range of possible offsetting prices identified, for both carbon and energy, across local plans and supporting evidence bases.

Stage	Scope	Approach	Example	Price	Source
Operational	Energy	Offset residual on-site renewable energy	Cornwall	£110/MWh	SWNZH
			B&NES	£373/tCO_2	BEIS/DESNZ
			Delivering Net Zero (not policy)	£880/tCO_2	*Delivering Net Zero*
				£1.32/kWh*	*Delivering Net Zero*
		Offset residual Total Energy Use	Bristol (draft)	£90/MWh	CSE
	Carbon	Offset residual CO_2 emissions to an improvement over Part L (regulated only)	Milton Keynes	£200/tCO_2	n/a
		Offset to zero emissions (regulated only)	GLA	£95/tCO_2	AECOM
Embodied Carbon	Stages A1 – A5	Offset to a set target in $kgCO_2e/m^2$	Bristol (draft)	£373/tCO_2	BEIS/DESNZ
		Offset to zero emissions	None	n/a	n/a
Any	Any	National carbon valuation 2023	DESNZ/BEIS	£126, £252 or £378/tCO_2	BEIS/DESNZ

**This price does not assume a 30-year lifetime and is instead set as an upfront price associated with the cost of delivering solar PV.*

Appropriate pricing

Offsetting under an Energy Use Intensity framing must be based upon the cost of creating new renewable energy generation capacity, which in the vast majority of cases will be solar PV. Although not local data, solar PV costs from the Department of Energy of Net Zero and Energy Security (DESNZ) provide a reliable estimate of what the costs of solar PV installations could be in South & Vale. The following costs are median values for 2022/23.

Capacity band	Cost	Offset price
4 – 10 kW	£2,077/kW	£2.44/kWh
10 – 50 kW	£1,226/kW	£1.44/kWh
4 – 50 kW average	**£1,652/kW**	**£1.94/kWh**

An average of the three installation capacity bands has been used because offset projects are likely to primarily consist of small-scale solar PV installations within the wider combined 4 – 50 kW band.

Assuming a conservative electricity generation rate for the PV system of 850 kWh/kWp (actual rate likely to be in excess of 900 kWh/kWp), the recommended energy offset price for operational energy is **£1.94/kWh**.

Please note this recommended price includes a 10% additional rate for offset fund administration and management, to cover this new administrative burden to the council(s).

The cost data from DESNZ includes a band for 0-4kW installations but this has not been included in the calculation methodology to determine the offset price. It is highly unlikely that funds collected through energy offsetting will be used for solar PV installations less than 4kW and therefore this band has been excluded. The costs used take a two-year average and therefore cost fluctuations are likely to occur to reflect market trends of solar PV technology. Therefore, it is important that South & Vale review the energy offset price on an annual basis using the same methodology.

This cost metric selected here for the recommended price is agnostic to the assumed lifetime of a building, which by contrast in many precedent offsetting approaches is typically 30 years. Assumed building lifetime has been used primarily for offsetting based on residual carbon emissions predicted to occur throughout building operation. Since the approach taken here is based upon the cost of solar PV to match what would otherwise have been installed on site (which itself is based on *annual generation* to match *annual demand*), it is not necessary to take into account an assumed building lifetime, because offset projects should directly fund solar PV installations at or before the commencement of the development.

Example scenarios

The example scenarios given here assume a 90m² residential building and show the types of costs that may arise where offsetting has been found to be acceptable. For any level of offsetting to be found acceptable, it must be demonstrated that on-site renewable energy capacity equates to ≥120 kWh/m²building footprint/year.

Energy Use Intensity	**35 kWh/m²/year**
Space heating demand	**15 kWh/m²/year**
On-site renewable energy generation	**35 kWh/m²/year**
Is offsetting required for compliance?	**No offset required: perfect policy compliance**

Energy Use Intensity	**35 kWh/m²/year**
Space heating demand	**15 kWh/m²/year**
On-site renewable energy generation	**29 kWh/m²/year**
Is offsetting required for compliance?	**£1,047: minimal offset value**

Energy Use Intensity	**35 kWh/m²/year**
Space heating demand	**15 kWh/m²/year**
On-site renewable energy generation	**10 kWh/m²/year**
Is offsetting required for compliance?	**£4,365: potentially excessive offset value**

To compare the third scenario offset cost of £4,365 to an existing energy offset price in Cornwall's adopted local plan, set at 9p/kWh assuming a 30-year lifetime, the equivalent offset contribution with the Cornwall price would be £6,683.

One key aspect of the wider energy-based policy approach, requiring an on-site net-zero energy balance, is that offsetting results in no significant additional cost to the developer compared to delivering the improvements on-site. This is because the offset price is set based on the cost of solar PV installations, which are likely to be similar whether on- or off-site.

In contrast, policies based on % improvements on Building Regulations (regulated carbon emissions) typically rely on offsetting to reach net zero (i.e. a 100% improvement) through a range of different on- and off-site measures and therefore offsetting in a specific carbon

context could result either in additional costs to the developer over on-site requirements – or insufficiently high costs to represent an incentive to deliver on-site improvements (and insufficient funding to deliver actual equivalent carbon savings offsite).

South & Vale may wish to commission a study closer to the time of examination that assesses recent existing or ongoing local solar PV installations of varying size to determine a locally-specific energy offset price. This could increase the robustness of the price set, but the median costs used in this report are representative of the current cost of solar PV at a national scale.

Embodied carbon offsetting

As previously explored in the 'Embodied carbon' section of the Tasks 1 & 2 report, embodied carbon is increasingly accounting for a relatively larger proportion of emissions arising from the whole lifetime of a building, due to improvements in operational energy efficiency. Also as previously noted in this report, the 'manufacturing and construction' sector is one of those recommended to reduce its emissions rapidly and reach close to zero carbon around 2040-45, in order to pull its weight towards the nationally legislated carbon targets. However, there is currently no national regulation on embodied carbon, yet embodied carbon targets are not yet widely established as a local policy concept and therefore neither is embodied carbon offsetting.

As briefly mentioned above, Bristol City Council emerging local plan is proposing embodied carbon offsetting if policy requirements, aligned with LETI embodied carbon targets, are not met. B&NES have set a backstop embodied carbon policy requirement limiting emissions to 900kgCO_2e/m^2, yet this does not include a requirement or mechanism for offsetting.

No other local plan precedents proposing embodied carbon offsetting have been identified. However, this is no reason to not explore offsetting options for embodied carbon.

Embodied carbon policies with aligned ambitious targets, as set out in the Policy Recommendations of Tasks 1 and 2, are feasible and achievable but similarly to operational energy, there may be added build costs and there will be some exceptional circumstances where policy requirements are not met. Therefore, instead of an application being refused, the last resort of embodied carbon offsetting allows an alternative route to compliance where the maximisation of on-site measures have clearly been demonstrated.

However, it is highly important to design policy to ensure that developers dedicate full focus to achieving upfront embodied carbon emissions reductions prior to any consideration of embodied carbon offsetting.

Recommended pricing

Unlike operational energy, embodied carbon offsetting should use the £/tCO_2 metric as this will most directly align to values reported in embodied carbon assessments.

The offset price set for operational energy cannot be used for embodied carbon offsetting as the embodied carbon does not translate to a specific amount of energy needing to be matched with delivery of off-site solar PV. For this reason, offsetting projects for embodied carbon do not need to be limited to renewable energy provision and can explore other options (see 'embodied carbon offset projects' subheading, opposite).

Bioregional recommends that the BEIS Green Book 'high' scenario price, which for 2023 is £378/tCO_2, is applied for embodied carbon offsetting in the South & Vale local plan. This is the nationally-recognised carbon price, which has been thoroughly tested and therefore represents the most robust value to use as a embodied carbon offset price without any further specific work produced on the specific costs of embodied carbon offsetting.

Embodied carbon offset projects

As the recommended price for embodied carbon offsetting uses a £/tCO_2 metric, a range of carbon reduction projects could be selected. However, the key principle of offsetting should still be integrated into project selection.

Projects that are not acceptable for operational energy could still be selected for embodied carbon offsetting. For example, existing buildings retrofit - especially as retrofit should reduce risks of existing buildings' demolition, keeping them in use and therefore avoiding future unnecessary embodied carbon emissions associated with the construction of new buildings in place of the demolished existing building.

As previously noted, we do not ideally recommend the use of afforestation or other land-based projects for offsetting due to their susceptibility to future failure from fire, die-off and poor management. Additionally, the aforementioned analysis of the 'balanced pathway' to the UK's legislated carbon targets appears to indicate that the UK's entire limited capacity for land-based carbon sequestration will be needed to counter the unavoidable emissions from agriculture, aviation and waste. This remains the case even if the afforestation target is hit, and even in combination with optimistic assumptions about future technologies for carbon removals).

Still, foreseeing the event that political or practical pressures may eventually result in revisitation of land-based carbon offsetting, our recommendation is that **if** land-based schemes are inserted as an option for embodied carbon offsetting they should be limited to projects inside the South & Vale area and backed by the Woodland Carbon Code. This is currently the only nationally recognised nature-based carbon credit scheme in the UK and confirmed by Government to be counted towards the UK's national carbon reduction targets (other than the Peatland Carbon Code, which is less geologically relevant to South & Vale).

Offset fund mechanisms

S106 mechanism

Section 106 (S106) of the Town and Country Planning Act (1990) provides the power to require an applicant to enter into an agreement with the local planning authority in order for permission to be granted for a proposal that would otherwise be unacceptable. In this case, without hitting the required embodied carbon and renewable energy targets, a scheme would need to pay into an offset fund ringfenced for the purpose of delivering projects that save the same amount of carbon or energy. S106 has been the mechanism used for carbon offsetting since the concept was driven forward as local policy by the GLA.

The financial contribution from the developer is often negotiated. However, South & Vale should take a clear stance that offsetting contributions must directly relate to the prices set and the residual on-site renewable energy capacity or embodied carbon emissions.

S106 agreements are also subject to viability limitations, but the separate feasibility and costs reports show that hitting on-site targets is typically achievable and so offsetting should only be necessary in exceptional circumstances (and cost similar to what it would have cost to hit the targets on-site). The expected minimal delivery of high-rise development in South & Vale means that feasibility claims are unlikely to be valid (as only in high-rise schemes is the ratio of roof space to floor space likely to be so low as to prevent meeting the renewable energy requirement).

Regulation 122 of the Community Infrastructure Levy (CIL) Regulations and Paragraph 57 of the NPPF set out the tests that must be met for planning obligations:

Necessary to make the development acceptable in planning terms	Offsetting is required to make the development acceptable (i.e. policy compliant) only where on-site targets are not achievable, i.e. in exceptional circumstances. Without an offset mechanism in such cases, proposals would be refused even if otherwise desirable.
Directly related to the development	The proposed offsetting mechanism is directly related to the development as its role is to achieve energy and carbon measures off-site to mitigate the climate impacts of the development. Offset-funded projects would ideally also be related by proximity.
Fairly and reasonably related in scale and kind to the development	The proposed offsetting approach is related in scale and kind to the development because the payment is directly scaled to the degree to which the development falls short of the required on-site energy and carbon targets. The prices are fair in that they relate to nationally set values and the local cost of mitigation, and do not add costs to developers compared to on-site compliance (which in turn is being tested for feasibility and cost uplift).

Alternatives to S106

A potential alternative is the use of unilateral undertakings. These are a one-sided legal agreement whereby only the developer bound by the obligation. As the council is not bound, this could create risks of not following through on delivery of the necessary projects to save the specific required amount of carbon or energy.

The Levelling Up and Regeneration Bill, at Part 4, intends to replace the current Community Infrastructure Levy and Section 106 Agreements with a new mandatory Infrastructure Levy. The Bill now has royal assent, but it appears that narrowly targeted Section 106 agreements may remain.

The Technical Consultation on the Infrastructure Levy (17/5/23) distinguishes between 'integral' (on-site) infrastructure and 'levy infrastructure', and identified that S106 will be largely replaced by "delivery agreements", to ensure integral infrastructure is secured. Paragraph 1.20 indicates that these 'delivery agreements' could be used to deliver off site mitigating infrastructure since it uses the example of 'suitable alternative green spaces'. So, although the name implies that it seems logical that off-site carbon offsetting measures would not be included, this may not be the current thinking.

In addition, the consultation proposes at paragraph 1.36 that there should be three "routeways" available to LPAs: the core levy routeway, infrastructure in-kind routeway and S106-only routeway. This reinforces that Section 106 would still have a role but that 'delivery agreements' may take over some of the work of Section 106 agreement. How S106 will be able to be used in future will need to be specified by future Regulations, as would the measures that ultimately encompass 'integral' infrastructure secured by 'delivery agreements'. The consultation responses are being considered, and it appears that the introduction of the new levy is intended to be on a 'test and learn' approach which means it will be some years away from mandatory status.

Fund administration and management

The recommended overall approach for fund management is that developers contribute into a council-run offset fund at the agreed prices, per kWh for operational energy and per tCO_2 for embodied carbon. It is important to note that two funds should be set up to individually ring-fence specified projects, for operational energy and embodied carbon offsetting projects respectively. Complications are likely to arise if a central fund is held for both offsetting scopes and could hinder monitoring and reporting abilities of funds received and benefits delivered by funded projects (as one fund's benefit should be measured in energy and the other in carbon).

Ideally, the South & Vale offset fund would have a balance of £0, yet this is not entirely realistic as some development will need to use the offsetting mechanism. It is the

responsibility of the Councils to determine whether a development is justified in its proposal to offset a shortfall in on-site renewable energy capacity or embodied carbon performance. Dedicated officers should be sufficiently upskilled to determine these decisions to ensure that offsetting is not exploited as a route to compliance.

Similarly, regardless of whether the fund is entirely council-run or involves external partners, dedicated officers should be assigned to fund administration and management to ensure there is no inertia of project funding and assignment. It is essential that this is in place to avoid unintended consequences previously seen at GLA authorities where financial contributions have gone unspent and subsequently returned to developers in some cases where funds have not been spent for five years, as required under S106.

Offsetting projects

Aside from pricing, project selection is key to efficacy of an offsetting project and should be considered at a local level. The key here is to fund projects that directly offset what was not achieved on-site, which is simply renewable energy generation (or carbon savings equivalent to the excess embodied carbon). For the energy offsetting, non-energy-based projects pose a high risk of mitigation not being equivalent to the development's impact, and are difficult to measure and validate offset effectiveness.

Bioregional recommends that offset projects for operational energy are limited to off-site renewable energy solutions that provide additional capacity not already in the energy pipeline. As previously noted, it will be important that the carbon or energy benefits funded by the offsetting are not sold on and thus 'double-counted' – for example if a solar PV farm is created with offset funding, this installation should *not* generate and sell-on REGO certificates (renewable energy guarantees of origin), as this would enable unrelated third parties to count that as 'zero carbon' energy within their own account, thus double-counting. The exception would be if that PV farm turns out to generate *more* than annual energy demand of the development that was being offset (REGO certificates for the excess energy could be sold).

An offset project that would score well against the 6 principles outlined above could be installing solar PV on social housing in close proximity to the development. In contrast, a tree-planting scheme abroad would be less effective due to aforementioned performance risks and lack of relation to the built environment's causes of carbon emissions and energy impacts.

In any case, offset projects set up abroad are strongly discouraged as they do not count towards the UK's or districts' carbon inventory and they removes valuable capacity for the overseas country's own offsetting that may be required for hard-to-abate sectors.

Nature-based solutions (e.g. tree planting) certainly have a role to play in reducing emissions, yet they are not sufficient to deliver necessary emissions reductions within the context of the built environment, particularly due to associated permanence and measurability implications.

Small scale local schemes vs large-scale

Small-scale offset projects are likely to perform better against the principles of co-benefits and proximity to the development because there will be more opportunities for small PV installations at a small scale compared to a large standalone PV scheme. Additionally, a time-lag is less likely with smaller projects because they can more rapidly be set up.

Administrative burdens are however likely to be more prominent if multiple small-scale local projects are selected instead of one larger project. This could be challenging to manage in terms of transparency and validation, alongside operational monitoring of such projects.

A balance may be struck between small and large projects. Project selection, and assessment of local community benefits, should be a council-led decision due to political implications.

Acceptability of example projects for offsetting of operational energy

Unacceptable projects	Acceptable projects
Existing buildings retrofit	Solar PV installations on existing buildings within the district(s) (e.g. social housing, schools and low-income households)
Nature-based projects (e.g. peatland restoration, tree-planting or grassland)	
National and international offset schemes	Large standalone renewable energy generation within the districts
Solar PV on other new buildings outside the development (unless in excess of the amount needed for that new building's own compliance with the policy)	

Regarding PV installations on other new buildings, there will rarely be scope for this project type as an offsetting intervention, because those other new buildings will already need their own roof space for their own solar PV to achieve their own required on-site net-zero energy balance. Therefore, additionality would not be achieved because PV installations on all new buildings should occur without any potential offset funding flowing between them. An exception could be if the 'other' building has more roof space than it needs for its own PV or has proven beyond reasonable doubt that it is unviable to provide its own sufficient PV (but is otherwise a necessary development), in which case it could be acceptable to use this space for further PV funded by offsetting from new buildings that don't have enough roof space.

Although solar PV installations on **existing** buildings can be acceptable as a means to offset operational energy, energy efficiency retrofitting (e.g. fabric improvements) is not. This is primarily because such projects may not ensure emissions reductions that are directly measurable and comparable with a shortfall in on-site renewable energy capacity. For example, behavioural factors can create a 'rebound effect' that partially or fully negates the energy savings of retrofit (e.g. keeping the building warmer rather than reducing heating use) which cannot be accounted for in the offset scheme. Additionally, efficiency projects would have different costs than those on which the offset payment is based. The energy offset price is based on the cost of solar PV, therefore spending this on other measures could risk a mismatch between the amount of funding available and the cost delivering the amount and type of project needed to deliver the same carbon or energy savings that solar PV would have.

Acceptability of projects for embodied carbon offsetting

Please note that projects for offsetting **embodied carbon** must still be subject to the principles of proportionality, additionality, permanence, low time lag, co-benefits and transparency. However, embodied carbon offsetting does not need to be subject to the same restrictions on project **type** that the operational energy offsetting projects are. This is because the embodied carbon (and/or whole-life carbon) emissions come from many sectors and locations:

- Industry (e.g. producing the materials and products; and fuel use in construction)
- Commercial (e.g. marketing the products to the developer; design process)
- Transport (transporting materials & products; transporting workers to site)
- Waste (material wastage during material production and manufacturing; disposal of materials during maintenance, replacement and eventual end of building lifetime if a whole-life carbon figure is used).
- In the District(s) and the UK, but potentially also partially overseas.

For this reason, there is no need to restrict the delivery of embodied carbon offset to renewable energy projects only, although these could be one option. Nevertheless, the projects **must** still be able to deliver measurable, additional and permanent savings and should still be delivered within the District(s) so that true oversight and certainty is possible. Overseas offsetting should still never be accepted.

Project delivery

Delivery of the two identified acceptable project types for operational energy offsetting can be implemented through two options:

1. Set up partnerships with local organisations such as community energy groups and social housing providers.
2. Entirely council-run fund with bidding process.

There are benefits and downfalls to both options, yet Bioregional tentatively recommends offsetting delivery through local partnerships. The key benefit of a partner-led approach is that the cost efficiency of project delivery can be significantly enhanced where the partner has mechanisms in place for swift project selection and delivery. For this benefit to be realised, the Council will need to select partners on the basis of skills and experience in delivering such projects, and the right connections, with preference for those with an existing pipeline of project options. Contractual and quality assurance mechanisms must be put in place.

Offset fund management and project delivery mechanisms should be an iterative process as the balance between options and approaches is found. For example, a pilot approach for the first year could be utilised. This was the approach taken at Bath & North East Somerset Council where partnerships were sought with a community energy group and housing provider. Both partnerships would be tested throughout the first year of offset fund operation. However, the efficacy of this approach will not be known until early next year.

Through a pilot approach, which can be built upon, the council can learn what works most effectively and then potentially open the fund up to additional partners once mechanisms are firmly in place.

To finally reiterate, although it is essential to have offset fund management, administration and project delivery mechanisms in place, the council should focus all efforts on ensuring that on-site measures are truly maximised and therefore it should only become necessary to collect contributions to the offset fund in exceptional circumstances.

	Cons	Pros
Partnerships	Not directly in control of project selection	Capacity not required internally at council for project identification
	Potential legal/financial implications if partners financially benefit from projects	Reduced administrative burden on council officers
	Council not in direct control of monitoring success and efficacy of project operation	Project delivery mechanisms already in place at partner organisations [should be part of selection process]
	Political implications selecting specific partners	Faster project delivery and guaranteed local benefit
Council-run	Administrative and management burden on resource/capacity	In direct control of project selection and delivery
	Additional responsibility to deliver projects effectively	Fewer legal complications as no third parties involved in project delivery
	Lack of mechanisms to deliver projects on time and effectively	In control of monitoring and reporting; improves transparency

Summary of recommended offsetting approach

Offsetting is an important element of local plan policy but should be minimally used and reserved for specific cases where genuine constraints to achieve on-site policy requirements are present.

Setting a sufficient offset price to deliver is of the utmost importance to prevent the use of offsetting as a route to compliance.

For operational energy, the recommended cost is directly related to the cost of solar PV and is set at £1.94/kWh. Projects should be linked to what is being offset from the development, which in this case relates to off-site solar PV installations, although other renewable energy generation technologies are acceptable if the generation output is equal to the on-site shortfall.

For embodied carbon, the recommended cost of £378/tCO_2, aligning to the national valuation of carbon produced by the Department of Energy Security and Net Zero. Both costs should be reviewed annually. Opportunities for embodied carbon offset projects are more widespread than operational energy because emissions sources come from a range of sectors. However, for both operational energy and embodied carbon, projects **must** be able to deliver measurable, additional and permanent savings and should still be delivered within the District(s).

Whether South & Vale decide to administer a council-run fund, or seek partnerships to deliver offset projects, or a combination of the two, it is essential that clear mechanisms to deliver projects are set up prior to funds being received and that such mechanisms align with the core principles of offsetting.