



Greater Cambridge Local Plan Strategic Spatial Options Assessment: Carbon Emissions Supplement.

(An addendum to Greater Cambridge Local Plan Strategic spatial options appraisal: implications for carbon emissions, November 2020)

Bioregional, on behalf of Greater Cambridge Shared Planning Authority

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Glossary and acronyms

BAU	Business as usual. Refers to today's current practices in design, construction and transport
BEIS	UK national government department for Business, Energy, Innovation and Skills
CO ₂	Carbon dioxide
Embodied carbon	Carbon emissions that already happened during the production, transport and assembly of goods before they are used or operated (such as building materials and construction)
EV	Electric vehicle
GB	Greenbelt
GCSP	Greater Cambridge Shared Planning
GHGs	Greenhouse gases
kWh	Kilowatt-hours (a unit of energy)
PV	Photovoltaics (solar panels generating electricity)
tCO ₂ /y	Tonnes of carbon dioxide per year
ZC	Zero carbon

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Introduction

This Greater Cambridge Local Plan Strategic Spatial Options Assessment: Implications for Carbon Emissions Supplement Report assesses, with regard to carbon dioxide emissions, the working assumption Greater Cambridge Local Plan preferred option development strategy, and a new blended Edge of Cambridge: Green Belt alternative, in the same way as was completed for the strategic spatial options in November 2020.

Alongside other evidence assessments and Sustainability Appraisal, consideration of the preferred option and Edge of Cambridge: Green Belt alternative alongside the strategic spatial options assessments ensures consideration of a range of reasonable alternative strategies.

Context

For the strategic spatial options stage we completed assessments of the three growth levels and eight strategic spatial options.

Further to this, ahead of the Preferred Options Plan consultation taking place in autumn 2021, officers from Greater Cambridge Shared Planning on behalf of the two councils shared with us a working assumption preferred option development strategy, including preferred growth level and distribution assumptions for dwellings, jobs and associated population growth.

Please note that use of the working assumption preferred option development strategy to inform this evidence base does not confer formal support by either council for that strategy. No decisions will be taken on development strategy assumptions until relevant member committees meet and approve documents for the Local Plan preferred options consultation. Such decisions will be informed by appraisal of reasonable alternatives. Setting out working assumptions in this and other notes does not prejudice those decisions.

Growth level

The three growth levels tested in the original report in Autumn 2020 (as per GCSP figures) were:

- Minimum - Standard Method homes-led (3,900 new homes)
- Medium - central scenario employment-led (9,800 new homes)
- Maximum - higher employment-led (26,300 new homes)

Following consideration of the November 2020 strategic spatial options evidence bases and Sustainability Appraisal, Greater Cambridge Shared Planning Service has determined that the medium level of homes associated with the central employment scenario represents the objectively assessed need for homes in Greater Cambridge. Having determined this, the previously assessed alternative growth options of minimum and maximum are no longer considered to represent reasonable alternatives.

Further to the above, the Greater Cambridge Local Plan Preferred Option growth level is the medium homes level, including a 1:1 commuting ratio for housing growth generated by additional jobs above those supported by the Standard Method, in line with the councils' aims of limiting longer distance commuting and thereby limiting carbon emissions (described as "medium+" growth level). We, and other evidence base consultants, did not assess the medium+ level of growth for the Strategic Spatial options, but we do not consider that rerunning the evidence testing of the strategic spatial options against a new medium+ housing figure would result in materially different outcomes to our November 2020 conclusions (in terms of ranking the Options from lowest or highest carbon).

We now test 'Preferred Option growth level' as follows:

- Preferred growth level (Medium+): circa 12,900 new homes

All of the above growth levels represent **additional** new growth that the local plan seeks to accommodate, on top of 'existing planning commitments' (growth to which the planning service has already committed but is not yet built).

Spatial distribution

The Councils' working assumption preferred option is a blended strategy including a number of broad supply locations. To ensure that the preferred option is tested against reasonable alternatives, an assessment of the preferred option blended strategy has been completed, so that it can be compared against:

- the strategic spatial options tested last year¹
- other reasonable alternative blended strategies.

Some of the spatial options tested last year were blended strategies and others not. The Councils reviewed the strategic spatial options tested in November to see whether these included a range of reasonable alternative blended strategies, noting that they don't need to test every possible reasonable alternative. The conclusion to this assessment was that the only alternative blended strategy not

¹ The spatial scenarios tested through the Autumn 2020 report were:

1. Densification of existing urban areas
2. Edge of Cambridge - outside the Green Belt
3. Edge of Cambridge - Green Belt
4. Dispersal - new settlements
5. Dispersal - villages
6. Public transport corridors
7. Supporting a high-tech corridor by integrating homes and jobs
8. Expanding a growth area around transport nodes

The title of each option refers to the type of location where *most* of the growth will occur, but most options had some growth elsewhere too (a blended strategy).

yet tested was one including development at Edge of Cambridge: Green Belt. The Councils therefore identified a blended strategy development distribution for this spatial option, which is directly comparable to the preferred option and broadly comparable to the strategic spatial options from November 2020.

Spatial options tested

We now test the carbon emissions of two new spatial scenarios:

9. Preferred Option - mostly Cambridge locations, some of which suburban, with a significant chunk at Cambourne and a small amount in villages.
10. Edge of Cambridge - Green Belt Hybrid. This is similar to Option 9, except with growth at the edge of Cambridge instead of Cambourne.

Methodology

This Supplement Report assesses the above spatial options using the same methodology as in the *Greater Cambridge Local Plan Strategic Spatial Options Appraisal: Implications for Carbon Emissions*. See that report for further detail.

We here provide a brief update about how the new options (option 9. Preferred Option and option 10. Edge of Cambridge - Green Belt Hybrid) have been modelled in our tool with housing numbers congruent with the new 'preferred/Medium+' growth level.

Methodology: Interpreting GCSP growth figures using our tool

Our tool offers six types of location category within which the emissions of each home would be expected to be roughly similar (including associated other growth that would be delivered along with the new homes). Those six categories are:

- Urban
- Edge of city greenbelt
- Edge of city non-greenbelt
- New settlement
- Village
- Public transport corridor.

These categories are distinguished by densities², typical dwelling type/size, amount of new infrastructure/facilities needed (as opposed to being able to utilise existing facilities), and the likelihood that journeys will be walked, cycled, driven, or made with public transport.

The tool allows us to enter any number of homes in each location category, to reflect how growth is distributed within each spatial option as per figures provided to us by Greater Cambridge Shared Planning service.

² Typical densities based on recent applications, or specified in Area Action Plans

The new spatial option '9. Preferred Option' includes the largest portion of its homes in fairly dense Cambridge suburbs, and an extension to a new town on the future East-West rail line. Smaller numbers of homes would also be distributed in small urban sites in Cambridge and in villages. It has been modelled as follows:

Urban category:	4,100 homes; mostly an emerging North-East Cambridge suburb with existing train station and 200 at smaller urban sites
Edge of city greenbelt category:	None
Edge of city non-greenbelt category:	3,900 homes. This has 2,900 homes at the Cambridge Airport site, and a further 1,000 homes at North-West Cambridge ³
New settlement category:	None
Village category:	1,500 homes (inc. 600 in southern cluster)
Public transport corridor category:	3,500 homes. 1,500 homes brought forward equally from build out of Waterbeach and Northstowe ⁴ and 2,000 homes extension to Cambourne ⁵ .
TOTAL:	13,000 homes

The final spatial option '10. Edge of Cambridge Greenbelt Hybrid' is similar to the above but with the 2,000 Cambourne homes moved to Green Belt, as follows:

Urban category:	4,100 homes (as above)
Edge of city greenbelt category:	2,000 - unspecified Cambridge sites
Edge of city non-greenbelt category:	3,900 homes (as above)
New settlement category:	None
Village category:	1,500 homes (as above)
Public transport corridor category:	1,500 homes brought forward equally by build out of Waterbeach and Northstowe ⁶
TOTAL:	13,000 homes.

³ Although North West Cambridge was once Green Belt, the land is considered to already be released. Our tool only finds very minor differences in emissions between Green Belt suburbs and non-Green Belt suburbs (slightly lower transport carbon in non-GB category). North West Cambridge will have enhanced bus and bike links, and therefore the marginally lower-carbon suburb category is suitable.

⁴ These are not additional homes to the new towns which have already been planned, but rather brought forward due to a faster assumed build out rate.

⁵ For modelling purposes, the Cambourne extension is treated as a 'Public Transport Corridor' because of the proposed East - West rail line and assumption that development would only occur once the railway station is in place.

⁶ These are not additional homes to the new towns which have already been planned, but rather brought forward due to a faster assumed build out rate.

As noted in our original methodology, our modelling is homes-led and assumes an associated amount of new infrastructure and other non-residential space being delivered alongside those homes (depending on what existing infrastructure is likely to already be present in each spatial category).

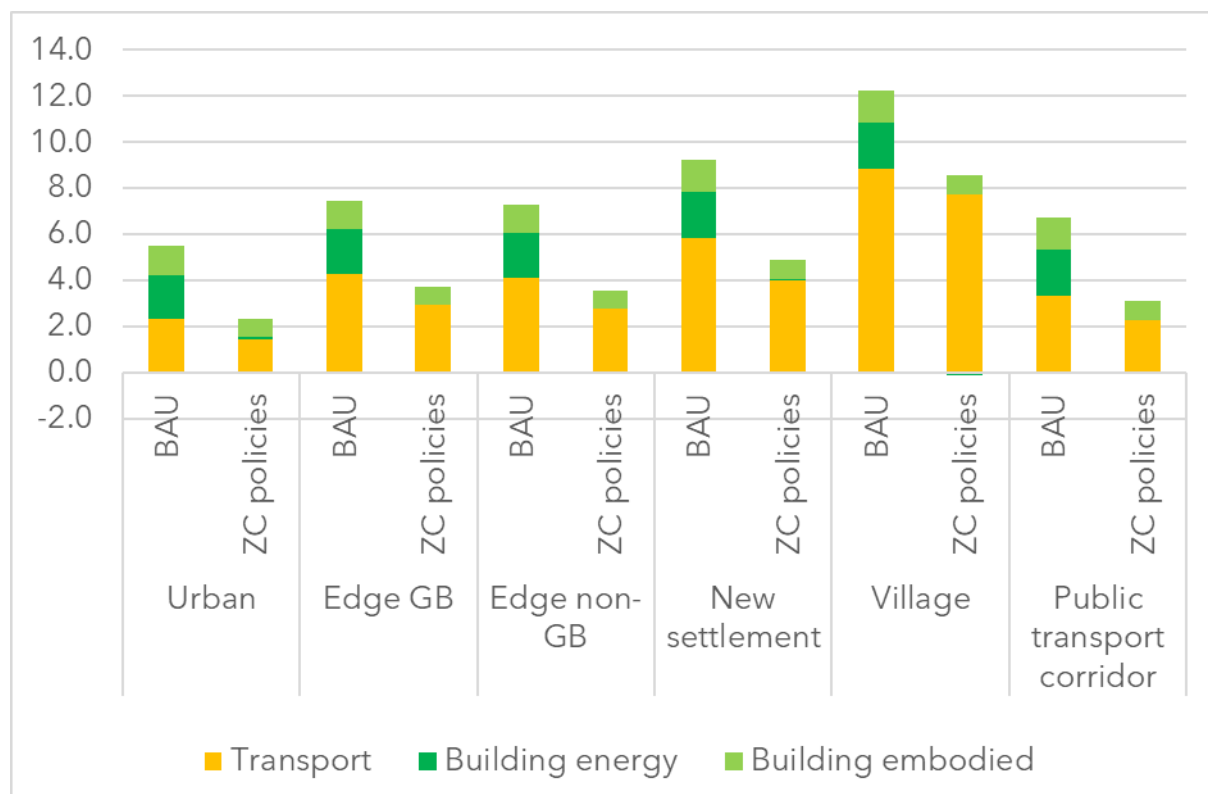
Development figures for each location shared by GCSP for our assessment were rounded. As such they do not exactly match the total assumed housing provision of the 'preferred/Medium+' growth level. Our modelled total is therefore 13,000 homes rather than 12,900 homes. This is a not a significant difference, and doesn't change the conclusions about differences between options 9 and 10.

Methodology: Effects of zero carbon policy

The model offers a range of options to apply policies to reduce carbon emissions in energy use, buildings' embodied carbon, and transport. We modelled the same two policy regimes as per our original report: 'Business as Usual' (BAU), and 'Zero Carbon Policies' (ZC Policies).

For ease of reference, we here re-present the graph showing how our modelling tool represents the annual emissions of a single home in each spatial category:

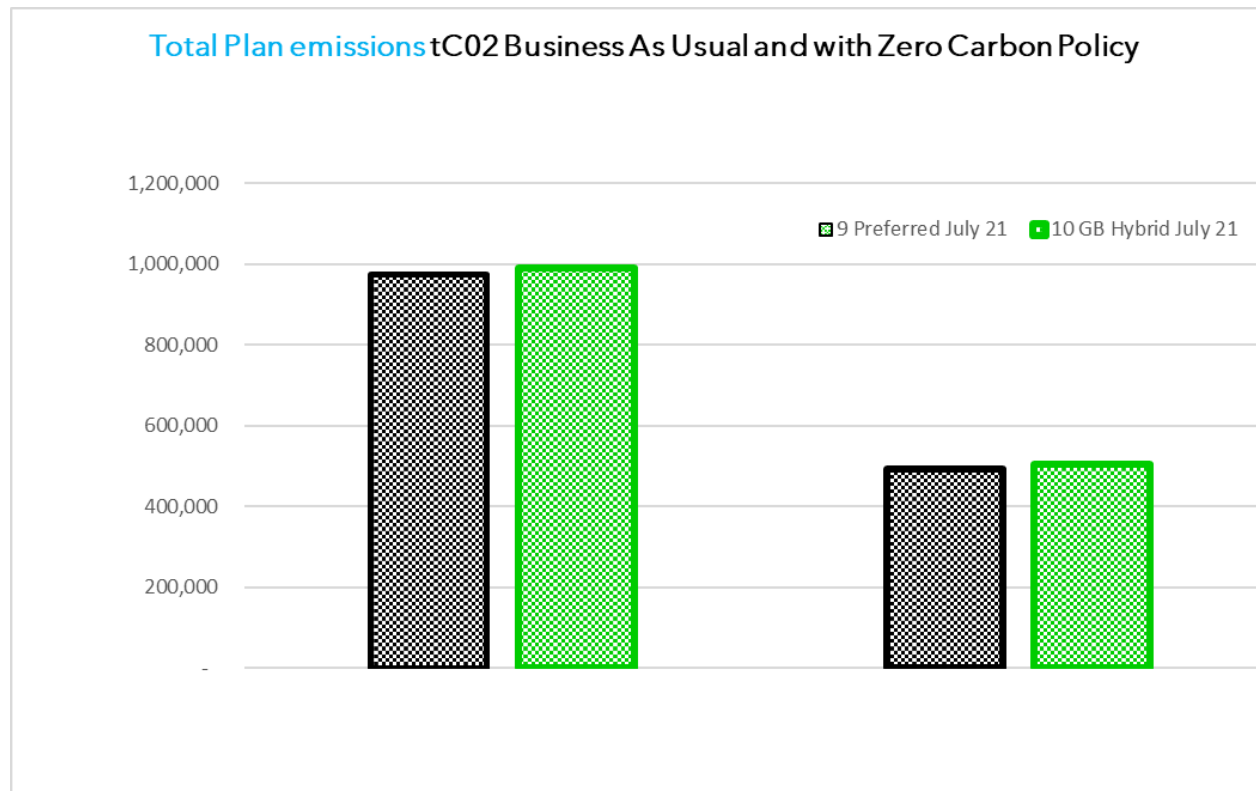
Figure 1 Annual carbon emissions (tCO₂) for 1 home in each location category in the modelling tool, with and without zero carbon policies, 2030



Findings and discussion

The two new options (13,000 homes based on medium+ growth scenario) compare to each other as follows:

Figure 2: **Total plan period** emissions (CO₂) comparing Preferred Growth of c.13,00 homes (spatial options 9 + 10), **with and without zero carbon policies**



The figures show that **in the plan period** (up to 2041), the **Green Belt Hybrid** spatial option produces almost exactly the same **carbon emissions** as the **'Preferred'** spatial option.

For comparison the previously modelled options for medium growth of 9,800 homes are shown below.

Figure 3 **Total plan period emissions** (CO₂) from previous modelling of Options 1 – 8 using a lower medium growth scenario of 9,800 homes, with and without zero carbon policies

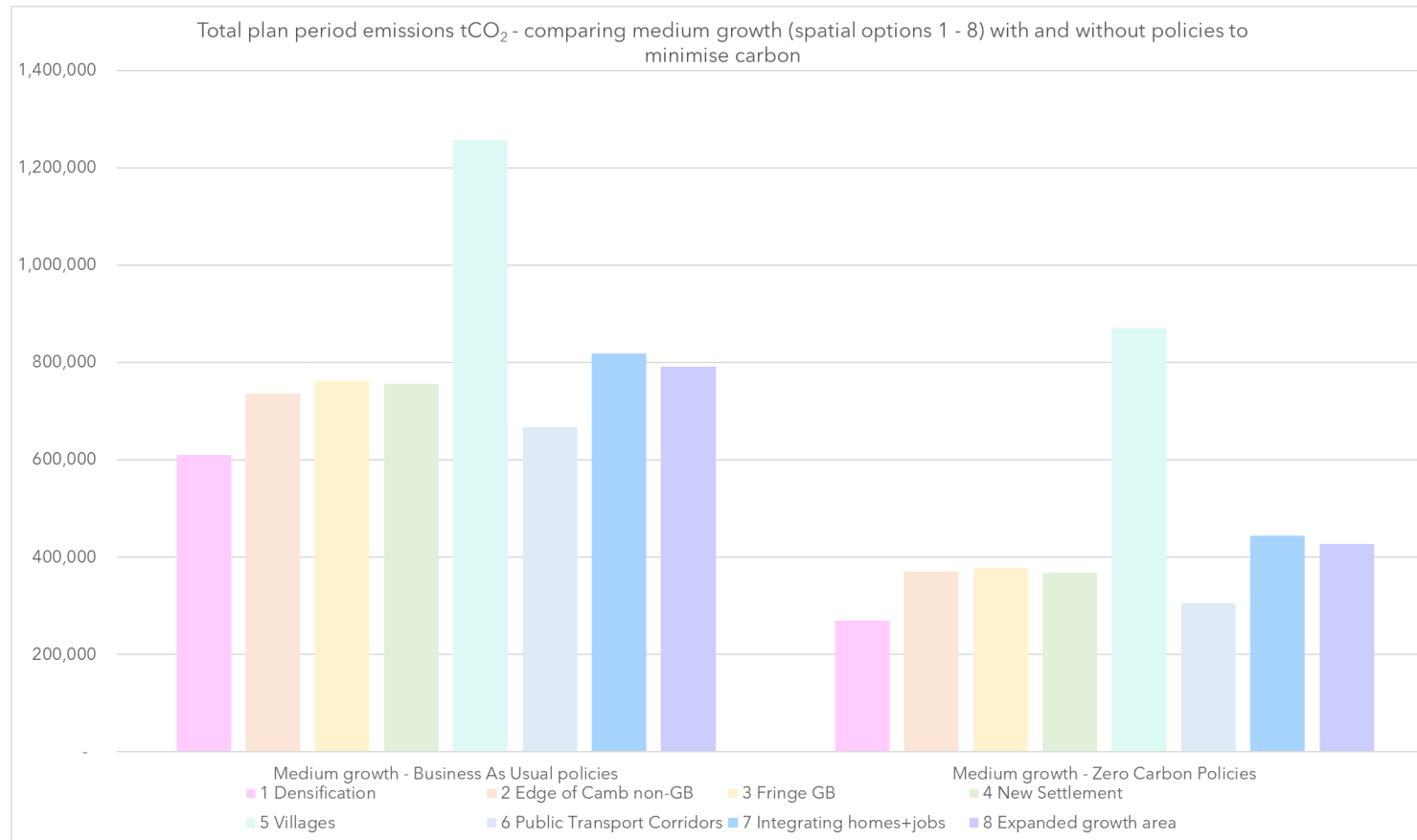
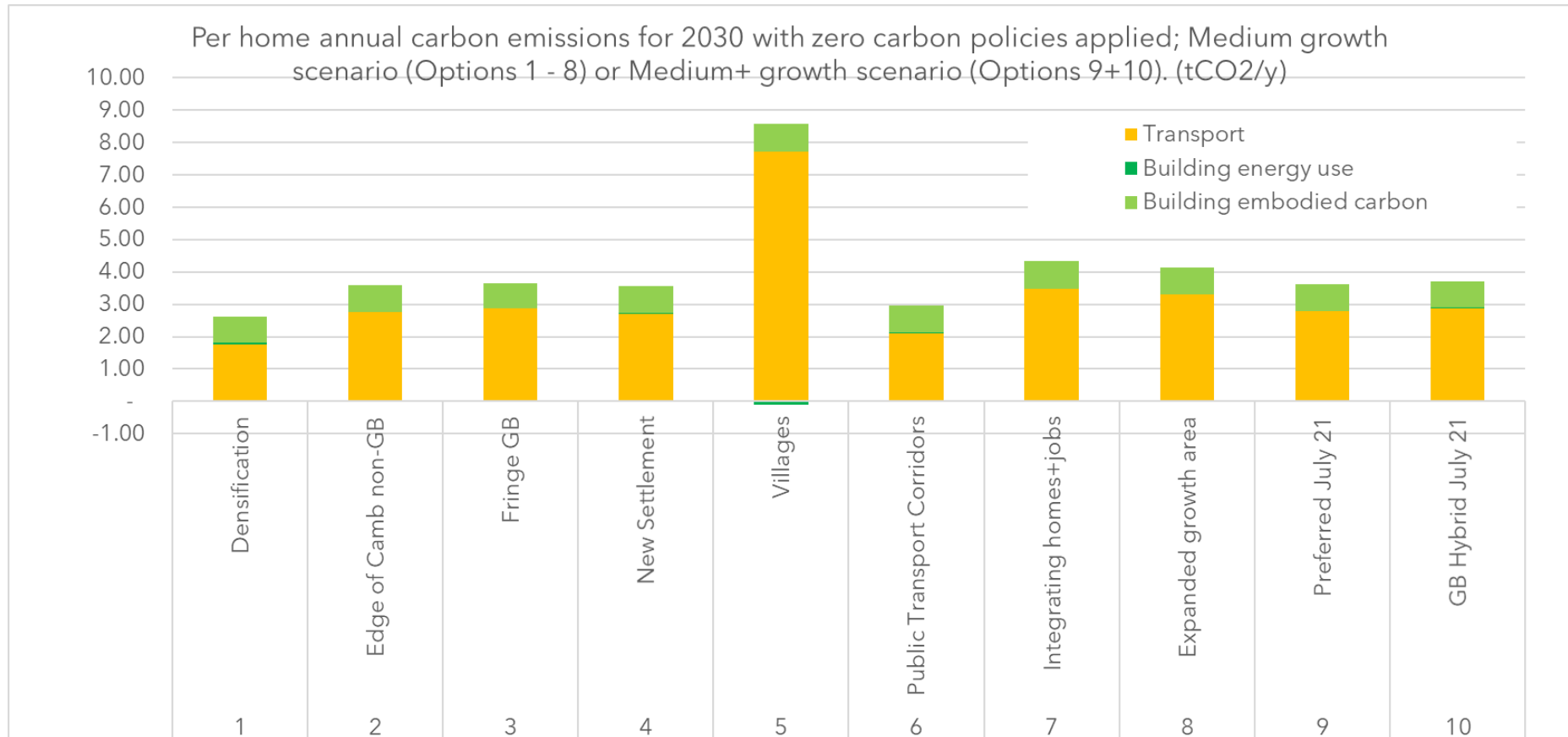


Figure 4: **Annual** carbon dioxide emissions **per home** in the mid-plan year (**2030**) - medium growth (options 1- 8) or preferred growth (options 9 + 10), with **zero carbon policies**



Discussion: drivers of modelled difference between Preferred Spatial Option and Green Belt Hybrid Spatial Option

The difference between the two new options is whether to put 2,000 homes in the new town of Cambourne or to place them in an unspecified Green Belt location on the edge of Cambridge.

In our tool, growth in the Cambridge Green Belt suburbs is anticipated to have only slightly higher carbon emissions to growth on new public transport corridors (see chart, [Figure 1](#)). The slight difference is on the basis that Green Belt suburbs will have marginally worse transport connections and therefore higher related emissions. However, this relatively small difference between the two options only affects 2,000 of the 13,000 homes modelled in each option. Hence there is little difference between these two options overall.

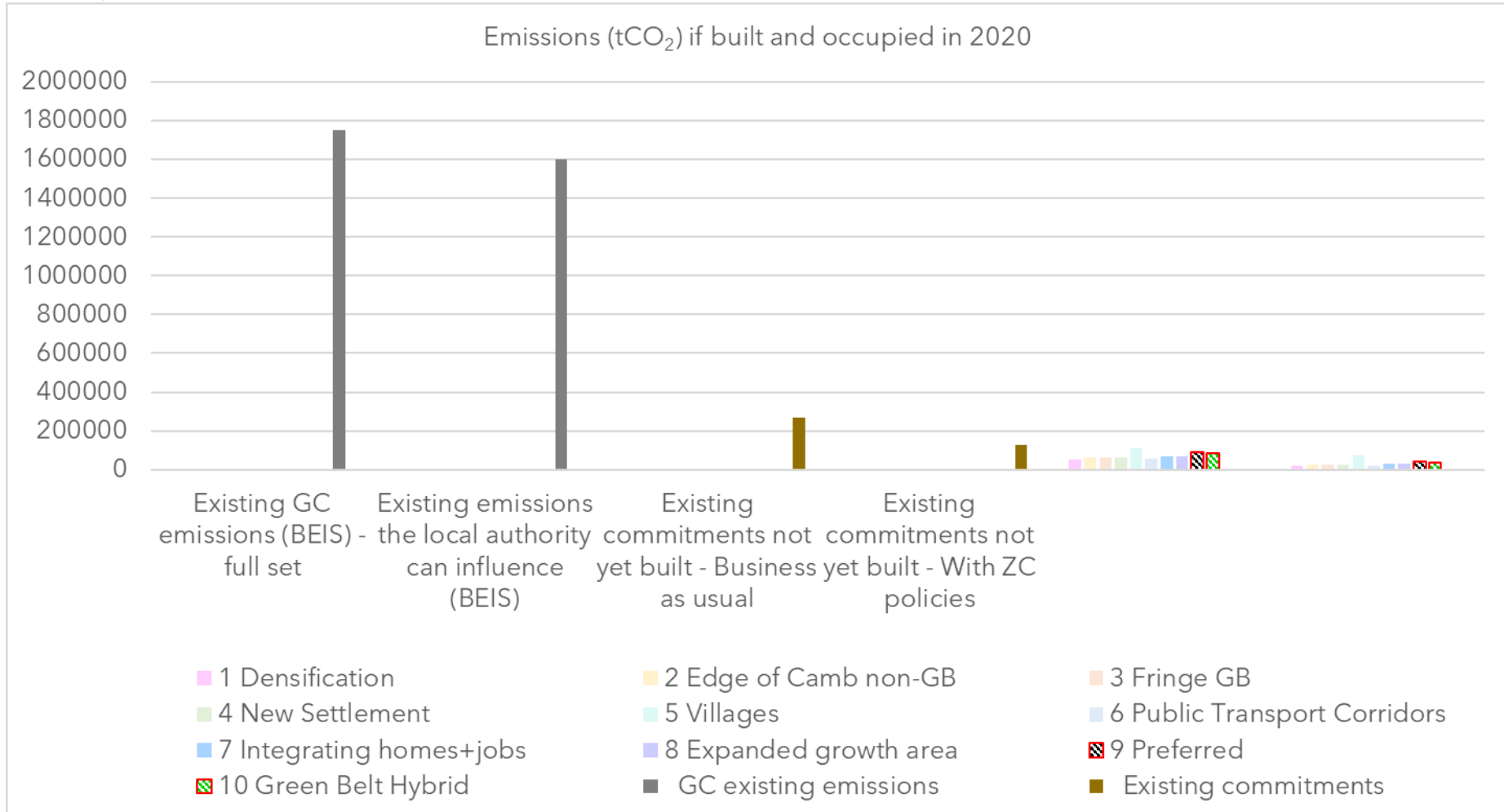
The very small difference between the two options now being considered is as follows:

- With '**business as usual**' policies, Option 9 Preferred is **1.6%** lower than Option 10 Green Belt Hybrid.
 - (Absolute difference: 15.4 kilotonnes of CO₂e).
- With '**zero carbon**' policies, Option 9 Preferred is **2.4%** lower than the Option 10 Green Belt Hybrid
 - (Absolute difference: 12.2 kilotonnes CO₂e).

Given the inherent assumptions involved in the modelling process, these are negligible differences.

Cambourne was modelled as a 'Public transport corridor' on the basis that development of the 2000 homes is only anticipated from when the new station is available from the new East-West Rail (EWR) line. This is a sensitivity, and if homes were built in Cambourne without the transport infrastructure in place, emissions from option 9 would be of the order of 3 - 5% higher than option 10.

Figure 5: New growth annual energy and transport emissions (tCO₂) if built and occupied in 2020, compared to Greater Cambridge existing emissions (BEIS) and existing committed growth. NB Options 9 and 10 are based on higher growth assumptions (13,000 homes) than options 1-8 (9,800 homes). (Far right: with zero carbon policies. Second from right: business as usual).



Discussion: Difference between options, and level of increase on existing Greater Cambridge emissions

The results show that the two options now being considered, with 13,000 homes, represent an increase equivalent to between **2 - 5% of Greater Cambridge's existing annual carbon emissions** as follows (see also Figure 4):

Preferred Option 9, business as usual:	4.8%
Green Belt Hybrid Option 10, business as usual:	4.9%
Preferred Option 9, with zero carbon policies:	2.1%
Green Belt Hybrid Option 10, with zero carbon policies:	2.2%

For comparison, the original modelling showed that the modelled options would result in a percentage increase in Greater Cambridge's existing emissions as follows:

Highest emissions: 26,300 homes, 'villages' option, business as usual: 15%

Lowest emissions: 3,900 homes, 'urban densification' option, ZC policies: 0.4%

Mid-range emissions:

- 9800 homes, with zero carbon policy, all options except villages: 1 - 2%
- 9800 homes, villages option, with zero carbon policy: 4%.

The two options now being tested at a 'Preferred/Medium+' growth level are therefore similar to the mid-range of options previously tested, albeit slightly higher due to the increase in houses being provided.

As before, the results still show that applying zero carbon policy achieves dramatic improvement.

As before, even with the 'zero carbon' policies applied, there is still a residual amount of carbon emitted from buildings and transport. Please see our original report for an explanation of why this is, and steps that could be taken to address this beyond the 'zero carbon policy' suite that we applied in this model.

Discussion: Is the 'preferred' growth level worse for carbon?

As explained in the introduction, the 'Preferred' growth level (~12,900 homes) is selected so that Greater Cambridge can provide enough homes and workspace to fulfil its own anticipated growth in jobs and population.

As shown in our charts, this shows up in our modelling as a somewhat higher amount of carbon compared to the previous 'medium' scenario (9,800 homes). This carbon falls into the 'carbon inventory' or carbon footprint of Greater Cambridge. However, failing to plan for this growth does not necessarily mean that this carbon would not be emitted at all, nor that the climate impact would disappear.

Without delivering these homes in Greater Cambridge, jobs would otherwise most likely be filled by workers who live outside the local area - and if the housing growth doesn't happen here, the new job creation locally would draw in commuters. The demand for homes could push this growth elsewhere, for example to locations that don't have such strong carbon reduction building policies as Greater Cambridge is intending to apply. Additionally, there could be higher transport carbon if more people are having to commute further rather than living close to their jobs (or close to public transport).

This means that suppressing growth in Greater Cambridge (for the sake of suppressing the modelled carbon) could have the unwanted side effect of an overall higher amount of carbon being emitted from those people's homes elsewhere, and transport into Greater Cambridge to work. The difference would be that this carbon would not show up in our model because it would not be 'in' Greater Cambridge⁷. By enabling the growth within its own area, workers in the local area are enabled to live closer to where they work or study - and Greater Cambridge takes responsibility for the wider impacts of its own economic growth and can ensure that strong policies are applied to reduce the carbon emissions of those homes and their associated transport.

As per the previous report: please also note that our modelling cannot account for the fact that growth in some settings could result in step changes to transport patterns of *existing* households as well as new homes - for example, if a critical mass of new growth were to justify a dramatic upgrade in public transport provision. For more details, see our original report

⁷ For more information on carbon accounting for local areas, please see also the following section of our full suite of reports: *Task A: Defining net zero carbon, exploring planning powers towards this, and devising a position statement.*)

Conclusion

In terms of total or per-home carbon emissions, there is very little difference between Options 9 (preferred) and 10 (Green Belt Hybrid). Options 9 (preferred) comes out with a slightly lower carbon figure.

Compared to Greater Cambridge's existing emissions and those of existing planning commitments (see Figure 4), the choice between Options 9 and 10 will make a barely significant difference to total emissions in the plan period.

The small difference that arises is due almost entirely to transport, and is dependent on transport assumptions.

If the Preferred Option (9) is pursued, the potential for variation from the transport carbon emissions modelled could be best mitigated by:

- delivering the growth at Cambourne only after East-West Rail becomes operational
- delivering first-class express bus provision to the other locations likely to be commuted to by Cambourne residents (perhaps to be ascertained by a survey), and offering new residents discounted tickets.
- delivering the growth at Cambourne only after a large proportion of cars are electric (with universal rapid charging)