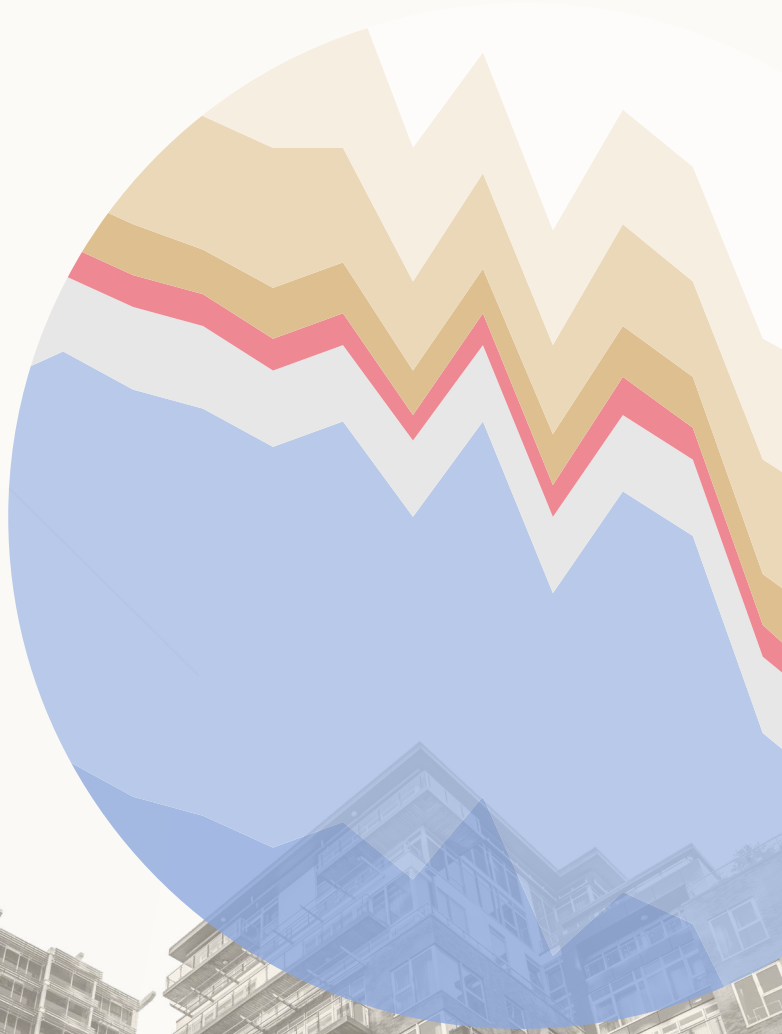
Net Zero Whole Life Carbon Roadmap Progress Report

A Pathway to Net Zero for the UK Built Environment

December 2023



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"Unprecedented global events have shaped the story of the built environment over the last 4 years, but despite forced emissions reductions during the pandemic, this progress report makes one thing clear: our industry is not moving fast enough.

The timeline to meet net zero cannot extend. We must now reduce emissions nearly twice as fast as we have been to get back on track. The later we leave it, the harder it will be and the greater the missed opportunities for tackling interconnected nature and social crises. Industry and government need to work hand in hand to create decisive change and bridge the emissions gap that sets us on path to deliver net zero. "

—

Smith Mordak, Chief Executive

UKGBC Whole Life Carbon Roadmap for the Built Environment

UKGBC's Net Zero Whole Life Carbon Roadmap for the Built Environment (the Roadmap), published in 2021, was the first industry-led effort to develop a deliverable pathway to Net Zero for buildings and infrastructure in the UK. It identified the rapid and consistent actions needed to realise the 85% reduction in greenhouse gas emissions (compared to 1990) required en route to near zero emissions by 2050. This included both substantial policy reforms and engagement from all sectors of the UK construction industry.

This report reviews progress in the four years following the 2018 baseline of the Roadmap. It presents the operational carbon, embodied carbon, and F-gas emissions of the entire UK domestic, non-domestic, and infrastructure stock based on reported data, for comparison against the progress determined to be necessary by the Roadmap.

Executive Summary

According to the Roadmap, UK built environment emissions needed to fall 19% from 2018 to 2022. This progress report shows that, upon review, they fell just 13%.

Operational emissions reduced by 18%, which was broadly as needed based on the Roadmap, whilst embodied carbon emissions reduced by just 4%, less than one quarter of the amount that was required. Key influences across this time period include the Covid-19 pandemic and the extent of grid decarbonisation. Making up the resulting annual emissions shortfall of 11 $MtCO_2e$ in 2022 would require taking one in every six cars off the UK's roads.

This means we are not moving fast enough. In fact, we need to move nearly twice as fast to make up the shortfall and get back on track by 2025. The timeline to meet net zero cannot extend, and consequently more rapid and immediate decarbonisation is vital to compensate and maintain our pathway.

With policy faltering, industry has a crucial role to play in setting the course for decarbonising the built environment and must act quickly, taking learnings and evidence from exemplary projects and rapidly rolling them out across all sectors. Prioritising retrofit, increasing renewable energy supply, and reducing consumption are not just suggestions; they're a mandate for real progress.

The UK government needs to act urgently to make upgrading homes affordable, including boosting public investment, introducing incentives such as stamp duty 'rebate to renovate', and regulations such as minimum standards for private rented homes. Policies to support commercial retrofit must be expedited and the next generation of developments must not compound the problems.

We need political and industry leadership and swift and decisive action to drive systemic change at the pace and scale required to reduce emissions in line with the pathway set out.

Falling significantly short of the targeted reduction from 2018 to 2022 further amplifies the urgent need for an immediate and profound acceleration of our efforts.

11 $MtCO_2e$

Annual shortfall in emissions reductions in 2022

The shortfall in emission reductions amounted to 11 $MtCO_2e$. This is equivalent to the annual emissions of 6.5 million cars or heating nearly 5 million homes this winter.

13%

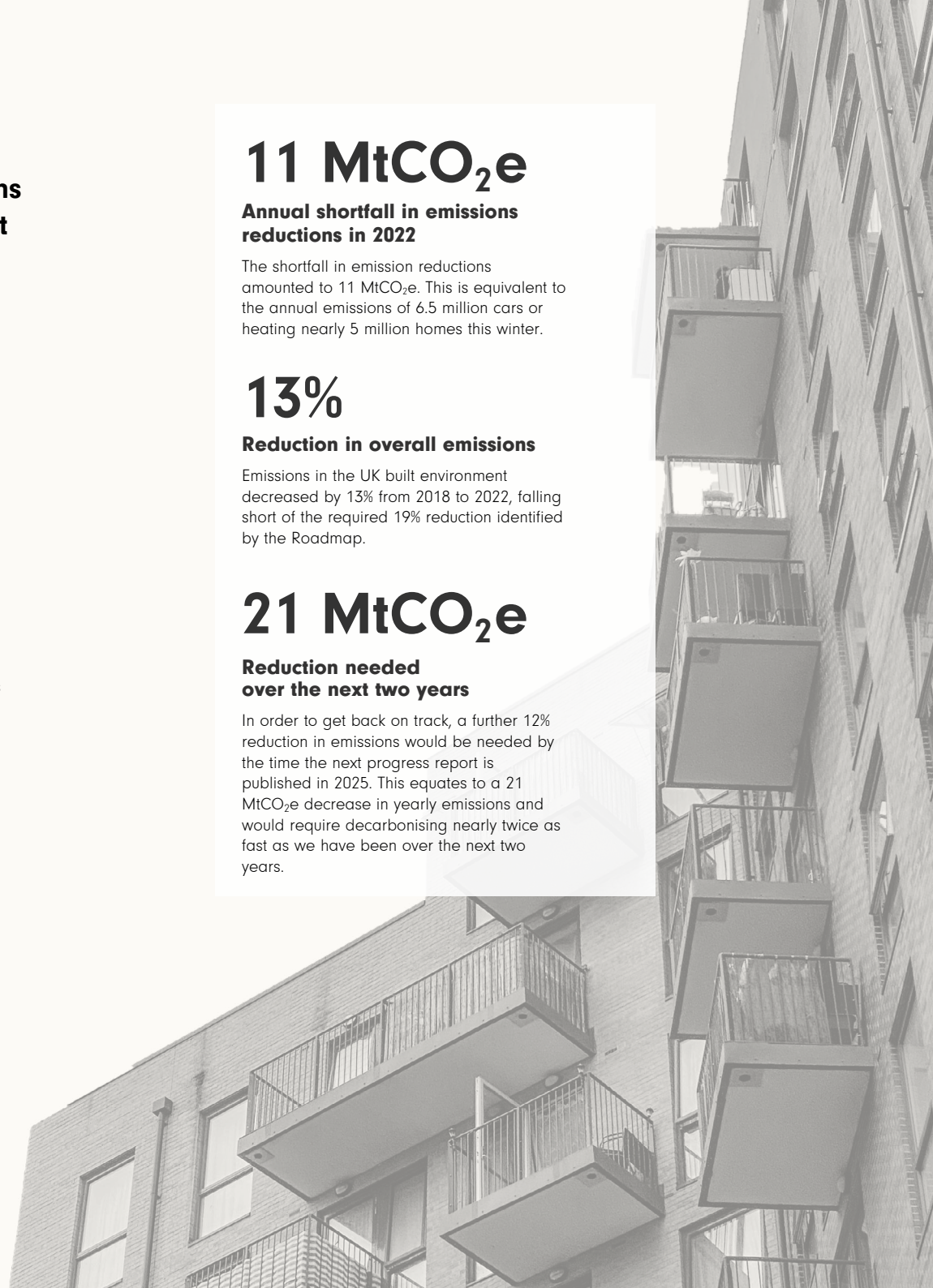
Reduction in overall emissions

Emissions in the UK built environment decreased by 13% from 2018 to 2022, falling short of the required 19% reduction identified by the Roadmap.

21 $MtCO_2e$

Reduction needed over the next two years

In order to get back on track, a further 12% reduction in emissions would be needed by the time the next progress report is published in 2025. This equates to a 21 $MtCO_2e$ decrease in yearly emissions and would require decarbonising nearly twice as fast as we have been over the next two years.



UK Net Zero Whole Life Carbon Roadmap:

2023 Progress Report

UK built environment emissions reduced 13% since 2018, falling short of the 19% reduction needed

According to the Roadmap, total emissions needed to fall 19% by 2022 over the 2018 baseline. In reality, they fell just 13%, translating to an 11 $MtCO_2e$ shortfall. The total emissions reported for 2022 are higher than the Roadmap model predicted, predominantly reflecting the changes to the embodied carbon data summarised in the next paragraph. Nonetheless, emissions reduced over the period between 2018-2022, with Covid-19 showing a clear impact.

Historic emissions have increased due to updates to international greenhouse gas emissions data

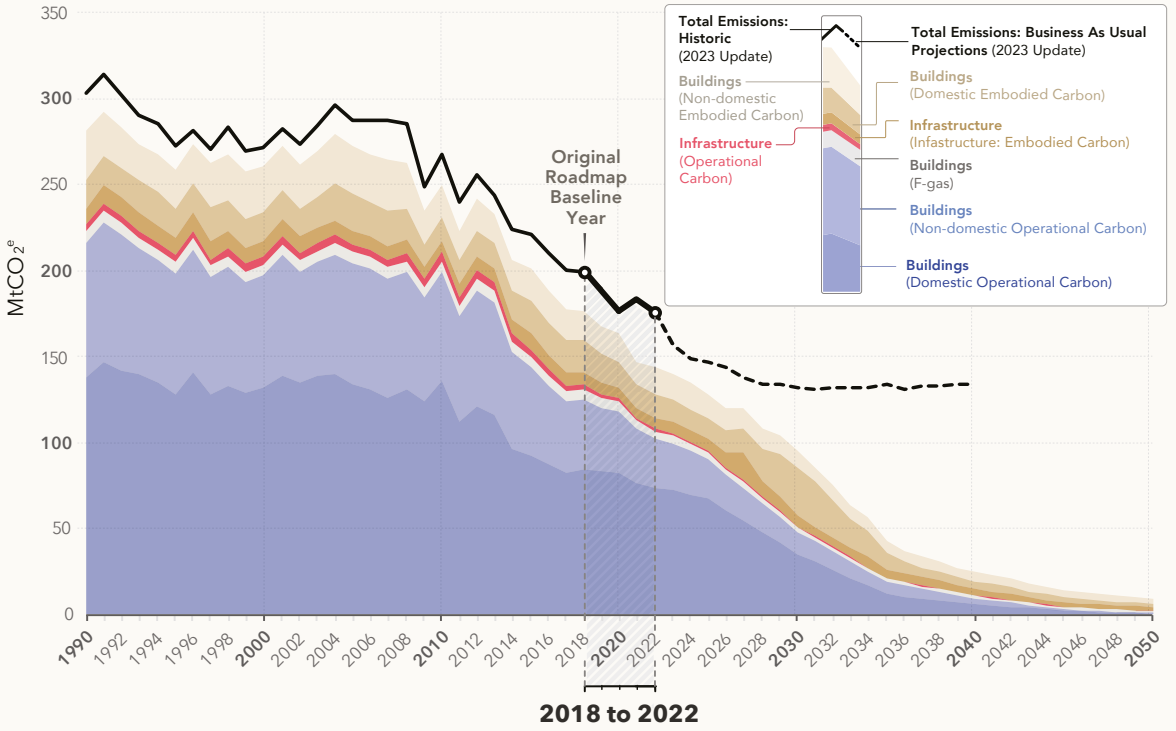
Embodied carbon between 1990 and 2018 carbon has increased relative to the Roadmap, to 67$MtCO_2e$ in the original baseline year. This is due to revisions to sectoral emissions data for other countries, where the largest adjustments occurred in material and energy producing sectors (e.g., Chinese manufacture of basic iron and steel). This was primarily caused by changes in emissions from materials extraction, manufacturing, and production, with much of the remaining difference indirectly attributable to overseas material production.

Committed policies still do not take us close to delivering decarbonisation fast enough to achieve net zero

The Roadmap used the BEIS Energy and Emissions Projections (EEP) to create a business-as-usual scenario reflecting committed national government policies. The model was updated with the latest projection data which shows that, without further policy intervention, future annual emissions are likely to plateau around 130 $MtCO_2e$, well shy of the <25$MtCO_2e$ the Roadmap projects is needed after 2040. Note, the EEP does not extend beyond 2040.

FIGURE 1: HISTORIC BUILT ENVIRONMENT EMISSIONS (1990-2022)

Excluding Transport, with Business as Usual Projections Overlaid onto the 2021 UKGBC Net Zero Whole Life Carbon Roadmap Data.



As defined by the 2021 UKGBC Whole Life Carbon Roadmap

FIGURE 2: REQUIRED EMISSIONS REDUCTIONS

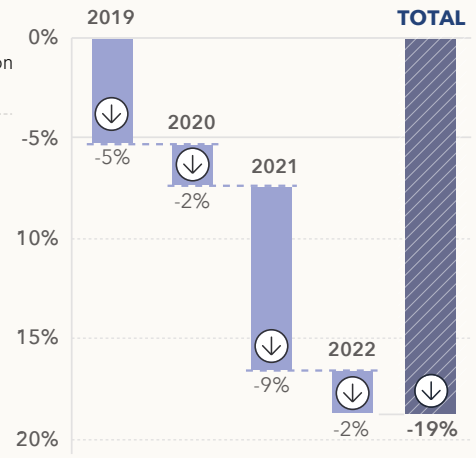
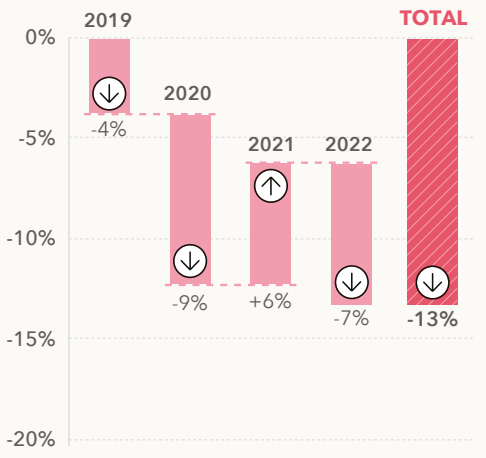


FIGURE 3: ACTUAL EMISSIONS



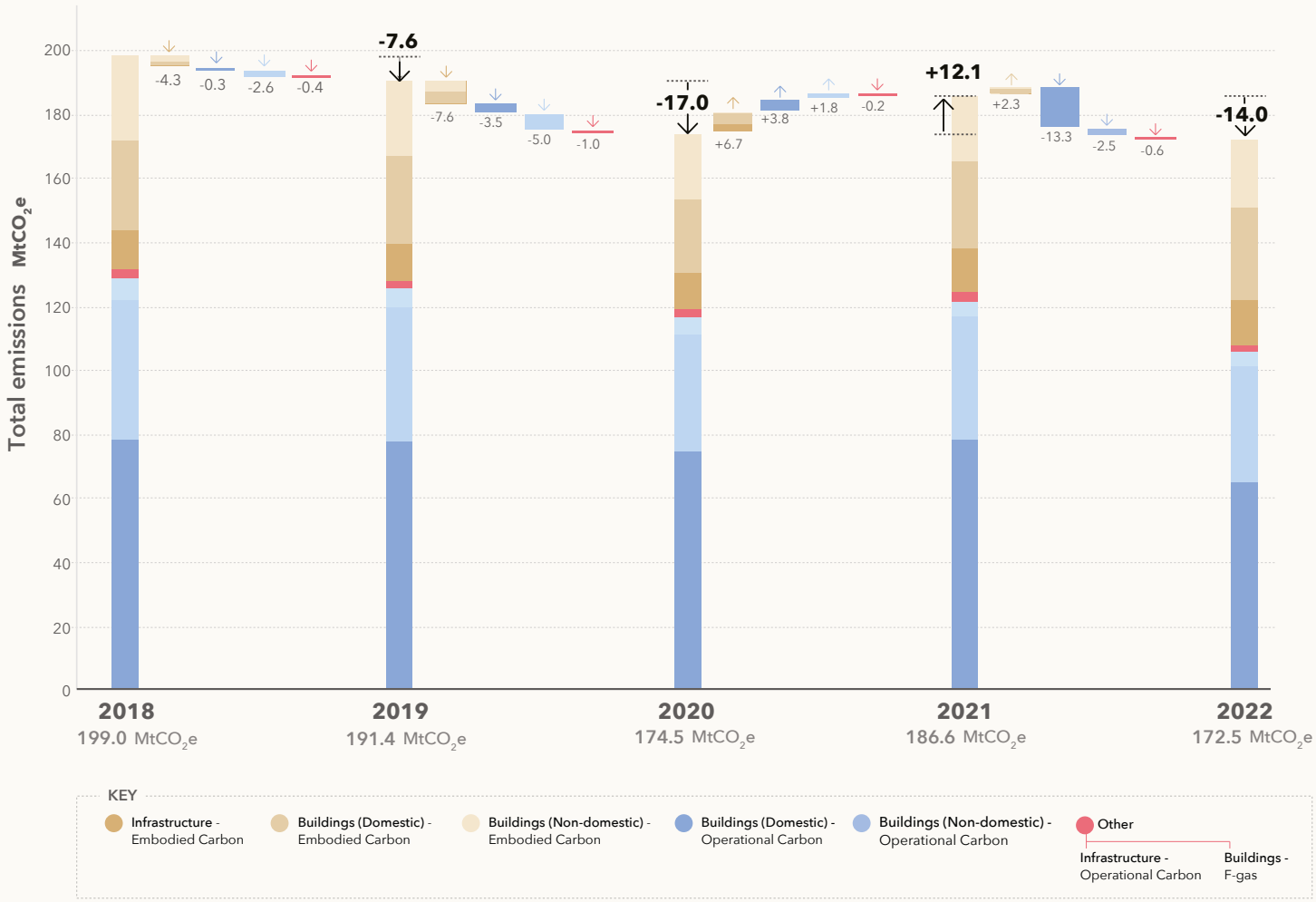
Industry Context

Unprecedented global events have primarily shaped the story of built environment emissions since 2018, but one thing is clear: we are not moving quickly enough, irrespective of the geopolitical lens.

This progress report indicates that while there has been progress, widescale shifts in practice have not yet occurred. Industry must move further and faster to realise the transformational impact the sector is capable of.

Voluntary efforts to go beyond what is required by policy can help establish market maturity, economies of scale and, ultimately, demonstrate what is possible when ambition and regulation eventually align with what is necessary to avoid the existential threat of the climate crisis.

FIGURE 4 EMISSIONS CHANGES PER SECTOR FOR EACH YEAR 2019 - 2022



Operational carbon

Total operational carbon emissions have fallen broadly in line with the Roadmap

The majority of operational emissions continue to come from domestic buildings and therefore this remains a key barrier to decarbonising the industry as a whole. Emissions were observed to decline and then return to 2018 levels by 2021 – likely because of increased home working during Covid-19 – before declining more steeply in 2022. As a result, operational emissions, including F-gases, reduced at a similar rate to the Roadmap overall. The Roadmap projected 26 $MtCO_2e$ reduction over the period (19% reduction) and the reported emissions reduced by 24 $MtCO_2e$ (18% reduction), where the total $MtCO_2e$ reduction was evenly split across both domestic and non-domestic sectors.

However, with the geopolitical considerations of the Covid-19 pandemic and wholesale gas price spikes leading to the energy crisis, these reductions should not necessarily be seen as indicative of sufficient progress. Furthermore, the Roadmap demands even steeper declines in emissions during the second half of this decade, showing the necessity for a step change in focus and action to drive increased reduction.

Grid decarbonisation

The electricity grid has decarbonised by just 24% since 2018, compared to the 63% projected in the Roadmap

While most fossil fuels emissions intensities are consistent over the period 2018-2022, there is a significant difference between the projected grid electricity emissions intensity used in the Roadmap and the reported data: grid emissions intensity reduced by just 24% compare to the 63% projected in the Roadmap, which was based on the National Grid's Future Energy Scenarios Consumer Transformation scenario.

Delivering a decarbonised electricity system by 2035 is critical to achieving our Net Zero target nationally. As we predominantly electrify heat and transport, any shortfall in grid decarbonisation will have an increasingly significant effect on the built environment's ability to reduce emissions in line with the Roadmap.

Embodied carbon

Embodied carbon emissions have reduced by just 4%, less than one quarter of the amount that was needed

According to the Roadmap, embodied carbon emissions from the UK built environment needed to fall 17% between 2018 and 2022. This progress report has found they fell by 4%, less than one quarter of the amount that was needed.

Embodied carbon declined in 2019 and 2020 at a faster rate than required by the Roadmap. In 2019 this was due to a reduction in carbon intensity of supply chains (-9% compared to 2018). In 2020 this was due to the reduction in construction output caused by the Covid-19 pandemic (supply chain carbon intensity actually increased 3% during this year).

In both 2021 and 2022 embodied carbon increased, mostly negating any progress made in the preceding two years.

[1] Energy Consumption in the UK (ECUK) 1970 to 2022, BEIS, September 2023.

[2] Since the operational emissions modelling calculates emissions on 5-year periods, it cannot easily capture the impact of year-on-year temperature differences.

Please note, outturn embodied carbon data for 2021 and 2022 was not available when producing this progress update. As such, estimates for these years were made using partial data for 2021-2022 and historic data from 2020.

Impact of the pandemic

Covid-19 had a notable impact on energy demand and operational emissions from domestic and non-domestic buildings

As expected, domestic energy consumption shows a small increase during Covid-19, and this contrasts with a significant reduction in 2022. The underlying Energy Consumption UK data indicates this is primarily a reduction in natural gas used for space heating (18% reduction between 2021 and 2022). BEIS analysis[1] of this concludes: "Domestic consumption hit a record low... as a result of record warm temperatures during the year and increased energy and other prices leading to behaviour changes for energy users."[20]

Operational emissions in non-domestic buildings reduce in line with the Roadmap in 2019, but in the 2020 pandemic period the actual reductions outstrip the required decrease, driven by reduced energy demand. However, reported emissions increase in 2021 with only a small further reduction in 2022, so that the overall reduction achieved was less than needed across the four years.

Similarly, non-domestic energy consumption appears to be predominantly affected by the pandemic, with a 6% reduction in 2020. There is a reasonably uniform increase in 2021 across all non-domestic sectors (3-5% year-on-year), then a similar sized reduction between 2021-2022. The reductions in 2022 may well be affected by the warm temperatures and high energy prices, although the impact is mitigated by the fact that heating is a less significant energy end use in non-domestic buildings and commercial energy prices are often fixed on longer-term tariffs.

The pandemic caused a deeper and faster reduction in construction sector output than predicted, but embodied carbon rebounded to nearly pre-Covid levels by 2022

The impact of the pandemic on sector output did not follow the prediction of the Roadmap – the reduction in output was deeper and earlier than predicted but also rebounded much faster. The annual embodied carbon totals reflect this steeper decline and sharper recovery. As a result, overall embodied carbon emissions only decreased 4% from 2018 baseline levels, falling substantially short of the 17% reduction the Roadmap envisaged.

The relative contributions of sub-sectors (domestic, non-domestic and infrastructure) vary but largely mirror economic patterns from prior recessions, with earlier reductions in domestic output followed by increases in infrastructure as part of a recovery stimulus. These trends should not be mistakenly interpreted as improvement or regression in practices within particular sub-sectors.

Policy Context

During a tumultuous governing period, progress on policies critical to decarbonising the built environment has been glacially slow across the vast majority of key issues and has moved in the wrong direction in some areas.

Despite the built environment being UK's second-largest source of territorial greenhouse gas emissions after surface transport, high-profile legislative opportunities continue to be missed, while the industry is still waiting for crucial guidance and regulation that could make or break the UK's commitment to reach Net Zero.

Existing homes and buildings:

The Government has not delivered policies that would enable retrofitting of existing buildings at anywhere near the scale and speed required to meet net zero:

- The 'lost decade' in home insulation continued. Ten years ago, 2.3 million energy efficiency measures were installed annually through Government-backed schemes. In 2022, the figure was just 200,000. The Great British Insulation Scheme announced by the Department for Energy Security and Net Zero (DESNZ) is projected to reach less than 1% of homes that require retrofitting.
- The UK has the lowest level of heat pump installations per capita of all neighbouring countries. The UK Government has a target of 600,000 heat pump installations per year by 2028, but just 72,000 were installed in 2022.
- A flurry of 'U-turns' in 2023 saw the Government scrap plans for Minimum Energy Efficiency Standards (MEES) that could have raised standards of rental homes and delivered vital protection to some of the most fuel-poor households in the country during the cost of living crisis. Meanwhile, the delay to phasing out gas and oil boilers for home heating continues to prolong the UK's reliance on expensive, polluting fossil fuels.

Green home incentives

UKGBC is calling for a step-change in national government investment in home retrofit to make it affordable for everyone alongside a change to stamp duty so people buying homes are rewarded for decarbonising their homes within two years of purchase – driving the whole market to recognise the value of low-carbon and energy efficient homes.

New builds:

The planned introduction of the Government's Future Homes Standard and Future Buildings Standard in 2025 is the chance for the next generation of buildings to meet the environmental and social challenges of our age. We're still too often building homes and buildings connected to costly and carbon intensive gas, with insufficient insulation, without solar panels, and not adapted to floods, drought and overheating. But draft proposals for the next Building Regulations have been repeatedly delayed throughout the period of this progress report, undermining the certainty and clarity urgently needed by the industry.

Net zero building standards

UKGBC is calling for new homes and buildings to be genuinely ready for a net zero future. They should be highly energy efficient, with a low heat demand enabled by high performance building fabric and quality construction, not connected to the gas grid but equipped with an efficient, low-carbon heat source such as a heat pump, produce their own renewable electricity wherever possible for example by maximising and have smart controls to reduce the pressure on our electricity grid at peak times. The embodied carbon should be measured, reported, and reduced. This will mean homes and buildings delivered to a higher standard, that don't need expensive retrofitting in the future. It will also drive investment into the innovation and skills needed for the whole sector.

Planning reform:

The planning system is one of the biggest levers we have to turn around the climate and nature crisis. Every planning decision must help, not undermine progress. The Government had a golden opportunity to end decades of frustration and delay to green development in the planning system through its Levelling Up and Regeneration Act in autumn 2023. UKGBC played a central role in coordinating widespread industry and NGO support and cross-party backing for a climate clause that would align the system to the UK's net zero and nature regeneration goals. But the Government defeated large votes for this at every stage of the Bill. A much watered-down policy is now expected in the National Planning Policy Framework.

Greener decision-making

UKGBC is calling for clear national legislation to give climate and nature priority in planning decisions and for a system of local carbon budgets so that every local government plan and every planning decision contributes to meeting the national targets.

Closing Remark

The Net Zero Whole Life Carbon Roadmap for the UK built environment showed the scale of action required to achieve net zero by 2050 and demanded a 19% reduction in emissions by 2022. However, this progress report reveals a 13% decrease, highlighting a critical shortfall. Rapid action is imperative and can only be achieved through more ambitious political and industry leadership. We must now reduce emissions nearly twice as fast if we are to return to our trajectory to net zero by 2025, emphasizing the urgency to bridge the gap between aspirations and actual emissions reductions. UKGBC will continue to work with our members, industry, and Government to act at speed and scale.

This research has been prepared and published by the UKGBC team. We would like to give special thanks to the following stakeholders for their time and contributions which have helped inform this work.

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