

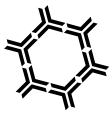


from **Carbon Conundrum**
to **Carbon Control**

Artus[®]

From carbon conundrum to carbon control

Can the building sector get to Net Zero on time or are the promises just hot air?



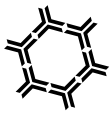
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Precis

Artus was founded with a vision to make a genuine impact through innovation. Our pedigree lies in design, and particularly in finding solutions to advance building design. We are certainly not newcomers to development and building, but we are not part of the fabric yet. We want to challenge and ask questions, understand the difficulties and ultimately be part of the solution.

That is why we have taken the time to gain the insights and experiences of a group of specialists in the UK who are working hard to make sustainability central to development. Our focus for this piece is on the commercial office market – new and existing projects – to get behind the façade and determine if we really are on course to get to Net Zero by 2050.

We've shared below outputs and analysis of our conversations which reflect the foundations of Artus and our belief in change for the sector and a more sustainable society.



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Introduction

Tick, tick, tock

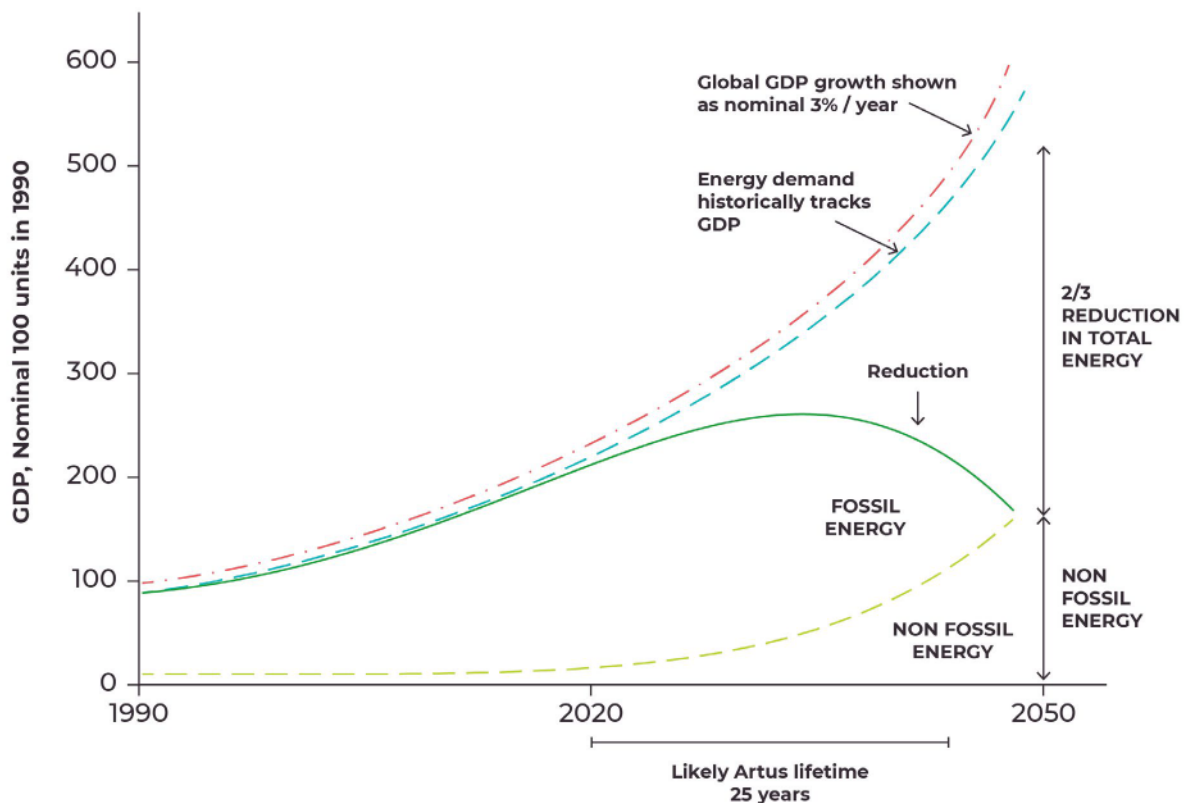
We cannot avoid the headlines or spin the truth no matter what sector we are in. The future of the planet is in our individual and collective hands. In 2015 the world watched as the Paris Agreement was signed and pledges and promises aplenty have followed from governments and organisations to show movement in a unilateral direction – Net Zero by 2050. Let’s face it, the other direction isn’t really an option.

The building sector is a significant contributor to total UK emissions. According to a RICS’ report on [decarbonising UK real estate](#), the built environment accounts for around 30% of total annual carbon emissions in the UK – embodied and operational. This is a situation that has to change. The industry knows that and is showing ambition

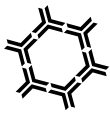
and impetus. The pressures are substantial from significant quarters, such as investors and occupiers, but there are still unknowns about solutions, approaches and costs.

The building sector has made clear sustainability commitments in recent years – with legislation, regulation and environmental responsibility driving this forward. Increased urgency over net zero has moved the conversation and subsequent approaches ahead with more nuanced and measurable targets.

This is illustrated in the graph below which shows the need for decoupling GDP growth from energy consumption. We have less than 30 years to implement this massive change. Everything we build from now must use 1/3 of the energy of the current status quo.



¹ <https://www.rics.org/news-insights/research-and-insights/decarbonising-uk-real-estate-report>



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Decoupling GDP growth from energy consumption

Presently, UK policy is insufficient to both adequately reduce carbon emissions from buildings and to meet emissions reductions targets². In particular, there is no specific legislation on embodied carbon. There is an emphasis on renewable energy, but that will only go part of the way, and not far enough on whole life carbon.

It's estimated the electricity consumption in the UK will increase by approximately 50 % by 2036 and more than double by 2050³. Buildings are currently about 30% of carbon emissions and expected to be 50% of the peak capacity of the future grid by 2050. Renewables will struggle to seriously address the increased electrification of our living and working demands at this rate.

However, across the building and development sector there is a growing understanding today of whole-life carbon and its constituent parts of operational and embodied energy, and the appropriate

solutions that are being introduced. Solutions like those from Artus, for example, where both the operational and embodied carbon are greatly reduced.

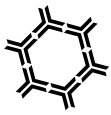
We firmly believe that change is being made and that innovations in design and development are reflecting a sector committed to playing its part and making change happen.

In our view we need to respond proactively to the very pertinent issue:

**how do we design,
build or retrofit better
to reduce the whole life
carbon needed to create,
install and maintain our
buildings?**

² In 2019, carbon emissions generated in the operation of buildings via the use of electricity and the burning of fossil fuels for heating and cooking ("operational" carbon emissions) accounted for 23% of total UK emissions. An additional 7% of carbon emissions were "embodied" into buildings during the manufacturing and construction stages as a result of the energy used in those processes. Of this 23% is for non-residential buildings.

³ <https://www.nationalgrid.com/stories/energy-explained/how-will-our-electricity-supply-change-future>



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Chapter 1

The will is there; we can find the way

“Too many siloes across the sector and not enough collaboration.”

Siloed working can lead to tiered systems of innovation and reduced stimulus to improve sustainability.

A concentration of new developments and greater capital availability in London encourages sustainability but keeps its focus geographically tight which limits opportunities for other regions.

In the wider industry there are vocal specialists championing collaboration to promote sustainability in development, design, acoustics and engineering. These range from private organisations, consultants and developers to industry bodies and initiatives such as the UK Green Building Council (UKGBC) and LETI.

However, there is a serious stumbling block with a lack of legislative levers. The Government’s Energy white paper: Powering our Net Zero Future⁴ has not moved any further forward since consultations in 2021 and with current political rhetoric edging back from Net Zero the momentum gained in the industry could be minimised.

We need to ensure this does not happen.

Our conversations highlighted that the UK is a leading exemplar, particularly in the commercial office space, versus European counterparts with a commitment to remove gas boilers in favour of heat

pumps. The UK shows much greater interest in the flexibility of design and more commitment to innovation rather than convention. However, there is still more needed to speed up and broaden the take-up of net zero and sustainability measures.

“This market is conservative and slow for take up.”

The sector wants to make a difference but needs the nerve and foresight to do it. What is the ‘carrot’, rewarding and encouraging the sector? And what is the ‘stick’, enforcing and legislating at an industry level? Those in the ‘carrot’ category include: investors, occupiers, committed designers and innovators, as well as more favourable Capex and Opex costs; and the ‘stick’ in this scenario are the government and regulators, and the potential for hefty fines.

“Low carbon targeting and climate risk was part of the lending requirement from a major bank. The investors are really driving the market.”

Investors in real estate, of all shapes and sizes, are generating tangible impact in this area and structuring deals with an emphasis on net zero and lower carbon – in construction, retrofit, and longer-term operation. The notion of a building as a “safe deposit box” no longer chimes as longevity and responsibility are key investor drivers.

“The occupier agenda is shifting – no one wants to take up space in a gas-guzzling dog of a building.”

Crucially there is also a marked shift from certain quarters of the occupier market. Greater pressure at organisational level, ESG targets and more environmentally conscious staff are changing occupier ‘must haves’. This then influences design and space decisions.

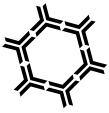
The pandemic has prompted a shift too as organisations reconsider their spaces. Reduced occupancy levels, more efficient and cost-effective spaces and a ripe occupier market are driving this. With a louder voice to stipulate how they want to work and what they want their office space to reflect about them⁵.

“Sustainability metrics will become less of a wallpaper and more a statement of work.”

Sustainability and a genuinely purposeful approach to reducing carbon emissions is a core narrative and clearly impacting the methods and solutions being identified. When that impacts access to capital, fit out costs and tenant uptake there is a very marked shift – the carrot is most definitely driving the agenda at this point.

⁴ <https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future>

⁵ <https://bregroup.com/buzz/the-business-case-for-sustainability-a-tenants-perspective>



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Chapter 2

Over-designed and over the top – are we over this approach?

“It’s not just a checklist of demanding the most because the biggest and most is best. Actually, the realisation is the most appropriate to meet our minimum comfortable requirements and be most energy conscious is best.”

How do we take a bigger bite of that carrot? How do we genuinely start to address the requirements and expectations of an increasingly carbon-conscious customer and investor market?

We need to spend more thought and effort in the design phase and really drill down into the reality of the occupancy demand to deliver ‘good enough’.

The need to reduce whole life carbon – embodied and operational – is a central tenet of this design approach and requires a shift in how we think about what is essential in a building or office space and what is just ‘nice-to-have’.

“The industry has been too wedded to systems that are very energy hungry because for decades people didn’t really care, and overdesign was easier and attractive to customers.”

Each component in the building should be considered on this basis – building management systems; façade design; HVAC; lighting; acoustics: all must be smarter. One of the key components to smarter, efficient and essential function is the importance of local control, data collection and analysis.

That doesn’t mean more complicated, larger or cost-prohibitive. It means they really need to prove themselves and deliver savings, efficiencies and overall effectiveness. According to one commentator:

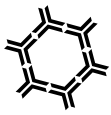
“We want to get the building functioning reasonably correctly and then we can look to smooth off the peaks.”

The approach to HVAC systems is also changing with gas boilers being replaced in favour of heat pumps on an increasing scale; a clear example of how the industry has changed in a short period of time. But, overall, the requirements of these systems

are changing with an emphasis on three core areas: **“energy, health and space.”** The energy use must be significantly less; there must be much better indoor air quality; and the hardware needs to fit easily into inherited shallow floor-to-ceiling heights.

Inevitably efficiency and flexibility in building design will lead to greater longevity and ultimately a more sustainable approach. We need to move away from ‘over design’. One of our interviewees talked about their preferred approach of **“long life, loose fit”**, (as referenced by the President of RIBA)⁶. Leaving more open space, less structured fit-outs, more exposed ceiling space and less demands on energy hungry systems could revolutionise the commercial office space and will be fundamental to delivering net zero.

⁶ https://www.researchgate.net/publication/287400678_Measuring_Good_Architecture_Long_life_loose_fit_low_energy



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Chapter 3

Innovation only works when put into practice.

“I haven’t seen one building that can’t get to EPC B rating.

The fear of needing deep pockets puts people off, but that is not what innovation is about.”

Ninety per cent of the buildings that will be standing in 2050 are already built. This presents a challenge for the retrofit market to meet EPC B ratings by 2030. According to Knight Frank on current stock levels, the retrofit rate of the office sector would need to quadruple, from around 3.9% to 16.6% to meet the 2030 target⁷.

We know there is a challenge, but being too hung up on achieving an EPC B rating really stops us seeing the wood for the trees.

We want to consider whole life carbon across a development and if we only focus on operational and not embodied carbon what problems will we be storing up for ourselves (and our future generations) further down the road?

As we strive for net zero by 2050, reducing embodied carbon will be the dominating factor in whether or not we succeed. The notion that this should be crippled by cost-consciousness is not acceptable, nor is it actually necessary. Innovation and wider adoption wouldn’t be possible if cost was such an inhibitor.

Operational carbon will continue to be important. But it is easier to measure, control and place targets on. Ultimately it will also become greener with more renewable sources available, but more focus is definitely needed on embodied as part of the whole life carbon concept.

As we embrace the importance of assessing solutions for their whole life carbon, innovation and thinking differently prevails. As a sector we are starting to reconsider the way people want to use buildings. How we support this new era of design requirements with sustainable solutions will drive the faster adoption of innovation with a greater appetite for risk.

The sector collectively is quite cautious and often cost-conscious by nature. This has stemmed from the way contracts are established and awarded by developers often restricting the ambition of consultants (not always consciously) by burdening them with greater risk on projects. A looser design approach which allows greater fit out flexibility can reduce this risk.

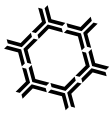
However, one contributor cautioned **“most consultants over-design to protect their PI”**; this is a pertinent point to reduce risk and ensure more flexibility in the design approach. Suppliers and designers, like Artus, need to be more directly collaborative and transparent. They must highlight the benefits of their approach to empower the developers to embrace the recommendations of consultants and achieve long term benefit, rather than a short-term ‘safe bet’. This is a cycle that has to be broken soon to really start achieving results.

‘MEP consultants worry about putting their necks on the line to design something different. It is needed but there is some way to go on that.’

There is a crucial role for the consultants undertaking design, and those with clients who are prepared to create exemplar buildings or retrofits. They must work closely with supply chain and occupiers to encourage a more joined up and considered strategy. They need access to crucial cost-effective innovations, and in some cases, revolutions in product design, to create looser spaces with longer life spans.

We do have it in our collective power to make this change. We have proven that with the innovations in refrigerant alternatives and legislation to prevent the production and supply of harmful refrigerants. Innovation is in our hands; now is the time to make the change.

⁷ <https://www.knightfrank.com/research/article/2023-05-03-uk-commercial-property-retrofit-rate-needs-to-quadruple-to-meet-proposed-regulation>



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Conclusion

The clock is ticking.

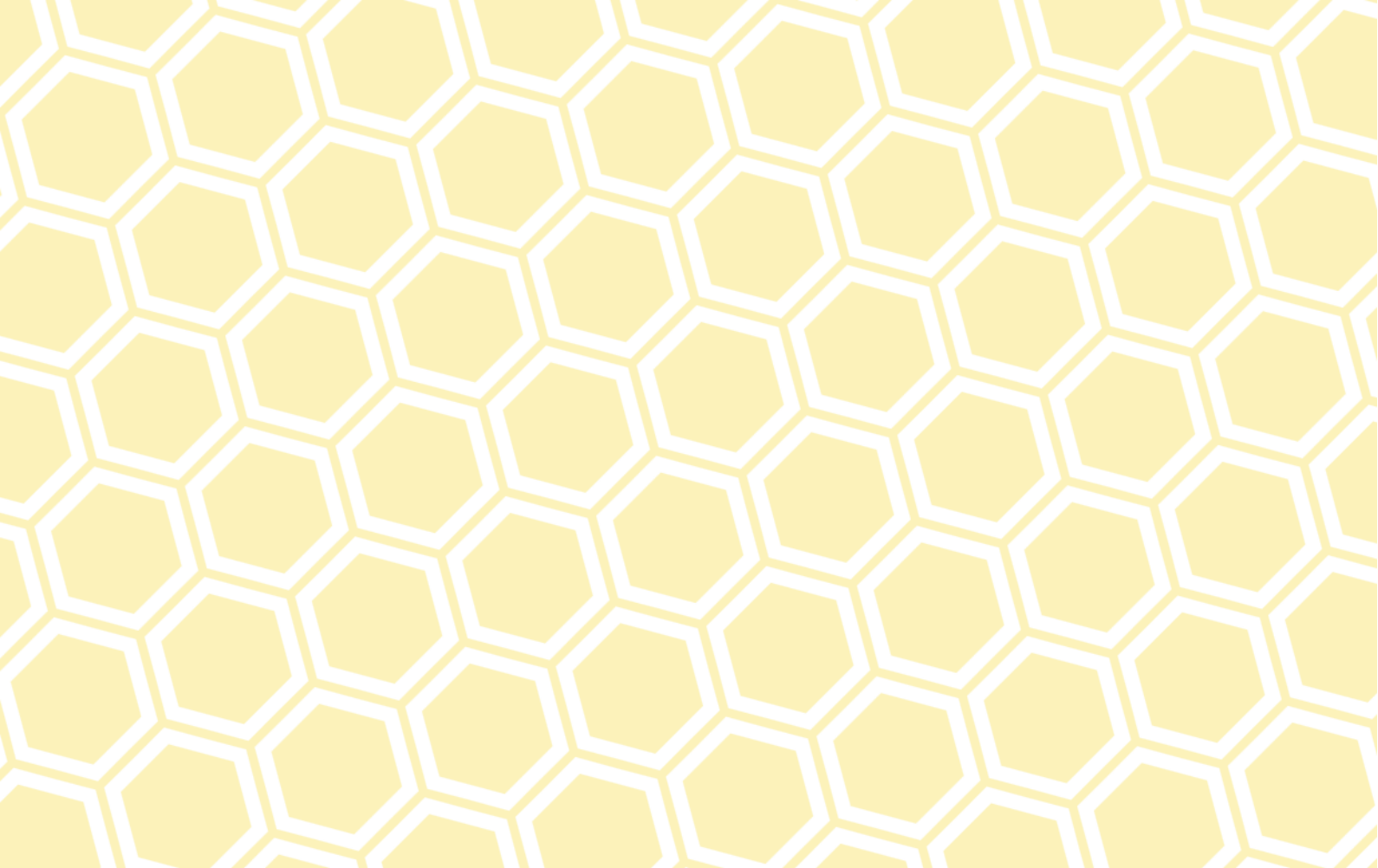
At Artus we are innovators by nature and now is the time for us to prove what that innovation can do – positively for our people and planet. We are being held to account by future generations and we need to really prove our credentials and commitment across this sector.

Our cities are much larger than they used to be, and incumbent building solutions are not getting us to where we need to be. We need to change our mindsets about doing things a certain way because we are too nervous to do it differently.

When we formed Artus our goal was to find sustainable solutions in building design. We strive to do this as part of the ecosystem fabric working together with the sector to innovate and evolve. Our approach is reflected in the 3 C's that we see as fundamental to its future.

- o **Collaboration** – fundamental to achieving a common goal, even within the parameters of competition and commerciality.
- o **Consensus** – there needs to be a common view on targets, measurement, methodologies and approach to whole life carbon, in the delivery and overall design of our buildings.
- o **Capital** – This can't be the elephant in the room. Investment and capital are required and the market is driving sustainability. Innovation will attract capital, and ultimately drive down both Capex and Opex with the right solutions in place.

Each of these elements is in motion and pulling together in the right direction to deliver the design and development required is absolutely within our grasp. This is not all hot air; this is a wind of change, and we must embrace it.



Contributors

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