

Are carbon prices in the NGFS scenarios high enough to steer real estate investment decisions towards lower carbon design alternatives?

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Introduction

The Network for Greening the Financial Systems¹ (NGFS) has developed scenarios to investigate the impact of climate change on financial institutions, as set out in the technical document providing guidance on the purpose and use of the NGFS scenarios². The NGFS scenarios include carbon prices which aim to reflect the level of climate policy intervention by governments.

¹ <https://www.ngfs.net/en>

² <https://www.ngfs.net/en/communique-de-presse/ngfs-publishes-technical-document-providing-guidance-purpose-and-use-ngfs-scenarios>

For any real estate development different design alternatives exist, each potentially emitting very different levels of carbon. The emitted carbon can be offset by purchasing carbon credits over the real estate asset's lifetime; in future such voluntary offsets might be replaced by carbon tax. This paper explores whether the carbon prices in the NGFS scenarios would materially impact decision-making in real estate sector.

Factoring carbon into real estate investment decisions

To date, most development decisions by real estate investors do not incorporate the impact of the project's carbon. This is despite the built environment directly accounting for around 25% of the UK's carbon footprint. Globally, this figure is closer to 33%.

There are usually many alternative designs to provide the floorspace and other key requirements set by a real estate client. Investors evaluate design alternatives by yield, which factors in costs and revenues, programme, and design quality.

Just as cashflow and rental value models project future costs and income, whole life carbon calculations – now increasingly being done for real estate developments – project future carbon emissions of a development option, as discussed in a previous Actuaries Carbon Collaboration paper³. Carbon is emitted over a building's life mainly through the industrial process to manufacture the materials and products used in a building (initially and through replacements and alterations over time), and through producing the energy used to heat and cool them.

Carbon can be included in decisions by treating carbon emitted as a development cost by applying a price for credits that would offset the emitted carbon.

Worked example

The NGFS provides alternative carbon price projections under different future scenarios. These can be used to allow investors to understand the sensitivity of their returns to uncertain future carbon prices. This example applies the carbon prices from the NGFS's Nationally Determined Contribution, Delayed Transition and Net Zero 2050 scenarios. A summary of these is in the Appendix.

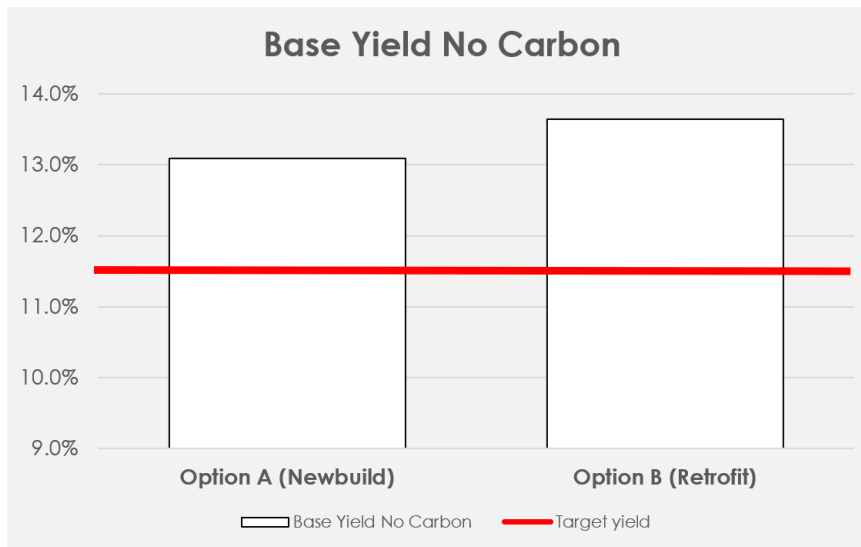
We consider an anonymised version of a real 200,000ft² city centre office building project, and look at two design options with different embodied carbon and energy consumption:

- Option A is a new building, with standard construction of steel frame with concrete floor slabs and cores. The façade has opening panels for natural ventilation and cooling, and the exposed concrete slabs providing passive temperature control.
- Option B is a retrofit of an existing concrete frame building on the site. Only the concrete structure is retained; all other building elements are stripped out and replaced. It takes more energy to heat, cool and ventilate the building than Option A because the façade is sealed and the concrete slabs cannot help to stabilise temperatures as they are enclosed by ceilings and raised floors.

Ignoring the cost of carbon, both design options have similar yields, and both meet the investors' target yield of 11.5% (see below).

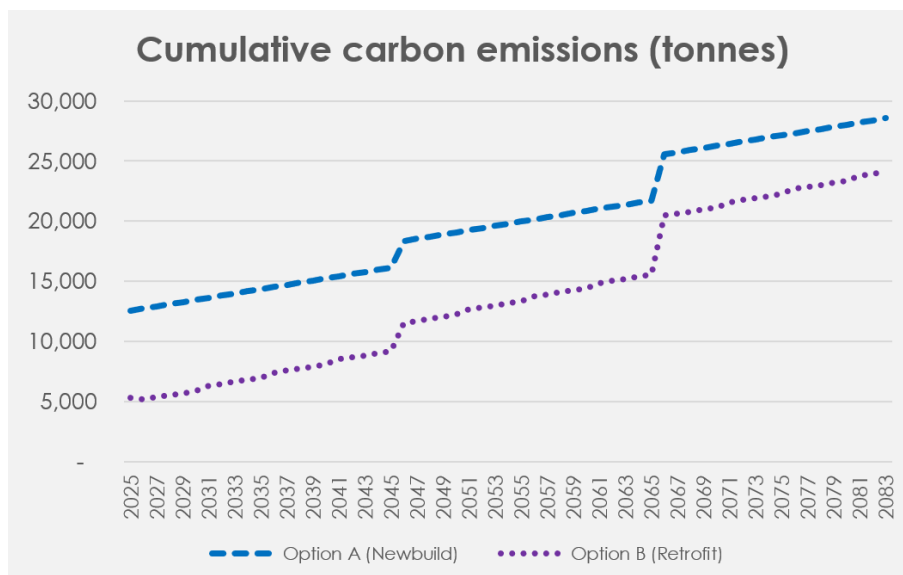
³ <https://carbon.ifoagroups.org.uk/comment-on-the-wlcn-leti-riba-framework-for-assessing-the-carbon-emissions-of-buildings/>

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Even though Option A has a lower yield, investors may prefer Option A because in this case the new-build project (A) is faster to deliver than a retrofit (B), and it avoids uncertainties around the condition of the existing building fabric which could add cost.

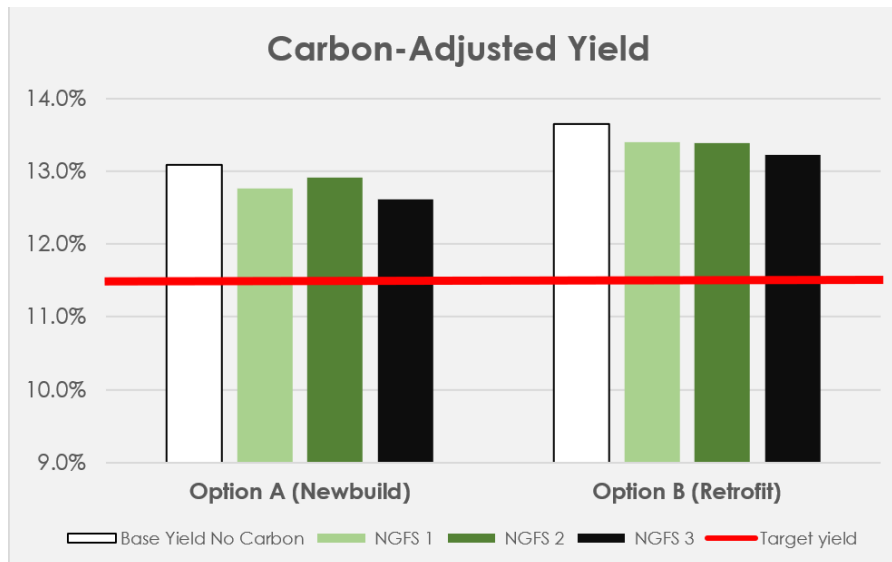
The projected carbon emissions over 60 years from the two design options are set out below. Clearly the retrofit option B is preferable from a carbon emissions perspective, with upfront emissions only 40% of the newbuild option A. The lifetime emissions of option B also remain below that of option A.



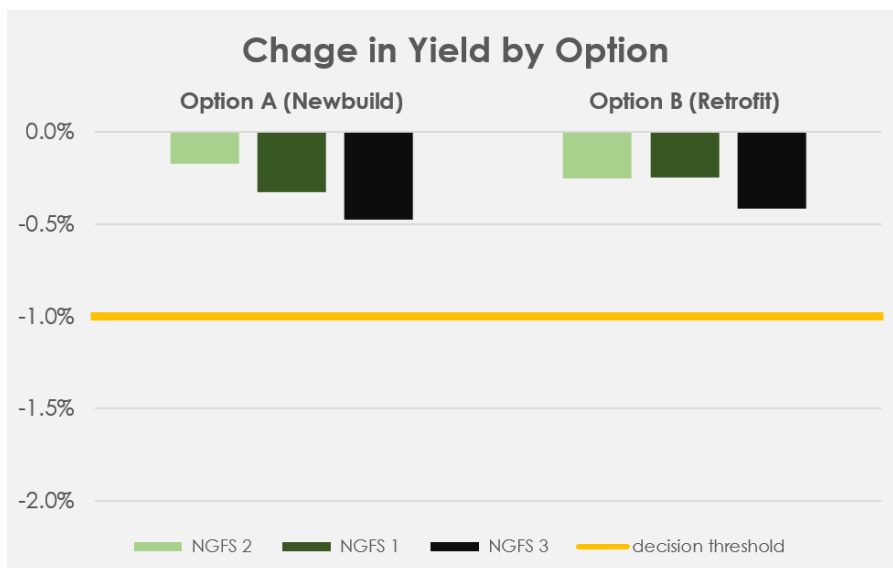
Source: Analysis using inputs from FCBS CARBON, available at <https://portal.fcbsstudios.com/fcbscarbon>

The 'cost of carbon' can be estimated by multiplying the emissions by the projected carbon prices from the NGFS scenarios. (The scenarios used are those for the OECD90 and EU (and EU candidate) countries. NGFS1 is from the Nationally Determined Contributions scenario, NGFS2 from the Delayed Transition scenario and NGFS3 from the Net Zero 2050 scenario.) The impact of the cost of carbon on yields is shown below.

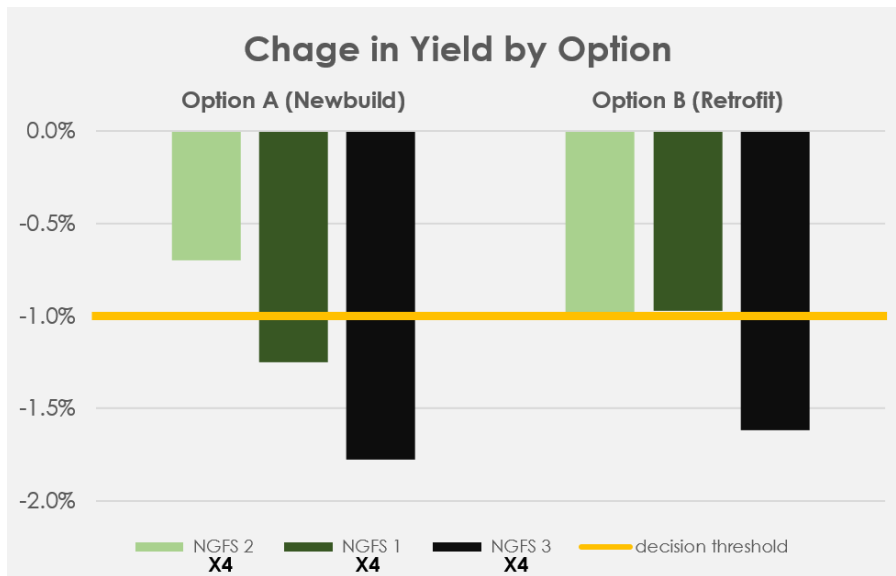
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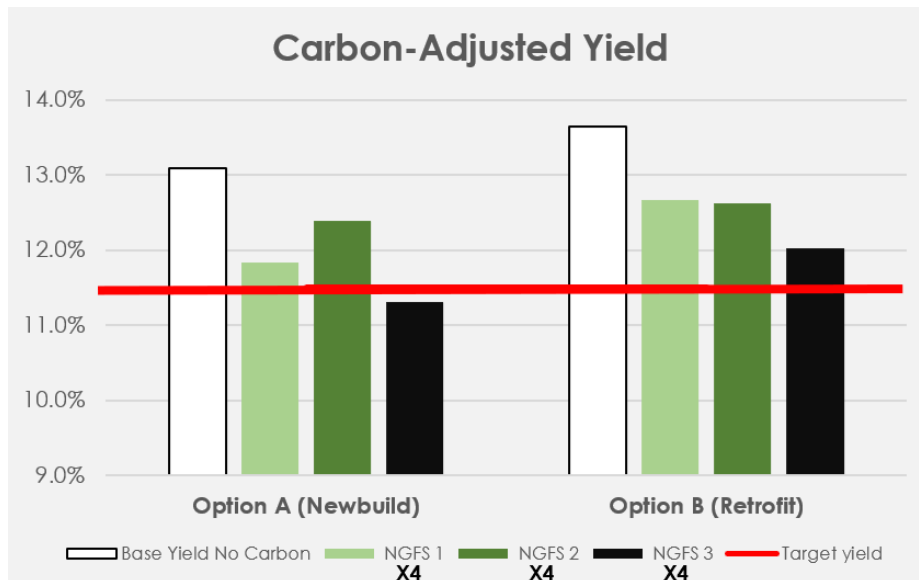
Sources in the commercial real estate development and management community told us that anything over a 1% reduction in yield is likely to be taken seriously by investors. The reduction in yield from the impact of ‘cost of carbon’ suggested by the NGFS scenarios fall well below this threshold (see below), meaning these levels of carbon prices would not impact the decision between option A and option B.



What then should the projected cost of carbon be to have an impact on investors’ decisions? The above chart suggests that a multiplier of 4 should be applied to NGFS carbon prices for them to cross the investor decision-making threshold. The reduction in yields by the “NGFS X 4” look as follows:



And the impact of the three “NGFS X 4” carbon price scenarios on yields is shown below.



This level of carbon price pushes the investor’s decision further towards the lower carbon Option B – retrofit, as it still comfortably meets the target yield under all carbon price scenarios, unlike Option A - newbuild, which fails to meet it under “NGFS X 4” Scenario 3.

The above case study and analyses hint that an investor’s decision between development options (in this case between newbuild and retrofit) is often not clear-cut, especially given that other factors not covered here play into such decisions. However, our focus for this paper was not on how NGFS projected carbon price scenarios might impact the choice **between** different options, but rather on the more fundamental question of whether these scenarios could ever have an impact on decision-making.

Conclusion – A level of carbon prices that can make a difference

Carbon prices need to be at a level where they have a meaningful impact on investment yields, thus better reflecting the benefits of lower carbon design alternatives. For a case study of a typical

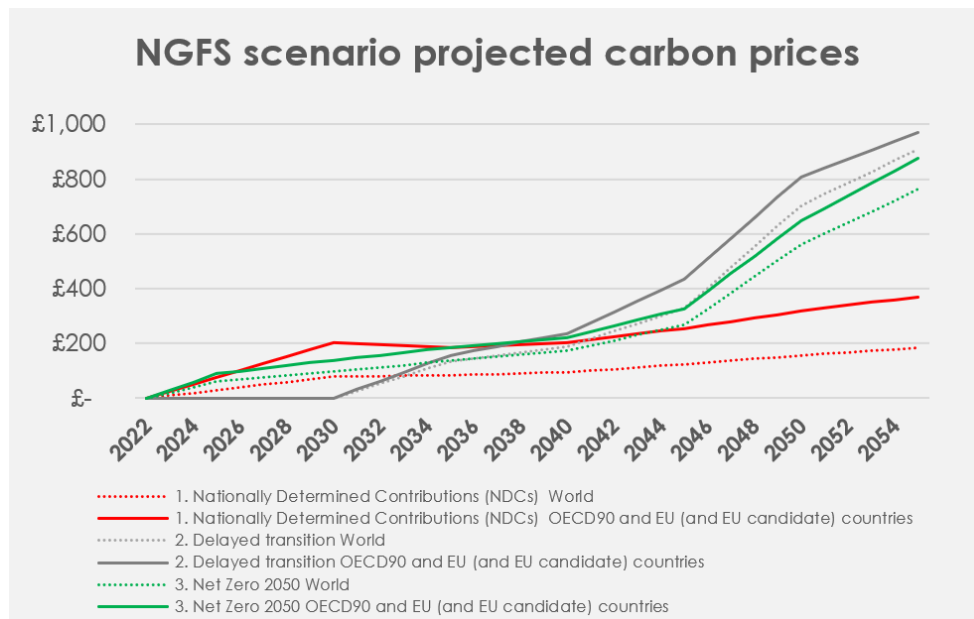
commercial real estate development, we found that the carbon prices in the NGFS scenarios fail this requirement in that they are not likely to impact real estate investment decisions and steer these towards lower carbon development options. We also found that the carbon prices in the NGFS scenarios would need to be multiplied by a factor of around 4 for them to start to have an impact.

We note the Financial Stability Board and NGFS joint report which admits current financial climate scenario analysis exercises may understate climate exposures and vulnerabilities⁴. The Institute and Faculty of Actuaries has demonstrated how a deeper understanding of climate change can improve financial climate scenario modelling⁵.

We suggest a review – urgently, given the climate emergency – of the carbon prices in the NGFS scenarios, using the context of investor yields for real estate developments in this paper.

Appendix – NGFS carbon prices

Future carbon price projections are set out by NGFS in different scenarios that contain different assumptions about the speed of transition to a low carbon economy, the impacts from the resulting climate and environmental changes, economic indicators, and actions taken by governments as a result such as carbon taxes using different prices. The corresponding associated carbon prices with the scenarios explored in this paper are:



Source: NGFS Scenario Explorer <https://data.ece.iiasa.ac.at/ngfs>

⁴ <https://www.fsb.org/2022/11/current-climate-scenario-analysis-exercises-may-understate-climate-exposures-and-vulnerabilities-warn-fsb-and-ngfs/>

⁵ <https://actuaries.org.uk/news-and-media-releases/news-articles/2023/july/04-july-23-emperor-s-new-climate-scenarios-a-warning-for-financial-services/>