

ZERO-CARBON HOUSING

Why is Zero-Carbon Housing Important and How Can Housing Developers in Oxfordshire Achieve it?

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Zero-carbon architecture: When the net carbon emissions for a building over the period of a year are zero.

The Environmental Impact

In the UK, the construction industry contributes to a significant proportion of carbon emissions. While some companies are building zero-carbon houses, with several developments in Oxfordshire being at the forefront, there are many housing developers who are not. The construction industry has an obligation to minimise its carbon emissions.

Globally, nearly **40%** of energy related carbon emissions in 2017 were contributed by building construction.¹

Objective

To determine the importance of the construction industry moving towards zero-carbon housing by using case studies in Oxford to explain how this can be achieved; through the analysis of materials, methods of construction and manufacture and the responsibilities of various groups throughout the life of the building.

Methodology

- Undertand the factors relating to zero-carbon architecture, such as sustainability and environmental impact, which cause the requirement for housing developers to move towards zero-carbon architecture.
- What are the incentives for housing developers to move to zero-carbon architecture?

1 Case Studies

Elmsbrook, NW Bicester
Kings Farm Close
Springfield Meadows

2 Reports

2018 Global Status Report
Climate Change Act 2008
Carbon footprint for Building products

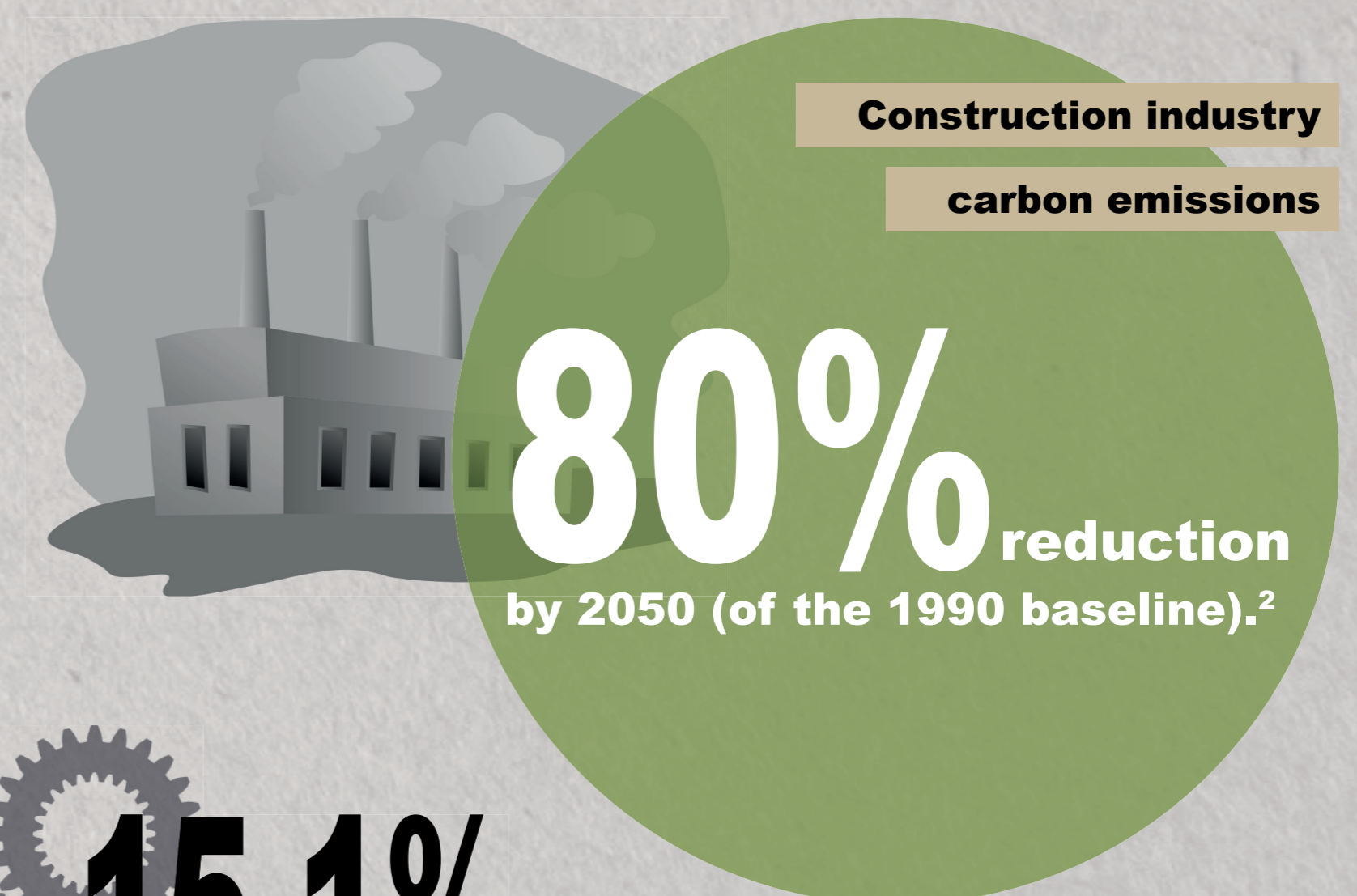
3 Questionnaire

Presented to professionals in the construction industry to gain insight into existing knowledge. Identifying holes in awareness and the reasons for them. Participants responses are anonymously coded, which aids the analysis of the results.



Figure 1. Kings Farm Close 15 eco-homes (Greencore Construction, 2019)

Results



Building product	CO ₂ e g/kg	CO ₂ uptake g/kg	Net CO ₂ g/kg
Dried Timber (Coniferous)- Germany	119	1637	-1518
Glued laminated timber- Sweden	109	1730	-1621
Aerated Concrete Block, Europe	442	-	422
Pre-cast concrete 20/25 (Europe)	121	-	121

Figure 2. Carbon footprint and carbon uptake information for building products. (VTT, 2013)

Timber products are superior at reducing carbon outputs of products due to their ability to sequester carbon, resulting in a carbon offset.

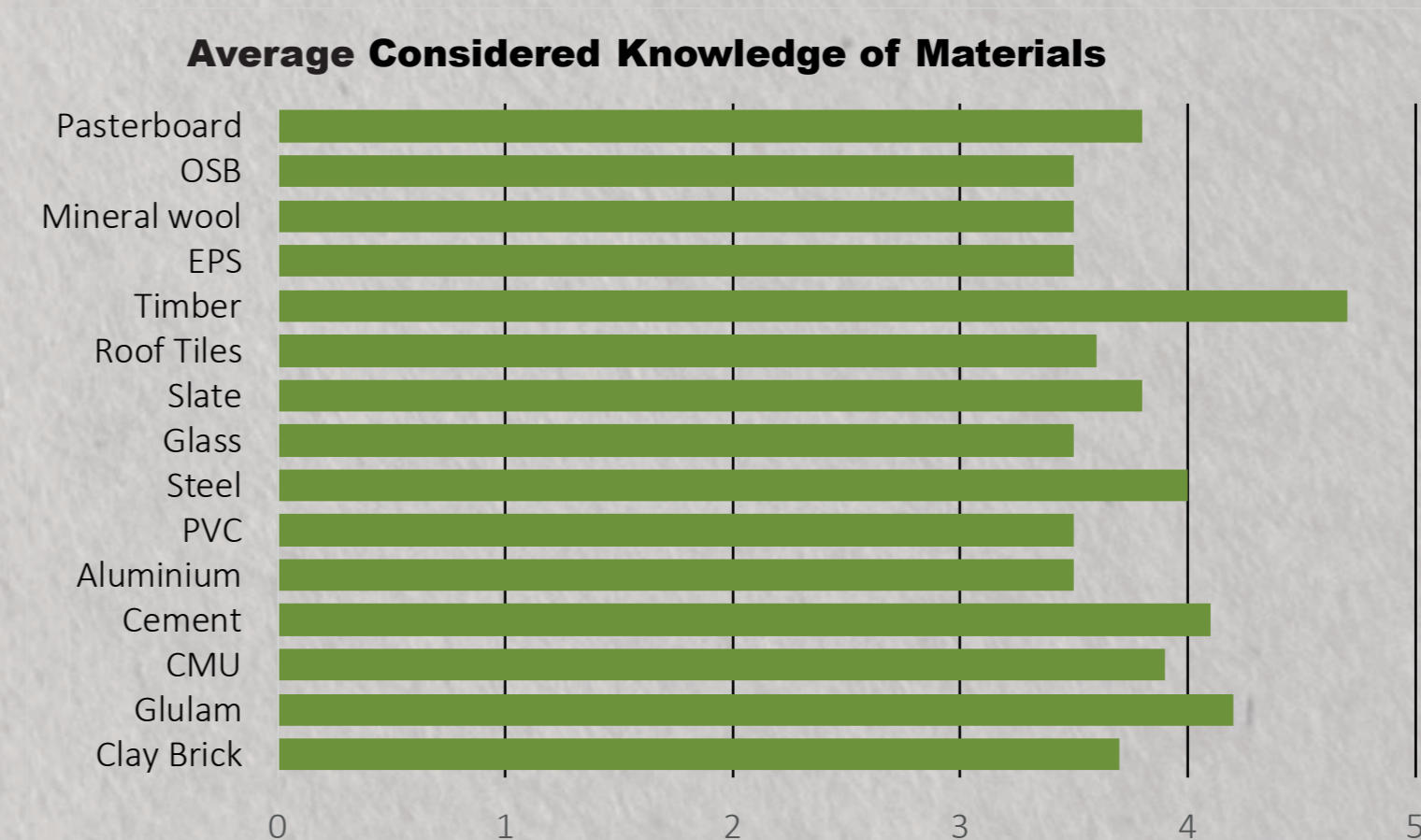


Figure 3. Data averages from primary research questionnaire.

Conclusions & Discussions

- It is essential to condier the **2050 carbon target**, especially as the UK government aims to build 300,000 homes a year, and very few are expected to be **zero-carbon**.
 - The carbon impact of materials' **manufacture** and transport is significant.
 - Using **'healthy materials'** can offset emissions, providing an obvious solution to sustainable architecture.
 - Sustainability increases when using **timber** as a primary building material compared to most others.
 - Professionals generally have a good working knowledge of sustainability, however such knowledge is infrequently passed between colleagues.
 - Ensuring that a building remains sustainable is the **responsibility** of professionals as well as those operating the buildings.
- Questionnaire**
- Generally participants noticed zero-carbon projects increased yearly.
 - **Sustainability** is an increasing factor in professionals' roles.
 - Specific government **targets** for carbon reductions are not commonly known amongst professionals.
 - **Traditional materials** were said to becoming more popular, including lime and hemp-lime.

References

1. International Energy Agency and the United Nations Environment Programme (2018) 2018 Global Status Report: towards a zero-emission, efficient and resilient buildings and construction sector. Available at: <https://www.globalabc.org/> (Accessed: July 2019).
2. Climate Change Act 2008, c. 27. Available at: <http://www.legislation.gov.uk/ukpga/2008/27/contents> (Accessed: September 2019).
3. Lawrence, M. (2015) *Reducing the Environmental Impact of Construction by Using Renewable Materials*. USA: Scrivener Publishing LLC.

Figure References

- Figure 1
Greencore Construction (2019) *Kings Farm Close* [Online] Available at: <https://www.greencoreconstruction.co.uk/news-events/> (Accessed: October 2019).
- Figure 2
VTT, Ruuska, A. (ed.) (2013) *Table 8 & 9. Carbon footprint and carbon uptake information*. [Online] Available at: <http://www.vtt.fi/publications/index.jsp> (Accessed: September 2019).
- Figure 3
Braband, S. (2020) *Data averages from primary research questionnaire*. [PDF]