Major Contractors Group
NFB
National Federation of Builders

Transforming Construction
for a Low Carbon Future

National Federation of Builders
Major Contractors Group
2019

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Foreword

The world is warming, with dire consequences for both human life and the whole ecosystem. Research highlighted in the International Journal of Science in July indicates that there has never been a period in the last 2,000 years when temperature changes have been as fast and extensive as in recent decades (Nature, Volume 571, 25 July 2019). The scientific consensus that humans are causing global warming is likely to have passed 99%, according to the lead author of this research.

The UK is leading the world in effecting carbon reductions and our Government has recently pledged to move to a net zero emissions target by 2050. This will drive huge change in people's lives and place a titanic stress on businesses and organisations who will have to change the way that they work within complicated and sophisticated supply chains.

Nowhere is the change more difficult - and the opportunity so large - than in the UK building industry. We directly account for 10% of the country's emissions and influence a massive 47% of all emissions through our work.[1] However, the structure and nature of our fragmented industry makes rapid and coordinated change difficult.

The purpose of this report is to support those companies that act as the fulcrum of our industry, shaping its progress from its very heart. Main contractors take a uniquely influential position between the client and the supply chain, and mediate between creating an aspiration and delivering reality. Main contractors are the gateway through which our industry must deliver both the buildings and the infrastructure that society deserves and also the reductions in carbon needed to save the planet.

This report covers the commercial risks and opportunities for the wider industry and offers guidance on what organisations should be doing now if the UK is to achieve the rapid changes demanded by politicians and society. Written by contractors, it is commercially focused, identifying how main contractors and the broader industry can provide their customers and wider society with a comprehensive and profitable construction service.

This document is designed to prompt debate, but that debate must lead to action and it must do so fast. There is no time to lose to tackle climate change; the War on Carbon must be fought. There must be an equal level of urgency in the industry to open our eyes to the challenges and opportunities ahead. In less than a generation, building and construction will have changed beyond all recognition. Anyone not preparing for this right now faces extinction.

Mark Wakeford
Chair of the MCG
November 2019

Notes:
1 Low Carbon Construction Report, Innovation & Growth Team, HM Government 2010, page 23.

" The NFB National Executive Board fully endorses this report. The time is now to grasp the nettle and tackle the issue of carbon reduction. This report shows that there can be a better way of doing business that both works towards the governments zero carbon commitment and pays dividends to those who rise to this challenge. This will not only allow us to give back to our communities, something that I have always been passionate about, but also future generations and the planet as a whole."

Nick Sangwin
Chair, National Federation of Builders
November 2019

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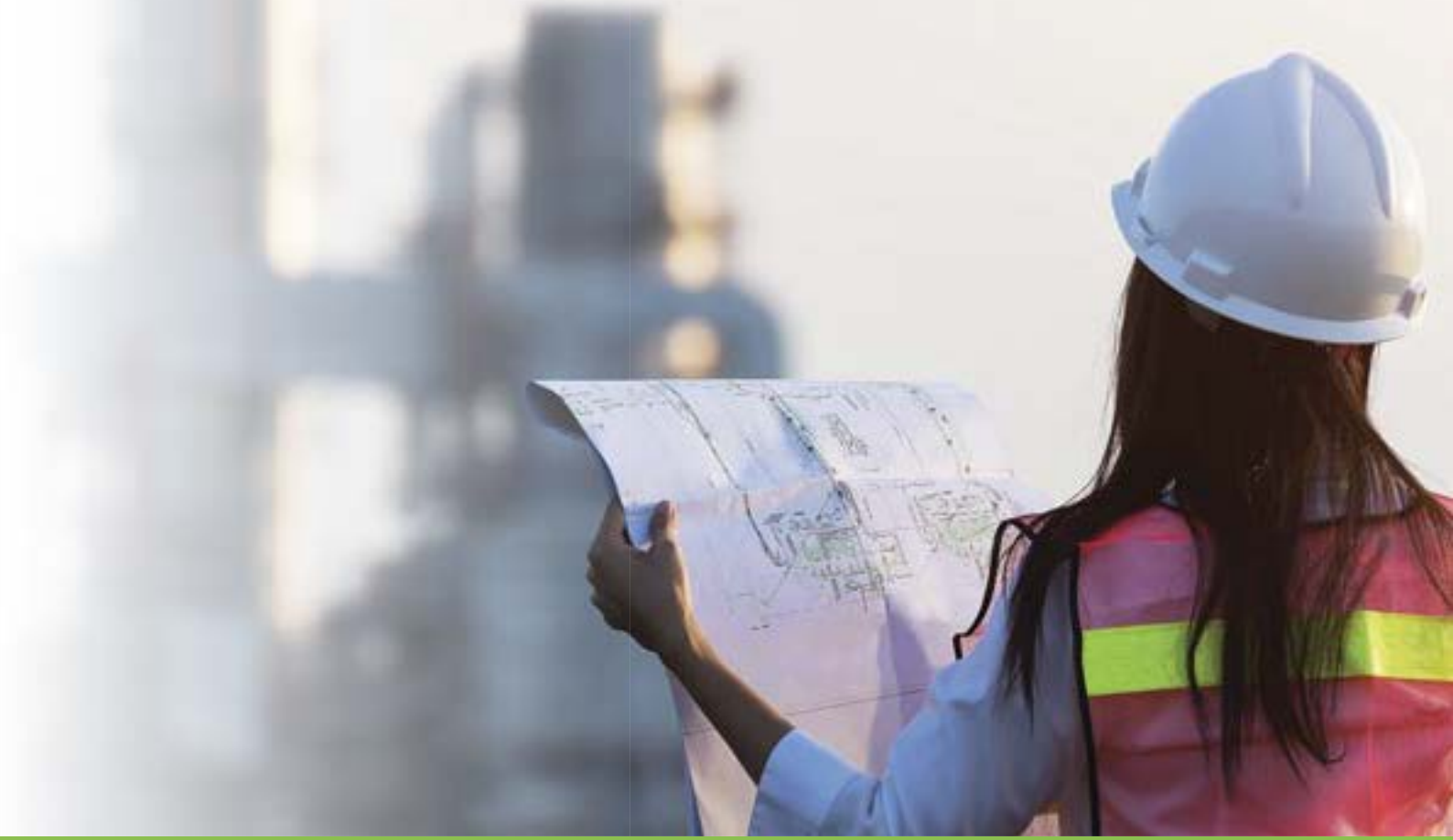

Executive Summary

Climate change is the major issue of our time. No individual or organisation is immune to the challenges it presents and everyone has a role to play in combating it.

Construction, however, has a greater role than most. The industry represents 10% of UK carbon emissions and directly influences 47% of all national emissions.

This puts the industry in a position of great responsibility and influence. This report is designed to kick-start the industry, and in particular main contractors, into action. It is high time that there was an injection of urgency into the way construction contributes to the war on carbon.

Great responsibility comes with great opportunity. Given the sheer magnitude of what is required to meet the target of net zero emissions of global warming gases by 2050, it will be impossible to succeed by continuing to operate in the same way. A step-change is required and it is those companies that are willing to commit to transforming their businesses within a generation who will be in a position to build their prosperity in a new landscape full of new markets and new approaches.

Main contractors are the gatekeepers to a low-carbon future. It is main contractors who can drive change in partnership with their supply chains and their forward-thinking clients.

Domestic housing will require a government spend of £15 billion each year to reduce carbon emissions and the MCG proposes that an existing certification scheme is adapted to promote and manage the design and retrofit of carbon saving technology. Industrial and commercial property and infrastructure requires £5-10 billion a year and this can only be achieved through Government procurement and through the urgent development of tools to accurately measure carbon use. Only then can companies understand their carbon footprint and how to reduce it.

It must be noted that although many green initiatives will be driven by regulation and customer demand, businesses should also be looking at how to win hearts and minds. Green initiatives can save money and are good for the bottom line; going green is good for staff morale and new recruitment; and a socially-aware, sustainable approach helps companies forge a valued place in their communities.

The transformation required in the construction industry is multi-faceted and it is critical that Industry and Government take a joined-up approach to bring together developments in skills, procurement, design, products and materials, transport and more.

This report is a call to arms. It represents the start of a transformation in the construction industry in which main contractors will play a critical role, alongside a Government willing to support the industry through regulation, guidance and funding. Massive carbon reduction will not just happen; it requires great commitment, vision and determination - and the time to start is now.

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- The United Kingdom is leading the world in driving carbon reductions and our Government has recently pledged to move to a net zero emissions target by 2050.
- Construction directly accounts for 10% of the UK's emissions and influences 47% of all emissions through our work.
- The Committee on Climate Change has identified a Government spend of £15 billion needed each year to reduce carbon emissions from domestic housing.
- In 2016, construction, demolition and excavation waste accounted for 61% of total UK waste.
- The Committee on Climate Change has proposed that all rented properties are upgraded to have an EPC rating of C by 2030 and 80% of all homes to be rated C by 2035.
- The Environment Agency is preparing for a 4°C rise in global temperature with plans for all infrastructure to be resilient to flooding and coastal change by 2050.

Background

At the Paris climate conference COP21 in 2015, governments from 195 countries agreed to adopt a legally binding deal to limit global temperature rises to below 2° Celsius and pursue efforts to limit it to 1.5° Celsius. The UK signed up, with its statutory target, set out in the Climate Change Act of 2008, to achieve 80% of the emissions of 1990 by 2050. Since then the effects of climate change have become more obvious and worldwide public opinion is gathering momentum behind these targets.

In the UK, the Independent Committee on Climate Change identifies and makes recommendations on public policy initiatives to achieve the targets set within the Climate Change Act 2008. In May 2019, it recommended that the UK should improve its target to achieve net zero emissions of global warming gases by 2050. This was based upon the importance to the world economy, the UK's best interests and our ability to achieve this within the costs set by Parliament.

The construction industry represents 7% of the UK economy, yet it represents 10% of carbon emissions and it directly influences 47% of UK carbon emissions through the infrastructure and built environment that it delivers and maintains. This puts the industry at the heart of the war on carbon.

Our industry has not been entirely complacent. 'Construction 2025', published in 2013, proposed a 50% reduction in carbon emissions, a target that was taken up by the subsequent Construction Leadership Council with their 'Building Mission 2030'. This developed the theme of Goal 13 of the 2015 United Nations Sustainable Development Goals.

The war on carbon cannot be ignored. Public opinion is hardening against polluters and demanding greater accountability of those who may harm the environment. Action on this issue is becoming business critical. The construction sector, known for its short-term outlook, must look longer term and get to grips with the opportunities and challenges ahead if it is to remain relevant in a rapidly changing environment.

The Opportunity

The two key elements to reducing carbon emissions in the built environment are:

- **tackle the embodied carbon within new buildings and infrastructure**
- **ensure that buildings and infrastructure can be used with minimal carbon emissions**

The carbon that is embodied within buildings and infrastructure is a consequence of the total carbon emitted during the creation of the individual elements of that building, added to the carbon emitted during the construction process, as defined by The UK Green Building Council.

The carbon emitted during the operation of the buildings will depend upon the energy efficiency of the building and the ease of maintaining the building using low carbon techniques. It will also be heavily dependent upon the life of the building, the ease of dismantling and the ability to re-purpose various building elements, so that the embodied carbon can be spread over as many years as possible.

The way the construction industry responds to these two key opportunities will dictate just how - and how well - the United Kingdom decarbonises the built environment. Right now, every business should be examining its customers' needs and its own offer in order to identify the opportunities that it is best placed to deliver on.

There will be significant new markets in our sector and our existing customers will have to change their approach and priorities to take carbon into account. The UK Energy Research Centre anticipates 'significant disruption in the way that [the UK Construction] industry is structured'. It is up to each and every business to put themselves in a position to take advantage of new opportunities and not be left behind while others forge ahead. The sooner businesses consider their Strengths, Weaknesses, Opportunities and Threats in the context of the war on carbon, the better placed they will be to be at the vanguard of change, growing their business as they help shape the future.

In their 2014 report, the Inter-Governmental Panel on Climate Change identified many of the areas of improvement our industry must deliver. Every company will have its own markets on which it can focus to develop its own commercial model but the following opportunities represent some new markets where significant investment is planned. If main contractors and the industry as a whole want to be part of the sector's transformation, they would be wise to consider how these areas fit into their portfolio.

Alan Somerville, Head of the Building Performance Group at the Building Research Establishment (BRE), talks of the opportunity for the industry to decarbonise the UK and the role of the BRE to support all aspects from funding through design and delivery to verification.

Brian Berry, Chief Executive of the Federation of Master Builders, calls for a comprehensive Government strategy to tackle carbon reduction and for the industry to collaborate to deliver the skills necessary to address the issues

Domestic Properties

Buildings account for 40% of carbon emissions and The Committee on Climate Change has identified a Government spend of £15 billion each year to reduce carbon emissions from domestic housing.[1] This challenge relates to existing stock, as annual new build represents only 1% of housing stock.

Current targets include all rented properties to be an EPC rating of C by 2030 and 80% of all homes to be rated C by 2035.[2] Contractors engaging in this retrofit market must be able to deliver the modifications required to make the necessary carbon savings: this will require high quality installation skills allied to a technical education. Contractors must provide fastidious attention to detail and excellent site management throughout the project if the investment is to yield the necessary savings.

Recognising the importance of this investment, the MCG proposes that a certification scheme is either created or adapted to promote and manage the design and retrofit of carbon-saving technology to domestic homes. The scheme would focus on the skills, designs, processes and consequences of failing to achieve anticipated reductions in carbon. A detailed proposal is included in **Appendix A**.

There are a wide variety of technologies that can be used to reduce carbon emissions from homes. This report does not seek to identify them all, but aims simply to give a flavour of the opportunities that exist or may soon exist - see **Appendix B**.

Industrial and Commercial Properties and Infrastructure

The Committee on Climate Change is forecasting that £5-£10 billion per year needs to be spent by UK industry if we are to achieve net-zero carbon emissions by 2050.[3] The MCG recognises that UK businesses will have a range of priorities and that they must primarily respond to commercial pressures. The MCG therefore encourages Government to promote low levels of embedded carbon within assets that they procure and to factor in a cost of carbon.

A cost of carbon is determined by Government and is effectively a combination of market value and the cost effects of various forms of energy production. (We note that the current cost assumes no major impact on markets; this will need careful management to remain both valid and useful.) We believe that this will drive the right behaviours within businesses to reduce carbon. Focusing on embodied carbon will ensure that providers will drive down the carbon content of their goods and services, which, in turn, will force their supply chain to reduce the carbon content of their products.

For non-Government clients, providing a cost of carbon will allow them to assess the true cost of supply, based upon the carbon cost and the capital cost. Main contractors who provide information on the embodied carbon and the anticipated carbon in use will allow their customers to make informed decisions for their own businesses.

The wider industry does not yet possess the skills to carry out these carbon assessments with the necessary level of accuracy and the MCG urges Government to work with experts to provide all industries with the tools to measure and audit carbon use. Once carbon assessments are being carried out with

Notes:
1 'Net Zero: The UK's contribution to stopping global warming', Committee for Climate Change, p.245, May 2019.
2 'Net Zero: The UK's contribution to stopping global warming', Committee for Climate Change, p.29, May 2019.
3 As above.

rigour and accuracy, the next step is to undertake an annual carbon account, in the same way that businesses currently account for finance. This will allow businesses to dictate rates of carbon depreciation and to account for their operational demands. The result will be a cost of carbon owed, or a benefit of carbon saved for those companies who can save more than they generate.

Main contractors have a significant role to play to support the decarbonising of UK industry. First they must understand their own carbon footprints and those of their supply chain. Then they must ensure that the performance of their buildings and infrastructure meets the design promises made at the outset.

James Diggle, Head of Energy & Climate Change at the Confederation of British Industry calls for an urgent change in approach to tackle the climate challenge, stating that British businesses are ready to collaborate to help the UK achieve its net zero target.

Gren Tipper, Director at the Construction Clients Leadership Group, explains that carbon is a major issue for construction clients and that clients want to work with main contractors who understand this challenge.

Flooding and Coastal Defences

The Environment Agency is preparing for a 4°C rise in global temperature with plans for all infrastructure to be resilient to flooding and coastal change by 2050. It believes that the dual effects of climate change and population growth will see the number of properties built on a flood plain over the next 50 years double. To manage this risk, the Environment Agency says £1 billion per year is needed to protect and prepare the country's traditional flood and coastal defences.

Rachel Skinner, Vice President of the Institution of Civil Engineers, and UK Head of Transport for WSP, explains the priority that carbon has in design, delivery and operation of the nation's infrastructure and how civil engineers have a major role to play in helping secure lower carbon emissions.

Power Sector

The Committee on Climate Change forecasts that the power sector will need to invest double its recent rate of investment in the sector to £20 billion per year, if the UK is to have adequate power networks to enable society to achieve net zero emissions by 2050. This mirrors the potential doubling in demand for electricity up to 600 TWhrs per year, 80% of which will need to be renewable electricity, according to some energy experts.

This investment will need to be in both transmission and distribution networks if the UK is to accommodate a distributed generation network and the increasing demand.

Nina Skorupska CBE, Chief Executive of the Renewable Energy Association, explains the move to renewable sources of energy and the need for the UK construction industry to collaborate widely to deliver infrastructure that is fit for purpose to deliver net zero emissions within 30 years.

Transport Network

There is a real dichotomy in transport investment: invest in transport that improves people's ability to move around the country and thereby contribute to GDP - but generate more carbon dioxide; or reduce demand, reduce congestion, improve local pollution hotspots and reduce carbon emissions. The Committee on Climate Change is an advocate for reducing the demand for transport, as the sector is the largest emitter of greenhouse gasses, emitting 28% of UK emissions. Our industry should therefore expect both opportunity and risk.

The opportunity for work within the national roads sector amounts to £28.3 billion between 2020 and 2025 through RS2 of the National Roads Fund. Government's 'The Road to Zero' sets out its ambition to become a world leader in zero emission road transport through reducing the number of vehicle journeys, increasing the number of electric vehicles (EVs) and improving HGV and plant emissions. In addition, the Committee on Climate Change is recommending that more town centres ban vehicles. Main contractors will need to consider how they are going to best service their sites and their staff when considering office locations.

The investment required to deliver a low carbon road network includes both electric vehicles and hydrogen fuelled vehicles. Both require a fuelling infrastructure if they are to be successful. Government is mandating all new homes to have a charge point and are considering rolling out the London Plan whereby all new commercial developments of more than ten car park spaces are to have 20% connected to a charge point. In addition, Government has pledged £400m to a Charging Investment Infrastructure Fund to speed up the availability of electric charge points.

The rail network offers further opportunity. Network Rail plans to invest, through Control Period 6, £39.7 billion between 2019 and 2024 (£27.5 billion in maintenance and renewals), looking to achieve a 25% improvement in carbon emissions and an 18% improvement in energy consumption. HS2 is also awaiting funding: this £56-£85 billion project should relieve congestion and therefore improve the carbon emissions per passenger. Investments in the rail network will support a movement of passengers from air to rail travel.

There are equivalent capital investments in airports and sea ports, though these are not directly linked to the carbon economy.

Alasdair Reisner, Chief Executive of the Civil Engineering Contractors Association, describes how civil engineering companies can play a leading role in reducing the carbon content of infrastructure and operational carbon through collaboration and good design.

Funding for Green Construction

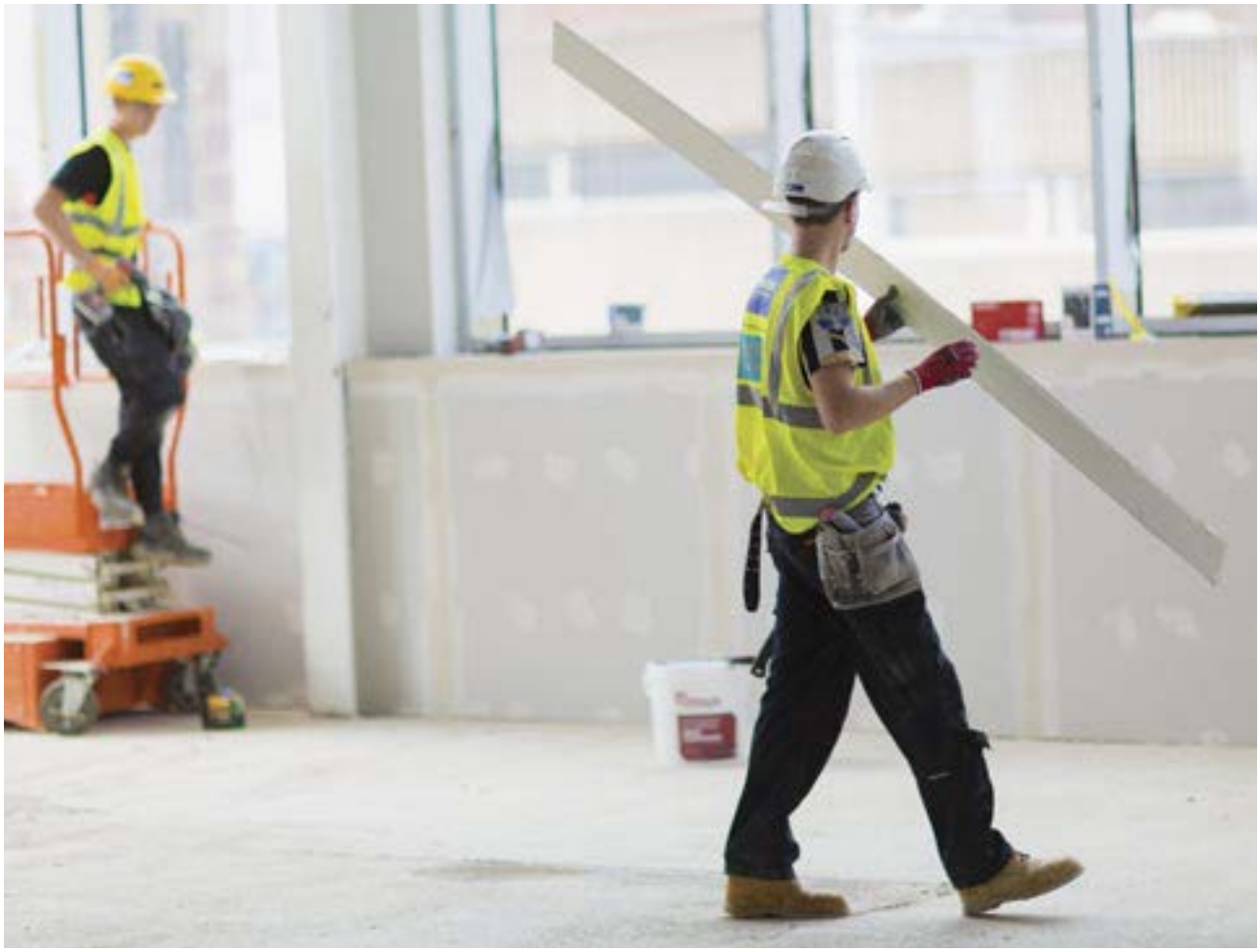
Main contractors will need to understand the routes to funding for many of these investments. The UK Government is setting the strategy, supported by many banks and universities. Green projects can be funded through a variety of routes and main contractors may have to adapt their services to match the funding processes.

As funding priorities have diversified, so have the options to fund green projects. Contractors may choose to support a client's bid for funds. Understanding that some of these funds may be performance-based will be critical to the success of the project and the profitability of the team. Funds may come from one or more of the following sources:

- Equity funding direct from the client, where the client will determine the requirements of their investment.
- Debt funding, where the equity is subordinate to the debt. Some debt providers will only fund schemes with specific attributes that the main contractor must deliver.
- Crowdfunding can provide either equity or debt funding, is raised from the public and is becoming a serious option for projects. The requirements of funding will be explicit, as will the consequences of not meeting these requirements.
- Peer to Peer funding where corporate bodies lend monies to each other, generally as debt, will also have their funding requirements defined, but these are generally secondary to equity, which will control the project.
- Green bonds where the client issues bonds in return for fixed term (and often fixed return); investment can generally only be used on green projects. These will have to be determined by the client, though, as with all projects, the main contractor must be aware of specifications, input or output, that must be achieved.
- Grants are available for specific green projects and these will stipulate exactly what they can and cannot be used for. These are available from central Government via Innovate UK and Local Authorities. The Carbon Trust, for example, provides business advice on energy efficiency and carbon-related matters.

Louise Wilson, Co-founder of Abundance Investment, explains how Crowdfunding contributes to a low carbon economy.

If our industry is to deliver our share of carbon savings we will have to create new and better ways of working over the next decades. Research & Development tax credits are available to any business that carries out innovative work where the risk of success or failure is borne by the business. Construction companies should take advantage of this benefit.



Internal Opportunities

The Independent Committee on Climate Change recognises that every business in the UK will need to make changes if they are to succeed in an increasingly decarbonised environment. Construction companies will have to play their part and will need to look carefully at their carbon-creating activities and work to reduce or eradicate them. The key is to change our staff's outlook and behaviour: the British Psychological Society has produced a guide for those looking for the science of staff buy-in to going green in the workplace.

Ann Bentley, Global Director of Rider Levitt Bucknall and member of the Construction Leadership Group, describes the importance of caring for staff and allowing them to work in a way that encourages a low environmental impact.

Ways to reduce corporate carbon are well documented. Some common areas on which businesses can focus are included in **Appendix C**.

Measuring Carbon Footprints – Corporate, Staff and Project

The quantity of carbon dioxide that society produces is enormous and usually hidden. As an invisible and inert gas, its effect on the environment is only visible through the long-term consequences of large volumes being added to the atmosphere. To give some idea of the size of the challenge: a 30-mile trip in an average car will create 7.2kg of carbon dioxide. The volume of this gas equates to 57 times the size of an average man and will take a fully grown tree 120 days to process. Under the UK's original 80% reduction target, 7.2kg represents an individual's daily personal allowance of carbon dioxide in 2050. This would not leave anything for the food they eat, the work they do or the buildings that our construction sector will need to deliver. Changes over the next decade must therefore be considerable if the UK is to achieve this national target.

To play its part, construction must start to measure its carbon emissions and it must state both the embodied carbon and operational carbon emissions for its products. There are many organisations that can support this, including the Carbon Trust and Carbon Footprint. Many companies will also become accredited to PAS 2080, which provides a recognised structure to report and record carbon.

There are four areas of measurement that construction companies should address. The first is that of their staff. Asking staff to measure their personal footprints raises awareness and reinforces actions taken by their employer. The second is the carbon footprint of the business: looking at the footprint created to run the business. This will record your head office footprint and other overhead activities. The third area is the embodied carbon within your projects. This is the carbon that you will pass to your customer within your products and services. Your project footprint should include your supply chain's footprint and an element of your overhead footprint so that your customers can account for all the carbon taken to deliver their project. The fourth is the calculation of the carbon used to operate finished projects: this will help main contractors' customers to account for their ongoing use of carbon.

David Frise, Chief Executive Officer of the Building Engineering Services Association, shows how building services engineers provide a key contribution to the effective operation of buildings and have a big agenda to reduce the carbon emissions of buildings that account for 40% of national emissions.

Main contractors who are unfamiliar with carbon within their services should be aware that there are contractors such as Skanska and EvoEnergy who are already recording embodied carbon and carbon in use. There are also clients such as Anglian Water, the Highways Agency and developer Derwent London who are recording carbon, including embodied carbon; and whole cities, such as Nottingham and Bristol implementing strategies to become carbon neutral. They are ahead of the game and it is important that those contractors who still want to be relevant (and solvent) in ten years' time act now.

Mike Salisbury, Technical Director at EvoEnergy, explains why his company records carbon for the benefit of his customers and how recording personal footprints has engaged his staff in the work to reduce their customers' carbon footprints.

These measures will take time to action - and this is time we do not have.
The MCG therefore urges Government to utilise the Energy Savings Opportunity Scheme (ESOS) and the Streamlined Energy & Carbon Reporting legislation to further promote and enforce energy efficiency and to encourage voluntary adoption by small and medium sized enterprises.

Public Opinion and Our Social Environment

Public opinion is firmly in favour of reducing carbon. 74% of people questioned by the Department for Business, Energy and Industrial Strategy (BEIS) said they were fairly or very concerned about climate change.

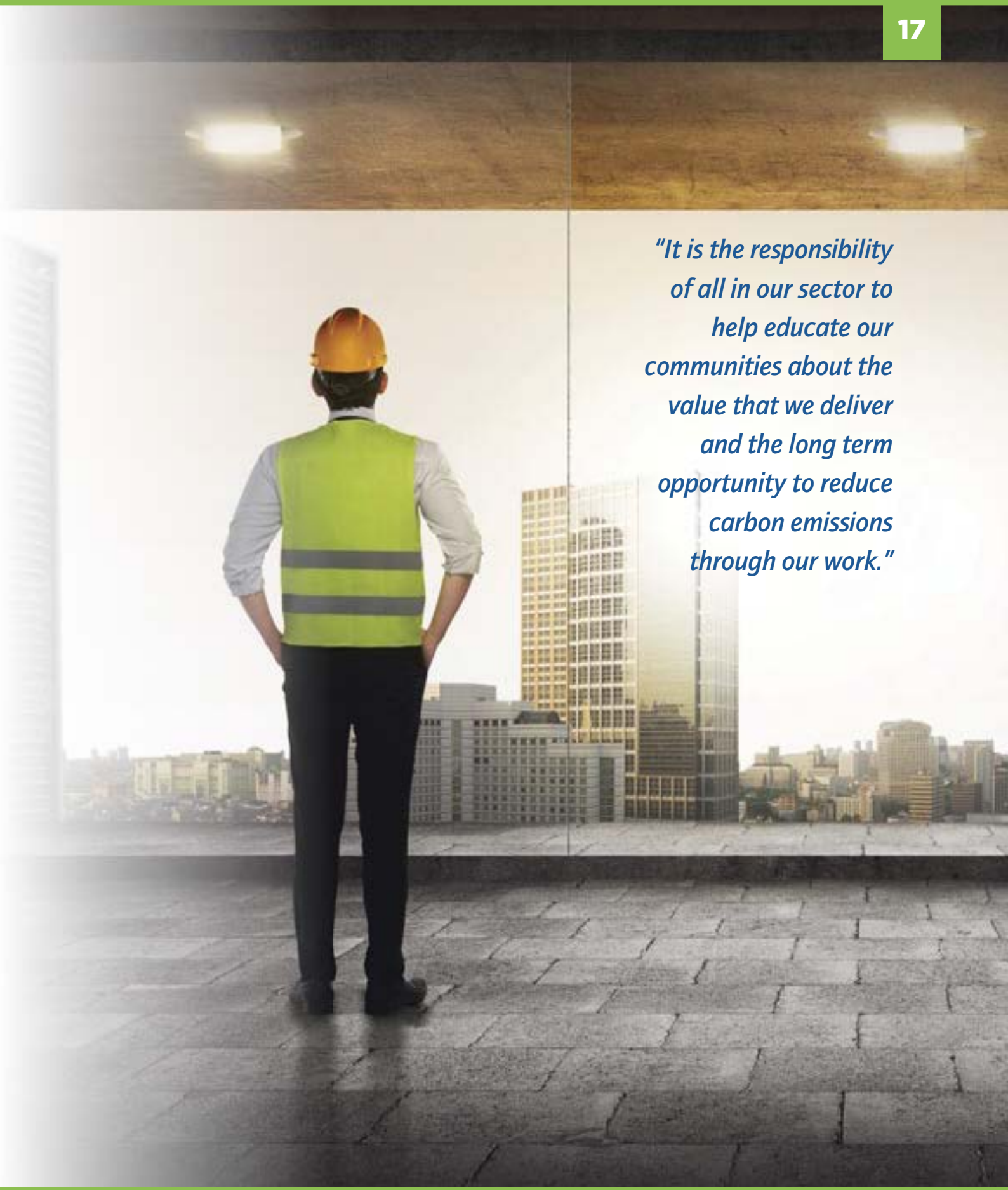
The views of the public are hardening against the profligate use of resources and uncontrolled and ill-considered waste. There are a number of pressure groups demanding change at a national, strategic level. Awareness is growing around the impact certain key materials and processes in our industry are having, and key organisations are turning their focus on our industry; Friends of the Earth have an infrastructure campaign against dirty fuel and harmful infrastructure projects; Extinction Rebellion have been blocking concrete work - and there are many more. We need only look at the galvanising presence of Greta Thunberg to realise that the next generation of employees and customers is anxious to drastically reduce carbon emissions and is on the lookout for ways to influence decision-makers in Government and industry to make that change. As a heavy user of natural resources, our industry cannot and will not be immune to these pressures.

In construction, one of our greater challenges is to remain relevant to our employees, providing jobs that new recruits are proud to work in and where their work is valued both within and without the industry. Sustainability is high on the agenda for many young employees and they are far more demanding of their employers than previous generations when it comes to ethics and making a contribution to society. They also understand that going green can be good for profits.

Though many green initiatives will be driven by regulation and customer demand, businesses should also identify what they can do to support their environment in their own right. There is evidence showing that carefully considered green initiatives can save money and are good for the bottom line. Anglian Water has achieved significant cost and carbon reductions within programmes of works by making carbon reduction a priority. Going green is also good for staff morale and new recruitment as people seek broader reasons to join a company, which often include a sense of belonging and shared values.

Ultimately, operating in a responsible, sustainable, green way must become an integral part of the way a business does things and the way it interacts with its customers, its supply chain and its local community. By becoming a brand innately associated with these positive, pro-social activities, a business makes itself an attractive proposition for clients and employees alike.

It is the responsibility of all in our sector to help educate our communities about the value that we deliver and the long term opportunity to reduce carbon emissions through our work.



"It is the responsibility of all in our sector to help educate our communities about the value that we deliver and the long term opportunity to reduce carbon emissions through our work."

Gordon Thomson, Director of Commercial, Infrastructure and Energy at Nottingham City Council, explains his city's approach to carbon and the importance of collaboration in achieving net zero infrastructure.

Alison Nicholl, Head of Constructing Excellence, describes how her movement acts as a key driver for change within the industry, across all sizes and locations of companies and how carbon is the key issue that has to be addressed by the industry.

Transformation in a Generation

We make no apology for being ambitious in the aims described in this document. Realistically, there is no other option: within a generation, the construction landscape in relation to carbon will be transformed. If it is not, we will fail to meet all of the Government's stated aims and we will have let society and our communities down. However, to achieve this step-change requires a whole range of elements to come together, including the following:

Skills

The Committee on Climate Change has identified that new skills for designers, builders and installers are urgently needed for low-carbon heating, energy and water efficiency, ventilation and thermal comfort and property-level flood resilience.

The industry must find ways of training the staff necessary to undertake this anticipated workload. The industry must ensure that it has the skills to deliver the designed carbon saving to prevent a disconnect between theory and practice. This requirement has significant implications for an industry of subcontracted liabilities and poor capitalisation of companies. It may mean that the successful companies within this burgeoning sector will be relatively well capitalised and directly employ many of those with the key skills needed to deliver the service.

The post-18 education review conducted by Philip Auger has recognised that the FE Sector is 'a vital building block in the UK's platform for future prosperity' and this is where the majority of the skills needed to de-carbonise the UK are taught. The MCG asks the Government to adopt the Auger Review recommendations and channel funds to this sector to support the creation of the human resource needed to support the war on carbon.

Corrie Harris, Chief Executive and Principal at Moulton College, explains the readiness of the further education sector to address the shortage of skills in this area of the economy and why trade apprentices are the ideal solution to help the UK achieve net zero emissions.

The CITB runs a number of carbon-facing initiatives and is open to supporting additional schemes. The CITB now offers a free distance learning series of modules where companies can gauge their knowledge of this important sector.

Richard Bayliss, Sustainability and Innovation Strategy Lead at the Construction Industry Training Board (CITB), outlines the work that the CITB has done and continues to provide in support of the industry and to prepare it for the significant volume of work and services that it will be expected to deliver to achieve net zero.

A key strategic skill required by business leaders and opinion formers is knowledge of sustainability. The Cambridge Institute for Sustainability Leadership offers distance learning courses to equip senior and aspiring managers with the knowledge to promote better carbon management.

Procurement

Within the context of carbon, procurement is crucial, particularly in an evolving and uncertain environment. Procurement is central to the ambitions and conditions of a project, and to its final outcome. The MCG urges Government and publicly-funded bodies to procure construction work on the basis of Natural Capital (or total wealth, which is similar to Triple Bottom Line) accounting. These bodies should use The Public Services (Social Value) Act 2012 to use Lifetime Carbon as a procurement tool to assess the value of goods and services to their wider communities. We believe that this change will help drive better community ownership and better long-term procurement decisions that will focus on the wider benefits to society.

The UK Green Building Council has published advice to Local Authorities on Social Value. This advice supports the wider sustainability agenda within local communities, which can support local delivery of construction works. One such example is the delivery of tree cover by HS2 within a 50 mile corridor centred on their new railway: this 'green corridor' consisting of new wildlife habitats, native woodlands and community spaces helps integrate the new line into its surrounding environment and is a project of unprecedented scale.

Funding of carbon reduction programmes will vary depending upon the client and the value that Government (or customers) places on the benefit. The MCG makes the following proposals:

- **Domestic:** Domestic installations should attract a 5% VAT rate to encourage take-up. Government may choose to further support this work with grants, depending upon the technology or carbon savings available.
- **Commercial:** Adequate focus is given to the intangible benefits of carbon reduction when assessing the value of decarbonisation, for example: reputation, staff morale, the ability to win work as a result of adopting best practice etc.
- **Investment:** Investment in infrastructure should be funded through taxation in the normal manner, but serious consideration must be given to the whole life carbon emissions of the project, which should be factored into the cost.

Chris Clarke, Head of Transformation at the Scape Group, makes the case for professional construction procurement to ensure correct standards and verifiable outputs are provided by the supply teams delivering the UK's infrastructure.

Rudi Klein, Chief Executive of the Specialist Engineering Contractors (SEC) Group, argues that the only way that our industry can tackle the carbon challenge is through collaboration throughout the supply chain, where all stakeholders are treated fairly with appropriate transfer of risk.

Design for a Low Carbon Society

Good design can reduce both the quantity of embedded carbon within a project and the amount of carbon wasted through building inefficiencies. WRAP has produced a guide "Designing out Waste" to help for industry focus on the key issues.

There are also a number of international standards that support the design of sustainable buildings. These include BREEAM, Passivhaus, WELL Standard and LEED. Infrastructure has a dedicated standard in CEEQUAL.

Design is about making decisions that affect the building and long-term use of a project and then imparting this knowledge to the wider team. There are a number of tools that already exist to support designers that include the BRE Green Guide to Specification and the Inventory for Carbon & Energy, which seek to give environmental data on common products. In addition, there are various guides for common materials such as steel and concrete. Refurbishment, where the bulk of the industry's work will be, carries its own challenges and there are a number of design guides available, including from the BRE.

Dr. Michelle Agha-Hossein, Soft Landings Operational Lead at the Building Services Research & Information Association (BSRIA), describes the important role that soft landings provides in supporting main contractors to deliver net zero buildings and the role of BSRIA in changing the culture within our industry.

Products and Materials for a Low Carbon Society

The industry's challenge is to provide a modern, knowledgeable and relevant service to its customers. The industry must find new - and use appropriate existing - products and materials that have a low carbon footprint, based on their serviceable life. There are many fantastic examples and main contractors need to be careful not to be limited in their thinking and ambition.

Selection of materials should be done with the client as the nature, use and implications of various options need to be agreed from the outset. For customers who are very carbon conscious, the quantity and ability to off-set or depreciate the embedded carbon may be a key selection criteria.

Main contractors must be careful how new materials and processes are incorporated into a project. Problems often occur at the interfaces where the consequences of new interactions are not anticipated and the performance in use is compromised by another product. Whilst primarily a design issue, main contractors must be careful not to overlook these design checks.

There are numerous products and processes that have been created to support a low carbon construction industry. **Appendix D** starts to list the breadth of solutions available to encourage the industry to investigate their own low carbon solutions for themselves and their customers.

Andrew Carpenter, Chief Executive of the Structural Timber Association, explains the sustainable benefits of structural timber and the opportunity to use this in a wide range of building projects.

Eddy Taylor, Laing O'Rourke's Technical Environmental Leader, makes the case for off-site fabrication to drastically reduce embodied carbon and improve quality that will reduce operational carbon consumption.

Other Environmental Initiatives

The drive to reduce carbon consumption within our society has many different approaches. The following initiatives are already adding value within industries and have applications in construction.

The Circular Economy

The circular economy is a concept that rejects the traditional way of destroying products when they reach the end of their natural life and often sending them to landfill. Instead, products are kept in use for as long as possible to extract maximum value, then as much as possible of that product is recovered and regenerated at the end of its service life.

This works on a number of levels: a product can be used for a different job, such as lithium ion car batteries being used to store energy in a house when their capacity to store enough energy to run a car fails. A product could be designed to allow easy replacement of worn parts, such as a drill motor within a drill being easily removed to be replaced with a new motor; or products being designed to allow easy dismantling to aid recycling of the raw components. The Ellen MacArthur Foundation is leading the way in promoting the circular economy and our industry presents a huge opportunity to redesign and/or repurpose products for a longer and more beneficial life.

Plastic Reduction

Our industry uses a huge amount of plastic in both permanent works and in wrapping and securing products during delivery and installation. There is a similar opportunity to reuse or recycle this material. The Waste and Resource Action Programme (WRAP) is working in this area and has created the UK Plastics Pact to ensure that 100% of all plastic wrapping is reusable, recyclable or compostable by 2025, plus other targets.

Construction waste and rework is a major source of cost and carbon that adds zero value to contractors and clients alike. In 2016, construction, demolition and excavation waste accounted for 61% of total UK waste. This amounted to 136.2 million tonnes and excludes commercial and industrial waste of 41.7 million tonnes, some of which must be accounted for within the construction industry. Whilst 91% of construction and demolition waste was recycled, this was generally to a lower economic band. These figures show the opportunity and the challenge to meaningfully reduce these figures.

Off-Site Manufacture

Off-site manufacture is one way that the industry can reduce the embodied carbon within a building. Efficient and repeatable design should lead to less waste and more efficient production. Indeed, WRAP states that onsite waste can account for 15% of the embodied energy of a building and case studies indicate that off-site manufacture can reduce this by at least 50%.

Construction Plant and Heavy Goods Vehicles (HGVs)

In the UK, HGVs account for 5% of vehicle miles but 17% of greenhouse gas emissions. Construction plant is generally at the poorer end this spectrum, with higher levels of greenhouse gases and particulates. There are various initiatives to make our industry use less polluting equipment. The London Mayor is supporting this drive for cleaner construction plant and our industry might anticipate that this will be rolled out nationwide.

"All elements in the construction industry must be aware in no uncertain terms that if they do not take advantage of the opportunities ahead, they risk finding themselves left behind in a rapidly-changing construction landscape."

Conclusion

Members of the Major Contractors Group believe that the industry must change quickly if it is to remain relevant to its customers and help deliver zero emissions by 2050. There is a real opportunity for main contractors to drive the agenda and provide the necessary service to enable their customers to meet their carbon targets. This will allow main contractors to do what they do best – coordinate their supply chains to add real value to their customers.

The industry and main contractors cannot do this alone and clients must play their part too. Clients must recognise their responsibilities to society as commissioners, owners and operators of the built environment and accept their role in achieving the net zero emissions goal by 2050. The best way to achieve this is through a collaborative approach to construction, with main contractors, clients and the whole supply chain acting as one to achieve the desired outcomes.

All elements in the construction industry must be aware in no uncertain terms that if they do not take advantage of the opportunities ahead, they risk finding themselves left behind in a rapidly-changing construction landscape.

Government too must play its part. Without a bold and ambitious vision, allied to a detailed and realistic roadmap to realising that vision and the regulatory landscape to facilitate it, none of this can happen. On this basis, the MCG makes 17 recommendations to the various stakeholders within the construction industry overleaf. These recommendations should be used to generate discussion and influence rapid change within organisations, including Government, clients and supply chains.

Mark Wakeford, Joint MD of Stepnell and Chair of the Major Contractors Group, summarises the opportunities and the urgency for main contractors to collaborate with professionals across the industry to tackle the net zero challenge.

Recommendations

Government

1. Provide clear guidance on how the UK will achieve zero carbon by 2050. We support the CBI's call for 'clear pathways to enable investment in low-carbon technologies'. This should involve creating a 'Ministry of Carbon' to direct the UK's activities to reduce its dependence on carbon.
2. Work with Governments from around the world to price carbon so that there is a uniform price on the cost of carbon content within products and services.
   We support the Global Commission on the Economy and Climate's 2018 report findings.
3. Create a Carbon Reduction Certification Scheme for use in the domestic and small commercial sector that is tied to funding, ensures quality and deals with customer complaints.
4. Implement the recommendations of the Auger Report, specifically in the FE Sector, to help create the skills necessary to decarbonise the UK.

Construction Clients

5. Public bodies should use their powers under the Social Value Act to procure construction services on the basis of Total Wealth Accounting parameters. This will allow local communities to share in the benefits and clients to procure on the basis of carbon reduction.
6. Clients procuring construction services should demand to know the embedded carbon within their buildings and the carbon requirement in-use prior to purchase. This knowledge is evolving, but it will allow clients to understand their estate and the impact of their actions within society.
7. Clients should make use of performance-based targets and Government Soft Landings to ensure that the operational carbon production of a new building matches the original design parameters.
8. Clients must be open to innovation in both products that may be specified and in methods that are used to deliver them. The construction industry will have to innovate extensively if our services are to support the net zero greenhouse gas emissions ambition and clients will have to accept change in what, and how, projects are delivered.

Main Contractors

9. Understand, record and publish your carbon footprint, both on a business basis and a project basis. This will allow you to engage meaningfully in the debate on carbon with your clients, supply chain and wider society. It will also provide a benchmark from which to reduce both your footprint and your costs.
10. Identify the market opportunities where your skills and resources can make a commercial contribution. Set a strategy that accounts for the issues described within this report. Sell this strategy to your staff, customers and supply chain.
11. Research new products, partnerships and collaborations to tackle these new challenges. Change in your markets will bring new opportunities that will need different skills and partners to deliver.
12. Upskill your employees. Record their personal carbon footprints and give them the tools to contribute to this reduction. Engage with the CITB to ensure that they provide a service that meets your needs.

13. Reflect your changing corporate focus in your marketing and recruitment material. Demonstrate that your business cares about your environment and is working to help save the planet.
14. Engage with the National Federation of Builders to ensure that there is a common standard to measure and record embedded carbon and a recognised methodology to measure in-use carbon within our buildings.

The Supply Chain Including Designers

15. Understand, record and publish your carbon footprint and then work to reduce it. Main contractors will need to know your carbon contribution to a project in terms of both products and delivery.
16. Work with your client contractors to identify new designs, products and processes that can be used to reduce the carbon embodied in a project.

The National Federation of Builders and Other Trade Organisations

17. Educate all stakeholders regarding the challenges, urgency and solutions to reduce carbon dependency on the 47% of carbon emissions influenced by our industry.

Appendix A

Funding for the Domestic Retrofit Work

The Committee on Climate Change has identified our existing housing stock as an area for significant improvement. There are three routes to reducing the carbon footprint of our homes, all of which need to be pursued if we are to meet the challenge. These are to:

1. change people's behaviour to use less energy
2. reduce the carbon content of the energy we use, and
3. improve homes so that they use less energy.

The Committee on Climate Change has proposed a spend of £15 billion per year to tackle the existing housing stock.

Whilst this figure is within the investment parameters set by Government, a spend of this magnitude would require a high degree of probity to ensure the public purse gets value for money.

If the number of improvements is to be achieved, the challenge with the domestic market is to galvanise both the small local contractors and the larger regional and national contractors. These contractors will need to provide a first-class service in design and delivery, workmanship and customer care. Government will have to support this investment and encourage take-up, otherwise it will not happen.

In order to achieve this, the MCG therefore recommends the following:

- The UK takes advantage of our exit from the European Union to reduce the level of VAT on specified repairs to 5%.
- Government reviews existing certification schemes for suitability, with particular emphasis on the standards around design and delivery of domestic carbon saving measures. Customers will need to use a certified contractor if they wish to benefit from either reduced VAT or any available subsidies. The MCG believes a successful certification scheme includes the following attributes:
    1. accredited ISO standards of installation and performance that are clearly defined
    2. customer-focused staff to ensure that homeowners who retrofit measures understand the behaviours necessary to reduce carbon
    3. external audit function to ensure effective workmanship and high levels of quality are maintained
    4. effective redress against companies and staff where measures are not effective. The MCG recommends that operatives lose accreditation to carry out further installs without retraining and the Directors of the business responsible are made personally liable for fines that may be levied on the business if the business is unable to pay the fines
    5. An Approved Code of Practice (ACOP) that defines the delivery and performance standards and qualifications required to operate in the sector. The Gas Safe Register provides a template.
- Where necessary, Government specifies a range of carbon saving measures, with expected carbon benefits, that will qualify for a subsidy or reduced VAT to encourage adoption by private homeowners and, where appropriate, landlords.
- A three year timetable from Government, starting as soon as possible, to enable the industry to adequately respond with training and investment to meet the strict delivery criteria necessary to reduce carbon in homes.

Appendix B

Technology and Products for the Domestic Market

The domestic market for energy efficiency demands specific attributes and a fast timescale. The technology needs to be easy to install, easy to use, be space limited and relatively inexpensive. The largest market is the 25 million existing homes that will need some form of energy efficiency technology to support the net zero target. New homes are built to newer codes that are designed to meet modern energy standards.

A domestic energy refurbishment will require detailed planning. Material selection, energy planning and ventilation design are all key areas for a successful low carbon project.

Material and Fittings Selection

Select materials that are low in embodied carbon. These are generally materials that have low energy and low water use during manufacture. They may also be a product of the circular economy, further reducing the resources used to modernise a home.

- Lighting should be LED
- Rainwater harvesting should be included, even if only used for the garden
- Low energy fixtures in accordance with the Energy Rating Certificate & low water fittings
- Stand-by savers to reduce energy consumption of appliances on stand-by
- Voltage optimisers can reduce energy consumption
- Low voltage distribution

Energy Generation

Energy generation is a key carbon source that needs to be minimised. Generating energy in a home needs to be done without solid fuels, gas or oil. Energy needs to come from self-generated means or carbon free energy from the grid.

There are a wide variety of technologies that can be used to reduce carbon emissions from homes. Those given below represent just a few of the possibilities:

- Air source heat pumps
- Ground source heat pumps
- Solar PV to generate electricity
- Solar thermal
- District heating offers significant carbon savings through a shared resource

Structure for New Homes

A report by Bangor University, 'Wood in Construction in the UK' (Feb 2019), showed that timber-framed houses offered a 20% reduction in carbon dioxide compared to traditional build and that this increased to 60% for cross laminated timber (CLT) compared to concrete buildings.

Brick and block may be replaced in the future by rammed earth walls or cork walls, which significantly reduce the embodied carbon within a house.

Appendix C

Greening Our Businesses

Ways to reduce carbon emissions from our businesses are well documented. These are some of the more common areas on which businesses focus:

Leadership and Staff

- Tools for SMEs to start measuring, managing and reducing carbon emissions and reducing energy cost
- Measure your corporate carbon footprint
- A guide to carbon footprinting that explains what is included in organisational, supply chain and product footprints, how you can measure and communicate them, and the benefits of doing so
- Pledge a carbon reduction target for the business to achieve
- Ask staff to measure their own footprints
- Engage staff in initiatives to reduce the company's carbon footprint
- Register your company to PAS 2080

Energy Use

- Review energy use against time of use and quantity to identify reductions
- Assess energy saving measures, which may include:
  1. Changing time of activities
  2. Installing LED lighting with PIR detectors
  3. Competitions between teams to reduce energy use
- Install Solar PV or other renewable generators
- Assess load shifting or other mechanisms to reduce the peak cost of energy
- Provide electric vehicle charging points

Movement and Communication

- Reduce the fuel consumption of driving plant and vehicles through vehicle selection
- Reduce the need to produce carbon through cutting unnecessary travel
- Improve your company's ability to have meetings remotely over the internet

Products and Services

- Use the Energy Technology List to search for high performing products in the top quartile for energy efficiency
- Select low energy fixtures and fittings
- Choose products with low levels of embodied energy or that work in a circular economy
- Reduce the amount of paper by starting the paperless journey and then review other products and services consumed by the business
- Choose a green energy supplier

Appendix D

Technology and Processes for the Wider Industry

Products and processes listed below are clearly not exhaustive. They are given only to indicate opportunities within the market and not as a substitute for comprehensive, tailored research:

Development Issues

- Plan your targets, standards and outputs early to maximise the opportunities for sustainable and low carbon development
- Smart electricity grids – these grids are owned and operated by the landowner and allow a multisite development to: optimise the use of self-generated electricity, flatten demand through combining different occupiers, provide EV charging points, and assess the benefit of large scale battery deployment
- There are increasing options to take developments off-grid in both electricity and wastewater

Products and Materials

- Natural fibre insulation
- Lighting improvements using LEDs
- The Committee on Climate Change recommends a 26% reduction in lime, cement and plaster by 2050[1] Products such as Hempcrete and other alternatives can make a big difference
- Natural fibre carpets and finishings
- The Committee on Climate Change recommends a 30% increase in timber frame use[2]
- Re-used materials and products to support a circular economy
- Re-designed materials to support a circular economy

Methods of Work and Running Sites

- Re-fillable tubes and bags
- Use of BIM to reduce waste and re-work
- Waste reduction programmes through segregation, planning and the circular economy
- Replacing site generators with solar power and battery technology

Notes:
1 'Net Zero: The UK's contribution to stopping global warming', Committee for Climate Change, p.163, May 2019.
2 'Net Zero: The UK's contribution to stopping global warming', Committee for Climate Change, p.148, May 2019.

Further Information and Acknowledgements

This report was intended to be an online document. However, if you are in possession of a hard copy you may wish to visit the National Federation of Builders Major Contractors Group subsite: https://www.builders.org.uk/nfb-groups/nfb-major-contractors-group/mcg-carbon-report-november-2019/ to view the many links to useful studies and resources within the interactive version of this report.

The NFB has developed this report as a live document that can be updated regularly to reflect new information, new ideas and progress made. Any individual or organisation who believes they can add to or improve this document should contact the NFB at the address on this page.

About the NFB Major Contractors Group

The Major Contractors Group (MCG) is a division of the National Federation of Builders, formed to share intelligence, improve governmental understanding of larger construction businesses and find solutions to current barriers to house building and infrastructure. The MCG is a dynamic forum of major contractors across the UK working collectively to challenge many of the sector's misconceptions and to be a focus for best practice and future-proofing the sector.

About the National Federation of Builders

The National Federation of Builders (NFB) represents builders, regional contractors and house builders across England and Wales. As one of the UK's longest-standing trade bodies, it was created to represent the building profession and to help create the conditions for its members to thrive and contribute to the economic success of the UK. Its members range from the sole trader to multi-million pound construction companies, with turnover ranging from below £500,000 to £500 million. The NFB provides advice, training and business services.

The NFB campaigns on the issues that affect the construction industry such as procurement, skills, sustainability and funding. It represents the industry at government and industry forums and is an active media commentator and policy influencer.

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Disclaimer:

This report is written by the National Federation of Builders Major Contractors Group Board and NFB staff, with support from the organisations listed above. The views expressed in this report are those of the NFB Major Contractors Group and do not necessarily reflect the view of all other parties named.

Thanks to Contributors

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Abundance Investment

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The Building Services Research & Information Association (BSRIA)

Carbon Trust

The Confederation of British Industry (CBI)

Construction Clients Leadership Group (CCLG)

Civil Engineering Contractors Association (CECA)

Construction Industry Training Board (CITB)

Constructing Excellence, BRE

EvoEnergy

Federation of Master Builders (FMB)

Institution of Civil Engineers

Laing O'Rourke

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Scape Group

Specialist Engineering Contractors' (SEC) Group

Structural Timber Association (STA)

National Federation of Builders
Major Contractors Group

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https://www.builders.org.uk/nfb-groups/nfb-major-contractors-group/mcg-carbon-report-november-2019/