Carbon Reduction Plan Darwin Group February 2023

Contents

Commitment to achieving Net Zero

Darwin Group is committed to achieving Net Zero emissions by 2045.

Carbon Reduction Projects

Completed Carbon Reduction Initiatives

Darwin Group (DG) has implemented or completed the following environmental management measures and projects since the 2021 baseline.

Since our inception in 2006, DG has made a substantial investment in R&D, focusing on new construction materials and new building technologies and processes. We are ISO 14001 accredited and committed to continually reducing the carbon footprint of our activities.

DG is the first company in the industry to commission an external report (undertaken by Mtech Consult Ltd) on the full environmental life cycle assessment of our products. The results of this showed that our buildings are very sustainable and sympathetic to the environment. Compared with traditional building, offsite building through excellent energy efficiencies and build process can have up to 70% less of a carbon footprint.

As a result of continued improvements, we can commit to affordable modular buildings manufactured to the highest levels of environmental sustainability, constructing all buildings to meet at least a BREEAM Excellent rating. These are delivered through a turnkey package that includes initial concept designs and feasibility studies, planning applications, and building regulation compliance. We seek advice from our in-house LABC approval, BREEAM, SBEM, EPC, and Passivhaus assessors and stay up to date with the latest sustainability innovations, such as heat scavenging and distribution, to offer the most sustainable solutions to our clients.

Some of the many benefits of DG's modular construction approach include:

- **Reduced material waste:** <1.5% compared with 10% for construction sector generally. (Source: WRAP),
- **More efficient factory labour:** this has been shown to be 300% more efficient than the same operation onsite. (Source: WRAP)
- **Reduced energy consumption:** the energy consumption during production has been shown to be >60% less than traditional construction. (Source: KPMG),
- **Fewer materials used:** a key feature of our MMC approach is that we require fewer material deliveries to the construction site, typically >90% less. (Source: Building Intellect),
- **Better energy performance:** independent studies have shown that factory build can achieve a DEC (Display Energy Certificate) rating improvement of typically 24% compared with traditional construction. (Source: Building Intellect),
- **Reduced CO2:** each DG two-bed, four-person home reduces CO2 emissions by 162 Tonnes over a 60-year life span due to combined running costs and maintenance com- pared with traditional build (Source: Mtech Consult).

Planned Carbon Reduction Initiatives

As you can see from the above initiatives, Carbon Reduction and Care for our Environment has been at the heart of everything that DG has done since we delivered our first Modular constructed school building in 2007. However, this is our first Carbon Reduction Plan, and we intend to use it to guide our actions using the same rigorous approach we bring to all our programmes. Our initiatives will therefore follow four categories of activities:

Measurement
To help track our progress and help dedicate resources to the areas of greatest impact, we plan to improve our measurements though the following activities:

Scope 1: We are confident that our measurement of our Scope 1 emissions is accurate, but we will codify our means of capturing this data to enable us to update it more regularly and easily than has been the case with the current reporting period.

Scope 2: We are confident that the data we have received from our energy supplier is accurate and delivered in a timely manner. In the short term, we see no improvement in the measurement of these emissions.

Scope 3: Our Scope 3 reporting, currently encompasses the Cabinet Office's categories of:

- **Business travel:** We are confident that our business travel emissions are accurate. However, as with Scope 1, we intend to codify this to enable the data to be more easily captured, allowing us to make it available to Management on a quarterly, rather than annual, basis.

  Employee commuting: As with many of the examples provided by the Greenhouse Gas (GHG) Protocol, we have measured only a percentage of our staff's commuting habits and extrapolated up from this. We intend to increase this to an annual polling of all staff, and our internal communications department will present the survey in a manner that will encourage our staff to become more engaged with emissions reduction.

- **Factory waste:** We are confident that the data provided by our waste removal company is accurate, but, as with our other emissions, we intend to capture this information quarterly.
- **Upstream & downstream:** We are confident of the accuracy of our upstream emissions data. Regarding our downstream emissions, we have asked our tier 1 suppliers for their carbon data, as their services account for around 90% of our downstream emissions. We will expand this data collection to include our tier 2 suppliers. In the meantime, we have inflated our Tier 1 supplier's carbon by 10% to account for the likely Tier 2 & 3 emission. Furthermore, we are looking at other matrices to see if we can define a carbon cost per m^2 of manufactured building, both on our upstream and downstream costs. This will enable us to measure the carbon upstream and downstream more closely as we expand the company.

We will expand our measurement and reporting to include other Scope 3 Categories, as defined by the GHG Protocol, as our measurement tools become more sophisticated, and the emissions data becomes available. In the meantime, our planned reporting initiatives include:

Governance
During 2023, we plan to appoint a Carbon Reduction Champion whose role will be to maintain, update, and improve our Carbon Reduction Plan, which will be signed off by a member of the Board. The Carbon Reduction Champion will report to the Board on all initiatives quarterly and will be empowered to implement and oversee all improvements signed off by the Board. In addition, they will oversee the annual refresh of the Plan.

Planning
We will carefully examine the outputs of our carbon measurement activities using a cost-benefit analysis. This will enable us to understand the cost and benefits of each improvement, and therefore more accurately plan where our most significant improvements will be implemented.

It should be noted that DG is a growing company, and that increasing one's business activities inherently results in more carbon being produced. However, this also means that the reductions we make to our downstream emissions will be even more impactful.

Implementation
We are committed to reaching Net Zero by 2045 and will stay up to date with new, innovative technologies and processes that will aid us in achieving this goal. We are confident that these innovations, along with our robust processes, procedures, and approaches, will enable us to meaningfully reduce our carbon emissions.

The benefits of our approach

Employing the Passivhaus Principles

In 2021, DG retained the services of a globally recognised sustainability consultancy, Cundall, to develop a Net Zero Carbon MMC solution compliant with PPN 06/21. We chose to partner with Cundall because of their impressive industry leading sustainability credentials including Certified Lead Designer, active Gold Leaf members of UK Green Building Council, and Net Zero technical advisors to government departments such as the Department for Education.

DG's approach to design and construction for Net Zero is focused on providing a low energy and low maintenance solution, and we believe a healthy building design strategy should be based on biophilic principles to promote user wellbeing. Our design philosophy is based on the five principles of Passivhaus:

1. High quality insulation, with a super insulated envelope,
2. Heat control and high-performance windows,
3. Airtight construction with a continuous airtight layer,
4. Heat recovery ventilation,
5. Thermal bridge free design.

The Passivhaus principles ensure designs maximise winter heat, summer cooling, natural light, and ventilation without summer solar gain. We have found this also results in there being minimal heat loads. Our designs always consider future climate adaptation and include cross ventilation, heat scavenging, and occupancy gains.

Reducing embodied carbon

DG's MMC reduces embodied carbon by up to 90% & waste by up to 98%. Our innovative construction approach starts with the least energy intensive approach (passive/natural ventilation) to maximise thermal comfort and natural ventilation and maximise green technology. For all projects, our Net Zero Carbon cost allowance is less than 5% of overall net construction cost.

We transport modules via low carbon hauliers, tracking distance and CO2 in our BREEAM scoring and reporting tool, and use this data to identify further carbon reduction opportunities.

We prioritise local suppliers, which reduces travel mileage and the associated CO2 emissions. On all projects, we work closely with our supply chain to minimise waste and maximise recycling and reuse by regularly reviewing both products and packaging.

Reducing whole-life carbon costs

DG's approach to whole-life carbon costs is focused on the Passivhaus Planning Package tool and energy software PHRibbon. The PHRibbon cross-references quantities of all materials to be used, their densities against prescribed list of carbon data derived from Environmental Product Declarations (EPDs) and ICE database of embodied carbon. The software also captures the cost for component replacement during the building's lifespan. Data is inputted by Cundall, and the process is overseen by our Design Manager.

We carry out operational energy assessments utilising recognised methodology, such as TM54 or Passivhaus. This establishes a true picture of a building's regulated and unregulated energy consumption at an early stage, following which we can agree energy intensity targets with the client.

DG and Cundall work closely with clients to consider any Carbon Reduction Plans that they may already have in place. During RIBA stage 2 of each project, we engage with them via an options workshop attended by our Design Director, Design Manager, and representatives from Cundall. We conduct optioneering, focusing on achieving Net Zero carbon and sustainability opportunities by minimising embodied and operational carbon, and capturing this in PHPP energy software. We identify early quick wins, such as using local supply chains and increasing a fabric-first approach incorporating Passivhaus. We also factor in the client's existing site infrastructure, as well as considering the proposed building orientation and efficiencies that may be achieved by considering the proposed use, footprint, and layout.

During the workshop, we identify Net Zero carbon, energy intensity, and sustainability opportunities, such as:

- Establishing decarbonisation pathways for all energy sources,
- Reviewing the client's existing estate strategy and suggesting improvements to existing buildings,
- Carefully designing glazing to allow both air movement and good daylight, where possible reducing the need for artificial lighting and mechanical ventilation,
- Using LED lighting with good lumen efficiency,
- Reducing waste,
- Exploring carbon offsetting,
- Maximising standardisation and digitalisation,
- Implementing low water usage measures throughout the building,
- Using low carbon intensity materials,
- Employing measures such as leak detection and presence-controlled lighting,
- Using energy efficient HVAC plant and controls.

Following the meeting, DG produces a detailed report covering the opportunities discussed, strategies for achievement, and our risk mitigation approach. We share this, as well as all other outputs, with clients via an agreed Common Data Environment.

Throughout each project, DG and Cundall hold regular opportunity enhancement workshops to refine the outputs of the initial workshop. Cundall produces Stage Reports detailing key decisions and any further risks or opportunities identified. They also conduct strategic options studies and present the results of these to the client. Throughout delivery, DG engages in knowledge transfer exercises to enable the client's decisions to be as informed as possible.

Reference case: driving energy efficiency in the Education Sector

DGL has long been considered the leading providers of MMC or Modular Design & Build Solutions, providing transformational projects for local authorities, educational establishments, and the NHS across the UK. We strongly believe that high-performing, energy-efficient school buildings can serve a crucial role in uplifting students, staff, and the wider community over the long term. For this reason, we have invested heavily in developing best-of-breed construction and build system technologies from our site in Shropshire.

In 2019, The UK government published its long-awaited Net Zero Carbon strategy, setting out how it plans to meet the country's climate goals. Within the targets, it states that all new build developments must achieve Net Zero Carbon in operation by 2030, that that the wider estate must be brought up to speed by 2050.

With ongoing pressures on Local Authorities and Education Groups to provide sufficient spaces for the country's growing mainstream and high needs population, many are looking for innovative solutions in the race toward carbon neutrality. With targets looming, there is now increasing pressure to step away from traditional build systems and embrace the speed, efficiency, and sustainability that MMC offers in the design and delivery of Education new builds.

Passivhaus design typically utilises the same materials as any traditional build system with the de- sign life and durability relatively comparable. However, to achieve the Passivhaus Certification, not only do build materials have to be of the upmost quality, but installation and execution must be met with meticulous care and attention, which are all maintained internally through DGL's in-house manufacturing facility.

Understanding the requirements

In November 2021, DG began the construction of a new education building for St Edward's School in Romsey, Hampshire. St Edward's is a Catholic school, providing specialist compensatory education, social care, and therapeutic services to local authorities for pupils experiencing social, emotional, and mental health difficulties. The school is situated in a substantial park on the edge of the New Forest and benefits from extensive grounds, a wide selection of specialist buildings & workshops together, and excellent sporting facilities.

Speaking prior to the education building's construction, Sally Webb, Director of Development at St Edward's School, said: "At St Edward's, we are committed to the stewardship of our environment and therefore carbon neutrality is a target that has a moral imperative for all of us and that is why we are delighted that the new build will be Passivhaus."

DG was enthusiastic about the opportunity to deliver one of the UK's first Net Zero Carbon and Passivhaus Education Schemes. Charles Pierce, our Managing Director, said: "We are passionate about sustainable educational buildings, so it has been a privilege to be appointed by a client whose values align. Working together, we have the opportunity create a school block which pushes the boundaries of sustainability to achieve one of the first net zero educational environments."

As well as having to create a building sympathetic to the school's environmental policy, it was vital that DG's team of experienced designers and architects create an inspiring build that works in harmony with the Grade II listed former manor house. Furthermore, it was crucial that the building be designed to be 'low arousal' to meet the requirements of pupils with sensory needs.

Project delivery

The project at St Edward's School was developed through a Pre-Construction Services Agreement, making full use of DG's in-house capabilities. This allowed us to develop the scheme from a blank canvas and create a real spirit of team collaboration from project concept to delivery onsite. Many schools and local authorities find this approach offers the benefit of cost-savings through the design development phase of the project, as well as complete control and predictability of budget and programme at all stages of project delivery.

Working closely with St Edward's, DG has been able to exceed the school's requirements, delivering the first Special Educational Project to achieve the enhanced Passivhaus Plus Certification. The design was originally targeted to achieve Passivhaus Classic standard, however further design considerations have enabled us to achieve Plus certification. The capital vs operational cost on the project means that the additional capital spend will be recovered by year 14 of its lifespan.

The new 631sq² teaching block, which was completed in July 2022 and opened by Bishop Declan Lang of Clifton diocese in October, includes six classrooms, group learning areas, and a sensory room. Its Passivhaus approved windows reduce heat loss by more than 70% compared to existing double-glazed windows, and high-quality external insulation cuts heat loss by 90%, supported by an energy efficient design standard that maintains an almost constant temperature. This ensures a comfortable and healthy learning environment, while minimising the energy demand of the building and significantly lowering the school's operational costs.

DG is actively working alongside local author- ities to provide information around achieving Net Zero Carbon & Passivhaus Certification across Education. Our accredited Continuous Professional Development Session (CPD) outlines the benefits of utilising a modular build system to cost-effectively meet these credentials in-line with the 2030 & 2050 Targets.

Baseline Emissions Footprint

Baseline emissions are a record of the greenhouse gases that have been produced in the past and were produced prior to the introduction of any strategies to reduce emissions. Baseline emissions are the reference point against which emissions reduction can be measured.

DG's first reporting year was for the 12-month period ending 31st December 2021

Baseline Year: 2021	
Additional Details relating to the Baseline Emissions calculations.	
We have selected the 12 months ending 31 December 2021 as our Baseline year – this covers the consumption and emissions related to the business activities for DG. The Operational Boundary is both Financial and Operational Control. We have reported on all the required emissions and can confirm that the reporting for our Scope 1 & 2 emissions is in accordance with the Streamlined Energy and Carbon Reporting regulations whilst the mandatory subset of Scope 3 emissions has been calculated in accordance with the GCH Protocol's Technical Guidance for Calculating Scope 3 Emissions (version 1.0). Not all data is complete and totally comprehensive, however we have clearly identified where this is the case, explained our calculation methodology, and set out in our 'future initiatives' section of this plan our project plan and timelines for the required improvement measures.	
Baseline year emissions:	
EMISSIONS	**TOTAL (tCO_2e)**
Scope 1	**74 tCO2e**
Scope 2	**45 tCO2e**
Scope 3 Upstream transportation and distribution Waste generated in operations Business travel Employee commuting Downstream transportation and distribution	**340 tCO2e**
Total Emissions	**459 tCO2e**

Current Emissions Reporting

This report is for the 12-month period ending December 2022. The reporting year is therefore 2023 and the next report will be published in February 2024.

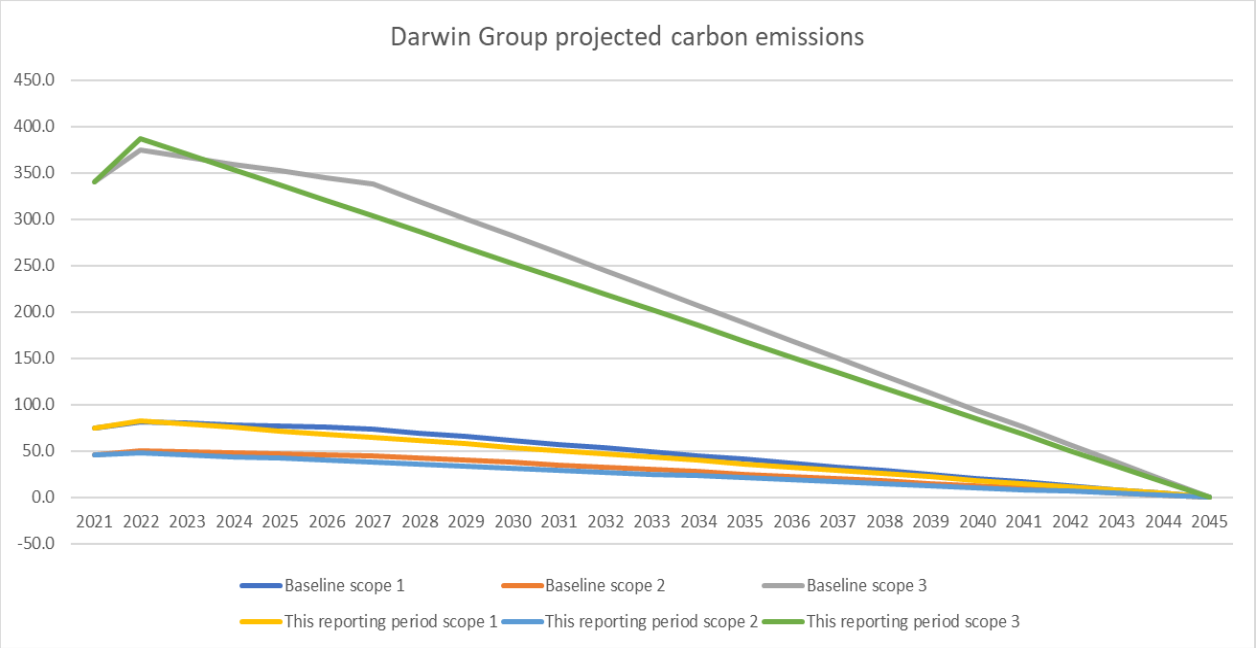
Reporting Year: 2023	
EMISSIONS	**TOTAL (tCO_2e)**
Scope 1	**82.4 tCO2e**
Scope 2	**48 tCO2e**
Scope 3 Upstream transportation and distribution Waste generated in operations Business travel Employee commuting Downstream transportation and distribution	**387 tCO2e**
Total Emissions	**459 tCO2e**

Emissions reduction targets

To continue our progress in achieving Net Zero, we have adopted the following carbon reduction targets.

Our Carbon emissions in our baseline year were 459tCO_2e, however, the figures were artificially reduced by the impact of COVID-19. We are a growing company, and this combined with employee commuting (our biggest source of carbon emissions) as staff return to the office means that our carbon increased in the period 2022-2023. Thereafter, we project that carbon emissions will decrease over the next five years to 456tCO2e by 2027. This is a reduction of 9%.

Progress against these targets is displayed on the graph below:



Declaration and Sign Off

This Carbon Reduction Plan has been completed in accordance with PPN 06/21 and associated guidance and reporting standard for Carbon Reduction Plans.

Emissions have been reported and recorded in accordance with the published reporting standard for Carbon Reduction Plans and the GHG Reporting Protocol corporate standard[1] and uses the appropriate government emission conversion factors for greenhouse gas company reporting[2].

Scope 1 and Scope 2 emissions have been reported in accordance with SECR requirements, and the required subset of Scope 3 emissions have been reported in accordance with the published reporting standard for Carbon Reduction Plans and the Corporate Value Chain (Scope 3) Standard.

This Carbon Reduction Plan has been reviewed and signed off by the board of directors (or equivalent management body).

Signed on behalf of the Supplier:

Jim Pierce – Deputy Executive Officer

Date: 22 February 2023

[1] https://ghgprotocol.org/corporate-standard
[2] https://www.gov.uk/government/collections/government-conversion-factors-for-company-reporting
[3] https://ghgprotocol.org/standards/scope-3-standard