



TECHRETE'S LOW CARBON STRATEGY 2021



UNDERSTANDING OUR CARBON
FOOTPRINT & STRIVING FOR
NET ZERO
CARBON EMISSIONS
BY 2030



INTRODUCTION

We strive to produce and deliver our products responsibly and in a way that respects people, their safety and their environment.

At the simplest level, this means doing no harm. We apply global standards to manage health & safety, the environment and how we engage with communities.

Our commitment to reducing our carbon footprint is evidenced by the significant investments we make in energy efficient and environmentally sustainable processes, equipment, workshops, facilities and management systems.

Climate change is a global emergency and we recognise that the time for serious action is right now. As such, we have put an aggressive 10 year carbon emission reduction plan in place.

Having recently published our own independently verified EPD, we are pleased to confirm that we are currently **20%** less carbon intensive than the industry standard.

By **2025**, we plan to reduce our carbon emissions by **50%** and our ultimate goal is to be **carbon neutral** by **2030**.



Mark O'Dea

Health, Safety & Environment Director



UNDERSTANDING CARBON

'The first step to tackling our carbon emissions is to understand what these emissions are, where they come from and how they affect us'.

WHAT IS CARBON?

'Carbon', or carbon dioxide, is often used to refer to all greenhouse gas emissions contributing to global warming. A more precise definition is carbon dioxide equivalent (CO₂ _eq), as it accounts for other greenhouse gases (such as methane and nitrous oxide). We use the term 'Carbon' in this brochure for simplicity.

Greenhouse gases are emitted from different processes such as energy generation, material production, farming, transportation, etc.

When people think of carbon emissions they usually think of the gases leaving the chimneys of fossil fuel plants, but greenhouse gases are emitted in many other ways.

WHAT ABOUT EMBODIED CARBON?

Embodied carbon is the term used to describe all the greenhouse gas emissions associated with a product i.e. all the emissions during material extraction, processing, transportation and operation.

In Techrete's case, the product is architectural precast concrete cladding, and all the associated carbon emissions need to be accounted for to understand our total environmental impact.

One of these metrics is the Global Warming Potential (GWP) which is the same as the carbon dioxide equivalent and describes the potential contribution of a product to global warming by way of greenhouse gas emissions.

DOES CONCRETE EMBODY CARBON?

Yes. The primary ingredient in concrete is cement and the manufacture of cement emits carbon dioxide. This is because cement is made from burning limestone at very high temperatures. To reach these temperatures, fossil fuels are typically used.

Additionally, the chemical process of turning the limestone into cement results in carbon dioxide being emitted. This process is called calcination.

Other sources of associated greenhouse gases are from the manufacturing processes, the transport of the raw materials to the manufacturing site and the associated carbon of the extraction of the other raw materials.

Although concrete embodies carbon, so does steel and in fact **steel embodies more than 20 times that of concrete per unit of mass**. The rebar used in Techrete's concrete panels is from 100% recycled material.

UNDERSTANDING CARBON

HOW DOES A PRODUCT'S LIFETIME AFFECT IT'S SUSTAINABILITY?

In a full life cycle analysis of a product, the product's expected lifecycle needs to be considered and one of concrete's major advantages over other products is its long service life.

As well as considering the embodied carbon of a product, one must also consider the amount of times that the product will need replacing over a long time period.

By increasing the lifetime of a product, you reduce the amount of cycles required and hence, save on carbon in the long run.

WHAT ABOUT PRECAST CONCRETE?

The benefits outlined above are even more relevant to precast concrete, where high quality control ensures better durability and hence, longer lasting concrete.

An additional benefit of precast is its modular form. Should a building be deemed redundant, the precast element may be detached and reinstalled elsewhere.

HOW DO WE CATEGORIZE OUR CARBON EMISSIONS AT TECHRETE?

WE DIVIDE CARBON EMISSIONS INTO 3 CATEGORIES:

1

Direct emissions from our factories, for example, carbon emissions from the natural gas used to heat our factories.

2

Indirect emissions from energy used in our factory, for example emissions from the fuel used to create the electricity we use. We currently buy only 100% renewable electricity.

3

Indirect emissions embodied in the raw materials used, for example, the emissions from creating cement.

OUR ENVIRONMENTAL PRODUCT DECLARATION



The best way to quantify the embodied carbon of any construction product is to obtain an **Environmental Product Declaration (EPD)**. This is a third party verified life cycle analysis which quantifies the amount of carbon embodied in a product, and is inclusive of all direct and indirect emissions.

In 2020, we had our own externally verified EPD published, which covers Techrete's architectural precast cladding products constructed of reinforced concrete.

The concrete itself is produced from white and grey cement, cement replacement, fine and coarse aggregates, admixtures and pigments if required. The reinforcement used in these products is produced from 100% recycled steel.

Our EPD confirms that the embodied carbon of our product is **575 kgCO₂ / m³ - 20% less than the industry average**, despite the often complex scope of works associated with our panels. For a 125mm thick panel, this is equivalent to 72 kgCO₂ / m².

According to the British Precast EPD, the industry average for architectural precast concrete cladding in the UK is the equivalent of **713 kgCO₂ / m³** (107 kgCO₂ / m² as per this industry averaged EPD) and in the United States it is **732 kgCO₂ / m³** (308 kgCO₂ / tonne as per this ASTM EPD).

The publication of our bespoke EPD marks an important milestone in our carbon reduction journey to reach **net zero carbon emissions by 2030**.

We are very proud to have published this first company-specific EPD for Architectural Precast Concrete Cladding.





HOW WE ARE REDUCING OUR CARBON AT TECHRETE - 3 OBJECTIVES

1

ELIMINATE EMISSIONS FROM OPERATIONS BOTH DIRECT & INDIRECT BY 2022

- ✓ *More renewable energy generation on our factory sites*
- ✓ *Energy sources with net zero carbon emissions only*

2

50% CARBON EMISSION REDUCTION BY 2025

- ✓ *Use less materials – thinner, more efficient sections*
- ✓ *Use materials with a lower carbon content – cement replacements*

3

NET ZERO CARBON EMISSIONS BY 2030

- ✓ *Reduce our cement content to the absolute minimum*
- ✓ *Offset remaining carbon*





ACHIEVING OBJECTIVE 1: CARBON NEUTRAL ON BUSINESS SIDE BY 2022

GREEN ENERGY

The production of our concrete is all powered by 100% renewable energy. A 250kW solar array, comprising 260 photovoltaic panels is installed on the roof of our UK plant, while a 45kW ground source heat pump system has been installed on the Irish site with six 150m deep boreholes. A 320kW solar array is due for installation in our Irish facility this year - 2021.

We are proud to have surpassed the milestone of **1,000,000kWh** produced on our UK site since 2015. This equates to **350,000kg** of carbon saved and would supply **250** houses for an entire year.

Our remaining electricity is provided by 100% renewable electricity from the grid. Furthermore, we buy 100% carbon offset natural gas.



ENERGY EFFICIENCY

Techrete's two factories are highly insulated to minimise heat loss and are equipped with a series of environmental sensors used to monitor and regulate temperature, humidity and CO₂ concentrations throughout the year.

Both factories are also designed with high levels of exposed thermal mass which passively stabilises the indoor climate and ensures a more energy efficient use of the heating system.

Ground source renewable energy is used to heat our offices through an exposed flooring system and heat pump.





ACHIEVING OBJECTIVE 1: CARBON NEUTRAL ON BUSINESS SIDE BY 2022

BIO-DIVERSITY & IMPROVING NATURAL HABITATS

We have made a significant investment in the planting of trees around our factory perimeters and in the landscaping of our sites, allowing flora and fauna to flourish. We have plans to expand this further.



WATER EFFICIENCY

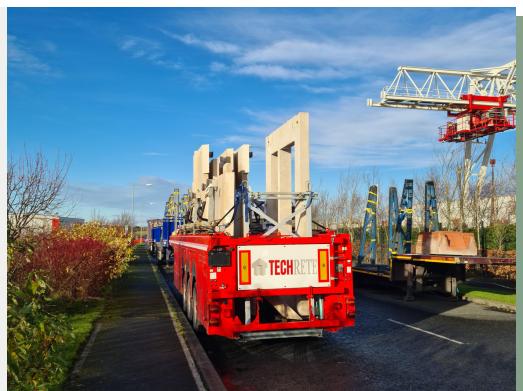
Both facilities are designed to maximise water recycling and re-use. Rainwater is captured from the factory roofs and hard surfaces. This harvested water is then fed into storage ponds for re-use in our wash-down and polishing processes. Mains water is used for concrete production as per international and European concrete standards.



USE OF LOW CARBON TRANSPORT

We use low carbon transport where possible and our Green Travel Policy limits emissions allowed on company cars. We use GPS tracking on transport to avoid unnecessary trips.

Our fleet of forklifts will be fully electric this year (2021).





ACHIEVING OBJECTIVE 2 :

50% LESS CARBON EMISSIONS BY 2025

MINIMISING MATERIAL THROUGH EFFICIENT DESIGN

We continue to develop innovative methods and materials that achieve the same high quality façades with less concrete and therefore, less embodied carbon .

Through efficient design and constant review of production processes, the volume of concrete used per meter squared of façade coverage, is reduced.



MINIMISING USE OF HIGH CARBON MATERIALS

Our 10 year strategy targets significant reductions in the amount of cement used in each panel.

Techrete use partial cement replacement in many of our mixes and we are continuously aiming to increase the proportion of cement replacement in line with European, British and Irish standards.



USE OF GREEN SUPPLIERS & MATERIALS

Techrete have achieved a "Very Good" rating for our responsible sourcing of construction products – BES 6001.





ACHIEVING OBJECTIVE 2 :

50% LESS CARBON EMISSIONS BY 2025

USE OF LOCAL MATERIALS

We use materials in Ireland and the UK which are local to our facilities wherever possible to offset transport associated carbon and ensure a sustainable supply chain.



RECYCLING, REUSE & WASTE MINIMISATIONS

Part of our 10 year strategy is to maximise our circular economy. We are currently developing novel products that incorporate waste material, reducing both the quantity of waste that leaves our factories and the quantity of virgin materials we use.



ACHIEVING OBJECTIVE 3 :

NET ZERO EMISSIONS BY 2030

The third and ultimate objective for Techrete is to be carbon neutral by 2030. This essentially means that Techrete will be a net zero carbon operation and each product purchased from Techrete will have zero carbon emissions associated to it.

To achieve this, we will be using our sustainability experience and expertise to push beyond our 50% carbon emission reduction target for 2025 and bring us as close as possible to carbon neutral.

We are aware that carbon offsetting will play an important role in this ultimate goal and are committed to invest in responsible carbon offsetting to help take us there.



INNOVATIONS IN CONCRETE



NOVEL HIGH PERFORMANCE CONCRETES

Techrete were an integral part and founding member of the 14-partner EU H2020 funded project IMPRESS. The project focused on developing thin, lightweight, energy efficient sandwich panels incorporating vacuum insulation, resin coated glass fibres, non-corrosive carbon fibre reinforcement, low-carbon geopolymers concrete and temperature regulating phase change materials. Our very own R&D laboratory - in operation today - has been constructed out of a selection of these novel thin panels.

We are continuing to develop these areas of research into practical applications which can be offered to our clients.

MINIMIZING EMBODIED CARBON THROUGH MIX DESIGN

We are developing a range of high-performance, low-carbon mix formulations which incorporate low carbon cement replacement powders and state-of-the-art chemical admixtures. Our ambition is to produce low carbon solutions in line with current production cycles.

PANEL WEIGHT REDUCTION

In addition to the research being conducted on producing thinner and hence lighter panels, Techrete are exploring other ways of reducing the weight of our product. Air entrained concrete and glass reinforced concrete have the potential to reduce panel weight by up to 25%.





INNOVATIONS IN PRODUCTION

ACHIEVING COMPLEX GEOMETRIES

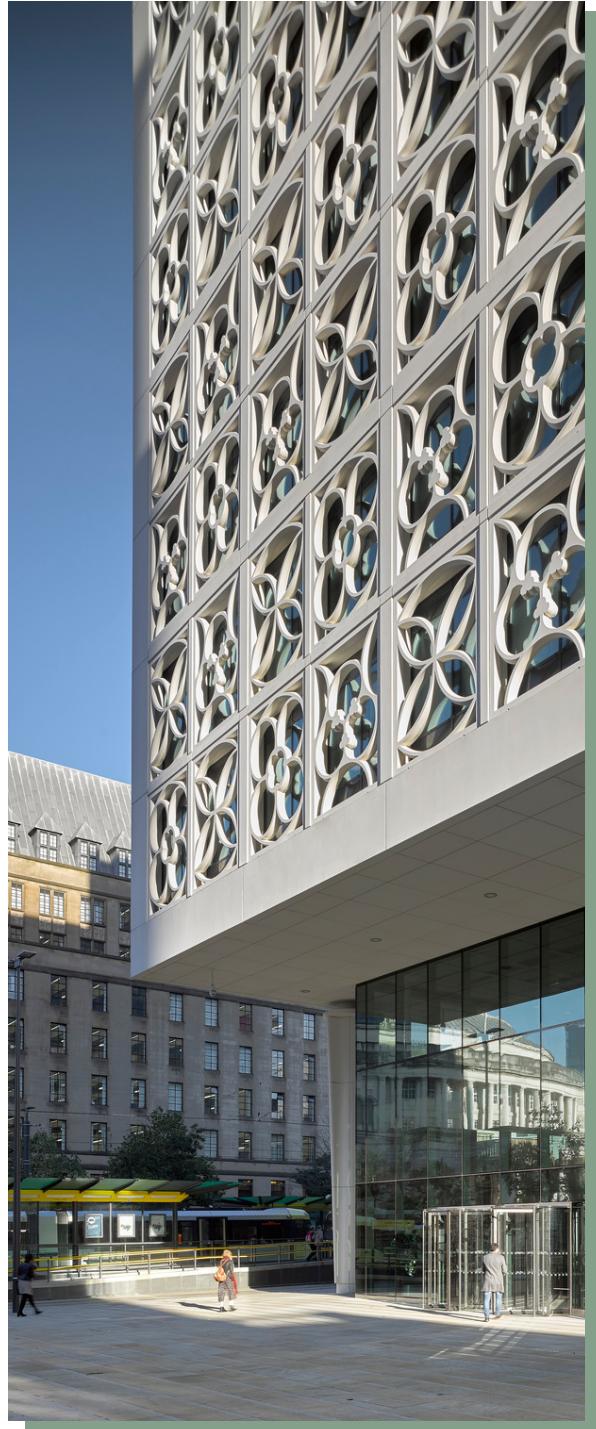
Our ability to achieve complex unit geometries is reliant upon our in-house design and manufacturing expertise, developed over 36 years, which allows us to both optimize material usage and minimize waste throughout the production process.

INCREASING PRODUCTION EFFICIENCIES THROUGH SELF COMPACTING MIXES

We are continually reassessing all our mix designs and have developed self-compacting concrete variants of our standard mixes in line with EU recommendations to ensure they are as efficient and environmentally responsible as possible.

HEAT SENSORS FOR OVERNIGHT TEMPERATURE MONITORING

Temperature, humidity and CO₂ sensors have been installed in both factories to monitor the factory's indoor environment. This allows us to optimize our energy and carbon consumption as we work towards our target of reduced carbon.





INNOVATIONS IN WASTE

INCORPORATING WASTE PRODUCTS TO CREATE A CIRCULAR ECONOMY

Concrete and washout waste is managed in a two stage process. First, larger particles are separated in a dewatering rotating filter and vibration chute. We are collaborating with local universities to investigate how much of this solid material can be re-introduced into the concrete without affecting the concrete's quality.

STATE-OF-THE-ART FILTER PRESS TO MINIMIZE WASTE

After the larger solid particles are removed, the grey water (water + finer solids) from washout and polishing is sent to a second processing stage. The finer solid particles are kept suspended to avoid any settlement and the liquid waste is sent to the 'filter press'. Here the material is compressed together, gathering all remaining solid particles into filter cakes. These filter cakes are currently being used to produce secondary aggregates by mixing it with slaked lime and CO₂ from the atmosphere.

WATER MANAGEMENT

Waste-water from our facilities is separated into two streams – alkaline from concrete production and acidic from etching. These streams are processed separately to ensure each receives the appropriate treatment prior to being recycled. Techrete only use mains water for concrete production and our canteens. Rainwater is collected from our facilities and stored in our lagoons for use in the finishing processes such as polishing and general wash-down.



CARBON REDUCTION STRATEGY SUMMARY

Becoming carbon neutral requires innovative thinking and constant development to overcome the challenges associated with minimising concrete cement content while maintaining high quality control.

It is generally well accepted that the embodied carbon emitted from the production of the raw materials themselves is the greatest challenge for any construction product.

We are constantly developing and trialing research mixes that further reduce the cement content of our product while maintaining the adequate mechanical and durability properties set out in the standards.

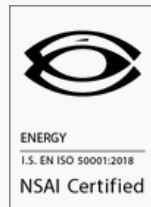
The reinforcement we use is another element at the forefront of our R&D ambitions. We have successfully used carbon fibre reinforced polymer mesh reinforcement, resin coated glass micro and macro fibres and a myriad of other novel reinforcements.

Our verified EPD proves that we are 20% less carbon intensive than the current standard - despite our greater scope of works, and this is just the starting point in our carbon reduction journey to be carbon neutral by 2030.





GREEN CREDENTIALS



NSAI Certified
ISO : 14001 : 2015
Environmental
Management

NSAI Certified
ISO 50001 : 2018
Energy
Management

Independently
Verified
Environmental
Product Declaration



BES 6001
Certified for
Responsible Sourcing

Sustainability
Charter
Member

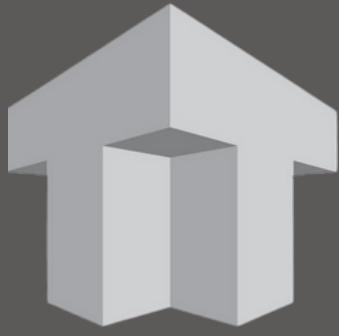


Green Awards
Medium Sized
Company of the
Year 2020

Green Awards
Manufacturer
of the Year
2018

Green Awards
Medium Sized
Company of the
Year 2015

SEAI Awards
Small / Medium
Enterprise User
of the Year 2012



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Leicester : +44 1162 865 965 Brigg : +44 1652 659 454 Dublin : +353 1 6901700

estimating@techrete.ie info@techrete.ie