Foster + Partners has long believed in design being holistic and respectful of the needs of people and planet.

To make it more accessible we produced ‘A Visual Interpretation of The Paris Agreement’ with the UN.

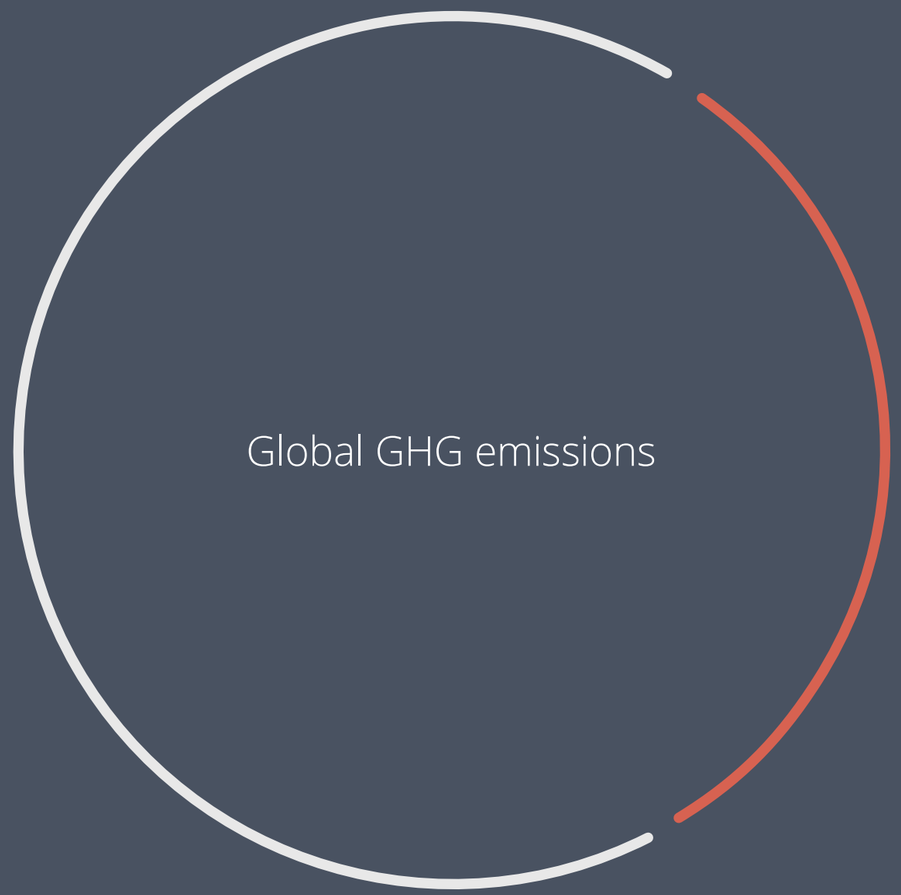
Climate change is caused by atmospheric warming by Greenhouse Gas emissions (GHG). Building construction and operations represent 26% of the total global GHG emissions.

To help us reduce carbon emissions on our projects to meet the demands of the UN Paris Agreement, we have now devised a methodology to quantify them.

Building construction and operations represent 26% of the total global GHG emissions.

26%

Building construction and operations.



Over 7,000 tonnes of CO2e was saved by choosing to use the existing structure of the Murray building.

Global temperature change should be limited to an increase of 2˚C. Ideally 1.5˚C above pre industrial levels.

In 2015, the Agreement (Article 2) stated that global temperature change should be limited to an increase of +2˚C, ideally +1.5˚C above pre-industrial levels. To make the Agreement more accessible, we produced a visual interpretation of it with the UN.

In 2018, scientists published their research and called for the increase in temperature to be limited to +1.5˚C maximum to avoid irrevocable change to life on Earth.

Achieving the UN's target means that existing buildings are an important part of the challenge. They should be retained wherever possible.

The lifecycle carbon footprint of buildings can be reduced by up to 30% – 40% by re-fitting them.

+1.5˚C

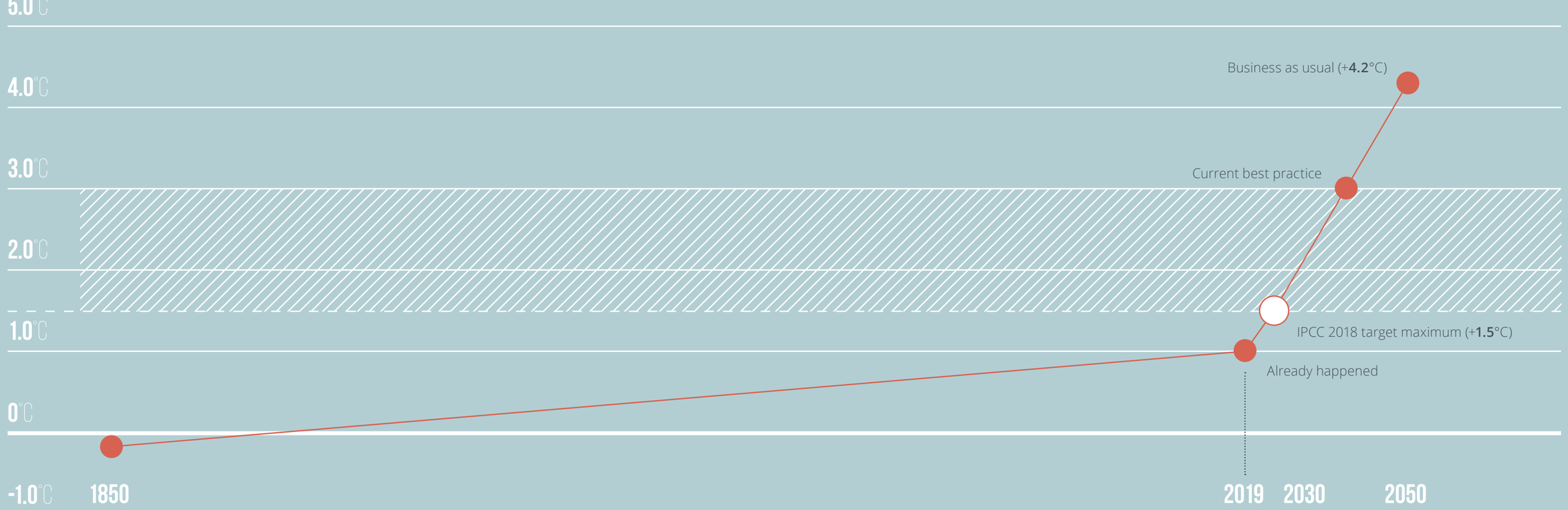
If the world continues with 'business as usual', our planet's atmospheric temperature will increase by about +4.2˚C due to carbon (and equivalent) emissions.

Even if all new and existing buildings are designed or refitted to comply with best practice, as set by the many international certification bodies, global temperatures would still rise by 3˚C. Therefore, we have to find ways of reducing the increase by a further 1.5˚C.

Below: Source: average from Met Office Hadley Centre and Climatic Research Unit, NOAA National Centers for Environmental Information, NASA Goddard Institute for Space Studies.

The existing certification systems focus on the operational energy which is expended by a building in use, but do not fully address the implications of embodied carbon emissions resulting from the energy required to construct a building and during manufacture.

This is a significant challenge. How do we bridge the gap?



We have developed our own evaluation methodology which goes beyond the current focus on energy used in buildings (over a 60-year-life-span).

Below right: 60 year lifespan of a typical UK office.

Future embodied carbon emissions will generally be a higher percentage of total emissions; the amount depends on both location and access to clean energy supplies for manufacturing and operations.

Our methodology quantifies the total carbon emissions produced by buildings and projects over a typical life-span, including design and construction stages, fitout and future refurbishment. Our platform can also predict and monitor operational carbon emissions throughout the life of the building.

This enables us to make judgements to reduce carbon emissions early in the design process.

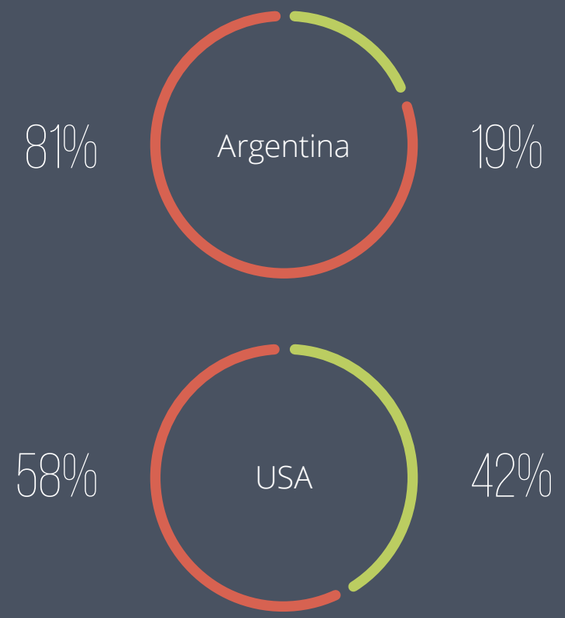
67%

Building construction
Embodied Carbon Emissions

33%

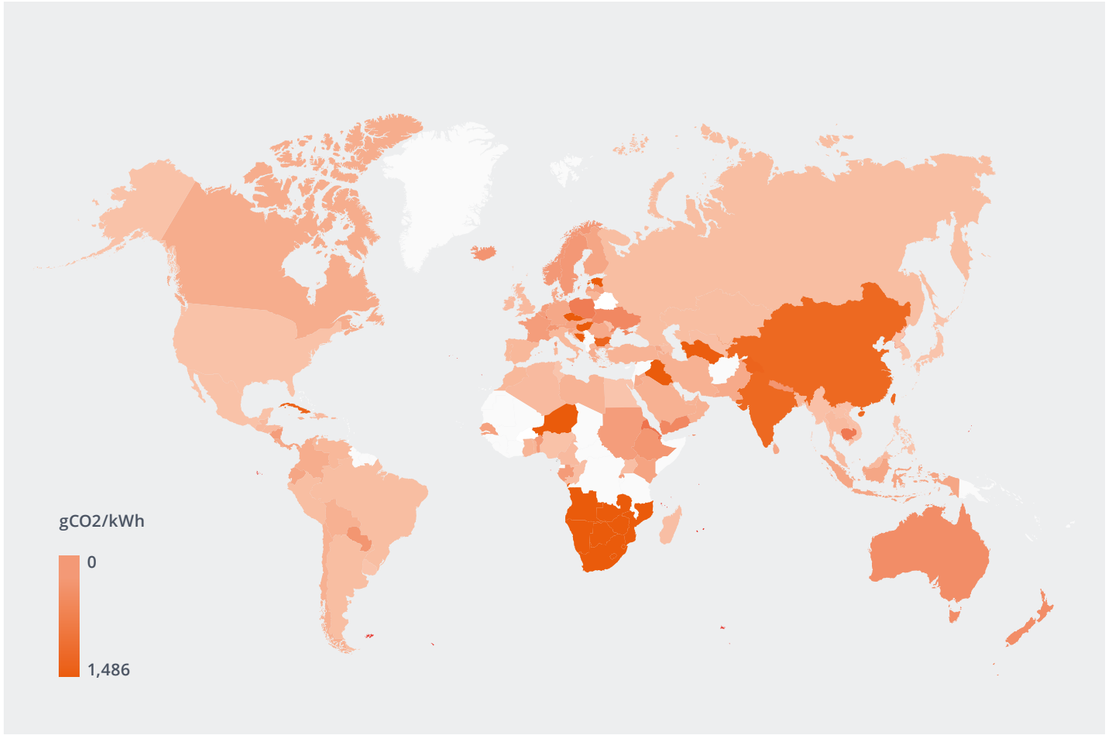
Building in use
Operational Carbon Emissions

Below: Embodied and operational carbon emissions based on actual project analyses.



To achieve the target of 1.5˚C maximum increase in global warming, we have to tackle both operational and embodied carbon emissions.

Below: Carbon emissions from generation of energy.



Our methodology to measure emissions

On current projects we are using BIM processing or bills of quantities or a combination of both to quantify the embodied energy.

To measure carbon emissions in our projects we divide each project into seven components: project setup such as site establishment etc, structure, facade, building services, fit-out and operations, energy and transport.

These are then monitored throughout the design process. We use independently verified scientific data sourced over 50 years for our calculations.

We have been selecting projects with different scales, locations and typologies to apply our techniques to real scenarios.

We are now ready to offer this methodology to all future clients so that their projects can comply with the Paris Agreement. This will be challenging but, with careful analysis and dialogue, we aim to achieve our goal of designing carbon neutral or climate restorative buildings.

Typical CBD office building

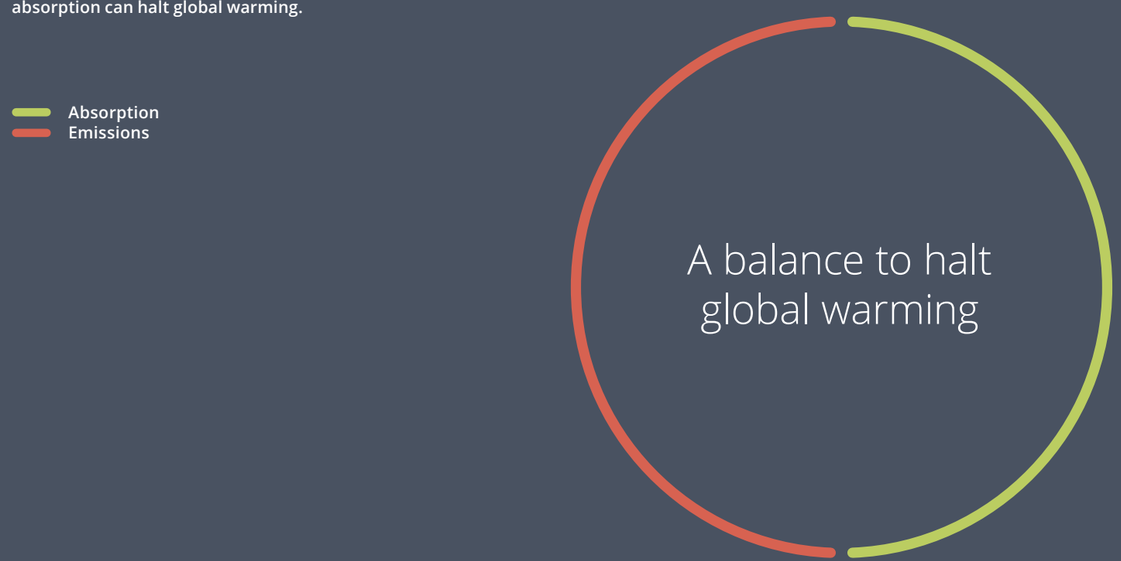
Balancing our planet

The Paris Agreement requires an increase in the absorption of carbon emissions to achieve a balance between emissions and absorption and halt global warming.

All carbon emissions associated with buildings need to be absorbed to maintain this balance.

In order to achieve this balance all nations must work together to understand their capacity to absorb emissions and their emission reduction targets. Detailed scientific studies have produced data to pinpoint where balance is required around the world. This data will tell us how we can mitigate the increase in carbon emissions.

A balance of carbon emissions and absorption can halt global warming.



Even with the most carbon efficient design, it is currently impossible to reduce carbon emissions to zero, mainly because today's energy sources are not yet fully renewable.

The residual carbon emissions should be offset by compensating in other ways, for instance by generating renewable energy or increasing reforestation to absorb more carbon. This process is currently recognised by the UN.

We are establishing relationships with others to tackle this, including the funding of renewable energy and planting of trees.

Below: Carbon sequestration
Below right: Carbon mitigation

Even with the most carbon efficient design, it is currently impossible to reduce carbon emissions to zero.

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