



EMBODIED CARBON: TECHNICAL GUIDE

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Introduction



You've got the basics from our Embodied Carbon: The Essentials guide, now it's time to dig deeper into the issues. Read on to find out everything you need to know about the issue and how to respond to it.

Before we get into embodied carbon, we need to talk about climate change.

What is Climate Change?

You've heard of it... but what exactly is it? (Other than the reason we're talking about embodied carbon...)

Climate change, also known as global warming, refers to "long-term shifts in temperatures and weather patterns".

What does that have to do with you?

Changes in the sun's activity play a part, but since the 1800s human activity has been the main driver. Why? Burning fossil fuels like coal, oil and natural gas. These create 'greenhouse gases' (you've heard of those too!) which wrap around the Earth's atmosphere and trap the heat from the sun and in doing so, raise the temperature of the planet.

Annual CO₂ emissions have risen rapidly - as highlighted in this graph by our friends at Circular Ecology.

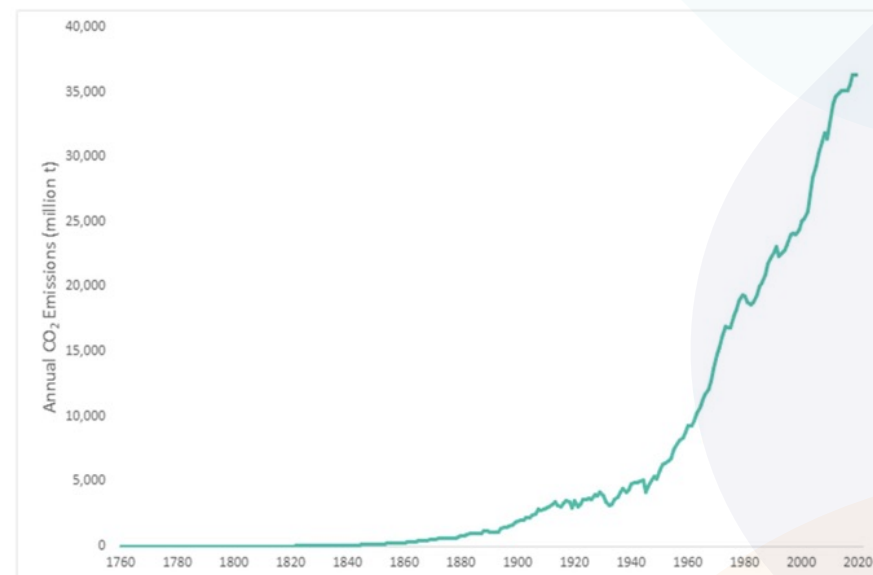
We all agree that something has to be done about this.

Turns out the UK Government does too.

You've heard of Net Zero, right?

Remind me.

<https://www.un.org/en/climatechange/what-is-climate-change>
<https://www.un.org/en/climatechange/what-is-climate-change>
<https://circularrecology.com/news/webinar-recap-product-footprinting>
<https://www.nationalgrid.com/stories/energy-explained/what-is-net-zero>



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ecology

In a nutshell, Net Zero is the balance between the amount of greenhouse gas that's produced and the amount that's removed from the atmosphere. The UK Government has pledged to cut our carbon emissions by 85% by 2035.

What is Climate Change?

Sounds like a plan doesn't it?

Absolutely!

To get it, we need data. The government knows this too, and it's all about the Scopes.

Scopes?

Yeah, 1, 2 and 3. You've heard of those too, right?

Err....

I promise we'll get to embodied carbon in just a moment, but just in case you need a quick refresher:



Scope 1 covers carbon emissions YOU make. By you we mean, your company or organisation. For example, the fuel you burn when delivering catering equipment to a customer. (Unless your vehicles are fully electric in which case... nice one!)

Scope 2 covers emissions your company causes indirectly from where the energy you purchase is produced. For example, the emissions caused by the electricity used to power your office.

Scope 3 is the biggie. Beyond anything not covered in Scopes 1 and 2, it refers to the carbon emissions generated up and down your value chain that you as a business are not directly responsible for but still depend on. For example, carbon generated through the process of growing, harvesting and processing food crops.

OK, we're done with the prequel, let's get down to it.

What is Embodied Carbon?

What is Embodied Carbon?

Embodied carbon is the name given to greenhouse gas emissions associated with the complete lifecycle of a product or building. Everything from the extraction of raw materials through to disposal at the end of life.

Come again?

It's the carbon that made your fridge, and the carbon emitted when you parted ways... if refrigeration is your thing. The same logic applies across the foodservice equipment board, so to speak.



Embodied carbon is REALLY important. Why? It is a significant contributor to total greenhouse gas emissions, and can account for a substantial percentage of your total carbon footprint.

Yikes.

Hold fire, there's good news!

In recent years manufacturers have been making significant improvements to the operational efficiency of their products.

Energy efficient cabinets will reduce your costs of operational energy use and reduce operational carbon emissions however the energy used during the operation is not classified as embodied carbon.

So having accurate Embodied Carbon data sounds like a plan, right?

It does! How do we get it?

What is Embodied Carbon?



Embodied carbon is typically calculated through assessing carbon emissions associated with raw material extraction, production, assembly and transportation of the product including carbon emissions associated with anticipated maintenance throughout the stages of a product's life.

Many of the materials used in the production of commercial foodservice equipment have very high embodied carbon figures, such as steel and aluminium, while recycled materials can have lower figures. And the same material can have different values depending on how it was made.

Knowing how to accurately calculate embodied carbon is going to become increasingly important in years to come, so it's vital to understand the way they are created and how they are used.

Gotcha. So, how are they created and... er, how are they used?

You'll need an EPD.

An EP... what?

Environmental Product Declaration. OK, strap in.

Creating EPDs



What is an EPD?

An Environmental Product Declaration (EPD) is a document that quantifies and reports the measurements that have been made on the environmental impact of a product. It needs to clearly communicate this impact throughout the entire lifecycle of the product, from the extraction of the raw materials through to end of life disposal.

So... the whole Shebang?

Precisely, if by 'shebang' you mean the carbon emissions of a product from get go to cheerio.

The information contained in an EPD is important for manufacturers and project specifiers who need to be able to compare the environmental performance of a range of products.

So... everyone's a winner?

Exactly!

How to make an EPD

To create an EPD you first need to identify the correct Product Category Rules for the equipment in question.

Product Category Rules is a mouthful.

We also call them PCR.

A PCR provides specific instructions about how to conduct a Life Cycle Assessment for a specific equipment type.



Let me guess... that's also called an LCA?

Absolutely! But let's jump back to PCR again first.

A PCR includes

- Which stages of the product's life cycle that need to be considered, as well as the processes it undertakes ie. Production, assembly, packaging, operation, disassembly etc.
- The declared specifications of the unit, including functional parameters and service life ie. Type of product (heat/cool) electrical loading, repairability, lifespan etc.
- How to define any options for different uses and end-of-life scenarios ie. Reuse for a different purpose, refurbish, recycle components etc.
- Any additional impact categories that need to be studied aside from the generic categories ie. Hazardous substances WEEE, RoHS etc.

How to make an EPD

Once you have identified the requirements with the PCR you can carry out the LCA.

This can cover up to twenty different environmental impact indicators beyond direct carbon emissions. This could include resource depletion, amount of water used during production, potential toxicity and pollution risks to a range of environments.

Following?

Sort of.

Let's break it down.



An LCA has four stages:

1. The product stage covers the extraction, transport and construction of the raw materials, then the transport/distribution and installation of the products.
2. The use stage covers usage, including energy and water consumption, as well as maintenance, repair, refurbishment and replacement.
3. The end of life stage covers deconstruction and removal, transport, water processing and disposal procedures.
4. The final section covers the potential for energy recovery, recycling or reuse.

What happens next?

Then you get your EPD.

Eh?

You've identified your PCR, you've carried out your LCA, now you use all that data to create EPD.

Why bother with an EPD if I already have an LCA?

The difference between an LCA and an EPD is that an EPD is aimed at customers whereas an LCA is an internal company document. LCAs allow companies to make informed decisions about their processes and products, by providing information about where the greatest environmental impacts occur. This allows them to develop more sustainable alternatives with a data driven foundation.



An EPD provides standardised information regarding environmental impact factors. **Which I need because...**

An EPD helps end users meet their legal obligations for green building certification, for example those established under the Building Research Establishment Environmental Assessment Method (BREEAM),

They can also help companies make informed decisions about selecting low carbon options for their supply chains, as well as identifying areas within their supply chains that could see improvements in carbon reduction.

Finally, they can be used for marketing and for eco labelling, making it easy for customers to make informed decisions about new equipment.

OK, that all sounds good... just remind me...

... what information does an EPD needs to contain?

Yes!

What information does an EPD needs to contain?



An EPD needs to contain a summary of the LCA and the environmental impact reporting, as well as other relevant data.

It begins with a section of general information, including:

- Manufacturer's details
- A full product description
- Information on the standards that were used (e.g., ISO 14025, ISO 21930, EN 15804).
- All aspects of the product's lifecycle are covered – this is known as the scope.

There should then be a description of the methodology used for the LCA, as well as explanations of how the quality of the data was assessed and how the results were interpreted.

Environmental Impact Data.



After that, there is Environmental Impact Data.

What's that?

Environmental Impact Data provides information on embodied carbon and other environmental considerations, such as ozone depletion potential, global warming potential and others.

This should also include a breakdown of resource consumption, including atmospheric emissions, waste management and embodied energy.

Pretty thorough!

Indeed.

The EPD should then summarise the product lifecycle information, from extraction of raw materials, through to manufacturing, transport use and end of life procedures.

That's a lot of data.

It is! And seeing as you've brought this up...

Data collection

Data collection

Creating an LCA and EPD require large amounts of data. This can include both primary data generated by the manufacturer and its supply chain, as well as secondary data taken from relevant resources including papers, reports and dedicated LCA databases.

So all the Scopes?

Exactly!

This is particularly important for recording emission sources outside of the control of the organisation making the declaration, for example emissions from the post manufacture supply chain. There are a number of different sources of this information.

For example?

Carbon data figures can be obtained from the Inventory of Carbon and Energy 4.0 (ICE) database and the UK government's GHG database.

The UK government's Department for Energy Security and Net Zero offers GHG emissions factors which are updated annually. These include spreadsheets that can calculate the greenhouse gas emissions associated with an organisation's activity, as well as spreadsheets that

can convert this information into relevant data such as amount of fuel used, distance travelled and total waste disposed of, as well as step-by-step guidance on how each is used.

The ICE 4.0 database contains data on the embodied carbon of over 200 materials broken down into 30 categories. It provides information on the energy consumed to make a building material, based off regularly updated and revised reviews of scientific literature.

I do love a spreadsheet...

Who doesn't?

As this information changes regularly it's important to make sure that you are using the most up to date information and the current methodology. This can be created within the company or through a third-party supplier.

OK, I think I'm following. Is that everything covered then?

Not quite.

Finally, there needs to be a verification statement. This will verify the accuracy of the EPD data.

How do I do that?

Verification



Verification

An appropriate verification procedure needs to be established in order to ensure the EPD is meeting the required standards. This also needs to include details of the format and documentation used, as well as access to the verification rules and results.

Internal or external verification?

Good question.

There has been some confusion whether EPDs need to be verified by third parties. According to ISO 14025: 2006, if the equipment being described by the EPD is aimed at individual consumers then to be compliant, it should be verified by third parties.

What about...?

... commercial equipment that is sold business to business?

Yes!

Verification



Commercial equipment that is sold business to business can be verified by the company that made it. However, the verification should not be carried out by anyone involved in the creation of the LCA or the EPD and should not have conflicts of interest resulting from their position in the organisation.

These verifiers should have relevant experience and knowledge to allow them to accurately assess the data used in the EPD.

EPD, LCA, PCR... there's quite a lot of terms here.

So, creating an EPD is pretty complicated?

Well, yes, it does require expertise though most manufacturers will have the capability to complete it if they choose to.

Is there a simpler way?

Actually yes, now you mention it, there's TM65

TM65

What is TM65?

Where an EPD isn't available, you can use TM65 to calculate the carbon footprint of products.

TM65 is a methodology designed by the Chartered Institution of Building Services Engineers (CIBSE) for calculating the embodied carbon in building services.

As well as providing information about how to use an EPD to calculate the Embodied Carbon of equipment it also explains how to estimate this figure in the absence of an EPD.

This methodology includes publications, digital tools, and data-gathering systems.

While TM65 is designed to be specific and relevant to UK regulations, there are variants that apply to different countries and major markets around the world.

TM65 allows for the creation of estimates of carbon expenditure for building projects based on submitted EPDs. While there is currently no legislative framework in the UK requiring EPDs this is likely to change, and some customers are beginning to ask for them in order to make more informed decisions about improving the sustainability of their businesses. If more manufacturers use it and report the lifecycle impacts of their products to CIBSE, the accuracy of the figures that can be generated by it will improve considerably.



In Conclusion



And that covers it.

Really?

Feeling better?

Yes!

Great. Let's conclude:

Mitigating and reducing the impacts of climate change is without doubt the biggest challenge facing society right now. Calculating and presenting the environmental impact of your products as expressed through the concept of embodied carbon will play a significant role in these efforts in the future.

Next steps

Agreed! What do I do next?

Here are the next steps you should be taking to implement these systems into your business

- You and your team need to understand the issues of climate change, carbon and sustainability. FEA's Foodservice Carbon Professional – FCP – course is ideal for this.
- Study your business processes, carry out a carbon and sustainability study on your operations and identify areas that can be improved.
- Collaborate with your supply chain, request information needed to create Scope 3 emissions data, in line with European Sustainability Reporting Standards (ESRS).
- Similarly, work with your distribution network, including logistics, delivery and service options to generate information relating to Scope 3 emissions.
- Become familiar with TM65 and establish appropriate procedures for the creation and verification of LCAs and EPDs within your organisation.

- When applying for tenders be aware of specific requests for methods to be used in carbon reporting.
- Collating raw data from the supply chains will be the most time-consuming part of the process and will need to be regularly updated to ensure accuracy.

Thanks for taking the time to read this guide. FEA hopes it helps you start your Embodied Carbon journey off right!

Glossary

Carbon Footprint: The amount of carbon dioxide released by activities or products.

Energy Efficiency: Using less energy to do the same task. Like turning off lights in empty rooms.

Greenhouse Gas (GHG): Gases that trap heat in the atmosphere, contributing to climate change. Think of a blanket warming the Earth a bit too much.

Life cycle: The amount of time a product is expected to be functional and usable.

LCA (Life Cycle Assessment): A method for assessing the environmental impact of a product or service throughout its entire lifecycle, from raw material extraction to disposal. (Think: cradle-to-grave environmental footprint)

EPD (Environmental Product Declaration): A document that quantifies the environmental impact of a product, based on the results of an LCA, used for communication between businesses or consumers.

PCR (Product Category Rules): Standardised guidelines for assessing and comparing the environmental impact of similar products. These provide a framework for LCAs and help to ensure EPDs report accurate data, creating a level playing field when evaluating the effect of equipment on the environment.

BREEAM: A system designed for assessing and certifying the sustainability of buildings and infrastructure across a variety of stages from design, construction and operation. BREEAM helps projects to meet sustainability goals and net zero targets as well as improving asset performance.



**FOR FURTHER INFORMATION
PLEASE VISIT
THE EMBODIED CARBON HUB**

