Supply Chain Target Setting In Your Business- What It Is And How To Do It

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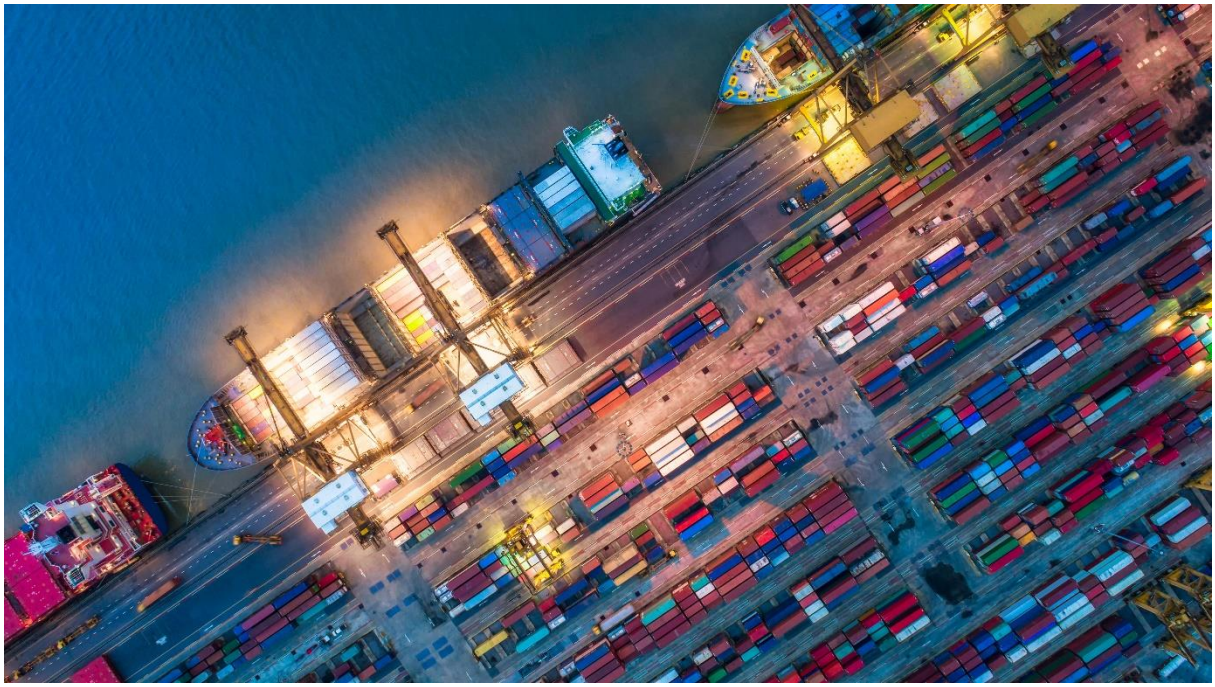
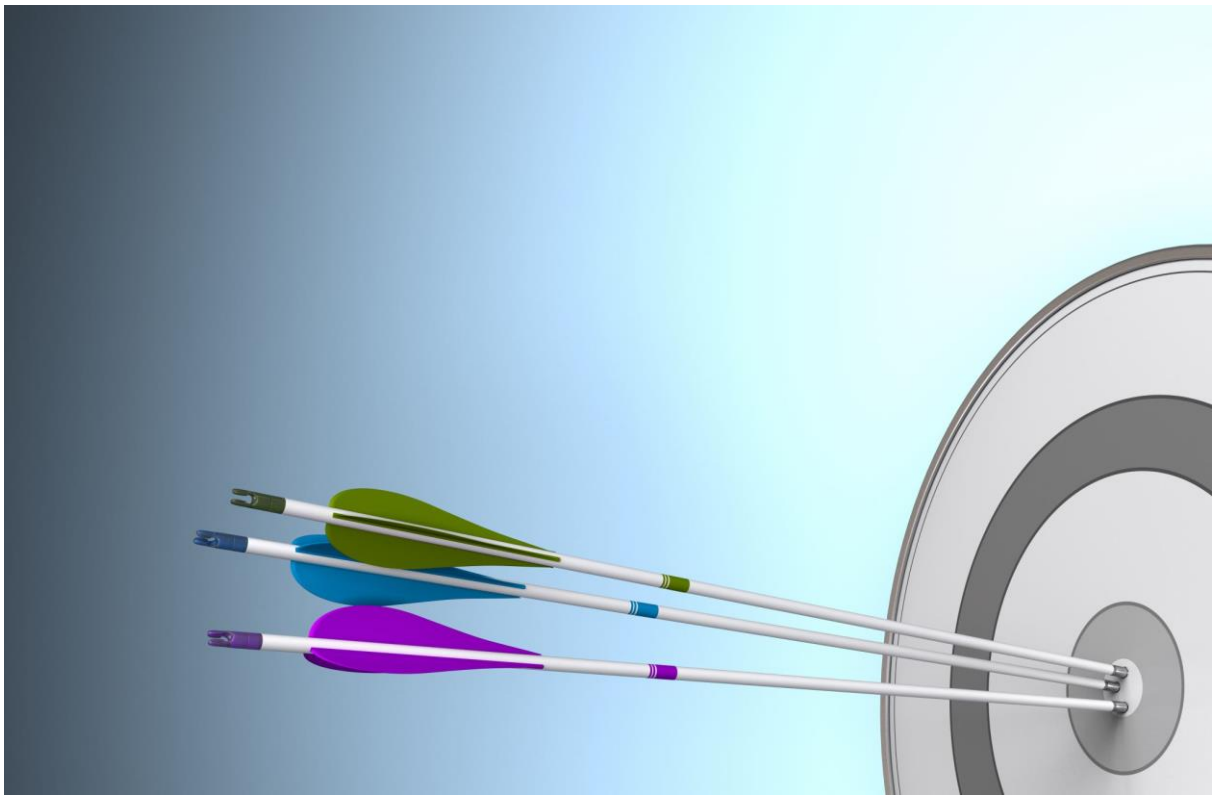


Abstract

The need for global action to reach 'net zero carbon' is everywhere and is a valid call-to action. In our previous paper (Ref: 1), we outlined practical methodology for setting targets within your business's organisational control (relating to Scopes 1 & 2 green-house gas emissions). For many businesses, supply chain carbon emissions are significant and for some these emissions dominate their carbon footprint.

Clearly a business needs to plan to reduce its supply chain footprint. The concern for many businesses is that this will be a resource-intensive process and that extracting data from suppliers can be difficult (particularly if the business is not a large value customer of the supplier), or if the business has many suppliers.

This paper outlines pragmatic and quantitative ways to measure the supply chain footprint and apply models and scenario planning to improve future tracking and reduce emissions. In this way, we show that Supply Chain Target Setting is readily quantifiable and provides a means to support net zero goals for Scope 3 emissions.



INTRODUCTION

Supply chain impact on a business can be a significant (often the predominant) source of carbon emissions. As many organisations are now setting targets for Net Zero carbon, quantifying the supply chain footprint and reducing it has come into sharp focus.

There are many "voluntary" programmes that companies are choosing to follow to measure their emissions and set reduction targets. Many of these require businesses to include their wider Scope 3 (Supply Chain) emissions. For example, for the Science Based Target Initiative's (SBTi's) Corporate Net-Zero Standard, participating businesses must include plans to reduce supply chain emissions (Scope 3) if these exceed 40% of their total Scope 1, 2 & 3 footprint (Ref: 2).

The UK government's Net Zero Procurement Policy Note (PPN) 06/21 (Ref: 3) asks all significant value suppliers to the government to make net zero declaration and refers to BSI's Publicly Available Specification (PAS) 2060 on Carbon Neutrality. PAS2060 requires supply chain emissions to be included if they constitute >5% of the total footprint (i.e. >5% materiality).

For many businesses, this presents the first immediate problem of needing to quantify these Scope 3 Supply Chain emissions. These are often the hardest to quantify, due to having multiple suppliers and less access to emissions data.

Organisations are under increasing pressure to:

- Assess their Supply Chain Footprint – to at least determine whether it is material to their overall carbon footprint.
- Adopt programmes to reduce those emissions and be sure to make them as quantitative as possible, but straightforward to implement.

Supply Chain Carbon Footprint – Does your business need to include it?

For Science Base Targets Initiative programme - You will need to set a target to reduce supply chain emissions if they make up more than 40% of your footprint.

For BSI's Publicly Available Specification 2060 on Carbon Neutrality – businesses are required to include supply chain emissions if they constitute >5% of total emissions.

How does an organization determine if its Scope 3 emissions are material?

The first step many companies take to get an indication of their overall Scope 3 is an initial spend based supply chain screening exercise to provide an initial estimate of these emissions. This is also called referred to as an Economic Input-Output (EIO) screening.

Economic Input Output (EIO) Modelling – is when the supply chain emissions are modelled based on the company's spend, broken down by the supplier(s) industry.

Advantages:

- **Quick & easy** - Only requires use of your spend data for suppliers.
- **Uses publicly available metrics** (e.g. BEIS and ONS) metrics on carbon intensity for each Standard Industry Code (SIC) category.

Disadvantages:

- **SIC categories are quite broad** and it can be difficult to directly relate the supply to one definitive SIC code.
- **Least accurate methodology** – e.g. does not consider differing prices from different providers for the same product; or lower carbon operating practices of a specific seller; or the supplier's proximity to you (which may also lower the supply footprint).

Although these initial results may include a significant error margin, they will reveal the approximate amount of emissions in your Supply Chain (allowing an organisation to determine if their supply chain is likely to be material), along with which supplier(s) are likely to contribute the most the highest carbon contributors.

Improving the accuracy of the initial Supply Chain screening

Once a company has determined that their Scope 3 supply chain emissions may be material, then they should focus on improving the accuracy of the assessment by focusing on the larger emissions sources. We recommend focusing firstly on the emissions sources that make up 63% or more of the Scope 3 emissions, through a more detail analysis of these suppliers. These emissions can be assessed by using Proxy data for services and products. There are several databases that companies can use to help with this including Bath University ICE factors, EcoInvent and Defra emissions factors to name just a few.

Proxy Product / Service is when the supply is modelled from an equivalent service, existent product carbon footprint or material emissions factor, usually based on the amount used (rather than the amount spent).

Advantages:

- **A more direct functional unit** can be chosen – e.g. number or weight of product.
- **Emission factors relate more closely** (than EIO model) to the suppliers' industries.
- **Easy to collect data** - only need the functional unit data from internal records – e.g. total weight or number of units procured
- **More accurate**, compared to the EIO model

Disadvantages:

- **An emissions factor is needed for each supply** - and finding a 'proxy' factor for this may be difficult and time-consuming.
- **Does not use suppliers' own direct data** – so will not consider the carbon impact of their specific operations or of shipping from their location.

The most accurate method – Supplier Data

The most accurate method of assessing Supply Chain emission is by obtaining supplier specific data direct from the companies in the supply chain.

Direct Supplier Data – is when the supply is calculated using the results of a Life Cycle Assessment (LCA) of the specific supplier's products / services.

Advantages

- **Uses direct supplier data** – so is by definition the most accurate, providing nothing has been excluded from the calculations.

Disadvantages

- **Supplier may not have assessed the emissions of their products / services and may not be willing to provide the data to you** – particularly if you are not a large customer for them. Sometimes the data may also be viewed by the supplier as proprietorial and they are unwilling to disclose it.
- **Data required from each supplier** – this makes the task a huge undertaking and very time-consuming
- **Data/reports need validation** to assure confidence in the numbers.

Hybrid Approach

Most companies adopt a Hybrid Approach to assessing their supply chain emissions. The Hybrid approach tends to be a combination of the 3 approaches outlined above:

- Cost based EIO method
- Proxy method
- Supplier data

A WORKED EXAMPLE - OF THE HYBRID APPROACH

As an illustrative example of how to use this approach to assess supply chain emissions we will consider a construction company that spent £3.17 million on goods and services over the last 12 months. This included spending £1.02 million on 5,000 tonnes of concrete.

The company can first calculate their emissions using the EIO cost figures to gain an initial assessment of their Scope 3 emissions (Table 1). These initial results show the purchase concrete is by far the most material Scope 3 element of their footprint (Table 1). Concrete is clearly the highest emissions source, i.e. the carbon "hot spot" in their purchases.

Table 1: Example company's emissions calculated using EIO emissions factors.

SIC Group	Section	Sector Summary	Total Annual Spend (£)	Emissions Factor (EF) (tCO_2e / £1,000)	tCO_2e
23.5-6	C	Cement, lime, plaster and articles of concrete, cement and plaster	1,020,000	2.79	2,847.13
53	H	Postal and courier services	1,000,000	0.12	122.67
32	C	Other manufactured goods	500,000	0.11	52.66
72	M	Scientific research and development services	250,000	0.02	4.05
61	J	Telecommunications services	100,000	<0.01	0.48
69	M	Legal activities	150,000	<0.01	0.37
63	J	Information services	150,000	<0.01	0.33
Total			**3,170,000**		**3,027.69**

Now the company is aware that most of its supply chain emissions are likely to come from the concrete they purchase, they can improve the accuracy of this element by using the Proxy calculation method.

For this particular example, as we also know that the company had purchased 5,000 tonnes of concrete, it is also possible to calculate the emissions based on the **quantity** of concrete purchase. The emissions can be calculated using an emissions factor for primary material use of concrete (e.g. 131.76 $kgCO_2e$/tonne – Defra 2021). The result from using this factor is shown in Table 2.

Table 2: Calculations of material emissions on a per tonne basis.

SIC Group	Name of Expense	Total Annual Spend (£)	Amount (tonnes)	Emissions Factor $kgCO_2e$ per tonne	tCO_2e
23.5-6	Concrete	1,020,000	5,000	131.76	658.79

Sometimes it is possible to obtain an emissions factor directly from the supplier, who may have completed a Life Cycle Assessment (LCA) of their specific products. Using the supplier specific emissions factor will usually result in the most accurate assessment of the embodied emissions.

For this construction company example, their supplier has provided the emissions factor for the concrete that this company bought (150 $kgCO_2e$ per tonne of concrete) – shown in Table 3

Table 3: Calculations of material emissions on a per tonne basis using the Supplier Specific factor.

SIC Group	Name of Expense	Total Annual Spend (£)	Amount (tonnes)	Emissions Factor $kgCO_2e$ per tonne	tCO_2e
23.5-6	Concrete	1,020,000	5,000	150.00	750.00

Replacing the original EIO Spend based emissions for the concrete with the supplier specific factor results produces a most accurate assessment of the companies emissions from the goods and services they have purchase, as shown in the Table 4.

Table 4: Recalculated emissions using tonnes of materials for the Concrete.

SIC Group	Section	Sector Summary	tCO_2e	Factor used
23.5-6	C	Cement, lime, plaster and articles of concrete, cement and plaster	750.00	Supplier factors
53	H	Postal and courier services	122.67	EIO Spend factor
32	C	Other manufactured goods	52.66	EIO Spend factor
72	M	Scientific research and development services	4.05	EIO Spend factor
61	J	Telecommunications services	0.48	EIO Spend factor
69	M	Legal activities	0.37	EIO Spend factor
63	J	Information services	0.33	EIO Spend factor
Total			930.56	

The emissions for the concrete in this example are significantly lower than the numbers calculated with the initial EIO spend method, but they are still the most material supply chain element. The proxy emissions factor would have reduced the error significantly, but the supplier specific factors are the most accurate source.

FORECASTING FUTURE SUPPLY CHAIN CARBON EMISSIONS

Once you know your current supply chain footprint emissions, you have set a solid foundation on which to forecast future emissions.

When forecasting emission, one of the first things you should do is to set a target date. Many companies are now setting mid-term dates (e.g. 2030) and long term dates (e.g. 2050) to coincide with the goals of the Paris agreement to be Net Zero by 2050.

When using SIC cost analysis, you can forecast the likely future emissions factors by extrapolating trends for the historical factors. The Office for National Statistics (ONS) in the UK has published the emission intensity across all SIC codes since 1990. From this historic dataset, it is possible to forecast emission into the future, following the trend of each industry.

Figure 1 shows an emissions forecast projected to 2050 of the concrete (from the example company), using forecasts based on historic BEIS/ONS emissions factors.

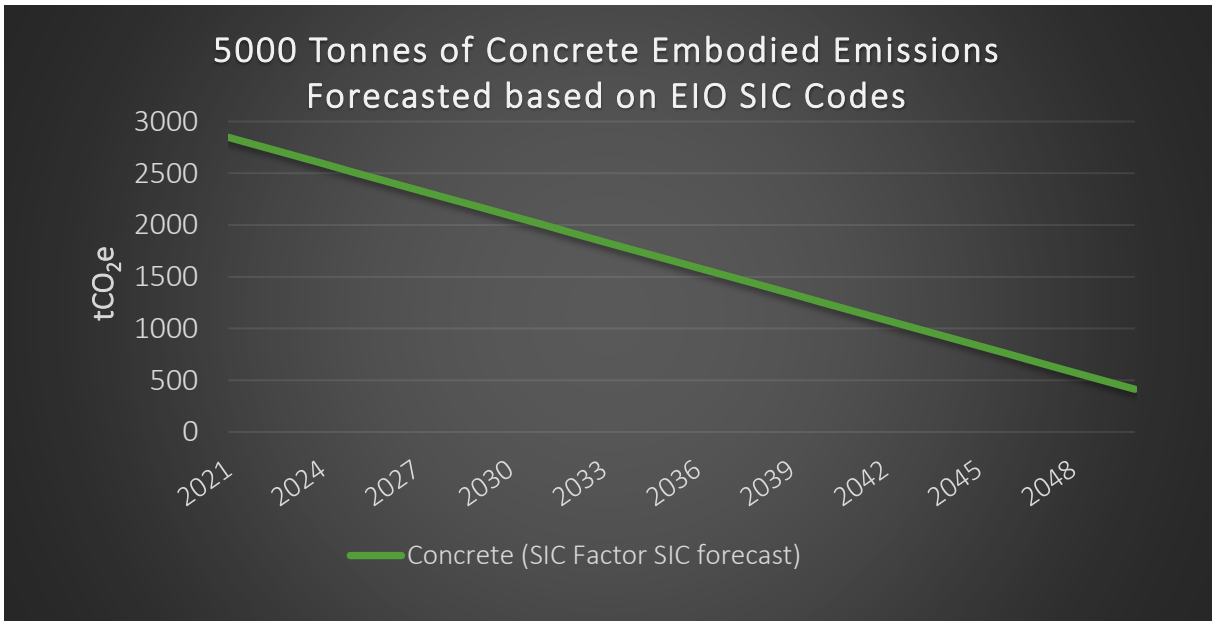


Figure 1: Forecasted emissions using the EIO method and forecasted ONS/BEIS emissions factors

Alternative emissions factors, such as Defra/BEIS factors, can also be used to forecast using the trend of the emissions factors from the previous 5 years. This provides two different forecasting scenarios, one based on extrapolating previous years emissions factors based on the Defra material factors; the other based on extrapolating the SIC code factors and applying this reduction to the proxy material factor. It is difficult to predict with any certainty, as the emissions may fall faster with the introduction of new technologies, though these cannot be easily predicted for every emissions source. These forecasts are shown in Figure 2.

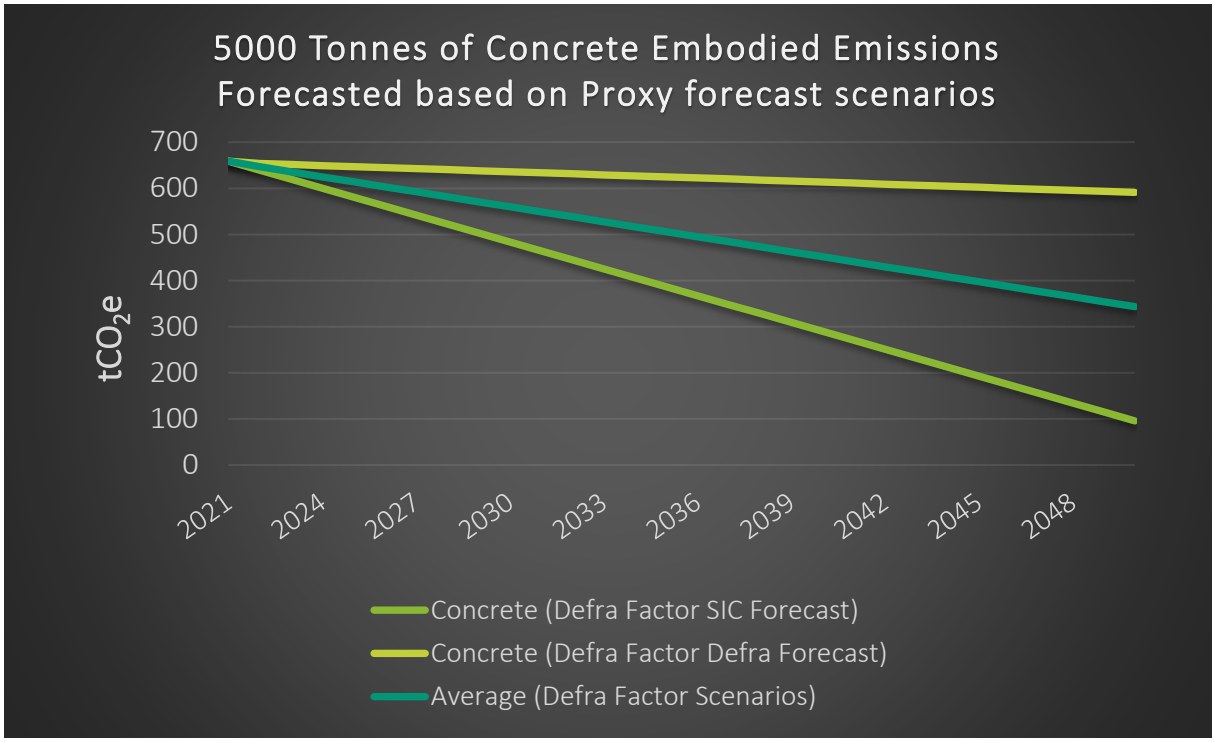


Figure 2: Emissions forecasted for the Defra Emissions factors based on different forecasting trends

If you are using product footprint/proxy business data, you will need to forecast those emissions; using historical factors (e.g. from old product lifecycle assessments). For physical products, it is likely that emissions are dominated by the materials (rather than the production energy use or transportation) - graphical analysis of old product footprint will reveal the trajectory and enable you to model those future emissions.

If you are using primary data from the supplier – your task should be much easier as all you require is the supplier's own projections of their carbon footprint. In the past this might have been considered sensitive information for a supplier to provide, though with the advent of net zero commitments (and accompanying public disclosure of plans), this is becoming much more readily available and often disclosed in financial/environmental reporting. If this data is unavailable, it may be possible to forecast using the trajectories of the relevant SIC code emissions by cost factors or trends for Proxy data.

Figure 3 below includes forecasted emissions for concrete as in this example the supplier has a target to reduce product emissions by 5% year on year.

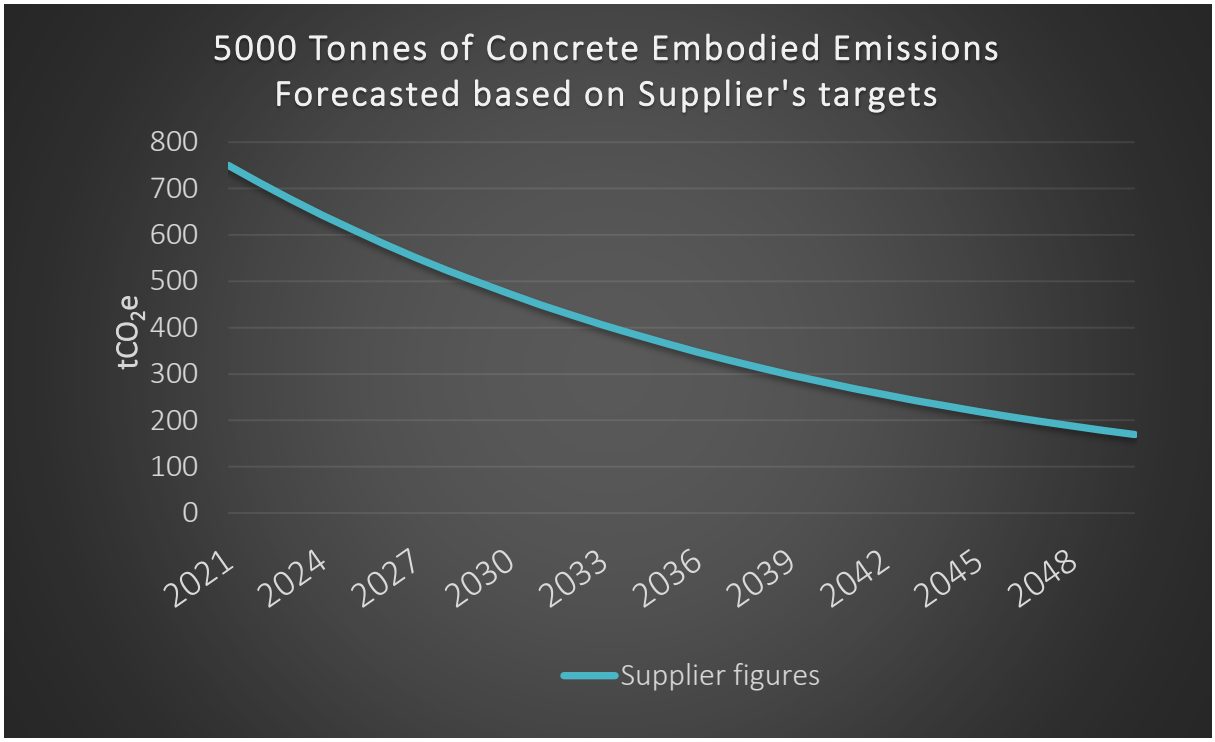


Figure 3: Emissions forecast using 'as is' supplier targets for concrete

PUTTING IT ALL TOGETHER

What if you do not Reach Zero?

It is likely that in your first year of doing Scope 3 Target Setting, you will adopt the SIC code method across the assessment. It is quite likely that when you forecast forward (to your target date) you fail to reach absolute zero emissions.

This type of modelling, by its nature, is passive; that's to say, there is no intervention by your business to make emissions reductions – you are relying on external factors.

How to Reach Zero - Active approaches to the Supply Chain

To make faster reductions to Scope 3 emissions will require more creativity and effort. You may decide to switch to alternative suppliers that have lower emissions products / services; or you can potentially lower emissions using a different type of material / technology / product that is less carbon intensive. This is the 'active approach' to carbon reduction.

Substituting new (more sustainable) materials into an existing product may bring a series of design/engineering challenges and cost changes to the product. Your business development team will need to build the business case for the change (unless of course new legislation phases out the less sustainable material). If the cost change is marginal, it may well be that the customer is willing to pay the premium for the more sustainable product. This allows you to benefit by differentiating your product/service from your competitors'.

CONCLUSION

Supply chain carbon footprinting is now accessible to all businesses. In its simplest form, based on EIO/SIC code method (we call 'supply chain screening'), it is a straightforward process requiring only a small amount of resource. This is probably the most pragmatic choice for your first year of supply chain carbon footprinting.

Your supply chain screening results will show where the 'hot spots' of carbon intensity are in your supply chain. These 'hot spots' are where efforts should be placed to source better quality emissions data – ideally primary data from your suppliers (if available). This **primary data will greatly improve the accuracy of your supply chain footprint.**

To forecast your supply chain emissions (for 'net zero' initiatives), if you are using the EIO/SIC code method, use projections of emissions reductions within the industry codes for the initial target setting. As you move forward with supplier primary data (for the products and services that are most material), ask the suppliers for their carbon reduction projections and include these in your forecasting.

If you find that your forecast emissions fail to meet 'net zero' (even with use of supplier projections), you could look to change to a lower emissions supplier and/or change to alternative material; this may bring engineering and cost challenges but may command a premium in the market and differentiate your brand.

REFERENCES

Ref 1 : 'Target Setting' Carbon Footprint Ltd White Paper, JR Fernandez et al

Ref 2 : DEFRA/BEIS GHG Conversion Factors for Company Reporting (June 2021)
https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021

Ref 3: Edelman Intelligence. (2019). HP Workforce Sustainability Survey: Global Insights Report.
https://press.hp.com/content/dam/hpi/press/press-kits/2019/earth-day-2019/HP%20Workforce%20Sustainability%20Survey.pdf

FURTHER READING

Ref 4: Intergovernmental Panel on Climate Change, IPCC. (2019). *Global warming of 1.5°C*.
https://www.ipcc.ch/site/assets/uploads/sites/2/2019/06/SR15_Full_Report_High_Res.pdf

Ref 5: Royal Society (2018) Keeping global warming to 1.5°C: challenges and opportunities for the UK (royalsociety.org)

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