SMALL WORLD CONSULTING

BT supply chain carbon emissions reporting approach and concise methodology

May 2026

1 Are supply chain emissions really the 'essential, but impossible' metric?

Supply chain emissions are an unavoidable component of a company's climate change impact and as such fall within an organisation's area of environmental responsibility. The convention that companies are responsible for their supply chain impacts of every kind has been firmly established in the public consciousness through a series of controversies over many other environmental and social impacts over the last few decades. Examples include sweat shops, child labour, deforestation and plastic pollution. Given this substantial case history of public reaction to other types of supply chain impact it is unsurprising that, as public awareness grows, supply chain greenhouse gas emissions are also being viewed as lying within an organisation's circle of responsibility.

For many organisations, including BT, supply chains account for the largest component of their greenhouse gas emissions 'footprint'. However, they are also the most complex part of the picture. In fact, carbon or greenhouse gas 'footprints' are so important yet complex that they have sometimes been referred to as the "essential, but impossible metric".

The reason that supply chain emissions are so difficult to measure is there is mathematically no limit to the number of pathways that contribute in some small way to the total supply chain emissions attributable to a company, product or service. For example, if a company which makes Product A buys Product B to run its operation, and product B devalues over time, it is clear that some of Product B's embodied carbon needs to be attributed to each unit of Product A that is created. However, Product B in turn has its own chains in exactly the same way as Product A does. So, the process starts again, and looking at Product B has taken us no closer to getting to the end of Product A's supply chain.

As we look further and further down the chain, the number of pathways grows so it is of little comfort that individually they become very small and eventually infinitesimal. This complexity inevitably leads to a level of uncertainty in any emissions metrics, and this has often been used a justification for organisations to pay little attention to their supply chain emissions.

However, the challenge of producing supply chain carbon metrics does not need to be seen as requiring perfect understanding. The real necessity is to achieve *'good enough'* and sufficiently *meaningful* information to enable effective and well-targeted emissions management. Seen in this way, with care, the impossible metric can be made to become not only achievable, but practical. BT is at the leading edge of this approach.

2 What are the methodological options for estimating supply chain emissions?

In broad terms, there are two central approaches to estimating embodied or supply chain carbon.

The most popularly understood is called **Process Based Life Cycle Analysis** (PBLCA). This 'bottom up' approach entails mapping out the supply chain, estimating the emissions that take place at each stage of every pathway and proportionately allocating them to the product, service or organisation that is being assessed.

An alternative approach is to use ***Environmentally Extended Input-Output Analysis*** (EEIO) This works from the 'top down' using a macroeconomic analysis to track the way embodied emissions flow through the economy in trade between industries, and using this to estimate the emissions associated with goods, services and organisations.

There are difficulties associated with each of these methods, but these can be mitigated by combining the two in some kind of ***hybrid*** methodology. There are many ways of doing this, none of which are perfect, but all of which seek to improve the quality of management information that can be achieved within a given resource. All hybrid approaches require care to ensure that when methodologies are combined, system completeness is maintained without double counting.

3 What are the pros and cons of PBLCA?

As well as being conceptually simple to understand, this method has the advantage that it is possible to have a bespoke and detailed look at the supply chain of the entity in question. This can be important for enabling well founded identification of the hotspots and the priorities for emissions management. However, there are also two problems with this approach.

The first problem is that it is never possible to map every pathway. With a finite resource it is always necessary to omit many pathways. Furthermore, it is not simple to determine how significant the omitted, or 'truncated' pathways are, whether they represent just a few percent of the total or, as will inevitably be the case for many products and services, a majority. What can be said is that PBLCA has a systematic tendency to underestimate emissions and that the seriousness of this problem varies greatly between types of products and between industries. Often termed 'truncation error', it cannot be solved by throwing a larger resource at the analysis.

Even with hundreds of pathways traced, it is still often not obvious whether, for example, 50% of total supply chain emissions have been mapped. Nor, as has been advocated in PAS 2050, is it possible to resolve the problem by standardising the criteria upon which each pathway can be excluded on the basis of its expected significance, because a large number of small pathways can have the same significance as a small number of larger pathways.

PBLCA, therefore, is generally not a suitable technique for estimating in absolute terms the emissions associated with the provision of a product or service. For the same reason it is generally not suitable for comparisons between different types of products. An exception to this rule is in the comparison of simple products from emissions intensive primary industries, such as, for example cast iron, electricity and the production of most primary foods. In the ICT industry the problem of truncation is particularly extreme because the supply chains are so complex.

A second problem with PBLCA is that doing it properly is resource intensive. To make the analysis more manageable, it is common to use generic data sets of emissions factors to account for some materials and processes within the supply chain. However, it is important to understand that doing this inevitably compromises the bespoke nature of the analysis, which is the core advantage of PBLCA.

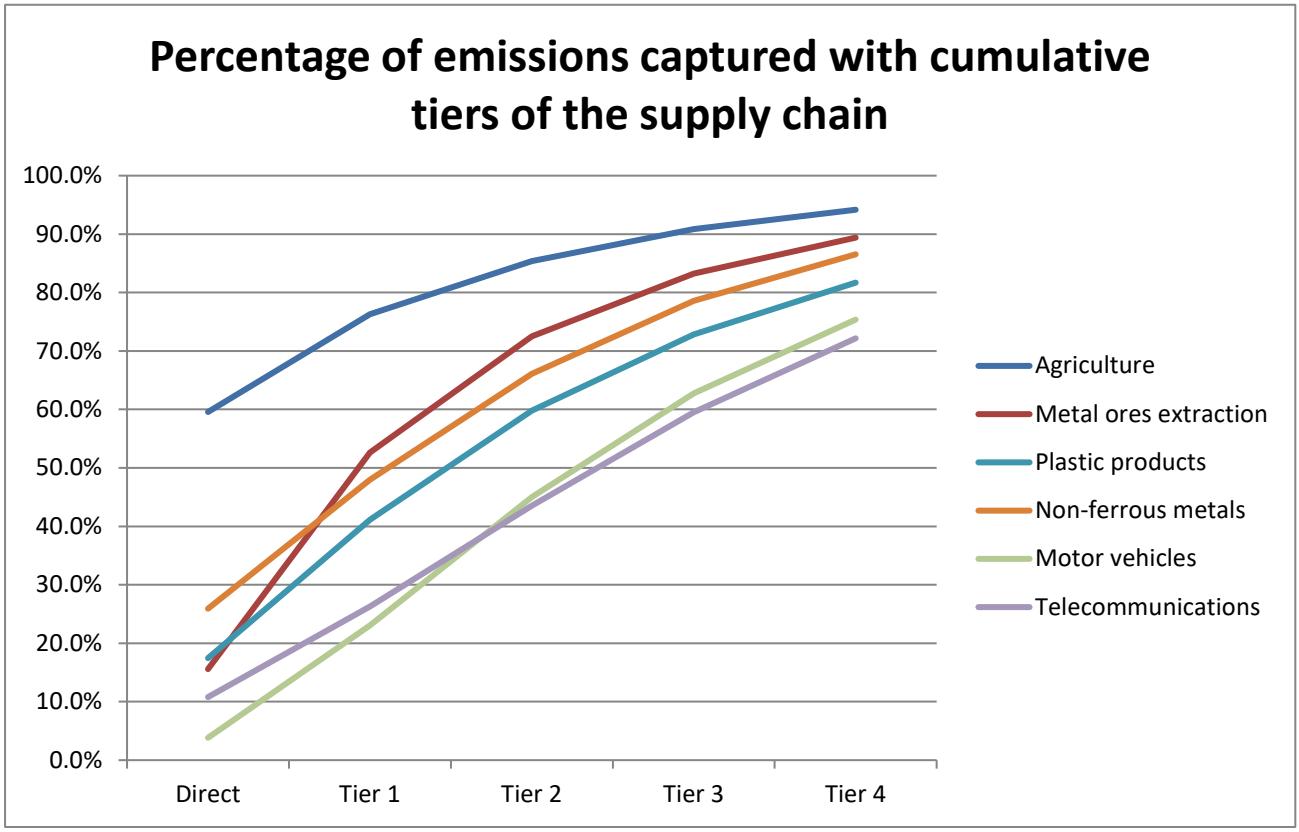

Figure 1: Different industries achieve tolerable 'system completeness' at different rates. In the telecommunications industry, only 72% of emissions are covered by direct emissions plus the first four supply chain tiers whilst in the agriculture industry, a greater proportion of total emissions are captured by direct emissions plus the first tier of suppliers.

Figure 1 uses EEIO to illustrate the proportion of all supply chain emissions that are typically captured at different tiers of the supply chain within different industries. In the case of the agriculture industry, a clear majority of total emissions are direct, and the majority of the remainder take place within the first and second tiers of the supply chain. It is realistic to think that truncation error could typically be reduced to below 20% in a PBLCA of an agricultural product. However, in the 'Telecommunications' industry[1], typically less than 60% of emissions are captured even when supply chains have been traced through three tiers, by which time the number of pathways is almost certainly unfeasibly large even for well-resourced studies.

4 What are the pros and cons of EEIO?

An alternative method to PBLCA is Environmentally Extended Input Output Analysis (EEIO). This technique uses financial information about trade between industries combined with information about the direct emissions from industries to make estimates of supply chain emissions. The biggest downside of EEIO is that it incurs inaccuracies of generalisation, especially by making the generic assumption that every unit of expenditure on each industry sector has the same emissions intensity.

[1]As defined by SIC.

EEIO also incurs other sources of inaccuracy which are difficult to quantify and are sometimes omitted from quantitative estimates of uncertainties in EEIO. These include the problems with the macroeconomic data sets that are relied on to understand the trade between industries and the emissions from each industry. Worldwide, a consensus dataset does not exist, although multiregional EEIO (EE-MRIO) models can allow for a more comprehensive consideration of trade between industries. Currently BT uses single-region EEIO, which makes the approximation that the global economy is structurally similar to the UK economy, however BT has built in capacity to improve on this approximation through a series of adjustments.

EEIO has the important advantage that it does not incur truncation error: it does not omit elements of the supply chain. Furthermore, it usually requires fewer resources than PBLCA, since it is based on financial information which is typically readily available.

5 What has BT done so far to estimate supply chain emissions?

For the upstream Scope 3 supply chain component, BT has so far used EEIO as its methodology and then improved the accuracy by employing hybrid techniques. Specifically, we refined the EEIO-based assessment by substituting suppliers' Scope 1 and 2 emissions data as reported to the CDP into the model and, where we can, further adjusting the results to take account of specific emissions data from supplier PBLCAs, hybridised with EEIO to ensure system completeness.

Since we are using EEIO to make estimates of the supply chain emissions, we need to recognise the following points:

- The estimates we make are based primarily on generic assumptions about the carbon intensity of procurement of different categories of goods and services. There is no basis for differentiating between the carbon intensities of any two expenditures within the same industry category.

- Because the methodology does not incur truncation error, it is likely to be higher than the figures that would be produced by a PBLCA and higher than competitors using such a methodology, even if the carbon intensity of the operations were the same.

6 Why does BT use the EEIO approach as its starting point?

BT begins its analysis with an EEIO-based assessment because this enables us to look at our entire supply chains, despite their complexity: it establishes system completeness at the outset. Although, like all supply chain carbon assessments, this approach contains inherent uncertainties, it is possible to apply it consistently and transparently. EEIO enables practical and meaningful comparisons over time and, with caution, between organisations. Some of the crudeness of a pure EEIO approach can be mitigated by introducing elements of PBLCA into the model, using either UK wide, or supplier specific PBLCA data.

7 Are there any notes of caution to be associated with this approach?

Yes. Whilst the results are carefully derived, as with all supply chain carbon assessments, they should be regarded as 'best estimates'. They help to identify where the emissions lie and how they change over time. Provided a consistent methodology is applied, and the results are interpreted as part of a richer context, they can even help to enable comparison between organisations. However, the numerical results should not be compared with those of other organisations that have used a different methodology, especially where the treatment of supply chains has been truncated, as is always the case where only PBLCA has been used.

8 How is BT using hybrid techniques to improve accuracy of its supply chain estimates, run scenarios and reflect changes?

It is possible to improve the accuracy of EEIO somewhat by substituting in more accurate estimates for parts of the supply chain. BT uses operational Scope 1 and 2 emissions data as declared by suppliers through the CDP. This technique enables BT to reflect carbon-efficient practices adopted by its immediate suppliers. Encouragingly, when aggregated over 20 or so key suppliers, in the first year of using this approach the estimates derived from CDP data tallied closely with those derived from EEIO despite the radical differences in the two methodologies. Over time the estimates derived from CDP data have trended lower than the EEIO-based assessment, as BT's suppliers have cut their Scope 1 and 2 emissions somewhat faster than the industry average. This trend is still visible in recent years; in 2025-26 BT's CDP declaring suppliers Scope 1 and 2 emissions were over 100,000 tonnes CO_2e lower than industry average values.

In theory, it is possible to apply the same technique to the suppliers' suppliers (i.e. the tier 2 suppliers), and even to further tiers in the supply chain, although the work involved goes up and the returns diminish. As company reporting to the CDP becomes more universal, and provided the quality of CDP data is high, it may be possible to move towards a position in which BT's own emissions are increasingly drawn from CDP data, with EEIO accounting for only a minority remainder of emissions.

Another potential means of mitigating the inaccuracies of generalisation is to make bespoke adjustments to elements of the supply chain estimate wherever there is a defendable case to estimate a difference between the supply carbon intensity and the economy's average for supply chains between those industries. BT have also done this, for example, by analysing the spend incurred in providing broadcast services to its customers. A bespoke analysis of the broadcasting of sport resulted in an emissions intensity derived partly from EEIO and partly from PBLCA. Although imperfect, this intensity can be defended as being more representative of BT's activity and is an example of hybrid modelling.

We have also been able to substitute process-based life cycle analyses into the carbon model (using a technique that adjusts for truncation errors and aligns system boundaries), so that year on year decarbonisation of the manufacturing process is reflected. This has expanded to cover a wider range of suppliers in 2024-25 and further in 2025-26, now covering 17% of BT's spend across categories including consumer devices, engineering materials, network infrastructure and cloud services.

9 Why are BT's estimates of emissions per unit of revenue likely to be higher than those reported by other organisations in the ICT sector?

BT is at the leading edge of its industry having adopted a comprehensive treatment of its operational emissions in which ***all*** supply chain pathways are included. This approach is not adopted by all companies in the sector and so is likely to lead to higher carbon intensity estimates than those using less complete methods. However, comparisons between organisations are not meaningful unless differences in boundaries and methodologies are fully understood.

Comparisons of carbon intensities between organisations should be treated with extreme caution and are not relevant unless the boundary criteria for the inclusion of emissions are the same and the methodology for estimating emissions similar enough to afford a comparison.

Since EEIO does not incur truncation error and provides a complete treatment of all supply chain pathways, the total estimates for BT's emissions per unit of company revenue are likely to be higher than for companies with a similar business model, but that calculate their supply chain emissions using PBLCA.

Since supply chain emissions are much larger than BT's Scope 1 and 2 emissions combined, it is also the case that the total emissions figure per unit of revenue that is obtained through our analysis is likely to be greater than a carbon intensity figure for a similar organisation which only included Scope 1 and 2 in its emissions estimates.

10 Why is BT's supply chain footprint so large compared to its Scope 1 & 2 emissions?

It is true of most companies that their supply chain carbon is greater than the footprint of their own energy use. The more complex the products of a company, the more this is likely to be the case. Each of BT's products and services requires it to purchase an array of goods and services from other companies that in turn have to buy from other companies and so on. The nature of the ICT industry dictates to a large extent that BT has particularly dispersed supply chains to which it adds only a relatively small final component to the 'footprint' of its output.

BT's supply chains also include the creation of products that are sold but not used by BT . These products add to the supply chain emissions but not to BT's Scope 1 and 2 emissions, increasing the ratio between the two.

11 How can BT cut its Scope 3 carbon emissions?

All carbon footprint assessments are about assessing the 'bang for buck'. BT's Scope 3 carbon should be assessed in relation to the goods and services that it offers. One simple way of doing this is by monitoring the carbon intensity of its revenue. This will have three components: Scope 1, Scope 2 and supply chain Scope 3. Of these, Scope 3 will be the largest.

There are three key routes to managing the Scope 3 supply chain carbon:

- ***Science Based Targets Initiative (SBTI)*** has been extended by BT to its Scope 3 supply chain emissions. This campaign backed by CDP, WWF, UN Global Compact, and WRI makes the setting of targets meaningful. The targets set for improvements are linked directly to carbon trajectories that will achieve the ambitions of the Paris Accord.
- ***Engage suppliers*** at different tiers in the chain, beginning with immediate suppliers (Tier 1) and encouraging them to:
    - set and meet operational carbon reduction targets
    - report their Scope 1 and 2 emissions to the CDP (Carbon Disclosure Project)
    - electrify processes and produce / purchase electricity from 100% renewable sources
    - encourage their suppliers to do likewise
- ***Efficient Procurement.*** This means wasting less and designing operational efficiencies that minimise wastage of procured goods and services. This route achieves cost efficiencies proportional to the carbon efficiencies.

12 Why doesn't the inclusion of supply chain emissions lead to double counting issues?

If all the Scope 1, 2 and supply chain emissions reported by every organisation in the world were added together, the total would indeed be much higher than the emissions from the world's industries since each company's emissions would also be counted by each downstream tier in the supply chains to which they contribute.

However, each company's output typically meets a mixture of intermediate demand (supplied to other organisations to enable their production) and final demand (sold directly to end consumers). If every organisation in the world were to proportionally allocate its emissions according to the proportion of its output that meets final and intermediate demand, then the sum of the final demand components should exactly equal the Scope 1 and 2 emissions from the entire world's industry, without double counting.

13 How is BT continuously improving its estimates?

We continue to explore new elements of hybridisation that bring together the best of Process-Based Life Cycle Analysis and Environmentally Extended Input-Output Analysis. This increasingly allows us to reflect the full range of carbon saving actions that take place in our supply chains.

Every year the underlying EEIO model is updated to incorporate the most recent data and, where methodological improvements are made, these are retrofitted to the model for previous years so that a methodologically consistent time series can be maintained.