



IFF AVOIDED EMISSIONS METHODOLOGY

Purpose

IFF has established a target to enable clients to save 50 times more CO₂e than generated at our facilities by 2030. To quantify, track and measure against this target, IFF has developed a methodology to assess avoided greenhouse gas (GHG) emissions from the use of our products. Using this methodology, we annually identify and assess products and applications in the current IFF portfolio which significantly affect climate change potential through their use. In the long-term, these efforts seek to promote IFF products and introduce others which drive meaningful reductions in GHG emissions for our customers while simultaneously striving to reduce our own footprint.

Methodology

Initial guidance on the assessments stems from the World Resource Institute (WRI) working paper by [Stephen Russel on comparative impacts](#). IFF has been evaluating avoided emissions for the past several years to track our progress towards the target defined by the following equation:

Equation 1:

$$\frac{\Sigma[(\text{Benchmark Solution}) - (\text{IFF Solution})]}{\text{IFF Scope 1\&2 Emissions}}$$

The numerator demonstrates the fundamental logic of avoided emission calculations, while the denominator is simply the assured Scope 1 and 2 emissions of IFF on a yearly basis. This metric enables us to put the benefits of our products in perspective by comparing the magnitude of IFF enabled benefits to IFF burdens. IFF Scope 1 and 2 emissions are tracked using site data detailing energy demands and site emissions. Calculations are performed using sales and scenarios consistent with the previous calendar year.

Scope

A complete analysis of IFF avoided emission calculations requires evaluations across many products and product applications, addressing both the impacts when using our products and the impacts if our products were not available.

The portfolio scope is intended to include products which show avoided emission savings of relevance in relation to the IFF scope 1&2 emissions. The system boundaries for a given solution are on a cradle-to-grave basis, but all parts of the system that are similar for both the benchmark and IFF solution can be omitted. Some aspects expected to favor the IFF solution but are expected to be small relative other avoided emissions are also omitted to simplify calculations. The net difference is the focus of the calculation, often with emphasis on the use-phase.

Process

Overview

Members of the IFF Global Sustainability team with expertise in life cycle assessment perform the avoided emissions calculations with input from the business with respect to grouping of products, benchmark selection, production volumes and functional differences across regions, products and benchmarks. Results are reviewed internally by other members of the Sustainable Solutions team. Before publishing the results in the annual sustainability report, IFF subjects the avoided emissions calculations to third party limited assurance.

Grouping and Benchmark Selection

With such an expansive portfolio of solutions and applications, it is necessary to group solutions whenever possible to make such an evaluation manageable. A grouping is deemed valid if the grouped solutions all provide the same functionality and application, particularly with respect to aspects leading to the GHG benefits or burdens. As avoided emissions are driven by applications and may differ by region, it is necessary to identify sales of products on both an application and regional basis.

The right benchmark for a given IFF solution is the one that best answers the following question: What would have been used in the market if the IFF solution or the IFF solution-enabled customer's product was not available? This is not a forward-looking statement because the analysis is for the previous year. Benchmark guidance is provided as shown in Figure 1.

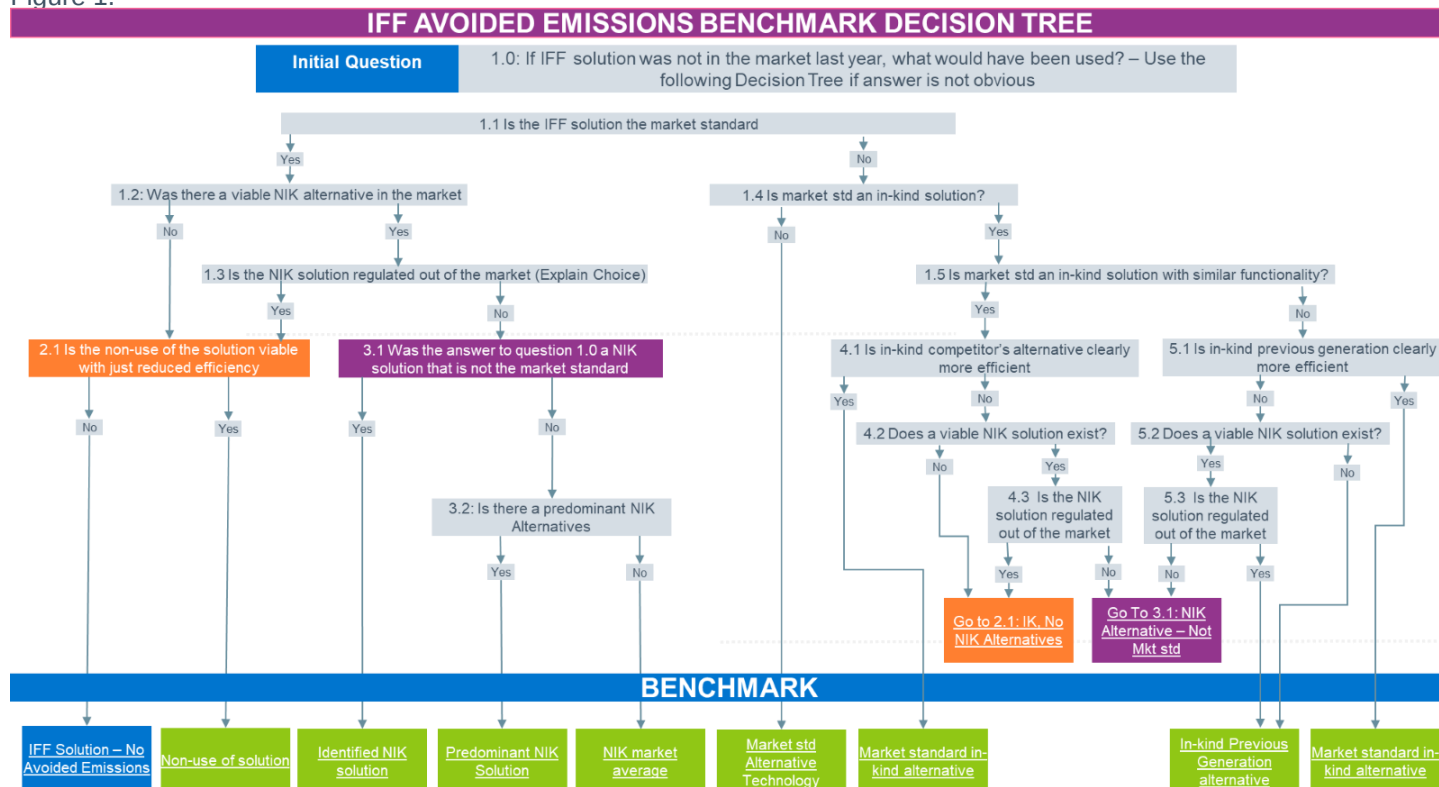


Figure 1: Benchmark Decision Tree

The grouping process may be iterative in nature as subsequent steps in the process may identify key differences among grouped solutions that require separation to best evaluate and compare an IFF solution to the benchmark alternative. Both grouping and benchmark assessment are evaluated each year as markets, technologies and regulations may change.

Allocation

For a given solution, multiple products may be required to provide the functional benefit which translates to avoided emissions relative to the benchmark. If the IFF solution is an integral part of the reason for the change in GHG emissions relative to the benchmark, then, for this analysis, all the avoided emissions are assigned to the IFF solution. This is consistent with the WRI guidance. IFF is not claiming avoided emissions in a Scope 3 analysis, but rather just tracking what is enabled by using our products.

IFF avoids double counting of avoided emissions associated with its own products. If multiple IFF products are used in one application, the benefits are not counted for each product, but rather the products are grouped into one solution, or some products are excluded from the calculations.

Data

In IFF avoided emissions calculations, consequential thinking is used in identifying what changed, as highlighted in the WRI guidance. However, often attributional background or literature data is all that is available – and often more appropriate for modeling the impacts of IFF and benchmark scenarios for the previous year. A focus on what did change is preferable to what will change in the future because of the timing of the calculations.

IFF avoided emissions calculations rely on data from peer reviewed LCA references when available. In their absence, LCA screening calculations are allowed providing details on scope, functional unit, key assumptions and applicable geography are included.



Data gap filling is sometimes needed by using simple physical or thermodynamic relationships.

On an annual basis, IFF reviews the data used and key assumptions and updates the calculations by incorporating new life cycle data, as well as differences in benchmarks, energy supply and technology.

Specific Aspects

The IPCC 6th assessment report released in 2021 is used for global warming potentials of emitted GHGs. All GHGs with characterization factors in this impact method for any given solution are included. Biogenic carbon, if sequestered at end-of-life, shall be given a credit and explicitly noted in the calculations. Fossil carbon incinerated or decomposing at end-of-life shall incur a carbon emission. No time-value of carbon is considered.

Land use change impacts, both direct and indirect, can greatly influence avoided emission calculations, but are subject to uncertainty and variability by region and crop. Direct land use change shall be included except when the following is true:

- a) IFF regional breakdown is not detailed enough in either the IFF or benchmark data to accurately reflect regional dLUC variability, specifically with respect to agricultural products supplied from countries including Brazil, Argentina, Indonesia and Madagascar, among other tropical regions. In other words, exclude dLUC when it does not match the actual supply chain.
- b) The dLUC impacts are not directly associated with the IFF product (i.e., dLUC from feed reductions enabled by phytase use) assuming these could be simply avoided by reasonable supply changes.

Indirect land use change (iLUC) need only be included when it is common practice or expected for specific applications (e.g., biofuels). Methodologies for dLUC and iLUC calculations should be the same for both the IFF solution and the benchmark, with a preference for the PAS2050 method used in Agrifootprint models for dLUC.

Note: Both direct and indirect LUC emissions have been included for the fuel alcohol enzyme product application as they are both required and included in the standard GHG calculations for the biofuels industry and the regions of interest are well defined. Such inclusion increases the GHG burdens of the IFF solution, resulting in lower avoided emissions. Direct LUC emissions have been excluded in the phytase solution in line with the exclusion conditions listed above. For phytase, the credit for a higher feed conversion ratio relative to the benchmark is reduced when dLUC is omitted.

Limitations

As of February 2025, the latest evaluation based on 2024 IFF portfolio and sales data has quantified five IFF solutions' avoided emissions that likely represent a very significant portion of the entire IFF portfolio as several of these solution groupings have large avoided emissions. These solutions represent five groupings of products, covering nearly 100 individual products. Results from the specific applications evaluated are not scaled to the IFF portfolio. Scaling would not be applicable, as these five groupings represent applications with significant avoided emissions, while many other product groupings not included in the evaluation would serve as benchmarks for their application (i.e., standard laundry enzymes, fragrances) and have no avoided emissions. Others contribute functionality in areas which do not have relevant GHG impacts or benefits relative to the IFF Scope 1 and 2 emissions (IFF Scent ingredients due to either functionality or scale).

Not all IFF solutions have been evaluated for their potential to provide avoided emissions. As such, there could exist some solutions which present as worse than a benchmark product and result in reducing the overall IFF avoided emissions. At this time, IFF does not expect any such products, or combination of products to significantly reduce the calculated avoided emissions (i.e., to be similar to the scale of IFF Scope 1 and 2 emissions).

While not all encompassing, the following high-level reasoning applies:

To be truly relevant with respect to IFF Scope 1 and 2 emissions (1.79 MM metric tons in 2022) and the five product groupings evaluated, product groupings must have a large scale, and either provide significant use-phase benefits or have substantial production differences relative a benchmark. In addition to the product groupings evaluated, IFF produces fragrances, flavorings, probiotics, cultures, enzymes, texturants and pharma ingredients, among others. Fragrances, in most applications would be benchmarked relative other fragrances. As IFF is a global leader, one would expect a typical IFF Fragrance would be the relevant benchmark – meaning most fragrances would be 'standard' fragrances and have no avoided emissions. While some would surely be higher or lower than an average impact, they would balance out or not have the scale to influence this metric as total cradle-to-grave impacts to scent are less than IFF total Scope 1 and 2 emissions. Flavors enable the experience of a taste, typically with much less material, suggesting likely reduced impacts in application, but also low volumes.

Furthermore, portfolio sustainability assessment screening in 2019 of cultures, other enzymes, probiotics, core texturants and others did not identify any obvious potential avoided emissions burdens, particularly not at a relevant scale. To the contrary, it is believed that IFF is likely currently under-reporting its avoided emissions as many solutions are expected to have small, but as yet unverified avoided emissions.

Outlook

In 2023, the WBCSD published specific guidance on avoided emissions [WBCSD, 2023]. Ideally, IFF will transition and align with this methodology. Our 2023 and 2024 calculations have some deviations which are noted here. In addition, the WBCSD guidance is intended for multiple industries and product types. As such, our methodology is more specific to our portfolio.

WBCSD sets three gates to ensure eligibility. Gate 1 is Climate action credibility. Essentially, the guidance requires a company to have its own house in order through setting and communicating a climate strategy. IFF meets Gate 1 through our Science-Based Targets Initiative (SBTi) commitments. Gate 2: 'Latest climate science alignment' requires solutions to have mitigation potential and not be directly applied to activities for the exploration, extraction, mining, production, distribution, or sales of fossil fuels. Although our current methodology does not specifically exclude such products, none are in the suite of products measured to date. Gate 3: 'Contribution legitimacy' requires solutions to have a direct and significant decarbonizing effect. For our methodology, the term significant would be in relation to the impact of IFF as opposed to global significance. For context, IFF Scope 1 and 2 emissions for 2022 were 1.79 million MT CO₂e [IFF Sustainability Report, 2022]

IFF methodology is in line with the WBCSD standard with the following caveats:

- **Timing:** IFF avoided emissions are specifically noted to be for the previous year (i.e., 2024 when reporting in 2025) and only account for savings addressed during that year. Virtually all IFF products are used or consumed within a year of their production. The WBCSD guidelines are written to cover savings that may occur across multiple years of use for some products which does not apply to the IFF portfolio.
- **Defining the Reference Scenario:** The WBCSD decision tree addresses many product types not found in the IFF portfolio. As such, the IFF Benchmark selection follows a more specific decision tree as shown in Figure 1. This is similar to the 'new demand' portion of the WBCSD decision tree with a couple differences – particularly allowing the comparison to a known market standard or expected replacement product as opposed to using market averages. 'New demand' products are those which do not replace existing products that may be used for multiple years or used many times. For instance, a product that is not 'new demand' could be a bicycle that replaces another bicycle already owned by a consumer which still is functioning.

The WBCSD guidance requires reporting of the portion of revenue associated with the solutions used to calculate avoided emissions. The intent is to show relevance and put these solutions in proportion to the company portfolio. In lieu of reporting revenue, IFF achieves the aspect of perspective by reporting of avoided emissions in relation to IFF Scope 1 and 2 emissions. Our goal pre-dates the guidance and serves as a solid basis to judge the importance of the solutions in the market. This same measure also guides IFF as to which solutions should be evaluated. Many IFF products which would be benchmarks for their application and therefore have no avoided emissions, or those not expected to have relevant avoided emissions due to their function in use have not been included in the assurance of the metric as they would not contribute to the metric. They would be meaningful to include if showing the relevance of the revenue generated from products evaluated, but this exceeds the scope of our methodology.

The numerator in equation 1 is subjected to third party limited assurance based on the methodology described and the three qualifications noted above with respect to the WBCSD avoided emissions guidance document. The denominator is subjected to limited assurance separately.