Zooming in on the limitations of the PEF methodology for agri-food products

Read IFOAM Organics Europe's position paper on substantiating claims & the Product Environmental Footprint and IFOAM Organics Europe's position paper on sustainability labelling & the Planet-score

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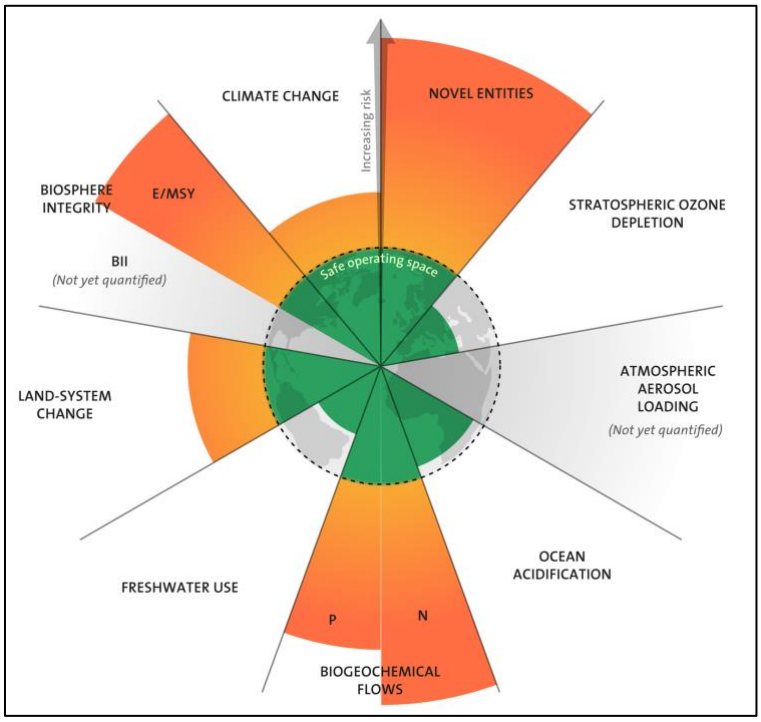
1.1. The environmental crisis & biodiversity loss

Globally, food and farming systems contribute up to 30% of greenhouse gas (GHG) emissions. In addition, Europe loses 970 million tons of soil per year[1]. Pesticides and nitrogen-based fertilizers are driving unprecedented impacts on plant and insect life. Only 23% of species and 16% of habitats under the EU Nature Directives are in good health[2], and global populations of mammals, birds, fish, reptiles and amphibians have declined by an average of 68% since the 1970s[3].



Five of the nine planetary boundaries – the nine processes that regulate the stability and resilience of the Earth system – have been exceeded. Crossing these boundaries increases the risk of large-scale and potentially irreversible environmental damages.

Image 1. Azote for Stockholm Resilience Centre, based on analysis in Persson et al 2022 and Steffen et al 2015

Earth Overshoot Day, which marks the moment where our demand for ecological resources and services in a given year exceeds what our planet can regenerate in that year, is occurring earlier and earlier through the years. For instance, it was on the 29th of July in 2022 and on the 13th of August in 2015.

[1] IPES Food, 2016. Towards a Common Food Policy for the European Union. Available here.
[2] WWF EU. Available here.
[3] WWF, 2020. Rapport planete vivante 2020. Available here.

1.2. Political context in the EU

The European Green Deal (EGD) published in December 2019 sets the direction for a climate neutral EU by 2050. The aim of the Farm to Fork (F2F) strategy, part of the EGD, is to comprehensively address the challenges of sustainable food systems. Among the objectives of this strategy are an increase in organic farmed land in the EU, a reduction of the use of pesticides, fertilisers and antibiotics, and the improvement of animal welfare.

In terms of environmental labelling and claims, the Commission is working on two different yet related initiatives, the objectives of which IFOAM Organics Europe welcomes: (1) Examining ways to harmonise voluntary green claims and thus address greenwashing; (2) Creating a sustainable labelling framework that covers, in synergy with other relevant initiatives, the nutritional, climate, environmental and social aspects of food products. The former initiative is led by DG ENV and is set to be published on 30 November 2022 as a "Regulation for substantiating claims based on the Product Environmental Footprint (PEF)", while the latter initiative is led by DG SANTE and is currently under development. This initiative on sustainability labelling will likely be embedded in the proposal for a legislative framework on sustainable food systems expected in September 2023.

While the initiatives on substantiating green claims and sustainability labelling do not have the same goal – to fight greenwashing and to provide more information about the impact on sustainability of a certain food product, respectively – they are linked, and discussions regarding the former will inevitably concern the latter. Indeed, DG SANTE is likely to at least be inspired by the work carried out by DG ENV on PEF for the sustainability label initiative.

2. The "Product Environmental Footprint" (PEF) methodology [4]

The European Commission has been developing the PEF methodology for more than 10 years, its objective being to measure the environmental performance of products. The PEF methodology is heavily based on the Life-Cycle Assessment (LCA) which is defined as "the compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle"[5]. **While the PEF methodology is still relevant for manufactured industrial products, it is not adequate to assess the environmental performance of agri-food products as it is unable to correctly capture the complexity of the agri-food system and its external impacts**.

2.3. Methodological limitations of the life cycle assessment (LCA) and PEF

2.3.1. Positive and negative externalities are inadequately reflected in the PEF methodology

Many studies, research institutes, and think tanks[6] have put forward that current LCA methodologies, on which the PEF methodology is heavily based, need to be improved and integrated with other environmental assessment methods to obtain a more balanced picture and better inform policy decisions. Indeed, **the PEF does not adequately consider the many positive and negative externalities of the agri-food system and tends therefore to favour intensive practices**. Hence, such methodology

[4] With thanks to the ITAB, the institute for organic agriculture in France, for their contributions to this paragraph.

[5] ISO 14040:2006

[6] Bosque *et al.,* 2020.: L'amélioration de la performance environnementale globale par l'évaluation environnementale. Available here.
INRAE, 2020. Pour une meilleure comparaison entre agriculture biologique et conventionnelle. Available here.
Reporterre, 2020. L'Ecoscore une étiquette environnementale qui pourrait favorises l'agriculture industrielle. Available here.

is not in line with the Commission's priorities – and the planet's needs – to transition towards more sustainable food systems.

These considerations are developed upon by for instance INRAE, the French national agriculture institute for agriculture and food[7], who highlights *inter alia* the need to improve the LCA methodology and integrate other methodologies to obtain a more balanced image of the environmental impacts of different methods of production:

> *"Three French, Danish and Swedish researchers have just published a critical analysis of numerous LCA studies in which they demonstrate that the implementation of LCA is too simplistic and misses major benefits of organic farming. First, their analysis shows that current* ***LCA studies rarely take into account biodiversity****, which is of crucial importance for the health and resilience of ecosystems. However, it is in decline worldwide and conventional agriculture has been found to be one of the main causes of observed negative trends, such as the decline of insects and birds. (…) Furthermore,* ***land degradation and reduction in soil quality resulting from unsustainable management of agroecosystems is also a problem that, again, is rarely considered in LCA studies****. The advantages of organic farming practices, such as rotations mobilizing a greater diversity of crops and the use of organic fertilizers, are paradoxically often overlooked in LCA studies.*
>
> ***Current LCA methodology and practices are simply not sufficient to assess agroecological systems such as organic farming. LCA therefore needs to be improved and integrated with other environmental assessment methods to obtain a more balanced picture and better inform policy decisions****. (…)* ***LCA favors conventional intensive systems.****"* [8]

Moreover, the agency for the ecological transition in France, ADEME, has described its vision for the role of the PEF[9]:

> *« It is clearly recognised that* ***the LCA method does not cover all environmental impacts of the sector and cannot be a methodology, on its own, that evaluates food products****", says Jérôme Mousset, head of unit at ADEME. "We are working to better take into consideration the benefits on biodiversity, or the impact of pesticides." [10]*

LCA assess agroecological systems inadequately for three main reasons: (1) a lack of operational indicators for three key environmental issues, namely land degradation, biodiversity loss and pesticide impacts; (2) a narrow perspective on functions of agricultural systems; and (3) inconsistent modelling

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[7] INRAE, 2020. Pour une meilleure comparaison entre agriculture biologique et conventionnelle [For a better comparison between organic and conventional agriculture]. Available here.

[8] Original text: *« Trois chercheurs français, danois et suédois, viennent de publier une analyse critique de nombreuses études d'ACV dans laquelle ils démontrent que cette mise en œuvre de l'ACV est trop simpliste et passe à côté d'avantages majeurs de l'agriculture biologique. Dans un premier temps, leur analyse montre que les études d'ACV actuelles ne prennent que rarement en compte la biodiversité, qui est d'une importance cruciale pour la santé et la résilience des écosystèmes. Cependant, elle est en déclin dans le monde et l'agriculture conventionnelle s'est avérée être l'une des principales causes de tendances négatives observées, telles que le déclin des insectes et des oiseaux. (…) Par ailleurs, la dégradation des terres et la réduction de la qualité des sols résultant d'une gestion non durable des agroécosystèmes constituent également un problème qui, encore une fois, est rarement considéré dans les études d'ACV. Les avantages des pratiques agricoles biologiques, telles que des rotations mobilisant une plus grande diversité de cultures et l'utilisation d'engrais organiques, sont paradoxalement souvent négligés dans les études d'ACV. La méthodologie et les pratiques actuelles d'ACV ne sont tout simplement pas suffisantes pour évaluer les systèmes agroécologiques tels que l'agriculture biologique. Il faut donc améliorer l'ACV et l'intégrer à d'autres méthodes d'évaluation environnementale pour obtenir une image plus équilibrée et éclairer aux mieux les décisions politiques. (…) L'ACV favorise les systèmes intensifs conventionnels. »*

[9] Reporterre, 2020. L'ecoscore, an etiquetage environnemental qui pourrait favoriser la nourriture industrielle [the Ecoscore, an environmental label that could favour industrial food products]. Available here.

[10] Original text: *Il est clairement reconnu que la méthode des ACV ne couvre pas tous les enjeux environnementaux du secteur et ne peut constituer une méthode à elle seule pour caractériser l'aliment », tempère Jérôme Mousset, chef de service à l'Ademe. « Des travaux sont en cours pour mieux prendre en compte les bénéfices sur la biodiversité, ou l'impact des produits phytosanitaires. »*

of indirect effects[11]. Specifically, below are two of the most important issues in terms of the production methods that fail to appear within the PEF methodology:

- Despite the biodiversity crisis that we are facing, and its inevitable consequences, the impacts of agricultural practices on terrestrial and marine biodiversity are not well addressed in the PEF methodology. This includes the question of the impact of pesticides on the soil, water, and air[12].
  - In the context of pesticides, it appears that it may take 20 to 30 years to discover toxicological hazards of new pesticides that had seemed relatively harmless at first. It is therefore extremely difficult for the PEF methodology to assess the potential environmental and health impacts of pesticide use[13], not only because the LCA has a product-focused approach, but also because future impacts should be considered.
- Those positive externalities that are "stable" and part of the system do not appear at all within the PEF calculation as LCA only considers annual flows. This includes the value of the presence of hedges, plots of limited size, diversified crop rotations, long-term practices which contribute to carbon sequestration, e.g. permanent grassland or soil cover practices.

Moreover, although 83% of the impacts of the 2500 most consumed food products are linked to agricultural production[14], it is important to note that the impact stemming from end of life of packaging, in particular plastics and their accumulation in ecosystems, is not well addressed in the PEF methodology.

Finally, the PEF uses a product-based approach, and as such, narrowly focuses on emissions per kilogram of product rather than holistically addressing the many environmental problems that the agri-food system currently contributes to[15]. With the PEF methodology, companies can claim that GHG per kilo or liter is reduced for a certain product, without considering that total emissions may have increased. For instance, this could lead to the absurd results seen in the dairy sector where emissions intensity decreased by 11% between 2005 – 2015, while overall dairy emissions increased by 18% in the same 10-year period[16].

These shortcomings have also been highlighted by several EU and national NGOs. For instance, in March 2022, EU NGOs sent an open letter to the European Commission highlighting that "the PEF methodology is not adequate to assess the environmental performance of agri-food products (…) When it comes to agri-food products PEF is predominantly an indicator of yields, favouring the most intensive methods of production while disregarding both a number of positive elements and the negative externalities of the food production process."[17]

[11] Van den Werf et al., 2020. Towards better representation of organic in life cycle assessment. *Nature sustainability*. Available here.
[12] Pesticides represent only 3 to 4% of the PEF scores of food products, suggesting that their impact is minor for this production sector. In the same way, the dependence on synthetic nitrogen fertilizers, which are heavy consumers of fossil fuels (gas) for their production and high emitters of GHGs when spreading, is hardly visible in the evaluations based on PEF.
[13] Van den Werf et al., 2020. Towards better representation of organic in life cycle assessment. *Nature sustainability*. Available here.
[14] Ademe Recherche, #32, September 2020. Available here.
[15] IATP, 2021. Emissions Impossible Europe. Available here.
[16] FAO, 2019. Climate change and the global dairy cattle sector. Available here.
[17] Joint open letter on concerns over PEF methodology for agri-food products, 2022. Available here.

2.3.2. Non robust indicators & the need to update such indicators

Among the 16 mid-point indicators of the PEF[18], several are qualified as "non robust" by the European Commission and are subject to "robustness factors" which drastically reduce their weight in the assessments (until x 0.17). This contributes to the inability of this methodology to account for externalities, and in particular the impact of synthetic pesticides and biodiversity loss.

Specifically, the French agency for the ecological transition (ADEME) recommended to avoid using the two indicators "human toxicity cancer" and "human toxicity non-cancer" given their lack of robustness. Similar considerations are to be made for other issues that are either missing or poorly reflected in the PEF methodology, such as:

- The use of GMOs
- The use of antibiotics
- The non-circularity of synthetic fertilisers
- Deforestation – in some cases the impact of deforestation does appear in the PEF methodology, but not when it comes to livestock production, which is a leading cause of deforestation. Indeed, according to the FAO, more than half of forest loss is due to conversion into cropland, whereas livestock grazing is the cause of about 40% of forest loss.[19]
- The pollution that is linked to packaging and plastics in particular.

Moreover, some LCA impact categories use obsolete data which calls to be updated, particularly when it comes to climate indicators. For instance, the PEF does not consider nitrous oxide[20] emission factors as it is based on IPCC 18 data[21]. From 2019, new settings were determined for synthetic fertilizers and organic fertilizers[22], which should be considered within the PEF methodology.

Another problematic aspect of the PEF methodology is linked to carbon sequestration and the LCA's product-based and unit of mass-focused approach, which inevitably favours more intensive, and likely more polluting, methods of production. Accounting for carbon emissions per kilogram, results in potentially claiming that emissions were reduced per kilogram, while this is not the case for overall emissions. In addition, as the Institute for Agriculture and Trade Policy (IATP) highlights[23]:

> *"Speculative carbon markets for agriculture as envisioned by the European Commission (EC) in its forthcoming Communication on Sustainable Carbon Cycles are the wrong solution. Public funds, such as the CAP eco-schemes and state aid, should not be diverted to carbon consultants to support costly monitoring, reporting and verification of carbon credits for impermanent land-based carbon sequestration. These public funds should instead be used directly to support farmers already practicing agroecology and to transition European farming to a holistic agroecological approach."*

Finally, the PEF uses the Global Warming Potential (GWP) 100 to assess the impact of methane, even though the IPCC does not recommend a specific metric, arguing that the method used should depend on the policy objective and the context[24]. Although the IPCC has not ruled in favor of one or the other metric, it specifies that the GWP* can improve the quantification of the contribution of gases to global warming. As there seems to be no explanation as to why the PEF methodology uses GWP 100 instead of the GWP*, the think tank IDDRI highlights that "LCA users should be aware of the challenges and

[18] 16 impact categories of the PEF are: climate change, water use, land use, acidification, ozone depletion, human toxicity non-cancer, marine eutrophication, eco-toxicity fresh water, terrestrial eutrophication, particulate matter, resource use minerals and metals, resource use fossils, freshwater eutrophication, human toxicity cancer effects, ionizing radiation human health, photochemical ozone formation.

[19] FAO, 2021. COP26: Agricultural expansion drives almost 90 percent of global deforestation. Available here.

[20] Nitrous oxide is the primary greenhouse gas in the agri-food sector (nearly 50% of total).

[21] ITAB, 2020. Available here.

[22] IPCC report, 2019. Summary for policymakers, available here.

[23] IATP, 2021. Emissions Impossible Europe. Available here.

[24] IPCC – Climate change 2021. The physical science basis. Available here (page 124).

value judgements inherent in the aggregation exercise of different GHGs" and recommends "aligning the choice of metric with policy objectives, as well as conducting sensitivity tests" [25].

2.4. The PEF concretely: what are the scores for different products?

The values in the image below show PEF scores that are consistently better for the most intensive systems (a lower score is better in terms of environmental impacts, according to the PEF). Therefore, PEF metrics seem to rather be performance indicators than environmental indicators. A particularly striking example is that of the eggs, where caged eggs perform better than free-range eggs that perform better compared to organic eggs.

Image 2: PEF scores for different food products, stemming from different methods of production. Kindly provided by the French Institute of Organic Agriculture, ITAB.

When carrying out PEF scores for different food products, and bringing these scores back to the letters A, B, C, D and E, it appears that, for instance, all fruits and vegetables score an A, regardless of the method of production, the transport requirements, or whether they were grown in greenhouses or not. Another example is that cheese will generally score a B and meat an E, again, regardless of the method of production or animal welfare. This means that **the PEF methodology is good at showing which category of products is more environmentally friendly compared to another, e.g. fruits and vegetables are more environmentally friendly than cheese, which is more environmentally friendly than beef, but it is unable to distinguish between different environmental impacts within the same category of food products**.

[25] IDDRI, 2021. Environmental food labelling: revealing visions of the future food system to build a political compromise. Available here.

3. Preliminary conclusions on the PEF methodology & the need for policy coherence

This document aims to show the limitations of the PEF methodologies for bio-based products, notwithstanding its value for manufactured products. It is important to note that, given its inadequacy to reflect the complexity and externalities of the agri-food system, the PEF favours intensive production as it is hardly able to distinguish between methods of production. The adequateness of PEF for agri-food products has been put into question by researchers, civil society, as well as companies[26] who are testing alternative to the PEF.

Importantly, this methodological debate is much more than 'just' that: it is a political debate as it is inextricably linked with the transition towards more sustainable food systems. As IDDRI points out: "*The methodological discussion on Environmental Labelling reflects one of the main debates on agricultural transition: one option is a move towards a more extensive agroecological model, which favours complementarity between animal and plant crops to avoid the use of nitrogen fertilizers; the other is a relative continuity with the current intensive system*"[27]. **The PEF in its current form does not support a transition towards more sustainable food systems** and is therefore not coherent with the direction that the European Commission has set for the EU with the European Green Deal and the Farm to Fork strategy in particular. **There is therefore the need for a non-LCA based methodology, in complement to the PEF, to align environmental scores to the realities of the agri-food systems, including positive and negative externalities**.

[26] Planet-score October 2021 newsletter. Available here.
[27] IDDRI, 2021. Environmental food labelling: revealing visions of the future food system to build a political compromise. Available here.