Methodology for sustainability scenarios

Following is an overview of the methodology and key assumptions used in the scenario analysis in Chapter 5 in the Urgency of Action to Tackle Deforestation Report.

Methodology and Data

Unit of measurement

The deforestation is measured as cumulative hectares of deforestation either between 2018 and 2025 (for time period 2025) or between 2018 and 2030 (for time period 2030). The CO_2e is measured over the respective time period depending on the scenarios.

Commodity focus

The data availability for sustainable sourcing varies by commodity. Specifically:

Palm oil

Based on the information retrieved from "*Choosing sustainable palm oil – progress report on the import and use of sustainable palm oil in Europe*" by the European Sustainable Palm Oil.[1]
Data is available for 10 of the 12 countries, namely:

- ***Belgium***. The Belgian Alliance for Sustainable Palm Oil (BASP) notes for the 16 reporting companies deemed representative of the most significant food manufacturers and vegetable oil refiners in the country, 99 percent of palm oil is considered sustainably sourced in 2017. However, BASP only accounts for 15 to 50 percent of the Belgian market. Hence, the sustainable sourcing figure would be much lower (~32 percent).
- ***Denmark***. A study by the Danish Ministry for Environment and Food and the University of Copenhagen estimates that 65 percent of the palm oil imported into Denmark for food is RSPO certified in 2017.
- ***France***. The Alliance for the Preservation of Forests notes by the end of 2017, 99 percent of palm oil purchases by its members were certified to be sustainable. The market share of the alliance is estimated to be 70 percent.
- ***Germany***. The Forum for Sustainable Palm Oil (FONAP) reports that 55 percent of total palm oil consumption (covering food, feed, laundry detergents, home care products and cosmetics, and chemistry/ pharmacy) in Germany in 2017 was sustainably certified.
- ***Italy***. Estimates by the Italian Union for Sustainable Palm Oil, the most recent estimates based on data from Eurostat, members' and other companies' data provided to RSPO indicate that about 43 percent of the total palm oil used in food products in Italy in 2017 was certified to be sustainably sourced.
- ***Netherlands***. The Dutch Alliance for Sustainable Palm Oil (DASPO) reports that 88 percent of the total volume processed by the Dutch food industry in 2017 is sustainably sourced.
- ***Norway***. The Norwegian Initiative for Sustainable Palm Oil (NISPO) estimates that its signatories have largely achieved its sustainable sourcing targets (99 percent). However, NISPO is only representative of the food industry. Therefore, we have factored the market share of the food industry (which is about 45 percent) in our analysis of sustainable palm oil sourcing in Norway.[2]
- ***Spain***. The Spanish Foundation for Sustainable Palm Oil estimates that the use of sustainable palm oil by the Spanish food industry reached 44 percent in 2018.
- ***United Kingdom***. Efeca analysis of UK refinery data finds that 75 percent of total palm oil imports to the UK in 2017 are certified by RSPO.
- ***Switzerland***. The State Secretariat for Economic Affairs estimates that the level of sustainably sourced palm oil is 90 to 100 percent. A conservative estimate of 90 percent is used for this analysis.
- For ***Poland*** and ***Portugal*** where no data is available, we took the most conservative assumption that none of its palm oil is sustainably sourced.

1. European Sustainable Palm Oil (2019). *Choosing sustainable palm oil – progress report on the import and use of sustainable palm oil in Europe.*

2. Germany's market share data was used as proxies for Norway.

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Soy

Based on the information retrieved from *"European soy monitor – insights on the European supply chain and the use of responsible and deforestation-free soy in 2017"* by the Sustainable Trade Initiative (IDH) and National Committee of the Netherlands (IUCN). Data on the share of soy from deforestation-free sources is available for 11 of the 12 countries:

- ***Belgium*** (43 percent)
- ***Denmark*** (20 percent)
- ***France*** (6 percent)
- ***Germany*** (16 percent)
- ***Italy*** (3 percent)
- ***Netherlands*** (50 percent)
- ***Norway*** (80 percent)
- ***Portugal*** (0 percent)
- ***Spain*** (0 percent)
- ***Switzerland*** (82 percent)
- ***United Kingdom*** (14 percent).
- For ***Poland*** where no data is available, we took the most conservative assumption that none of its soy is sustainably sourced.[3]

The above sustainable sourcing figures both for soy and palm oil have been derived through literature review and consultation with national experts.

3. This has also been verified through expert interviews.

Cocoa

Sustainable production of cocoa was estimated to be about 42 percent in 2018 under the UTZ, Rainforest Alliance, and FairTrade certification schemes.[4] However, there is no disaggregation by the source of demand.[5]

Coffee

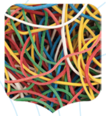
Sustainable production of coffee certified under a range of Voluntary Sustainability Standards (VSS) – including the UTZ, Fairtrade, Nestle AAA, and Starbucks CAFÉ schemes – constituted 55 percent of global production in 2017.[6] However, there is no disaggregation by the source of demand.[7]

Timber

Incomplete data by country; and only till 2015

Beef

No data



Rubber

No data

Given country-specific data is only available for soy and palm oil, this analysis only focuses on these two commodities. Furthermore, it is instructive to note that these sustainable sourcing shares are potentially an overestimate because it is based on a subset of the overall market (e.g. signatories of an NGO, or only for certain industries that could be representative of the market).

4. Antonie Fountain and Friedel Huetz-Adamas (2018), *Cocoa Barometer.* Available at: http://www.cocoabarometer.org/cocoa_barometer/Download_files/2018%20Cocoa%20Barometer%20180420.pdf
5. UTZ (2017). *UTZ Cocoa Statistics Report 2017.*
6. Sjoerd Panhuysen & Joost Pierrot (2018), *Coffee Barometer 2018.* Available at: https://www.hivos.org/assets/2018/06/Coffee-Barometer-2018.pdf
7. UTZ (2017). *UTZ Coffee Statistics Report 2017.*

Overview of approach

A four-step approach is used to understand the sustainability impacts of the six different scenarios (Exhibit A1).

EXHIBIT A1

MODELLING APPROACH FOR UNDERSTANDING DEFORESTATION (AND CO_2E) IMPACT INVOLVED 4 STEPS

	Step 1	Step 2	Step 3	Step 4
	Estimate net European imports	**Understand land requirements**	**Estimate deforestation and CO_2e impacts**	**Adjust for different scenarios**
Activities	○ Current net import (adjusted for re-exports) for the focus commodities in the 12 key European markets was taken from FAO database and IDH ○ They are then projected to 2025 and 2030 using historical growth rates	○ For simplicity, the trade flow composition (i.e. where each country imports from and volume as a percentage share of total imports) is held constant at the 2016 level ○ The land required to meet this level of demand was estimated based on current land required to produce a certain volume of production, adjusted for historical improvements in yield growth (e.g. soy produced per hectare) drawing on FAO data	○ This proportion of land required that could lead to deforestation was calculated based on the 2016 deforestation attributed to the production of the given crop / product (e.g., if deforestation attributed to the crop was 10,000 ha and the land under production was 100,000 ha, the proportion is 10%) ○ CO_2e impacts based on local data sources of emissions associated with deforestation	○ Understand these estimates for the different scenarios defined ○ The share of sustainably sourced production is assumed to result to an equal share of deforestation impacts (e.g. 20% more sustainable soy imports implies 20% less deforestation associated with the European demand)
End products	Domestic demand of the 12 European markets for soy and palm oil in 2025 and 2030	Land required (in hectares) to meet future European demand	Deforestation in millions of hectares; CO_2e	Deforestation and CO_2e impacts by scenario

Step 1: Estimate net European demand imports

Data from the Food and Agriculture Organization of the United Nations (FAO) and IDH was leveraged to calculate the net imports of demand for soy (includes soybean, soy meal and soy oil) and palm oil in the 12 European countries. As some countries are major re-exporters, it is important to properly account for imports that are meant for the domestic markets. This was done by stripping out exports that were produced locally, assuming that overall export to demand ratios apply to local production.

Table 1: Sources and approach for historical net imports

Area	Commodity	Source and approach
Net imports, adjusted for re-exports (in '000 tonnes)	Soy	• FAO Database[8] • IDH[9]
	Palm Oil	• FAO Database[10]

To estimate what the European demand for soy and palm oil in 2025 and 2030, historical data was used to provide weighted 5-year CAGRs which could be applied to the net import data of each of the 12 countries.[11]

8. Extracted from various FAO databases at: http://www.fao.org/faostat/en/#data
9. IDH and IUCN (2019), *European Soy Monitor*. Available at: https://www.idhsustainabletrade.com/uploaded/2019/04/European-Soy-Monitor.pdf
10. Extracted from various FAO databases at: http://www.fao.org/faostat/en/#data

Table 2: Sources and approach for demand projections

Area	Commodity	Source and approach
Projected growth rates of net imports (2018 – 2025 and 2018 – 2030)	Soy	• Weighted 5-year average growth rates used to project future demand • FAO Database using the growth rates of soybean as proxies
	Palm Oil	• Weighted 5-year average growth rates used to project future demand • FAO Database[12]

12. Extracted from various FAO databases at: http://www.fao.org/faostat/en/#data

Step 2: Understand land requirements

The objective of this step is to establish the amount of land (in hectares) required to support the aggregate volume of demand from the 12 European countries in each of those sourcing locations. Due to issues with disentangling re-exports (to understand the true source of production) and further data limitations to be explained in Step 3, the following assumptions must be made:

- First, the 12 European countries only source their soybean from Brazil and Argentina. This is a reasonable assumption because Brazil and Argentina together account for 87 percent of total exports from the 10 key producers to these European countries.

- Second, the 12 European countries only source their palm oil from Indonesia and Malaysia. This is a reasonable assumption because Indonesia and Malaysia together account for 93 percent of total exports from the 10 key producers to these European countries.

- Third, it is assumed the latest ratio of exports between the producers (Brazil and Argentina for soy, and Indonesia and Malaysia for palm oil) is constant for all 12 consuming European countries, and also constant for the projection period.

To estimate the land requirements in each location to meet this volume of production, we calculated the historical yield rates of the respective commodities by comparing a country's total production against its total area harvested. This allowed us to estimate the probable yields for each crop in each producer jurisdiction and we assumed that the historical improvement in yield growth continues (thus reducing the total land required to meet a certain volume of supply). Box 1 highlights an additional assumption regarding calculating the land requirements for producing soy meal and soy oil. For palm oil, the extraction rate for palm oil is assumed at 23%. This figure is chosen because it is widely used in a number of other reports by international organizations or initiative, such as USDA and TFA.[13]

13. See for example, USDA (2018) Indonesia Oilseeds and Products Annual 2018. Available at: https://apps.fas.usda.gov/newgain-api/api/report/downloadreportbyfilename?filename=Oilseeds%20and%20Products%20Annual_Jakarta_Indonesia_3-15-2018.pdf. For Malaysia, there are a range of numbers and all of them are below 0.23 (Star Online, MPOB, MPOB). For instance, the 2019 first 6-mth average was 0.20. Therefore, adjusting this will also reduce the yield and increase the deforestation savings figures.

Calculating land requirements for soy meal and soy oil

To determine the amount of land required to grow the soy products in the producer countries, we assume that each tonne of soy meal or soy oil requires the same amount of land as one tonne of soybean (termed as the 1-to-1 conversion approach). This will lead to an underestimation of deforestation as we need more than one tonne of soybean to produce one tonne of soy meal or soy oil (based on research on crushing ratios, one soybean only contains 78.5 percent of soymeal and 18.5 percent of soy oil). However, using the crushing ratio approach might lead to significant double-counting, which is more problematic.

To illustrate the extent of double-counting, we consider the following example:

- Belgium imported **625,441 tonnes** of unsustainable soy products in 2017 under the "Business-as-usual (BAU) to 2025" scenario
- Using the breakdown of soy products in 2017, soybean took up 16 percent at about **100,071 tonnes**; soymeal 77 percent at about **481,590 tonnes**, and soy oil 7 percent at **43,781 tonnes**
- If we take the 1-to-1 conversion approach, we will find the land requirements to plant **625,441 tonnes** of soybean
- If we take the crushing ratio approach, for soy meal, it will take **613,490 tonnes** of soybeans to produce **481,590 tonnes** of soy meal and for soy oil, it will take **236,654 tonnes** of soybeans to produce **43,781 tonnes** of soy oil. Total land requirement for soybean will then be equivalent to **950,215 tonnes** (about 1.5 times the 1-to-1 conversion approach)
- Therefore, due to the potential significant overlaps, we have decided to use the 1-to-1 conversion approach

Step 3: Estimate deforestation and CO_2e impacts

Historical annual deforestation data for soy and palm oil in each of the sourcing countries was extracted from a report by the USDA.[14] This report collected and standardized deforestation data from a variety of sources including government sources such as the Brazilian INPE PRODES project and other well-regarded research papers on the topic such as Henders et al (2015).[15] Such data is generally unavailable across all the sourcing locations – another reason for the assumption that soy and palm oil for the 12 European countries was only sourced from Argentina and Brazil, and Indonesia and Malaysia respectively. Furthermore, since there is no time series data, the latest estimates were assumed to hold constant for the projection period.

Table 3: Inputs and sources for historical deforestation data

Area	Country	Source and approach
Share of deforestation attributable to palm production	Indonesia	• USDA Economic Research Service • Henders et al • Gunarso et al[16]
	Malaysia	• USDA Economic Research Service • Henders et al
Share of deforestation attributable to soy production	Argentina	• USDA Economic Research Service • Henders et al
	Brazil	• USDA Economic Research Service • Henders et al

In order to estimate the 2025/2030 deforestation attributable to each commodity in each sourcing location, the 2025/2030 land use requirements are compared against the 2018 requirements, and the share of deforestation that is attributable to each commodity at the 2018 level is held constant.

To estimate the CO_2e associated with deforestation in each production location, we used time series data on emissions per hectare of tree cover loss from the Global Forest Watch. The data is available for Indonesia, Malaysia and Brazil. We assumed that Argentina's emissions profile is similar to Brazil given that recent deforestation in Brazil is mostly located in the Cerrado grassland.

The CO_2e emissions associated with the cumulative demand in the projection periods are then calculated by applying the average emissions per hectare of tree cover loss (2001 and 2017) across the projected years.[17]

Step 4: Adjust for different scenarios

Finally, the deforestation and CO_2e impacts were adjusted for the different sustainable sourcing scenarios. This was done in a proportional manner. For example, 20 percent more sustainable soy imports imply 20 percent less deforestation associated with the European demand.

14. USDA (2017), *International Trade and Deforestation*. Available at: https://www.ers.usda.gov/publications/pub-details/?pubid=83298
15. Henders et al (2015), *Trading Forests: Land-Use Change and Carbon Emissions Embodied in Production and Exports of Forest-Risk Commodities*. Available at: https://iopscience.iop.org/article/10.1088/1748-9326/10/12/125012/pdf
16. Gunarso et al (2013), Oil Palm and Land Use Change in Indonesia, Malaysia and Papua New Guinea. Available at: https://www.tropenbos.org/resources/publications/oil+palm+and+land+use+change+in+indonesia%2C+malaysia+and+papua+new+guinea
17. 100 metric megatonnes per million hectares in Indonesia, 108 metric megatonnes tonnes per million hectares in Malaysia, and 83 metric megatonnes tonnes per million hectares in Brazil.

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https://www.idhsustainabletrade.com/tacklingdeforestation