October 2018

Risky Business:

The risk of corruption and forest loss in France's imports of commodities

FINAL DRAFT

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Executive Summary

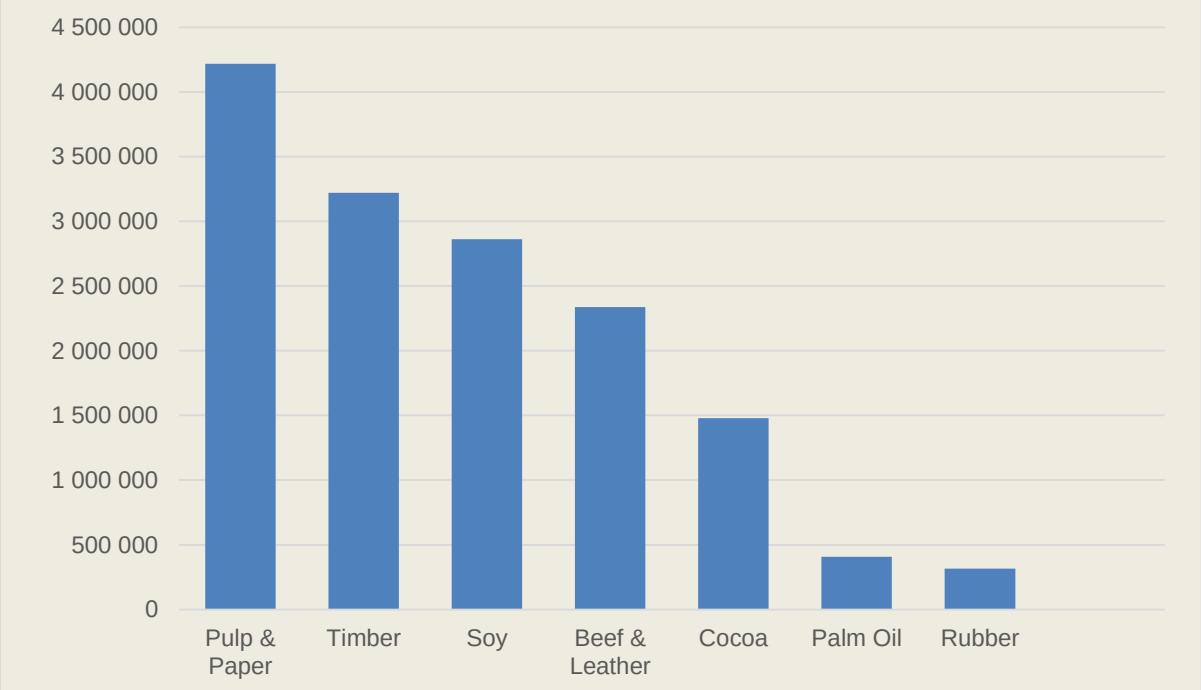
Between 1990 and 2015, the world lost 129 million hectares of forest. Deforestation, forest degradation and the conversion of natural habitats are, in the tropics at least, largely driven by commercial agriculture and forestry to produce cocoa, beef and leather, natural rubber, palm oil, pulp and paper, soy, timber and other commodities. The production of agricultural and forest commodities can also be associated with serious social issues and abuses, including appropriation of land from communities and indigenous groups, forced and child labour.

France imports significant quantities of all of the above commodities, and therefore puts people, forests and other natural habitats at risk. This study estimates the quantities of cocoa, beef and leather, natural rubber, palm oil, pulp and paper, soy, and timber that are imported, their provenance, and the land footprint associated with their production.

The research presented here estimates that the total land area that was required to supply France's demand for soy, palm oil, pulp & paper, timber, rubber and cocoa was on average over 14.9 million hectares each year between 2012-16. This is equivalent to a land area more than one quarter the size of Metropolitan France, one and three-quarters times larger than France's largest region, Nouvelle-Aquitaine, and 88% of the size of France's own forest area.

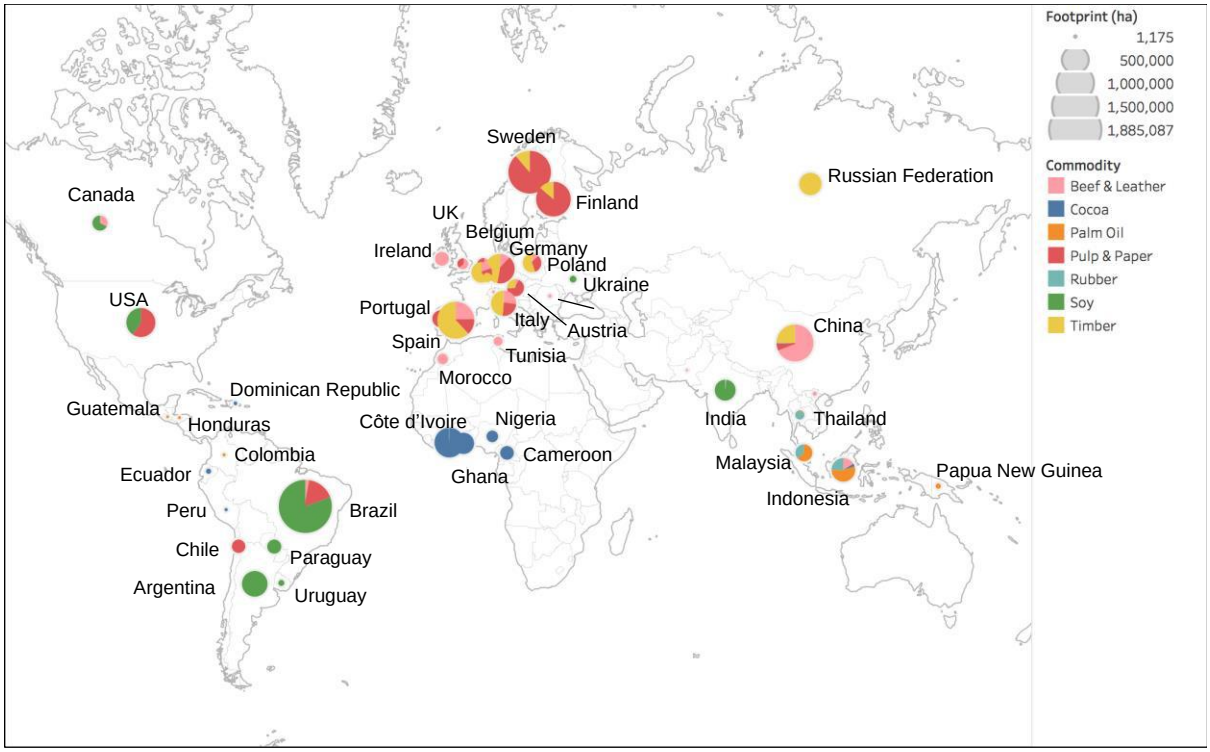
Pulp and paper had the highest footprint, followed by timber, reflecting the large quantities of these commodities that are imported by France. Soy also has a very significant footprint, a result of the large volumes imported, principally to supply France's livestock and poultry industries with feed (Figure A). The differences in footprints also reflect the differences in productivity between commodities.

Figure A: Land area required to supply France with commodities (hectares)



The largest footprint from countries supplying these commodities to France comes from Brazil at 1.9 million hectares, due to imports of soy, pulp and paper and leather (Figure B). Other significant footprints in tropical countries include Côte D'Ivoire (cocoa and natural rubber, 600,000 hectares), Indonesia (palm oil, cocoa, leather and natural rubber, 320,000 hectares) and Ghana (cocoa, 307,000 hectares). EU countries, especially Sweden, Finland, Spain and Germany also contribute significant land areas through their exports of timber, pulp and paper, beef and leather.

Figure B: Country footprints for all commodities (hectares)



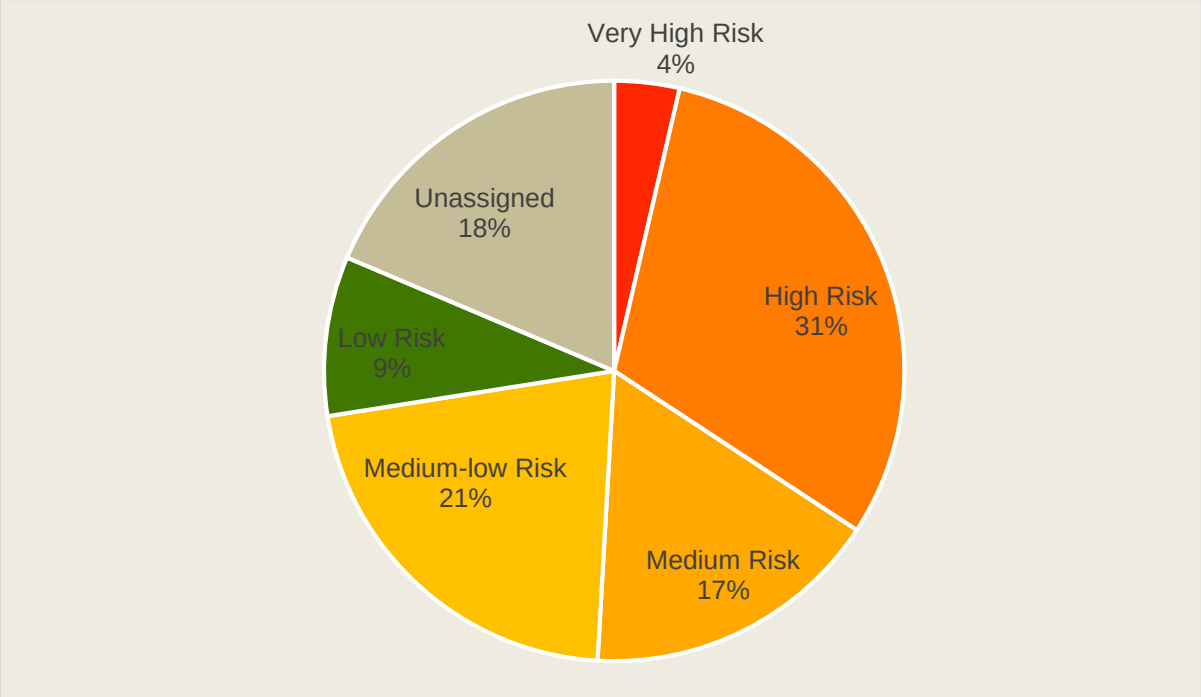
Commodity imports are rarely traceable back to individual farms or plantations, and so the exact contribution of France – via its imports – to deforestation, forest degradation, habitat conversion and social problems is unknown. It remains, however, a very real risk.

We estimate this risk by rating major exporting countries according to the rate and extent of deforestation, the perceived level of corruption, and the labour rights conditions within those countries. The land footprint of France's commodity imports was then allocated to these risk ratings. More than one third (35%) of the land area required to satisfy France's demand for these commodities, some five million hectares, was from countries rated high and very high risk (Figure C).

At least half of the land footprint of France's imports of palm oil (84%), soy (73%), cocoa (57%) and rubber (55%) was from countries rated as high risk or very high risk. Timber, pulp and paper, which are largely supplied from within the EU, have a much lower proportion of their footprints in high and very-high risk countries. However, even within these commodities, there are pockets sourced from high risk countries such as China, the Russian Federation and Brazil. Whilst beef imported largely from low and medium risk countries within the EU, leather is imported from a

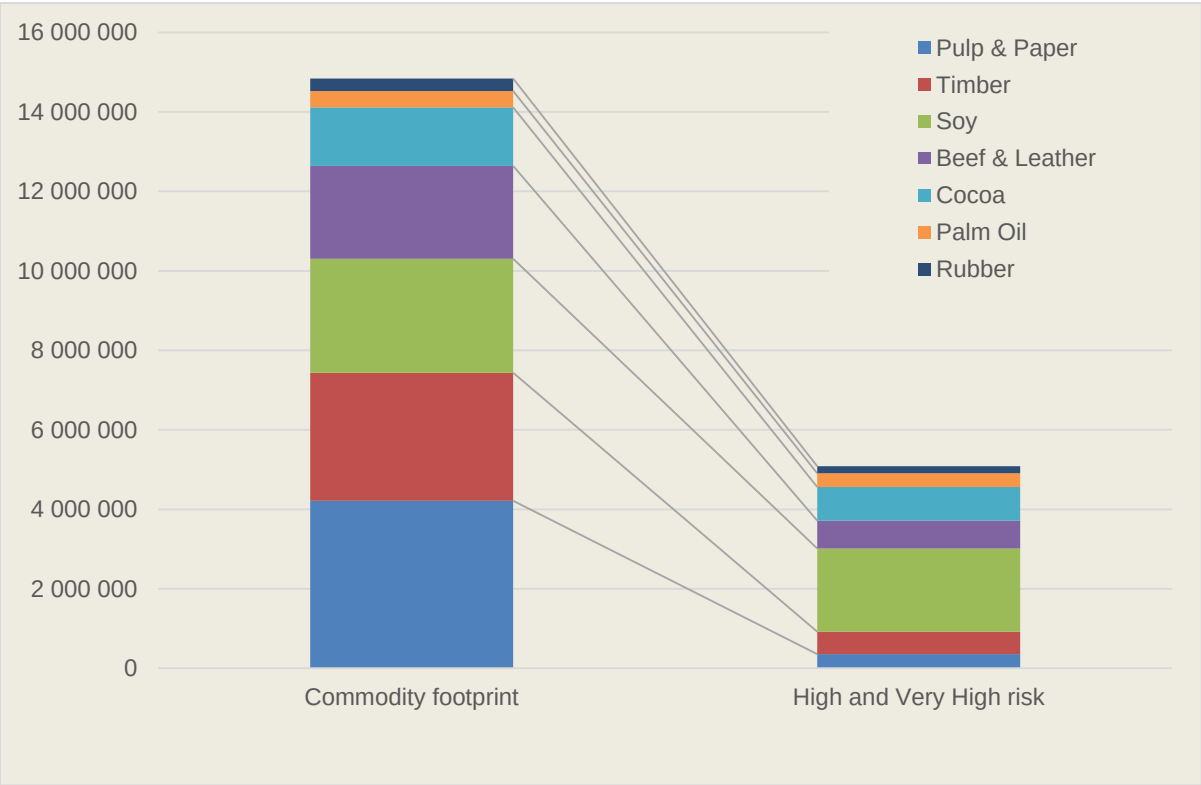
wide range of countries, including some rated as high risk, such as China, Brazil, Indonesia, Pakistan and Vietnam.

Figure C: Distribution of France's land footprint for imported commodities amongst risk categories



Soy contributes 20% (2.9 million hectares) to the overall footprint, but is responsible for 45% of the footprint from high and very high risk countries (Figure D). Cocoa also makes a disproportionate contribution to the high and very high risk footprint, being responsible for 10% of the overall footprint but 17% of the high and very high risk footprint.

Figure D: Contribution of commodities to France's high and very high risk footprint (hectares)



In all of these sectors, there are companies that produce commodities responsibly, and companies that show a high degree of diligence in excluding deforestation and social exploitation from their supply chains. The EU, the French Government, businesses, NGOs and the public have taken action to address some of these issues, through initiatives such as the EU Timber Regulation, The Amsterdam Declaration, purchase of sustainably certified timber, and the Consumer Goods Forum zero net deforestation commitments. Furthermore, the French government is developing a national strategy on imported deforestation, to be published during autumn 2018.

Yet the problems of deforestation, forest degradation, habitat conversion and social exploitation have not gone away, and there are opportunities for all stakeholders to act in order to break the link between France's imports of commodities and deforestation and social exploitation.

The research presented in this report is intended to underpin recommendations for policy-makers, businesses, investors, and consumers. These are being developed by WWF France and are available in a separate document.

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1 Introduction

1.1 Links between the commodity trade and deforestation

Forests are home to more than 80% of all terrestrial species, deliver ecosystem services such as flood protection, reduce atmospheric carbon dioxide levels, and provide a livelihood for forest-dependent communities, including the 60 million indigenous people who live in forests. Between 1990 and 2015, the world lost 129 million hectares of forest.

In December 2015, Denmark, France, Germany, the Netherlands and the UK signed the Amsterdam Declaration Towards Eliminating Deforestation from Agricultural Commodity Chains with European Countries.[1] Taking note of related initiatives and global agreements such as the New York Declaration on Forests, the Sustainable Development Goals, and the global climate agreement reached at UNFCCC COP 21 (the Paris Agreement), the Amsterdam Declaration aims to support private sector and public initiatives to halt deforestation from the production of agricultural commodities such as timber, palm oil, paper and pulp, soy, cocoa. natural rubber, beef and leather by no later than 2020. In signing the Amsterdam Declaration, the French Government signalled its intent to address the impact of France's forest footprint overseas.

These commodities have been cited as major drivers of deforestation[2] and habitat destruction in some of the most biodiverse and ecologically important places in the world.[3] Whilst the production and trade of commodities provides a livelihood for millions of people, they have also been associated with negative social outcomes, including land grabs, forced labour, and terms and conditions of employment that are below international norms. As one of the world's major economies, France is a significant user of commodities, and has a role to play in ensuring that the future production of these commodities no longer causes deforestation or social exploitation.

Box 1: Imported deforestation

The notion of imported deforestation (or 'embodied deforestation') refers to the deforestation associated with an imported produced, traded, or consumed product, good, commodity or service. The concept in now widely accepted, and has been enshrined within high level policy commitments such as the Amsterdam Declaration Towards Eliminating Deforestation from Agricultural Commodity Chains with European Countries,[4] and global agreements such as the New York Declaration on Forests, the Sustainable Development Goals, and the global climate agreement reached at UNFCCC COP 21 (the Paris Agreement).

Over the period 1990-2008, the EU27 imported from other regions nine million hectares of deforestation embodied in crop and livestock products. This is almost 36% of the total

[1] https://www.euandgvc.nl/documents/publications/2015/december/7/declarations
[2] We use the FAO's definition of deforestation: 'The conversion of forest to other land use or the permanent reduction of the tree canopy cover below the minimum 10 percent threshold.' FAO (2015). Global Forest Resource Assessment 2015: Terms and Definitions. Rome.
[3] Boucher, D., Elias, P., Lininger, K., May-Tobin, C., Roquemore, S. & Saxon, E. (2010). The root of the problem: what's driving tropical deforestation today? The Union of Concerned Scientists.
[4] https://www.euandgvc.nl/documents/publications/2015/december/7/declarations

deforestation that was embodied in crop and livestock products traded between regions during that period.[5]

1.2 About this report

The overarching purpose of the research presented here is to inform ongoing efforts to reduce the negative environmental and social impacts of France's imports of commodities. The specific research objectives for this report are:

- To assess the extent to which France's supply chains for timber, pulp and paper, palm oil, soy, cocoa, beef and leather and natural rubber are sustainable and deforestation-free. Other commodities that are associated with deforestation, habitat conversion and degradation of ecosystems, such as coffee, are not included in the current study.
- To generate a forest risk score that illustrates the risk of deforestation and social problems that France's imports of these commodities may create.

[5] European Union (2013). The impact of EU consumption on deforestation: Comprehensive analysis of the impact of EU consumption on deforestation. Technical Report 2013-063.

2 Methods

The general approach to data analysis is outlined in this section. The analysis is based on methods developed for a UK study that was commissioned by WWF UK and RSPB for the UK's imports of deforestation- and conversion-risk commodities.[6] The intent of that study was to develop a robust and transparent approach that could be replicated in other countries, as well as providing evidence to guide action.

2.1 Quantifying France's imports

The quantity (net weight) and value (in US$) of France's imports of each commodity were extracted from the UN COMTRADE database for the period 2012-16. The UN COMTRADE database is preferred to national data as it contains comparable data for all countries, which facilitates additional calculations for export countries and cross-checking of results. Unless otherwise stated, all trade data is derived from this database. The economic value of imported goods was converted from US$ to Euros, using historical annual conversion rates.[7]

We examined three routes by which commodities feature within France's supply chains:

- As **raw materials** (e.g., sawn timber);
- As a **component or ingredient** of imported manufactured goods (e.g., natural rubber in car tyres);
- **Embedded** within the production process of imported goods (e.g., soy used to feed imported chicken)

Many commodities are used in thousands of different products, and so the data captured was confined to those product categories that are cited in the literature as being major uses of the commodity (see Appendices 1, 4, 5, 6, 7 and 8 for a list of the product codes used). The estimates provided do not include all possible imports of each commodity, and are therefore conservative. However, we are confident that the HS codes used capture most of the imported volumes.

2.2 Estimating the provenance of the France's imports

Three general situations are found:

- **A country is a producer and exporter**. France's imports can be assigned the provenance of the exporting country without further analysis (e.g., Brazil's production of soy).
- **A country is an importer and exporter**. For example, the Netherlands imports palm oil and exports it, but does not produce it domestically. France's imports of palm oil from the Netherlands are assigned to the countries from which the Netherlands imports.
- **A country is a producer, importer and exporter**. For example, China produces, imports and exports large quantities of timber. In this situation, the origin of major exporter's imports were analysed, and added to its national production. Exports to France were then assigned in the same proportion as their relative contributions to

[6] WWF and RSPB (2017). Deforestation and Social Risks in the UK's Commodity Supply Chains. This report, and the summary report 'Risky Business', are available at https://www.wwf.org.uk/riskybusiness

[7] Historic exchange rates from Statista https://www.statista.com/statistics/412794/euro-to-u-s-dollar-annual-average-exchange-rate/

the total of the domestic production plus imports. Thus, if Country A produces one million tonnes domestically, and imports 0.5 million tonnes from Country B, two thirds of France's imports from Country A would be assigned to Country A, and one third to Country B.

To make this re-assignment feasible, we focused on estimating provenance for countries that are responsible for at least 2% on France's imports, by value.

2.3 Estimating the footprint of France's imports of commodities

Deforestation is measured by the area of land that has lost forest cover, and if we are to make meaningful assessments of the risk of deforestation caused by France's imports of commodities, we need to understand the land area required to produce France's imports.

Estimating the land area required to supply France's imports is essentially a two-step process. Firstly, the imported net weight of products needs to be converted into the quantity of harvested commodity that they contain. For raw materials (e.g., whole soy beans) no conversion is required. Where the commodity is a component of the imported goods, or embedded within it, a conversion factor is applied to the imported net weight. Details on conversion factors are given in the Appendices.

The second step is to estimate the land area required to produce the quantity of imported commodity. For most commodities, this is done by applying a yield to the estimated quantity of harvested commodity. FAO yield data,[8] specific to each commodity for each country and year, was used unless otherwise stated.

Finally, some commodities, notably palm oil and soy, are commonly imported in different fractions of the harvested crop. For example, soy is imported as whole soy beans, soy meal, and soy oil. In this case, imported goods are first assigned to the fraction of the commodity they contain, and then yield is assigned to that fraction in the same proportion that the fraction is derived from the harvested crop. For example, one tonne of whole soy beans yields 0.82 tonnes of meal and 0.18 tonnes of soy oil[9]. The area required to supply France's imports of whole soy beans (or products containing whole beans or that have whole beans embedded in the production process, once their weights have been converted to soy bean equivalent) is estimated by multiplying the quantity by the yield; the area for products using soy meal is estimated by multiplying the quantity by the yield * 0.82; and the area for products using soy oil is estimated by multiplying the quantity by the yield * 0.18.

The major exceptions to this method are timber, pulp and paper, and beef and leather, for which further details are given below.

2.3.1 Timber, pulp and paper

As trees are an intermittently harvested perennial crop, with hugely variable management systems, there is no straightforward measurement 'yield' that can be used to estimate the land required to produce a given amount of timber in the way that there is for agricultural crops. The approach taken was therefore to use the annual increment, which is the increase in the volume of timber in a forest per hectare per year,[10] and which in effect accounts for the area of forest needed to produce a given amount of timber in a year. For example, if the

[8] FAO STAT. The FAO calculate yield as the national production of the crop divided by area planted each year.
[9] U.S. Soybean Export Council conversion table, see: https://ussec.org/resources/conversion-table.
[10] Technically, the increment measure used was Net Annual Increment (NAI) which is defined as the average annual volume of gross increment over the given reference period less that of natural losses on all trees, measured to minimum diameters as defined for "growing stock". Source: FAO (2012). FRA 2015 Terms and Definitions. FAO, Rome.

increment were one cubic metre per hectare per year, it would take ten hectares to produce 10 cubic metres of timber in a year (equally, one hectare would produce the same amount in ten years).[11]

France's timber, pulp and paper imports were converted from tonnes of imports to raw material round wood equivalent (WRME). This conversion adjusts for wood content of manufactured products (e.g., plywood contains both wood and resin) and results in a volume metric that is broadly equivalent to the useable volume of a harvested tree. The conversion factors used were from the UK Forestry Commission (see Appendix 2),[12] and where no conversion factor is available, the closest available estimate was used (e.g., for the import category 'cartons and boxes of paper and paperboard' the conversion factor for 'other paper and paperboard' was applied). The area of forest required to produce this volume of WRME was estimated by dividing the WRME by the exporting country's Net Annual Increment (NAI, see Appendix 3).[13]

2.3.2 Beef and leather

Unlike crops, we found no publicly available data on cattle pasture productivity for a cross-section of countries (i.e. carcass weight per hectare of pasture). While individual studies exist for some countries, a variety of methods were used in these reports, and so using a mixture of different sources was not feasible. This seems like a significant gap in global agricultural data given the significant land use associated with cattle production. To fill this data gap we adopted method used by de Ruiter *et al.* (2017)[14] that allocates total country pasture to different grazing animals based on the relative feed conversion efficiencies and overall sector production.

Given that beef cattle have two products (meat and leather), we allocated a share of the land footprint to beef and leather co-products on the basis of their mass (the hide being 15% of the mass of a carcass,[15] it was allocated 15% of the land footprint). This was to avoid the potential double-counting of land where beef and leather where sourced from the same country.

There are limitations to this method (explored in detail in de Ruiter *et al., 2017)* – for example we assume similar feed conversion rates and pasture use in all countries.

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[11] Note that due to the large variation in NAI according to forest type and management system, the use of country level NAI could lead to significant over- or under-estimate of land footprint if France's imports from a particular country are highly specific (e.g., a particular species, or from a particular plantation. However, it does provide a reasonable first order estimate.

[12] Conversion to WRME underbark: Tools and Resources: Conversion Factors. UK Forestry Commission https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2016-introduction/sources/timber/conversion-factors/

[13] Net Annual Increment (NAI) data was obtained from FAO (2016) Global Forest Resource Assessment 2015: Desk Reference. Food And Agriculture Organization Of The United Nations, Rome. The FAO does not provide NAI for all of France's major exporters. NAI for Brazil was calculated as the average of estimates given in D. Alder, J.N.M Silva, JOP de Ca Carvalho, J. do C. Lopes, A.R. Ruschel (2012). The cohort-empirical modelling strategy and its application to forest management for Tapajós Forest, Pará, Brazilian Amazon. Bois et Forets Des Tropiques, 314; D. Valle, M. Schilze, E. Vidal, J. Grogan & M. Sales (2006). Identifying bias in stand-level growth and yield estimations: A case study in eastern Brazilian Amazonia. Forest Ecology and Management, Volume 236, Issues 2–3, pp 127–135 (both Amazon); and http://www.fao.org/3/a-ac121e.pdf (Brazilian pine plantations). For Luxembourg the average of Netherlands, France, Germany, Austria and Sweden was used. The average NAI of all major countries was applied to that portion of Belgium's imports that were from countries with less than 1% of imports by value ('Other and unassigned').

[14] de Ruiter, H., Macdiarmid, J.I., Matthews, R.B., Kastner, T., Lynd, L.R. and Smith, P. (2017) Total global agricultural land footprint associated with UK food supply 1986–2011. Global Environmental Change 43 (2017) 72–81

[15] Agriculture and Horticulture Development Board (2014). AHDB Beef Yield Guide. AHDB, Kenilworth, Warwickshire, UK. http://www.qsmbeefandlamb.co.uk/books/beef-yield-guide/files/assets/common/downloads/beef-yield-guide.pdf

However, given the lack of evidence in this area it was felt to be a reasonable approach to estimating sector-level grazing use for beef cattle.

This calculation showed significant variation between countries – including some countries that appear to be very extensive e.g. Namibia (>5000m^2/kg Carcass Weight Equivalent) and Australia (800m^2/kg Carcass Weight Equivalent). It is also worth noting that India appears to have very high pasture stocking rate, however we suspect this is because cattle often graze waste land, common land, urban areas and on waste by-products (e.g. rice husks). Hence a large cattle population are supported by a relatively small amount of grazing pasture.

2.4 Risk index

The land footprint of a commodity is an estimate of how much land is required to produce imports. However, the likelihood of these imports being associated with deforestation and social exploitation depends on the production systems in the countries in which they were produced. For example, production of a commodity in a country that has strong labour laws that are well implemented is less likely to be associated with labour problems than the same commodity produced in a country with poorly implemented and weaker regulations.

A risk-based approach is used to illustrate the potential association of France's imports of commodities with social problems and deforestation. A risk based approach is favoured because there are two over-arching challenges when assessing the environmental and social risks of the global trade in commodities:

- **Deforestation processes are varied**. In some instances, natural forest may be directly converted to plantations or farms. However, the process is often non-linear, and making attribution of conversion to a single commodity difficult. For example, deforestation may progress via degradation caused by logging, with farmers then using logging tracks to claim land and farm, consolidation of these settlements into larger landholdings with additional deforestation (e.g., for cattle ranching), and then further change into a 'final' commodity production (e.g., soybean production). Assigning deforestation to a specific commodity in such a chain of events is thus somewhat arbitrary.
- **Traceability**. It is rarely possible to know which forest or plantation a particular end-product comes from, and hence whether its production has occurred directly on recently deforested land or not. Although advanced modelling and remote sensing are beginning to provide greater insight, these approaches are not available in all producer countries or for most commodities.

2.4.1 Overview of method

We developed a risk index by assigning a risk rating to each exporting country according to indicators of deforestation and social risk. The inclusion of indictors for both deforestation and social exploitation reflects the focus and commitments of many actors (private sector and NGOs) to make supply chains free from deforestation and exploitation.

Four factors were used to indicate deforestation and social risk in producer countries:

- **Tree cover loss**. This provides an indication of the total extent of the deforestation problem in producer countries. The data used is the area of land with > 10% forest cover lost between 2012-16.[16] Using the low threshold of land with > 10% forest

[16] Global Forest Watch. http://data.globalforestwatch.org/

cover[17] means that this indicator takes into account loss of tree-savannah type vegetation, such as the Brazilian *Cerrado*, as well as high forest.

- **Rate of deforestation**. This is a measure of the proportion of change in net natural forest area (excluding plantations) in each producer country between 2010-15. Use of this second deforestation indicator helps to balance out the bias towards large countries of the first indicator, whereas countries that are losing a large proportion of their small remaining area of natural forest score highly on this indicator.[18]
- **Perception of corruption.** No single global data set is available that captures the range of social problems that have been associated with the production of commodities. These issues include land grabs, forced labour, child labour, and terms and conditions of labour below international norms. Transparency International's Corruption Perception Index is used as a proxy for the likelihood of the range of social and governance issues within an exporting country.[19]
- **Labour standards.** The International Trade Union Confederation (ITUC) documents violations of internationally recognised labour rights by governments and employers and uses these records to score countries, providing a measure of the likelihood of serious workers' rights violations, including forced labour, violence, and the denial of the right to free association.[20]

The value of each indicator in each country was scored on a three-point scale (high = 3 to low =1) according to the thresholds described in Table 1. These thresholds were selected according to the data range of producer countries that export to France to clearly distinguish between high and low impact. For example, Brazil lost 15 million hectares of forest with >10% tree cover between 2012-16 compared with the Netherland's 4,760 hectares. These countries score 'high' and 'low' respectively.

Table 1: Indicators and scoring used to indicate risk of deforestation and social issues with France's imports of commodities

Indicator	Description	Scoring		
		High risk	**Medium risk**	**Low risk**
Tree cover loss	Global Forest Watch assessment of the area of forest cover loss 2012-16	≥1M ha	500K to 1 M ha,	<500K ha
Deforestation rate	Percentage change in natural forest 2010-15 (FAO)	≤-1%	-1% to 0%	>0%
Labour Standards	ITUC Labour Standards score 2017 based on reported violations of labour rights published in 2017	≤5	3 to 4	≥2
Corruption Perception	Index of the perceived levels of public sector corruption published in 2017 (Transparency International)	≤36	37-72	>72

[17] Readers interested in interrogating patterns of tree cover loss can use Global Forest Watch's interactive mapping tool at http://data.globalforestwatch.org/
[18] FAO FLUDE data
[19] Transparency International (2017). Corruption Perceptions Index 2017. https://www.transparency.org/news/feature/corruption_perceptions_index_2017
[20] ITUC (2016). Global rights index: the world's worst countries for workers. International Trade Union Confederation, https://www.ituc-csi.org/IMG/pdf/survey_ra_2016_eng.pdf

An overall country risk rating was calculated by summing the scores for the individual indicators. This score was used to develop five risk categories, which are colour coded to aid visual inspection of the results (see Table 16).

France's import footprint is then apportioned to risk categories based on which partners they trade with, to illustrate the deforestation and social risks of the commodities that are the focus of this study.

2.5 Data challenges

There are significant challenges and constraints inherent in assessing commodity data and the link between production and deforestation. Our analysis focuses on capturing the majority of the trade in the selected commodities, not the whole, and makes conservative assumptions throughout. If anything, the results are likely to be underestimates.

Specific challenges within the constraints of this study are:

- **The diversity of products**. Many commodities have thousands of end uses. For example, the uses of timber, pulp and paper include construction, electricity generation, furniture, and stationery. The approach taken was to focus only on the major uses of each commodity.
- **Poor data on typical commodity use in products**. Commodities are combined with other components in many imported items. For example, natural rubber is combined with metal, chemicals, plastics (etc) in many vulcanised rubber products. The proportions vary depending on the specific product. The conversion factors used to estimate the commodity content of manufactured goods are therefore only first order approximations.
- **Complex/long supply chains**. There are often multiple stages of processing and manufacturing, and export can occur after any of these. This means that there is – at the level of individual items – little traceability on which country, let alone forest, a particular product has come from. The estimation of provenance (see above) is for some products no more than a first order estimate.
- **Need to cover multiple jurisdictions**. Sub-national patterns in production, export and deforestation are not detected in this analysis because of the need to cover multiple jurisdictions, which in turn means that the analysis of provenance is only practical at a national level. This could lead to overestimations of risk if, for example, deforestation is occurring in a different part of the country from that in which a commodity is produced. Equally, risk could be underestimated if a production of particular commodity was closely associated with deforestation.
- **Variability in productivity**. As described above, we have used national productivity (yield) assumptions. However it is conceivable that some of France's imports are sourced from a niche system with a productivity different from the country average.
- **The lack of readily available data on the France's imports of certified commodities**. Credible certification is one of the major ways of reducing the risk that an imported item has been associated with deforestation, poor social practices, or illegality. However, there is limited data available on the proportion of France's imports that are certified.

This report provides a useful guide on the overall need for action, relative levels of risk for commodities coming from different countries, and an indication of where the French government, businesses and civil society might target their efforts in order to have most

impact in reducing the deforestation risk of France’s overseas commodity footprint. There are uncertainties in the specific figures calculated using this methodology but the index approach allows for an interpretation of the figures that is intended to be simple, transparent, and adequate to drive action.

3 Timber products

3.1 Trade and uses of timber

3.1.1 Global uses and trade flows

There are two major production systems for timber: plantations and natural forest. The bulk of the world's forest is natural, with an estimated 3.7 billion hectares in 2015. Around 31% of the world's forests (almost 1.2 billion hectares) are designated as production forest, with a further 28% (over 1 billion hectares) designated as multiple use, i.e., serving multiple functions including timber production.[21] The area of planted forest has increased by over 105 million hectares since 1990, and now there is an estimated 291 million hectares of plantations, which vary in the intensity of production.

The key product types within the timber sector are sawnwood, plywood, particleboard, furniture, fuelwood and pulp and paper, collectively 'timber, pulp and paper'. Wood is extremely versatile and has a wide variety of end uses, including:

- **Fuel:** Globally, 49% of harvested wood is used for fuel[22], particularly in developing countries.
- **Construction:** Timber is widely used as a construction material in house frames, flooring (solid wood; laminate or parquet blocks), window frames, doors and doorframes, skirting, decking, garden buildings, telegraph poles, fencing, boat building, railway sleepers, etc.
- **Furniture:** Varying from softwood furniture (e.g. pine) and plywood/laminate flat pack furniture to luxury hardwood (e.g., mahogany, teak).
- **Various:** Musical instruments, tool handles, decorative items, packaging (e.g. pallets), etc.
- **Industrial processes**: Wood is used in electricity generation, principally in the form of wood pellets, in food processing (smoking), etc.

A total of € 350 billion of timber, pulp and paper were exported globally in 2016. Of this, timber products accounted for € 198 billion (56%), including raw timber, manufactured products such as plywood, and finished wooden articles (e.g., wooden furniture).

The Russian Federation has the largest share of world exports of timber by quantity, accounting for 12% of the tonnage in 2016 (Figure 1). However, by value, the Russian Federation ranked only eighth, with China (€ 36 billion, 18% of global trade), Canada (€ 14 billion, 7%), Germany (€ 14 billion, 7%), USA (€ 12 billion, 6%), and Poland (€ 10 billion, 5%) the top five ranked countries (Figure 2). The disparity between China's leading position in value and its lower proportion of the quantity of timber exports reflects the degree of value addition that China gains on timber products through manufacturing.

[21] FAO (2016) Global Forest Resource Assessment 2015: How are the world's forests changing? Food And Agriculture Organization Of The United Nations, Rome.
[22] FAO (2016) Global Forest Resource Assessment 2015: How are the world's forests changing? Food And Agriculture Organization Of The United Nations, Rome.

Figure 1: Quantity of global exports of timber products in 2016 (thousand tonnes)

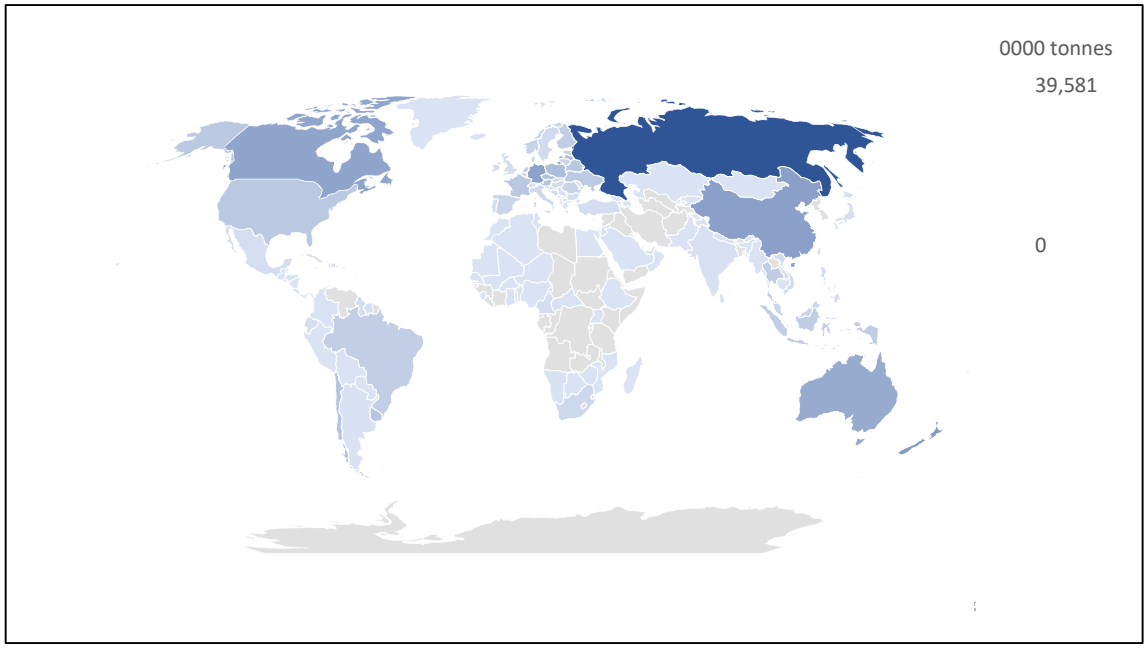
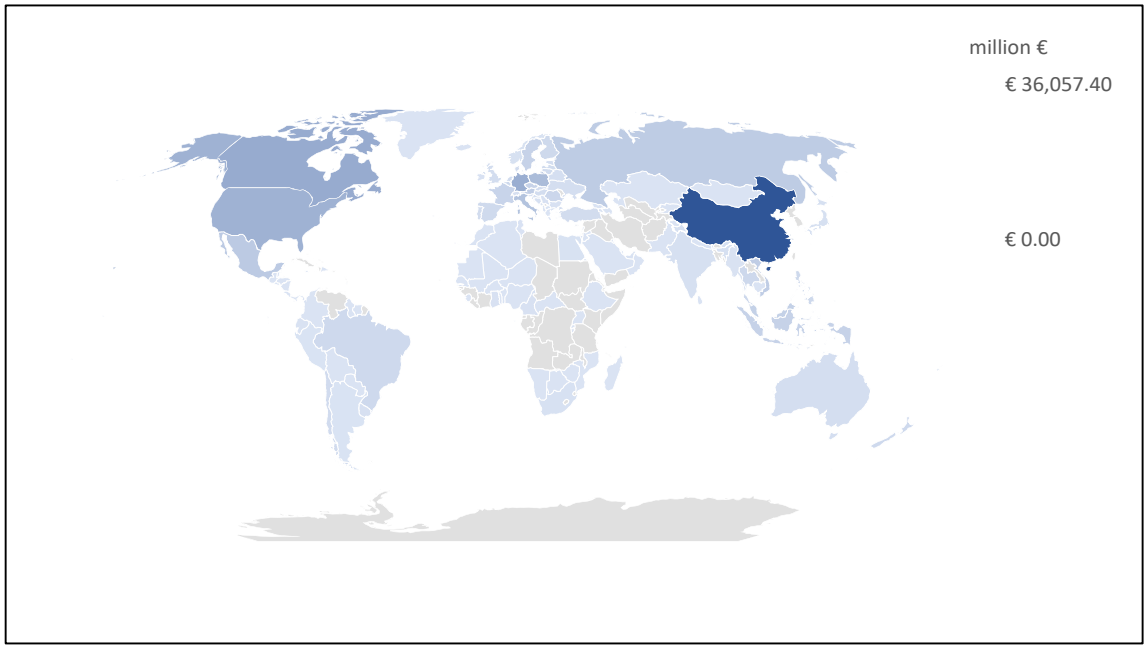


Figure 2: The value of global exports of timber products in 2016 (million €)



3.1.2 The EU and France

The EU is a major producer of timber, and is also one of the world's major importers of wood products, importing over € 29.7 billion of timber, pulp and paper in 2016.[23] An estimated 16-19% of this is from countries with a high risk of illegality,[24] and a proportion of these imports drive deforestation overseas.

[23] Source: UN COMTRADE https://comtrade.un.org/data/
[24] European Commission, *Assessment of the Impact of Potential Further Measures to Prevent the Importation or Placing on the Market of Illegally Harvested Timber or Products Derived from Such Timber* (Helsinki: European Commission – DG Environment, Indufor, European Forest Institute, Nepcon, Markku Kiikeri Ky, 2008).

France's domestic production of timber was 51.2 million m^3 in 2016 (for all uses, including pulpwood).[25] Domestic production satisfies a significant proportion of France's consumption, and France is also a major exporter of timber products, especially to countries within the EU, such as Belgium.[26]

With its roles as both a major trader and a significant consumer of timber, France has a part to play in ensuring that the future production of these commodities no longer causes degradation of forest ecosystems, deforestation or social exploitation.

France has the eleventh highest number of FSC Chain of Custody certificate holders of any country, standing at 743 in 2017,[27] however, the market share of FSC timber remains small.

3.1.3 France's policy responses to illegal and unsustainable timber

Illegality within the international trade in timber, pulp and paper trade has received significant attention within the EU. The EU's Forest Law Enforcement, Governance and Trade (FLEGT) Action Plan was established in 2003. The Action Plan sets out a range of measures available to the EU and its member states to tackle illegal logging in the world's forests. The measures include supporting timber-producing countries, promoting trade in legal timber, promoting environmentally and socially beneficial public procurement policies, supporting private-sector initiatives, financing and investment safeguards, using existing or new legislation (the EUTR), and addressing the problem of conflict timber. A key aspect of the Action Plan is the creation of Voluntary Partnership Agreements (VPAs) between the EU and timber-producing countries. A VPA aims to improve forest governance and, ultimately, provide a guarantee that timber and timber products exported to the EU are legal. Cameroon, Central African Republic, Ghana, Indonesia, Liberia and Republic of Congo are currently listed as implementing VPAs with the EU.[28]

The EU Timber Regulation (EUTR) came into effect in all countries in the EU on 3 March 2013. The Regulation prohibits the placing of illegally harvested timber (i.e., violating the laws of the country of harvest) on the European market, and covers both imported and domestically produced timber and timber products. The scope of the regulation includes solid wood products, flooring, plywood, pulp and paper (the complete list is given in the Annex of EUTR[29]), but does not include all wood products. For example, those products that have completed their lifecycle, and would otherwise be disposed of as waste are excluded, as are some specific import categories, such as upholstered seats and kitchenware. Timber or timber products that carry a valid FLEGT licence or Convention on Illegal Trade in Endangered Species (CITES) permit are automatically considered to comply with the requirements of the Regulation. VPA and CITES are the only licenses that are recognised in this way by the EUTR; e.g. certified timber cannot be used on its own as evidence of compliance.

Under the EUTR, EU Member States are obliged to determine penalties for non-compliance with the EUTR, establish authorities that will be able to check for compliance of the design and implementation of an operator's (the actor placing wood products on the EU market) Due Diligence System (DDS), recognize a monitoring organisation (in France, this is Le

[25] Source: FAOSTAT. http://www.fao.org/faostat/en/#data/FO
[26] Jennings S. & Wedeaux, B. (2018). The risk of corruption and forest loss in Belgium's timber and paper imports. WWF Belgium.
[27] FSC (2017). Market Info Pack 2016-17. FSC, Bonn, Germany
[28] http://www.flegtlicence.org/vpa-countries
[29] http://ec.europa.eu/environment/forests/timber_regulation.htm

Commerce du Bois, a French timber traders' association), check for their compliance with the EUTR, and provide assistance to operators in implementing the EUTR.

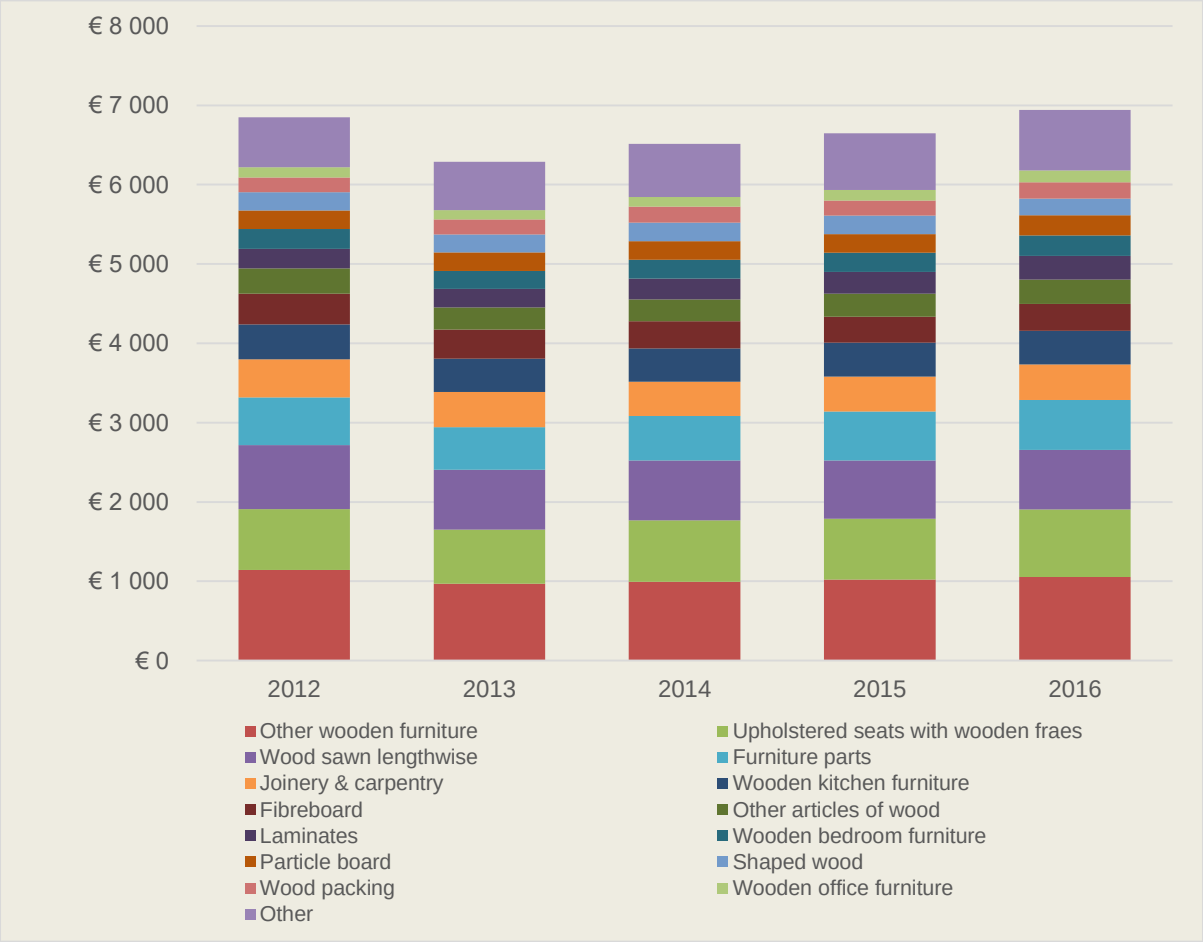
Legality is, of course, no guarantee of sustainable production. France is a signatory to the Amsterdam Declaration, which is a non-legally binding political commitment that aims to support the implementation of sector commitments to achieve zero net deforestation in supply chains.

3.2 France's imports of wood products

France imported an average of € 6.65 billion of timber products each year between 2012-16. The most important categories of timber products by value were 'Other wooden furniture', which accounted for 15.6% of the value of all timber product imports, upholstered wooden seats buildings (11.5%) and wood sawn lengthwise (11.5%,

Figure ***3***).

Figure 3: The value of France's imports of timber and timber product from 2012-16 (million Euro)



The majority of the timber products assessed are within the scope of EUTR, and hence traders have formal requirements to ensure that the timber is legal. However, a significant proportion (16%, averaging over €1 billion per year) is outside the scope of EUTR (

Table *2*). The main imported items outside the scope of the regulation are upholstered wooden seats (with an average €768 million in value of imports per year), wooden seats not

upholstered (€93 million per year) and wooden marquetry and inlay (€58 million per year). See Appendix 1 for details of the HS codes used.

Table 2: The value of France's timber that is within and outside the scope of EUTR (€ million)

Value (€ million)	Year						
	2012	2013	2014	2015	2016	Average	%
In scope	€ 5,805	€ 5,352	€ 5,474	€ 5,586	€ 5,784	€ 5,600	**84%**
Out of scope	€ 1,043	€ 936	€ 1,041	€ 1,061	€ 1,160	€ 1,048	**16%**

An average of 7.3 million tonnes of timber products were imported each year between 2012-16. Fuel wood showed a large increase, especially in 2016, with 1.3 million tonnes imported, compared with 0.83 million tonnes in 2012 (Table 3).

France's imports of timber were converted from tonnes into wood raw material equivalent (WRME), which indicates the volume of wood (in m^3) needed to produce one unit of a final product.[30] The WRME required to supply France's imports averaged over 14.7 million cubic meters of wood per year between 2012-16. This is equivalent to approximately one third of France's own production of timber (for all uses, including pulp and paper), which is approximately 55 million cubic metres per year.[31] Over the whole period, the largest share of volume is in wood sawn lengthwise (18%), fibreboard (9%), and fuel wood (8%, Figure 4).

Figure 4: Imports of timber by volume, adjusted for wood content (WRME, m^3). Average of 2012-16.

[30] Conversion factors to Wood Raw Material Equivalent underbark were obtained from the UK Forestry Commission https://www.forestry.gov.uk/website/forstats2009.nsf/0/8b4784e90b2a535480257361005015c6

[31] FAO (2016) Global Forest Resource Assessment 2015: Desk Reference. Food And Agriculture Organization Of The United Nations, Rome.

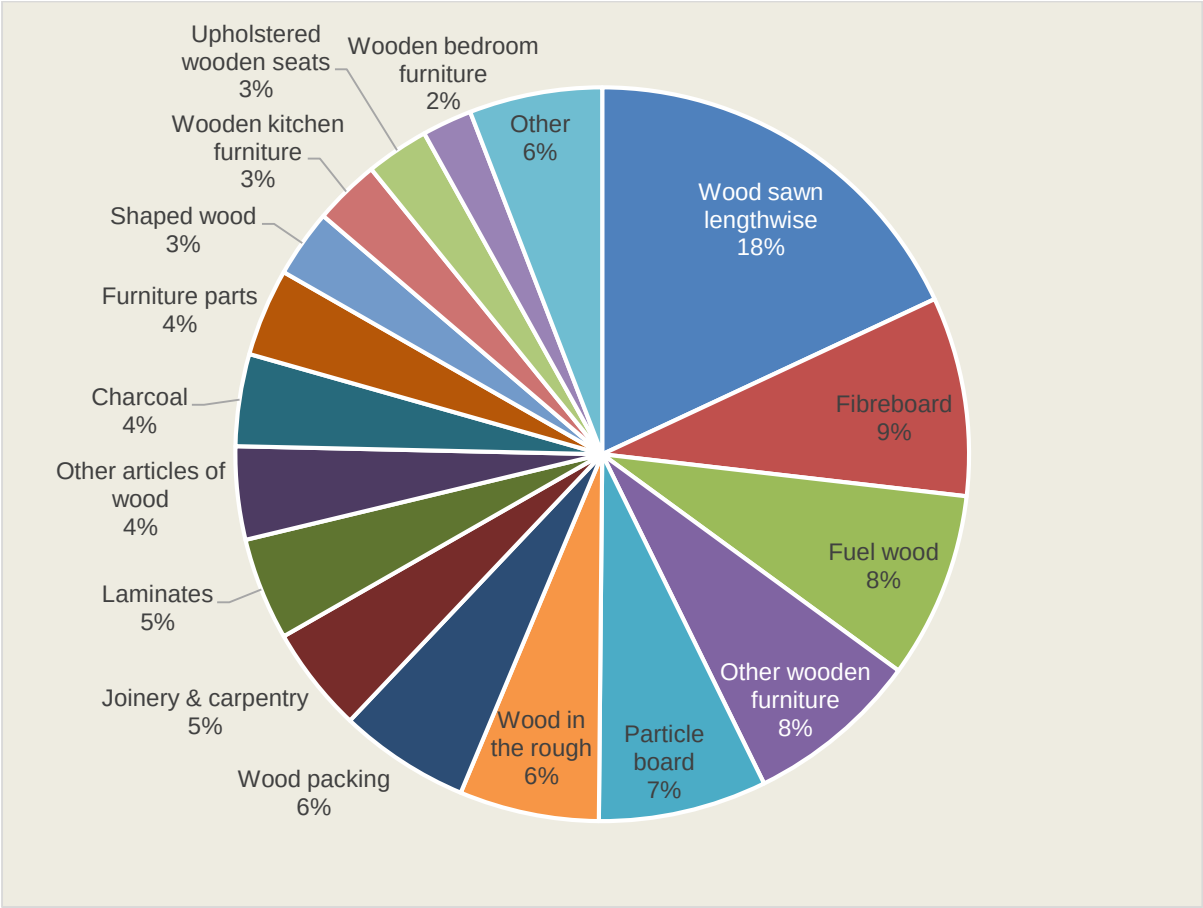

Wood sawn lengthwise 18%
Fibreboard 9%
Fuel wood 8%
Other wooden furniture 8%
Particle board 7%
Wood in the rough 6%
Wood packing 6%
Joinery & carpentry 5%
Laminates 5%
Other articles of wood 4%
Charcoal 4%
Furniture parts 4%
Shaped wood 3%
Wooden kitchen furniture 3%
Upholstered wooden seats 3%
Wooden bedroom furniture 2%
Other 6%

Table 3: Quantity of France's timber imports by for major product categories, 2012-16 (tonnes)

Product	Product name	Year					Average	%
		2012	2013	2014	2015	2016		
4407	Wood sawn lengthwise	1,604,435	1,469,987	1,428,818	1,399,311	1,480,247	**1,476,560**	**20.2%**
4401	Fuel wood	829,224	810,140	1,035,149	1,020,218	1,340,585	**1,007,063**	**13.8%**
4403	Wood in the rough	917,836	840,805	986,745	890,673	894,239	**906,060**	**12.4%**
4411	Fibreboard	527,972	513,316	517,164	515,611	510,183	**516,849**	**7.1%**
940360	Other wooden furniture	521,318	429,011	439,758	424,815	448,309	**452,642**	**6.2%**
4410	Particle board	481,049	460,689	396,244	400,074	446,118	**436,835**	**6.0%**
4415	Wood packing	404,192	405,148	441,940	409,197	461,813	**424,458**	**5.8%**
4418	Joinery & carpentry	292,985	266,175	265,554	265,161	283,755	**274,726**	**3.8%**
4412	Laminates	245,272	240,278	262,978	272,715	307,823	**265,813**	**3.6%**
4421	Other articles of wood	258,163	234,454	236,149	232,391	245,828	**241,397**	**3.3%**
940390	Furniture parts	244,253	212,393	212,710	225,955	241,707	**227,404**	**3.1%**
4409	Shaped wood	169,062	172,758	193,272	177,331	167,166	**175,918**	**2.4%**
940340	Wooden kitchen furniture	182,187	173,725	165,900	167,026	167,846	**171,337**	**2.3%**
940161	Upholstered wooden seats	157,209	144,809	171,612	159,677	184,011	**163,464**	**2.2%**
Other	Other	536,526	544,808	590,213	594,119	582,062	**569,545**	**7.8%**
Total		**7,371,684**	**6,918,496**	**7,344,206**	**7,154,276**	**7,761,691**	**7,310,071**	**100%**

3.3 Provenance of France' imports of wood products

Between 2012 and 2016, France imported timber from a total of 205 territories. The EU dominates France's imports, with Switzerland, China and the Russian Federation the only non-EU member states that contribute 2% or more of total imports by volume (converted to WRME, Figure 5). The top three exporting countries are Germany (an average of 2.96 million m^3 WRME each year, which accounts for 20% of the total), Belgium (2.17 million m^3 per year, 15%) and Spain 1.21 million m^3 per year, 8%). However, all of the countries from which France imports both produce timber domestically and import timber from other countries. This means that some of the wood in timber products imported by France may originate in third-party countries. With provenance adjusted to account for these indirect imports (see Section 2.2), Germany maintains its leading role as an exporter to France (20.8% of the total), whereas the share of imports from countries that themselves import large quantities of timber relative to their domestic production, such as Belgium (8.5%), declines (Figure 6).

Figure 5: The quantity of France's imports of timber products between 2012-16 from major exporting countries (WRME, m^3)

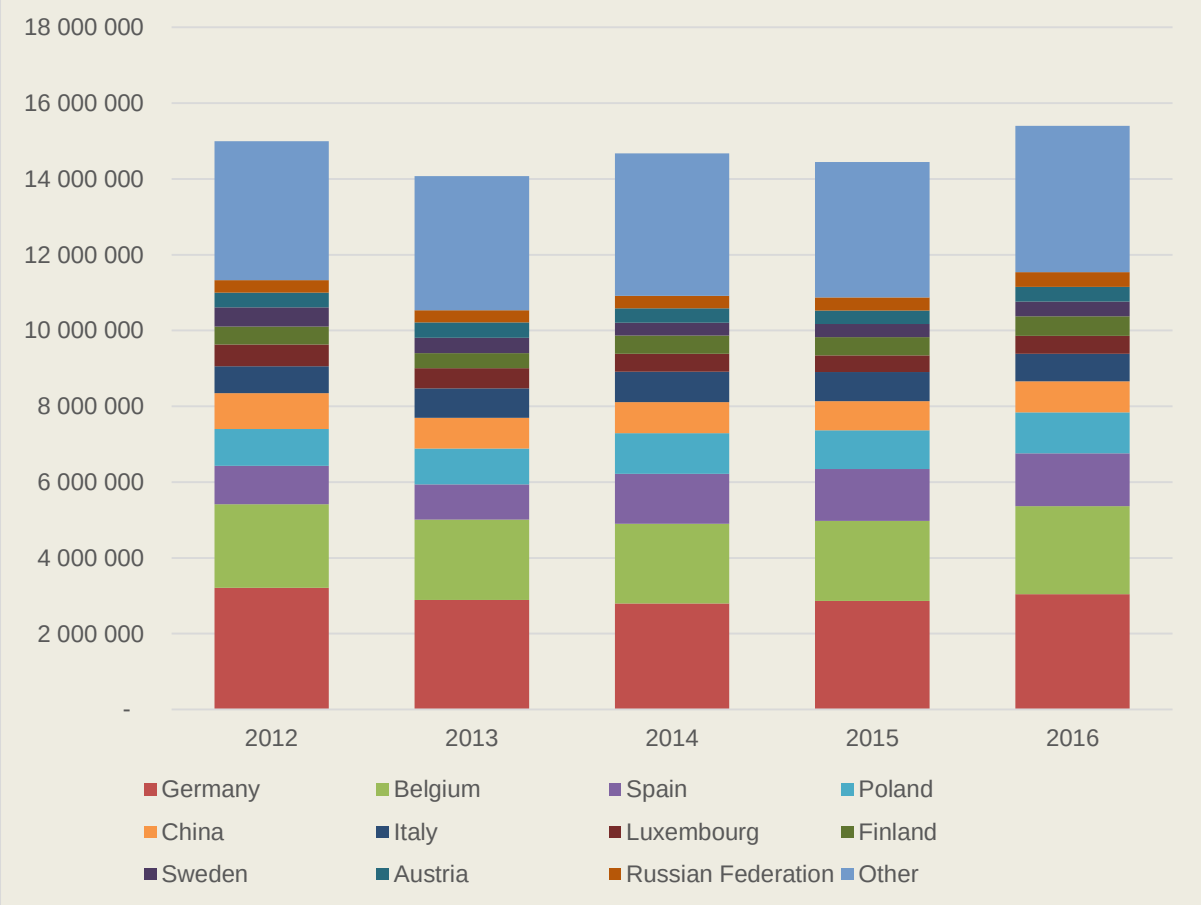
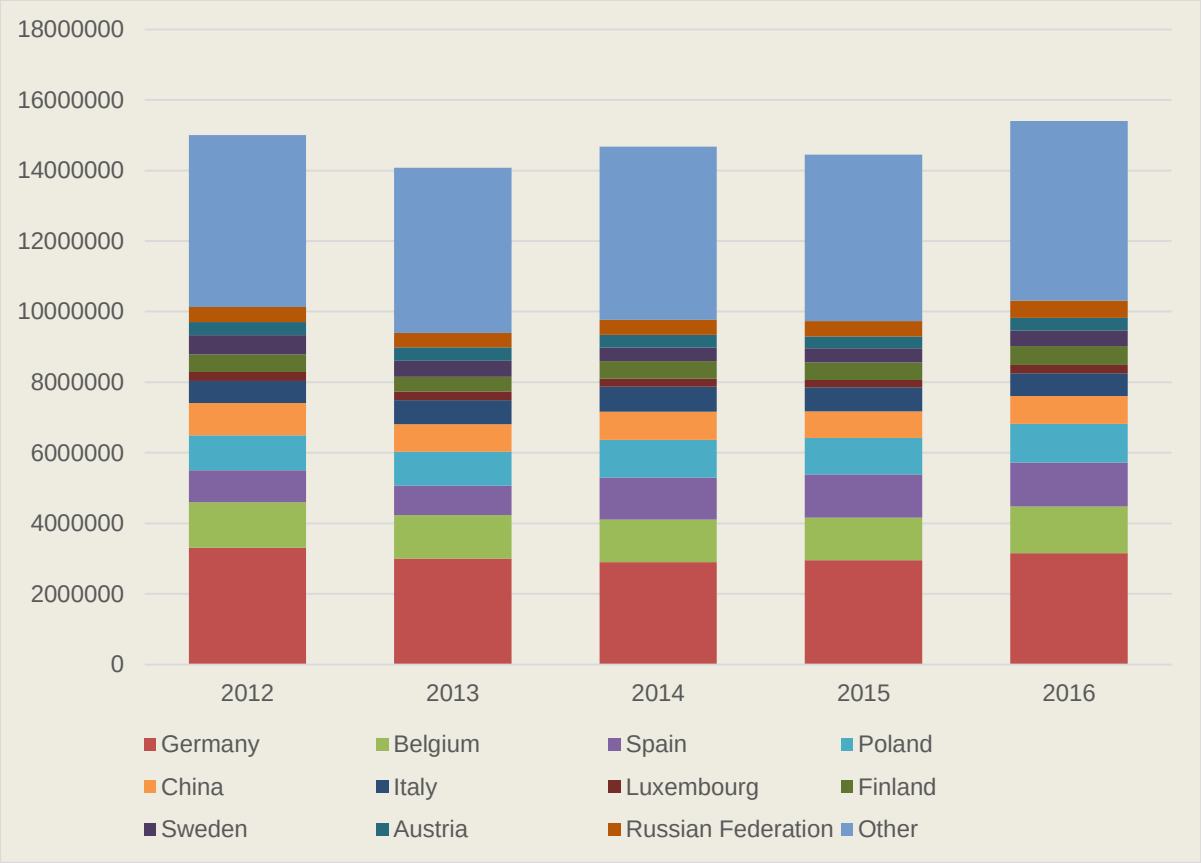


Figure 6: The quantity of France's imports of timber products between 2012-16 adjusted for provenance of third-party trade (WRME, m³)



France is a major consumer of tropical timber, with an estimated consumption of 822,000 m^3 round wood equivalent in 2016. This was by far the largest imports of tropical timber from any EU country, equivalent to 22.7% of the EU's consumption of tropical timber in that year.[32] In terms of specific product groups, France consumed more tropical roundwood and tropical veneer than any other EU country.

China, Brazil and Gabon amongst tropical and sub-tropical countries contribute more than one percent to France's total imports of timber (

Table *4*), and imports from these countries, as well as others such as Indonesia and Nigeria, all contain significant risk of being associated with deforestation, habitat degradation and social issues.

[32] Mark van Benthem, Jasprina Kremers, Jan Oldenburger, Nienke Stam, Nienke Sleurink (2018). How sustainable ARE Europe's tropical timber imports? Estimating the market share of verified sustainable tropical timber on the European market. IDH.

Table 4: The top ten tropical and sub-tropical exporters of timber products to France 2012-16

Country	Country rank	Average annual imports (RWME, m^3)	% of all imports
China	5	834,827	5.7%
Brazil	14	242,786	1.6%
Gabon	19	191,259	1.3%
Indonesia	21	128,058	0.9%
Nigeria	24	96,028	0.7%
Viet Nam	25	94,606	0.6%
Malaysia	26	82,674	0.6%
Cameroon	28	70,895	0.5%
Congo	32	56,204	0.4%
India	41	26,102	0.2%

3.4 France's timber footprint

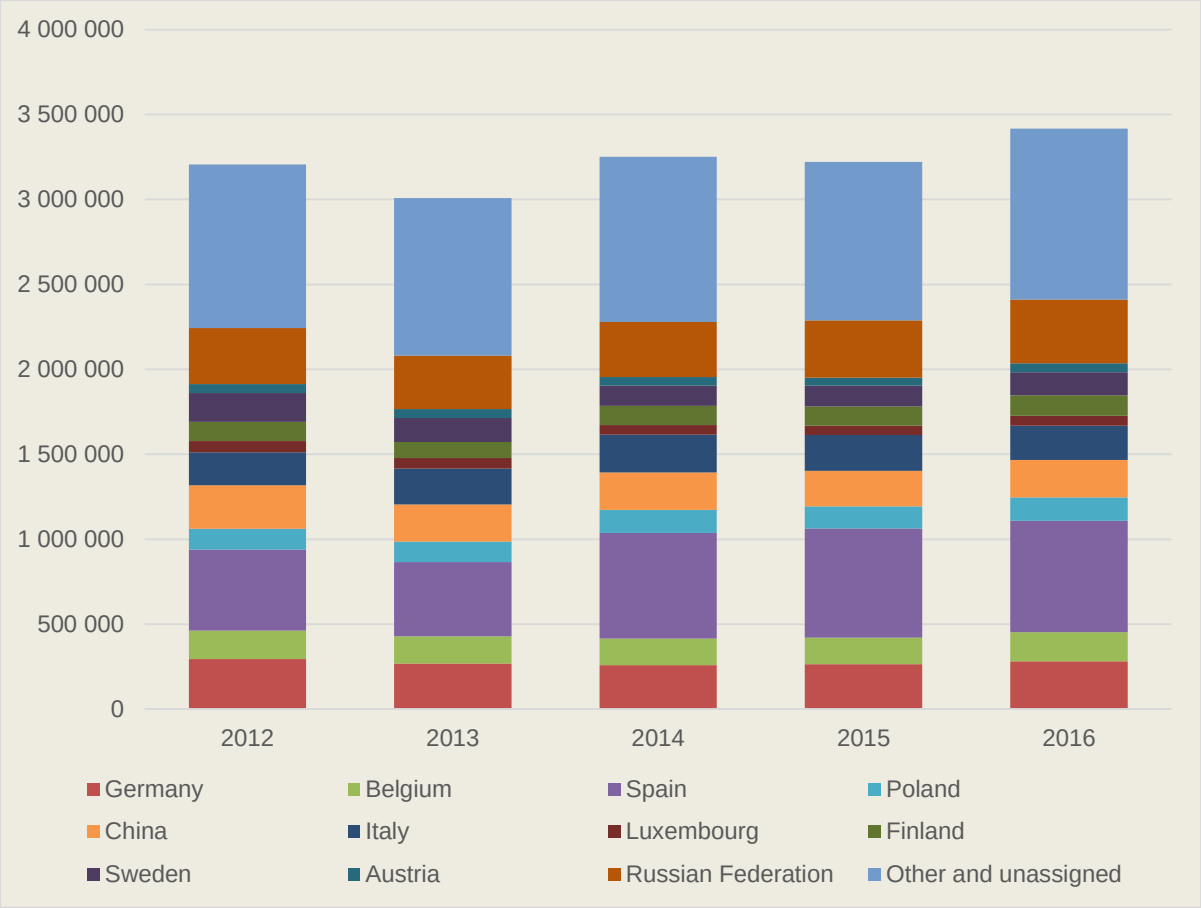
The total WRME volume of imports from each country (adjusted for provenance, as above) was divided by the Net Annual Increment (NAI, Appendix 3)[33] to produce an estimate of the area of forest required in each country to supply France's imports each year.

France's imports of timber products required an average of 3.2 million hectares per year between 2012-16. This is equivalent to nearly one fifth (19%) of France's own forest area of 16,989,000 hectares[34]. The largest footprints from France's imports fall in Spain (570,000 hectares, or 18% of total imported footprint), the Russian Federation (340,000 hectares, 10%), and Germany (270,000 hectares, 8%, see Figure 7). France's footprint of imported timber products remained between 3 and 3.2 million hectares between 2012-15, before rising to over 3.4 million hectares in 2016. As described in Table 1, above, this is a result of increased imports fuel wood in particular, with some other categories such as laminates and upholstered wooden seats also increasing. The increased footprint was spread across most of the major exporting countries.

[33] Net Annual Increment (NAI) data was obtained from FAO (2016) Global Forest Resource Assessment 2015: Desk Reference. Food And Agriculture Organization Of The United Nations, Rome. The FAO does not provide NAI for Luxembourg, for which an average of Eu countries was used, and the NAI for the 'Other and Unassigned category was the average of all other NAIs.

[34] France's forest area data is from FAO STAT. Last accessed July 2018.

Figure 7: Estimated land footprint of France's imports of timber products 2012-2016 (hectares)



4 Pulp and paper

4.1 Trade and uses of timber

4.1.1 Global uses and trade flows

Paper and paperboard are used in magazines, books, stationery, office paper, boxes, packaging, tissues, and labels. It can be coated with a wide variety of materials for specific uses such as printing photographs, pressure sensitive papers, or heat sensitive papers.

Pulp and paper are made predominantly from cellulose fibres present in trees in developed countries, with agricultural residues more widely used in some developing nations. Globally, there has been a shift in recent decades away from using hardwood pulp sourced from natural forests towards 'fastwood' plantations, especially eucalyptus and acacia. The cellulose fibres are derived directly from pulp grade logs, from wood chips and wood reclaimed from other manufacturing processes (e.g. furniture making), and from recycled paper.

The creation of pulpwood plantations has sometimes been at the expense of natural forest, or other natural habitats.[35] This can have a significant impact on biodiversity, and for this reason the main certification schemes, FSC and PEFC, essentially exclude plantations that have replaced natural forest on areas converted from natural forest after November 1994 and 2010 respectively.[36,37]

Over the past decade the largest increase in demand for forest products has been in pulp and paper. Current demand in Asia is so high that even though production within the region is growing, it is still a net importer.[38] There has also been a steep rise in the use of recovered and recycled paper in recent decades. However, it is important to note that paper is not infinitely recyclable, and fibre from tree species with specific technical characteristics is required for some specific types of product.

The value of pulp and paper products traded globally in 2016 was € 153 billion (44% of the value of all exported timber, pulp and paper products). The USA is the top-ranked country in terms of both quantity (Figure 8) and value (Figure 9) of pulp and paper products exported, accounting for € 16.6 billion in 2016 (11% of global pulp and paper exports). Germany (€ 16.1 billion, 11%), China (€ 13.6 billion, 9%), Canada (€ 10.7 billion, 7%) and Sweden (€$ 8.9 billion, 6%) make up the rest of top five exporters of pulp and paper products.

France produced an average of 8.3 million cubic metres of pulpwood between 2012-16.[39] According to the Association of French Paper Industries (COPACEL), approximately 40% of the paper and board consumed in France in 2015 was imported.[40]

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[35] For example: Deforestation in Riau's Forests: NASA Land-Cover and Land-Use Change (LCLUC) Program: Two Global Pulp and Paper Companies will Decide Their Fate. http://lcluc.umd.edu/hotspot/deforestation-riaus-forests-two-global-pulp-and-paper-companies-will-decide-their-fate-0 Last accessed 18 August 2018.
De-Li Zhai, Charles H. Cannon, J.W. Ferry Slika, Cui-Ping Zhang, Zhi-Cong Dai (2012). Rubber and pulp plantations represent a double threat to Hainan's natural tropical forests. Journal of Environmental Management, Volume 96, Issue 1, 15 April 2012, Pages 64-73

[36] Forest Stewardship Council (2015). FSC International Standard: Principles And Criteria For Forest Stewardship FSC-Std-01-001 V5-2 En.

[37] PEFC International Standard (2010). Requirements For Certification Schemes. PEFC ST 1003:2010.

[38] Aulisi, A., A. Sauer, and F. Wellington. 2008. Trees in the greenhouse: Why climate change is transforming the forest products business. Washington, DC: World Resources Institute

[39] Source: FAOSTAT http://www.fao.org/faostat/en/#data/FO. Last accessed 02 August 2018

[40] Source: http://www.copacel.fr/en/lindustrie-papetiere/chiffres-cles.html

Figure 8: Quantity of global exports of pulp and paper products in 2016 (thousand tonnes)

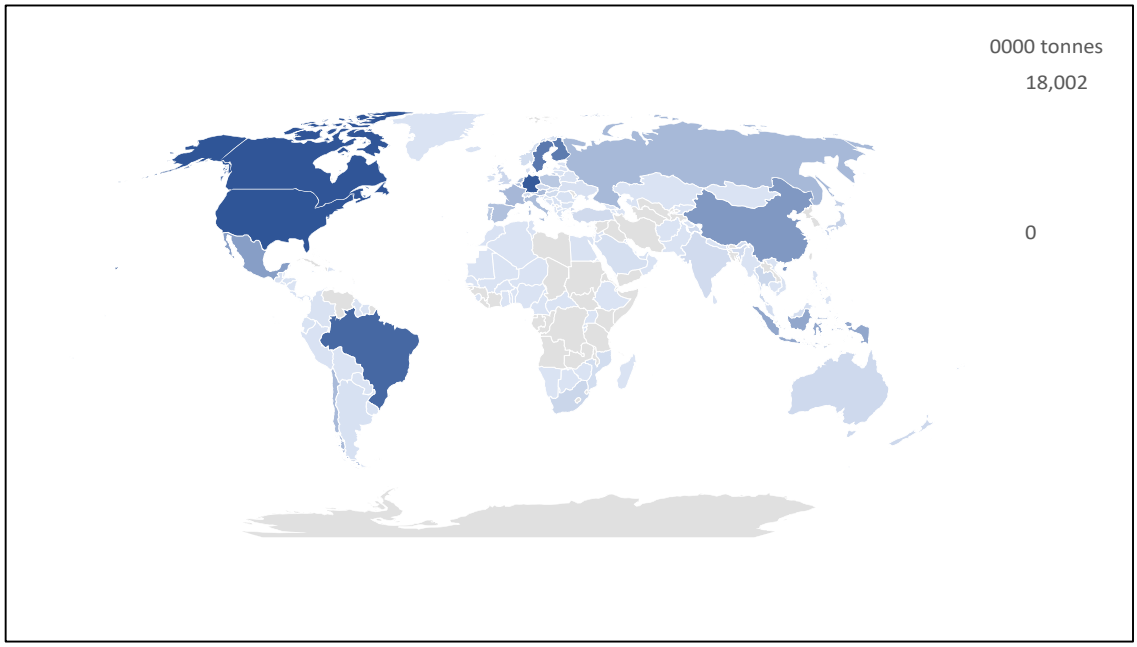
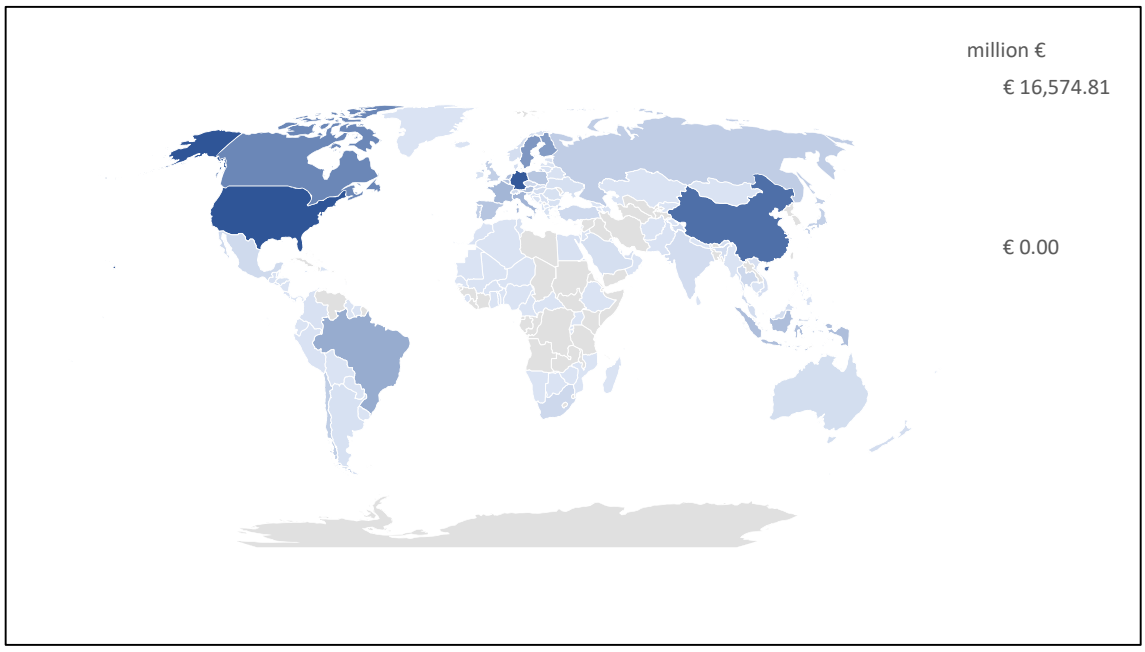


Figure 9: Value of global exports of pulp and paper products in 2016 (million €)



As with timber products, most but not all pulp and paper products are covered by the EUTR (see Section 3.1.2).

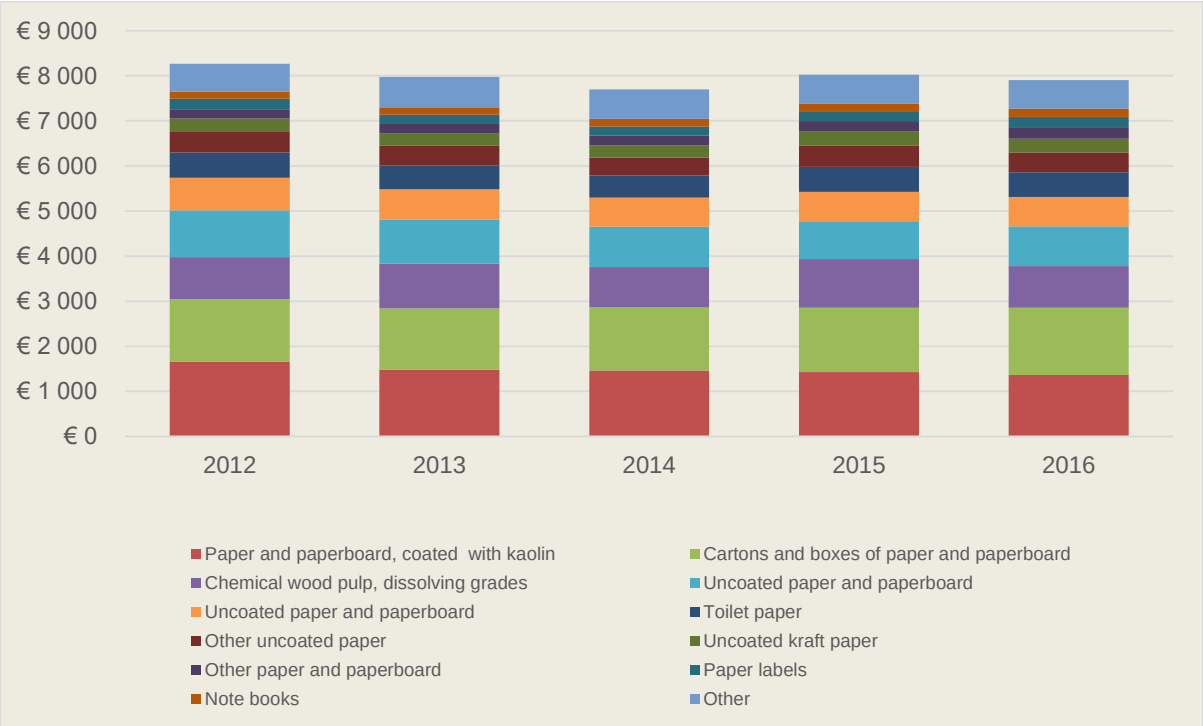
4.2 France's imports of pulp and paper

France imported an average of €7.97 billion of pulp and paper products each year between 2012-16. All of the products assessed are within the scope of EUTR (see Appendix 1), although it should be noted that France also imported around €3.9 million of printed materials (books, etc) each year over the same period, which are out of scope of EUTR but for which data on net weight was not available (and for which a further evaluation of risk was not possible under the present methodology).

There is little discernible trend in the value of imports over this period (Figure 10). The major imports by value were paper and paperboard coated with kaolin (€ 1.8 billion per year, 19% of the total value of pulp and paper imports), cartons and boxes of paper and paperboard (€

1.7 billion, 18%), dissolving grades of chemical wood pulp (€1.2 billion, 12%), and uncoated paper and paperboard (€1.1 billion, 12%).

Figure 10: The value of France's imports of pulp and paper products between 2012-16 (million €)



An average of 8.2 million tonnes of pulp and paper products were imported between each year between 2012-16 (Figure 11). Three quarters of the quantity of France's imports are manufactured paper and board products (75%), with pulp products contributing 25%.There is a small decline in the quantity of imports over the period, largely due modest declines in imports of paper and paperboard coated with kaolin, uncoated paper and paperboard, and other uncoated paper (Table 5).

Figure 11: The quantity of pulp and paper products imported by France 2012-16

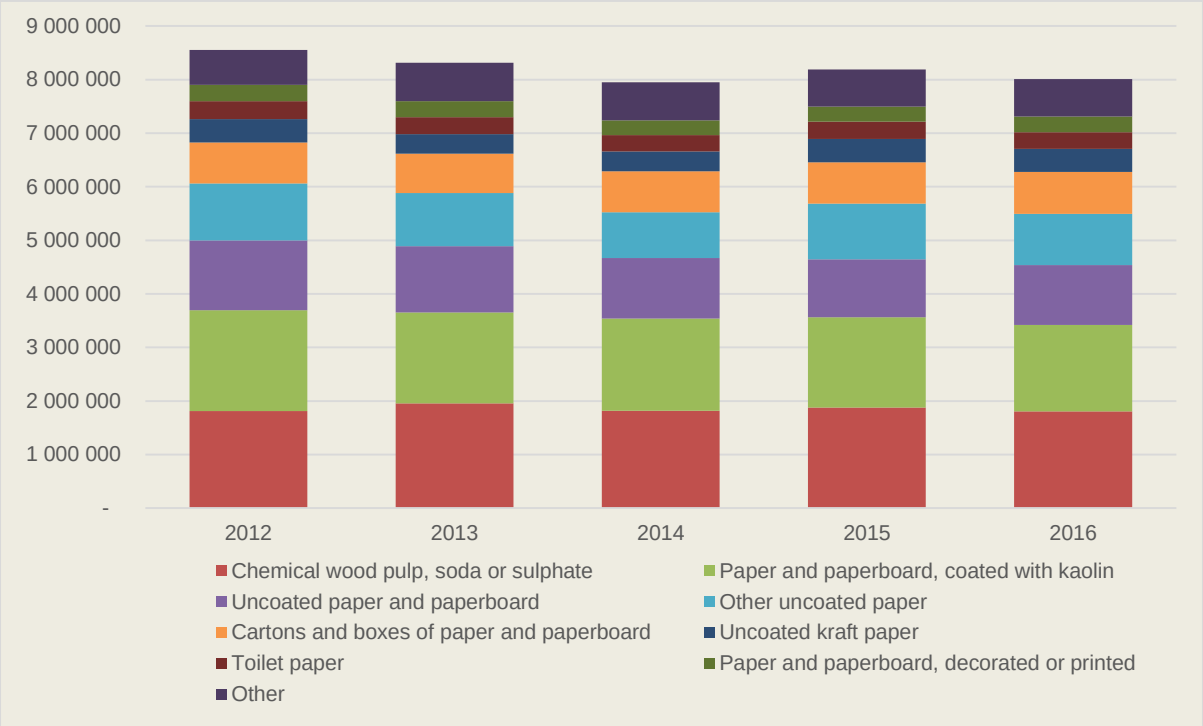
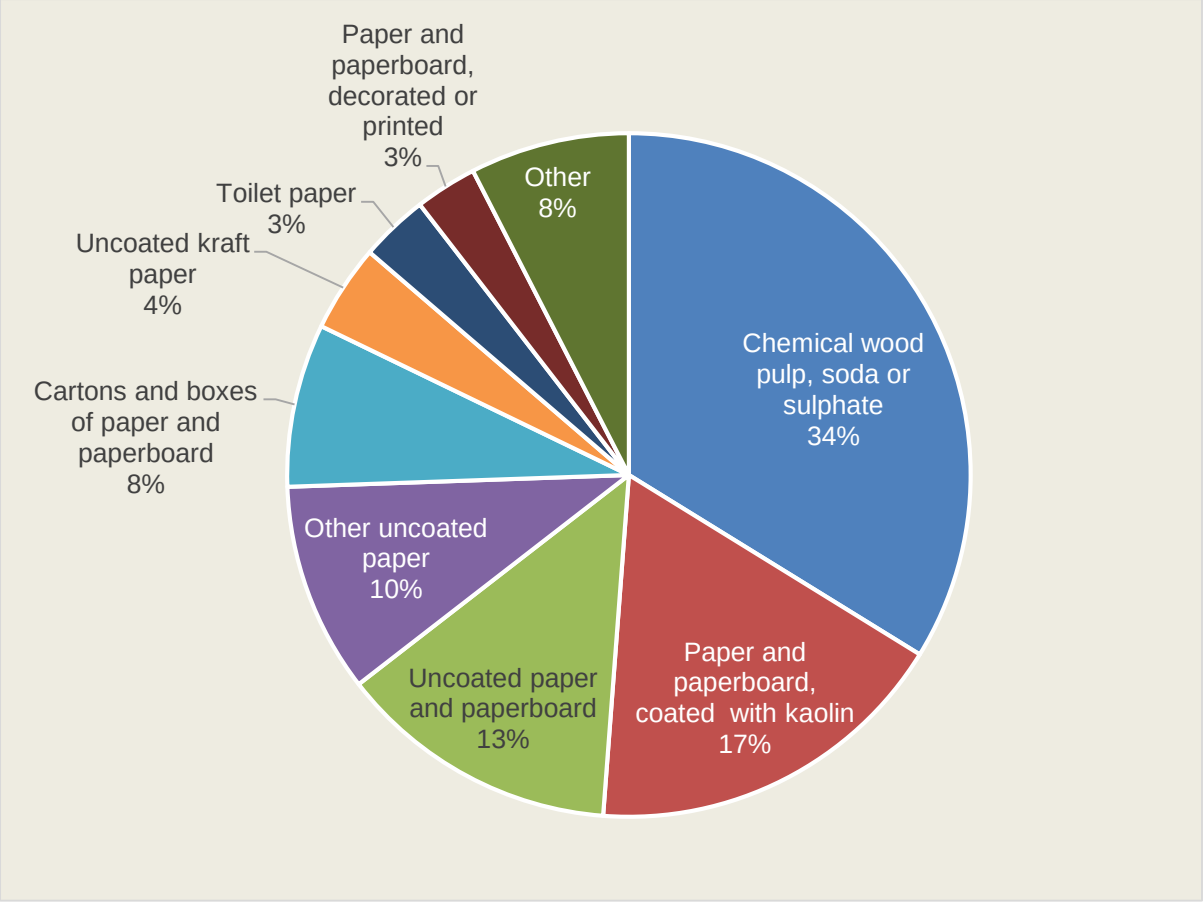


Table 5: France's pulp and paper imports 2012-16 by quantity (tonnes)

		Quantity (tonnes)						
HS code	**Product**	**2012**	**2013**	**2014**	**2015**	**2016**	**Average**	**%**
4703	Chemical wood pulp, soda or sulphate	1,811,390	1,953,657	1,819,410	1,879,512	1,808,998	**1,854,593**	**22.6%**
4810	Paper and paperboard, coated with kaolin	1,884,326	1,696,802	1,717,697	1,684,852	1,612,587	**1,719,253**	**21.0%**
4802	Uncoated paper and paperboard	1,301,869	1,238,121	1,133,963	1,082,354	1,113,308	**1,173,923**	**14.3%**
4805	Other uncoated paper	1,062,161	993,332	851,182	1,040,018	960,728	**981,484**	**12.0%**
4819	Cartons and boxes of paper and paperboard	763,860	735,669	763,004	769,368	780,515	**762,483**	**9.3%**
4804	Uncoated kraft paper	439,705	364,944	371,365	432,917	428,818	**407,550**	**5.0%**
4818	Toilet paper	330,866	317,579	309,323	322,985	314,007	**318,952**	**3.9%**
4811	Paper and paperboard, decorated or printed	306,644	293,684	272,565	283,516	292,404	**289,763**	**3.5%**
Other		651,662	720,270	710,675	690,722	694,921	**693,650**	**8.5%**
Totals		**8,552,484**	**8,314,059**	**7,949,183**	**8,186,245**	**8,006,285**	**8,201,651**	

France's imports of pulp and paper products were converted from tonnes into the quantity wood raw material equivalent (WRME), which indicates the volume of wood (in m^3) needed to produce one unit of a final product.[41] The WRME required to supply France's imports averaged over 24.7 million cubic meters of wood per year between 2012-16. This is equivalent to approximately 45% of France's own production of timber (for all uses, including pulp and paper), which is approximately 55.2 million cubic metres per year.[42] Over the whole period, the largest share of volume is in chemical wood pulp, soda or sulphate (8.3 million m^3 WRME, 34% of the total), paper and paperboard coated with kaolin (4.3 million m^3 WRME, 17%), uncoated paper and paperboard (3.3 million m^3 WRME,13%), and other uncoated paper (2.5 million m^3 WRME, 10%, Figure 12)

Figure 12: Imports of pulp and paper by volume, adjusted for wood content (WRME, m^3). Average of 2012-16



4.3 Provenance of France' imports of pulp and paper products

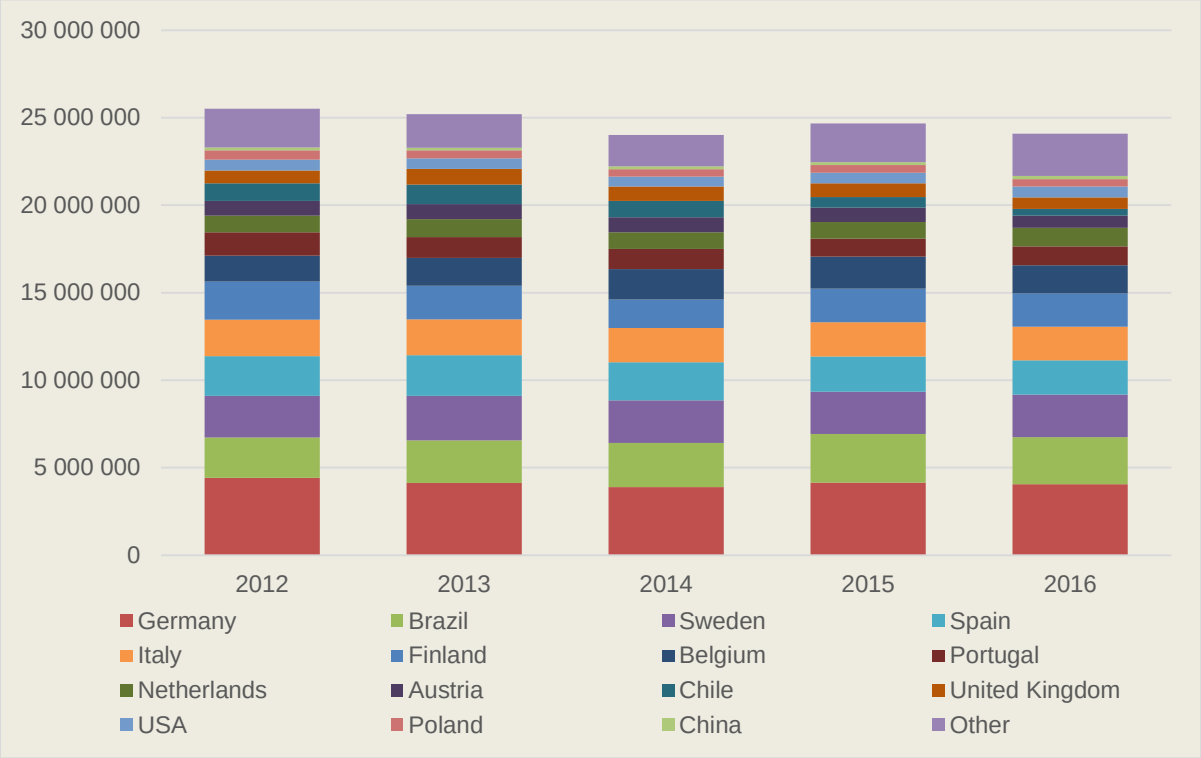
Between 2012 and 2016, France imported pulp and paper products from a total of 156 territories. The EU dominates France's imports, with Brazil, Chile, the USA and China being the only non-EU member states that contribute 2% or more of total imports by value.

In terms of volume (WRME), the top three countries exporting to France are Germany (17% of all pulp and paper imports), Brazil (10%) and Sweden (10%, Figure 13).

[41] Conversion factors to Wood Raw Material Equivalent underbark were obtained from the UK Forestry Commission https://www.forestry.gov.uk/website/forstats2009.nsf/0/8b4784e90b2a535480257361005015c6

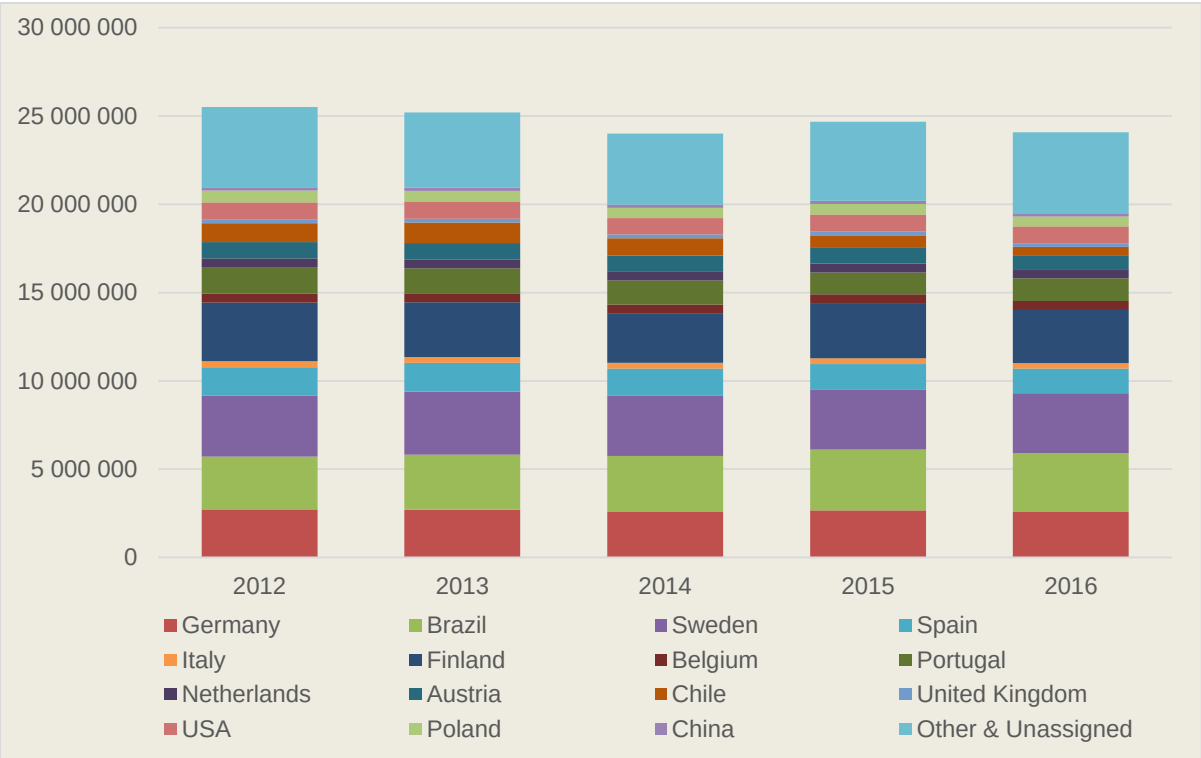
[42] FAO (2016) Global Forest Resource Assessment 2015: Desk Reference. Food And Agriculture Organization Of The United Nations, Rome.

Figure 13: Volume of France's pulp and paper imports 2012-16, adjusted in WRME (m^3)



However, all of the countries from which France imports both produce pulp and paper domestically as well as importing pulp and paper from other countries. This means that some of the wood in pulp and paper products imported by France will originate in third-party countries. With provenance adjusted for to account for these indirect imports (see Section 2.2). The same countries maintain their status as lead imports, but with some changes to the volumes: Germany (2.7 million m^3 WRME, 11% of the total volume of pulp and paper imports), Sweden (3.5 million m^3, 14%) and Brazil (3.2 million m^3, 13%) and Finland (3.2 million m^3, 12%, Figure 14).

Figure 14: Provenance of France's imports of pulp and paper products, adjusted for third party countries (m^3 WRME)



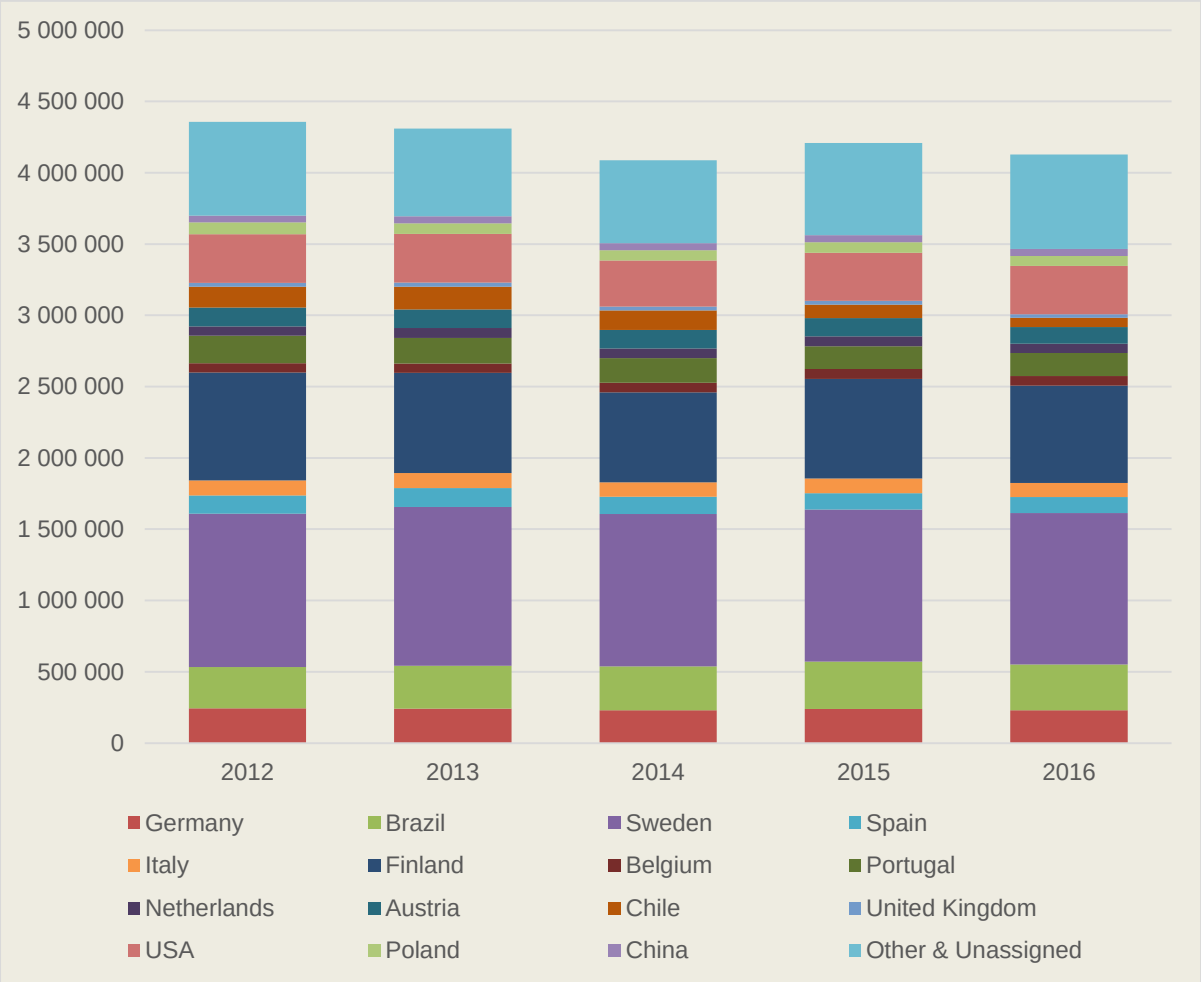
4.4 France's pulp and paper footprint

The area of land required to supply France's imports from each major exporting country was estimated by dividing the WRME volume by the Net Annual Increment (NAI) for that country (see Section 2.3, and Appendix 3).[43]

France's demand for imported pulp and paper products required an average of 4.6 million hectares per year between 2012-16. This is equivalent to over one quarter (27%) of France's own forest area of 16,989,000 hectares[44]. There is a modest decline in footprint over time, from 4.7 million hectares in 2012 to 4.5 million hectares in 2016 (Figure 15).

The largest footprints from France's imports fall in Sweden (1,077 hectares, 26%), and Finland (695,000 hectares, 16%, Figure 15).

Figure 15: Estimated land footprint of France's imports of pulp and paper products 2012-2016 (hectares)



[43] Net Annual Increment (NAI) data was obtained from FAO (2016) Global Forest Resource Assessment 2015: Desk Reference. Food And Agriculture Organization Of The United Nations, Rome. The FAO does not provide NAI for all countries (see Appendix 3).

[44] France's forest area data is from FAO STAT. Last accessed July 2018.

5 Cocoa

5.1 Trade and uses of cocoa

5.1.1 Global uses and trade flows

Cocoa products are made from cocoa beans, which are the seeds from pods produced by cocoa trees. Harvested cocoa pods are split open to retrieve the cocoa beans and cocoa pulp inside. The beans are fermented in the pulp for several days, then cleaned and dried. At this point the farmer will sell the beans on. Beans may be further processed in the country of origin, or exported elsewhere for continued processing. The majority of cocoa is produced by smallholders, with more than 90% of global cocoa production originating from small farms covering only 2-5 hectares.[45]

The primary end use of cocoa beans is chocolate and chocolate products which are manufactured from the intermediate products of cocoa beans: cocoa liquor, cocoa butter and cocoa powder. Small amounts of cocoa butter are also used in cosmetic products.

- **Cocoa liquor (or paste):** Cocoa liquor is the result of roasting and grinding cocoa nibs (the cocoa beans with their outer shell removed), and is either processed straight into chocolate, or pressed to make cocoa butter and cocoa powder.
- **Cocoa butter:** Cocoa butter is extracted through pressing cocoa liquor and is usually combined with pure cocoa liquor to be made into chocolate, but it can also be used in cosmetics. Typically, cocoa butter destined for cosmetic use is made from diseased pods, or beans that have germinated during drying, and is a relatively small-scale use.
- **Cocoa powder:** Cocoa powder (or 'press cake') is the resulting by-product from pressing cocoa liquor to extract cocoa butter. It is used in baking and the manufacture of other chocolate goods.

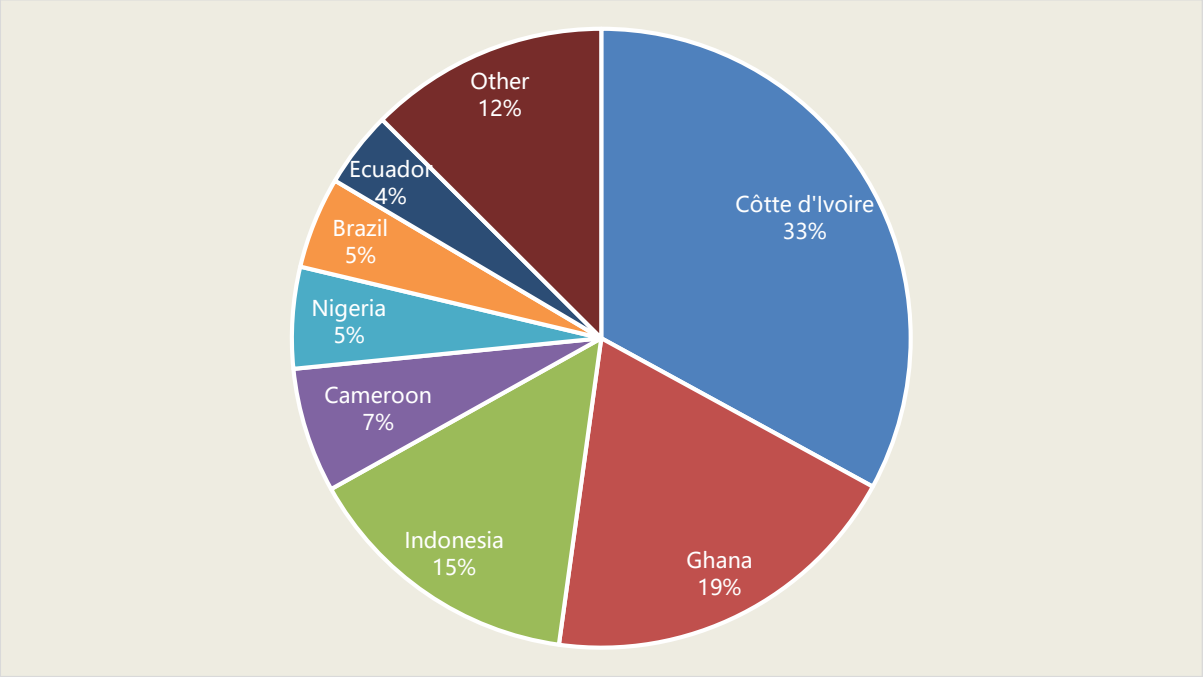
Besides the main use of cocoa beans, the husks of cocoa pods and the pulp surrounding the beans and the cocoa bean shells can be used[46]. Some examples of these uses are:

- **Cocoa pod husk:** Dried husks can be used in animal feed. However, to be usable, husks must be processed quickly and dried fast, which imposes limitations on production, as processing at this level often happens on farm.[47] Cocoa pods are generally not imported to the EU and cocoa husks are not normally available.
- **Cocoa pulp:** This material (also referred to as sweatings) surrounds the cocoa beans inside the pod. It can be used when fresh to make soft drinks, alcohol, and pectin. These uses are small-scale and local.
- **Cocoa bean shells:** As a first step in the processing of cocoa beans, the cocoa bean shells (also referred to as husks or hulls) that encloses the nibs is removed. Cocoa bean shells are often processed into animal feed or used as fuel or mulch. They are increasingly used also a food ingredient due to their high fibre and antioxidant content.

[45] Source: ICCO https://www.icco.org/component/content/category/9-economy.html. Last accessed 22 August 2018.
[46] Source: ICCO https://www.icco.org/faq/52-by-products/115-products-that-can-be-made-from-cocoa.html. Last accessed 22 August 2018.
[47] Source: http://www.new-ag.info/99-2/focuson/focuson6.html

Around 4.5 million tonnes of cocoa beans were produced globally in 2016[48]. Cocoa production is limited to those areas within 20 degrees of the equator because the trees require humid tropical climates for optimal growth. Cocoa is produced in 62 countries worldwide but over 66% of global cocoa production is located in Africa with the two largest producing countries being Côte d'Ivoire (33%) and Ghana (19%). At 15% of global production, Indonesia is the third largest producing country (Figure 16).

Figure 16: Primary cocoa producing countries in 2016.



The main exporters of cocoa raw materials include the major producing countries, with the addition of Belgium, which plays a major role in international trade of cocoa raw materials (Table 6)[49].

Table 6: Top 5 exporting countries of cocoa beans

Exporting countries	Quantity (tonnes)	% of total exports
Cote d'Ivoire	1,285,988	40%
Ghana	581,375	17%
Cameroon	263,746	8%
Ecuador	227,214	7%
Belgium	187,201	5%

At 60% of global imports, the EU is the main destination of cocoa beans globally, with the top three importing countries being the Netherlands (25%), Germany (11%) and Belgium (9%, Table 7). At 12% and 7% of global imports, the USA and Malaysia also play a significant role in the global trade of cocoa beans. France comes in 6th, with 5% of the global imports of cocoa beans in 2016.

Table 7: Top 5 importing countries of cocoa beans

[48] Source: FAOSTAT http://www.fao.org/faostat/en/#data/FO. Last accessed 16 August 2018.
[49] Source: UN COMTRADE https://comtrade.un.org/data/. Last accessed 16 August 2018. Note: for Côte d'Ivoire 2015 export data has been used as 2016 data was not available.

Importing countries	Quantity (tonnes)	% of total imports
Netherlands	818,613	25%
USA	396,989	12%
Germany	343,084	11%
Belgium	304,484	9%
Malaysia	213,841	7%

A large amount of further trading occurs within the importing countries, as cocoa beans are processed and manufactured into various intermediate and end products. A total of € 37.4 billion of cocoa products were exported globally in 2016. Of this, cocoa beans account for € 8.2 billion, partly or fully processed cocoa products for € 28.3 billion and cocoa bean shells for the remainder. Looking at the global trade flows of both cocoa beans and processed cocoa products, the cocoa-producing countries Côte d'Ivoire and Ghana, and the major importer-trader countries (the Netherlands, Germany, Belgium and France) are highly ranked in both the quantity and the value of cocoa exports (Figure 17 and

Figure *18*). With the exceptions of Côte d'Ivoire and Ghana, the trade role of other cocoa producing countries decreases in this wider picture of trade flows.

Figure 17: Quantity of global exports of cocoa products in 2016 (thousand tonnes)

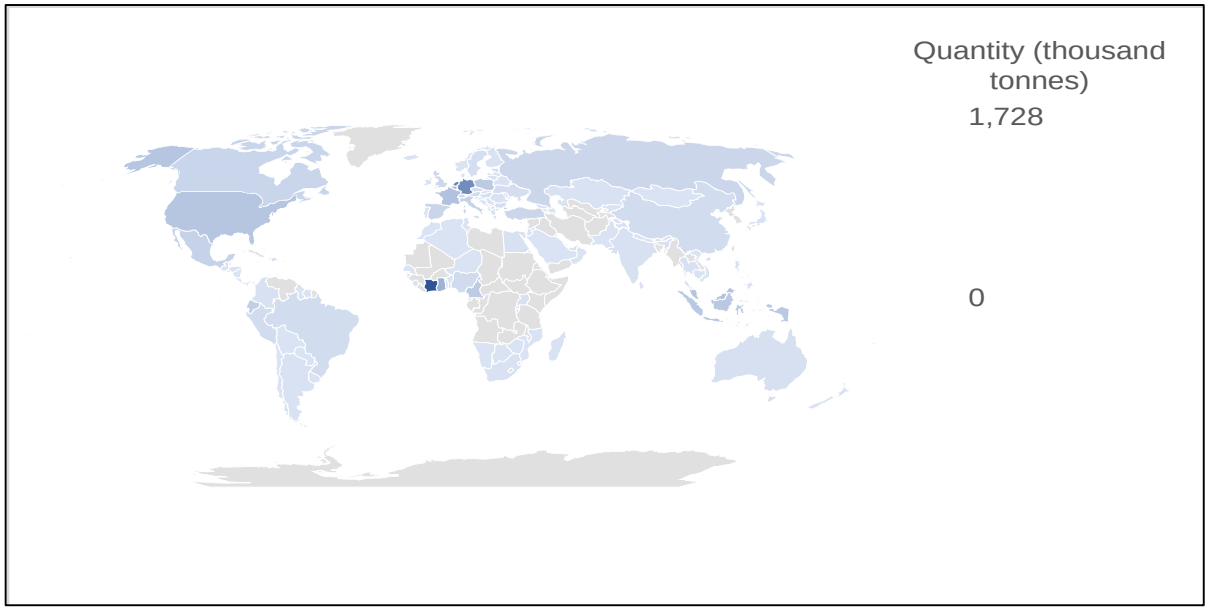
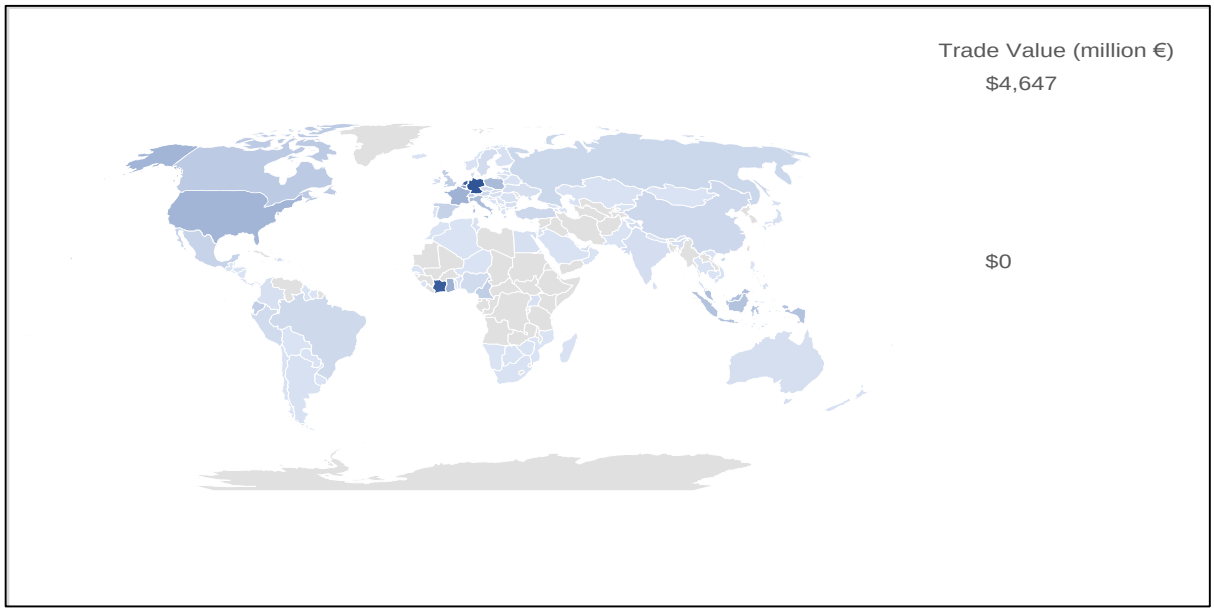


Figure 18: Value of global exports of cocoa products in 2016 (thousand Euros)



5.1.2 The EU and France's role in global trade

The EU is a major importer of cocoa, importing almost 1.7 million tonnes of cocoa beans and almost 0.7 million tonnes of processed cocoa products in 2016.[50] Once these cocoa products arrive in the EU, intra-EU trade occurs, in which the Netherlands, Germany and Belgium play the greatest roles. Around € 5 billion of processed cocoa products are exported to non-EU countries.

France imported over 149,000 tonnes of cocoa beans and more than 644,000 tonnes of processed cocoa products directly from producing countries and from the Netherlands, Germany and Belgium as its main EU trading partners. France exports over € 1.7 billon of cocoa products which are mainly sold within the EU (93%).

5.1.3 Issues associated with cocoa production

Cocoa production is linked to the loss of natural habitats, soil degradation, degradation of water quality, poor labour conditions and low farmer incomes.

As a crop that needs shade, cocoa can be produced in agroforestry systems. However the current combination of low investment in farmers (financially, and in terms of skills and management training) and aging trees sees a reduction in yield that means farmers must expand production by planting new trees. The location of the majority of cocoa production in tropical countries with large areas of rainforest means that this expansion increases the risk

[50] Source: UN COMTRADE https://comtrade.un.org/data/

of deforestation. Cocoa has driven deforestation in some major producing countries in West Africa, including Ghana and Côte d'Ivoire.[51] Deforestation has also been associated with the expansion of cocoa production in South America.[52]

Cocoa cultivation provides a livelihood for millions of smallholders in countries such as Côte d'Ivoire, Indonesia, Ghana and Nigeria. However, the US Department of Labor includes cocoa from six countries – Cameroon, Côte d'Ivoire, Ghana, Guinea, Nigeria, and Sierra Leone – on their List of Goods Produced by Child Labour. Côte d'Ivoire and Nigeria are also on the list for forced labour.[53] A US Department of State report in 2011 noted '*It is estimated that some 15,000 Malian children work on Ivoirian cocoa and coffee plantations. Many are under 12 years-of-age, sold into indentured servitude for $140, and work 12-hour days for $135 to $189 per year*'.[54] Child labourers on cocoa farms are typically exposed to hazardous working conditions.[55]

Cocoa farmers receive a small percentage of overall cocoa price – between 3 and 5% of the value of a chocolate bar. Low income combined with difficulties in obtaining high yields (due to small farm size, lack of training and knowledge, and lack of infrastructure or ability to invest in production improvements) mean that many cocoa farmers rely on loans and are unable to save money. [56]

Land grabs from local communities to create cocoa farms have been reported from South America.[57]

5.1.4 Certification in cocoa

The main third-party certification systems for what is considered sustainable cocoa are:[58]

- **UTZ:** Over 1.5 million hectares of cocoa were UTZ-certified in 2015, almost 15% of the global cocoa area. UTZ reported an estimated production volume of over 0.9 million metric tons, which represents almost 21% of the global cocoa production volume in 2015.
- **Rainforest Alliance/SAN** certified more than 737,000 hectares in 2015 and 11.8% of the global cocoa production volume.
- **Fairtrade certification:** Fairtrade International certified over 570,000 hectares of cocoa in 2015 (5.5% of the global cocoa area) and 5.7% of global production.
- **Organic:** more than 267,000 hectares (2.6% of the global cocoa area) were organic certified, and an estimated 155,750 tonnes (almost 3.5% of the world's cocoa production) were organic certified in 2015.

Combined, these four schemes certified 1.7-3.1 million hectares in 2015 (the range is provided because many producers are certified by more than one scheme), which represented 16.2-29.6% of the global cocoa area.

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[51] http://www.euredd.efi.int/cotedivoire
[52] https://news.mongabay.com/2015/04/court-rules-deforestation-of-peruvian-rainforest-for-chocolate-was-legal/
[53] https://www.dol.gov/ilab/reports/child-labor/list-of-goods
[54] http://www.state.gov/j/drl/rls/hrrpt/2000/af/773.htm
[55] ILO (2007). Rooting out Child Labour from Cocoa Farms. Paper No. 2: health and Safety Hazards.
[56] http://www.fairtrade.org.uk/~/media/fairtradeuk/farmers%20and%20workers/documents/cocoa%20commodity%20briefing_online7.pdf
[57] https://news.mongabay.com/2015/04/court-rules-deforestation-of-peruvian-rainforest-for-chocolate-was-legal/
[58] The following data is from Julia Lernoud, Jason Potts, Gregory Sampson, Salvador Garibay, Matthew Lynch, Vivek Voora, Helga Willer and Joseph Wozniak (2017), The State of Sustainable Markets – Statistics and Emerging Trends 2017. ITC, Geneva.

The schemes include criteria on conservation, with varying levels of protection against deforestation.[59] While Fairtrade includes criteria on general biodiversity conservation, which encompasses protection of areas of high conservation value (HCV) including forest, it does not have specific deforestation criteria.[60] Utz includes deforestation criteria that excludes certification of HCV areas converted after 2008. Rainforest Alliance/SAN has a new zero deforestation standard launched in 2017, which will maintain a 2005 cut-off for HCV as well as cut-off date of 2014 for conversion of any natural habitat. With this new standard, Rainforest Alliance/SAN will effectively be zero deforestation, while Utz and Fairtrade are not.[61]

Note that UTZ and Rainforest Alliance have recently merged, although it is too early to understand the possible effects of the merger on cocoa certification.

5.1.5 France's policy and industry responses

Unlike some of its European counterparts, France has no coordinated approach to sustainable cocoa on the national level.[62]

According to CBI, a Dutch government agency performing market research, the industry demand for sustainable cocoa in France has been growing over the past years, following a wider European trend. This includes an increasing demand for certified cocoa products, as well as a broader interest in the social and environmental aspects of cocoa production.

In line with this, many French chocolate manufacturers and global chocolate companies operating in France have developed their own programs around sustainable cocoa, for example the '*Transparence Cocoa*' initiative launched by Cemoi,[63] and the industry grouping '*Syndicat du Chocolat*', which has signed an agreement with the Ivorian government to support the Ivorian cocoa industry on social, economic and environmental issues related to cocoa production.[64] There are also a large number of private standards and programs, operated by large traders and manufacturers in the sector (e.g. Olam Livelihoods, Barry Callebaut's Cocoa Horizon, Mondelez Cocoa Life).

On an international scale, the World Cocoa Foundation (WCF), and especially its Cocoa and Forests Initiative, is a potentially important development. This initiative has brought together Côte d'Ivoire and Ghana with leading chocolate and cocoa companies who are together developing Frameworks for Action to end deforestation and restore forest areas. Central to the Frameworks are a commitment to no further conversion of any forest land for cocoa production within the two producer countries.

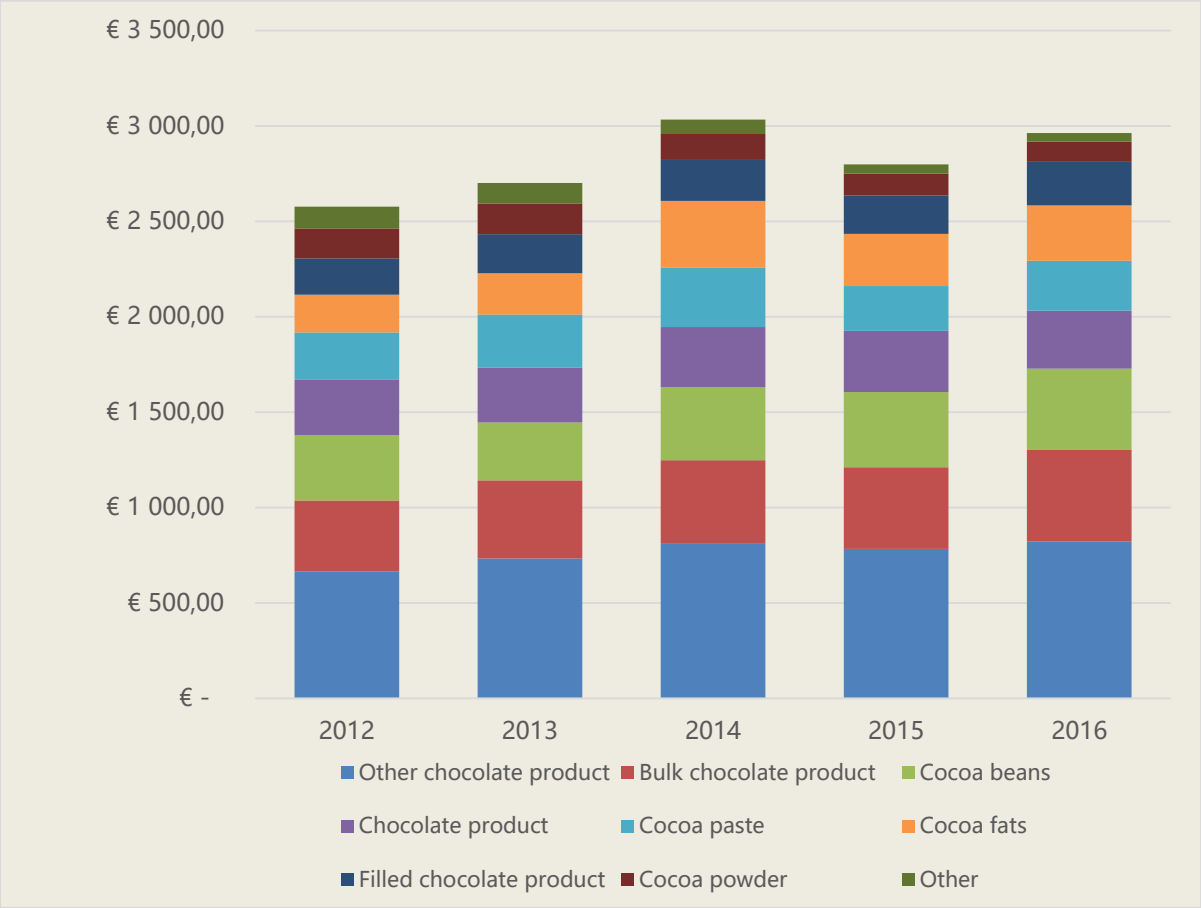
5.2 France's imports of cocoa[65]

France imported an average of nearly 774,000 tonnes of cocoa products each year between 2012-2016 (Table 8). This represents an average value of € 2.82 billion of cocoa products each year. Less than 20% of the total import quantity of cocoa are cocoa beans, indicating that most of France's cocoa imports underwent partial or full processing before entering the country.

[59] http://www.standardsmap.org/compare?standards=378,71,62&standard=0&shortlist=378,71,62&product=Cocoa&origin=Any&market=Any&cbi=78:78:756
[60] http://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/SPO_EN.pdf
[61] http://sanstandard2017.ag/
[62] Source: CBI www.cbi.eu/market-information/cocoa/france/. Last accessed 23 August 2018
[63] Source: Cemoi https://www.transparence-cacao.com/. Last accessed 23 August 2018.
[64] Source: Syndicat du Chocolat www.alliance7.com/wp-content/uploads/2015/10/CP-Journ%C3%A9e-Mondiale-du-Cacao-2015.pdf. Last accessed 23 August 2018.
[65] Source: Unless otherwise stated all data is derived from UN COMTRADE https://comtrade.un.org/data/

The most important categories of imported processed cocoa products by quantity are bulk chocolate products, which accounted for 19.6% of all cocoa product imports, 'other chocolate products' (18%) and cocoa paste (11%, Table 8). See Appendix 4 for details of the HS codes used in these calculations. By value, cocoa products that underwent further processing into chocolate are among the most important import categories. These are 'Other chocolate products' which accounted for 27% of the value of all cocoa product imports, Bulk chocolate products (15%) and 'Chocolate products' (11%, Figure 19). The value of cocoa imports to France shows an increase since 2012, with a particularly pronounced increase in 2014.

Figure 19: The value of France's imports of cocoa beans and cocoa products from 2012-16.

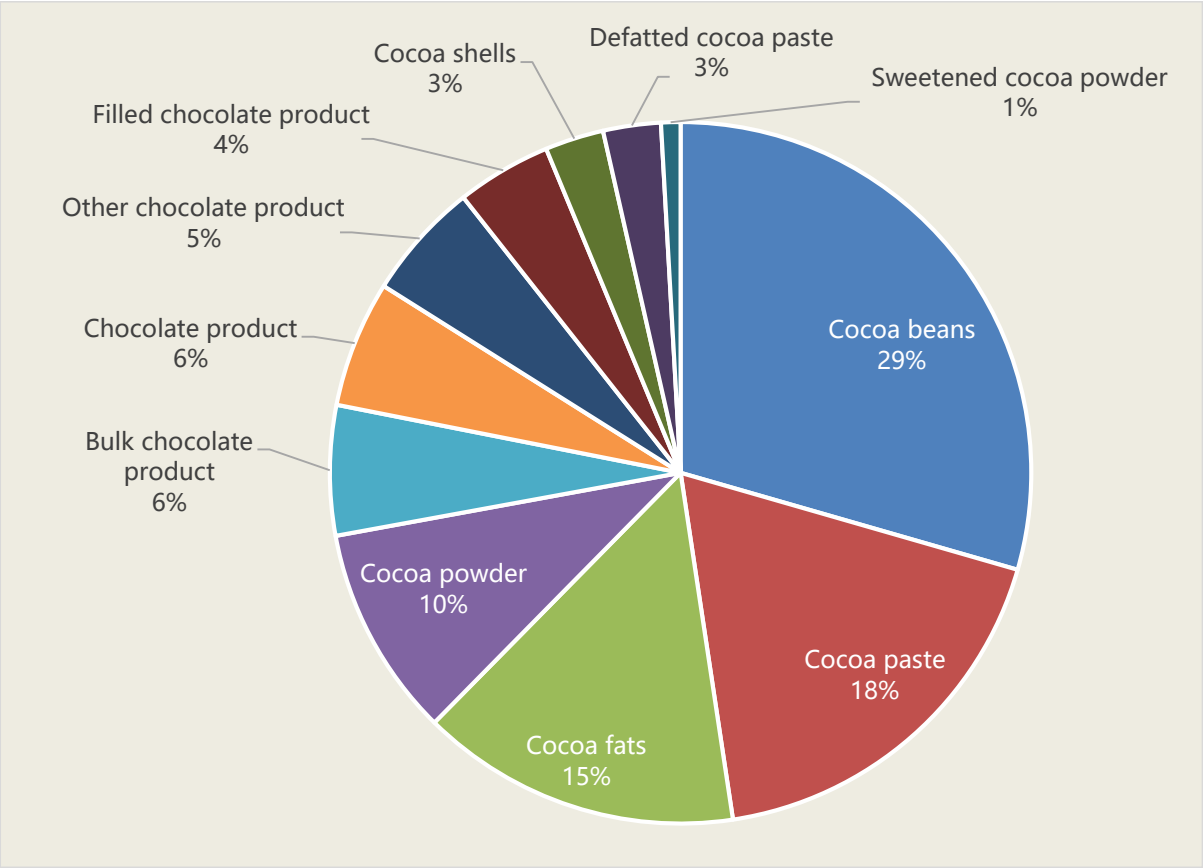


As France's imports include cocoa products that are not made out of pure cocoa (e.g., filled chocolate products), the import numbers have been converted to represent the cocoa raw material in the imports. See Appendix 4 for the conversion factors used in these calculations. The amount of cocoa raw material required to supply France's imports of cocoa products averaged nearly 457,000 tonnes per year between 2012-16. Corrected for cocoa content, over the whole period, cocoa beans becomes the main product of import by quantity (29%), followed by cocoa paste (18%), cocoa fats (15%) and cocoa powder (10%, Figure 20).

Table 8: Quantity of France's cocoa imports by major product categories, 2012-16 (tonnes).

		Year						
Product	**Product name**	**2012**	**2013**	**2014**	**2015**	**2016**	**Average**	**%**
180620	Bulk chocolate products	138,696	149,133	144,544	157,093	170,460	**151,985**	**19.6%**
180690	Other chocolate products	128,791	132,885	140,011	142,347	145,165	**137,840**	**17.8%**
1801	Cocoa beans	128,976	124,001	137,724	133,419	148,836	**134,591**	**17.4%**
180310	Cocoa paste	83,904	93,998	94,204	69,452	73,165	**82,944**	**10.7%**
1804	Cocoa fats	74,905	67,031	68,072	63,002	64,439	**67,490**	**8.7%**
180632	Chocolate products	64,423	62,374	63,107	68,961	65,923	**64,958**	**8.4%**
180631	Filled chocolate products	43,969	47,308	49,350	50,792	52,198	**48,723**	**6.3%**
1805	Cocoa powder	40,807	46,699	46,972	48,026	39,926	**44,486**	**5.7%**
180610	Sweetened cocoa powder	24,529	16,642	15,129	14,213	11,190	**16,340**	**2.1%**
Other	Other	24,633	29,622	24,224	22,278	21,799	**24,511**	**3.2%**
Total		**753,634**	**769,692**	**783,336**	**769,581**	**793,101**	**773,869**	**100%**

Figure 20: Quantity of France's imports of products containing cocoa, adjusted for cocoa content (tonnes). Average of 2012-16.



5.3 Provenance of France's imports of cocoa

Between 2012 and 2016, France imported cocoa products from a total of 138 territories. Corrected for the cocoa content of imports, France imports more than 44% of its cocoa directly from cocoa producing countries, dominantly from Côte d'Ivoire (27%) and Ghana (14%). However, at 45% of imports, an almost equal amount of cocoa, is indirectly imported into France through the EU, with the Netherlands (14%), Germany (12%) and Belgium (9%) being the major traders (Figure 21).

Adjusting for the provenance of the EU exports into France, the dominant role that Côte d'Ivoire and Ghana play in France's cocoa supply becomes more apparent (Figure 22). Between 2012 and 2016, an average of 43% of France's cocoa originated from Côte d'Ivoire and 21% from Ghana. Among other producing countries, only Cameroon (7%) and Nigeria (4%) contribute more than 2% to France's cocoa imports.

Figure 21: The quantity of France's imports of cocoa between 2012-16 from major exporting countries (tonnes).

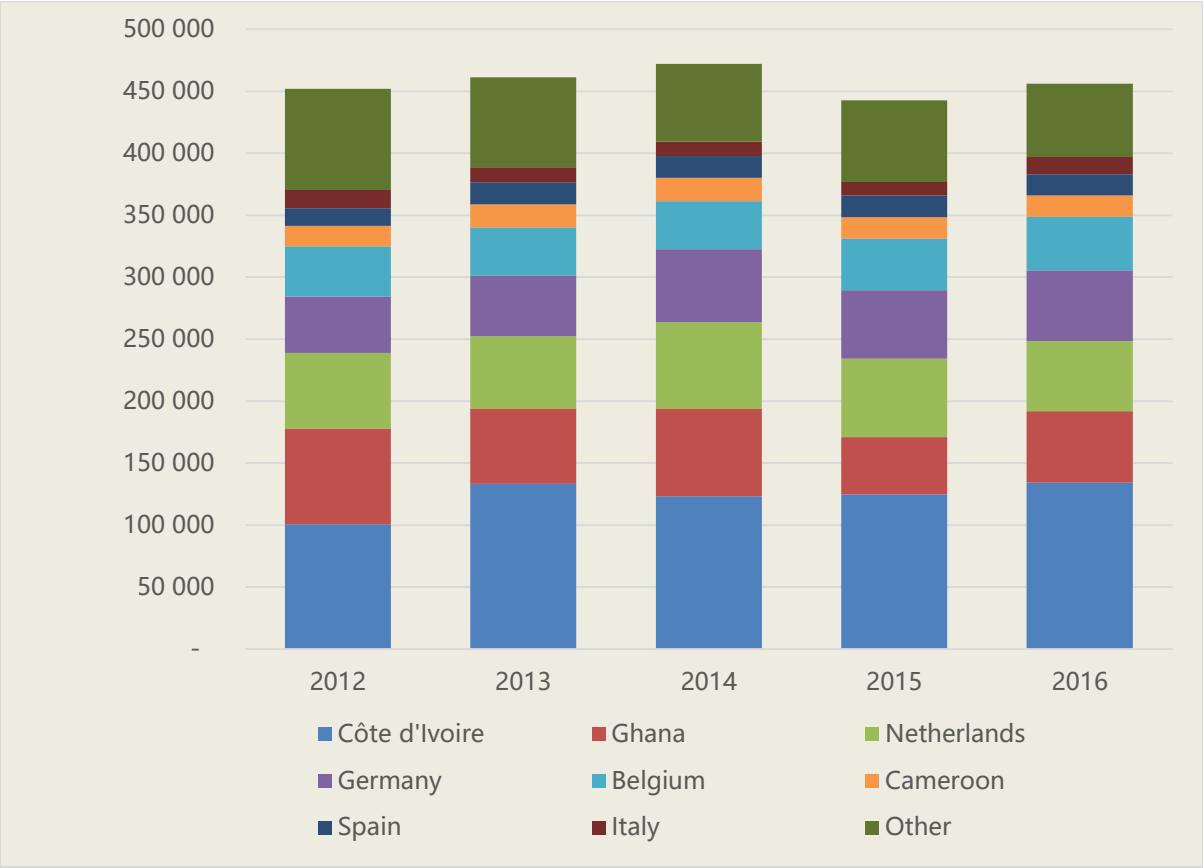
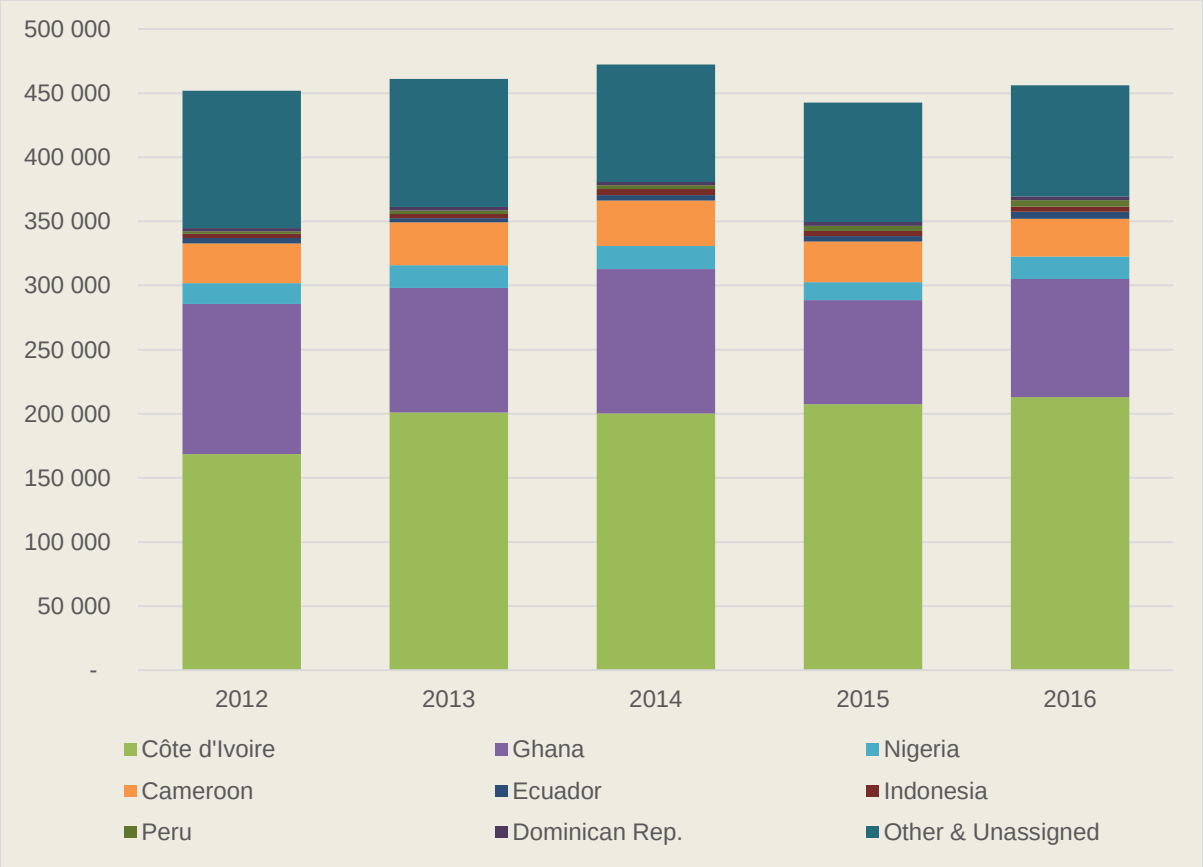


Figure 22: The quantity of France's imports of cocoa between 2012-16 adjusted for provenance of third-party trade (tonnes).



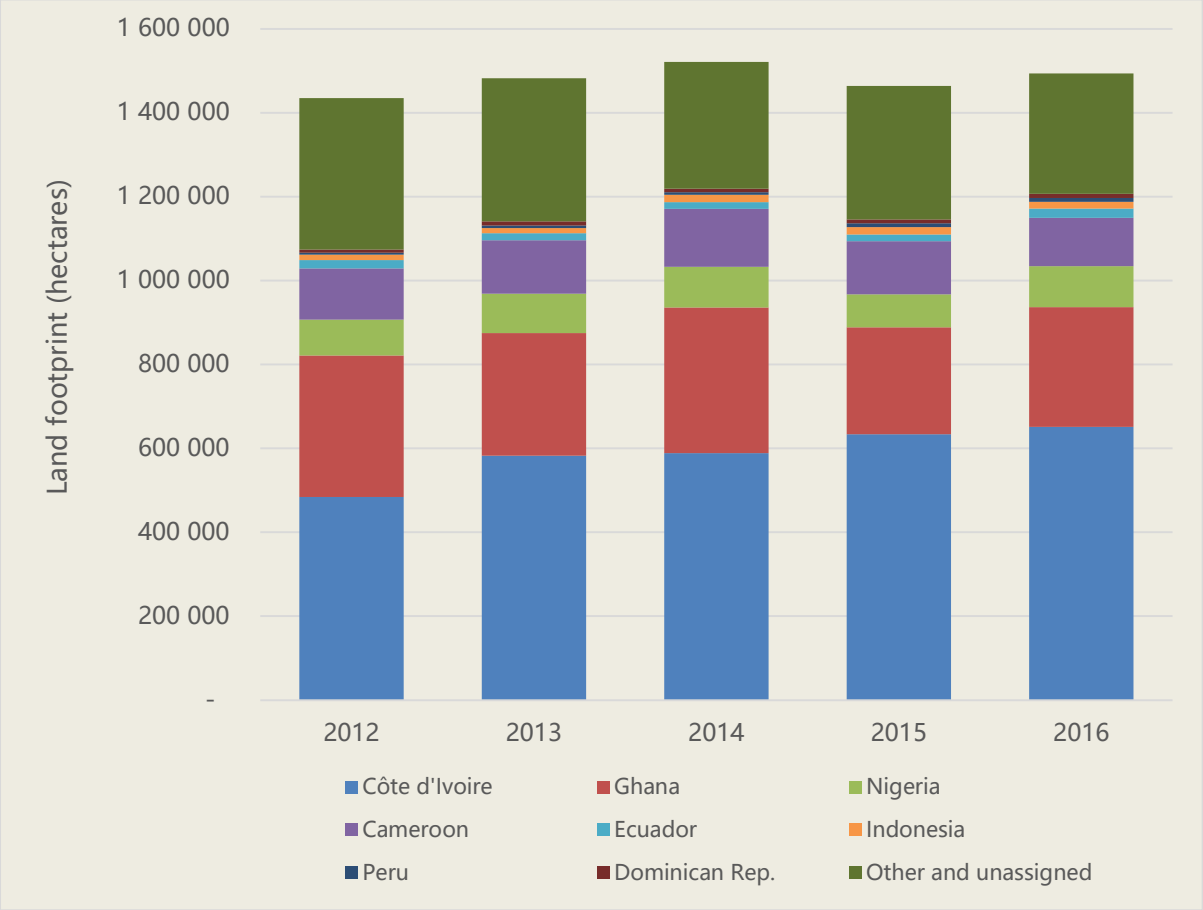
5.4 France's cocoa footprint

To produce an estimate of land required to supply France's cocoa imports, the cocoa used in the products imported by France were first assigned to cocoa bean fractions, i.e. cocoa beans, cocoa liquor, cocoa butter, cocoa powder or cocoa bean shells. This was done to arrive at a figure on France's cocoa imports per cocoa bean fraction. The imported fractions were allocated to yields that are specific to the cocoa fraction, which are as follows: beans 1.0; liquor 0.82; butter 0.41; powder 0.4 and shells 0.18.[66]

The estimated land area required to satisfy France's demand for cocoa products averaged 1.5 million hectares per year between 2012-16 (Figure 23). This is equivalent to approximately 14% of the global harvested area. Côte d'Ivoire dominates the land footprint, with an average of 594,000 hectares each year (40%), with Ghana contributing the second largest area (307,000 hectares, 21%). The land footprints from Cameroon (128,00 hectares, 9%) and Nigeria (91,000 hectares, 6%) are also significant.

The land area required to supply France's imports from Côte d'Ivoire rose from 484,000 hectares in 2012 to 659,000 hectares in 2016, unlike that of Ghana, which decreased from 338,000 hectares to 288,000 hectares over the period.

Figure 23: Estimated land footprint of France's imports of cocoa between 2012-2016 (hectares)



[66] Fairtrade International (2013). Questions & Answers: Cocoa conversion rates for mass balance. 19 December 2013. Available at http://www.fairtrade.net/fileadmin/user_upload/content/2009/standards/documents/2013-12-19_EN_CocoaMBConversionRates_Q_ADocument_final.pdf Yield data was obtained from FAO STAT, last accessed 05 September 2016.

6 Palm Oil

6.1 Trade and uses of palm oil

6.1.1 Production

The oil palm, *Elaeis guineensis*, is native to west and southwest Africa. It is now planted widely in tropical lowlands, with the most suitable areas for cultivation being between ten degrees north and south of the equator, with temperature ranges between 24-32ºC and rainfall that is evenly distributed throughout the year.

Harvesting begins when the palms are three to four years old, and plantations are harvested year-round. The fruit is processed into three main raw materials:

- **Palm oil**, which is extracted from the pulp of the fruit that has been sterilised by heating and pounded mechanically (known as digestion) followed by mechanical pressing. The oil is then refined, bleached and deodorised for most uses.
- **Palm kernel oil** is extracted from the seed of the fruit by mechanical crushing to remove the shells, steam cooking and pressing.
- **Palm kernel meal**, which is the residue from palm kernel oil extraction.

Palm oil is both the most-produced and most consumed plant derived oil, ahead of soy oil.[67] It is the most productive vegetable oil crop, yielding around five times more oil per hectare than rapeseed, the next most productive oil seed, and yields more than seven times more oil per hectare than soy.[68]

Large-scale palm oil plantations produce approximately 60% of the world's production, and usually also contain a processing mill, because fruit bunches must be processed within twenty-four hours of harvesting to maintain the quality of the oil. The mills typically take in fresh fruit brunches from the plantation as well as from small- and medium- sized growers in the vicinity. As there has been limited success in mechanisation to date, oil palm cultivation and harvesting is very labour intensive. To deal with the high labour requirement, plantations often rely on large amounts of migrant labour, with an estimated 2.5 million international or internal migrant labourers – both legal and illegal – in Southeast Asia alone (largely Indonesian, but also Bangladeshi, Filipino, Thai, etc.).[69]

An estimated three million smallholders grow oil palm, accounting for approximately 40% of total global oil palm production.[70] Smallholders may be independent, or be part of a plantation development scheme. Oil palm is a popular crop among smallholders because of its 25-30 year economic lifespan, and because it can give a substantially higher income than subsistence food crops.[71] However, smallholders' yields are generally lower than that of large-scale plantations due to lack of access to higher-yielding stock and lower knowledge

[67] Note: these are 2011 figures. http://www.befair.be/sites/default/files/Huile%20de%20Palme%20EN.pdf
[68] Oil World (2016)
[69] Cramb, R, and McCarthy, J.F. 'Characterising Oil Palm Production in Indonesia and Malaysia', in Cramb, R, and McCarthy, J.F., eds., The Oil Palm Complex (Singapore, 2016) pp.27-77.
[70] http://www.rspo.org/certification/smallholders
[71] Mark Barthel, Steve Jennings, Will Schreiber, Richard Sheane and Sam Royston, James Fry, Yu Leng Khor, and Julian McGill (February 2018). Study on the environmental impact of palm oil consumption and on existing sustainability standards. Final Report and Appendices. European Commission, DG Environment (Study contract No.: 07.0201/2016/743217/ETU/ENV.F3)
http://ec.europa.eu/environment/forests/pdf/palm_oil_study_kh0218208enn_new.pdf

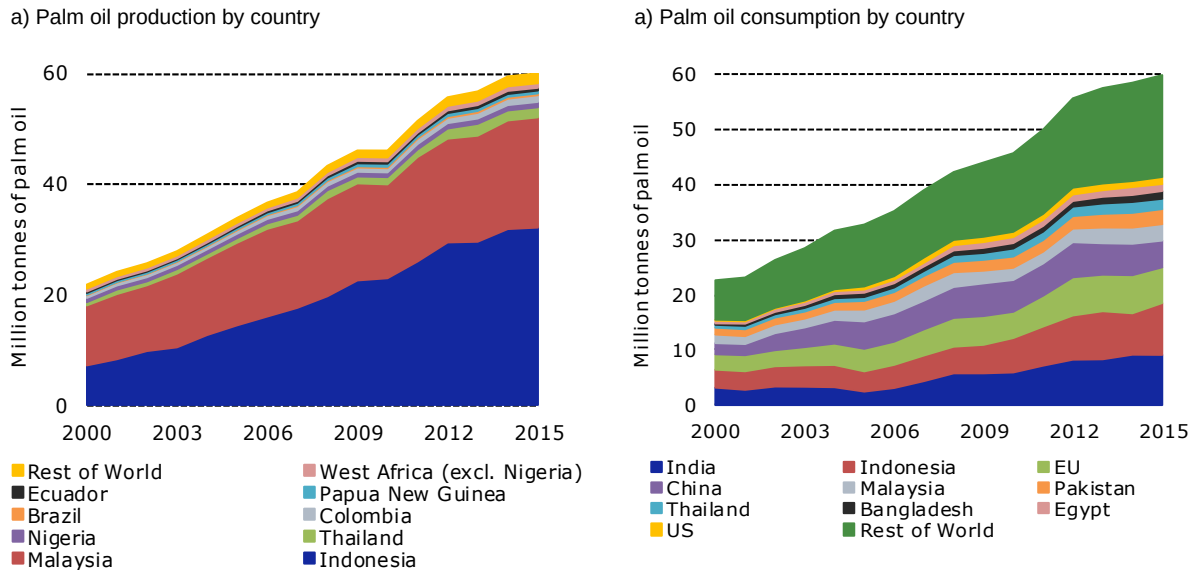
on agricultural practices.[72] The requirement to process harvested fruit rapidly means that most smallholders are effectively tied to sell to a single mill, via agents.

6.1.2 Trade

Global palm oil production has increased from 15.2 million tonnes in 1995 to over 60 million tonnes in 2015.[73] This volume is predominantly produced by Indonesia (51%) and Malaysia (34%, Figure 24a). Indonesia and Malaysia have increased the area cultivated for oil palm from 2.6 million hectares in 1990 to over 15 million hectares in 2014, with Indonesia accounting for just over 10 million hectares.[74] There has also been a marked increase in palm oil production in other parts of the world in recent years, with most of the additional volume generated in South and Central America, Thailand and Western Africa.[75]

Global demand for palm oil has seen strong and sustained growth. Major consuming countries include India, China, the EU, Indonesia and Malaysia (Figure 24b). In 2013, India, China and the EU combined accounted for almost 60% of global imports.

Figure 24: Palm oil production and consumption by country[76]



6.1.3 End uses

Palm oil is extremely versatile and can be easily separated into solid (stearin) and liquid (olein) components that are used in hard products such as soaps and margarines, or liquid

[72] Smallholder yields have been reported as being between 90% of plantation yields in Malaysia and Indonesia where smallholders are directly supported by the government or private sector. In Indonesia, unsupported smallholder may have yields 81-48% of that of plantations. See: Sonja Vermeulen and Nathalie Goad (2006). Towards Better Practice in Smallholder Palm Oil Production. IIED.

[73] FAO STAT

[74] Cramb, R, and McCarthy, J.F. 'Characterising Oil Palm Production in Indonesia and Malaysia', in Cramb, R, and McCarthy, J.F., eds., The Oil Palm Complex (Singapore, 2016) pp.27-77

[75] Vijay V., Pimm S.L., Jenkins C. and Smith S.J., 'The Impacts of Oil Palm on Recent Deforestation and Biodiversity Loss', Accessed 05/07/2017, https://doi.org/10.1371/journal.pone.0159668

[76] Mark Barthel, Steve Jennings, Will Schreiber, Richard Sheane and Sam Royston, James Fry, Yu Leng Khor, and Julian McGill (February 2018). Study on the environmental impact of palm oil consumption and on existing sustainability standards. Final Report and Appendices. European Commission, DG Environment (Study contract No.: 07.0201/2016/743217/ETU/ENV.F3)
http://ec.europa.eu/environment/forests/pdf/palm_oil_study_kh0218208enn_new.pdf

products such as oils and lubricants. Palm oil, palm kernel oil and their derivatives[77] are estimated to be present in over 50% of packaged supermarket products.[78] Some of the key uses are:

- **Palm oil:** cooking oil, and an ingredient in manufactured foods including biscuits, baking, ice cream, margarines, snacks, confectionary, dairy products and dairy replacers.
- **Palm kernel oil:** used in the oleochemical industry for making soap, detergent, toiletries and cosmetics, and for industrial use.
- **Palm kernel meal:** widely used as animal feed, and also in electricity production.
- **Biofuels:** It is estimated that approximately 15% of palm oil is used as biofuel feedstock globally, but a larger proportion of imported palm oil is used for this purpose in many European countries.[79]

China and India use palm oil predominantly for cooking oil and other culinary purposes. The growth in demand in both India and China has been correlated with increasing incomes, urbanisation and an associated dietary shift towards processed foods.[80] By contrast, palm oil is used in the EU more in manufactured products than directly for cooking, and demand growth has been partly driven as an indirect consequence of policy support for biofuels: palm oil has replaced other vegetable oils, mainly rapeseed oil, for biofuel production.

Palm oil consumption is vulnerable to competition from other vegetable oils, particularly soybean oil; the two can substitute for one another as cooking oil, biodiesel feedstock and in certain foods.

6.2 Environmental and social issues associated with palm oil production

A recent and comprehensive analysis of the environmental, social and economic impacts of palm oil cultivation is given in Barthel et al (2018).[81]

The expansion of palm oil cultivation has resulted in deforestation, particularly in Indonesia and Malaysia. Remote sensing studies of a subset of plantations in 20 countries suggests that around 45% of oil palm plantations in Southeast Asia came from areas that were forested in 1989. In other regions, the planting on forested areas appears to have been lower: 31% in South America, 7% in Africa and 2% in Central America.[82] This high rate of deforestation – with plantations replacing previously logged and unlogged forest – has led to

[77] Derivatives of palm oil and palm kernel oil are variously labelled as palmitate, palmolein, glyceryl, stearate, stearic acid, palmitic acid, palm stearine, palmitoyl oxostearamide, palmitoyl tetrapeptide-3, sodium laureth sulfate, sodium lauryl sulfate, sodium kernelate, sodium palm kernelate, sodium lauryl lactylate/sulphate, hydrated palm glycerides, etyl palmitate, octyl palmitate, palmityl alcohol.
[78] https://www.pwc.com/id/en/publications/assets/palm-oil-plantation-2012.pdf
[79] Mark Barthel, Steve Jennings, Will Schreiber, Richard Sheane and Sam Royston, James Fry, Yu Leng Khor, and Julian McGill (February 2018). Study on the environmental impact of palm oil consumption and on existing sustainability standards. Final Report and Appendices. European Commission, DG Environment (Study contract No.: 07.0201/2016/743217/ETU/ENV.F3)
[80] https://www.chathamhouse.org/sites/files/chathamhouse/publications/research/2016-01-28-agricultural-commodities-brack-glover-wellesley.pdf
[81] Mark Barthel, Steve Jennings, Will Schreiber, Richard Sheane and Sam Royston, James Fry, Yu Leng Khor, and Julian McGill (February 2018). Study on the environmental impact of palm oil consumption and on existing sustainability standards. Final Report and Appendices. European Commission, DG Environment (Study contract No.: 07.0201/2016/743217/ETU/ENV.F3)
[82] Vijay V., Pimm S.L., Jenkins C.N., Smith S.J. (2017). The Impacts of Oil Palm on Recent Deforestation and Biodiversity Loss. PLoS ONE 11/7, 1-19.

a significant loss of biodiversity, particularly of forest specialist species.[83] Converting logged or unlogged forest to palm oil plantations is a significant source of greenhouse gas emissions. When oil palm is planted on grassland or scrubland on mineral soils, there can be a net uptake of carbon dioxide.

A specific concern with deforestation is the conversion of peat land. Peat swamp forest is a critically endangered of habitat characterised by deep layers of peat soil and highly acidic water. Malaysia, Indonesia and Papua New Guinea support some of the most extensive tropical peatlands in the world, covering around 27.1 million hectares. The development of peat land can have a disproportionate impact on biodiversity and greenhouse gas emissions: peat soil contains large quantities of carbon and plays a major role in carbon sequestration. Draining peat land results in carbon dioxide emissions, and drained peat is highly flammable, releasing carbon dioxide if burnt.[84] Reliable estimates of peatland conversion suggest that 3.1 million hectares of former peatland in Malaysia, Borneo and Sumatra were covered by palm oil plantations by 2015, equivalent to 21% of the original area of peat land in these areas.[85]

The use of fire to clear forests for agriculture expansion, in particular in Kalimantan and Sumatra, is a major source of greenhouse gas emissions and air pollution, including haze. Burning is particularly severe during the droughts associated with El Niño, and drained peat land represents a particular fire hazard. The 2015 fires in Indonesia caused emissions of between 1.62[86] and 1.75[87] billion tonnes of CO_2 equivalent, and effectively tripled Indonesia's greenhouse gas emissions for that year. Approximately 19% of the land burned in Indonesia in 2015,[88] and 16.6% of fires between 2012-15 in Sumatra and Kalimantan occurred within oil palm concessions. The resulting haze, lasting three months, resulted in an estimated 100,300 excess deaths across Indonesia, Malaysia and Singapore in 2015.[89]

The economic and social impacts of palm oil are complex and contradictory. Oil palm cultivation has improved incomes for many rural people, including smallholder farmers, supported the development of rural economies, and the growth of national economies of producer countries. It has also often been associated with social concerns, the most important of which are land use rights (particularly in Indonesia,[90,91] but also in other

[83] For example, Brook, B.W., Sodhi N.S., Ng P.K.L. (2003). Catastrophic extinctions follow deforestation in Singapore. Nature 424, 420–423.
[84] Hooijer, A., Silvius, M., Wösten, H. and Page, S. (2016). PEAT-CO2, Assessment of CO2 emissions from drained peatlands in SE Asia. Delft Hydraulics report Q3943, Delft, Netherlands.
[85] Miettinen, J., Shi, C., and Liew, S.C. (2016). Land cover distribution in the peatlands of Peninsular Malaysia, Sumatra and Borneo in 2015 with changes since 1990' Global Ecology and Conservation, Volume 6, Pp 67–78
[86] Chamorro, A., Minnemeyer, S., and Sargent, S. (2017). Exploring Indonesia's Long and Complicated History of Forest Fires. World Resources Institute. http://www.wri.org/blog/2017/02/exploring-indonesias-long-and-complicated-history-forest-fires
[87] World Bank (2016). The Cost of Fire An Economic Analysis of Indonesia's 2015 Fire Crisis. Indonesia Sustainable Landscapes Knowledge Note: 1. The World Bank Group, Jakarta
[88] World Bank (2016). The Cost of Fire An Economic Analysis of Indonesia's 2015 Fire Crisis. Indonesia Sustainable Landscapes Knowledge Note: 1. The World Bank Group, Jakarta
[89] Koplitz, S.N., Mickley, L.J., Marlier, M.E., Buonocore, J.J., Kim, P.S., Liu, T., Sulprizio, M.P., DeFries, R.S., Jacob, D.J., Schwartz, J., Pongsiri, M. and Myers, S.S. (2016)'Public health impacts of the severe haze in Equatorial Asia in September–October 2015: demonstration of a new framework for informing fire management strategies to reduce downwind smoke exposure. Environmental Research Letters, 11, 094023.
[90] Siscawati, M. (2011). The Case of Indonesia: Under Soeharto's Shadow. *In The bitter fruit of oil palm: dispossession and deforestation.* World Rainforest Movement (2001), UK.
[91] Colchester, M. and Jiwan, N. (2006). Ghosts on our own land: Indonesian oil palm smallholders and the Roundtable on Sustainable Palm Oil. Forest People's Programme & Sawit Watch (2006), Moreton-in-Marsh, UK and Bogor, Indonesia.

producer countries[92]), forced and child labour (especially Indonesia and Malaysia),[93,94,] and issues relating to the terms and conditions of labour, (such as wages, health and safety and gender discrimination), [95] including within RSPO certified plantations.[96]

6.2.1 France and the EU's responses to environmental and social issues with palm oil

Two-thirds of the forest area converted to oil palm plantations is estimated to be caused by the global trade in palm oil.[97] The EU alone was estimated to be responsible for 0.9 million hectares of embodied deforestation through its imports of palm oil between 1980 and 2000.[98] In response to this, and the issues highlighted in the previous section, there are an increasing number of public, NGO and private-sector-driven initiatives and commitments relating to different aspects of palm oil sustainability.

Although there are no palm oil specific EU sustainability regulations, a recent study identified twelve EU regulations that relate to the key environmental, social, economic and trade and development aspects concerning palm oil. For example, the sustainability criteria of the EU Renewable Energy Directive exclude biofuels derived from previously forested land from counting towards the renewable energy targets. In addition, eleven UN instruments (e.g., the UNFCCC Paris Agreement), and a further three non-binding policy instruments (e.g., the Amsterdam Declaration) are relevant within the EU.[99]

In April 2017, the European Parliament made a Resolution on Palm Oil and Deforestation to ban biofuels based on palm and other vegetable oils that drive deforestation by 2021, and are considering a complete ban on the use of palm oil in biofuels by that date. In March 2018, the EC released a study that laid out policy options for the EU to tackle the impact on global deforestation caused by the trade in crop and animal products, including palm oil.[100]

Attempts by some within in the French parliament to increase the tax on palm oil imports (the 'Nutella tax') have so far failed to win sufficient support, but in response, some food manufacturers have removed the ingredient and labelled products as being palm oil-free.

Sitting within these evolving policy and regulatory landscapes – and often challenging them to do more, and at a faster pace – are an increasing number of public, NGO and private-sector-driven initiatives and commitments. These voluntary initiatives and commitments operate at different scales:

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[92] Colchester, Marcus and Sophie Chao (Eds.) (2013) Conflict or Consent? The Oil Palm Sector at a Crossroads, Forest Peoples Programme, Moreton-in-Marsh

[93] World Vision (2013). Forced, child and trafficked labour in the palm oil industry. World Vision Australia.

[94] Skinner, E.B. (2013).Indonesia's Palm Oil Industry Rife With Human-Rights Abuses: The hidden human toll of the palm oil boom. Bloomberg Business Week. https://www.bloomberg.com/news/articles/2013-07-18/indonesias-palm-oil-industry-rife-with-human-rights-abuses

[95] Amnesty International (2016), The Great Palm Oil Scandal: Labour Abuses Behind Big Brand Names. London: Amnesty International. https://www.amnesty.org/en/documents/asa21/5184/2016/en/, accessed 1 Feb. 2017.

[96] EIA (2015). Who Watches the Watchmen? Auditors and the Breakdown of Oversight in the RSPO. Environmental Investigation Agency, London.

[97] Henders, S., Persson, U.M. & Kastner, T. (2015). Trading forests: land-use change and carbon emissions embodied in production and exports of forest-risk commodities. Environmental Research Letters 10/12, 125012.

[98] Cuypers, D., Geerken, T., Gorissen, L., Lust, A., Peters, G., Karstensen, J., Prieler, S., Fisher, G., Hizsnyik, E. and van Velthuizen, H. (2013). The impact of EU consumption on deforestation: Comprehensive analysis of the impact of EU consumption on deforestation. European Union Technical Report - 2013 - 063

[99] Mark Barthel, Steve Jennings, Will Schreiber, Richard Sheane and Sam Royston, James Fry, Yu Leng Khor, and Julian McGill (February 2018). Study on the environmental impact of palm oil consumption and on existing sustainability standards. Final Report and Appendices. European Commission, DG Environment (Study contract No.: 07.0201/2016/743217/ETU/ENV.F3)

[100] COWI/AS (2018). Feasibility study on options to step up EU action against deforestation. Final Report. European Commission Directorate General for Environment (Study Contract No.: ENV.F.1/FRA/2014/0063.

- Initiatives and commitments made by or through international organisations, regional governmental bodies and institutions – e.g. the Consumer Goods Forum's 2020 Zero Net Deforestation Commitment, which aims to achieve the commitment through the responsible sourcing of key commodities such as palm oil, soy, beef and paper and to which French companies such as Carrefour, Casino, Danone, and L'Oréal are signatories.[101]
- Intra-regional initiatives and guidance – e.g. the European Sustainable Palm Oil (ESPO) initiative, EPOA (European Palm Oil Alliance) and ESPOAG (European Sustainable Palm Oil Advocacy Group).
- The policies, strategies and commitments adopted by relevant international and national industry bodies and trade associations, whose members are end users of palm oil – e.g. FASPO (French Alliance for Sustainable Palm Oil).
- Individual corporate sustainability initiatives and reports – e.g. commitments from major producer companies and retailers to produce or source palm oil responsibly and sustainably, including reports on the progress they are making and the partnerships they have formed.

A fuller analysis of the voluntary and private sector initiatives on palm oil in Europe is given in Barthel et al. (2018).[102]

Box 2. The Total refinery and France's imports of biodiesel

Biodiesel derived from palm oil has received considerable attention in France in recent years.

The French Government published a report in 2016 which estimated that France used 650,000 tonnes of palm oil in biodiesel in 2015.[103] However, there is some doubt about this estimate. Firstly, the report estimates that France imported 1,150,000 tonnes of biodiesel from all feedstocks in 2015. The report does not provide a source for this figure, and it is significantly higher than that submitted by the government authorities to EUROSTAT and UNCOMTRADE, which record that France imported 586,260 tonnes of biodiesel from all feedstocks in 2015.

Secondly, the figure given for the proportion of palm oil used in biodiesel in France (66%) is inaccurate. The Government's analysis only use HS codes that specify palm oil, and so does not include any of the palm oil that is imported as an ingredient within other products (e.g., imported soap, margarine, chocolate, cosmetics, etc). This means that the total amount of palm oil imported is significantly underestimated, and hence the proportion that is used for biodiesel will appear higher in their calculations. For 2015 (the year their study uses), the failure to include embedded palm oil suppresses the estimated imports from 220,538 tonnes with embedded palm oil to 94,418 tonnes without embedded (our calculation of what we assume their data is, as no sources or tables are provided). France also refines biodiesel from imported palm oil fractions, but this current study does not consider consumption: the Government report estimates that 253,000 tonnes of imported palm oil is refined into biodiesel within France.

[101] For more information, please see: http://www.theconsumergoodsforum.com/sustainability-strategic-focus/sustainability-resolutions

[102] Mark Barthel, Steve Jennings, Will Schreiber, Richard Sheane and Sam Royston, James Fry, Yu Leng Khor, and Julian McGill (February 2018). Study on the environmental impact of palm oil consumption and on existing sustainability standards. Final Report and Appendices. European Commission, DG Environment (Study contract No.: 07.0201/2016/743217/ETU/ENV.F3)

[103] Marie-Hélène Aubert, Jean-Jacques Bénézit, François Champanhet and Michel-Régis Talon (2016). Durabilité de l'huile de palme et des autres huiles végétales. Ministère De L'Environnement, De L'énergie Et De La Mer & Ministère De L'Agriculture, De L'Agroalimentaire Et De La Forêt.

One specific flashpoint regarding the use of palm oil in biodiesel has been the approval granted by the French government for a refinery owned by Total that will import soybean and palm oil, mainly produced in South America and Asia. Along with the concerns about deforestation and social exploitation associated with the palm oil sector, French farmers who grow local oilseed crops like rapeseed that are also used to make biodiesel, view cheaper palm oil imports as unfair competition. Many NGOs regard the refinery as being contrary to France's commitment to the UNFCCC Paris agreement and other EU and international commitments.

The Total refinery would use up to 300,000 tonnes of palm oil per year, equivalent to 10% of total palm oil consumption in Europe for biofuels in 2016 and adding an additional 30% to France's overall palm oil imports. We estimate that this would add a further 77,000 hectares (16%) to France's footprint for palm oil. The refinery is also expected to use up to 250,000 tonnes of Palm Fatty Acid Distillate (PFAD) each year, a by-product of palm oil refining.

6.2.2 Certification

The two major certification schemes for palm oil are the Roundtable on Sustainable Palm Oil (RSPO), which is used principally in consumer goods, and the International Sustainability and Carbon Certification (ISCC), which predominates in the biofuel sector. The two schemes have broadly similar requirements and procedures (including third party independent audits), however the RSPO has stronger requirements on social issues whilst the ISCC has stricter controls on deforestation.[104]

RSPO has been conspicuously successful in achieving scale when compared to sustainability certification schemes in most other commodities. The RSPO currently has 2,879 members and RSPO certified palm oil accounted for 17% of global production in 2016.[105] Although the RSPO does not provide traceability data, France had the fourth largest number of facilities certified to handle RSPO certified palm oil in 2015 (i.e., chain of custody certificates), behind only the UK, Germany and the Netherlands.[106]

There are significant and recurrent doubts as to whether the RSPO's Principles and Criteria are sufficiently robust, and the quality and transparency of the auditing system. High profile investigations of certified plantation companies have revealed actions that are in direct contradiction of the RSPO standard.[107] The RSPO is currently revising its Principles and Criteria in response to some of these issues.

Bothe Indonesia and Malaysia have developed palm oil certification systems in recent years. The Indonesian Sustainable Palm Oil Foundation (ISPO) was established in 2009 to implement a certification policy system designed by the Indonesian Ministry of Agriculture. The ISPO system is mandatory and applies to all oil palm growers operating in

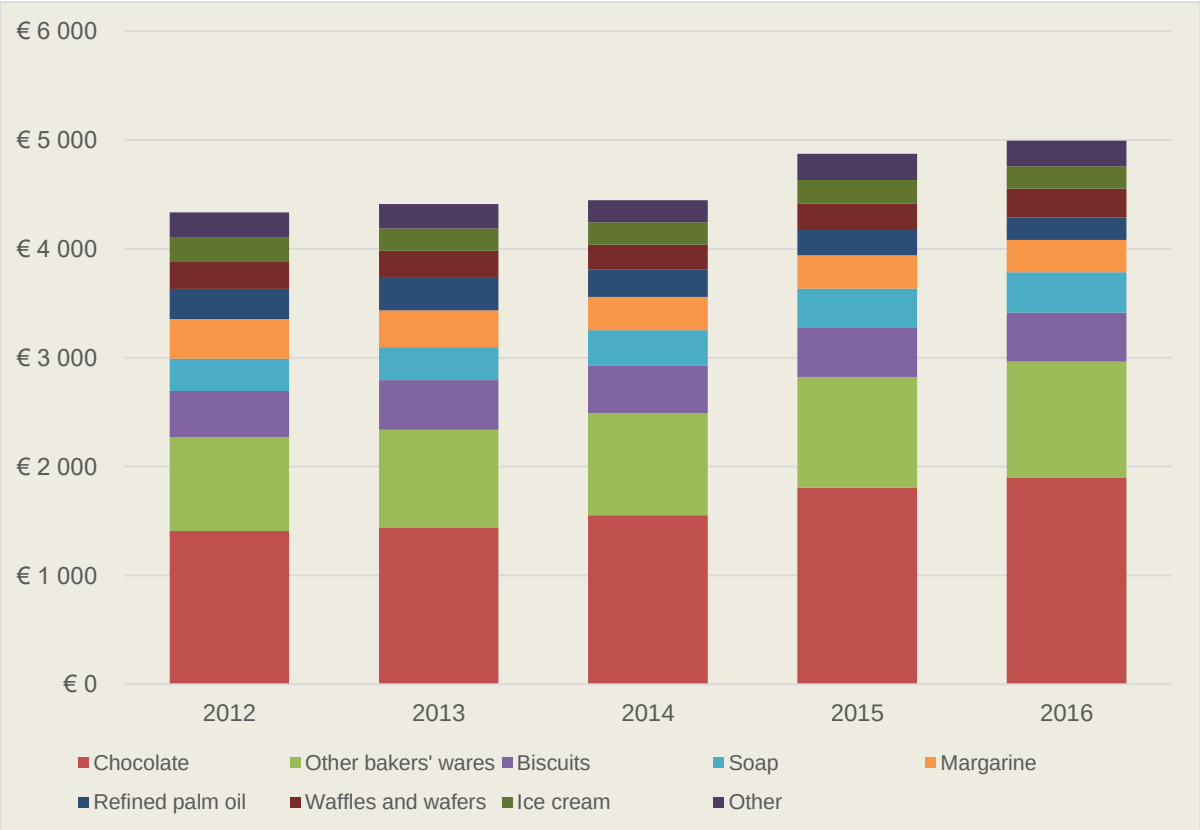
[104] Mark Barthel, Steve Jennings, Will Schreiber, Richard Sheane and Sam Royston, James Fry, Yu Leng Khor, and Julian McGill (February 2018). Study on the environmental impact of palm oil consumption and on existing sustainability standards. Final Report and Appendices. European Commission, DG Environment (Study contract No.: 07.0201/2016/743217/ETU/ENV.F3)
[105] http://www.rspo.org/about Last accessed 07 December 2016
[106] Mark Barthel, Steve Jennings, Will Schreiber, Richard Sheane and Sam Royston, James Fry, Yu Leng Khor, and Julian McGill (February 2018). Study on the environmental impact of palm oil consumption and on existing sustainability standards. Final Report and Appendices. European Commission, DG Environment (Study contract No.: 07.0201/2016/743217/ETU/ENV.F3)
[107] See: EIA (2015). Who Watches the Watchmen. Auditors and the Breakdown of Oversight in the RSPO; and Amnesty International (2016). The Great Palm Oil Scandal: Labour Abuses Behind Big Brand Names.

Indonesia, from large plantation companies to smallholders, although requirements for each vary. ISPO audits have been conducted by independent certification bodies since May 2012. The Malaysian Sustainable Palm Oil (MSPO) standard is a national certification standard created by the Malaysian government and developed with input from various stakeholders in the palm oil industry. It was first launched in November 2013, and officially came into implementation in January 2015. There are plans to merge ISPO and MSPO to create a coordinated 'Council of Palm Oil Producing Countries' (CPOPC). It is important to note that neither standard has criteria preventing deforestation, other than those instances where deforestation would be illegal.

6.3 France's imports of palm oil

France imported an average of € 4.6 billion of palm oil, palm kernel oil and meal, products containing them or embedded in the production process each year between 2012-16. There was a steady increase in the value of this trade over time, from € 4.3 billion in 2012 to nearly € 5 billion in 2016 (Figure 25). Over 90% of this value was in products containing oil palm fractions as an ingredient, or embedded in production processes, in particular in chocolate and bakery products.

Figure 25: The value of France's imports of palm oil and major products containing palm oil from 2012-16 (million €)



The most important categories of imported palm oil and products containing palm oil by quantity are 'other bakers wares' which accounted for 20% of the quantity of all oil palm product imports, chocolate (19% of the net weight of imports), refined palm oil (15%) and margarine (11%). However, as the imports include oil palm fractions (palm oil, palm kernel oil and palm kernel meal), as well as products that contain these raw materials as ingredients (e.g., soap, margarine), the import numbers have been converted to represent the quantity of oil palm fractions in the imports (see Appendix 5 for the conversion factors used in these calculations).

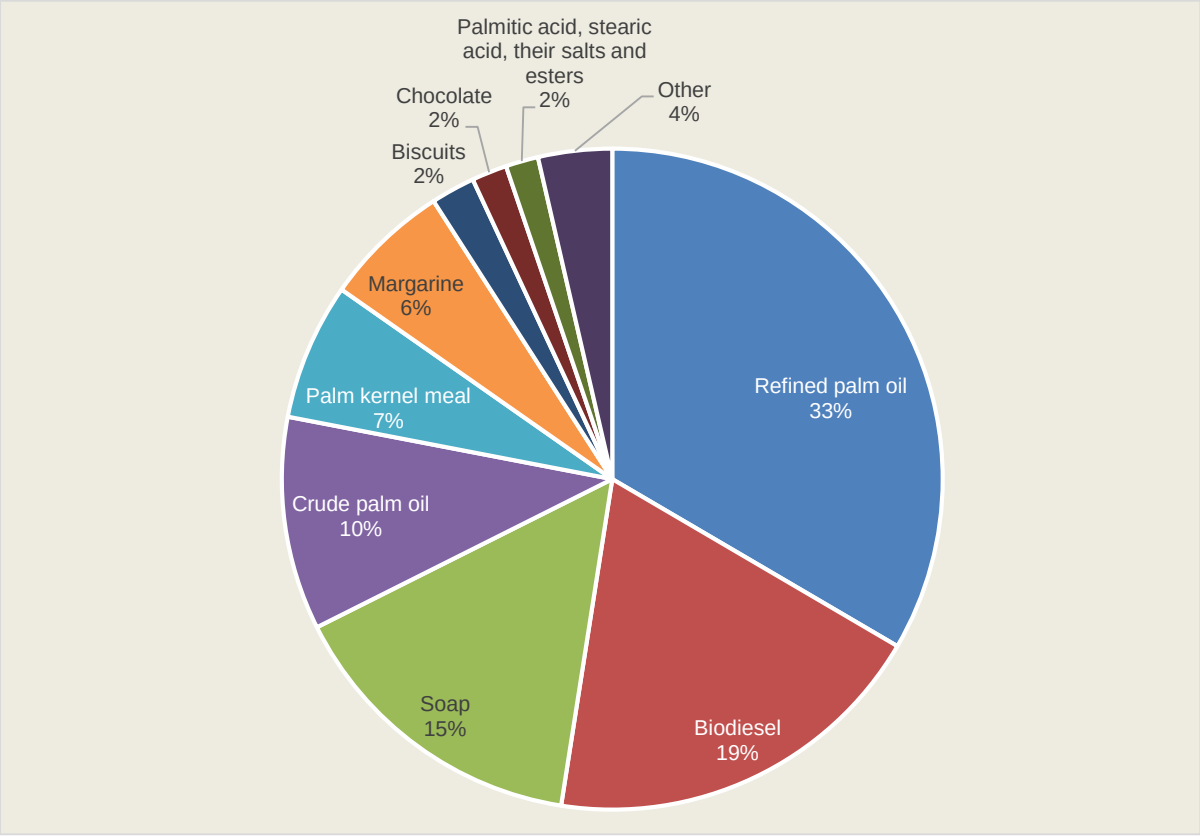
The amount of palm oil, palm kernel oil and palm kernel meal required to supply France's imports averaged 0.97 million tonnes per year between 2012-16 (Table 9, and see Appendix 5 for details of the HS codes used in these calculations). In line with the value of imports, the quantity of palm oil imported increases over the period.

Corrected for palm oil content, refined palm oil was the main import by quantity (330,000 tonnes, 29% of the total) over the whole period, followed by biodiesel (190,000 tonnes), soap (150,000 tonnes, 15%) and crude palm oil (100,000 tonnes, 10%, Figure 26).

Note that these figures do not represent end use, with for example, imported palm oil being refined within France to produce biodiesel, being used as an ingredient in the domestic manufacture of products (e.g., soap, margarine), or in production processes (e.g., palm kernel meal used as animal feed). Note also that not all possible products containing palm oil are included. For example, palm oil is sometimes used in the manufacture of paints and solvents, however, many other oils and oil derivatives can be used for these purposes (often manufacturers are unaware of the origin of the oleochemicals they use), and so it is difficult to assign a proportion of products these to palm oil.

France's pattern of imports is different from some other EU countries, such as the Netherlands and the UK, which import a larger proportion of crude palm oil and palm kernel oil and refine it themselves, thus avoiding the higher tariffs on refined oils in consumer markets.[108]

Figure 26: Quantity of France's palm oil imports by major product categories 2012-16, converted to palm oil content.



[108] WWF and RSPB (2017). Deforestation and Social Risks in the UK's Commodity Supply Chains. This report, and the summary report 'Risky Business', are available at https://www.wwf.org.uk/riskybusiness

Table 9: France's palm oil imports 2012-16 by quantity of palm oil, palm kernel oil and palm kernel meal (tonnes)

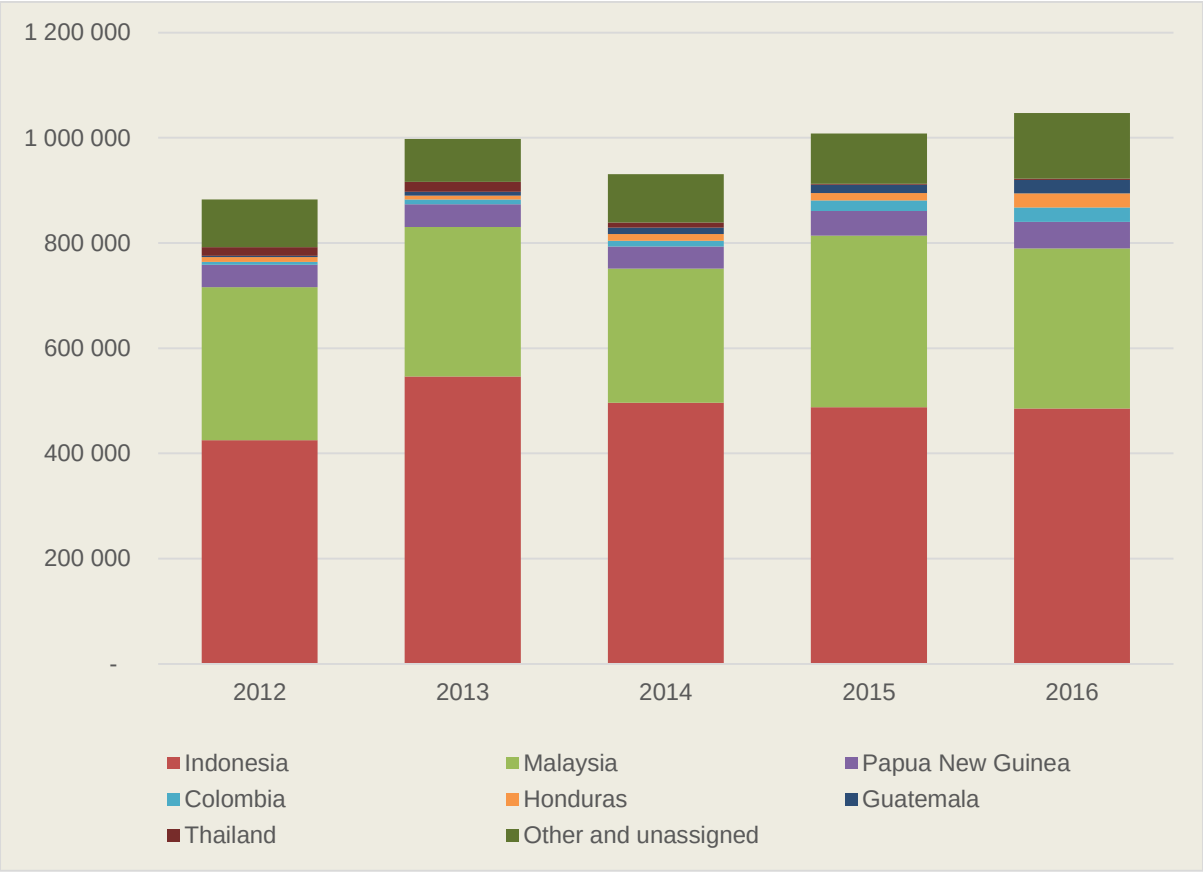
		Quantity (tonnes)						
HS code	**Product name**	**2012**	**2013**	**2014**	**2015**	**2016**	**Average**	**%**
151190	Refined palm oil	306,993	379,131	329,669	326,984	284,235	**325,402**	**33.4%**
3826	Biodiesel	99,281	148,299	186,258	194,891	297,870	**185,320**	**19.0%**
3401	Soap	131,785	133,715	144,975	159,840	165,814	**147,225**	**15.1%**
151110	Crude palm oil	114,848	110,452	88,809	95,271	97,847	**101,446**	**10.4%**
230660	Palm kernel meal	91,420	77,863	40,151	69,232	47,285	**65,190**	**6.7%**
1517	Margarine	63,882	61,704	59,353	59,173	56,926	**60,208**	**6.2%**
190531	Biscuits	20,020	20,417	20,607	21,670	22,247	**20,992**	**2.2%**
1806	Chocolate	15,843	16,724	16,775	17,200	17,434	**16,795**	**1.7%**
291570	Palmitic acid, stearic acid, their salts and esters	15,633	14,754	13,606	16,295	17,403	**15,538**	**1.6%**
	Other	22,944	34,861	30,684	47,680	39,639	**35,162**	**3.6%**
Totals		**882,649**	**997,921**	**930,888**	**1,008,235**	**1,046,698**	**973,278**	**100%**

6.4 Provenance of France's palm oil imports

Between 2012 and 2016, France imported palm oil, palm kernel oil and meal, products containing them or embedded in the production process from a total of 162 territories. Due to the preponderance of manufactured goods, the EU dominates France's imports by quantity, accounting for over 73% of the oil palm raw materials within imports. Nearly half of this (34% of the total quantity of oil palm raw material) is imported from the Netherlands.

However, few of the countries from which France imports products containing palm oil grow oil palm. With provenance adjusted for to account for these indirect imports (see Section 2.2), the provenance of France's imports are dominated by Indonesia (an average of 488,000 tonnes per year, accounting for 50% of the total oil palm fractions imported) and Malaysia (292,000 tonnes, 30%, see Figure 27). Papua New Guinea, with an average of 45,000 tonnes (less than 5% of the total) is the third largest supplier.

Figure 27: The quantity of France's imports of palm between 2012-16 adjusted for provenance of third-party trade and palm oil content of imports (tonnes)



6.5 France's palm oil footprint

To estimate the land area required to supply France's palm oil, palm kernel oil and meal, products containing them or embedded in the production process were firstly assigned to palm fractions, i.e. crude palm oil, palm kernel oil and palm kernel meal. The imported fractions were allocated to yields that are specific to the fraction, which are as follows: palm oil, 3.7 tonnes per hectare, palm kernel oil, 0.5 tonnes per hectare, and palm kernel meal, 0.54 tonnes per hectare.[109]

[109] Various sources, including RSPO

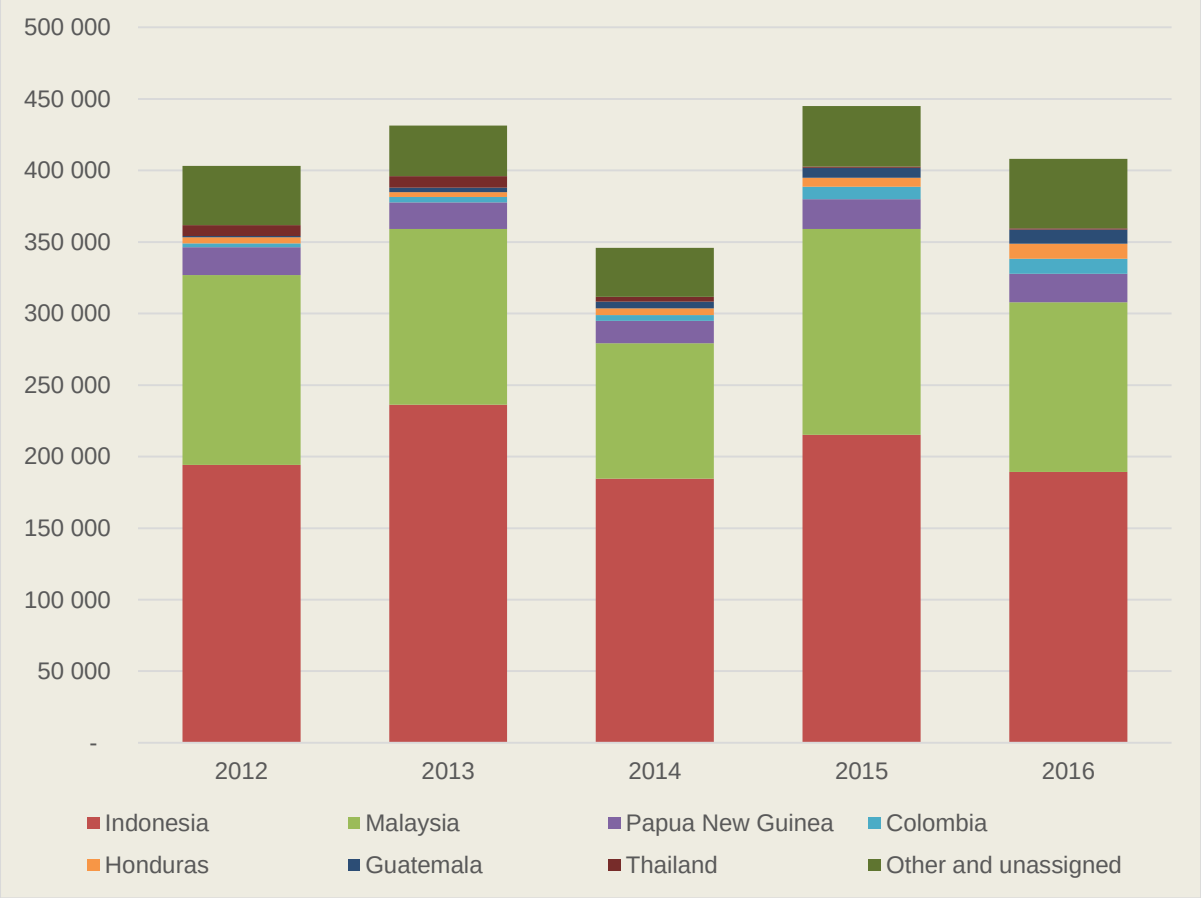
The estimated land area required to satisfy France's demand for oil palm fractions was 407,000 hectares per year between 2012-16 (Figure 28). This is equivalent to approximately 2.5% of the global harvested area of oil palm.

Indonesia dominates the land footprint, with an average of 204,000 hectares each year (50% of the total), with Malaysia contributing the second largest area (123,000 hectares, 30%) and Papua New Guinea ranking third with 19,000 hectares (5%).

There is no clear trend in the land area required to supply France's imports of oil palm fractions over the period, but there was a notable dip in 2014, partly a result of a slight decrease in overall oil palm imports (see Figure 27) and partly because of a larger reduction in imports of palm kernel oil (which has the lowest yield of any oil palm fraction, and hence contributes disproportionately to the footprint) in that year.

Our estimate is that the recently approved Total refinery that aims to use up to 300,000 tonnes of palm oil per year (see Box 2) would add a further 77,000 hectares to France's footprint for palm oil.

Figure 28: The estimated land footprint of France's imports of palm oil between 2012-2016 (hectares)



7 Soy

7.1 Trade and uses of soy

7.1.1 Introduction

Soy (or soybean, or soya), *Glycine max*, is a leguminous species native to East Asia, grown for its edible bean. Cultivation is successful in climates with hot summers, with optimum growing conditions in mean temperatures of 20-30°C. It can grow in a wide range of soils, with optimum growth in moist alluvial soils with a good organic content. Soy, like most legumes, fixes nitrogen via a symbiotic relationship with bacteria. It is grown widely in Asia, North, Central and South America.

The soybean contains 38% protein (double that of pork, and treble that of eggs), a wide range of essential amino acids, a high proportion of unsaturated fat, and produces more protein per hectare than any other major crop. This high protein content has resulted in soy being a major animal feed ingredient.

The main uses of soy are:

- **Soy oil**: Soybeans contain approximately 18% oil, which is refined and used as vegetable oil for cooking and in a wide variety of processed foods.[110]
- **Soy meal**: This is the material remaining from oil extraction, which can contain up to % protein.[111] The meal is 'toasted' (steam treated) and ground and then is almost entirely used in livestock feed.
- **Direct human consumption**: Soy is used directly in a range of food – especially in China, Japan and Indonesia – including soy sauce, tempeh, tofu, soy flour, soy milk, textured vegetable protein, and edamame.

7.1.2 Production

Soy production has increased eightfold since the 1960's and has doubled since 2000. This growth in production has been dominated by three countries: the USA, Brazil, and Argentina, which together account for over 80% of global production. The rate of growth has been particularly rapid in South America, with more than half of Argentina's agricultural area now used for the cultivation of soy.[112]

Global soybean production is projected to increase by around 23% over the next decade, growing on average at 2.5% per year, compared to 5% during the past decade. Behind the slowdown in the growth rate are a marked decrease in the yearly expansion of area planted to soy in Argentina and Brazil, and a stagnation of planted area in the USA.[113] Growth in production is likely to come primarily from expanding the cultivated area, as soy has relatively limited potential for yield increases.[114] South American producers are likely to cover most of the expansion of soy production and exports.[115] Developing countries are

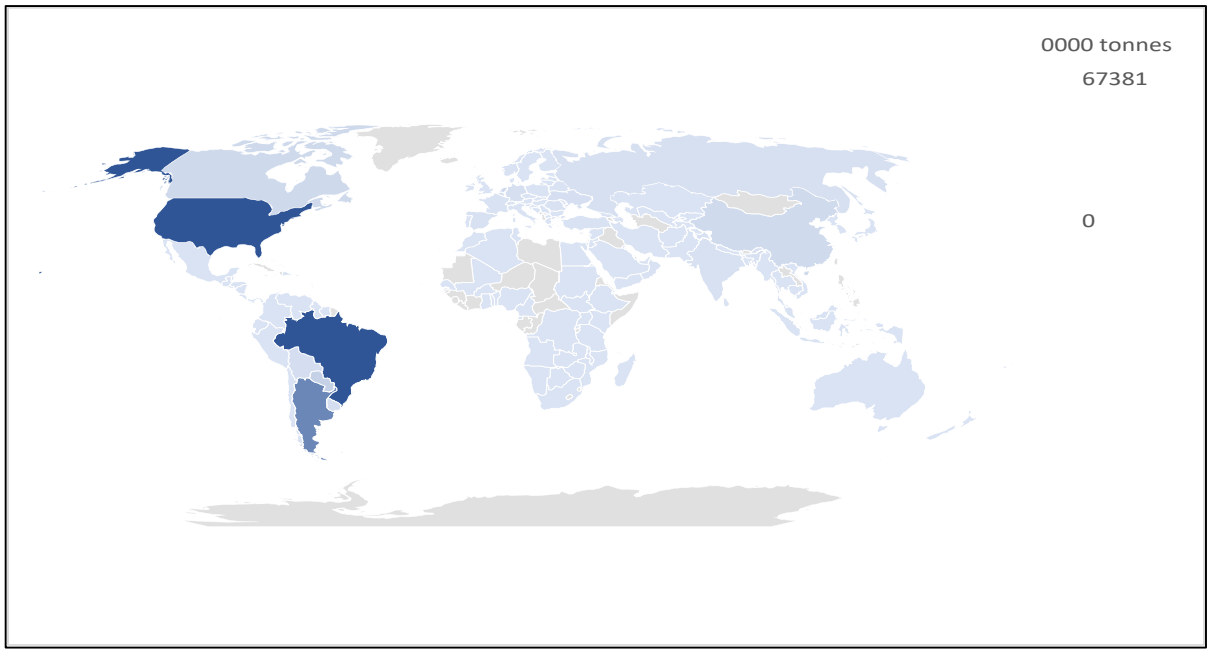
[110] U.S. Soybean Export Council conversion table, see: https://ussec.org/resources/conversion-table
[111] Cromwell, G. L., 2012. Soybean meal - An exceptional protein source. Soybean Meal InfoCenter, Ankeny, IA
[112] García-Lopez, G.A. and Arizpe, N. (2010), 'Participatory processes in the soy conflicts in Paraguay and Argentina', Ecological Economics, 70(2), 196-206.
[113] http://siteresources.worldbank.org/INTAFRICA/Resources/257994-1215457178567/Soybean_Profile.pdf
[114] https://www.chathamhouse.org/sites/files/chathamhouse/publications/research/2016-01-28-agricultural-commodities-brack-glover-wellesley.pdf
[115] http://siteresources.worldbank.org/INTAFRICA/Resources/257994-1215457178567/Soybean_Profile.pdf

likely to account for the majority of additional soy meal consumption due to increased livestock production, driven by the trend of more meat-rich diets.

7.1.3 Global trade

Soy is the most successful oilseed on world markets with an estimated 60% share of global oilseed production. About two-thirds of the global soybean harvest is traded internationally,[116] which amounted to 217 million tonnes of soybean, soy meal and oil in 2016. Brazil, the USA and Argentina dominate international exports, with their exports an order of magnitude greater than other exporting countries such as Paraguay, India and Bolivia (Figure 29). The soy products exported differ between countries: the United States, Brazil and Paraguay export comparatively more beans, while Argentina and India perform most of the crushing of beans domestically, and thus export comparatively more meal and oil.

Figure 29: Global exports of soybeans, soy meal and soy oil (million tonnes)[117]



China dominates global imports of beans, oil and meal, with the EU also importing significant quantities (

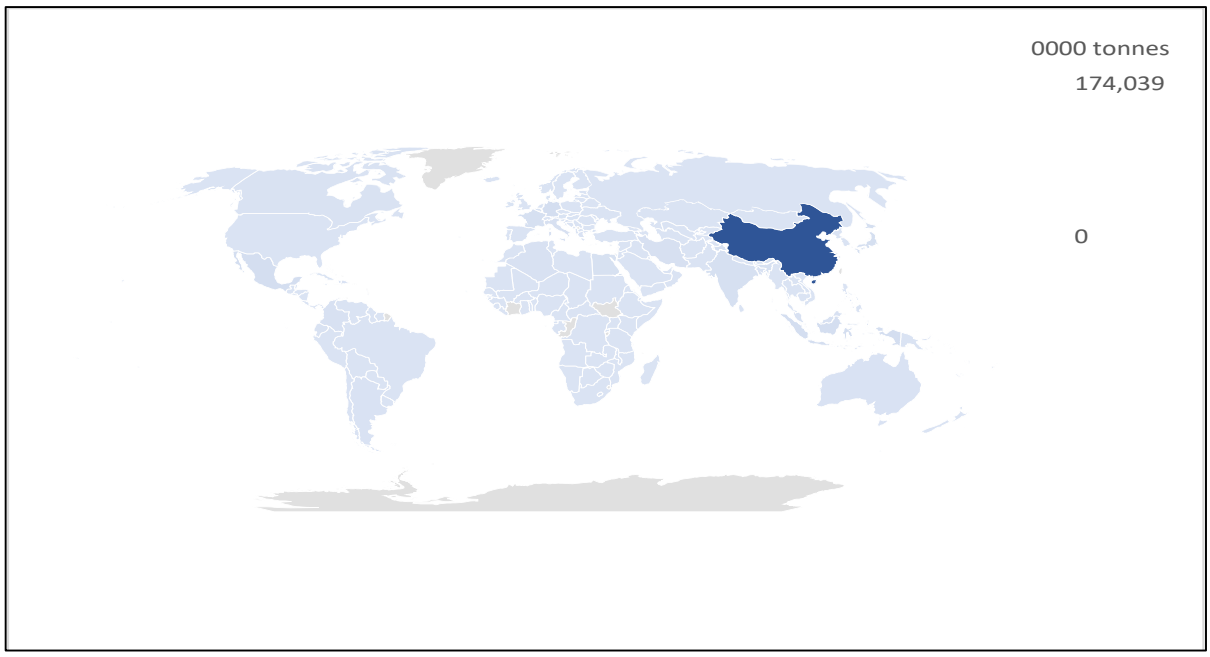
Figure ***30***). China's imports have increased sevenfold between 2000 and 2014, much of this demand being for animal feed in pig and poultry industries. Demand has been primarily driven by a general deficit in protein crop production and by expanding livestock production, together with biofuel policy.

World prices of soy have fallen by about half since 2011, due to the end of the commodities price boom of the 2000's together with several years of strong harvests.[118]

Compared with trade in other agricultural commodities, trade in whole oilseeds, particularly soybeans, is relatively unrestricted by tariffs. Oilseed meals, and particularly vegetable oils, typically have higher tariffs.[119]

[116] http://www.bothends.org/uploaded_files/document/Soy_Barometer2014_ENG.pdf
[117] Source: FAOSTAT
[118] http://www.reuters.com/article/research-and-markets-idUSnBw295291a+100+BSW20150529
[119] http://www.ers.usda.gov/topics/crops/soybeans-oil-crops/trade.aspx

Figure 30: Global imports of soybeans, soy meal and soy oil (million tonnes)[120]



7.1.4 End uses

Close to 85% of the global soybean crop is crushed for oil and meal, with approximately 70% of the total used to feed livestock.[121] In the EU this figure rises to around 90%. Soy meal accounts for over 60% of the world's production of vegetable and animal meal and occupies a prominent position among protein feedstuffs used for the production of feed concentrates.

Soybean oil is the second most important vegetable oil (after palm oil), accounting for 25% of global vegetable/animal oils and fats consumption.[122] Soy oil is used in food products, cosmetics, detergents, industrial products, and increasingly it is being used to produce biodiesel (especially in the USA). A valuable by-product from the crushing process is soy lecithin. It is an effective emulsifying agent in food products such as chocolate, biscuits, peanut butter and coffee creamer, but also in cosmetics, textiles, paints, coatings and waxes.[123]

Only about 6% of the global production is directly used in food products, and this predominantly in Asia, with another small share of beans used in animal feed prior to extracting the oil ('full-fat soybeans').[124]

7.2 Environmental and social issues associated with soy production

The expansion of soy production in South America has been strongly associated with deforestation and other natural habitat destruction.[125] One recent study estimated that soy

[120] Source: FAOSTAT
[121] http://www.bothends.org/uploaded_files/document/Soy_Barometer2014_ENG.pdf
[122] http://siteresources.worldbank.org/INTAFRICA/Resources/257994-1215457178567/Soybean_Profile.pdf
[123] http://www.bothends.org/uploaded_files/document/Soy_Barometer2014_ENG.pdf Note that there is no separate HS code for lecithin, but its imports are included within higher level codes for soy oil.
[124] http://www.bothends.org/uploaded_files/document/Soy_Barometer2014_ENG.pdf
[125] Nepstad, D.C, et al. (2006), 'Globalisation of the Amazon Soy and Beef Industries: Opportunities for Conservation', Conservation Biology 20: 6

production accounted for 0.6 million hectares of land use change per year between 2000-11 in Brazil, Argentina, Paraguay and Bolivia. The same study estimated that 0.4 million hectares per year of this land use change was embedded in global trade.[126] Seventy per cent of the Saladillo wetlands in Cordoba, Argentina have been lost as a result of the construction of canals for soy cultivation.[127] Soy can also act as an indirect driver of deforestation, displacing cattle ranching towards the forest frontier.[128]

Soybeans and derived products were estimated to be responsible for 4.4 million hectares of the 9 million hectares of deforestation embodied in crop and livestock products imported into the EU between 1990 and 2008.[129] This estimate however does not include the role of soy as an indirect driver of deforestation via its impact on land prices.[130]

The expansion of soy cultivation has led to land rights issues with local communities and indigenous groups, sometimes escalating into violent conflict. Soybean expansion has been associated with poor labour conditions and violations of human rights in Brazil[131] and Paraguay.[132] The fertilisers and pesticides used in soy cultivation could pose widespread health risks to people living near soy farms.[133]

7.2.1 France and the EU's responses to environmental and social issues with soy

Many of the same instruments described for palm oil (see Section 6.2.1) also include or are applied to soy. These include EU and international policies, such as the EU Renewable Energy Directive, the UNFCCC Paris Agreement, the Amsterdam Declaration, discussions in the European Parliament over banning the use in biofuels of vegetable oils that drive deforestation, and voluntary initiatives such as the Consumer Goods Forum.

In 2014, the French Government launched a plan to promote the cultivation of high protein crops for livestock, aimed at reducing its reliance on imports of mostly South American soybeans. This was principally driven by fears that soy production would in the long term be diverted to meet increasing Asian demand, rather than for environmental reasons. French farmers have accused the EU of undermining domestic production of oil crops by accepting cheap (and genetically modified) imports of US soy.

Internationally, one of the most significant initiatives to reduce deforestation associated with soy production is the Amazon Soy Moratorium. The Moratorium began in 2006 as a voluntary agreement designed to ensure that traders do not buy soy grown in the Amazon on land deforested after 2006. The commitment was renewed in 2008 with the participation of the Brazilian government, and since then has been renewed annually. In May of 2016, the agreement was renewed indefinitely '*until it is no longer necessary*'. The Moratorium is considered to have been successful in halting deforestation in the Brazilian Amazon: before

[126] Henders, S., Persson, U.M. & Kastner, T. (2015). Trading forests: land-use change and carbon emissions embodied in production and exports of forest-risk commodities. Environ. Res. Lett. 10.
[127] http://www.bothends.org/uploaded_files/document/Soy_Barometer2014_ENG.pdf
[128] Barona, E., et al. (2010) 'The Role of Pasture and Soybean in Deforestation of the Brazilian Amazon', Environmental Research Letters, 5 (2).
[129] EU (2013). Comprehensive analysis of the impact of EU consumption of imported food and non-food commodities and manufactured goods on deforestation. http://ec.europa.eu/environment/forests/pdf/1.%20Report%20analysis%20of%20impact.pdf
[130] Richards, P.D., Walker, R.T., Arima, E.Y. (2014). Spatially complex land change: The Indirect effect of Brazil's agricultural sector on land use in Amazonia. Global Environmental Change 29: 1–9.
[131] *https://milieudefensie.nl/publicaties/factsheets/factsheet-2-dutch-soy-coalition-modern-slavery-in-brazil*
[132] Hobbs, J. 2012. Paraguay's destructive soy boom. The New York Times July 2 2012. http://www.nytimes.com/2012/07/03/opinion/paraguays-destructive-soy-boom.html
[133] http://www.bothends.org/uploaded_files/document/Soy_Barometer2014_ENG.pdf

the moratorium, 30% of soy expansion occurred through deforestation, compared with just one per cent after the Moratorium came into effect.[134] However, habitat destruction remains unmanaged in other soy sourcing areas such as in the *Cerrado*, and indeed conversion of *Cerrado* may have been exacerbated by the Moratorium.

In 2017, a grouping of NGOs, including WWF, published the Cerrado Manifesto. The manifesto was a call to halt conversion of *Cerrado* vegetation in Brazil, the main causes of which are expanding agribusiness, and particularly soy cultivation. Over 60 companies recently signed a Statement of Support for the Cerrado Manifesto, committing them to work with local and international stakeholders to halt deforestation and native vegetation loss in the Cerrado, including support for implementation of Brazil's Forest Code.

7.2.2 Certification

The most prominent soy certification scheme is the Roundtable on Responsible Soy (RTRS). RTRS members include producers, industry, trade & finance, and civil society organisations. The scheme includes a standard with independent third-party verification, and chain of custody arrangements that include segregation, mass balance or a credit system.

The RTRS standard excludes deforestation of High Conservation Value Forest[135] after 2009, and has social requirements that are at and above national legal minimum requirements for issues such as land rights and workers' terms and conditions.[136] A revised version of the standard effectively precludes the conversion of any natural vegetation from June 2016 onwards. A new module related to non-GM production was approved in 2018.

The first RTRS-certified soy came on the market in June 2011. Over 10,000 producers in Argentina, Brazil, Canada, China, India and Paraguay produced around 2.3 million tonnes of RTRS certified soy in 2015[137], which is approximately 0.7% of global production. Despite this modest volume, the amount of RTRS certified soy is increasing rapidly: in 2011 the amount of RTRS certified soy was around 400,000 tonnes.[138] Most of the companies buying credits are based in the EU.

A second certification scheme, the ProTerra Certification Program, was created in 2006 within Cert ID (part of Global ID Group), a global certification body that provides accredited certification programs to the food and agricultural industry. It was transferred in full to the ProTerra Foundation in 2012. The standard includes sustainability criteria and excludes genetically modified (GMO) soy. Certification of producers, handling, transport and storage, and processing and manufacturing is possible, involving independent third party verification. About 95% of the volume of certified ProTerra soy is from Brazil. The volume of Proterra certified soy has dropped from 4.5 million tonnes in 2007 to 2.8 million tonnes in 2014.[139]

In addition to these soy-specific multi-stakeholder standards, there are a numerous proprietary standards (e.g., ADM's Responsible Soy Standard), the FEFAC guidelines (which benchmark standards), and the FEMAS standard (which is in essence a food quality

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[134] Gibbs, H. K., L. Rausch, J. Munger, I. Schelly, D. C. Morton, P. Noojipady, B. Soares-Filho, P. Barreto, L. Micol, and N. F. Walker. 2015. "Brazil's Soy Moratorium: Supply chain governance is needed to avoid deforestation." Science 347(6220): 377-378

[135] High Conservation Value Forests are those that contain one or more outstanding biological, ecosystem, social or cultural value. First defined in the Forest Stewardship Council standard for sustainable forest management, the definition is now used in sustainability initiatives in many sectors.

[136] Jason Potts, Mathew Lynch, Ann Wilkings, Gabriel Huppé, Maxine Cunningham, Vivek Voora (2014). State of Sustainability Initiatives Review. IISD & IIED.

[137] http://www.responsiblesoy.org/mercado/volumenes-y-productores-certificados/?lang=en

[138] WWF (2016). Soy Scorecard: Assessing the use of responsible soy for animal feed. http://d2ouvy59p0dg6k.cloudfront.net/downloads/wwf_soy_scorecard_2016_r6.pdf

[139] http://www.proterrafoundation.org/index.php/certified-volumes Last accessed 06 June 2016.

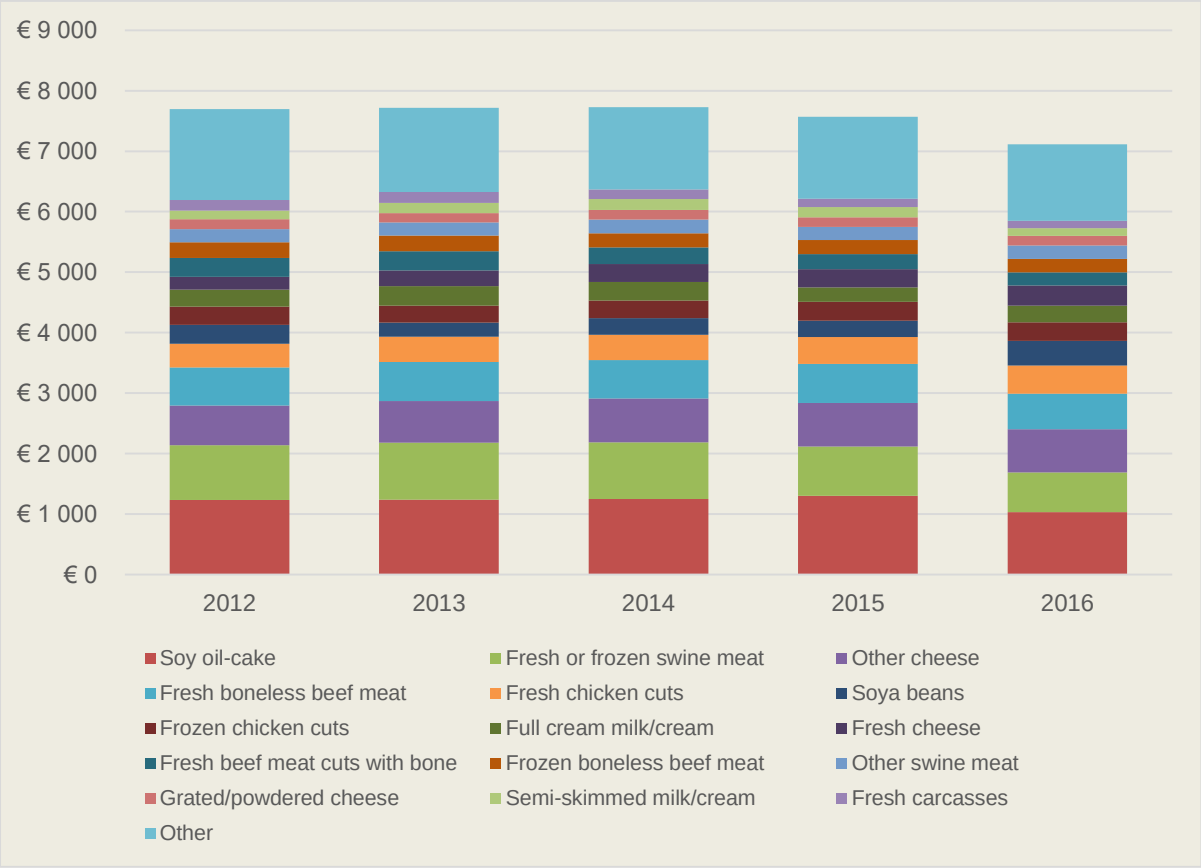
benchmark with an add-on responsible soy module). These standards focus on legal compliance, good agricultural practice, and decent treatment of workers, but the provisions in these standards regarding deforestation and social issues are weaker than that of RTRS and ProTerra. For example, FEFAC compliant standards need only exclude illegal deforestation, thus allowing legal deforestation. They are significantly less transparent than RTRS and ProTerra.

Non soy-specific standards, including organic standards, are also used in the sector.

7.3 France's imports of soy

France imported an average of € 7.6 billion of soy beans, meal or oil, products containing soy (e.g., soy sauce) or embedded in production process (e.g., pig meat) each year between 2012-16. There has been a steady decline in the value of these imports, from € 7.7 billion in 2012 to € 7.1 billion in 2016 (Figure 31). There are significant contributions to the value of imports from raw materials, especially soil oil cake (meal), the import of which averages €1.2 billion each year; and soy embedded as feed used to produce pig meat (€ 0.85 billion), cheeses (€ 0.7 billion), fresh beef (€ 0.6 billion) and fresh chicken (€ 0,5 billion).

Figure 31: The value of France's imports of soy and major products containing soy from 2012-16 (million €)



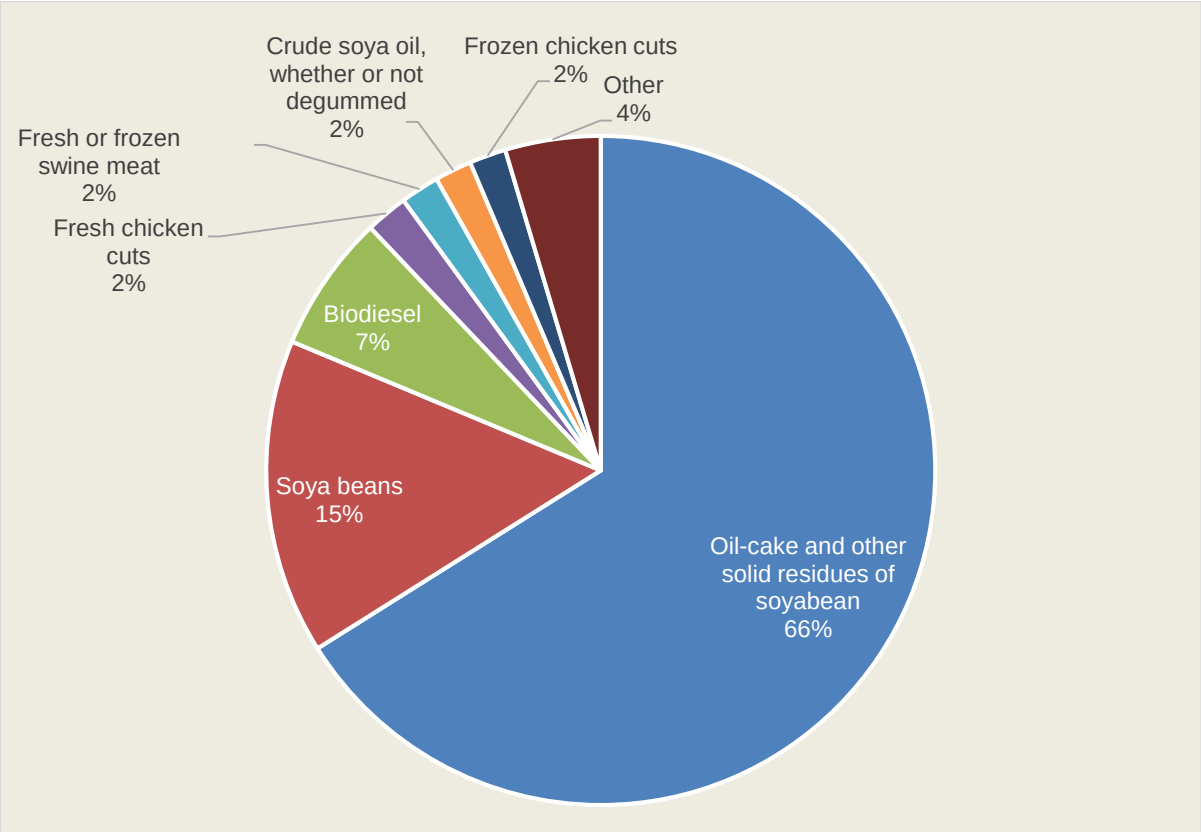
When adjusted for the soy content of imported products (see Appendix 6 for the conversion factors used), an average of 4.8 million tonnes of soy were imported each year between 2012-16 (Table 10), as soybeans, soy oil, soy meal, as an ingredient or embedded within imported products. Note that soy meal is commonly used as feed in aquaculture, but this use has not been included within this study as we were unable to find a reliable estimate for imports of fish produced in aquaculture systems. For similar reasons, France's imports of lecithin (which are approximately 20,000 tonnes per year), and which can be made from a variety of edible oils, including soy, is not included in the present study.

Table 10: France's soy imports 2012-16 by quantity of soy meal, oil and beans (tonnes)

		Quantity (tonnes)						
HS code	**Product name**	**2012**	**2013**	**2014**	**2015**	**2016**	**Average**	**%**
230400	Oil-cake and other solid residues of soybean	3,268,291	3,052,982	3,177,031	3,475,731	2,969,273	**3,188,662**	**66.1%**
120190	Soy beans	646,618	526,228	700,475	718,288	1,081,491	**734,620**	**15.2%**
3826	Biodiesel	250,516	213,099	288,224	265,292	581,223	**319,671**	**6.6%**
20713	Fresh chicken cuts	87,904	92,885	96,560	104,055	111,540	**98,589**	**2.0%**
203	Fresh or frozen swine meat	94,362	96,013	96,236	91,455	74,225	**90,458**	**1.9%**
150710	Crude soy oil, whether or not degummed	169,494	76,311	63,535	65,209	56,321	**86,174**	**1.8%**
20714	Frozen chicken cuts	86,136	78,924	82,534	90,391	89,657	**85,528**	**1.8%**
Other	Other	264,163	232,254	215,868	202,042	197,603	**222,386**	**4.6%**
Totals		**4,867,484**	**4,368,696**	**4,720,463**	**5,012,463**	**5,161,332**	**4,826,088**	**100%**

Soy meal ('oil cake') is by far the main import, at 3.2 million tonnes and accounting for two thirds of the quantity of soy in all imports (Figure 32), with whole soy beans (0.73 million tonnes, 15%) and biodiesel derived from soy oil feedstock (0.32 million tonnes, 7%) also making major contributions. Note that these figures do not represent end use, with for example, imported soy meal being used as feed for France's domestic livestock production.

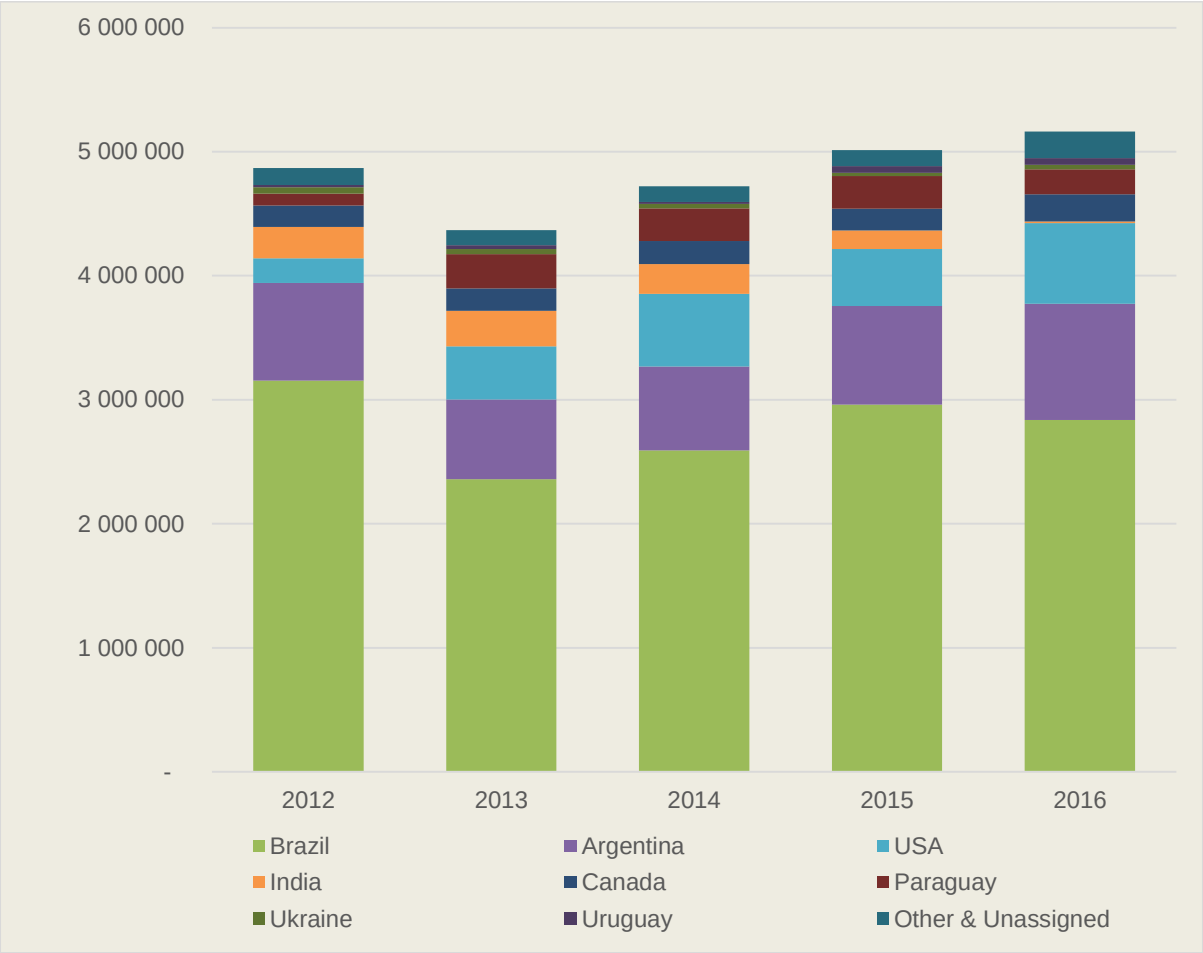
Figure 32: Quantity of France's soy imports by major product categories 2012-16, converted to soy content.



7.4 Provenance of France's imports of soy

Between 2012 and 2016, France imported soybeans, soy oil and meal, products containing them or with soy embedded in the production process from a total of 120 territories. Of major soy exporting countries, only Brazil features in the top five exporters to France. with an average of 47% of the imports, and EU countries contributing a further 32%. EU countries are not major producers of soy for the export market, and when the figures are adjusted for provenance (see Section 2.2), Brazil dominates imports, exporting an average of 2.8 million tonnes of soy beans, oil and meal per year to France (58% of the total, Figure 33), Argentina (0.78 million tonnes, 16%) and the USA (0.46 million tonnes, 10%) are also major sources of France's soy imports. There has been a marked increase in soy imported from the USA (199,000 tonnes in 2012 to 650,000 tonnes in 2016) over the period.

Figure 33: The quantity of France's imports of soy between 2012-16 from major exporting countries (tonnes), adjusted for soy content and provenance



7.5 France's soy footprint

To estimate the land area required to supply France's soybeans, soy oil, soy meal, products containing them or that have them embedded in the production process were firstly assigned to soy fractions, i.e. beans, oil and meal. For example, the quantity of soy embedded in poultry products is assigned to soy meal, whereas the quantity of soy used as a biodiesel feedstock is assigned to soy oil.

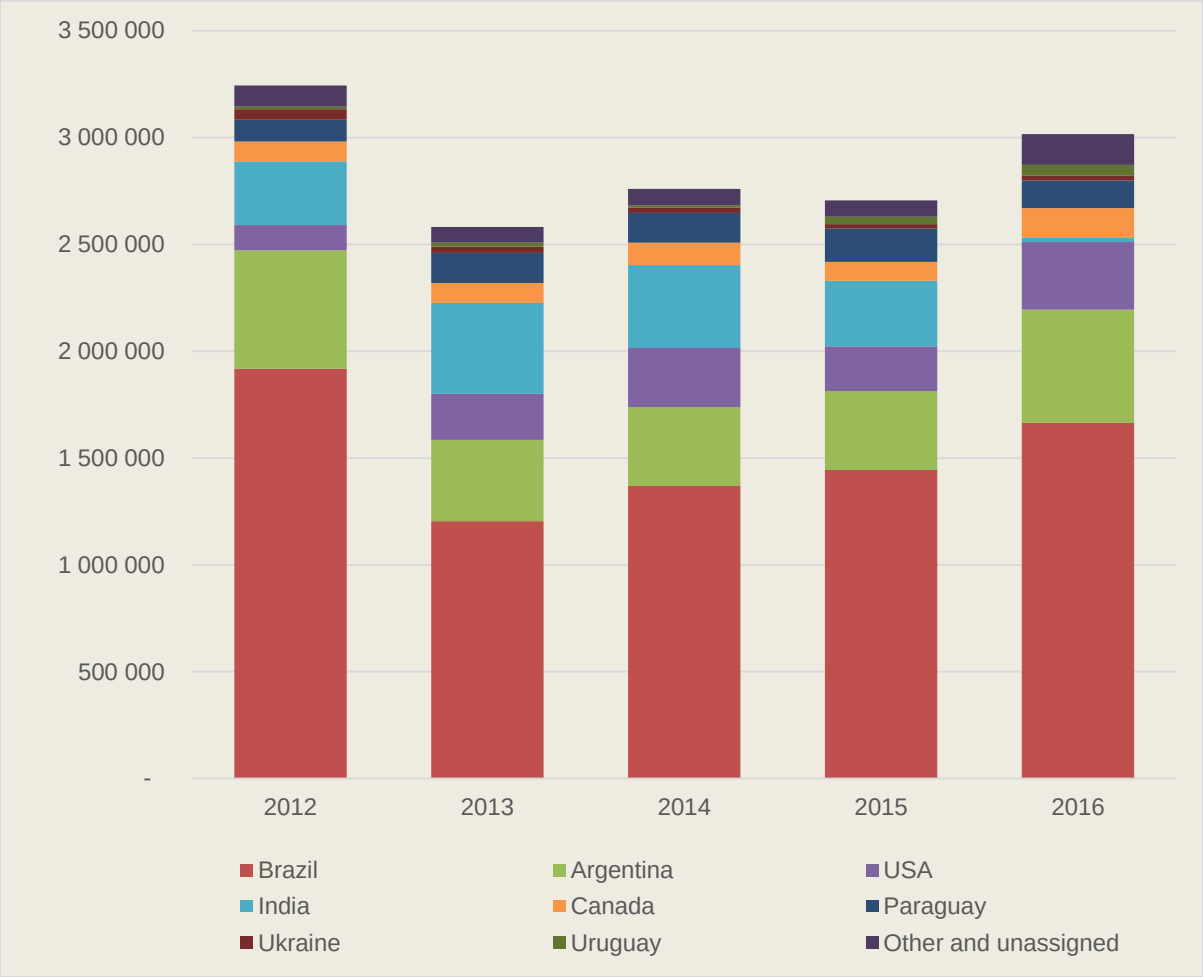
The imported fractions were then allocated to yields in the proportion in which they are produced from whole soy beans (i.e., the yield of oil and meal from a given quantity of soy beans): soybeans 1 * yield; soy meal 0.82 * yield; and soy oil 0.18 * yield.[140] The yield data used to convert the quantity of soy to the land area required to produce it were country and year specific.[141]

The estimated land area required to satisfy France's demand for soy was 3.02 million hectares per year between 2012-16 (Figure 34). This is equivalent to approximately 2.4% of the global soy planted area, and is over twenty-two times the area of France's own area of soy cultivation (136,370 hectares in 2016).[142] Brazil dominates the land footprint, with an average of 1.52 million hectares each year (53% of the total land area). Argentina ranks

[140] U.S. Soybean Export Council conversion table, see: https://ussec.org/resources/conversion-table. The 3% waste is assigned proportionally to soy meal and oil.
[141] Source: FAO STAT
[142] Source: FAO STAT

second in land area required to supply France (440,000 hectares, 15%), with the USA in third place (228,000 hectares, 8%).

Figure 34: The estimated land footprint of France's imports of palm oil between 2012-2016 (hectares)



8 Natural rubber

8.1 Trade and uses of rubber

8.1.1 Introduction

The primary source of natural rubber is the rubber tree, *Hevea brasiliensis*. The species is native to Brazil and the Guianas[143], and grows in humid, tropical lowland conditions, limiting its cultivation to areas within 15° of the equator. Production is now mainly in Southeast Asia, with plantations in South America hampered by a fungal disease (known as South American leaf blight). There has been significant recent expansion of production in 'non-traditional' rubber producing countries such as Lao PDR and Myanmar, often replacing secondary forest in hilly areas. Natural rubber is used in thousands of ways, from engineering and industrial applications, to tyres, bouncing balls, boots, balloons and latex gloves.

A second type, synthetic rubber, is produced from petrochemical feedstocks (crude oil), with a range of varieties produced that possess different properties. More than half of the rubber produced is synthetic, and this results in the price of natural rubber being determined in part by the prevailing price of crude oil. Where they are substitutable, the competitive advantage between them is determined partly by oil prices. However, the two forms of rubber are not fully substitutable for all end uses: some natural rubber is more or less necessary in tyre production as it provides the highest level of (unvulcanised) strength and high 'tack' (the ability of tyres to 'stick' to the road surface).

8.1.2 Production

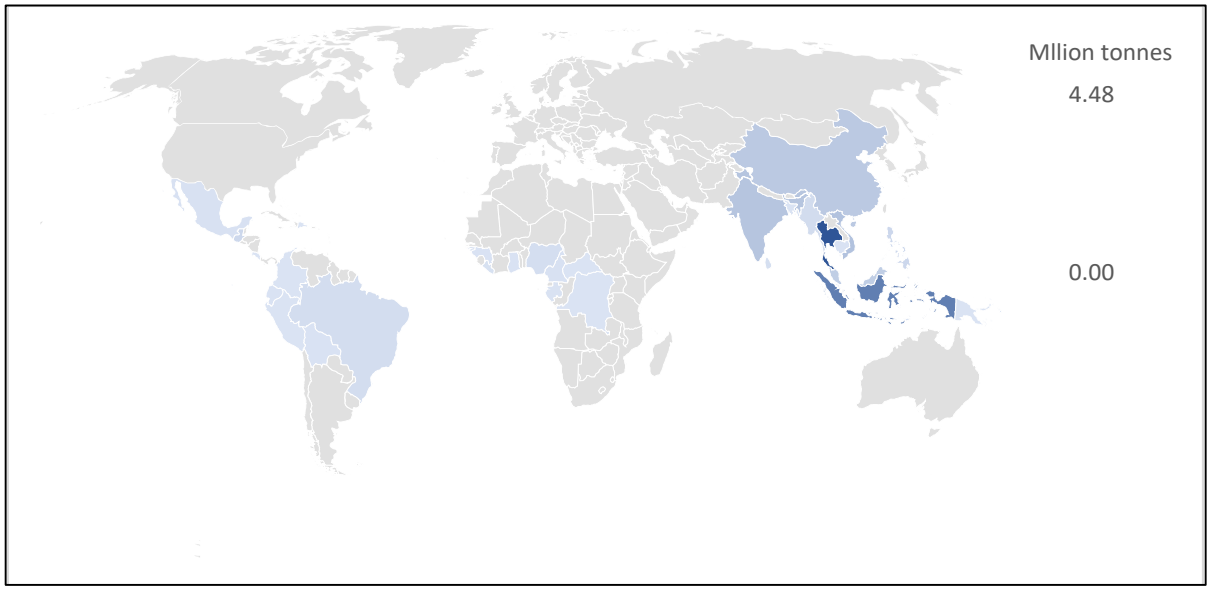
The rubber tree is grown in plantations, both large-scale and smallholder. Individual trees are tapped on alternate days with the latex collected in suspended vessels, and most plantations have a rest period where tapping is adjourned in the dry season. The latex is then coagulated with acid to make rubber, which is further processed to a finished product. The most important of these processes is vulcanisation, which is most commonly done by adding a curing agent (e.g., sulphur compounds) and treating the rubber at high temperature and pressure.

Smallholders have traditionally dominated production in many of the major producing countries, including Indonesia, Malaysia, and India.[144] For example, about 7 million Indonesian farmers gain some or all of their income from growing and selling rubber, managing just over 85% of the planted area and producing 81% of the latex between 2000 and 2005.[145] Large plantations are increasingly emerging on expansion frontiers (e.g., Laos).

Global production of natural rubber was nearly 13.15 million tonnes in 2016[146], a 75% increase since 2000. The overwhelming majority of the world's natural rubber is produced in Asia (Figure 35). Thailand accounted for 32% of world production in 2016, and Indonesia 23%. Along with Vietnam and India (both 7%), China (6%) and Malaysia (5%), these 'top 6' producer countries accounted for 80% of global production.

[143] Mabberly, D.J. (1987). The Plant Book. Cambridge University Press.
[144] Manivong, V (2007). The Economic Potential for Smallholder Rubber Production in Northern Laos. http://lad.nafri.org.la/fulltext/LAD010320080112.pdf
[145] Pye-Smith C. 2011. Rich Rewards for Rubber? Research in Indonesia is exploring how smallholders can increase rubber production, retain biodiversity and provide additional environmental benefits. ICRAF Trees for Change no.8. Nairobi: World Agroforestry Centre. http://www.worldagroforestry.org/downloads/Publications/PDFS/B17073.pdf
[146] Source: FAO STAT http://faostat3.fao.org/home/E Last accessed 25 April 2015.

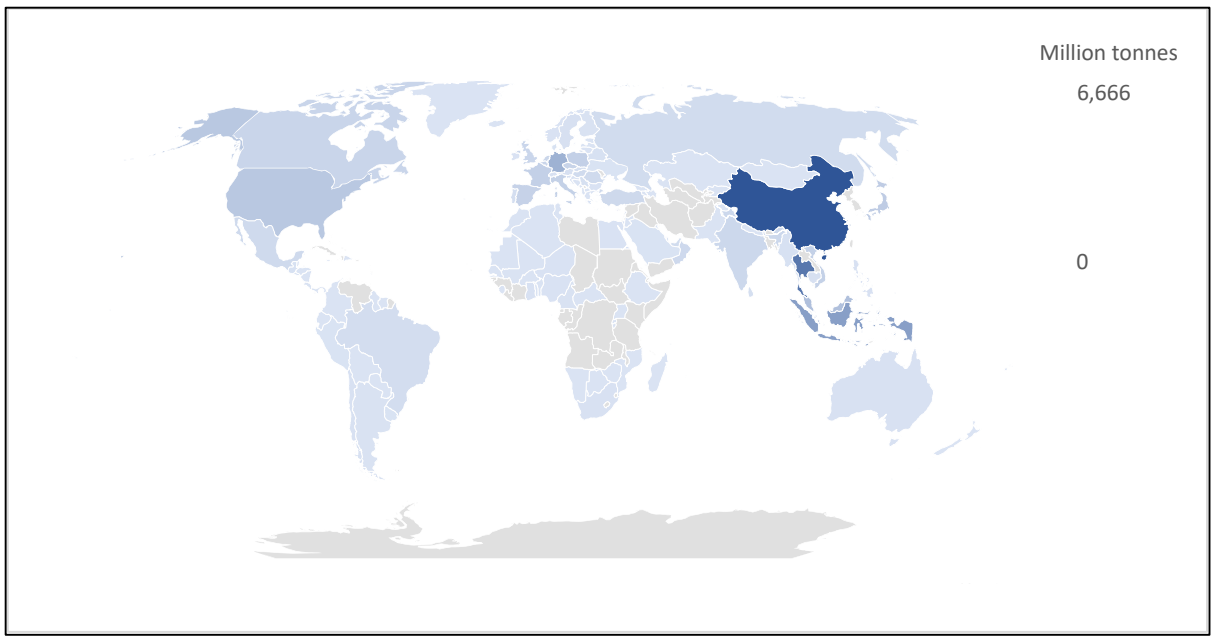
Figure 35: Global production of natural rubber in 2016 (million tonnes)



8.1.3 Global trade

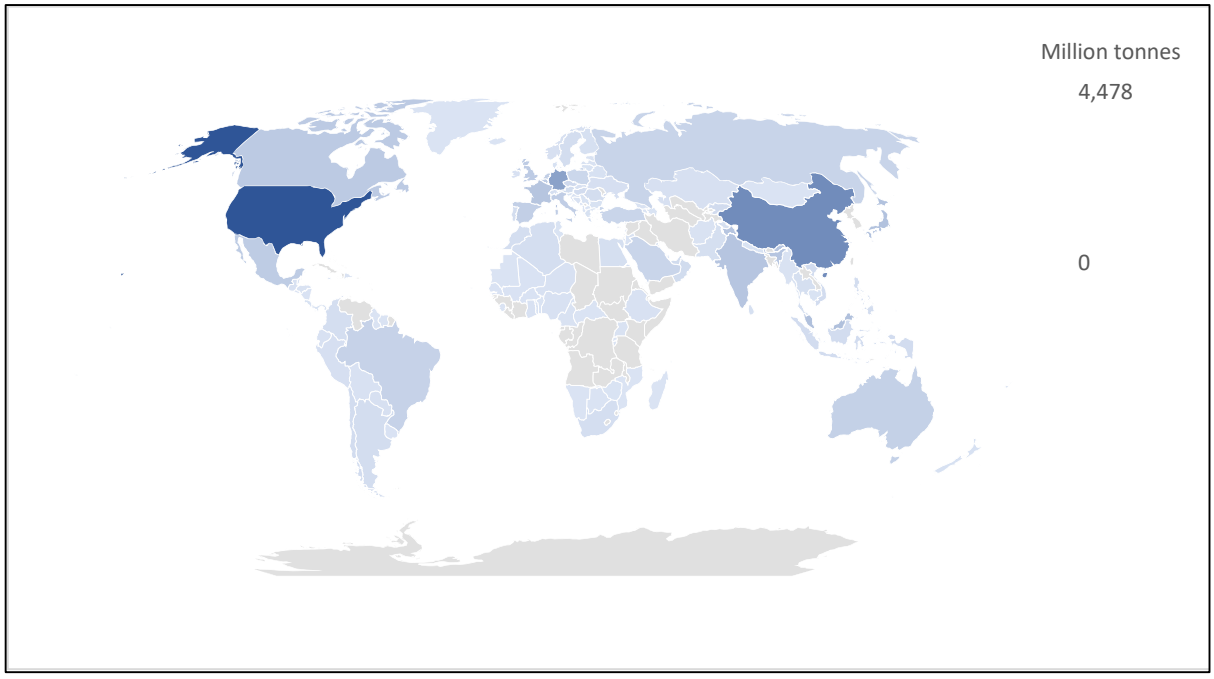
Asia dominates global exports, with China (which produces natural rubber, imports it, and manufactures, exports and consumes products containing natural rubber) dominant (Figure 36). Of producer countries, Thailand and Indonesia are important exporters to the global market.

Figure 36: Global exports of natural rubber and natural rubber products in 2016 (million tonnes)



The USA, China and Germany dominate global imports of natural rubber and products containing natural rubber (Figure 37), accounting for 30% of natural rubber traded as raw materials. Other important importing countries include, Malaysia, USA, Japan and South Korea, together accounting for around two-thirds of global imports. The EU accounts for approximately one quarter of the global imports of natural rubber and products containing natural rubber.

Figure 37: Global imports of natural rubber and natural rubber products in 2016 (million tonnes)



8.1.4 Environmental and social issues associated with rubber production

An estimated one million hectares of secondary forest and subsistence crop land in China, Laos, Thailand, Vietnam, Cambodia and Myanmar has been converted to rubber trees over the last few decades.[147] A recent estimate that "*up to 8.5 million hectares of additional rubber plantations will be required to meet demand by 2024*" points to the serious threat that this expansion is likely to have on biodiversity.[148] The same study found that since there are no market prohibitions or deterrents on growing rubber trees on deforested land, some growers are converting forest to rubber plantations rather than oil palm. In Malaysia, whilst less important than other drivers such as oil palm, expansion of the area of rubber plantations has been cited as an important cause of deforestation in Sabah.[149]

Land grabs for rubber plantations have caused loss of land and livelihood for people in Southeast Asia. Two Vietnamese companies, HAGL and Vietnam Rubber Group, have been accused of land grabs to create rubber plantations in Cambodia and Laos[150,151], and a Chinese company has been reported as having been granted a concession to establish rubber on land traditionally owned by the Khmu ethnic minority in northern Laos.[152] The US Department of Labor lists Cambodia, Indonesia, Liberia, the Philippines, and Myanmar as using child labour in the production of rubber; it also lists Myanmar as using forced labour in natural rubber production.[153]

[147] Li, Z. & Fox, J.M (2012). Mapping rubber tree growth in mainland Southeast Asia using time-series MODIS 250 m NDVI and statistical data. Applied Geography 32:420–432.
[148] https://www.uea.ac.uk/about/-/expanding-rubber-plantations-catastrophic-for-endangered-species-in-southeast-asia
[149] Ratnasingham, J., et al. (2012), 'Production potential of rubberwood in Malaysia: its economic challenges', Not. Bot. Horti Agrobo, 40(2), pp. 317–22; and Sabah Forestry Department (2013), Annual Report 2013.
[150] https://www.globalwitness.org/en/campaigns/land-deals/rubberbarons/
[151] http://www.bbc.co.uk/news/world-asia-22509425
[152] McAllister, K. (2015). Rubber, rights and resistance: the evolution of local struggles against a Chinese rubber concession in Northern Laos. Journal of Peasant Studies, 42(3-4):1-21
[153] http://www.dol.gov/ilab/reports/child-labor/list-of-goods/

8.1.5 Sustainability initiatives for natural rubber

There is currently no independent, third party verification certification system specifically for rubber.

The Sustainable Natural Rubber Initiative (SNR-i) has developed a set of voluntary guidelines and criteria for members that include indicators on productivity, quality, forest sustainability, water management, and human/labour rights. Twenty-three of SNR-i's registered companies have completed the self-declaration stage. There is no independent third-party auditing or certification, and the scheme is expected to work as a credit/mass-balance scheme.[154] Michelin is the only French member of SNR-I, however, the European Tyre & Rubber Manufacturers Association is also a member, which has connections with French companies.

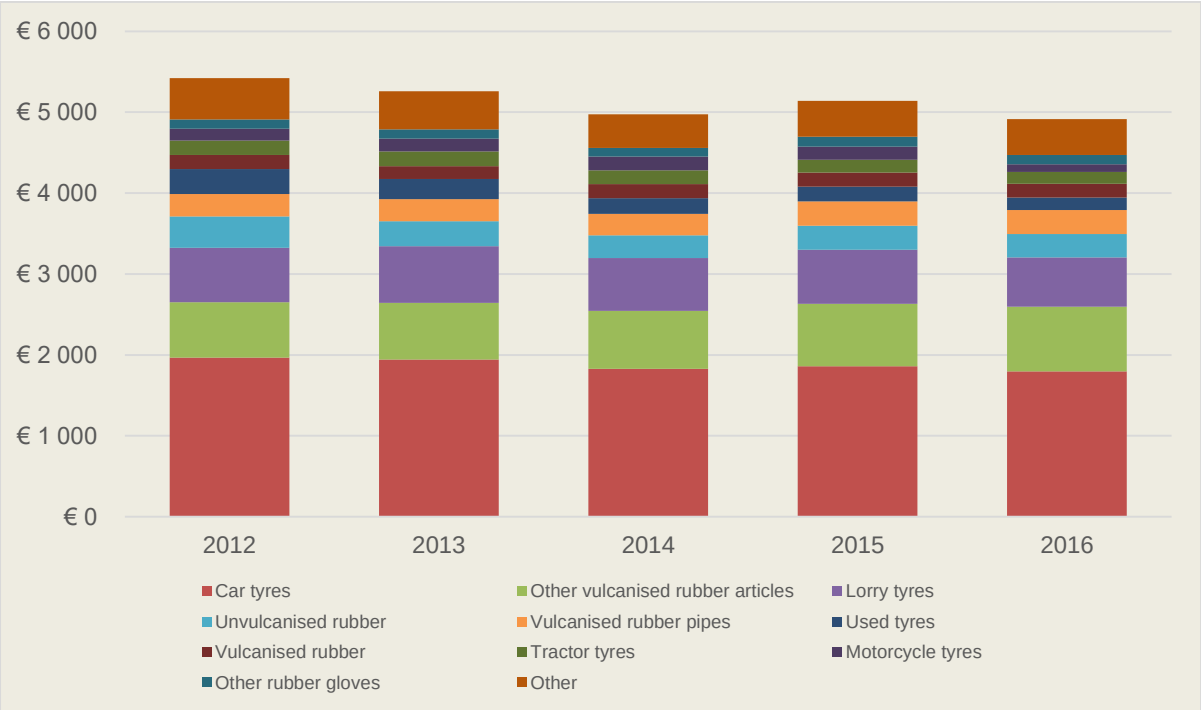
Non-sector specific certification schemes that apply to rubber include FSC (for rubber wood, hence included within the relevant chapter on timber) and organic standards. Organic certified rubber is, however, imported in diminutive quantities (e.g., for use in mattresses).

The lack of credible sustainability mechanisms suggests the need to raise awareness of sustainability issues within the sector, and catalyse a credible sectoral approach to sustainability. In 2016, Michelin announced a 'zero net deforestation policy' that excludes deforestation of primary forest, High Carbon Stock Forest and High Conservation Value Forest from their supply chains[155] and is in partnership with WWF-France, which indicates that the sector is perhaps open to addressing its environmental footprint.

8.2 France's imports of natural rubber

France imported an average of € 5.1 billion of natural rubber and products containing natural rubber each year between 2012-16. There was a steady decrease in the value of this trade over time, from € 5.4 billion in 2012 to € 4.9 billion in 2016 (Figure 38). Well over half of this value (57%) was in automotive tyres.

Figure 38: The value of France's imports of natural rubber and products containing natural rubber from 2012-16 (million €)



[154] http://www.snr-i.org/index.php

[155] Sustainable Natural Rubber Policy. Reference Document. 2016 edition. Michelin.

The quantity of natural rubber and products containing natural rubber has changed little between 2012-16 (Figure 39). Car tyres contribute the largest tonnage (an average of 430,000 tonnes per year, 34% of the total), with lorry tyres (180,000 tonnes, 14%), compounded unvulcanised rubber (129,000 tonnes, 10%) and Technically Specified Natural Rubber (TSNR, 120,000 tonnes, 10%, Table 11) the other major import categories by weight (see Appendix 7 for the HS codes used).

Figure 39: The quantity of France's imports of rubber and products containing rubber 2012-16 (tonnes)

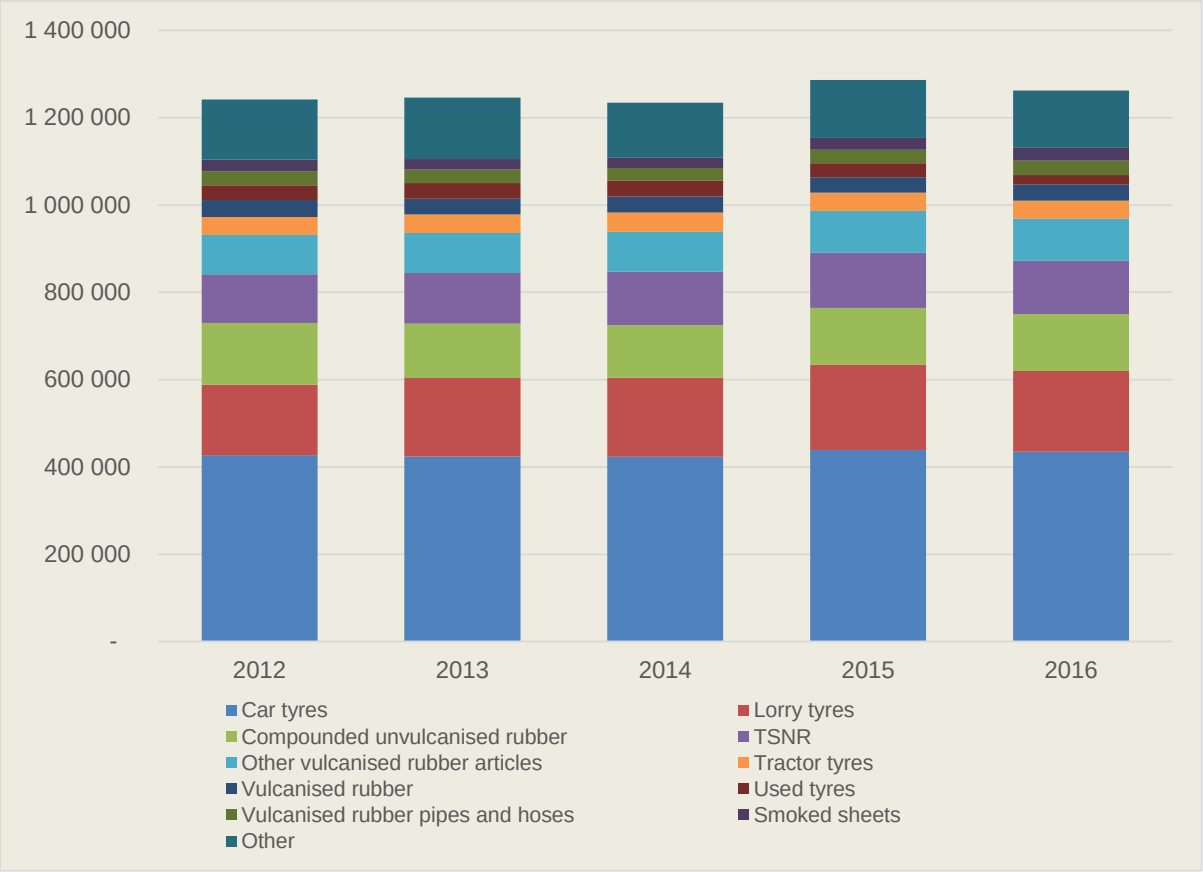
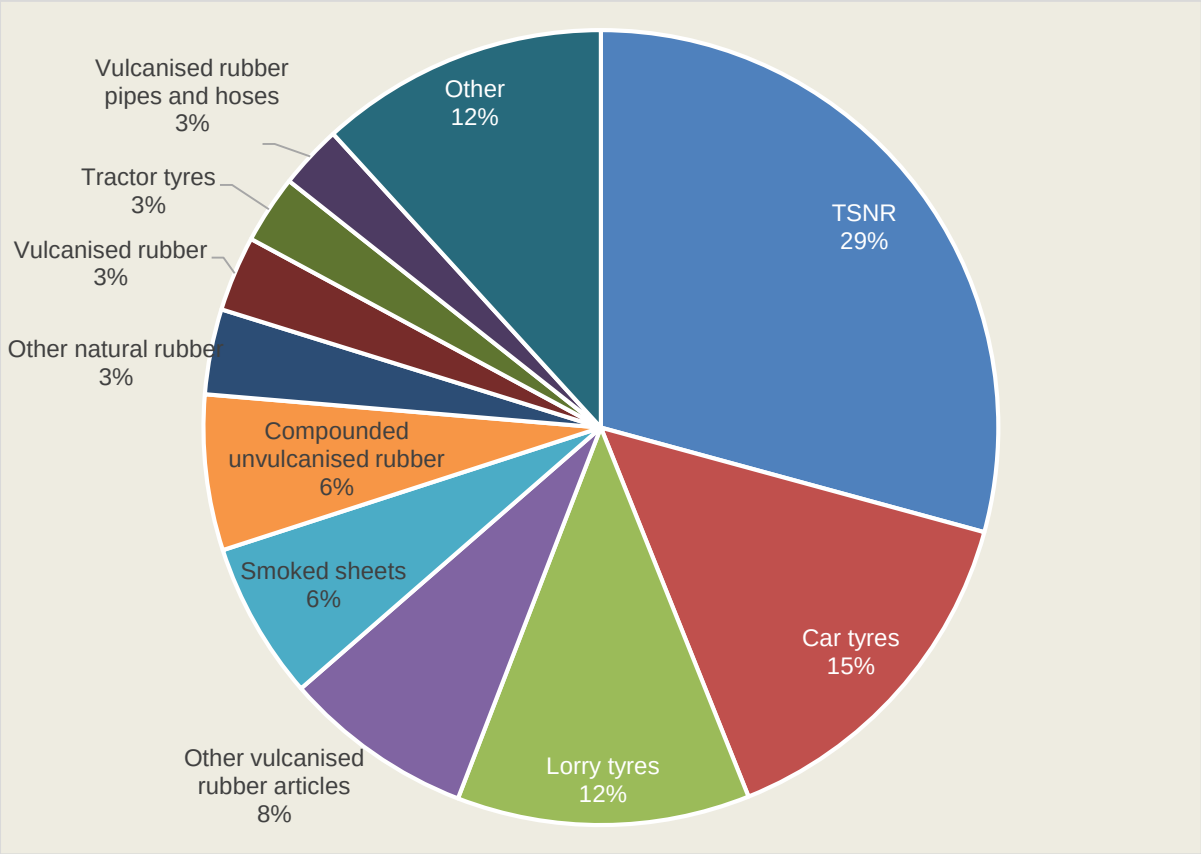


Table 11: Quantity of France's imports of natural rubber and products containing natural rubber 2012-16 (tonnes)

HS Code	Product	Quantity (tonnes)						
		2012	2013	2014	2015	2016	Average	%
401110	Car tyres	426,873	424,196	423,285	438,720	435,232	429,661	34.3%
401120	Lorry tyres	161,546	179,259	181,298	195,478	184,913	180,499	14.4%
4005	Compounded unvulcanised rubber	141,467	124,914	120,296	129,928	130,406	129,402	10.3%
400122	TSNR	111,792	116,019	122,278	126,479	121,537	119,621	9.5%
4016	Other vulcanised rubber articles	89,696	91,502	91,976	95,887	97,168	93,246	7.4%
401161	Tractor tyres	41,539	42,826	43,401	42,044	40,878	42,137	3.4%
4008	Vulcanised rubber	38,677	35,940	37,075	35,092	37,436	36,844	2.9%
401220	Used tyres	33,509	35,413	36,597	32,094	21,254	31,773	2.5%
4009	Vulcanised rubber pipes and hoses	32,051	30,847	28,541	31,038	33,022	31,100	2.5%
400121	Smoked sheets	26,982	24,519	23,737	27,073	28,753	26,213	2.1%
	Other	137,430	140,437	125,714	132,412	131,244	133,447	10.6%
	Totals	**1,241,560**	**1,245,871**	**1,234,199**	**1,286,244**	**1,261,843**	**1,253,943**	**100%**

As France's imports include natural rubber raw materials, semi-manufactured natural rubber (e.g., TSNR) and products where natural rubber is a component (e.g., car tyres), the import quantities have been converted to represent the natural rubber content of the imports. See Appendix 7 for the conversion factors used in these calculations. The amount of natural rubber raw material required to supply France's imports of natural rubber products averaged nearly 409,000 tonnes per year between 2012-16. Corrected for natural rubber content, over the whole period, TSNR becomes the main import by quantity (29%), followed by car tyres (16%) and lorry tyres (12%, Figure 40).

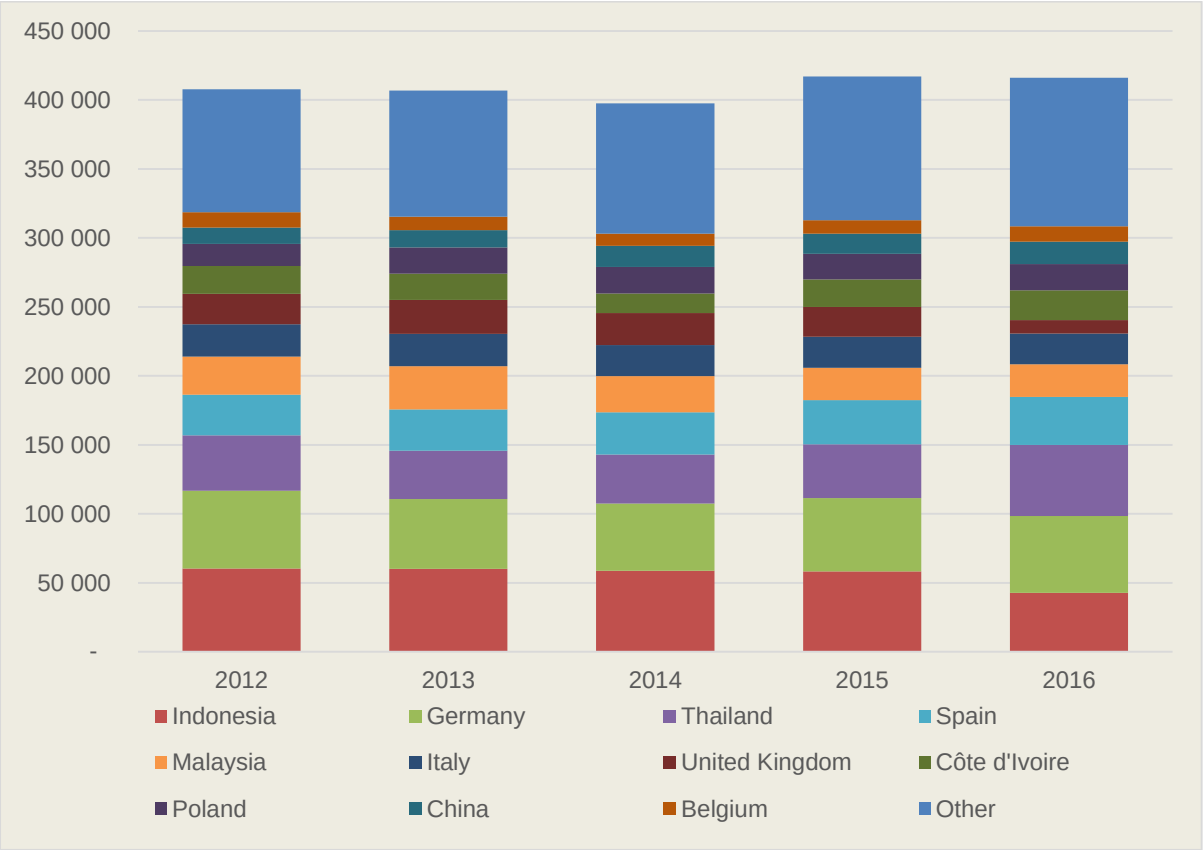
Figure 40: Quantity of France's imports of natural rubber and products containing natural rubber, adjusted for rubber content (average 2012-16, tonnes)



8.3 Provenance of France's imports of natural rubber

Between 2012 and 2016, France imported natural rubber and products containing natural rubber from a total of 189 territories. The major exporters to France include a mixture of producer countries (e.g., Indonesia, Thailand and Malaysia) and countries that are either trading rubber products or selling manufactured goods to France (e.g., Germany, Italy, the UK, Figure 41). Amongst this latter group, EU countries account for nearly half of the natural rubber imported (49%). Imports from other EU countries remained stable, but there were significant decreases in the imports from Indonesia (60,000 tonnes in 2012 to 43,000 tonnes in 2016) and Malaysia (28,000 tonnes in 2012 to 24,000 tonnes in 2016) counterbalanced by increases from Thailand (40,000 tonnes in 2012 to 52,000 tonnes in 2016) and minor exporters ('Other' in Figure 41), which include both producer countries and traders/manufacturers (e.g., Turkey).

Figure 41: The quantity of France's imports of natural rubber and products containing natural rubber between 2012-16 from major exporting countries, adjusted for the content of natural rubber (tonnes)



As Figure 41 shows, many of the countries from which France imports natural rubber do not produce it and are solely traders and/or manufacturers of natural rubber products. This means that some of the natural rubber in products imported by France originates in third-party countries. With provenance adjusted to account for these indirect imports (see Section 2.2), Thailand becomes the main provider of natural rubber to France (an average of 88,000 tonnes each year between 2012-16, 22% of the total), with growth in exports to France in 2015 and 2016 (Figure 42). Indonesia was the ranked second (85,000 tonnes each year, 21%), with a steep decline in imports in 2016, and Malaysia provided an average of 57,000 tonnes (14%), also declining over the period.

Figure 42: Provenance of France's imports of natural rubber 2012-16, adjusted for rubber content of imported products and for third party (intermediary) countries. (tonnes)

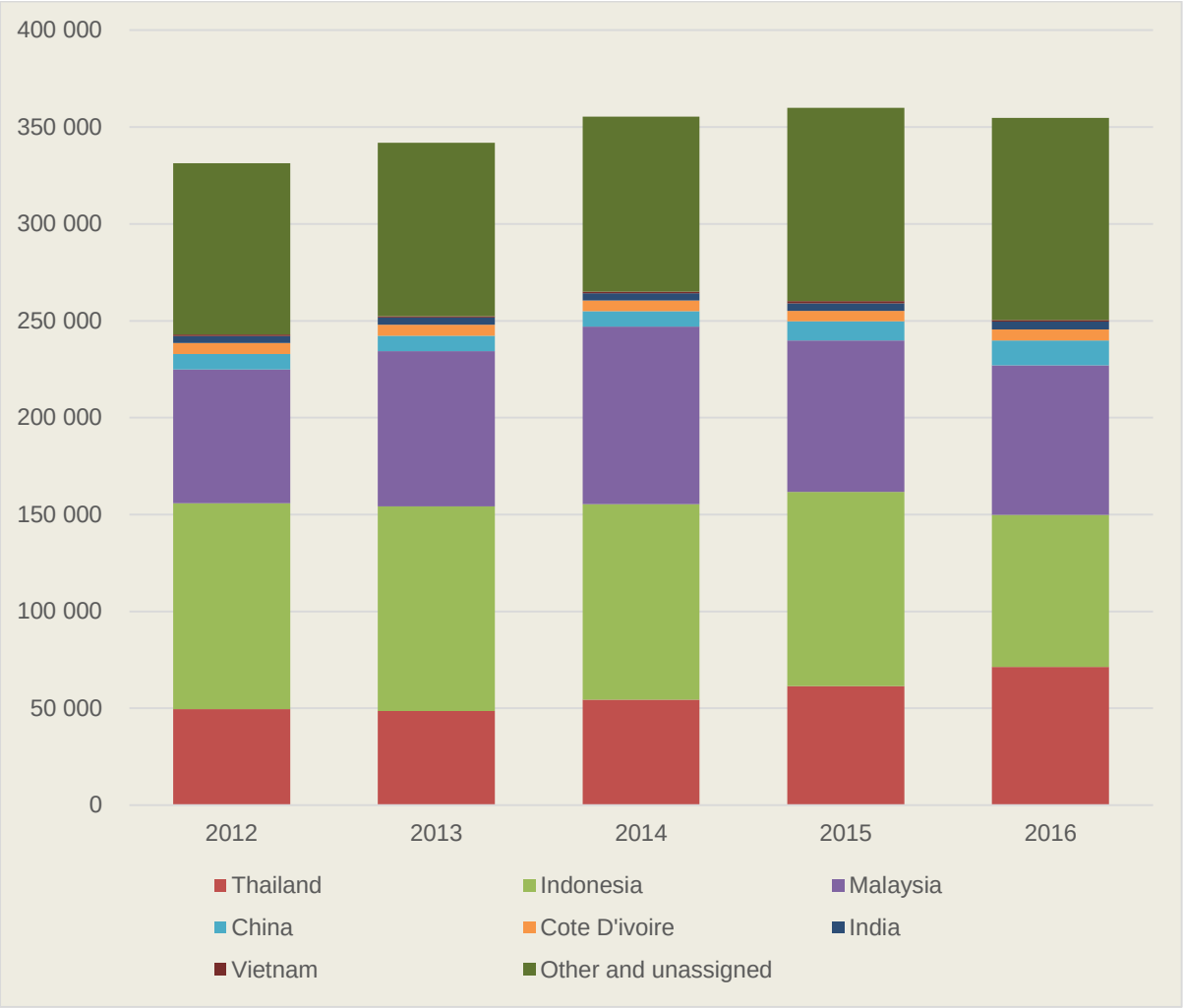
8.4 Footprint for natural rubber

To estimate the land area required to supply France with natural rubber, the quantity of raw materials imported from each producer country were divided by the yield from that country for each year.[156]

The estimated land area required to satisfy France's demand for natural rubber was 349,000 hectares per year between 2012-16 (Figure 43). This is equivalent to approximately 2.8% of the global planted area. Three countries – Indonesia, Malaysia and Thailand – dominate the land footprint, contributing an average of 98,000 hectares, 79,000 hectares and 57,000 hectares respectively each year.

[156] Source: FAO STAT

Figure 43: France's land footprint for natural rubber (hectares)



9 Beef and leather

9.1 Trade and uses of beef and leather

9.1.1 Introduction

Beef and leather share the same supply chain at primary production and primary processing (i.e. slaughter). Beyond this, their routes to France and their end uses are very different.

France has the highest per-capita consumption of beef within the EU, at approximately 23 kilograms per capita in 2015.[157] France is a key driver of the EU beef market as it is the largest producer and consumer, and amongst the largest importers of beef. The majority of beef is purchased by consumers as fresh or frozen cuts e.g. steaks, mince and roasting joints. However – like most meats – it is also found in a range of food products e.g. burgers, ready meals, pastry products, etc.

The typical supply chain for beef starts on farm and goes through a number of processing and packing stages before reaching the consumer. Depending on the supply chain, there can be agents and traders between all the main processing, manufacturing and retailing stages. This is particularly the case with imported beef that can be moved through intermediaries in other European countries.

Bovine leather is the major source of leather globally, accounting for 69% of all leather. This document focuses on bovine leather as cattle are an important driver of global land use change compared to other livestock species.[158]

The accepted definition of leather is hide or skin with its original fibrous structure more or less intact, tanned to be imputrescible (i.e. not liable to decomposition). The hair or wool may or may not have been removed. Hides or skins are converted into leather through the tanning process, in which the hide is treated with chemicals which cross link the microscopic collagen fibers to form a stable and durable product. It is also made from a hide or skin that has been split into layers or segmented either before or after tanning.[159] Leather quality varies depending on the quality of the hide and the degree to which it has been processed (Table 12).

Table 12: Common leather terms[160]

Term	Description
Full grain	Strongest and thickest type. Has the original grain surface of the skin. Used in high quality footwear & furniture.
Top grain	The first cut taken from the grain side of a split hide. Most common leather used in luxury goods.
Corrected grain	Lower quality hides that have the surface grain corrected by sanding, dyeing etc.
Split	What's left from the hide once the 'Top grain' has been removed. If thick enough it can be split more than once.

[157] France Agri Mer, 2016. Les filières animales terrestres et aquatiques. Données et bilans. En ligne : http://www.franceagrimer.fr/content/download/42562/397510/file/BIL-MER-VIA-LAI-Bilan2015-Perspectives2016.pdf
[158] FAO (nd) Cattle ranching and deforestation. Livestock Policy Brief 03
[159] British Standard BS 2780:1983 Glossary of Leather Terms
[160] British Standard BS 2780:1983 Glossary of Leather Terms

Hide accounts for about 10% of the slaughter value of cattle[161], so it makes a relatively small but worthwhile contribution to the overall profitability of the beef livestock sector. Despite this value, cattle are not raised and slaughtered primarily for their hides but for their meat, and so their management is no different from cattle raised for beef.

France has approximately 50 tanning companies, which are typically small and medium sized enterprises, employing an average of 32 people.[162] The French leather industry is mostly specialised in the production of leather for the high-end and luxury segments (e.g., fashion, saddlery), which demands a high degree of craftsmanship.

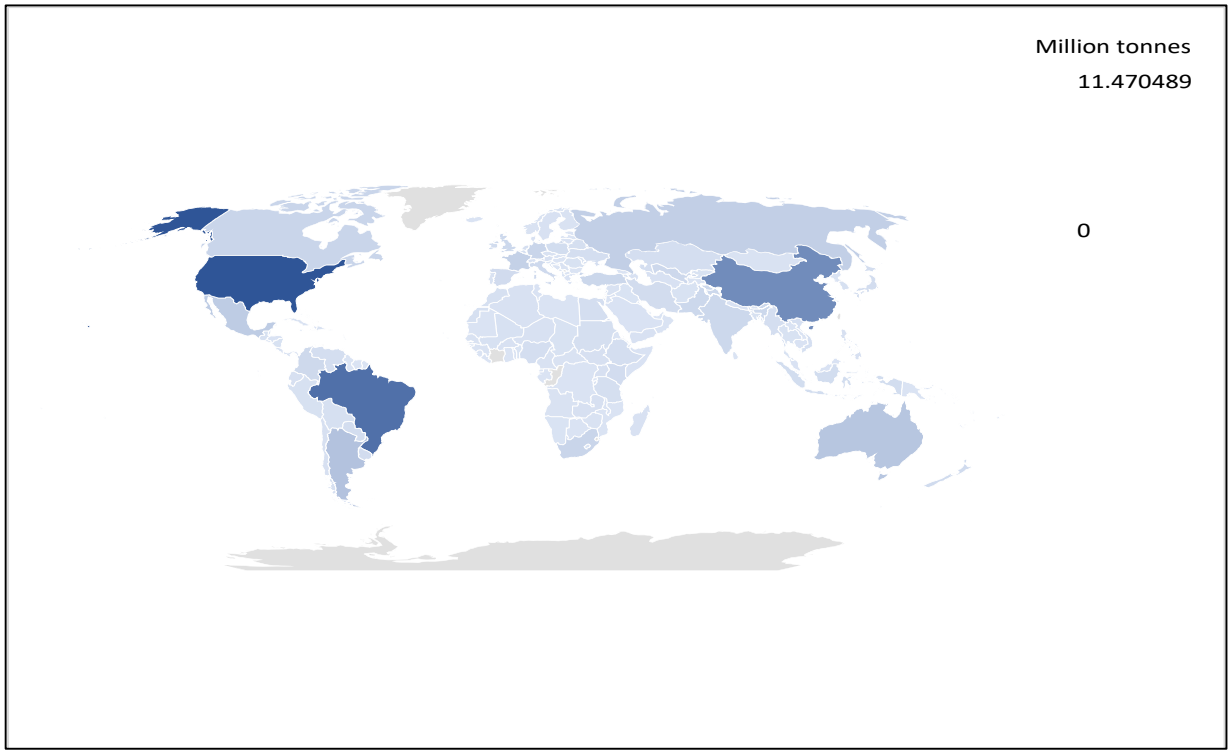
Depending on the supply chain, there can be merchants and traders between all the main processing, manufacturing and retailing stages. Leather supply chains can be integrated (i.e. highly traceable and potentially owned downstream businesses), especially in premium products where quality and provenance of raw material are highly valued to ensure sufficient supply and quality of leather.

9.1.2 Production

There are three main types of beef production systems around the world:

- Multipurpose animal beef production systems which mainly involve the use of cattle that will produce milk or be used for traction, as well as meat (e.g., China and India).
- Beef industry coupled with dairy. Cattle produce milk as the main product, but unproductive and bull calves are utilised for their meat. This is common in the EU and India.
- Stand-alone meat production (e.g., United States, Brazil, Australia and Argentina).

Figure 44: Global cattle production in 2016 (million tonnes). Source: FAOSTAT.



[161] Brack, D. Glover, A. and Wellesley L. (2016) Energy, Environment and Resources Agricultural Commodity Supply Chains Trade, Consumption and Deforestation. Chatham House Research Paper.
[162] COTANCE (2012). Social & Environmental Report of the European Leather Industry. http://www.euroleather.com/socialreporting/SER/EuropeanSocialandEnvironmentalReport2012.pdf

The top five producers of cattle – the USA, Brazil, China, Argentina and Australia – account for half of all global production. France is the world's eighth largest producer, with 1.46 million tonnes in 2016 (**Figure *44***).

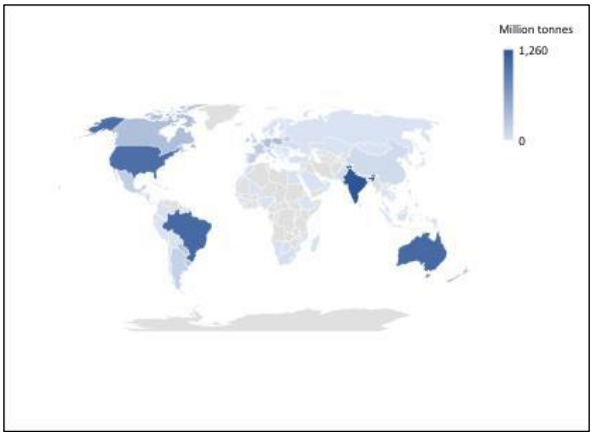
Most cattle begin on grass or forages for cow and calf operations. In countries such as Australia, China, India and the EU, pasture and forage remains the main source of food for cattle throughout their lifecycle. Some of these systems are extensive, with very low stocking densities. For example, the average stocking density in Namibia may be as low as one animal every 16.7 hectares.[163] In the Brazilian Amazon, the stocking rate has risen from one animal every 3.3 hectares in 1975[164] to around one per hectare in 2013.[165] In some countries, such as the USA and Argentina, cattle are moved from pasture to grain feedlots, and although Brazil is still dominated by pasture systems, it is transitioning into a grain-fed system for finishing.

9.1.3 Global trade

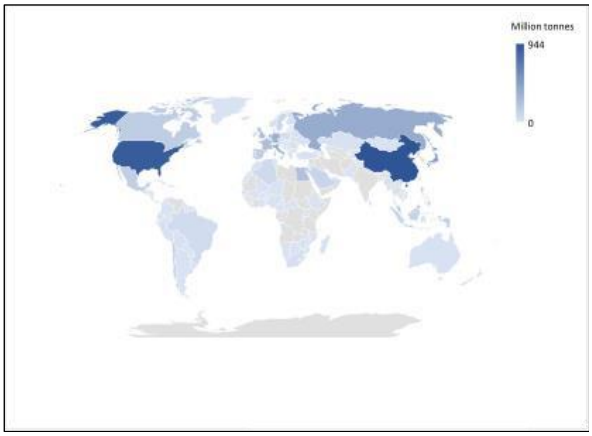
The major cattle producing countries also dominate global exports of beef, with the addition of India, where beef consumption is minimal for religious reasons and hence most of its production is exported (Figure 45 A). Imports are dominated by China (12% of the total) and the USA (11%), with the EU accounting for more than 30% of global imports. France alone accounts for 3% of direct imports of fresh and frozen beef (Figure 45 B).

Figure 45: Global exports and imports of beef in 2016 (million tonnes). Source: UNCOMTRADE[166]

A. Global exports



B. Global imports



Leather can be traded having been just tanned (e.g. so-called 'wet blue' leather which has been tanned using chromium) or as 'crust',[167] or as finished leather. Countries such as Brazil are increasingly adding value to raw leather before exporting it, e.g., it is exported part-processed as 'wet blue', as finished leather or as leather products such as clothing and bags.[168]

[163] John-Oliver Englera,, J-O., von Wehrdena, H. and Baumgartner, S. (2017). Determinants of farm size and stocking rate in Namibian commercial cattle farming. Leuphana University of Lüneburg, Scharnhorststr. 1, D-21335 Lüeburg, Germany

[164] Valentim J.F., Andrade de. C.M.S 2009. Tendências e perspectivas da pecuária bovina na Amazônia Brasileira. Amazônia: Ciência & Desenvolvimento, Belém, 4 (8: 273-283

[165] Walker, N.F., Patel, S.A., and Kalif, K.A.B. (2013). From Amazon pasture to the high street: deforestation and the Brazilian cattle product supply chain. Tropical Conservation Science – Special Issue Vol.6 (3): 446-467

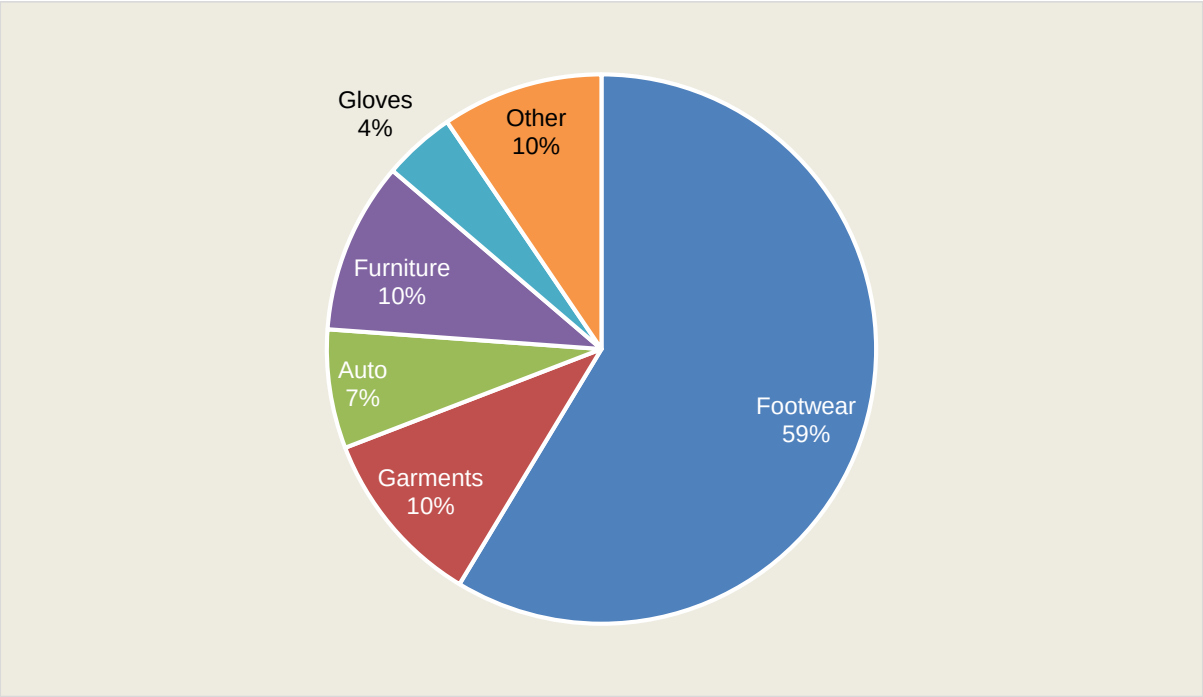
[166] Imports of fresh and Dynamics of Cattle Production in Brazil frozen beef (see Appendix 8 for HS codes used).

[167] Crust leather is leather that has been tanned, dyed and dried, but not finished.

[168] Leather Panel (2010) Future Trends in the Leather and Leather Products Industry and Trade

Leather is manufactured into a variety of end products, including shoes, bags, car seats, gloves, clothes, furniture upholstery, belts and saddlery. However, shoes are the dominant end use, accounting for 59% of leather use globally (Figure 46).

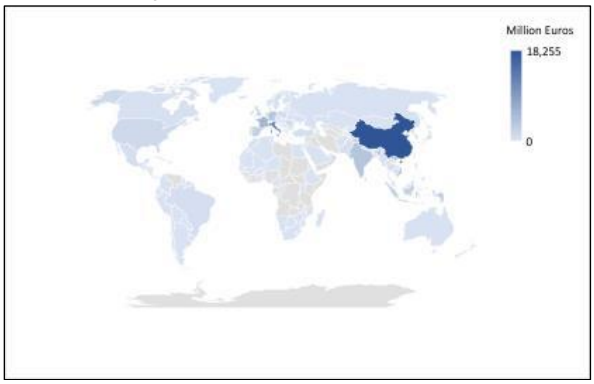
Figure 46: Global end uses of leather.[169]



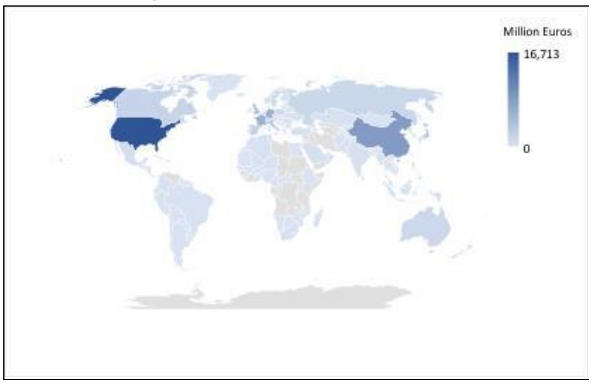
Global exports of hides broadly follow the same pattern as cattle production. However, there is a very large international trade in manufactured leather goods. China accounts for 35% of global exports of manufactured leather goods by weight (22% by value), with Italy second ranked with 7% and 16% (Figure 47 A). France is also a major exporter of manufactured leather goods, accounting for 2% of global exports and € 5.8 billion in 2016. France also imports manufactured leather goods, to a value of € 5.7 billion in 2016 (7% of global imports). The USA (18% of the value of global imports), China (10%), and Germany (7%) are other major importers of manufactured leather goods (Figure 47 B).

Figure 47: Global exports and imports of manufactured leather good in 2016 (million Euro) Source: UNCOMTRADE.[170]

A. Global exports



B. Global imports

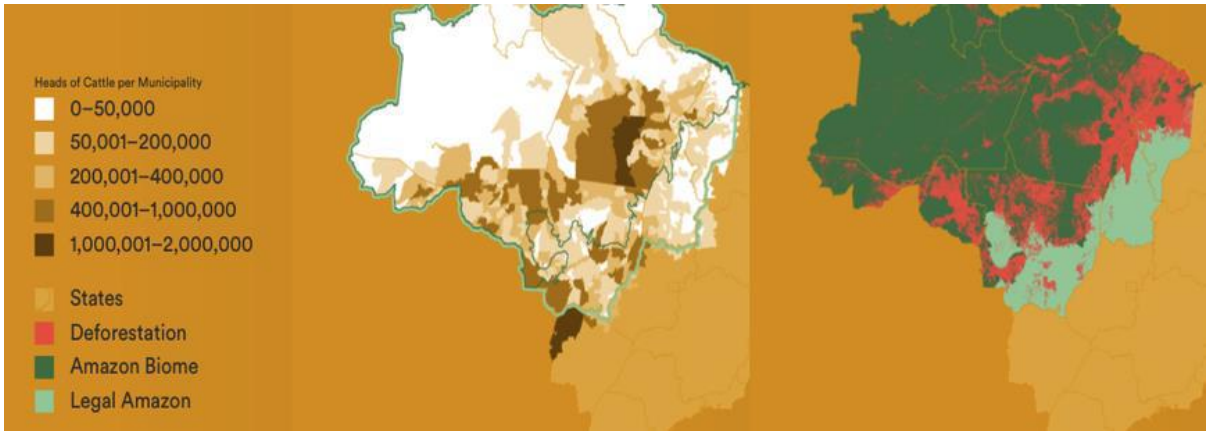


[169] Data from UK Leather (http://www.ukleather.org/trade-issues/industry-statistics.htm). 'Other' includes other leather goods e.g. bags, belts, wallets and purses.
[170] Imports of leather shoes, car seats, bags, apparel and gloves (see Appendix 8 for HS codes used)

9.2 Environmental and social issues associated with beef and leather production

Cattle production is the dominant land use following deforestation in WWF Priority Places such as the Amazon, *Cerrado* and Pantanal. According to the research by Gibbs *et al*.[171]: "*Cattle ranching occurs on over two-thirds of deforested land in the Brazilian Amazon … The large-scale expansion of the cattle herd into the Brazilian Amazon has come at great environmental cost, as large expanses of tropical forests have been cut, burned, and converted to pastures*." Figure 48 below shows the patterns of cattle herd expansion and forest cover loss in Brazil. It is important to note that the production of soy, which is sometimes fed to cattle, is also driving deforestation in South America. This is analysed within the soy section of this report.

Figure 48: Patterns of cattle herd expansion and forest cover loss in Brazil.[172]



Most of the research on the links cattle and deforestation has focused on Latin America, especially Brazil, but also Belize, Bolivia, Costa Rica, Ecuador, Mexico, and Peru. Pasture creation for cattle – often in concert with infrastructure development and settlement programmes – has also been cited as a cause of deforestation in Asia, albeit minor.[173] In common with any other land use, even where little forest is cleared to create pasture directly, any increase in demand for cattle products can contribute to deforestation indirectly, by displacing other land uses into previously forested areas.

Research for the US State Department identifies cattle ranching in Brazil as a source of forced labour in the country.[174] According to the International Labor Organisation, some 62% of slave labour in Brazil is employed in livestock farming-related businesses.[175]

Tanneries consume a large amount of water and produce large quantities of effluent. Tannery wastewater is a mixture of particles of hides and a large variety of organic and inorganic chemicals. These include hydrogen sulphide and residues of chromium that are highly toxic to many organisms. Indiscriminate discharge of effluents into water bodies or open land can result in contamination of surface and ground water, affect local flora and fauna, and have direct impacts on agriculture.

[171] Gibbs et al. Did Ranchers and Slaughterhouses Respond to Zero-Deforestation Agreements in the Brazilian Amazon? Conservation Letters, January 2016, 9(1), 32–42
[172] zerodeforestationcattle.org citing Gibbs *et al*.
[173] Geist, H.J. & Lambin, E.F. (2011). What drives tropical deforestation? A meta-analysis of proximate and underlying causes of deforestation based on subnational case study evidence. – (LUCC Report Series; 4). CIACO Louvain-la-Neuve.
[174] US State Department (2016) Trafficking In Persons Report
[175] ILO (2009) Fighting Forced Labour: The Example of Brazil

9.2.1 Certification

The issue of deforestation caused by cattle production has been tackled using several sector and supply chain approaches (see summary in Table 13 below). These are largely focused on the Brazilian Amazon, and many do not fully mitigate the risk of deforestation.

Table 13: Private sector options for managing deforestation risk in beef value chains[176,177]

Type of intervention	Availability	Notes
Credible certification	Yes – but low adoption	The Sustainable Agriculture Network (SAN) Standard for Sustainable Cattle Production Systems (Rainforest Alliance).[178] It appears there has been relatively limited uptake[179] – with examples being a European beef burger producer[180] and Gucci (for leather handbags).[181]
Other credible zero deforestation mechanisms	Yes – but costs high and doesn't cover whole chain	Animal tracking and traceability systems have been developed and deployed in South America – however costs can be prohibitive.[182] These include programmes implemented by some of the biggest suppliers, such as Marfig and JBS. The G4 Agreement between Greenpeace and major beef producers has been seen as a good step forward but currently doesn't cover the full supply chain.
Other relevant initiatives	Yes	The Global Roundtable for Sustainable Beef (GRSB) and local chapter Brazilian Roundtable on Sustainable Livestock[183] (GTPS) are initiatives that are developing standards, criteria, and common practices that address the protection of native forests from deforestation.

9.3 France's imports of beef and leather

France imported an average of € 1.89 billion of beef each year between 2012-16 (Figure 49). The value of beef imports has is dominated by imports or fresh and chilled beef (56% of the total). The overall value of imports has declined over the period, from over €2 billion in 2012 to € 1.7 billion in 2016. This decline was predominantly in fresh and chilled beef and frozen beef (see Appendix 8 for HS codes used).

Imports of leather and products containing leather averaged € 31.0 billion each year (Figure 50). However, this figure is dominated by car imports, of which only a small fraction of the value is in leather seats (imports are adjusted for leather content in the subsequent analysis of import volumes). More pertinently, imports of leather shoes averaged € 3 billion per year.

[176] Zero Deforestation Cattle website http://www.zerodeforestationcattle.org/
[177] DATU research (2014) Deforestation And The Brazilian Beef Value Chain
[178] According to the cattle standard guidance document it is critical that the farm can demonstrate: "*It purchases cattle born and raised on non-certified farms that do not violate the following SAN criteria: … Destruction of a high value ecosystem after November 1, 2005 (critical criterion 2.2)"*
http://www.san.ag/biblioteca/docs/SAN_GIG_Cattle_Standard___February_2013.pdf
[179] The Rainforest Alliance 2015 Impacts report shows cattle land coverage is relatively small compared to others e.g. coffee http://www.rainforest-alliance.org/sites/default/files/publication/pdf/SAN_RA_Impacts_Report.pdf
[180] http://www.frozenfoodeurope.com/europes-first-rainforest-alliance-certified-frozen-beef-product-launches-at-anuga/
[181] Rainforest Alliance press release: http://www.rainforest-alliance.org/newsroom/press-releases/gucci-goes-sustainable
[182] http://www.zerodeforestationcattle.org/#reading/ch5t2
[183] http://www.pecuariasustentavel.org.br/

Overall, there was an increase in the value of imported leather and products containing leather over the period, and this increase was found across most product categories.

Figure 49: The value of France's imports of beef and products containing beef between 2012-16 (million Euro)

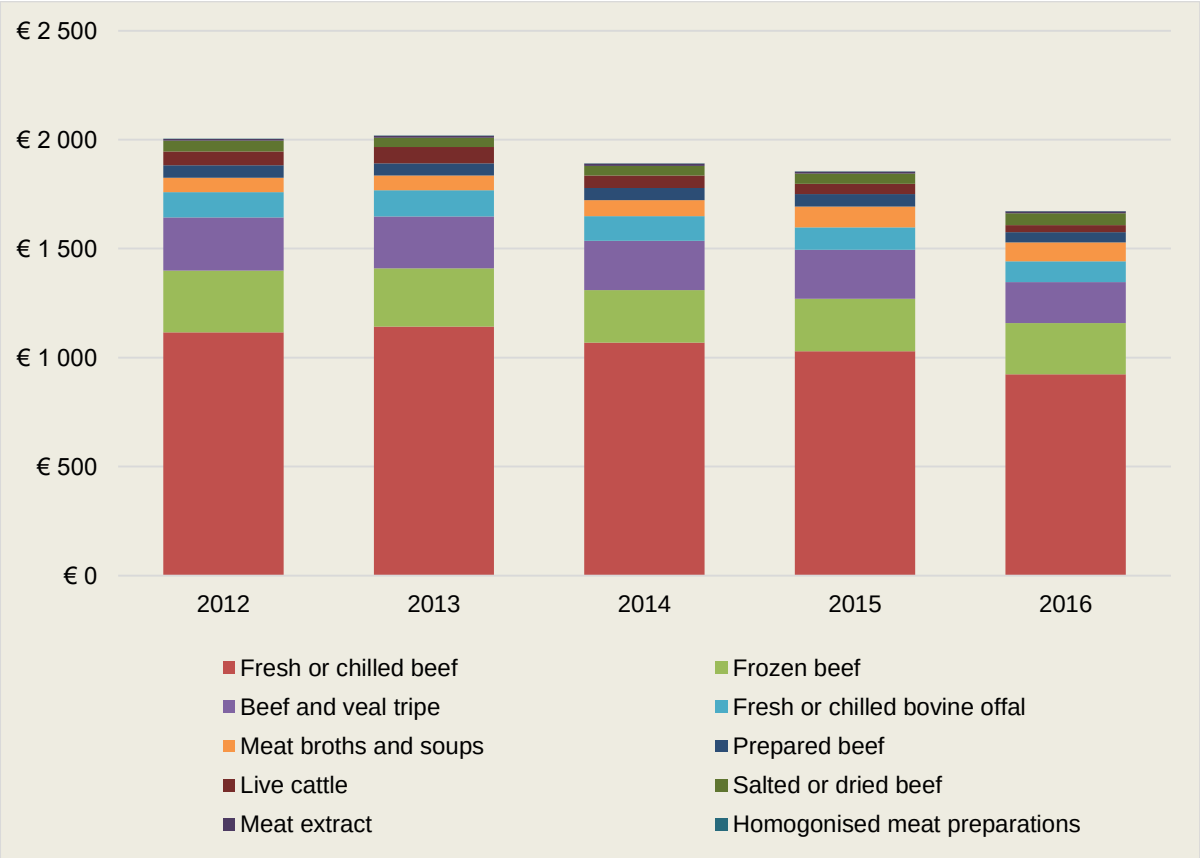
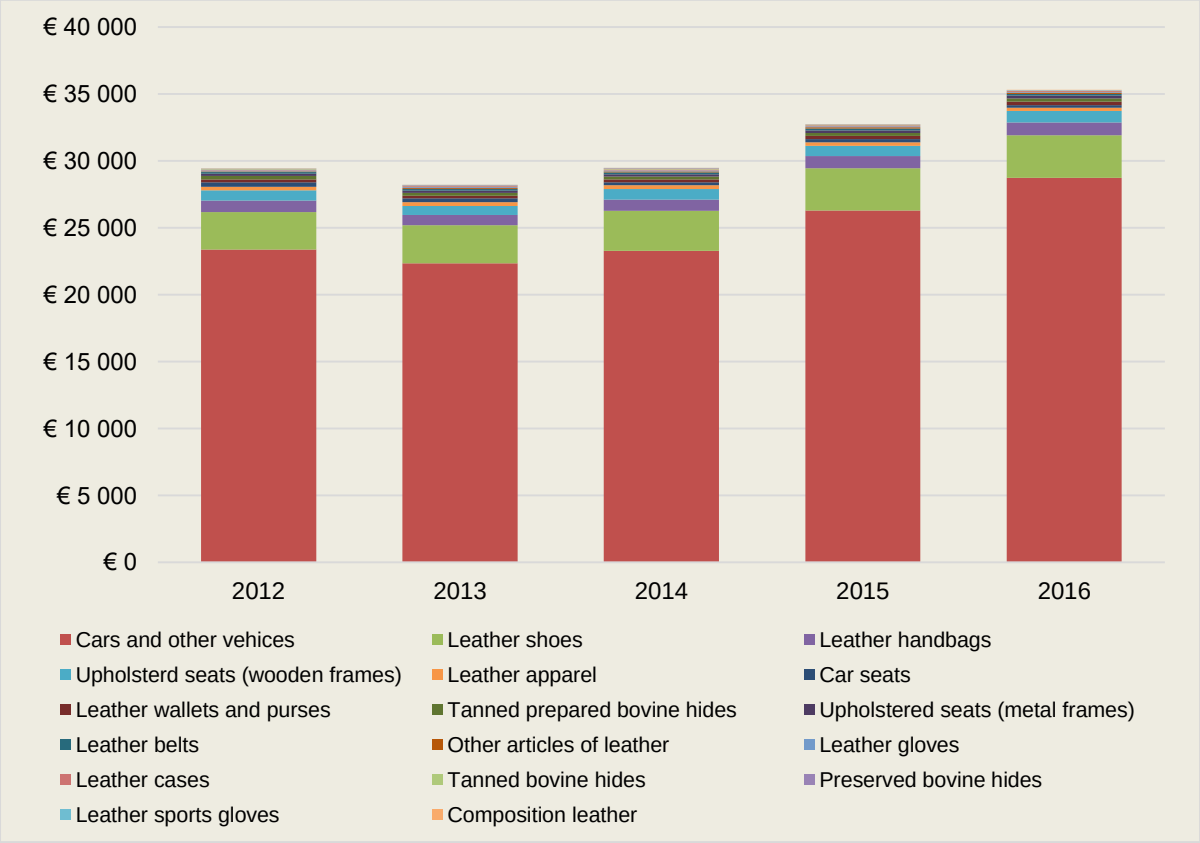


Figure 50: The value of France's imports of leather and products containing leather between 2012-16 (million Euro)



When adjusted for the quantity of beef contained in imports (see Appendix 8 for details), France imported an average of 260,000 tonnes of beef (Carcass Weight Equivalent, CWE) each year between 2012-16 (Table 14). There has been a steep decline in imports, from over 282,000 tonnes in 2012 to approximately 220,000 tonnes in 2016. This is predominantly a result of declines in imports of fresh or chilled beef, but most other product categories have shown some decline (Figure 51). Fresh and chilled beef dominated imports (54%) with frozen beef contributing 19% (Figure 52).

Figure 51: France's imports of beef between 2012-16, adjusted for beef content (Carcass Weight Equivalent, tonnes)

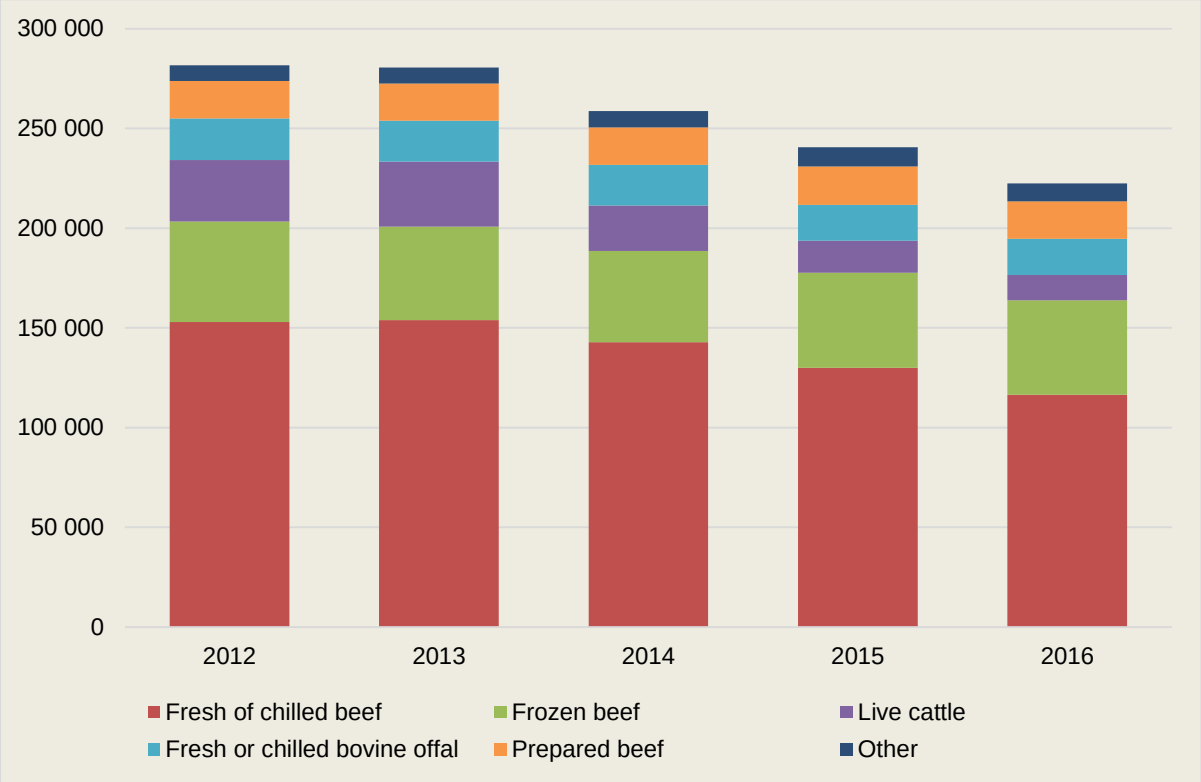
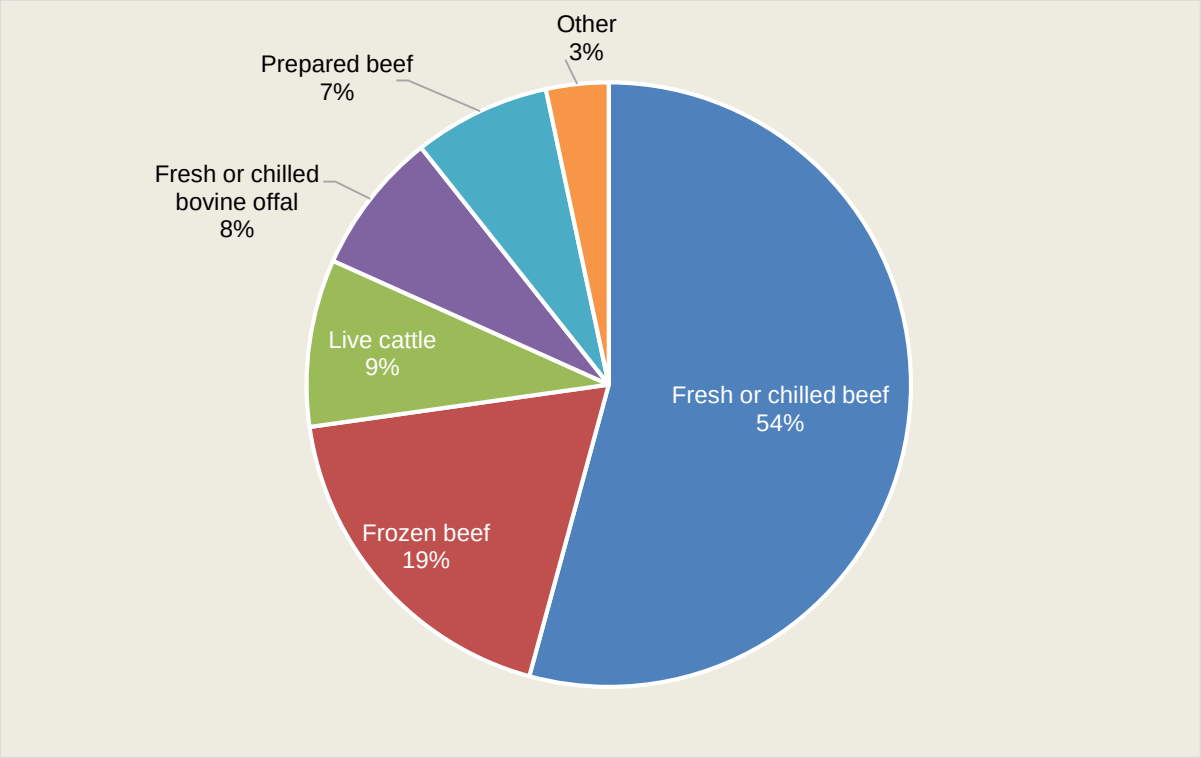


Figure 52: France's imports of beef. Adjusted for beef content (Carcass Weight Equivalent, tonnes, average 2012-16)



When adjusted for the quantity of leather contained in imports (see Appendix 8 for details of the conversion factors used), France imported an average of 101,000 tonnes of leather (Hide Equivalent) each year between 2012-16. There has been a steep increase in imports, from over 73,000 tonnes in 2012 to approximately 108,000 tonnes in 2016 (Table 15). This is predominantly a result of increases in imports of leather shoes (Figure 53). Leather shoes dominated imports (45%), with preserved bovine hides (14%) and tanned hides (13%) also making significant contributions (Figure 54).

Figure 53: France's imports of leather, between 2012-16, adjusted for leather content (Hide Equivalent, tonnes)

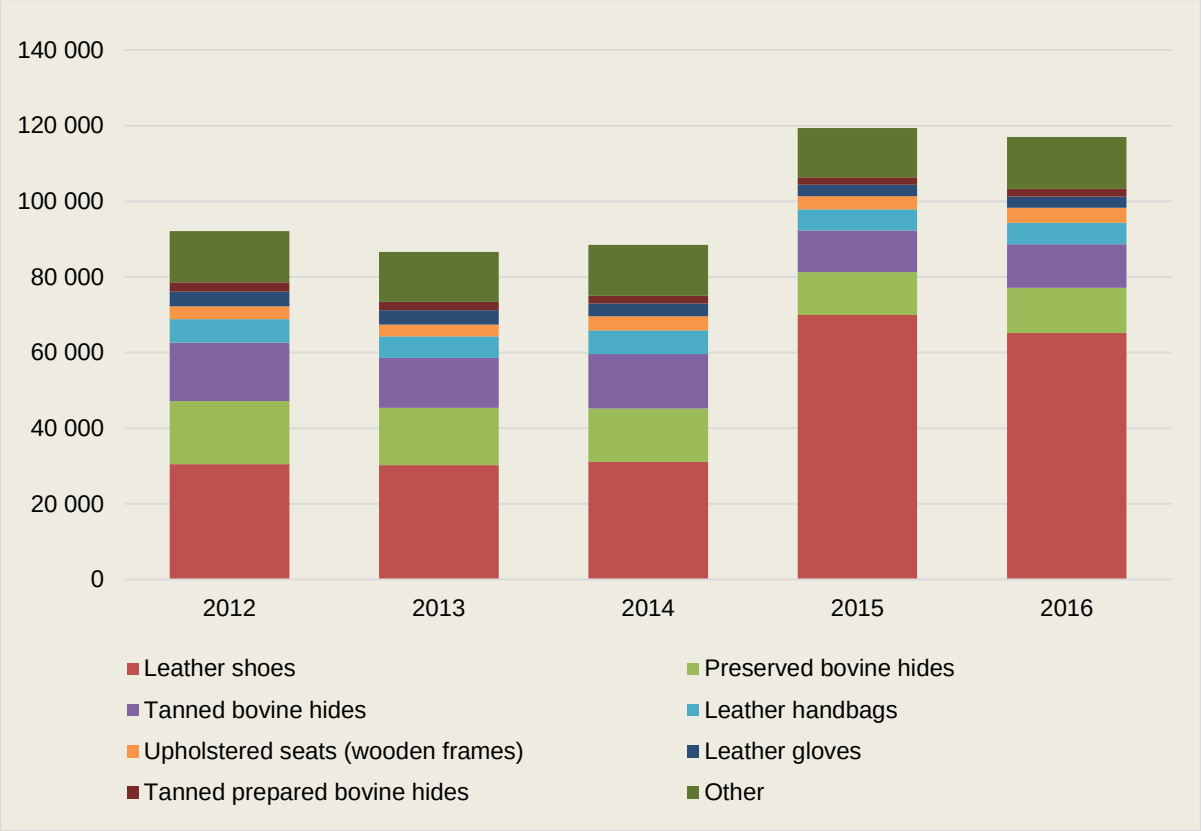


Figure 54: France's imports of leather. Adjusted for leather content (Hide Equivalent, tonnes, average 2012-16)

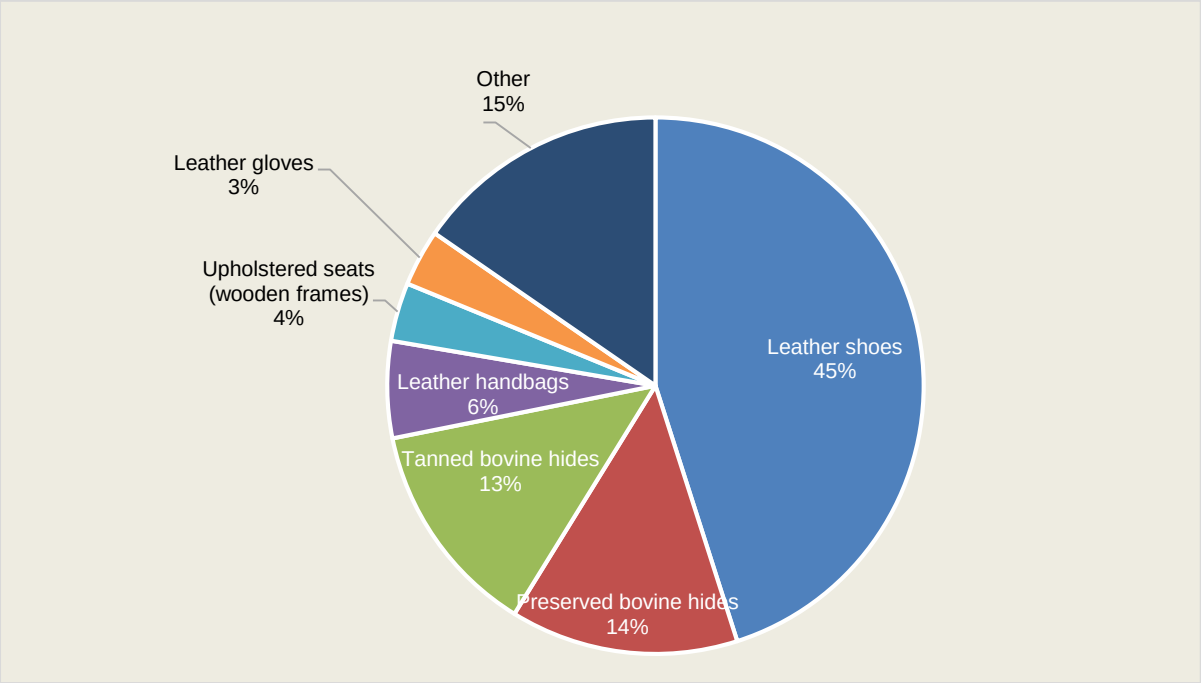


Table 14: Quantity of France's imports of beef and products containing beef 2012-16, adjusted for beef content (Carcass Weight Equivalent, tonnes)

HS code	Product	2012	2013	2014	2015	2016	Average	%
0201	Fresh of chilled beef	152,997	153,965	142,864	129,999	116,569	**139,279**	**54%**
0202	Frozen beef	50,367	46,787	45,650	47,709	47,359	**47,575**	**19%**
0102	Live cattle	30,858	32,613	22,922	15,940	12,649	**22,996**	**9%**
020610	Fresh or chilled bovine offal	20,825	20,570	20,268	18,079	18,132	**19,575**	**8%**
160250	Prepared beef	18,704	18,492	18,838	19,287	18,678	**18,800**	**7%**
	Other	7,963	8,123	8,203	9,576	9,038	**8,581**	**3%**
Totals		**281,713**	**280,550**	**258,746**	**240,590**	**222,426**	**256,805**	**100%**

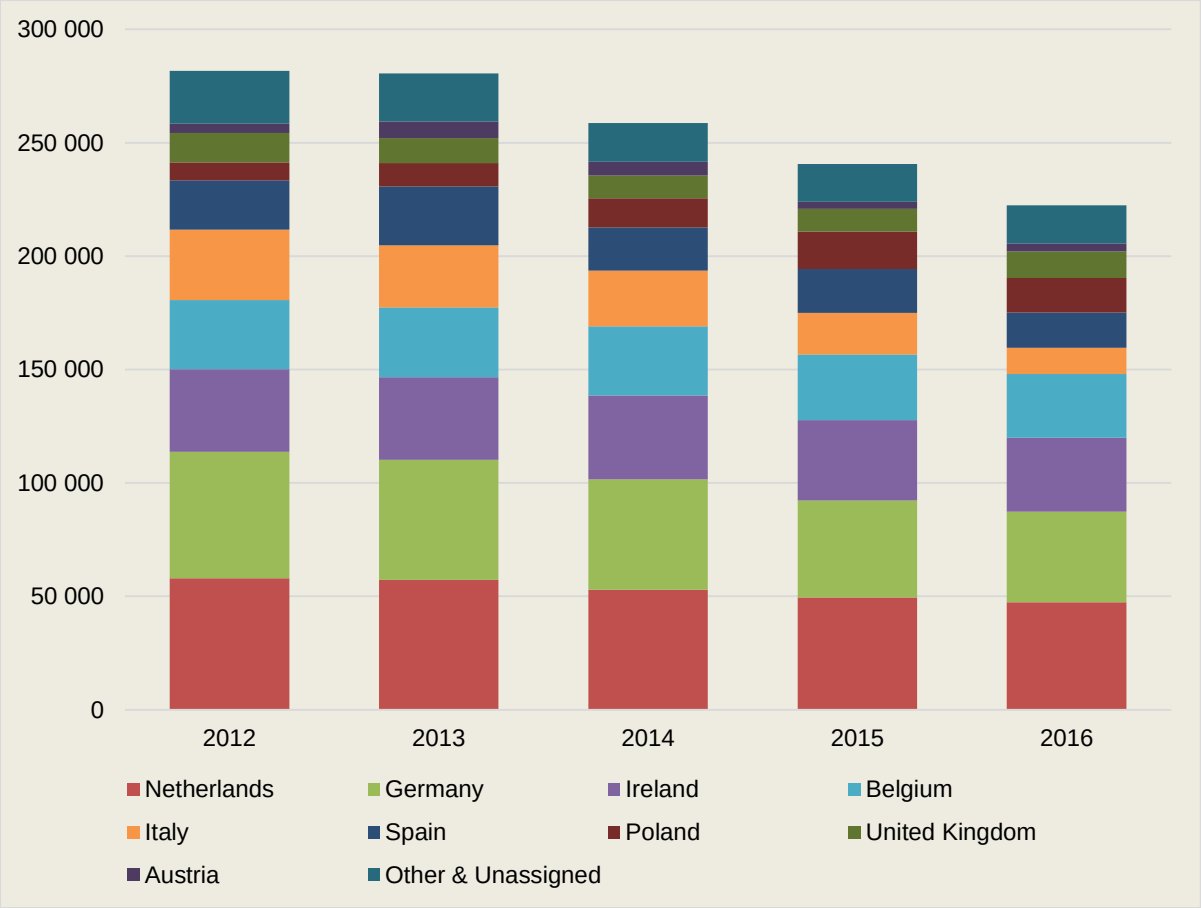
Table 15: Quantity of France's imports of leather and products containing leather 2012-16, adjusted for leather content (Hide Equivalent, tonnes)

HS code	Commodity	2012	2013	2014	2015	2016	Average	%
6403	Leather shoes	30,443	30,240	31,111	69,975	65,153	**45,384**	**45%**
4101	Preserved bovine hides	16,747	15,138	14,090	11,277	11,952	**13,841**	**14%**
420221	Tanned bovine hides	15,434	13,246	14,441	11,005	11,528	**13,131**	**13%**
420329	Leather handbags	6,175	5,645	6,211	5,658	5,671	**5,872**	**6%**
940161	Upholstered seats (wooden frames)	3,415	3,146	3,728	3,469	3,998	**3,551**	**4%**
420310	Leather gloves	3,940	3,790	3,426	3,020	2,994	**3,434**	**3%**
	Other	15,923	15,410	15,446	14,984	15,677	**15,488**	**15%**
Totals		**92,078**	**86,614**	**88,453**	**119,388**	**116,974**	**100,701**	**100%**

9.4 Provenance of France's imports of beef and leather

Between 2012 and 2016, France imported beef and products containing beef from a total of 116 territories. The EU dominates imports, accounting for an average of 97% of the total. Adjusting for indirect imports makes little difference to the estimated provenance, with EU countries remaining dominant, and the largest contributions coming from the Netherlands (an average of 53,000 tonnes CWE each year, 21% of the total), Germany (48,000 tonnes, 19%), Ireland (36,000 tonnes, 14%) and Belgium (30,000 tonnes, 12%, Figure 55). Imports from almost all countries have declined between 2012-16, the exception being Poland, which has recorded an increase from 8,000 tonnes CWE to 15,000 tonnes CWE.

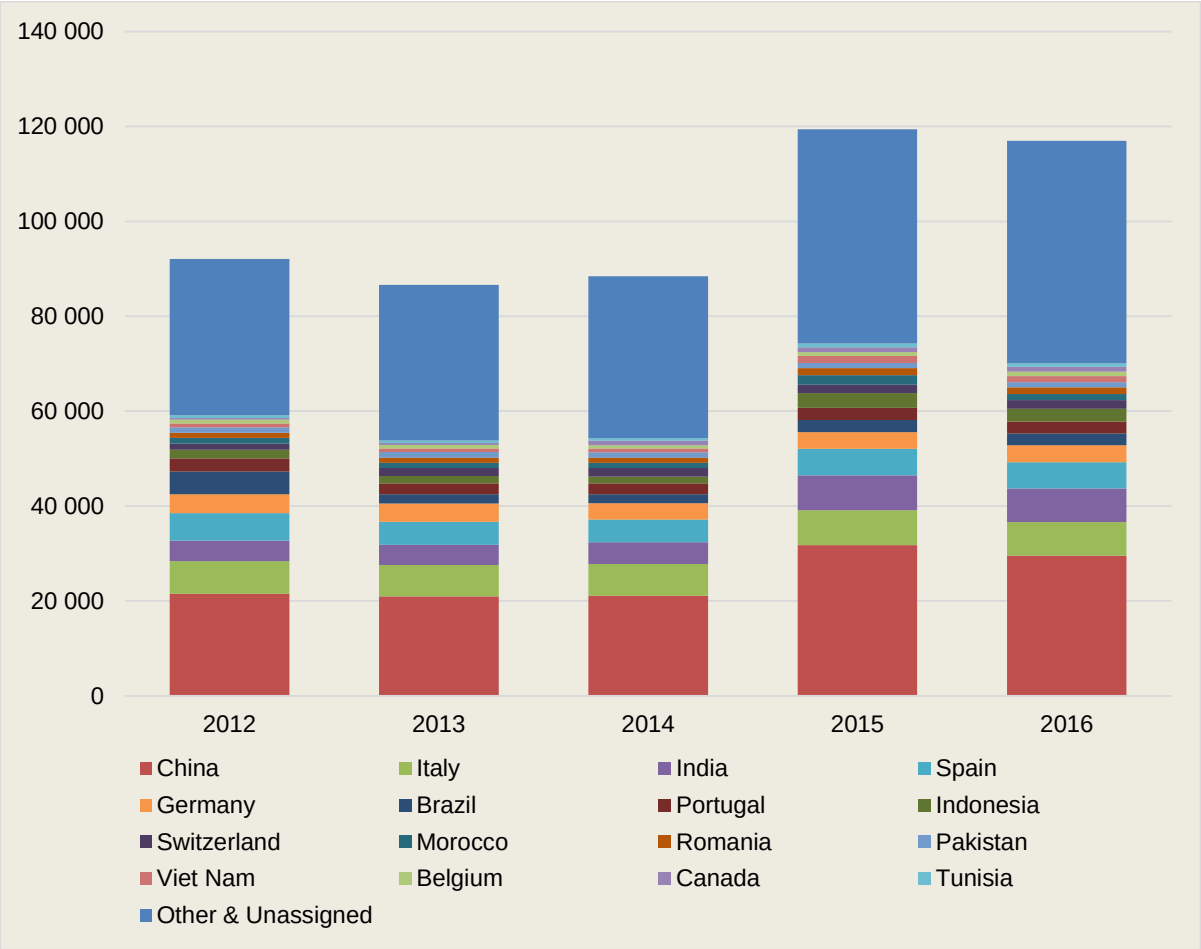
Figure 55: The provenance of France's imports of beef 2012-16, adjusted beef content and for third party country (intermediary) trade (Carcass Weight Equivalent, tonnes)



France imported leather and products containing leather from a total of 224 territories between 2012-16. When provenance is adjusted to account for trade, the greatest quantities come from China (exporting an average of 25,000 tonnes of hide equivalent each year, 25% of the total), Italy (7,000 tones, 7%), India (6,000 tonnes, 5%), and Spain (5,000 tonnes, 5%).

More than a third of the total (38%) is from countries contributing less than 2% of the value of beef or leather, or remained unassigned during the provenance adjustment (i.e., was imported by France's major suppliers from 'other' countries).

Figure 56: The provenance of France's imports of leather 2012-16, adjusted leather content and for third party country (intermediary) trade (Hide Equivalent, tonnes)



9.5 France's beef and leather footprint

To estimate the land area required to supply France with beef and leather, total country pasture to different grazing animals based on the relative feed conversion efficiencies and overall sector production (see Section 2.3.2). This provided an estimate of the area of pasture allocated to beef cattle in each country. Given that beef cattle have two products (meat and leather), we further allocated this pasture to beef and leather co-products on the basis of their mass (the hide being 15% of the mass of a sold carcass,[184] it was allocated 15% of the land footprint). This was to avoid the potential double-counting of land where beef and leather where sourced from the same country.

The estimated land area required to satisfy France's demand for beef and leather was 2.3 million hectares per year between 2012-16 (Figure 57). France has a total pasture area of 12,843,000 hectares,[185] of which just under half (5,919,000 hectares) can be allocated to beef cattle. The land required overseas to supply beef and leather to France is thus equivalent to 18% of France's total area of pasture, or 39% of France's beef cattle pasture. China contributes an average of 630,000 hectares each year (leather), with Spain contributing 230,000 hectares (beef and leather). A large proportion of the footprint (27%) is from countries contributing less than 2% of the value of beef or leather, or remained

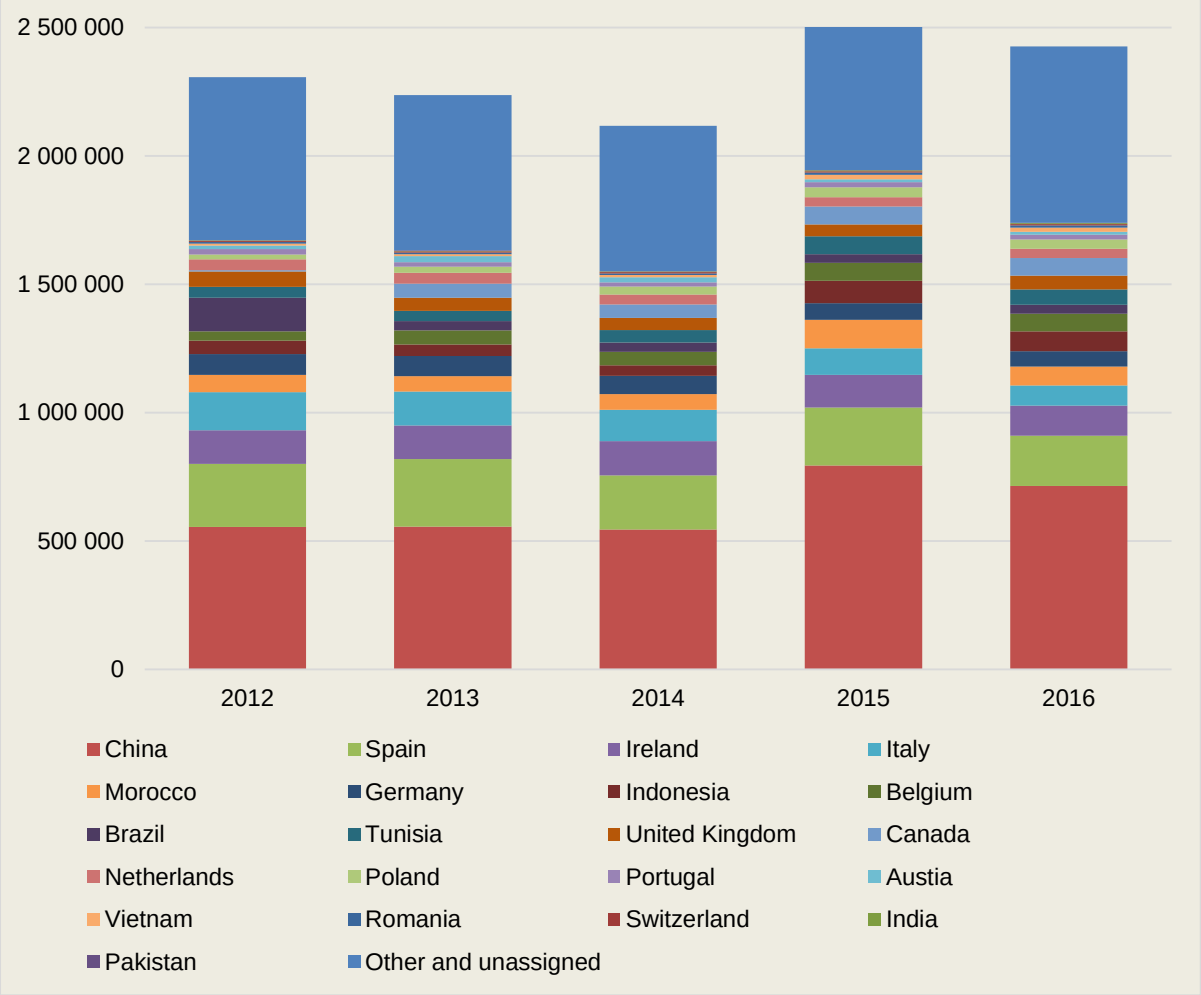
[184] Agriculture and Horticulture Development Board (2014). AHDB Beef Yield Guide. AHDB, Kenilworth, Warwickshire, UK. http://www.qsmbeefandlamb.co.uk/books/beef-yield-guide/files/assets/common/downloads/beef-yield-guide.pdf

[185] FAOSTAT

unassigned during the provenance adjustment (i.e., was imports from ‘other’ countries to France’s major suppliers: ‘Other and unassigned’ in Figure 57).

Even though the quantities of leather imported by France are only around half of those of beef (see Table 14 and Table 15), leather accounts for 62% of the total footprint. This is principally because leather is only 15% of the carcass weight of cattle, and hence requires more cattle and therefore more land to produce the same weight as beef. However, the imports of leather from countries where cattle production is extensive, such as Morocco and Tunisia, also contributes to the large leather footprint.

Figure 57: The land area required to supply France with beef and leather (hectares)

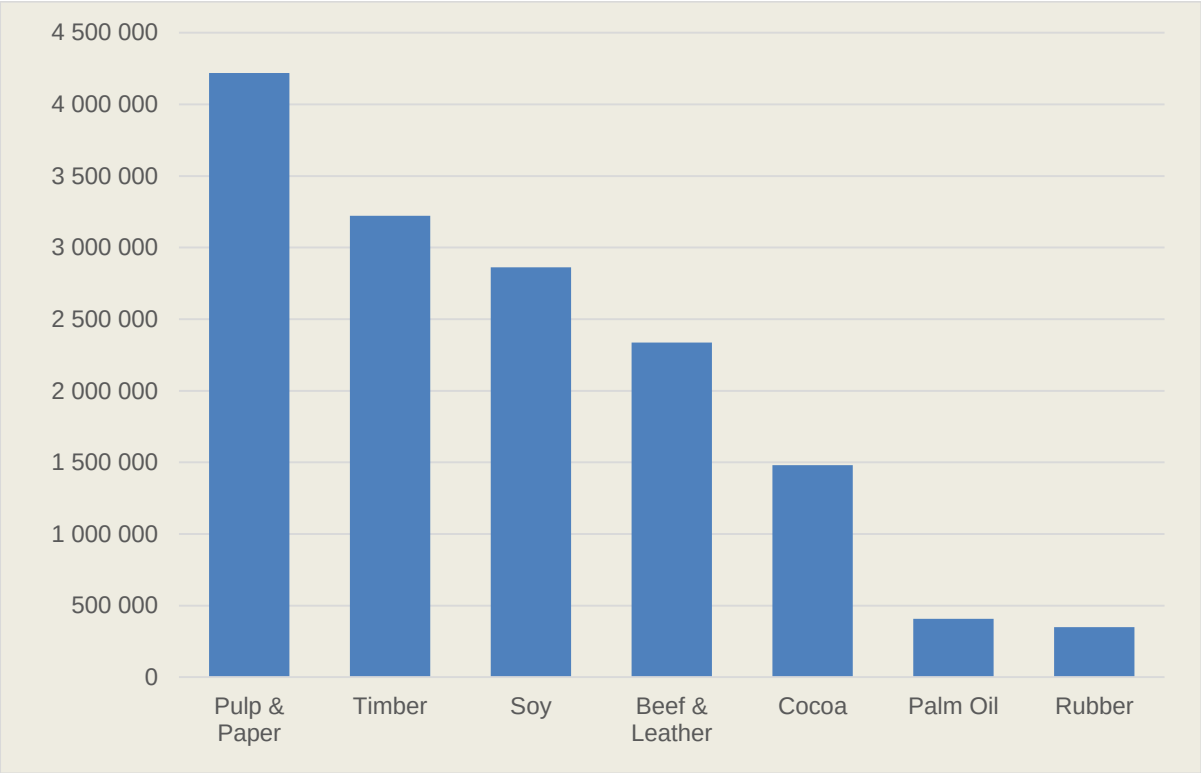


10 France's commodity footprint

Figure 58 shows the estimated total land area required to supply France with its imports of timber, soy, palm oil, pulp & paper, rubber, beef & leather and cocoa. The overall land footprint of these commodities averages 14.9 million hectares each year between 2012-16, an area equivalent to more than one quarter the size of Metropolitan France (or 87% of the size of France's own forest area[186]). The estimates are likely to be low-end estimates, as the assumptions made in their calculation are largely conservative (e.g., only major product categories of import have been assessed for each commodity, not every possible end use).

Pulp and paper had the highest estimated footprint, followed by timber, reflecting the large quantities of these commodities that are imported by France and low yield of wood (Figure 58). Soy also has a very significant footprint, a result of the large volumes imported, principally to supply France's livestock and poultry industries with feed.

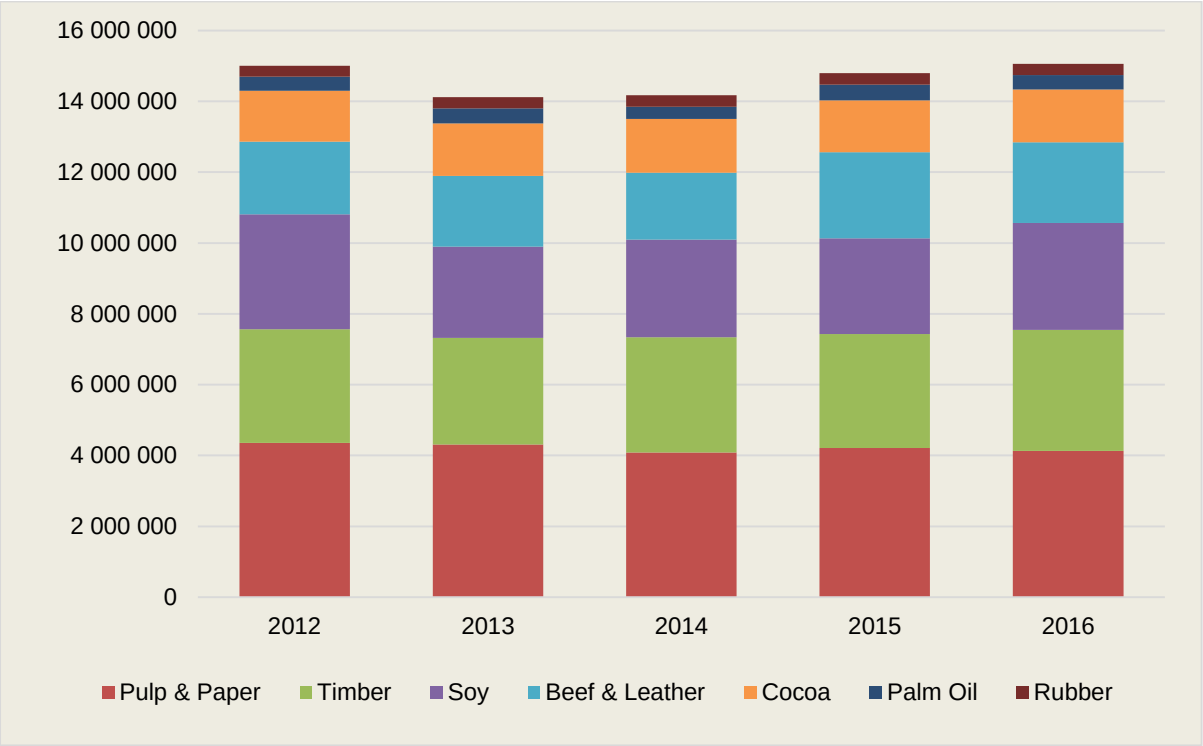
Figure 58: Land area required to supply France with commodities (hectares)



There is little evidence of a trend in the total footprint between 2012-16, although the decline in the soy footprint in 2013 caused a reduction in the total land area required to supply France, which recovered by 2016 (Figure 59). Pulp and paper, timber, soy, beef and leather and cocoa consistently make the largest contribution to the overall footprint.

[186] FAO (2016) Global Forest Resource Assessment 2015: How are the world's forests changing? Food And Agriculture Organization Of The United Nations, Rome.

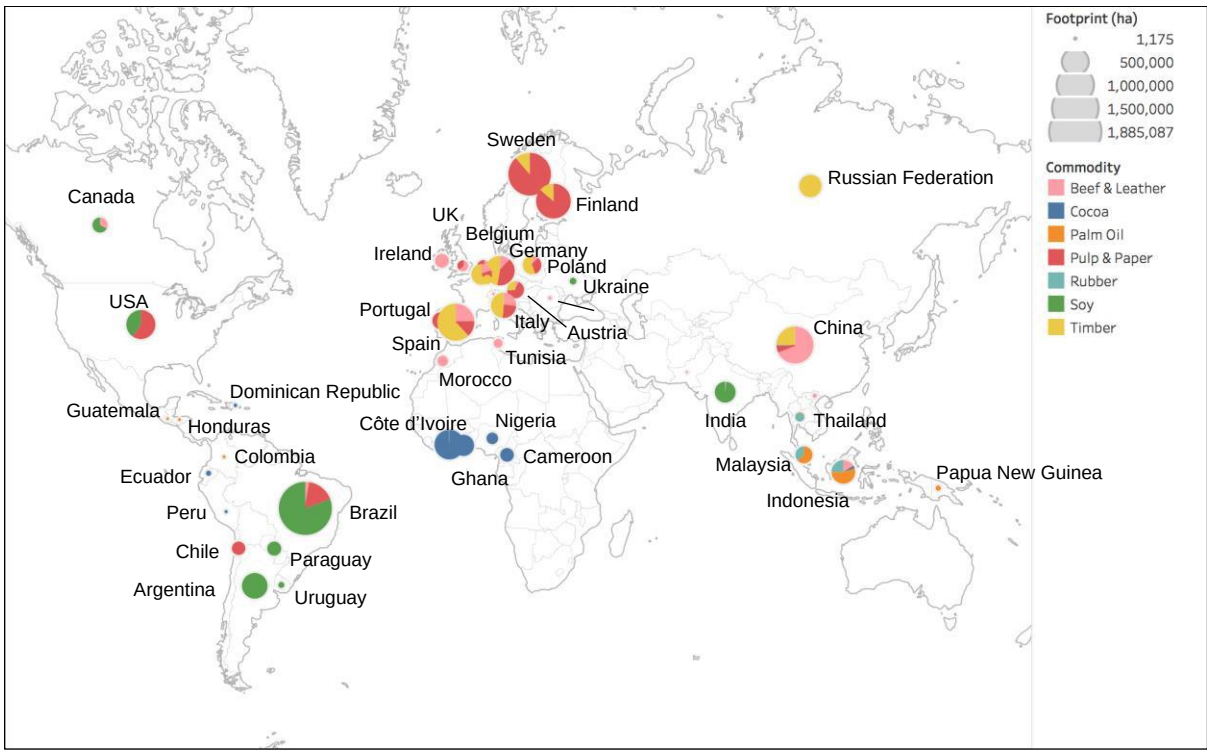
Figure 59: The area of land required to supply France with commodities 2012-16 (hectares)



The largest footprint comes from Brazil at 1.9 million hectares, largely due to imports of soy, with some pulp and paper, and leather (

Figure ***60***). Other significant footprints in tropical countries include Côte D'Ivoire (cocoa and natural rubber, 594,000 hectares), Indonesia (320,000 hectares of palm oil, cocoa, natural rubber and leather) and Ghana (304,000 hectares of cocoa). EU countries, especially Sweden (1.2 million hectares), Finland (806,000 hectares), also contribute significant land areas through their exports of timber, pulp and paper, and Spain (916,000 hectares) and Germany (582,000 hectares) though their exports of timber, pulp and paper, beef and leather.

Figure 60: Country footprints for all commodities (hectares)


Footprint (ha)
1,175
500,000
1,000,000
1,500,000
1,885,087
Commodity
Beef & Leather
Cocoa
Palm Oil
Pulp & Paper
Rubber
Soy
Timber
Sweden
Finland
Russian Federation
Canada
UK
Belgium
Ireland
Germany
Poland
Ukraine
USA
Portugal
Italy
Austria
China
Spain
Tunisia
Morocco
Dominican Republic
Guatemala
Honduras
Côte d'Ivoire
Nigeria
India
Thailand
Colombia
Cameroon
Malaysia
Ecuador
Ghana
Papua New Guinea
Peru
Brazil
Indonesia
Chile
Paraguay
Argentina
Uruguay

11 Deforestation and social risk

11.1 Country risk rating

As described in Section 2.2, each of the countries that contribute at least 2% by value of France's imports of timber, pulp and paper, soy, palm oil, beef and leather, cocoa and rubber were scored against four risk indicators: tree cover loss, change in the area of natural forest, perception of corruption and labour rights. Scores from each of these indicators were summed to provide an overall indication of the risk of deforestation and negative social outcomes.

The country risk scores and overall risk rating were calculated and are presented in Table 16.[187] Of the 45 countries rated, only eight (Austria, Belgium, Germany, Ireland, Luxembourg, the Netherlands, Switzerland and Uruguay) scored the minimum overall score of four (i.e., low risk for each indicator). These countries are assigned low risk status. A larger group of countries, including Finland, Spain, and the UK achieved a medium-low risk rating as they typically scored low risk on two or three of the indicators, and medium risk on the remainder. The majority of the countries with a low or medium-low risk rating are within the EU.

Indonesia, Nigeria and Paraguay were rated as very high risk, as they scored high on three of the four indicators and medium risk on the remainder. Thirteen countries, including Argentina, Brazil, Cameroon, China, Côte d'Ivoire, Malaysia, the Russian Federation and Vietnam were rated as high risk. Note that these risk ratings do not reflect sub-national trends (e.g., if particular region within a country is supplying France, and has a lower or higher rate of deforestation) or commodity-specific factors (e.g., if labour conditions within a particular sector are significantly better or worse than the national picture).

The degree of risk of France's imports being associated with deforestation and social exploitation is related to the risk rating of the exporting country and the amount of production in that country that is required to fulfil France's demand.

[187] Note that data from different years as well as a different indicator are used in this study compared to the Risk Business report developed for the UK, and so some countries score slightly differently.

Table 16: Country risk ratings for France's major suppliers of commodities associated with deforestation[188]

Country	Tree cover change GFW	Deforestation Rate FAO	Labour standards IUTC	Corruption Perception Index TI	Overall score
Argentina	1,597,666	-5.5%	4	39	10
Austria	185,723	0.6%	1	75	4
Belgium	17,502	2.0%	2	75	4
Brazil	9,409,340	-1.2%	4	37	10
Cameroon	339,307	-5.6%	4	25	9
Canada	10,134,697	-0.6%	2	82	7
Chile	492,431	6.1%	3	67	5
China	2,142,551	1.4%	5	41	9
Colombia	729,270	-0.3%	5	37	9
Cote D'ivoire	850,278	-0.2%	4	36	9
Dominican Rep.	55,912	7.4%	2	29	6
Ecuador	193,920	-0.2%	5	32	9
Finland	629,261	0.0%	1	85	5
Germany	92,877	0.1%	1	81	4
Ghana	358,063	0.9%	3	40	6
Guatemala	230,365	-6.5%	5	28	10
Honduras	175,148	-11.6%	5	29	10
India	404,973	0.0%	5	40	7
Indonesia	6,487,141	-4.0%	5	37	11
Ireland	30,943	0.0%	1	73	4
Italy	65,401	3.0%	1	50	5
Luxembourg	1,557	0.0%	0	82	4
Malaysia	7,575,795	-1.3%	4	47	10
Morocco	9,288	-2.4%	3	37	8
Netherlands	3,267	0.0%	1	82	4
Nigeria	643,734	-24.6%	5	27	11
Pakistan	389	-17.6%	5	32	10
Papua New Guinea	267,959	0.0%	-	29	7
Paraguay	1,608,837	-9.9%	4	29	11
Peru	796,410	-1.4%	4	37	9
Poland	194,837	5.8%	3	60	6
Portugal	206,040	-3.5%	2	63	6
Romania	97,951	5.3%	4	48	6
Russian Federation	18,280,516	-0.1%	3	29	10
Spain	265,017	0.9%	2	57	5
Sweden	840,494	-7.6%	1	84	7
Switzerland	6,324	1.5%	2	86	4
Thailand	430,973	1.2%	4	37	6
Tunisa	9,684	0.0%	4	41	6
Ukraine	195,655	1.4%	5	30	8
United Kingdom	113,997	0.0%	3	82	5
Uruguay	104,406	4.1%	1	70	4
USA	7,079,378	0.2%	4	75	7
Vietnam	646,164	7.8%	5	35	9

Key to Table 16

Risk rating	
Very High Risk	≥11
High Risk	9-10
Medium Risk	7-8
Medium-low Risk	5-6
Low Risk	4

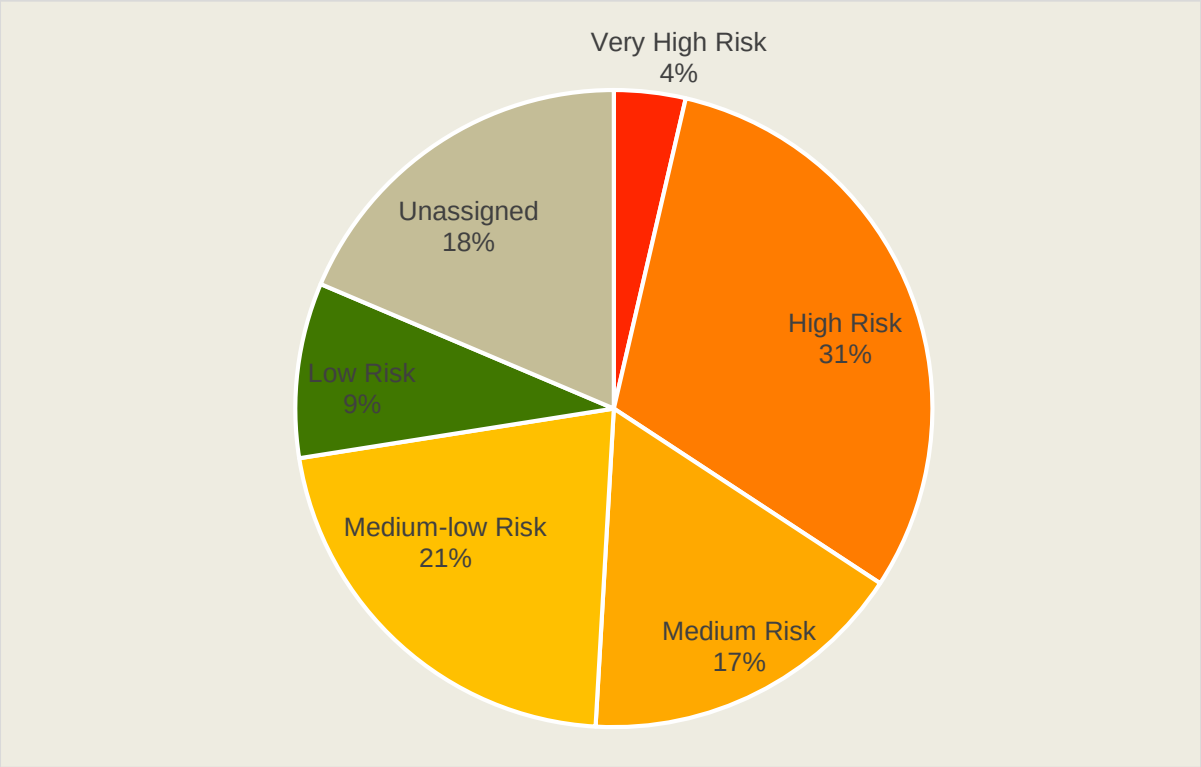
[188] Côte d'Ivoire was not rated by the ITUC in 2017, so the 2016 rating was used instead; Luxembourg is not rated by ITUC and but is assumed to have a similar record on labour rights abuses to neighbouring countries such as Belgium. Papua New Guinea is not rated by ITUC, and is not scored for this indicator, meaning that the overall score is lower than it otherwise would be which reflects the fact that only commodity that it exports to France in quantity is palm oil, which is produced by NBOP, and is widely regards as being one of the best plantations in the world for labour and environmental performance,; and the FAO data assigns no natural forest to the Netherlands, which is scored as zero change on that indicator.

11.2 Commodity risk profiles

11.2.1 All commodities

The overall risk profile of France's footprint for the commodities assessed in this report is given in Figure 61. One-third of the land area (35%, or 5.1 million hectares) is in high and very high risk countries, a land area equivalent to nearly one third (30%) of France's own forest area. A further 17% (2.5 million hectares) is in medium risk countries. Four and a half million hectares (30% of the total) came from countries with low and medium-low risk ratings. The portion that is 'other and unassigned' is either imports from countries that contributed less than 2% of France's imports of a commodity by value, or imports that it was not possible to allocate to a country within the limitations of this study. This portion is likely to come from countries with a range of risk profiles.

Figure 61: Distribution of the France's land footprint for imported commodities amongst risk categories



The majority of the footprints of palm oil (84%), soy (73%), cocoa (57%) and rubber (55%) are from high and very high risk countries. Timber, pulp and paper, and beef (less so leather) are largely supplied from within the EU, and have a much lower proportion of their footprints from high and very-high risk countries (Table 17 and

Figure ***62***).

Figure 62: Proportion of the land area of each commodity originating in high and very-high risk countries

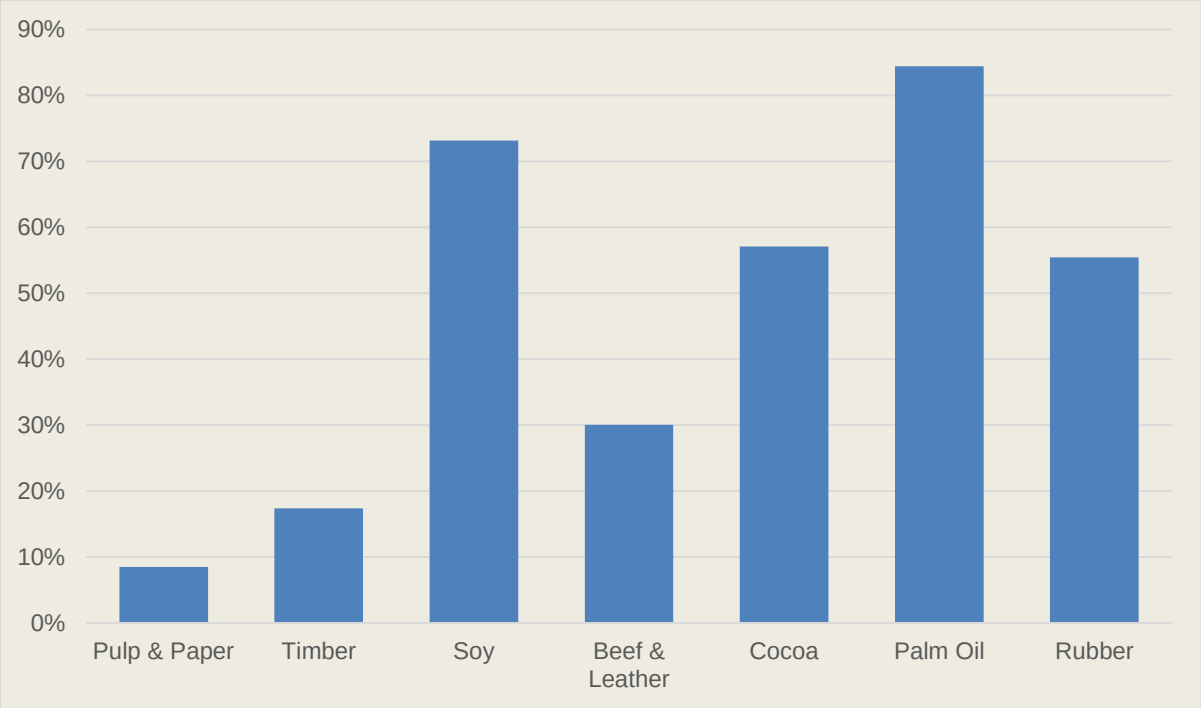


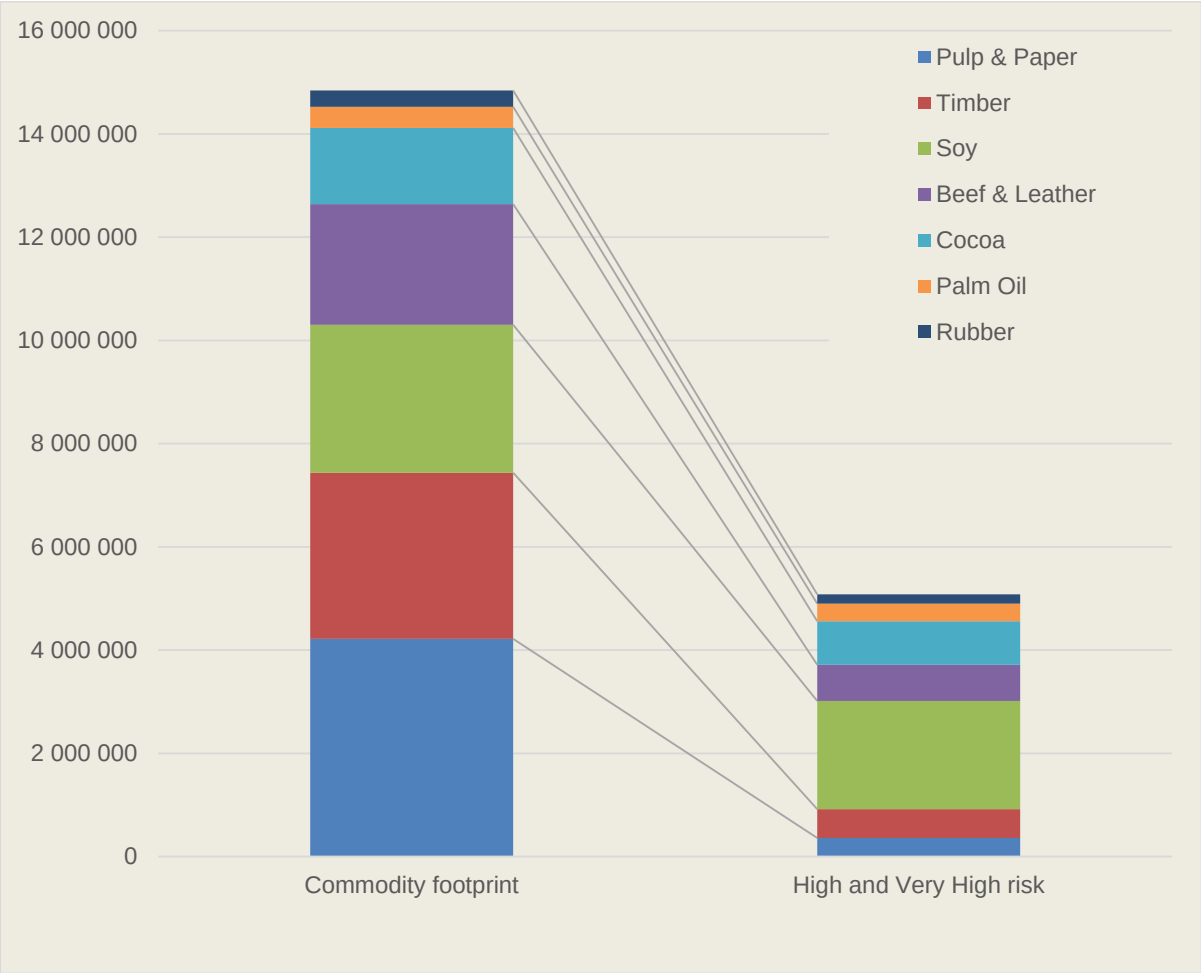
Table 17: Land requirements for France's imports of commodities by risk category (hectares)

	Risk rating						
Commodity	**Very High**	**High**	**Medium**	**Medium-low**	**Low**	**Unassigned**	**Total**
Pulp & Paper	0	359,804	1,413,000	1,314,366	498,811	632,558	**4,218,540**
Timber	0	560,775	137,554	1,015,703	546,598	960,415	**3,221,044**
Soy	133,074	1,960,635	649,277	0	24,832	93,694	**2,861,513**
Beef & Leather	60,514	699,493	126,734	505,131	315,605	629,387	**2,336,864**
Cocoa	106,818	747,217	0	316,776	0	325,048	**1,495,860**
Palm Oil	203,886	139,428	18,864	4,173	0	40,359	**406,710**
Rubber	98,269	95,043	3,795	57,072	0	894,461	**348,641**

Soy contributes 20% (2.9 million hectares) to the overall footprint, but is responsible for nearly 41% of the high and very high risk footprint (

Figure ***63***). Cocoa also makes a disproportionate contribution to the high and very high risk footprint, being responsible for 10% of the overall footprint but 17% of the high and very high risk footprint.

Figure 63: Contribution of commodities to France's high and very high risk footprint (hectares)



When the risk profile of each commodity is considered by quantity of imports, a subtly different picture emerges, reflecting the influence that variation in yield between countries has on land requirements. The provenance of palm oil (84%), soy (78%) and cocoa (57%) quantities remain predominantly from very high and high risk countries (Table 18). The quantities of rubber sourced from high and very high risk counties (44%) decreases somewhat compared with land footprint, a result of the comparatively higher yield that Thailand (rated medium-low risk) has compared with Indonesia and Malaysia (very high and high risk, respectively). The quantities of timber, pulp and paper sourced from high and very high risk countries remains low – but non-negligible – at 14% and 8% respectively.

Table 18: Quantities of France's imports by risk rating of producer countries (tonnes)

Commodity	Very High	High	Medium	Medium Low	Low	Unassigned	Total
Pulp & Paper	0	3,388,104	5,401,785	5,980,312	4,566,288	4,383,908	**23,720,397**
Timber	0	1,245,786	1,471,832	2,234,109	4,915,186	4,852,714	**14,719,628**
Soy	220,235	3,547,652	878,236	0	35,204	144,762	**4,826,089**
Beef & Leather	3,225	10,878	39,130	68,026	182,119	40,613	**343,991**
Cocoa	20,479	237,914	0	102,808	0	95,685	**456,886**

Palm Oil	488,240	333,168	45,141	9,768	0	96,961	**973,278**
Rubber	85,486	96,513	7,802	88,060	0	131,252	**409,114**

11.3 Timber

France imports most of its timber products from low and medium-low risk countries, including Germany, Austria, Belgium, Spain and Finland. However, 17% of the footprint is from two high risk countries, China and the Russian Federation (Figure 64). Both these countries have high rates of tree cover loss, and poor labour standards (especially China) and a perception of high levels of corruption (especially the Russian Federation, see Table 16). Both countries are known as conduits for illegal timber.[189] Greater uptake of FSC certification, which has the highest social and deforestation safeguards, would undoubtedly reduce the risk of association of France's imports with deforestation, forest degradation and conversion of natural habitats.

Figure 64: France's timber footprint by risk category

11.4 Pulp and paper

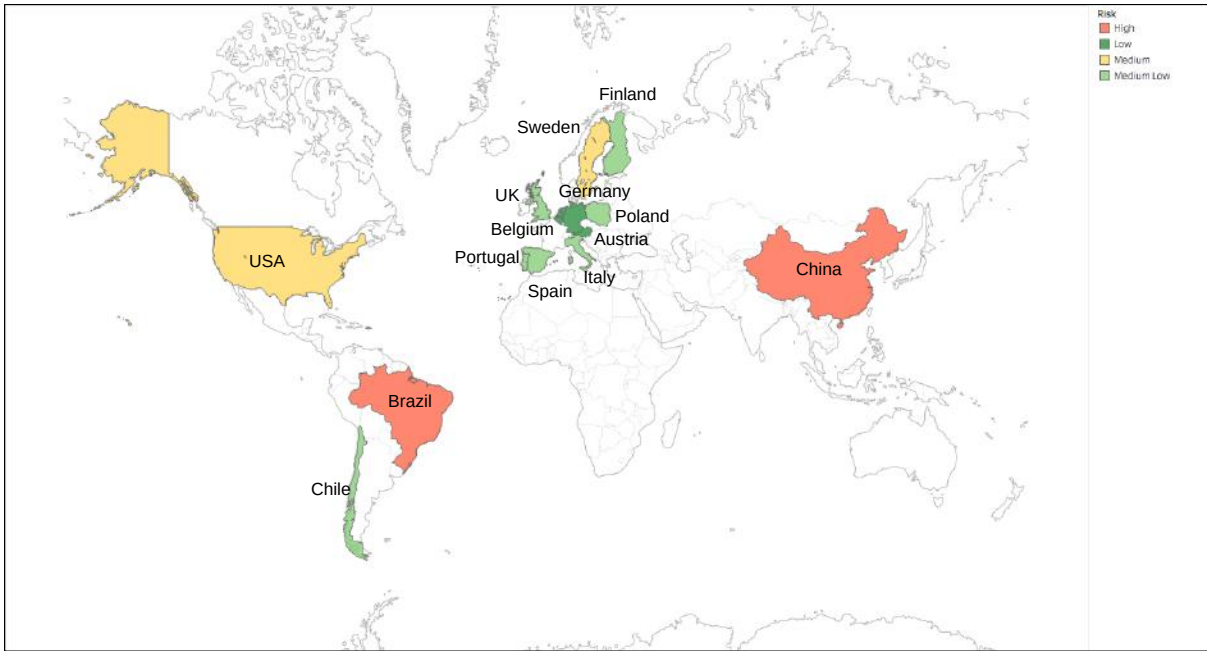
France imports two-thirds of its pulp and paper products (67%) from low and medium-low risk countries, including Finland, the UK, the USA and Sweden, and 15% from low risk countries, including Germany, Austria and Belgium (Figure 65). However, 8% of the footprint originates from two high risk countries, China (50,000 hectares) and Brazil (310,00 hectares).

Within the overarching category of pulp and paper, there are hidden risks. For example, between 2012-16, 2.8 million tonnes of pulp was imported from Brazil, representing 27% of

[189] For example: Greenpeace (2008). Alternatives to unsustainable plywood in the UK construction industry, Greenpeace, London, UK; and https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/402325/Chinese_Plywood_Research_Report.pdf

all of the pulp France imported over that period. The risks within this specific product group (more specifically, the imports from Brazil were of dissolving grades of chemical wood pulp), are higher than for pulp and paper products in general. These risks can be managed through purchasing from plantations that are well managed and that are not associated with deforestation and habitat conversion, such as those certified by the FSC. In addition, for some product types, greater use of recycled paper would reduce the demand on high risk plantations. Finally, there are pulp and paper products that arrive into France as packaging material for other imports. Whilst it is beyond the scope of this study to estimate the quantities and provenance of packaging, it is inevitable that some of this material has been produced at the expense of forests and other natural habitats, and this represents an additional overseas impact of France's imports.

Figure 65: France's pulp and paper footprint by risk category



11.5 Cocoa

France imports most of its cocoa products (57%) from high and very high risk countries: Côte d'Ivoire, Cameroon, Nigeria, Ecuador, Indonesia and Peru (Figure 66). All of these countries have significant deforestation, labour and corruption issues. The majority of the remaining footprint is from Ghana, which at a national level is rated as medium risk due to relatively modest rates of tree cover loss and natural forest loss (Table 16). However, the cocoa sector in Ghana has repeatedly been shown to rely on low paid or unpaid labour, coercion and violence, and systematic debt,[190] is included by the US Department for Labor in their List of Goods Produced by Child Labour,[191] and has directly been associated with deforestation.

While certification is well advanced within the cocoa sector, the safeguards that different schemes provide on deforestation and social exploitation vary (see Section 5.1.4), and there remain entrenched problems within the sector. However, voluntary certification, alongside initiatives such as the World Cocoa Foundation's Cocoa and Forests Initiative, remain the best option for reducing the risk of deforestation.

[190] Genevieve LeBaron (2018) The Global Business of Forced Labour: Report of Findings, SPERI & University of Sheffield.
[191] https://www.dol.gov/ilab/reports/child-labor/list-of-goods

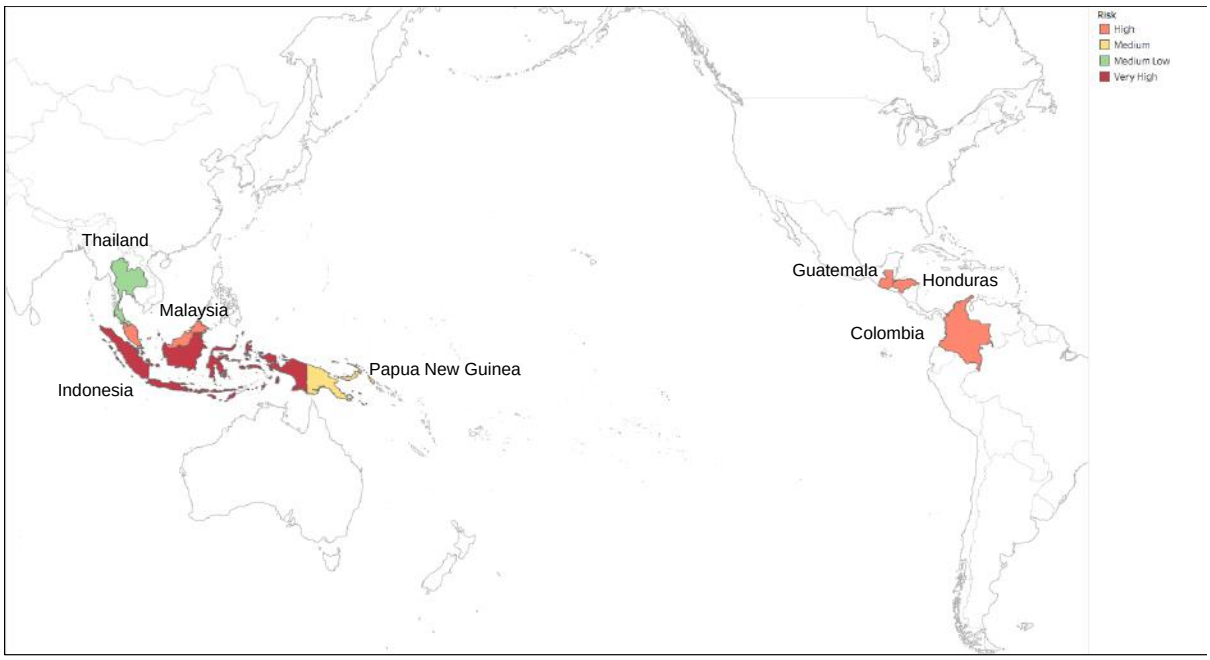
Figure 66: France's cocoa footprint by risk category

11.6 Palm Oil

France imports most of its palm oil (84%) from high and very high risk countries, principally Indonesia and Malaysia (Figure 67). Both countries have significant deforestation, labour and corruption issues (Table 16).

The two major certification schemes within the sector, the RSPO favoured by consumer goods companies) and the ISCC (favoured by the biofuel sector) have significant market penetration, and are used by many companies to reduce the risk of deforestation and exploitation within their supply chains. However, conversion of High Conservation Value Forest and labour abuses have been reported from RSPO plantations, and so whilst certification remains the best way of managing deforestation risk, some organisations are also exploring complementary approaches, such as jurisdictional (landscape) scale initiatives.

Figure 67: France's palm oil footprint by risk category



11.7 Soy

France imports most of its soy (73%) from high and very high risk countries: Brazil, Argentina and Paraguay (Figure 68). All three countries have very high levels of tree cover loss and deforestation of natural forest (Table 16).

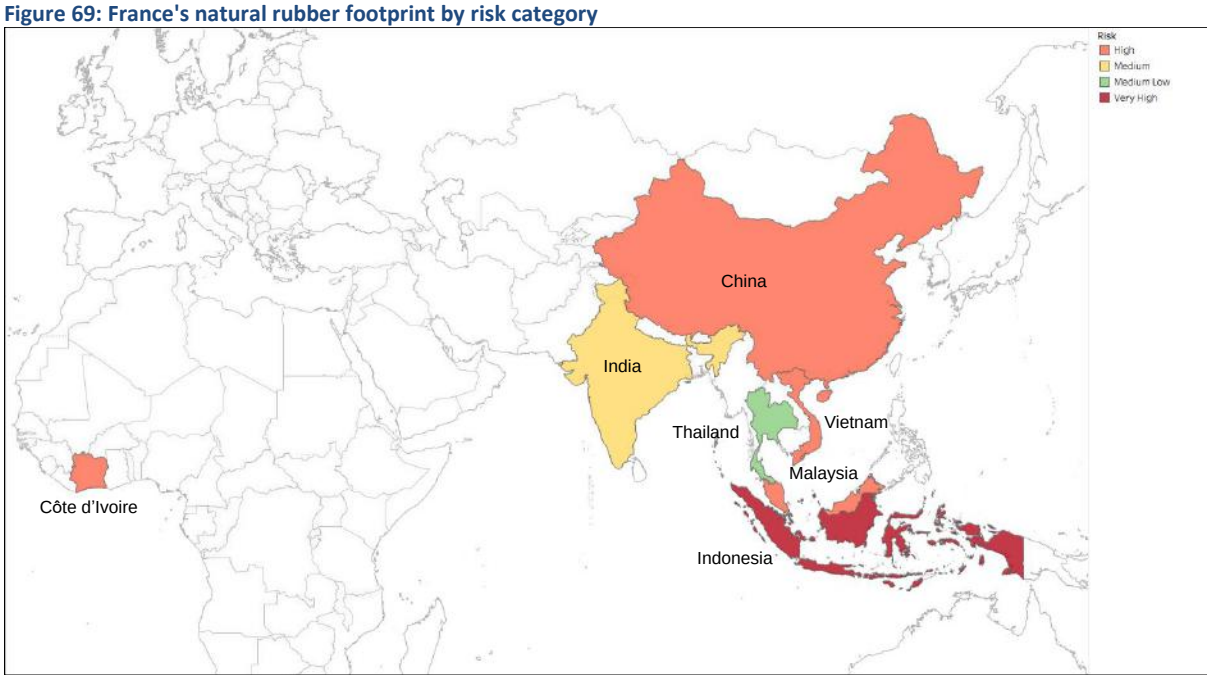
Credible certification schemes, such as the Roundtable on Sustainable Soy (RTRS) and ProTerra exist within the soy sector, and have strong safeguards against deforestation and conversion of natural habitats. However, their market penetration is limited (see Section 7.2.2), and many companies consider them too costly. Additional approaches to reducing the environmental cost of soy in Brazil have included the Amazon Soy Moratorium, and more recently the Cerrado Manifesto, and organisations are also beginning to develop jurisdictional (landscape) approaches to reduce the risk of deforestation in soy supply chains.

Figure 68: France's soy footprint by risk category

11.8 Natural Rubber

France imports most of its natural rubber (57%) from high and very high risk countries: Indonesia, Malaysia, China, Côte d'Ivoire and Vietnam (Figure 68). All of these countries have either very high levels of tree cover loss and deforestation of natural forest, and/or a poor record of labour rights and corruption (Table 16). The lack of a credible, transparent certification scheme for natural rubber means that there are limited options for managing this risk.

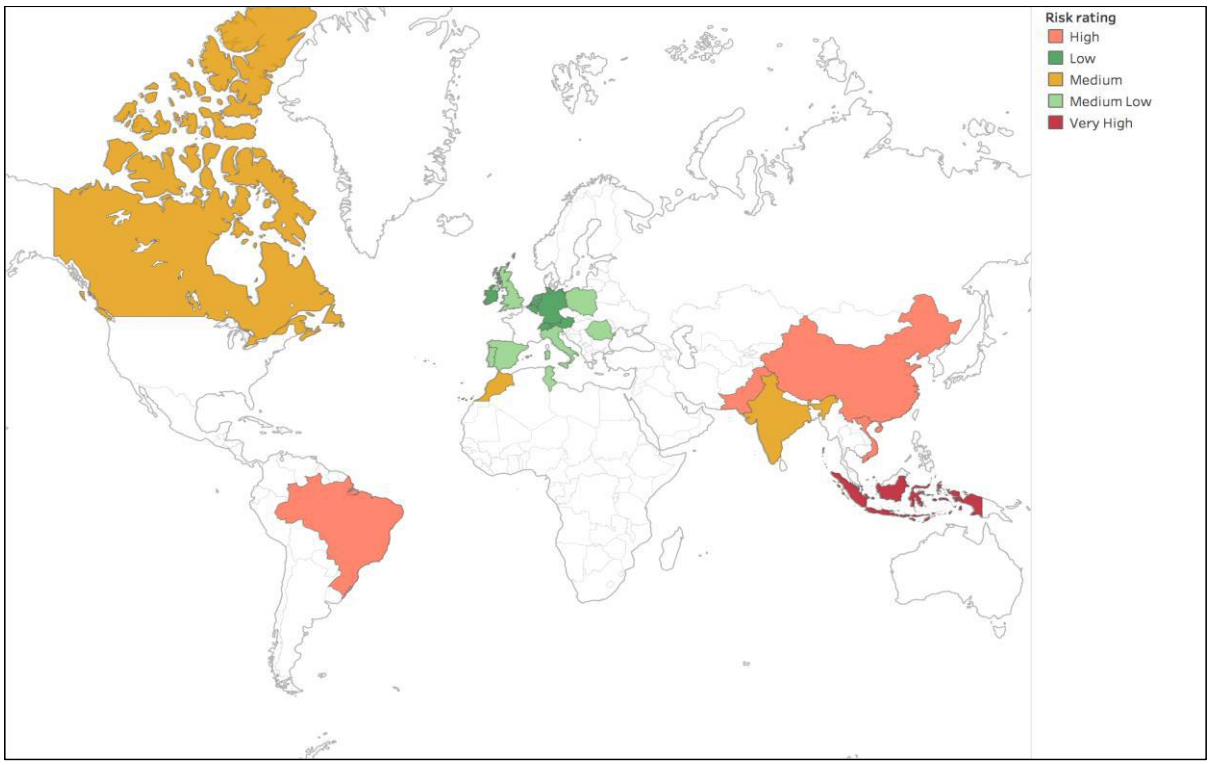
Figure 69: France's natural rubber footprint by risk category



11.9 Beef and leather

Almost all of France's beef imports are from within the EU countries, including Austria, Belgium, Germany, and Ireland. These countries are rated as having low and medium-low risk of deforestation and social issues. Leather has a different import pattern, coming a wide range of countries. Thirty three percent of the combined beef and leather footprint comes from four very high risk (Indonesia) or high risk countries (China, Pakistan, and Vietnam, Figure 70). Most of the imports from these countries are of leather, and hence it is in leather that the largest risk of France's imports being associated with deforestation occurs. Other than some initiatives largely focused on beef from the Brazilian Amazon (Table 13), there is little progress on certification or other supply chain mechanisms that would reduce these risks.

Figure 70: France's beef and leather footprint by risk category


Risk rating
High
Low
Medium
Medium Low
Very High

12 Conclusions

According to the FAO, a net area of six and a half million hectares of natural forest – more than one tenth the size of Metropolitan France – were lost each year between 2010-2015.[192] Other habitats, such as the *Cerrado* in Brazil, have also been lost at an alarming rate: almost three quarters of the original extent of the *Cerrado* had been lost by 2002,[193] and 18,962 km² of the *Cerrado* was converted between 2013 and 2015.[194] Deforestation, forest degradation and habitat conversion causes a loss of biodiversity, often violates the rights of local communities and indigenous peoples, and contributes to climate change. Over 70% of tropical deforestation is driven by commercial agriculture.[195] Moreover, a significant proportion of this deforestation is embedded within the global trade in commodities.

France's imports of have undoubtedly contributed to these losses of forest and biodiversity, and to some of the exploitative production practices associated with the production of commodities in various countries. We find that a land area of approximately 14.9 million hectares was needed on average each year between 2012 and 2016 to supply France with palm oil, soy, timber, pulp & paper, beef and leather, cocoa and natural rubber. There is little change over time in the size of this footprint (Figure 59). More than one-third (35%) of this land area was from countries rated as high risk or very high risk from a deforestation and social point-of-view (Figure 61). The commodities that contribute the largest share of this high and very high risk footprint are soy and cocoa (Figure 63).

The commodities France imports include ones grown solely in the tropics (e.g., palm oil, cocoa, natural rubber) as well as ones that are imported from across tropical, temperate and boreal regions (e.g., timber, pulp and paper, beef and leather). The loss and degradation of forest and other habitats in the tropics is a particular concern, as these contain the greatest biodiversity. Loss of tropical forests, or habitats where there are a high proportion of endemic species, can therefore have a greater impact on biodiversity than the conversion or degradation of forest and habitats elsewhere.

For palm oil, soy, cocoa and natural rubber, at least half of the land footprint was from countries rated as high risk or very high risk (

Figure ***62***). In some of these commodities (e.g., palm oil) there are certification schemes with a degree of credibility. For other commodities, there are fewer options for managing the risk of deforestation and social exploitation – for example rubber, beef and leather.

The EU, the French Government, businesses, NGOs and consumers have taken action to address some of these issues, through initiatives such as the EUTR, The Amsterdam Declaration, purchase of FSC certified timber, and Consumer Goods Forum zero net deforestation commitments. Furthermore, the French government is developing a national strategy on imported deforestation, to be published during autumn 2018. Yet the problems of deforestation and social exploitation have not gone away, and there are opportunities for the

[192] FAO (2016) Global Forest Resource Assessment 2015: How are the world's forests changing? Food And Agriculture Organization Of The United Nations, Rome.
[193] Overbeck, G. E., Vélez-Martin, E. , Scarano, F. R., Lewinsohn, T. M., Fonseca, C. R., Meyer, S. T., Müller, S. C., Ceotto, P. , Dadalt, L. , Durigan, G. , Ganade, G. , Gossner, M. M., Guadagnin, D. L., Lorenzen, K. , Jacobi, C. M., Weisser, W. W., Pillar, V. D. and Loyola, R. (2015), Conservation in Brazil needs to include non-forest ecosystems. Diversity Distrib., 21: 1455-1460. doi:10.1111/ddi.12380
[194] INPE & Funcate. (2017). Anthropization data: The Cerrado between 2013 and 2015. Available at http://combateaodesmatamento.mma.gov.br/analises-no-cerrado
[195] Lawson, S., et al. (2014). Consumer Goods and Deforestation: An Analysis of the Extent and Nature of Illegality in Forest Conversion for Agriculture and Timber Plantations. Forest Trends.

EU, the French Government, companies and consumers to act in order to break the link between France's commodity imports and deforestation and social exploitation.

The research presented in this report is intended to underpin recommendations for policy-makers, businesses, investors in this commodities, and consumers. These are being developed by WWF France and are available in a separate document.

Appendix 1: HS codes used for timber, pulp and paper products

HS Code	Short description	In EUTR scope
4401	Fuel wood	Yes
4402	Charcoal	No
4403	Wood in the rough	Yes
4404	Hoopwood & poles	No
4405	Wood wool	No
4406	Railway sleepers	Yes
4407	Wood sawn lengthwise	Yes
4408	Veneer and ply	Yes
4409	Shaped wood	Yes
4410	Particle board	Yes
4411	Fibreboard	Yes
4412	Laminates	Yes
4413 00 00	Densified wood	Yes
4414 00	Wooden frames	Yes
4415	Wood packing	Yes
4416 00 00	Casks	Yes
4417	Wooden tools	No
4418	Joinery & carpentry	Yes
4419	Wooden kitchenware	No
4420	Wood marquetry and inlay	No
4421	Other articles of wood	No
4701	Mechanical wood pulp	Yes
4702	Chemical wood pulp, dissolving grades	Yes
4703	Chemical wood pulp, soda or sulphate	Yes
4704	Chemical wood pulp, sulphite	Yes
4705	Combined mechanical and chemical pulp	Yes
4801	Newsprint	Yes
4802	Uncoated paper and paperboard	Yes
4803	Tissues and napkins	Yes
4804	Uncoated kraft paper	Yes
4805	Other uncoated paper	Yes
4806	Glazed, transparent or translucent paper	Yes
4807	Composite paper and paperboard	Yes
4808	Corrugated paper and paperboard	Yes
4809	Carbon paper	Yes
4810	Paper and paperboard, coated with kaolin	Yes
4811	Paper and paperboard, surface-decorated or printed	Yes
4812	Filter blocks of paper pulp	Yes
4813	Cigarette paper	Yes

4814	Wallpaper	Yes
4816	Other carbon papers	Yes
4817	Envelopes and letter cards	Yes
4818	Toilet paper	Yes
4819	Cartons and boxes of paper and paperboard	Yes
4820	Note books	Yes
4821	Paper labels	Yes
4822	Bobbins and spools of paper	Yes
4823	Other paper and paperboard	Yes
9401 61 00	Upholstered wooden seats	No
9401 69 00	Seats with wooden frames, not upholstered	No
9403 30	Wooden office furniture	Yes
9403 40	Wooden kitchen furniture	Yes
9403 50	Wooden bedroom furniture	Yes
9403 60	Other wooden furniture	Yes
9403 90	Furniture parts	Yes
9406 10 00	Prefabricated wooden buildings	No[196]

[196] Note: HS code 9403 90 30 is specified under EUTR but not reported on UN COMTRADE. HS Code 9406 00 20, specified within EUTR does not exist. The description given of this code by them is prefabricated buildings; so code 9406 10 00 is used instead (description Prefabricated buildings; Of wood).

Appendix 2: Factors used to convert imported timber, pulp and paper products into roundwood equivalents

HS code	Short description	Factor	Notes[197]
4401	Fuel wood	1.2	
4402	Charcoal	6	
4403	Wood in the rough	1	
4404	Hoopwood	1.8	Conservative factors for sawnwood used: average of softwood (1.099) and hardwood (2.5)
4405	Wood wool	1.8	Conservative factors for sawnwood used: average of softwood (1.099) and hardwood (2.5)
4406	Railway sleepers	2.26	
4407	Wood sawn lengthwise	1.8	Average of softwood (1.099) and hardwood (2.5) sawn wood factors
4408	Veneer sheets	3.45	
4409	Shaped wood	2.5	'Other manufactured wood' in Forestry Commission factors
4410	Particle board	2.5	'Other wood based panels' in Forestry Commission factors
4411	Fibreboard	2.5	
4412	Laminates	2.5	
4415	Wooden packing cases and pallets	2	
4417	Tools and tool handles	2.5	'Other manufactured wood' in Forestry Commission factors
4418	Builders joinery	2.5	'Other manufactured wood' in Forestry Commission factors
4419	Wooden tableware	2.5	
4420	Wood marquetry	2.5	
4421	Other articles of wood	2.5	'Other manufactured wood' in Forestry Commission factors
4413	Densified wood	2.5	'Other manufactured wood' in Forestry Commission factors

[197] Unless otherwise stated, all conversion factors are from the UK's Forestry Commission https://www.forestry.gov.uk/website/forstats2009.nsf/0/8b4784e90b2a535480257361005015c6

4414	Wooden frames	2.5	'Other manufactured wood' in Forestry Commission factors
4416	Wooden casks and barrels	2.5	'Other manufactured wood' in Forestry Commission factors
940161	Wooden seats (upholstered)	2.5	'Other manufactured wood' in Forestry Commission factors
940169	Wooden seats, not upholstered	2.5	'Other manufactured wood' in Forestry Commission factors
940330	Wooden office furniture	2.5	'Other manufactured wood' in Forestry Commission factors
940340	Wooden kitchen furniture	2.5	'Other manufactured wood' in Forestry Commission factors
940350	Wooden bedroom furniture	2.5	'Other manufactured wood' in Forestry Commission factors
940360	Other wooden furniture	2.5	'Other manufactured wood' in Forestry Commission factors
940390	Wooden furniture parts	2.5	'Other manufactured wood' in Forestry Commission factors
4703	Chemical wood pulp, soda or sulphate	4.5	Bleached sulphate pulp is converted at 6.00, unbleached at 4.50. The more conservative factor is used.
4801	Newsprint	2.8	
4802	Uncoated paper and paperboard	2.8	
4804	Uncoated kraft paper	2.5	Conversion factor used is for 'other paper and paperboard'
4805	Other uncoated paper	2.5	Conversion factor used is for 'other paper and paperboard'
4810	Paper and paperboard, coated with kaolin	2.5	Conversion factor used is for 'other paper and paperboard'
4811	Paper and paperboard, surface-decorated or printed	2.5	Conversion factor used is for 'other paper and paperboard'
4819	Cartons and boxes of paper and paperboard	2.5	Conversion factor used is for 'other paper and paperboard'

Appendix 3: Net Annual Increment values used in timber, pulp and paper footprint calculations

Country	Sector	NAI (m^3/ha/yr)	Notes
Austria	Both	7.1	NAI from FAO GFRA 2015 Desk Reference[198]
Belgium	Both	7.7	NAI from FAO GFRA 2015 Desk Reference
Brazil	Timber	10.3	Various sources[199]
Chile	Pulp and paper	5.8	Pulpwood is likely to derive from pine and eucalypt plantations, so the average for European countries is used
China	Both	3.6	NAI from FAO GFRA 2015 Desk Reference
Finland	Both	4.4	NAI from FAO GFRA 2015 Desk Reference
Germany	Both	11.2	NAI from FAO GFRA 2015 Desk Reference
Italy	Both	3.2	NAI from FAO GFRA 2015 Desk Reference
Luxembourg	Timber	4.0	NAI average of EU countries from FAO GFRA 2015 Desk Reference
Netherlands	Pulp and paper	7.3	NAI from FAO GFRA 2015 Desk Reference
Poland	Both	8.0	NAI from FAO GFRA 2015 Desk Reference
Portugal	Pulp and paper	2.6	Average of Italy and Spain used
Russian Federation	Timber	1.3	NAI from FAO GFRA 2015 Desk Reference
Spain	Timber	12.5	Pulpwood likely to derive predominantly from Eucalypt plantations[200]
Spain	Pulp and paper	1.9	NAI from FAO GFRA 2015 Desk Reference

[198] Net Annual Increment (NAI) data was obtained from FAO (2016) Global Forest Resource Assessment 2015: Desk Reference. Food And Agriculture Organization Of The United Nations, Rome unless otherwise stated.
[199] The FAO does not provide NAI for Brazil. This was calculated as the average of estimates given in D. Alder, J.N.M Silva, JOP de Ca Carvalho, J. do C. Lopes, A.R. Ruschel (2012). The cohort-empirical modelling strategy and its application to forest management for Tapajós Forest, Pará, Brazilian Amazon. Bois et Forets Des Tropiques, 314; D. Valle, M. Schilze, E. Vidal, J. Grogan & M. Sales (2006). Identifying bias in stand-level growth and yield estimations: A case study in eastern Brazilian Amazonia. Forest Ecology and Management, Volume 236, Issues 2–3, pp 127–135 (both Amazon); and http://www.fao.org/3/a-ac121e.pdf (Brazilian pine plantations). and for Luxembourg the average of Netherlands, France, Germany, Austria and Sweden was used. The average NAI of all major countries was applied to that portion of Belgium's imports that were from countries with less than 1% of imports by value.
[200] Luis Ugalde and Osvaldo Pérez (2001). Mean annual volume increment of selected industrial forest plantation species. Forest Resources Development Service Working Paper FP/1. Forest Resources Division FAO, Rome (Italy).

Sweden	Both		3.2	NAI from FAO GFRA 2015 Desk Reference
United Kingdom	Pulp and paper		7.4	NAI from FAO GFRA 2015 Desk Reference
USA	Pulp and paper		2.9	NAI from FAO GFRA 2015 Desk Reference
Other & Unassigned	Pulp and paper		5.8	Average of other NAI's used
Other & Unassigned	Timber		5.1	Average of other NAIs

Appendix 4: HS codes and conversion factors used for cocoa products in this study

HS Code	Short description	% cocoa	Source
1801	Cocoa beans	100%	
1802	Cocoa shells	100%	
180310	Cocoa paste	100%	
180320	Defatted cocoa paste	100%	
1804	Cocoa fats	100%	
1805	Cocoa powder	100%	
180610	Sweetened cocoa product	25%	The Cocoa and Chocolate Products (England) Regulations 2003, see: www.legislation.gov.uk/uksi/2003/1659/made
180620	Bulk chocolate product	18%	Based on average of underlying Combined Nomenclature (CN) code conversion ratios: 18062010 31% Lower limit in CN code description 18062030 25% Lower limit in CN code description 18062050 18% Lower limit in CN code description 18062070 9.9% Average cocoa content of different chocolate crumbs, see: meadowfoods.co.uk/chocolate-crumb-the-unsung-hero-of-british-chocolate/ 18062080 16% The Cocoa and Chocolate Products (England) Regulations 2003, see: www.legislation.gov.uk/uksi/2003/1659/made 18062095 10% Best estimate
180631	Filled chocolate product	41%	Based on shop research for WWF UK Risky Business
180632	Chocolate product	41%	Based on shop research for WWF UK Risky Business
180690	Other chocolate product	18%	Based on average of underlying Combined Nomenclature (CN) code conversion ratios: 18069011 20% Best estimate 18069019 20% Best estimate 18069031 20% Best estimate

			18069039	20%	Best estimate
			18069050	2%	Best estimate
			18069060	7.4%	Based on shop research
			18069070	41%	Based on shop research
			18069090	10%	Best estimate

Appendix 5: HS codes and conversion factors used for palm oil products in this study

HS Code	Short description	% palm	Source
120710	Palm nuts and kernels	100%	
151110	Crude palm oil	100%	
151190	Refined palm oil	100%	
151321	Crude palm kernel oil	100%	
151329	Refined palm kernel oil	100%	
1517	Margarine	24%	Based on estimate stated in a research report of the UK Department for Food, Environment and Rural Affairs on the palm oil supply chain, see: randd.defra.gov.uk/Document.aspx?Document=EV0459_10154_FRA.pdf
1806	Chocolate	5.15%	Based on estimate stated in a research report of the UK Department for Food, Environment and Rural Affairs on the palm oil supply chain, see: randd.defra.gov.uk/Document.aspx?Document=EV0459_10154_FRA.pdf
190510	Crispbread	2.37%	Based on palm oil content of toast products that are sold in France: sample of 3 products; content of total product minus fat content in other main ingredients (sources are in hyperlinks). Number is halved to correct for products that use different vegetable oils, blends or butter:
190520	Gingerbread	1.00%	Best estimate, based on palm oil content of gingerbread products that are sold in France: sample of multiple products indicates that there is often no palm oil in these products but rapeseed oil and butter *Example products (sources in hyperlinks):* Pain d'epice – Bjorg; Pain d'epice – Carrefour; Pain d'epice - Bonne Maman
190530	Sweet waffles and wafers	10.49%	Based on palm oil content of waffles/wafers that are sold in France: sample of 3 products; content of total product minus fat content in other main ingredients (sources are in hyperlinks). Number is halved to correct for products that use different vegetable oils, blends or butter:

Product	*Total fat (g/100g)*	*Wheat flour content*	*Fat in wheat flour*	*Fat due to wheat*	*Fat due to palm*
Biscotte Heudebert	7.4	96.4%	1.66	1.60	5.80
Narvik Pain Grillé	6.5	86%	1.66	1.43	5.07
Toast brioches	5	No info	1.66	1.66	3.34

			Product	*Total fat (g/100g)*	*(Soft) wheat flour content*	*Fat in (soft) wheat flour*	*Egg content*	*Fat in egg*	*Fat due to wheat and egg*	*Fat due to palm*
			Lotus Gaufres de Liège	21.7	50%	1.95	5%	9.51	1.45	20.25
			Gaufres moelleuses	24	33%	1.95	13%	9.51	1.86	22.14
			Gaufres au miel	21	28%	1.66	N/A		0.46	20.54
190531	Biscuits	9.35%	Based on palm oil content of biscuits that are sold in France: sample of 3 products; content of total product minus fat content in other main ingredients (sources are in hyperlinks). Number is halved to correct for products that use different vegetable oils, blends or butter:							
			Product	*Total fat (g/100g)*	*Wheat flour content*	*Fat in wheat flour*	*Oat content*	*Fat in oat*	*Fat due to oat and egg*	*Fat due to palm*
			Biscuits Thé	14	67.9%	1.66	N/A		1.13	12.87
			Palmito L'original	30.5	58.9%	1.66	N/A		0.98	29.52
			Good Morning Nature - McVitie's	16.7	33.7%	1.66	34.4%	7.03	2.98	13.72
190532	Waffles and wafers	10.49%	See conversion for HS Code 190530							
190540	Toasted bread products	2.37%	See conversion for HS Code 190510							
190590	Other bakers' wares	1.00%	Best estimate (very variable)							
2105	Ice cream	10.00%	Based on estimate stated in a research report of the UK Department for Food, Environment and Rural Affairs on the palm oil supply chain, see: randd.defra.gov.uk/Document.aspx?Document=EV0459_10154_FRA.pdf							
230660	Palm kernel meal	100%								
291570	Palmitic acid, stearic acid, their salts & esters	100%								
3401	Soap	75%	Based on estimate stated in a research report of the UK Department for Food, Environment and Rural Affairs on the palm oil supply chain, see: randd.defra.gov.uk/Document.aspx?Document=EV0459_10154_FRA.pdf							
3826	Biodiesel	102%	Calculations are based on an article by Mekhilef et al. (2011); Renewable and Sustainable Energy Reviews 15							

Appendix 6: HS codes and conversion factors used for soy products in this study

Category	HS Code	Short description	%soy	Source
Soy	120110	Soya seed	100%	
	120190	Soya beans	100%	
	120810	Flours and meals of soya beans	100%	
	150710	Crude soya oil, whether or not degummed	100%	
	150790	Soya-bean oil and its fractions	100%	
	210310	Soya sauce	20%	Wilson, L. A. (1995) "Soy foods." Practical handbook of soybean processing and utilization. 428-459.
	230400	Oil-cake and other solid residues of soya bean	100%	
Beef	010210	Live breeding animals	18%	WWF Soy Report Card, see: d2ouvy59p0dg6k.cloudfront.net/downloads/soyreportcard2014.pdf
	010221	Live pure-bred breeding animals	18%	
	010229	Live cattle	18%	
	010290	Live animals except pure breeding	18%	
	020110	Fresh carcasses	18%	
	020120	Fresh beef meat cuts with bone	18%	
	020130	Fresh boneless beef meat	18%	
	020210	Frozen carcasses	18%	
	020220	Frozen meat cuts with bone	18%	
	020230	Frozen boneless meat	18%	
	020610	Fresh edible offal	18%	
	020621	Tongues	18%	
	020622	Livers	18%	

Poultry	020629	Other frozen offal	18%	
	021020	Preserved beef meat	18%	
	160250	Other preserved beef meat, offal or blood	18%	
	020711	Fresh whole chicken	57.5%	WWF Soy Report Card, see: d2ouvy59p0dg6k.cloudfront.net/downloads/soyreportcard2014.pdf
	020712	Frozen whole chicken	57.5%	
	020713	Fresh chicken cuts	57.5%	
	020714	Frozen chicken cuts	57.5%	
Swine	203	Fresh or frozen swine meat	26.3%	WWF Soy Report Card, see: d2ouvy59p0dg6k.cloudfront.net/downloads/soyreportcard2014.pdf
	21011	Preserved swine hams and shoulders	26.3%	
	21012	Preserved swine bellies	26.3%	
	21019	Other preserved swine meat	26.3%	
	160241	Prepared swine hams	26.3%	
	160242	Prepared swine shoulders	26.3%	
	160249	Other prepared swine meat	26.3%	
Eggs	40711	Eggs for incubation	30.7%	WWF Soy Report Card, see: d2ouvy59p0dg6k.cloudfront.net/downloads/soyreportcard2014.pdf
	40721	Fresh eggs	30.7%	
	40891	Dried egg	30.7%	
	40899	Preserved egg	30.7%	
Dairy	40110	Low fat milk/cream	1.65%	Correct conversion factor for litre of milk > soy (0.017 - see: www.responsiblesoy.org/contribute-to-change/know-your-soy-print/?lang=en) for the weight of a litre of milk (1.03 kg / litre - see: hypertextbook.com/facts/2002/AliciaNoelleJones.shtml)
	40120	Semi-skimmed milk/cream	1.65%	See conversion for HS Code 40110
	40130	Medium fat milk/cream	1.65%	See conversion for HS Code 40110
	40140	Full fat milk/cream	1.65%	See conversion for HS Code 40110
	40150	Full cream milk/cream	1.65%	See conversion for HS Code 40110
	40210	Low fat milk/cream powder	14.03%	Use same conversion factor as for milk products but multiplied by 8.5 as 8.5 litres of milk are used to produce 1 kg of powdered milk (see: www.quora.com/How-much-milk-is-required-to-produce-1-kilogram-of-powdered-milk)
	40221	Milk/cream powder	14.03%	See conversion for HS Code 40210

	40229	Milk/cream powder (other)	14.03%	See conversion for HS Code 40210
	40291	Unsweetened concentrated milk/cream	3.30%	Use same conversion factor as for milk products but multiplied by 2 as the double amount of milk is used to produce 1 kg of condensate milk (general info).
	40299	Sweetened concentrated milk	3.30%	See conversion for HS Code 40229
	40310	Buttermilk	1.65%	Use same conversion factor as for milk products as this processing limitedly changers milk quantities in the product.
	40390	Buttermilk (other)	1.65%	Use same conversion factor as for milk products as this processing limitedly changers milk quantities in the product.
	40490	Milk products	1.65%	Use same conversion factor as for milk products as this processing limitedly changers milk quantities in the product.
	40610	Fresh cheese	8.01%	Use same conversion factor as for milk products but multiplied by 5 as 5 litres of milk are used to produce 1 kg of fresh cheese (see: 3wheeledcheese.wordpress.com/2012/01/19/indian-cottage-cheese-paneer-raw-milk-indian-family-200-years-of-cheese-making)
	40620	Grated/powdered cheese	14.42%	Use same conversion factor as for milk products but multiplied by 9 as 8-10 litres of milk are used to produce 1 kg of cheese (see: cheeseforum.org/forum/index.php?topic=4475.0)
	40630	Processed cheese	14.42%	See conversion for HS Code 40620
	40640	Blue cheese	14.42%	See conversion for HS Code 40620
	40690	Other cheese	14.42%	See conversion for HS Code 40620
Biodiesel	3826	Biodiesel	1026%	(i.e. 10.26 tonnes of soy are required to produce one tonne of biodiesel). Calculations are based on publication of the University of Arkansas, see: www.uaex.edu/publications/PDF/FSA-1050.pdf

Appendix 7: HS codes and conversion factors used for natural rubber products in this study

HS Code	Short description	% rubber	Source
4003	Reclaimed primary rubber	19.6%	Best estimate, based on average of natural rubber estimate of compounded (20.2%) and vulcanised (19.1%) rubber. Note: this HS code most likely comprises of a mixture of scrapes of compounded and vulcanised rubber and synthetic and natural.
4005	Compounded unvulcanised rubber	20.2%	Best estimate, based on general formula of rubber compounding, see: https://www.tut.fi/ms/muo/vert/8_processing/2.3.htm. The rubber industry uses a special unit for expressing the components of a rubber mixture: parts per hundred rubber (phr), to calculate rubber content from phr values the phr rubber value is divided by SUM(rubber + compounding agents (carbon black and oil)); in this example 100/180. This number is corrected for the proportion of natural (36%) vs. synthetic (64%) rubber in France imports.
4006	Unvulcanised rubber articles	20.2%	See conversion for HS Code 4005
4007	Vulcanised rubber threads	19.1%	Best estimate, based on general formula of rubber vulcanisation, see: https://www.tut.fi/ms/muo/vert/8_processing/2.3.htm. The rubber industry uses a special unit for expressing the components of a rubber mixture: parts per hundred rubber (phr), to calculate rubber content from phr values the phr rubber value is divided by SUM(all phr values); in this example 100/190. This number is corrected for the proportion of natural (36%) vs. synthetic (64%) rubber in France imports. Note: vulcanised rubber contains highly variable rubber contents as different degrees of vulcanisation are used for different purposes so this is a best estimate.
4008	Vulcanised rubber	19.1%	See conversion for HS Code 4008
4009	Vulcanised rubber pipes and hoses	19.1%	See conversion for HS Code 4008
4013	Rubber inner tubes	19.1%	See conversion for HS Code 4008
4014	Vulcanised rubber hygienic articles	19.1%	See conversion for HS Code 4008
4016	Other vulcanised rubber articles	19.1%	See conversion for HS Code 4008
4017	Hard rubber articles	19.1%	See conversion for HS Code 4008
5604	Textile covered threads	19.1%	See conversion for HS Code 4008
400110	Latex	100.0%	
400121	Smoked sheets	100.0%	
400122	TSNR	100.0%	

400129	Other natural rubber	100.0%	
400400	Rubber waste and scrap	19.6%	Best estimate, based on average of natural rubber estimate of compounded (20.2%) and vulcanised (19.1%) rubber. Note: this HS code most likely comprises of a mixture of scrapes of compounded and vulcanised rubber and synthetic and natural.
400610	Camel-back strips	19.6%	See conversion for HS Code 400400
401110	Car tyres	14.0%	Based on information that 14% of passenger car tyre is natural rubber, see: http://infohouse.p2ric.org/ref/11/10504/html/intro/tire.htm
401120	Lorry tyres	27.0%	Based on information that 27% of truck tyre is natural rubber, see: http://infohouse.p2ric.org/ref/11/10504/html/intro/tire.htm
401130	Aircraft tyres	27.0%	Based on natural rubber estimate of lorry tyres (27%)
401140	Motorcycle tyres	14.0%	Based on natural rubber estimate of car tyres (14%)
401150	Bicycle tyres	14.0%	Based on natural rubber estimate of car tyres (14%)
401161	Tractor tyres	27.0%	Based on natural rubber estimate of lorry tyres (27%)
401211	Retreated car tyres	14.0%	Based on natural rubber estimate of car tyres (14%)
401212	Retreated lorry tyres	27.0%	Based on natural rubber estimate of lorry tyres (27%)
401213	Retreated aircraft tyres	27.0%	Based on natural rubber estimate of lorry tyres (27%)
401219	Other retreated tyres	20.5%	Based on average of natural rubber estimate of car (14%) and lorry tyres (27%)
401220	Used tyres	20.5%	Based on average of natural rubber estimate of car (14%) and lorry tyres (27%)
401290	Other tyres	20.5%	Based on average of natural rubber estimate of car (14%) and lorry tyres (27%)
401511	Surgical gloves	19.1%	See conversion for HS Code 4008
401519	Other rubber gloves	19.1%	See conversion for HS Code 4008
401590	Rubber accessories	19.1%	See conversion for HS Code 4008

Appendix 8: HS codes and conversion factors used for beef and leather in this study

	HS code	Short description	Conversion Carcass Weight Equivalent	Source
Beef	0102	Live cattle	0.62	Holland, R., Loveday, D. & Ferguson, K. (n.d.). How much meet to expect for a beef carcass. UT Extension PB 2822. University of Tennessee.
	0201	Fresh of chilled beef	0.66	Holland, R., Loveday, D. & Ferguson, K. (*ibid*)
	0202	Frozen beef	0.66	Holland, R., Loveday, D. & Ferguson, K. (*ibid*)
	020610	Fresh or chilled bovine offal	0.47	Agriculture and Horticulture Development Board (2014). AHDB Beef Yield Guide. AHDB, Kenilworth, Warwickshire, UK. http://www.qsmbeefandlamb.co.uk/books/beef-yield-guide/files/assets/common/downloads/beef-yield-guide.pdf
	021020	Salted or dried beef	0.66	Holland, R., Loveday, D. & Ferguson, K. (op. cit.)
	0504000	Beef and veal tripe	0.03	Agriculture and Horticulture Development Board (2014). (*op. cit.*)
	160210	Homogenised meat preparations	0.66	Holland, R., Loveday, D. & Ferguson, K. (op. cit.)
	160250	Prepared beef	0.66	Holland, R., Loveday, D. & Ferguson, K. (op. cit.)
	160300	Meat extract	2.98	Estimate: assumes any (edible) part of carcass can be used, based on Holland, R., Loveday, D. & Ferguson, K. (*op. cit.*) and is concentrated to approximately 20% of original weight
	210410	Meat broths and soups	0.05	Estimate: products will include other ingredients
			Hide weight	
Leather	4101	Preserved bovine hides	1.000	
	4104	Tanned bovine hides	0.255	Source: http://leatherpanel.org/sites/default/files/publications-attachments/mass_balance.pdf
	410711	Tanned prepared bovine hides	0.255	Source: http://leatherpanel.org/sites/default/files/publications-attachments/mass_balance.pdf
	4115	Composition leather	0.128	European Committee For Standardization published EN 15987:2011 'Leather - Terminology - Key definitions for the leather trade' to stop further confusion about bonded leather. The minimum amount of 50% in weight of dry leather is needed to use the term "bonded leather".
	420211	Leather cases	0.230	Estimate, assumed 90% of the weight of the product is leather
	420221	Leather handbags	0.230	Estimate, assumed 90% of the weight of the product is leather
	420231	Leather wallets and purses	0.230	Estimate, assumed 90% of the weight of the product is leather

	420291	Other articles of leather	0.230	Estimate, assumed 90% of the weight of the product is leather
	420310	Leather apparel	0.230	Estimate, assumed 90% of the weight of the product is leather
	420321	Leather sports gloves	0.230	Estimate, assumed 90% of the weight of the product is leather
	420329	Leather gloves	0.230	Estimate, assumed 90% of the weight of the product is leather
	420330	Leather belts	0.230	Estimate, assumed 90% of the weight of the product is leather
	6403	Leather shoes	0.084	Assumes that approximately one third of the weight of a pair of shoes is leather, that 0.28 kg of leather is used per pair (http://www.unido.org/fileadmin/import/userfiles/timminsk/leatherpanel14schmelcosts.pdf)
	940120	Car seats	0.001	Estimated from proportion of leather used globally in car seats: https://ukleather.org/
	940161	Upholstered seats (wooden frames)	0.022	Estimated from proportion of leather used globally in upholstery: https://ukleather.org/
	940171	Upholstered seats (metal frames)	0.022	Estimated from proportion of leather used globally in upholstery: https://ukleather.org/
	8703	Cars and other vehicles	0.006	Estimated from proportion of leather used globally in car seats: https://ukleather.org/