

# Roadmap towards an increased use of wood and cork in public buildings of South-West Europe

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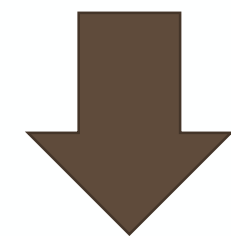
18-04-2023



## **WP1. Integral design of the construction system value chain**

(<http://www.sudoe-imip.eu/results/>)

- D1.1.1 Preliminary study on biomaterials availability
- D1.2.1 Preliminary study on traceability certification
- D1.3.1 Preliminary study on current wood and cork uses in the South-West of Europe



**Roadmap towards an increased use of wood and cork in public buildings of  
South-West Europe**





The aim of D1.1 is to identify and provide information of availability of wood of autochthonous pines species (*Pinus pinaster*, *Pinus halepensis*, *Pinus nigra*) and cork in the SUDOE space.

## D1.1.1 PRELIMINARY STUDY ON RENEWABLE AND AUTOCHTHONOUS BIOMATERIALS AVAILABILITY

It includes information on the potential supply of resources, information on actual potential use and a comparative analysis between countries.



# D1.1.1 Preliminary study on renewable and autochthonous biomaterials availability



The SUDOE Space comprises the entire territory of Spain and of Portugal and the Southwestern regions of France. The three countries contain 39 million hectares of forest land (39.8 % of the the European Union's area).

**Table 1.** Forest area in France, Spain and Portugal for 2020

Country	Forest area 2015 (×10 <sup>3</sup> ha)	Forested area 2015 (%)
Spain	18 572	37.2
Portugal	3 312	36.2
France	17 253	31.5
FR+SP+PT	39 137	34.4
EU27	159 231	39.8





# D1.1.1 Preliminary study on renewable and autochthonous biomaterials availability



Forests in SUDOE grow mainly in Mediterranean climate, but also in Atlantic and Alpine climates.

**Table 2.** Distribution of main wood species in million ha.

	France	Portugal	Spain	Total
<i>Quercus petraea</i> and <i>Quercus robur</i>	3.8		0.24	4.044
<i>Fagus sylvatica</i>	1.4		0.40	1.80
<i>Pinus pinaster</i>	1.0	0.71	1.06	2.77
<i>Pinus sylvestris</i>	0.88		1.03	1.91
<i>Picea abies</i>	1.1			1.11
<i>Abies alba</i>			0.01	
<i>Pinus nigra</i>			0.71	0.71
<i>Pinus halepensis</i>	3.5		2.07	5.57
<i>Eucalyptus spp</i>		0.85	0.62	1.47
<i>Quercus suber</i>	0.57	0.72	0.68	1.97
<i>Quercus ilex</i>		0.35	4.96	5.31
<i>Pinus pinea</i>		0.19	0.37	0.56



# Maritime pine (*Pinus pinaster* Ait.)



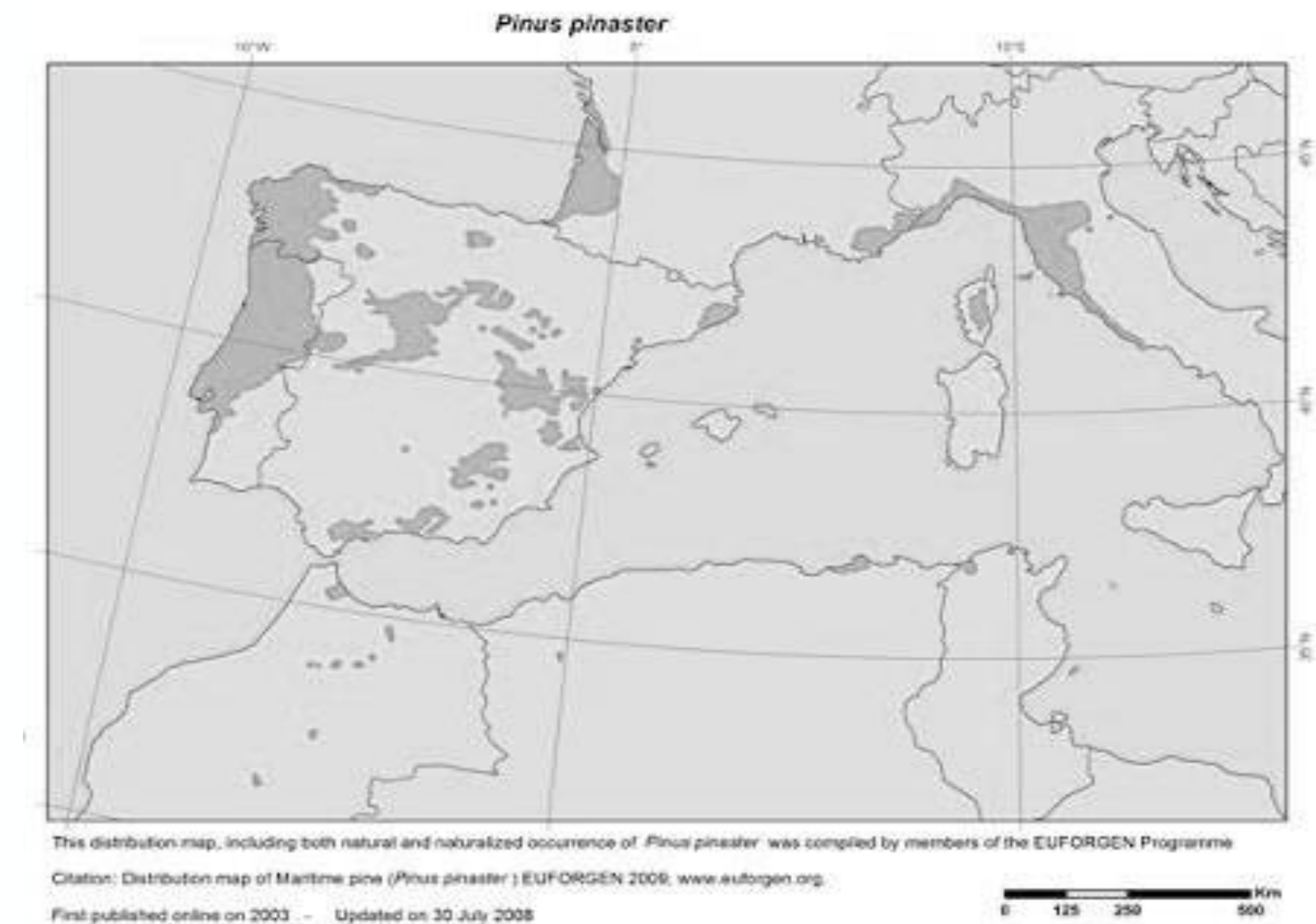
## Maritime pine (*Pinus pinaster* Ait.)

Spreads naturally in Atlantic-influenced regions of Portugal, Spain and France (subspecies *atlantica* at the Atlantic coast)

In Mediterranean regions of France (including Corsica) and Spain (subspecies *pinaster* or *mesogeensi* at the Mediterranean basin).

**Table 3.** Area and growing stock and industrial roundwood production of Maritime pine in the three main countries of the SUDOE region

Country	Area (million ha)	Growing stock (million m <sup>3</sup> )	Industrial roundwood production (million m <sup>3</sup> )
Spain	1.1	153.6	3.3
France	1.0	143.0	6.9
Portugal	0.7	63.9	3.8





# Aleppo pine (*Pinus halepensis*)



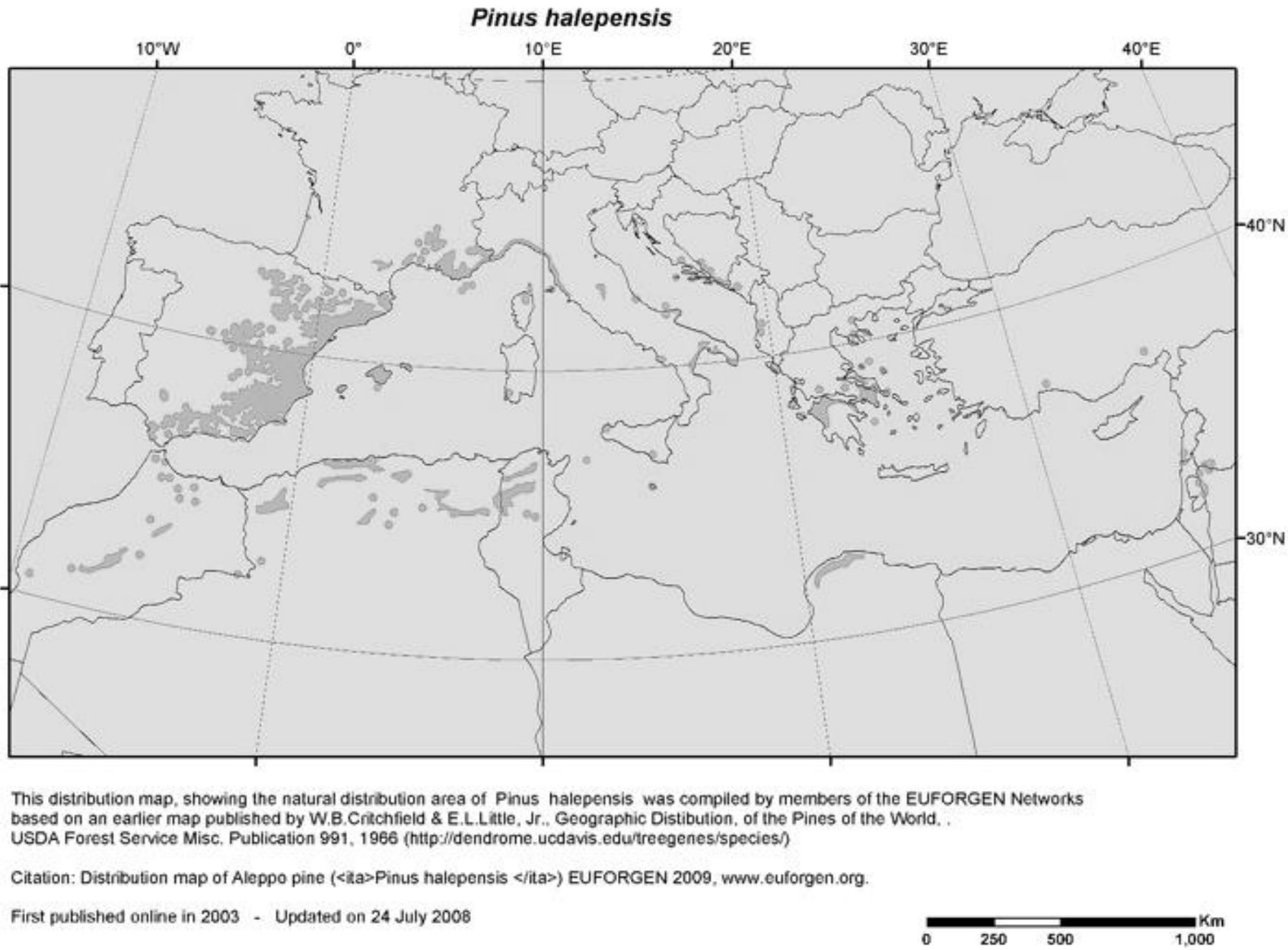
The **Aleppo pine** is a native tree species widely distributed in the SUDOE region where it is dominant mainly in Mediterranean climate forests.

In Spain, in western part of the Mediterranean basin .

In France, in Provence-Alpes-Côte d’Azur region

**Table 4.** Area, growing stock and industrial roundwood production of Aleppo pine in the three main countries of the SUDOE region

Country	Area (million ha)	Growing stock (million m³)	Industrial roundwood production (million m³)
Spain	2.1	82.9	0.23
France	3.5	0.3	-
Portugal	-	-	-





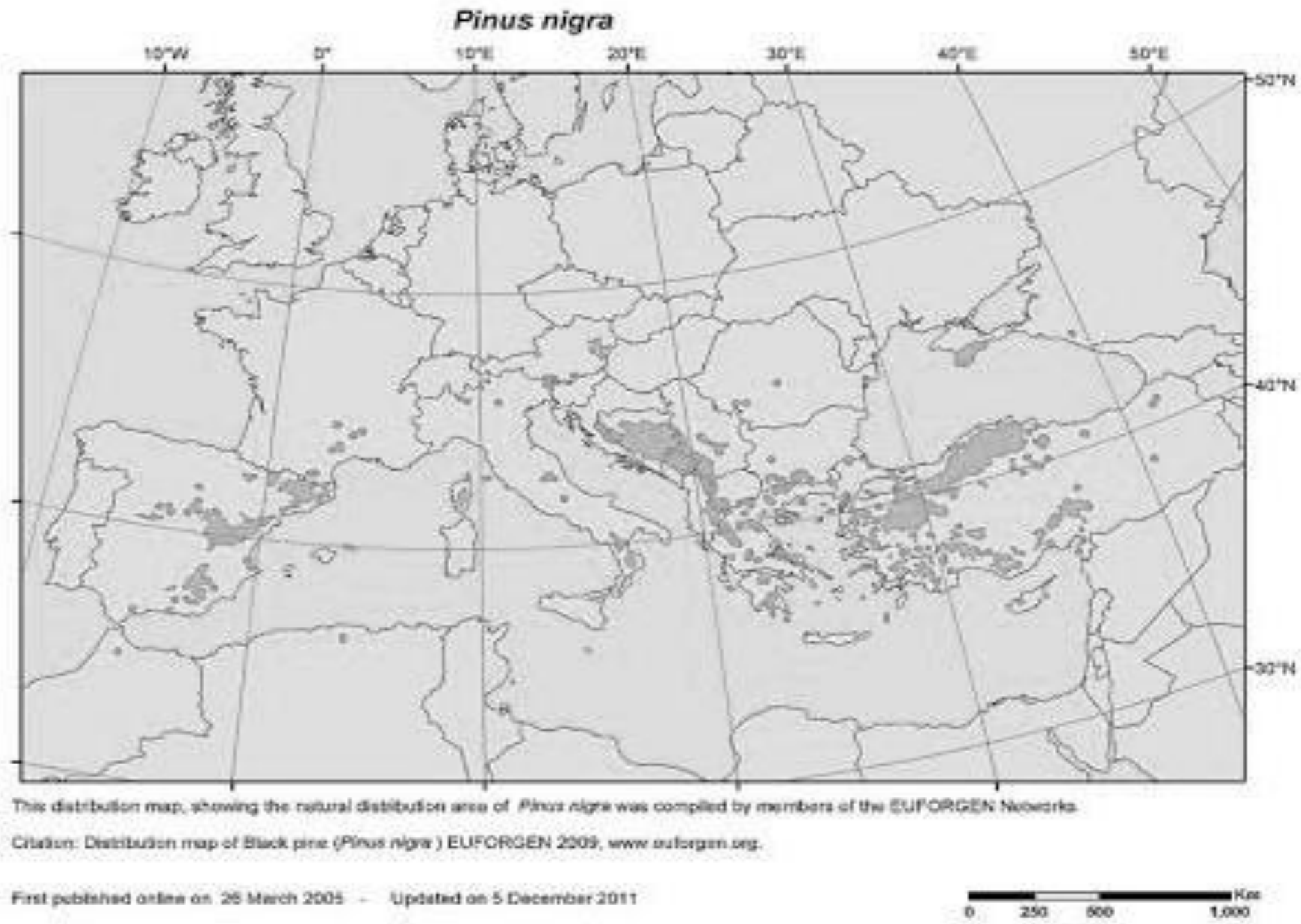
# Black pine (*Pinus nigra*)



The natural forests of **Black pine** in the Iberian Peninsula are restricted to Spain.  
In France, Black pine is found in a few isolated populations in the Pyrenees and Cévennes regions.

**Table 5.** Area, growing stock and industrial roundwood production of Black pine in the three main countries of the SUDOE region

Country	Area (million ha)	Growing stock (million m <sup>3</sup> )	Industrial roundwood production (million m <sup>3</sup> )
Spain	0.71	77.1	0.54
France	-	71.0	-
Portugal	-	-	-





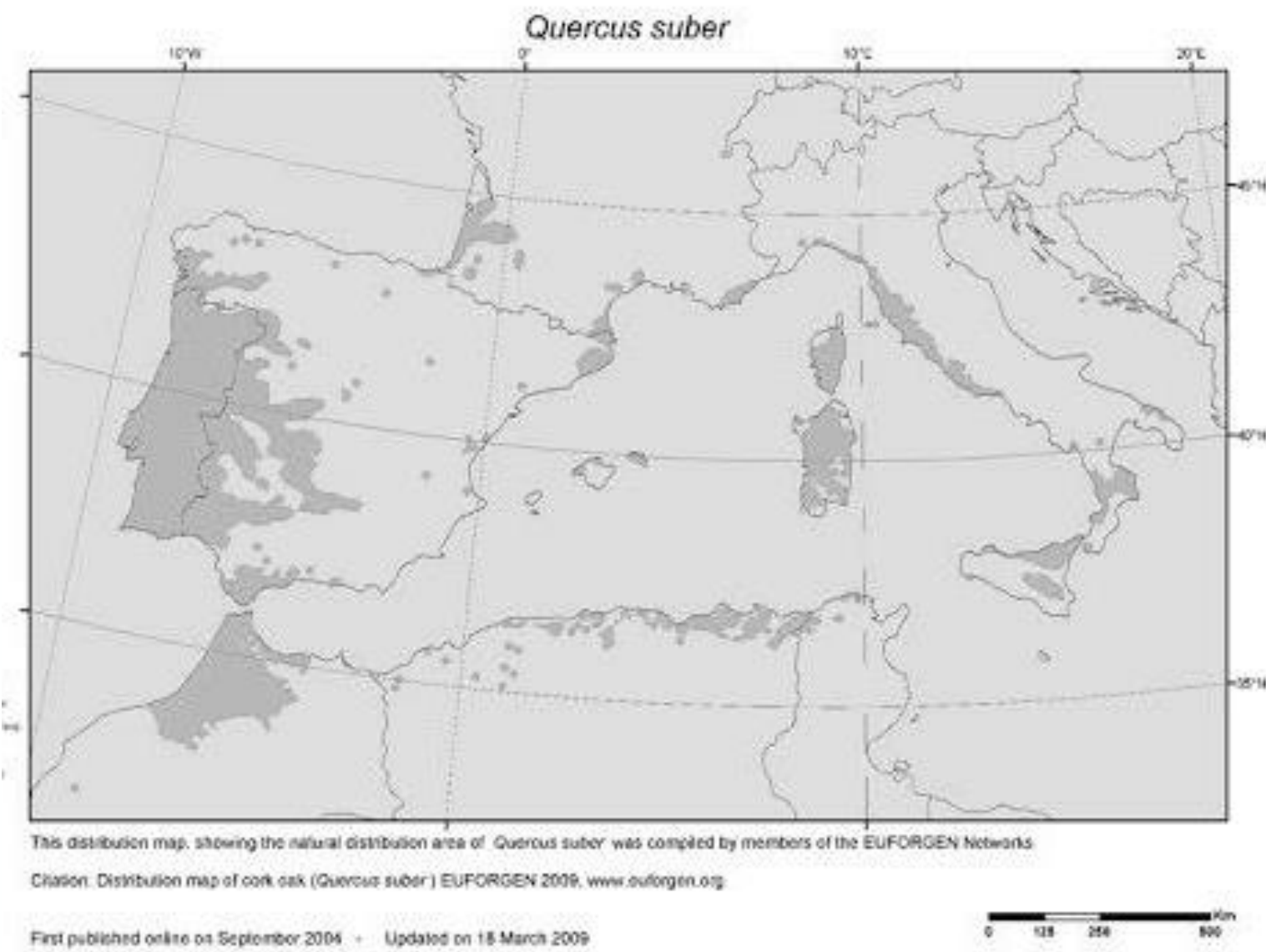
# Cork oak(*Quercus suber* L.)



The evergreen **Cork oak** (grows in the Western Mediterranean Basin, occurring spontaneously in Portugal and Spain and in restricted areas of France.

**In Portugal**, cork oak forests cover extensive area in the Alentejo region in the south of the country.

**In Spain**, Cork oak woodlands, covers extensive areas in the autonomous regions of Andalusia, Extremadura and Catalonia.

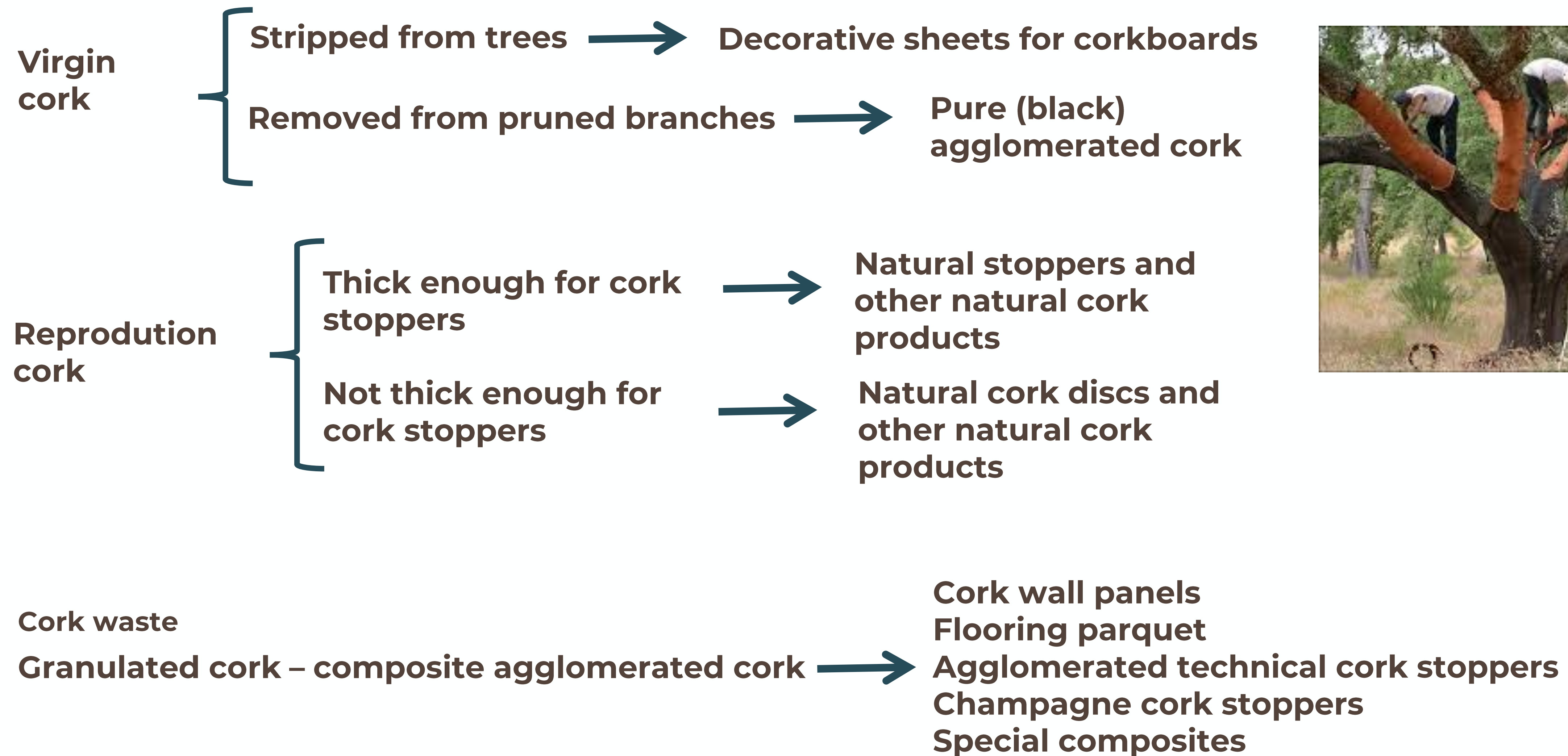


**Table 6.** Area of Cork oak and cork production in the three main countries of the SUDOE region.

Country	Area (million ha)	Cork production (k tons/year)
Portugal	0.74	100.0
Spain	0.55	60.1
France	0.07	5.2



# Cork oak(*Quercus suber* L.)





## ***Sawmills industries***



**Spain:** about 10 455 sawmills providing approximately 61 514 jobs.

**Portugal:** 248 sawmills produce a total of about 90% of the lumber (7 000 small sawmills and installations that produce but not on a permanent basis. Employment 4 592 employees.

**France:** (Nouvelle Aquitaine), at the end of 2012, 28 300 establishments employ 56 300 people

## ***Pallet Industries***



Wooden pallets dominate the markets with 90 to 95% market share.

Annual industry production estimated - 849 million wood pallets (508 million new and 341 million recycled).



## ***Cork industries.***

Geographical localisation of cork industry is mainly concentrated in the Iberian Peninsula.

### **Production activities**

**Preparation  
Manufacture – production of stoppers  
Granulation and agglomeration.**

**Portugal:** about 888 cork industries providing approximately 8 704 jobs.

**Spain:** about 200 cork industries providing approximately 3 200 jobs.



Natural cork



Champagne and sparkling wine cork stopper



Agglomerates of cork particles, with or without the addition of binding materials



# D1.2.1 Integrated forest harvesting systems and certification of traceability in the forest-industry harvest chain



## D1.2.1 Integrated forest harvesting systems and certification of traceability in the forest-industry harvest chain



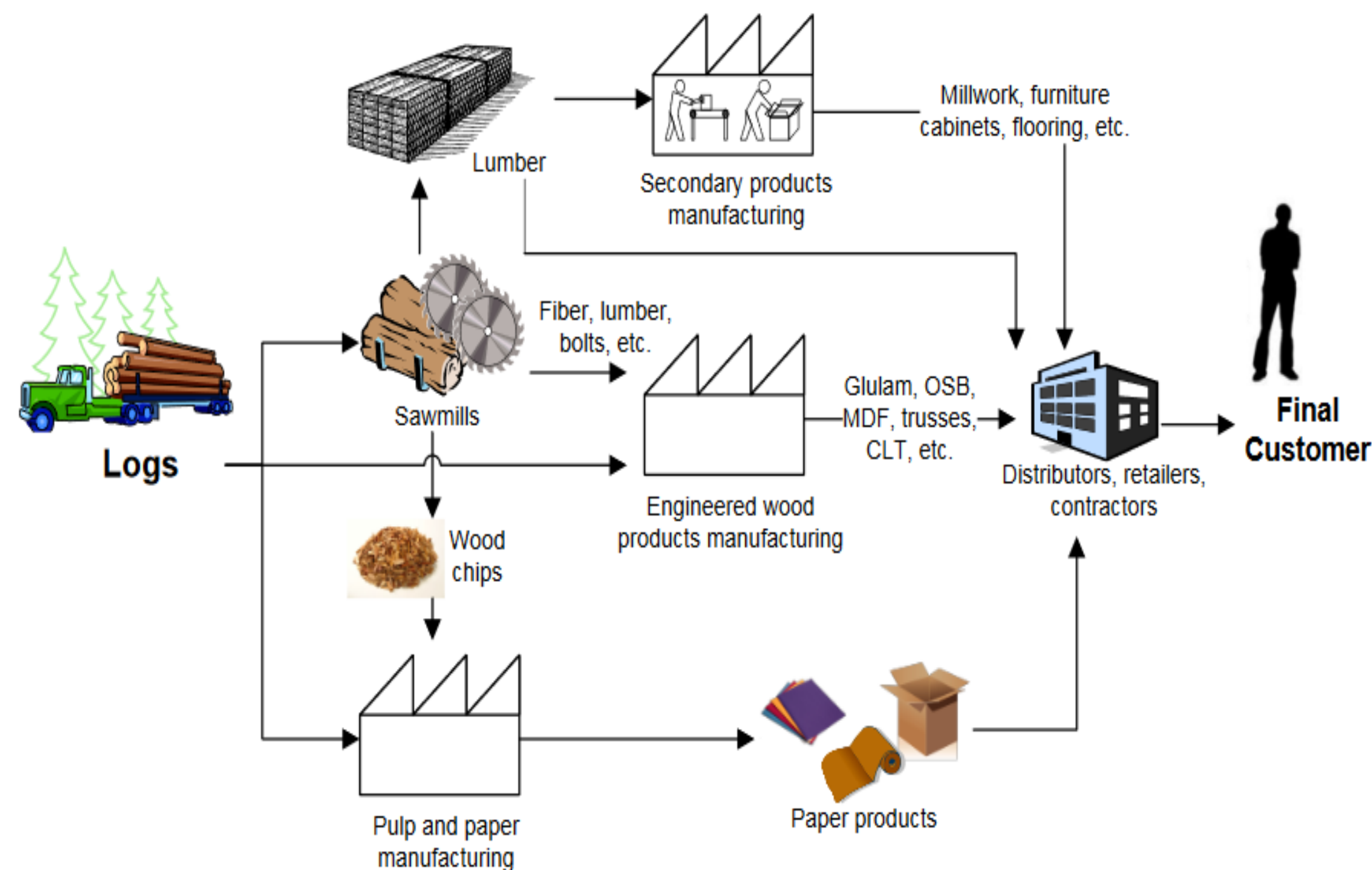
**Objective** - Traceability is beneficial both for companies and the consumers, providing better quality for wood and its products. The aim of the review is to study the emerging traceability technologies used in wood trade sector and present the current trends and the future perspectives.



# Certification of traceability in the forest-industry harvest chain



Forest certification is a market mechanism to promote the sustainable use and management of forests and to identify “sustainably produced” products for the consumer.



- Forest Stewardship Council™ (FSC)



- Programme for Endorsement of Forest Certification (PEFC)



A certification label on a forest product informs potential buyers that the product was produced in a well-managed forest in accordance with a given set of standards.



# The differences between FSC® and PEFC™



The main difference between **FSC®** and **PEFC™** is the way in which they carry out the certification process.

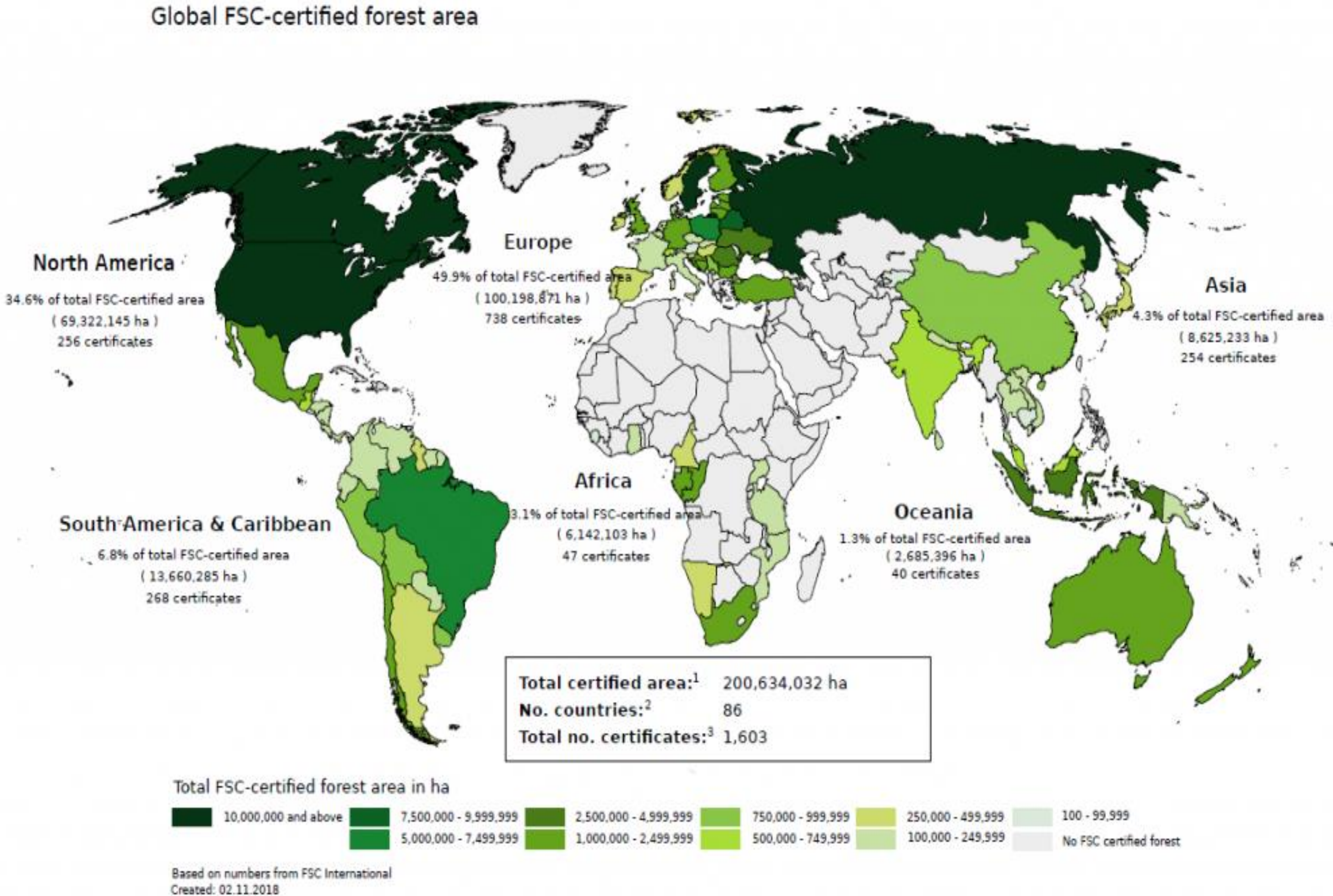


**FSC®** - has a 'top-down' approach to the market, where a separate policy is determined for each individual country. Once FSC® has established the standards for this policy, they examine each individual forest in the country in question to determine whether it meets the criteria.

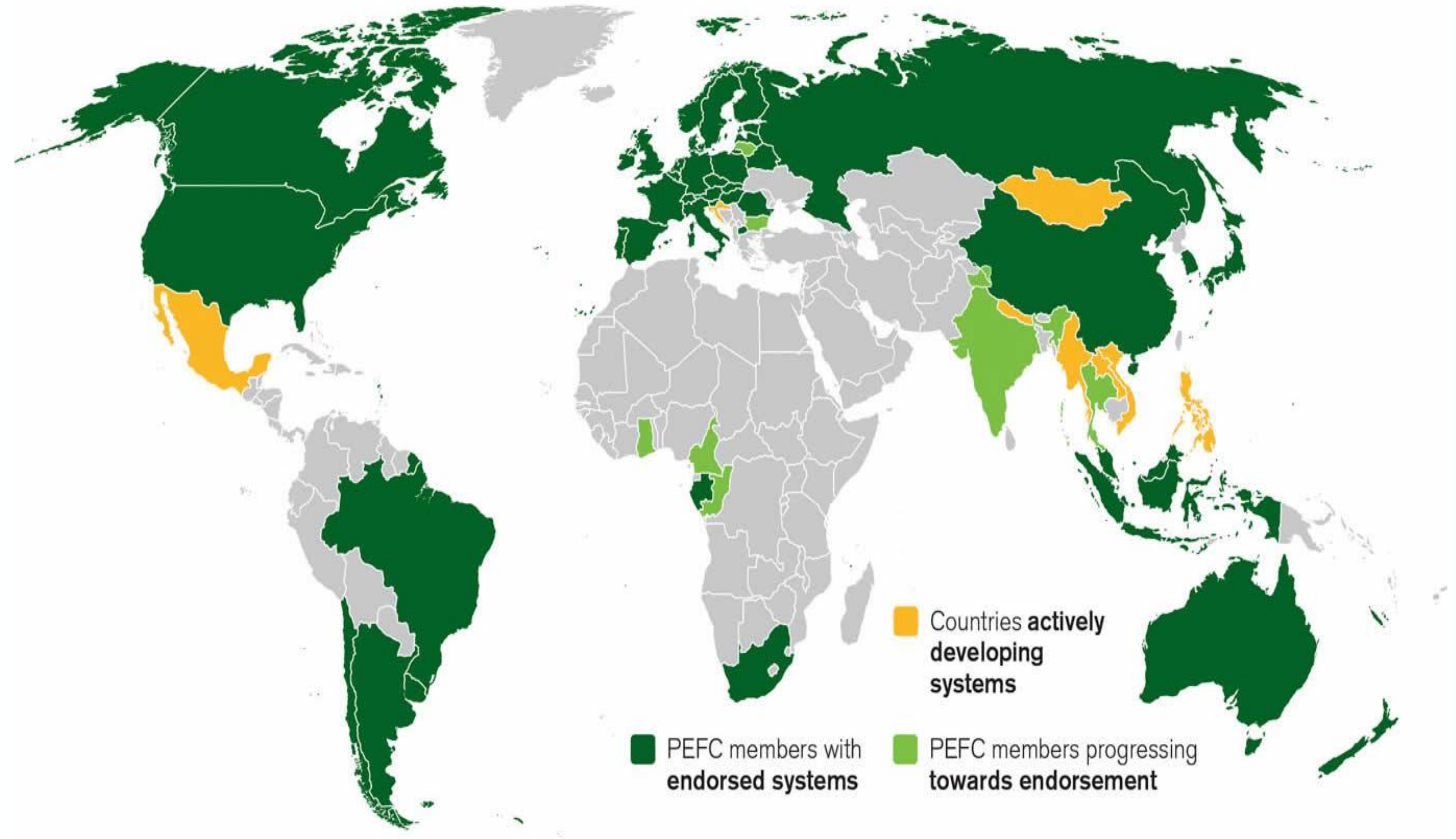


**PEFC™** - depends primarily on underlying inspection companies. Forest can be considered PEFC™-certified by examining local inspections and assessing whether these local inspections meet PEFC™ requirements. The PEFC™ works together with SFI (Sustainable Forestry Initiative) and SCA (Svenska Cellulosa AB, or Swedish Cellulose Company). In the literature, this is also called 'bottom-up' certification.









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# Forest area certified by FSC® and PEFC™



## *Spain*

2.3 million ha of certified forest, (12 % of the forest area)

1.9 million ha are PEFC certified

0.3 million ha are FSC certified

1 542 companies are PEFC certified in Chain of Custody and

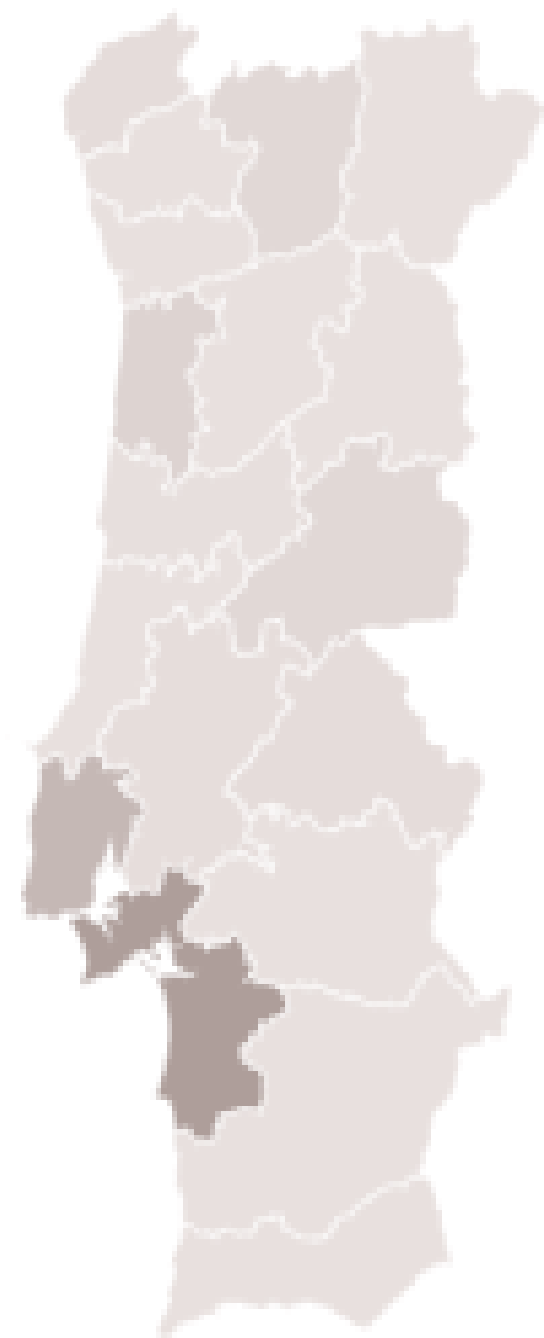
1 099 companies are FSC certified in Chain of Custody



# Forest area certified by FSC® and PEFC™



% of certified forest area



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## ***Portugal***

0.8 million ha of certified forest (15.5 % of the forest area)

0.3 million ha are PEFC certified

0.5 million ha are FSC certified

1 886 companies are PEFC certified in Chain of Custody

375 companies are FSC certified in Chain of Custody



# Forest area certified by FSC® and PEFC™



% of certified forest area

0 100



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## *France*

8.2 million ha of certified forest, (50 % of the forest area)

8.2 million ha are PEFC certified

0.04 ha are FSC certified

1 396 companies are PEFC certified in Chain of Custody

118 companies are FSC certified in Chain of Custody



# Certified cork oak forest



In Portugal, Spain and Italy around 150 thousand hectares are certified by the FSC and PEFC systems



**FSC certification** for cork oak forest management is currently adopted in Portugal, Spain

Portugal - 357 386 certified hectares

Spain - 159 695 certified hectares

**PEFC certification** currently applies in cork oak forests in Portugal and Spain

Portugal - 109 058 certified hectares

Spain - 21 000 certified hectares







## D1.3.1 ANALYSIS OF CURRENT USES OF WOOD AND CORK IN THE SUDOE SPACE



**Objective** - The forest-based sector value chains produce a wide range of products ranging from wood construction products, packaging, furniture, paper and pulp products, and hygiene articles to bioplastics, biocomposites, carbon fibres, textile fibres and biochemicals. The aim of this task is to analyse the different current uses of wood (*P. pinaster*, *P. halepensis*, *P. nigra*) and cork (*Q. suber*) in the Sudoe regions, specifically France, Portugal and Spain.



## Wood-based industries

According to EUROSTAT, the wood-based industries of the three Sudoe countries are composed by 84,691 enterprises including printing industries (35%), furniture manufacturing industries (32%), wood working industries (29%) and manufacturing of paper and paper products industries (4%). They represent 19% of all manufacturing enterprises in the three countries and most of them are located in France (44%) and Spain (42%).



## Cork-based industries

Cork oak forests are mainly located in Portugal and Spain, representing 34% and 27% of world cork oak forest area, respectively (APCOR, 2019). France represents an additional 3%. Cork production leaders worldwide are Portugal and Spain with 49.5% and 30.5% of the total cork production (APCOR, 2019). France represents an additional 2.6%.





## Sawnwood production

The total output of sawnwood across the EU-27 was approximately 100 million m<sup>3</sup> per year from 2010 to 2018, reaching 109 million m<sup>3</sup> in 2018. Germany and Sweden were the EU's leading sawnwood producers in 2018, accounting for approximately 21 % and 17 % of the EU-27 total sawnwood output, respectively.

in 2018

**France:** totalled approx. 13.0 million m<sup>3</sup>,

**Portugal:** approx. 5.0 million m<sup>3</sup>,

**Spain:** approx. 3.0 million m<sup>3</sup>

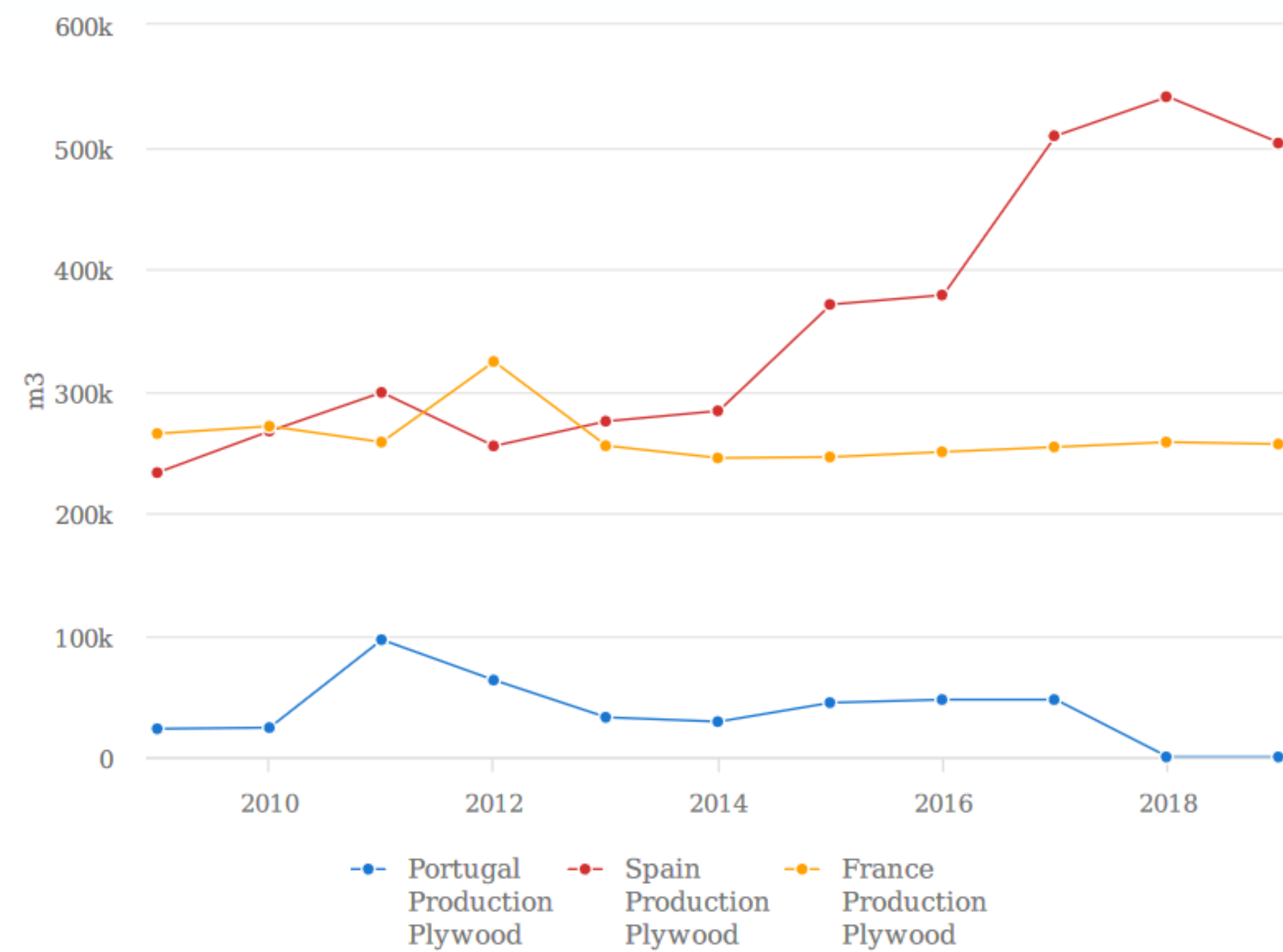


[Eurostat 2020]



## Engineered wood panels production in France, Portugal and Spain 2020

### Plywood



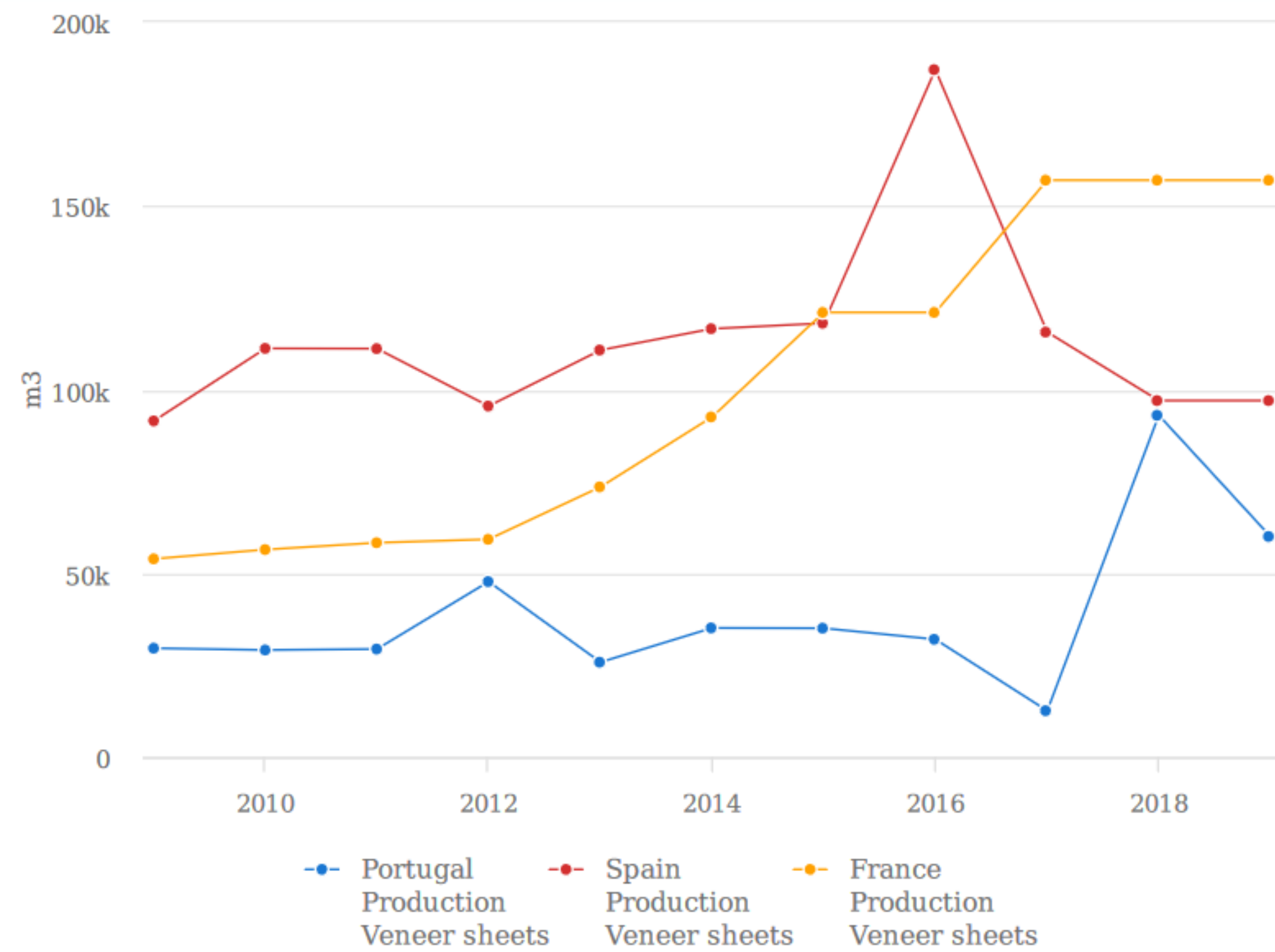
Source: FAOSTAT (Oct 27, 2020)





## Engineered wood panels production in France, Portugal and Spain 2020

### Veneer sheets



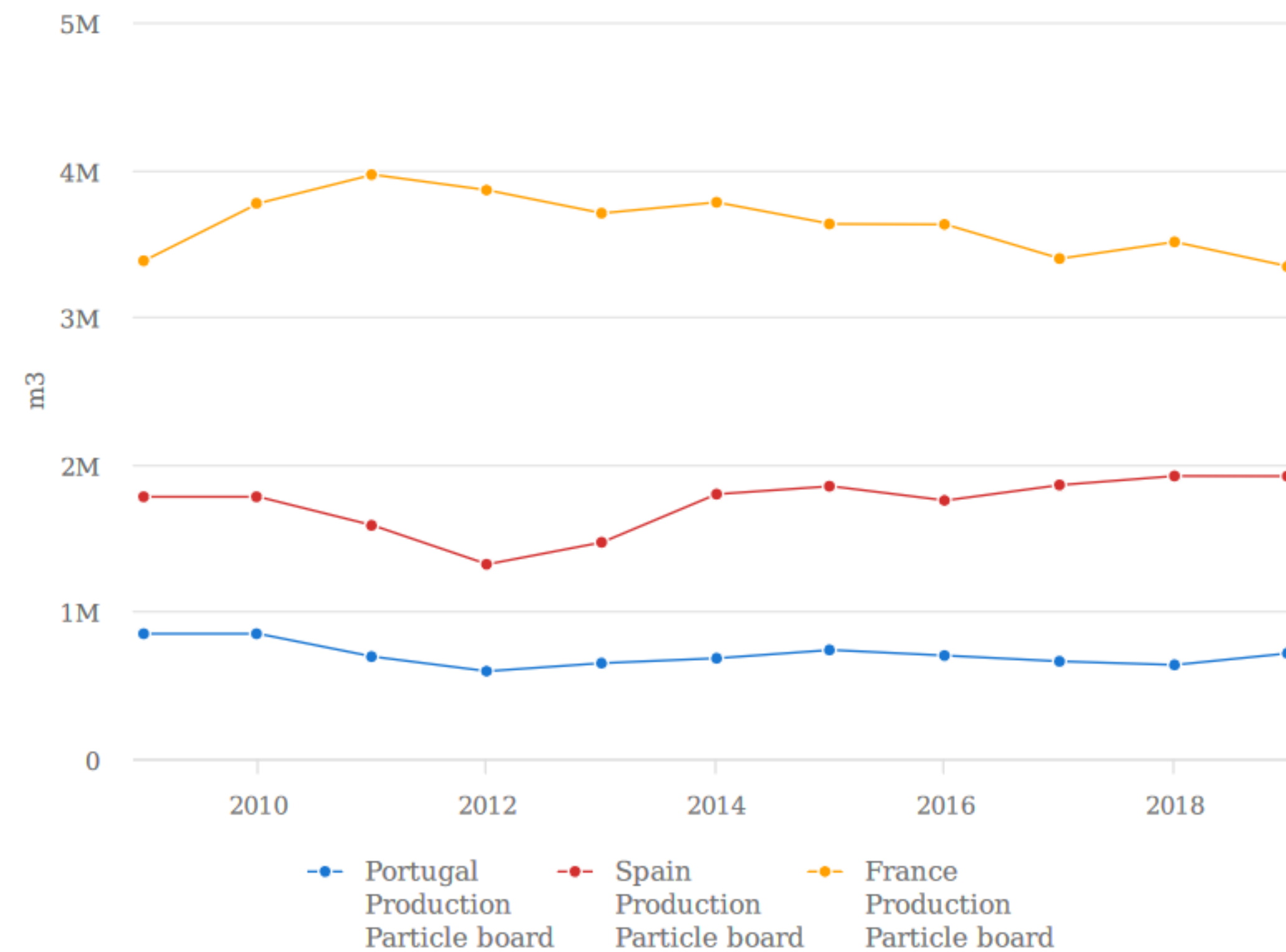
Source: FAOSTAT (Oct 27, 2020)





## Engineered wood panels production in France, Portugal and Spain 2020

### Particle board



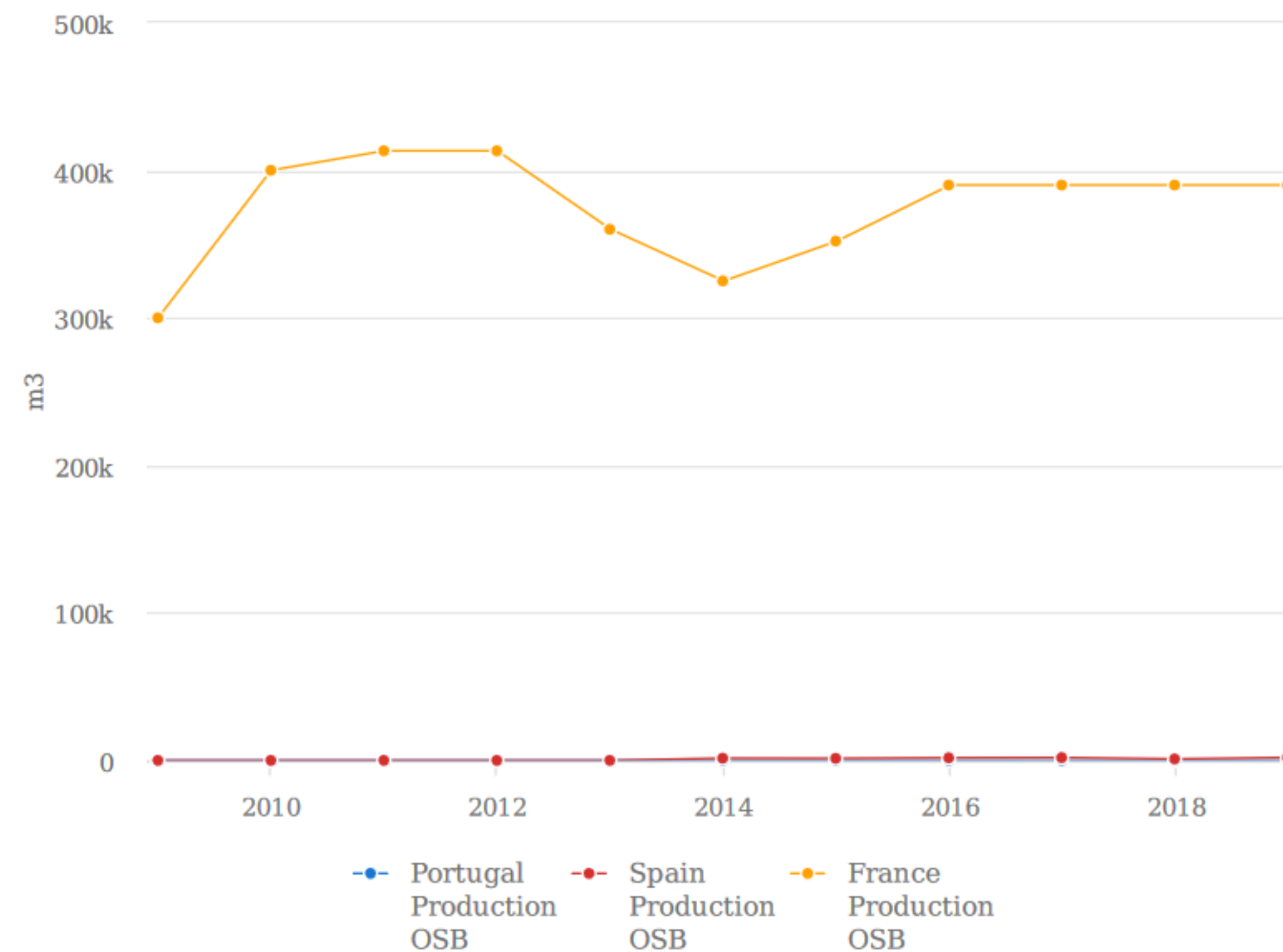
Source: FAOSTAT (Oct 27, 2020)



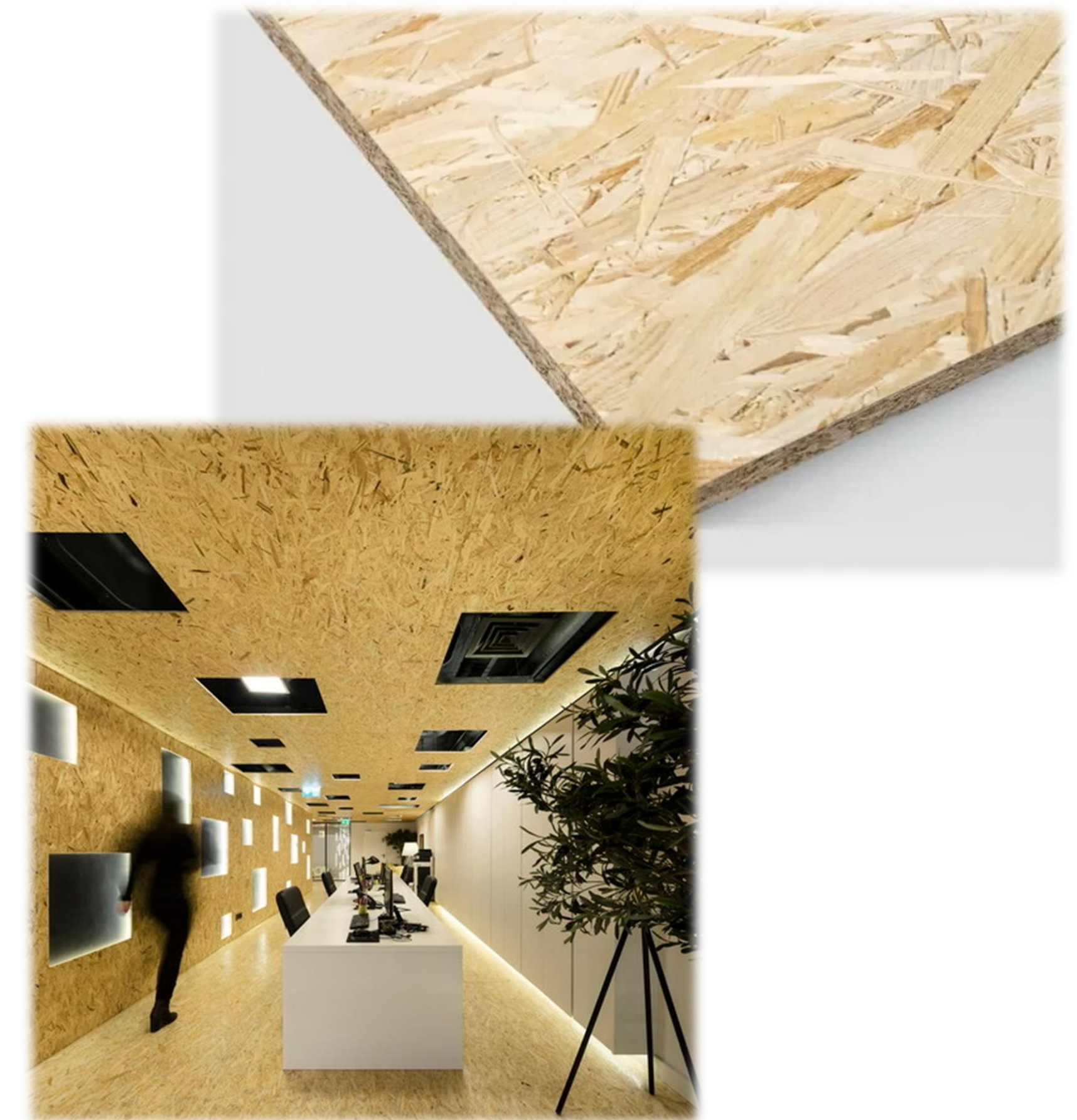


## Engineered wood panels production in France, Portugal and Spain 2020

### OSB (Oriented strand board)



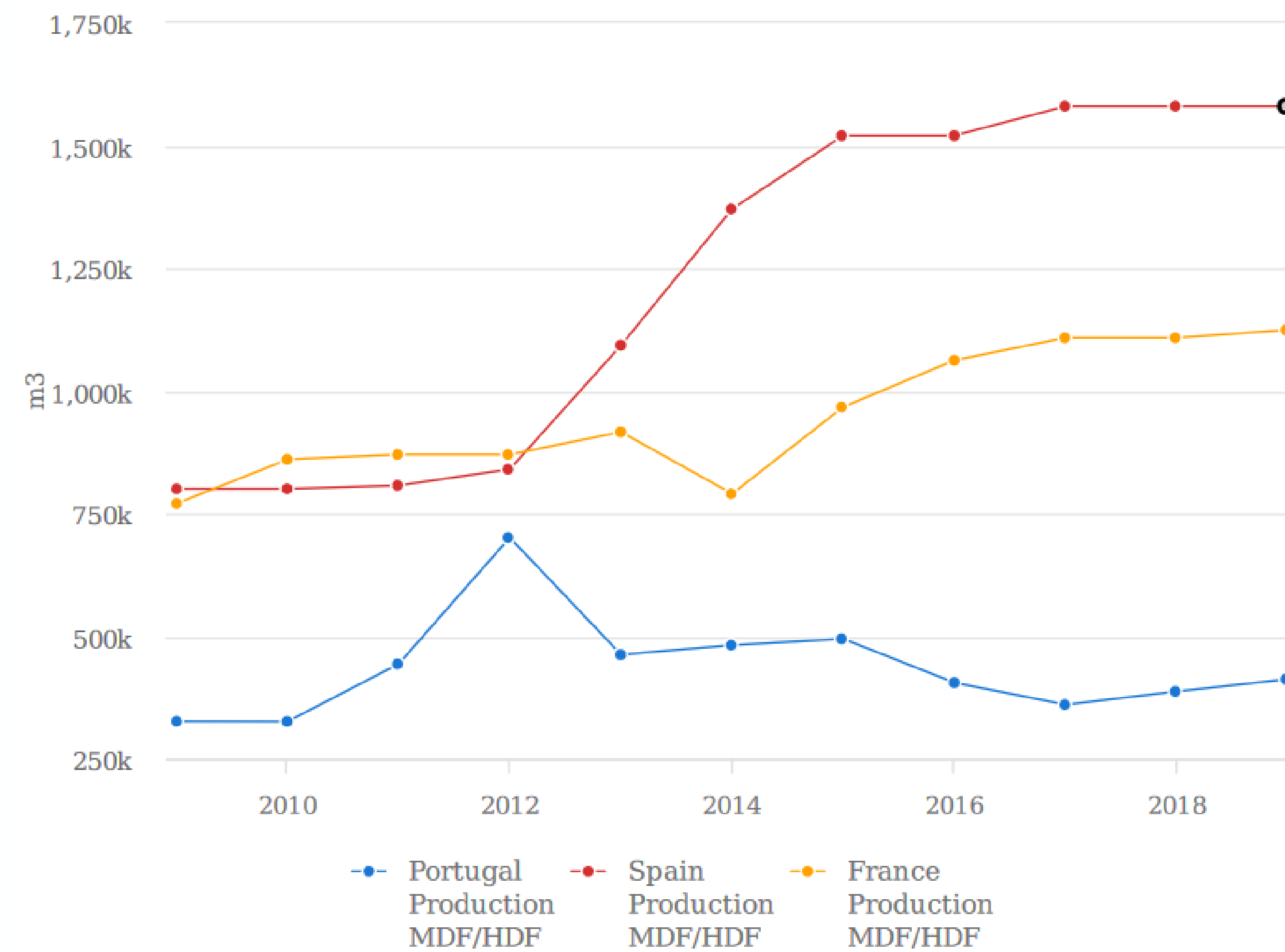
Source: FAOSTAT (Oct 27, 2020)





## Engineered wood panels production in France, Portugal and Spain 2020

### MDF/HDF



Source: FAOSTAT (Oct 27, 2020)





## Main cork products import and export in 2018

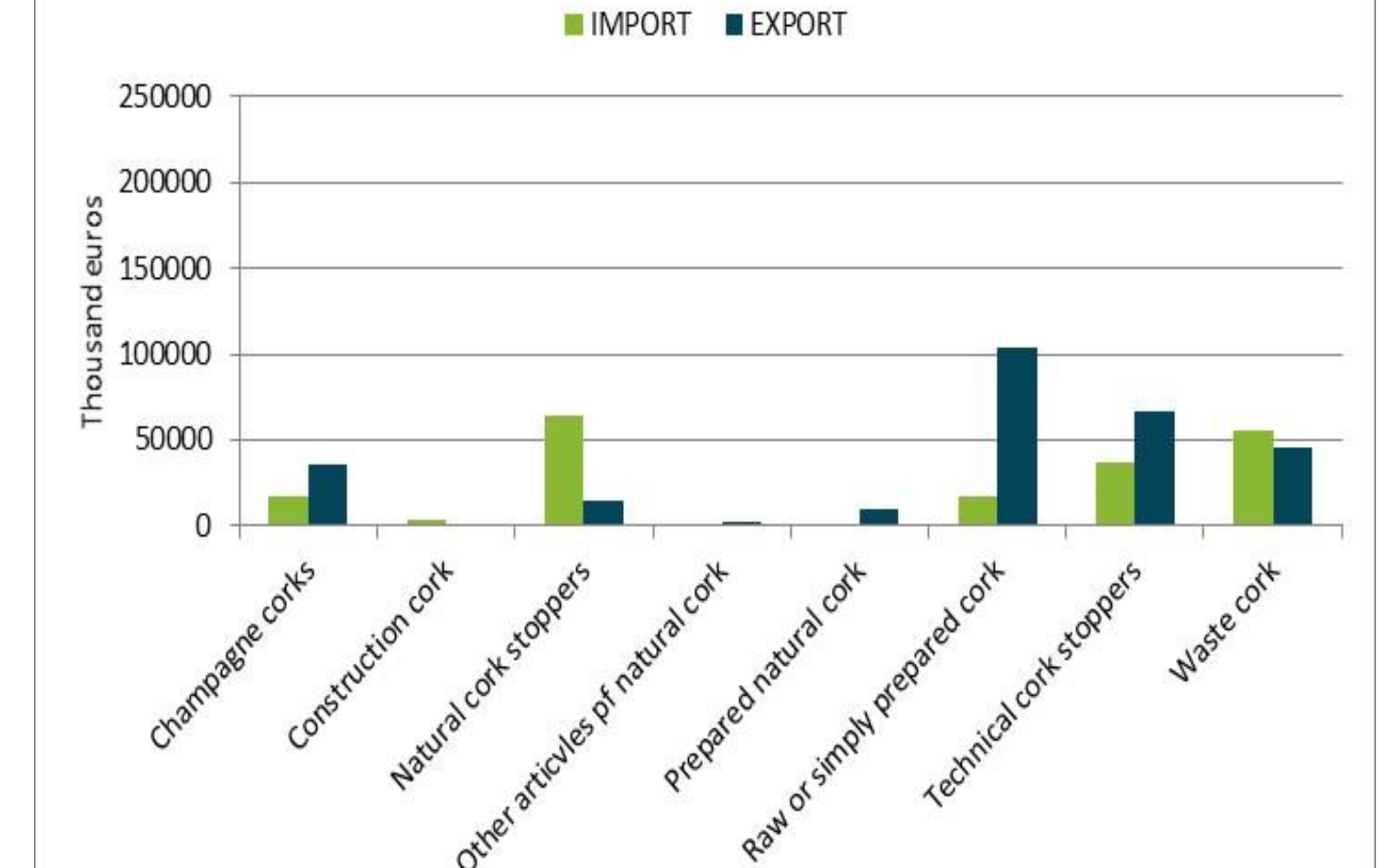
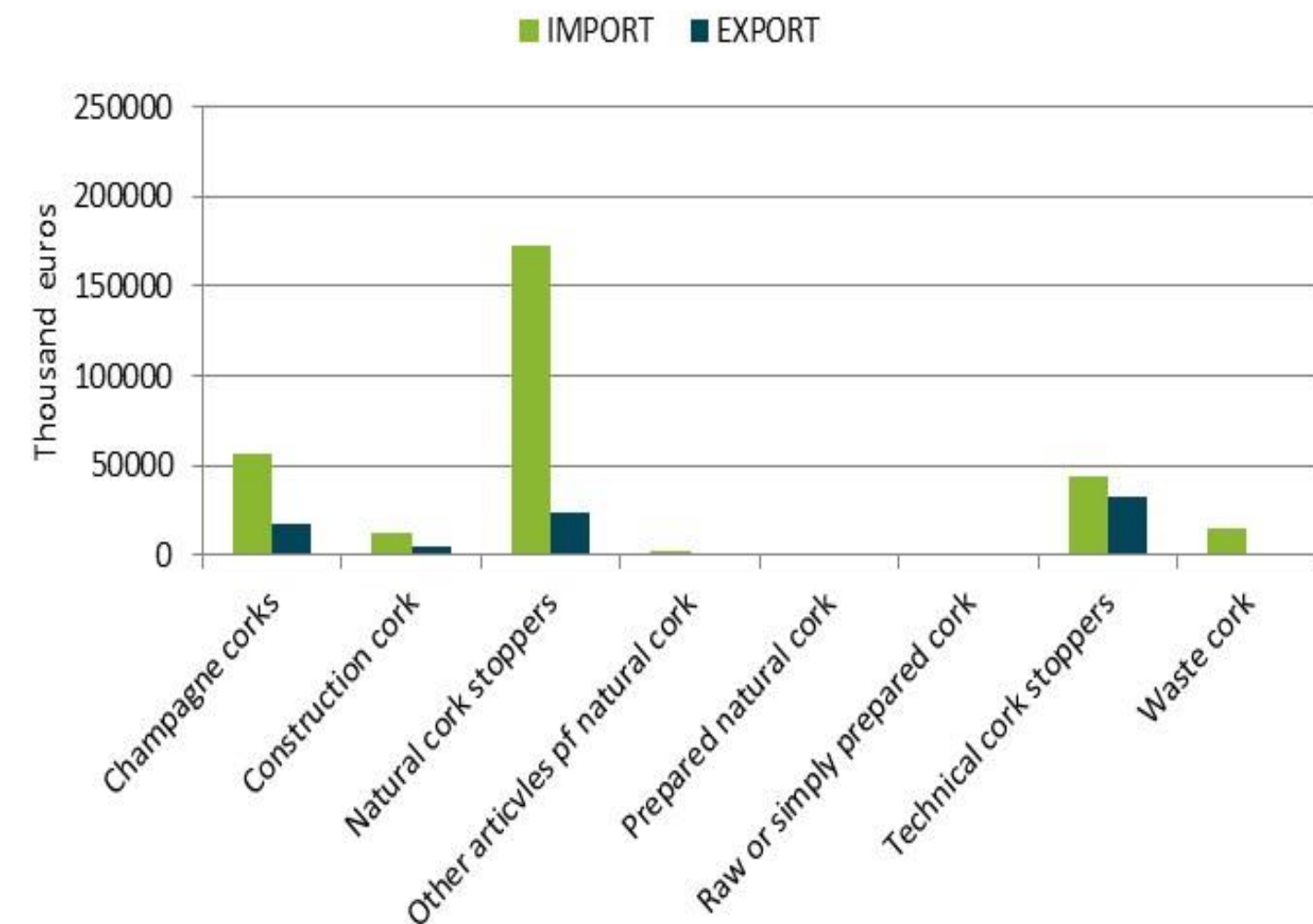
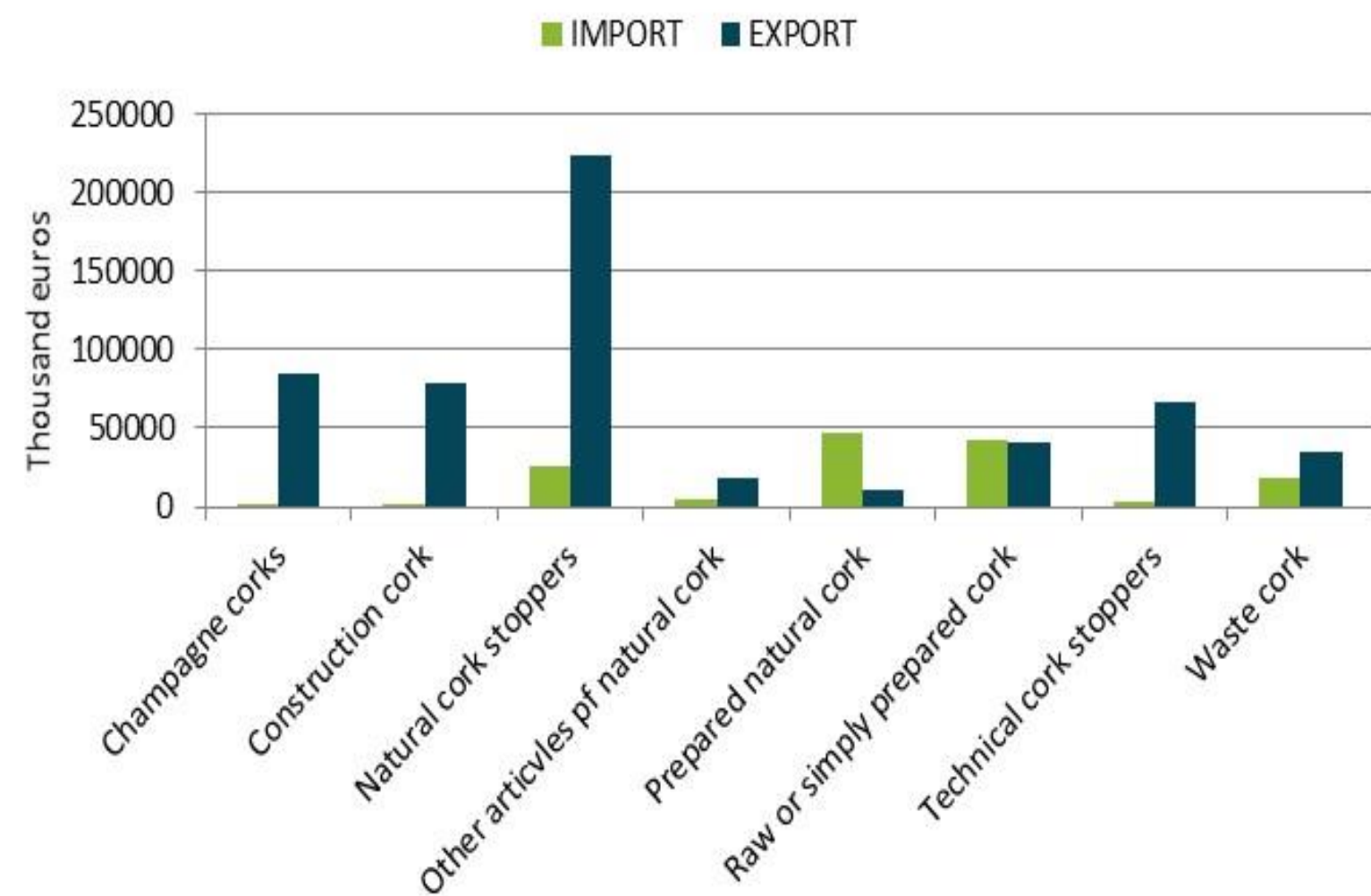


Portugal



Spain

France





Exported cork products from the three countries in the Sudoe region, 2019.

	Portugal		Spain		France		Total	
	1,000 t	M €	1,000 t	M €	1,000 t	M €	1,000 t	M €
<b>Agglomerated cork</b>	78.93	197.36	2.29	6.56	0.51	6.61	81.73	210.52
<b>Cork stoppers</b>	50.23	751.15	22.50	193.53	5.92	84.22	78.65	1,028.90
<b>Natural cork</b>	2.56	22.29	10.96	33.03	0.04	0.69	13.57	56.01
<b>Waste cork</b>	49.60	75.59	37.09	65.53	0.36	1.90	87.04	143.02
<b>Total</b>	<b>181.31</b>	<b>1,046.39</b>	<b>72.84</b>	<b>298.64</b>	<b>6.83</b>	<b>93.42</b>	<b>260.98</b>	<b>1,438.45</b>

Source: EUROSTAT.





# **Roadmap towards an increased use of wood and cork in public buildings of South-West Europe**



## The building sector

The building sector plays a relevant role in the EU economy

- Representing 10% of the global *Gross Domestic Product* with 12 million employments

(Hurmekoski, 2017).

- In 2019, the total European construction sector reached about 1,700 billion € (EUROSTAT).

- Represent 42% of final energy consumption and generate 35% of greenhouse gas emissions (Hurmekoski, 2017).

- Responsible for 40% of extracted materials and 30% of water consumption (Hurmekoski, 2017).

- Including the whole life cycle of buildings, construction and demolition waste represents 46% of the total waste (Gálvez-Martos et al., 2018).



## CHARACTERIZATION OF WOOD AND CORK INDUSTRIES

### ***Primary wood products***

The total roundwood production in the three Sudoe countries reached 82.8 million m<sup>3</sup> in 2019.

- Where SP+FR+PT represents 18% of the EU-27 production. (France contributed 60%, Spain 23% and Portugal 17%)
- Traditionally, roundwood in the EU has been dominated by coniferous trees. However, non-coniferous roundwood production dominates in the three countries of the Sudoe region (59%) since the relevance of oak wood in France and the eucalyptus in Portugal.
- 50% of roundwood production in France is used as fuel wood, while in Spain and Portugal, only for 19 and 10%.



## CHARACTERIZATION OF WOOD AND CORK INDUSTRIES

### **Wood-based industries** (EUROSTAT)

of the three Sudoie countries are composed by 84,691 enterprises

- printing industries (35%),
- furniture manufacturing industries (32%),
- woodworking industries (29%),
- manufacturing of paper and paper products industries (4%).

Although some pulp and paper manufacturing companies are big, most of the wood-based industries are small and medium enterprises, with an average of 5.4 employees per enterprise.

The value added at factory cost was estimated at 26.3 billion € for 2018. The pulp and paper industries generated about one-third of it.



## *Life Cycle Analysis of buildings*

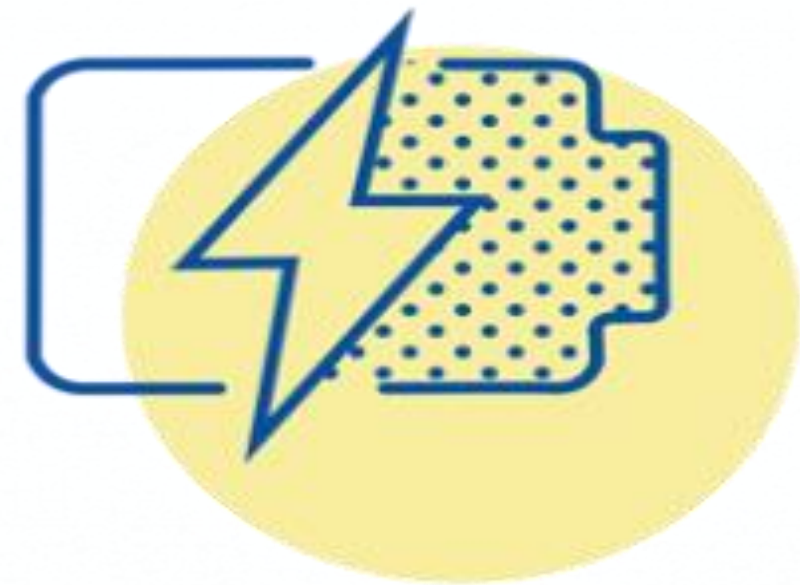
Environmental impact of the building sector in Europe

Based on a building's full lifecycle, the building sector is responsible for:



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**1/2** of all extracted materials



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**1/2** of the total energy consumption



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**1/3** of water consumption



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**1/3** of waste generation





## ***Solid softwood quality requirements***

Solid softwood employed as a structural element in buildings must be graded and fulfil the minimum technical requirements according to the standards of the country of origin

### *Standards for solid softwood classification in the main countries of the Sudoe region*

Country	Standard	Structural grade
Spain	UNE 56544: 2011. Clasificación visual de la madera aserrada para uso estructural. Madera de coníferas.	ME-1, ME-2 and ME-G.
France	NF B52-001-1 Avril 2018. Règles d'utilisation du bois dans la construction - Classement visuel pour l'emploi en structures des bois sciés résineux et feuillus - Partie 1 : bois massif - Règles d'utilisation du bois dans la construction - Classement visuel pour l'emploi en structures des bois sciés résineux et feuillus - Partie 1 : Bois massif.	ST-I; ST-II; ST-III and ST-IV
Portugal	NP 4095:1995. Madeira serrada de pinheiro bravo para estruturas. Classificação visual.	E



## Engineered wood products

### *Technical requirements for engineered wood products and mechanical properties standards*

	Requirements for production	Mechanical properties for structural purposes
<b>Particleboards (P4, P5, P6, P7)</b>	EN 312	EN 12369-1
<b>OSB</b>	EN 300	
<b>Solid wood</b>	EN 13353	EN 12369-3
<b>Plywood</b>	EN 636	Test according EN 789 and EN 1058 or values based in small bending test EN 310 + EN 636 + EN 12369-2
<b>CLT</b>	EN 16351	Test or properties based on calculation using lamellas' strength class.
<b>Any type (testing for obtaining mechanical properties)</b>		EN 789, EN 1058 and EN 14358





# THANK YOU

