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Quantification of the economic, environmental and social impacts of introducing mandatory treatment requirements for wood packaging material circulating inside the European Union

Final Report

Framework Contract for evaluation and evaluation related services –

Lot 3: Food Chain

Submitted by:

Food Chain Evaluation Consortium (FCEC)

Civic Consulting – Agra CEAS Consulting-

Arcadia International - Van Dijk Management Consultants

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Contents

List of Tables

List of Figures

Acronyms

CAs:	Competent Authorities
CCAA:	Comunidades Autónomas (Spain)
CEI-Bois:	European Confederation of woodworking industries
CHEP:	Commonwealth Handling Equipment Pooling
CLECAT:	European Association for Forwarding, Transport, Logistics, Customs
COM:	European Commission
CP:	Chemical Pallet
DCF:	Discounted Cash Flow
DG SANCO:	DG for Health and Consumers
DH:	Dielectric Heating
EFNA:	European Forest Nursery Association
EOS:	European Organisation of the Sawmill Industry
EPAL:	European Pallet Association
ESC :	European Shippers' Council
EU:	European Union
FEFPEB:	Fédération Européenne des Fabricants de Palettes et Emballages en Bois
FMCG:	Fast Moving Consumer Goods
FTE:	Full-Time Equivalent
HO:	Harmful Organism
HT:	Heat Treatment
IFQRG:	International Forestry Quarantine Research Group
IP:	Industrial Packaging
IRU:	International Roadtransport Union
ISPM:	International Standard for Phytosanitary Measures
JKI:	Julius Kühn-Institut
KD:	Kiln Drying
LPR:	Logistic Packaging Return
LWP:	Light Weight Packaging
MB:	Methyl Bromide
MC:	Moisture Content
MS:	Member States
Mt:	Megatonne
NPV:	Net Present Value
NPPO:	National Plant Protection Organisation
PBP:	Payback Period
PRS:	Pallet Return System
PWN:	Pine wood nematode (*Bursaphelenchus xylophilus*)
SCPH:	Standing Committee of Plant Health
TCs:	Third Countries
ToR:	Terms of Reference
WPM:	Wood Packaging Material

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Key messages

The whole of continental Portugal has been a Demarcated Area (DA) for pinewood nematode (PWN) since May 2008; three PWN outbreaks have occurred in Spain close to the Portuguese border, and these areas are applying strict eradication measures. Portugal and the DAs in Spain are subject to emergency measures to prevent the further spread of PWN, which include compulsory heat treatment (HT) according to the International Standard for Phytosanitary Measures (ISPM) 15 for all newly produced and circulating wood packaging material (WPM) leaving the DAs. WPM used in trade within the EU may present the risk that exotic HOs with limited distribution in the EU, such as PWN and *Anoplophora* longhorned beetles, may spread to new areas. Since 2008, several interceptions of PWN-infested susceptible pine wood, WPM and bark coming from Portugal have been notified to the Commission by other Member States (MS).

The present study analyses the potential economic, social and environmental impacts of introducing the obligation to treat WPM circulating within the EU – and in particular pallets, the focus of the study - in compliance with ISPM 15. As Sousa *et al.* (2011) found that moist pallets can be subject to cross-infestation with PWN, the study also assesses the costs of kiln drying (KD) pallets in addition to performing HT. The **analysis, carried out by the Food Chain Evaluation Consortium (FCEC)** yielded the following results:

- The extension of the obligation to perform HT of pallets will have **economic** costs for the industry sectors concerned (primarily WPM manufacturers and repairers but also the sawmilling sector) ranging from €206 million – €2.2 billion (investment and operational costs) and €95 – €170 million/year (operational costs) depending on the policy option to be followed. These compare against estimated current operational costs of €86 million/year[1] (for newly produced pallets only);
- Options 2 (and 3) carry the lowest investment and operational costs in comparison with Option 1[2]; the scenarios that would minimise the costs (investment, operational and environmental) for the sector are those whereby repaired pallets are repaired with HT wood, or repaired with HT wood and retreated after subsequent repairs, with investment and operational costs amounting to €206 - €299 million and €335 - €491 million respectively;
- In the case the obligation is extended to perform both HT and KD of pallets, investment and operational costs for the sector would amount to €562 million – €2.8 billion and €258 – €333 million/year (operational costs), compared to current operational costs estimated at €108 million/year[3](for newly produced pallets only);
- In **environmental** terms, the treatment of pallets would result in annual potential additional CO_2 emissions after 2015 of 204,000 tons/year for HT and 575,000 tons/year for HT/KD, which compare with current emissions estimated at 61,000 tons/year and 292,000 tons/year respectively. These figures have to be compared with the carbon stock of EU coniferous forests, which is estimated at ~5 billion tons, as well as against the potential impacts of PWN to convert EU forests from carbon sinks to carbon sources, which are roughly estimated at 562 million tons of CO_2 emissions over twenty years[4];
- The WPM sector is characterised by the high presence of micro and small enterprises and has been consolidating in recent years, with production increasingly concentrated in larger enterprises. It is likely that the introduction of ISPM15 would further favour this process, with

[1] EU MS currently have an estimated capacity that is sufficient to carry out heat treatment (HT) in compliance to ISPM 15 on ~60% of the pallets newly produced each year.

[2] Option 1: Obligation to HT all the new, repaired and old pallets by 2015; Option 2: Obligation to HT new and repaired pallets by 2015 and old by 2020, Option 3: Obligation to HT new and repaired pallets by 2015. As in Options 1-3 all newly produced pallets will systematically be treated starting from 2015, it is estimated that by 2020, there will be no untreated 'old' pallets circulating in the EU, therefore Options 2 and 3 are identical.

[3] EU MS currently have an estimated capacity that is sufficient to carry out both HT and kiln drying (KD) treatment on ~46% of the pallets newly produced each year.

[4] Effects of this order of magnitude have been documented in Canada following an outbreak of *Dendroctonus ponderosae*, the Mountain Pine Beetle, in British Columbia (Kurz et al., 2008). The estimates provided have to be read as a rough indication of the potential effect of a similar outbreak in the EU. This having been said, a more precise estimation would require detailed scientific work and therefore this estimate must be treated with considerable caution.

microenterprises (less than 10 employees) likely to be particularly disadvantaged by new rules[5]. This development has, however to be read against the scenario of non intervention, which could potentially lead to the destruction of the forestry resource base that forms the base of the economic activity of the WPM sector;

- In terms of **social** impacts, business closure related to the new rules may cause estimated job losses ranging from ~1,440 to ~7,200 jobs; this figure has to be balanced against job creation estimated at ~ 890 to ~3,400 jobs (Options 2 and 3, HT only) and potential additional employment at the level of HT/KD equipment production and for the supervision and management of the system;
- The transmission of the increased cost of production to the next customer in the supply chain depends on the level of competition and relative bargaining power between operators at different stages of the supply chain; the analysis concludes that the transmission of any cost increase would be difficult, and the impact on the final consumer prices of goods should therefore be relatively limited;
- The costs of introducing the treatment obligation in compliance with ISPM 15 have to be compared against the costs of complete deregulation (Option 4), with a total potential impact on available forestry stock of the EU 27 estimated at €39 – €49 billion assuming no regulatory control measures are taken.

The industry noted that 3-5 years from the announcement of the measures will be required for completing the investment required under Options 2-3 (scenario envisaging use of pre-treated wood for the repaired pallets). They also indicated that any extension of the ISPM 15 requirements for repaired pallets would have to be associated with the harmonisation of rules at EU level for this category of pallets, given the contrasting current positions on this issue in MS. The MS' Competent Authorities pointed out that in terms of enforcement Options 2 and 3 would minimise costs (compared to Option 1), as only places of production/repair would need to be inspected, and not the movement of pallets, particularly in the case of Option 3. However, to overcome any potential for fraud it was suggested that date marking of the pallets could be introduced, to distinguish date of production and date of treatment.

Under the status quo, in the event of a PWN outbreak, the rapid implementation of ISPM 15 for all WPM produced in the infested MS is seen as very difficult, if not impossible. This increases the risk of spread until the measures can be implemented or could result in significant disruptions to trade, with potential impacts as devastating as in the case of Portugal, but amplified. In Options 2 and 3 the industry is made aware and given time to prepare. In terms of control costs, as DAs expand, the enforceability of status quo (variant B)[6] compared to Options 2 and 3 is expected to diminish; in Options 2 and 3 controls become more simplified therefore better targeted and more effective and cost efficient.

Considering the results of the analysis, the MS CAs and industry views, the relatively best option is concluded to be Option 3 (in practice identical to Option 2) without kiln-drying (although kiln drying may remove the residual risk of cross-pallet infestations while wood is still moist, its additional costs are disproportionate). Furthermore, in view of the changed position of PWN within the EU, the present study recommends the introduction of the obligation for WPM circulating within the EU to be subject to treatment according to ISPM 15, with banning of non compliant newly produced and repaired WPM by 2015.

[5] It is noted that the introduction of ISPM 15 in Portugal resulted in the disappearance of 60% of WPM producers, nearly all of which were microenterprises, and the sawmilling sector was also particularly affected. This negative impact has, however, to be considered in the general context of negative impacts on the forestry and the wood processing sector as a whole deriving from PWN presence.

[6] In the status quo variant B a PWN outbreak has theoretically occurred in a major forestry area in France, Germany, Spain and Latvia (one in each MS) and the PWN emergency measures are applied in the DAs.

Executive summary

- **Current status of pinewood nematode in the EU**

The whole of continental Portugal has been a Demarcated Area (DA) for **pinewood nematode (**PWN) since May 2008. In addition three PWN outbreaks have occurred in Spain close to the Portuguese border, and these areas are applying strict eradication measures. Portugal and the DAs in Spain are subject to **emergency measures** as set out in Decision 2006/133/EC[7] to prevent the further spread of PWN. These include compulsory heat treatment (HT) for all wood and circulating wood packaging material (WPM) leaving the DAs. WPM used in trade within the EU may present the **risk** that exotic HOs with limited distribution in the EU, such as PWN and *Anoplophora* longhorned beetles, may **spread** to new areas. Since 2008, several interceptions of PWN-infested susceptible pine wood, WPM and bark coming from Portugal have been notified to the Commission by other Member States (MS).

- **Resources at risk from plant pests transmitted through WPM movement**

Among the Harmful Organisms (HOs) susceptible to spread through the movement of WPM are *Bursaphelenchus xylophilus* (pinewood nematode), *Anoplophora glabripennis* (Asian longhorned beetle) and *Agrilus planipennis* (emerald ash borer). These constitute serious **threats** to the EU forests and to their associated value as an economic and public goods resource.

The total **forest and wooded land area** in the EU27 is **178 million ha**. (42% of the total EU land area), of which ca. 73% is available for wood supply. The EU27 forest-based industries, with a production value of €365 billion and an added value of €120 billion, account for more than 3 million jobs in 344,000 enterprises[8]. In addition to their economic value, many parts of these industries play an essential role in maintaining **sustainable employment in rural areas**, and in the woodworking and printing sectors, where microenterprises and small and medium enterprises (**SMEs)** are particularly present. In recent years, total EU27 wood production has averaged ca. 400 million m^3 of roundwood per year, consistently maintaining its position as one of the main roundwood producers in the world. In 2010 annual roundwood production was roughly valued at ca. €16.1 billion[9]. From this resource the EU 27 produces ca. 100 million m^3 of sawnwood per year[10].

Forests and forest-based industries play a key strategic role in **climate change mitigation**: the available data[11] show that at least 9.6 billion tonnes of carbon are stored in the EU27 wood forest biomass. Furthermore, forests provide wider benefits, in particular **landscape/recreational and biodiversity values**. Based on estimates by the UK Forest Research (2010) for specific UK tree species, the landscape/recreational value and the biodiversity /carbon sequestration value of EU27 forests could roughly be valued at some €56 billion[12].

The **protection** of the EU27 forestry sector **from plant health threats** is relevant to a range of industries downstream from the forestry sector as such. Indeed, the availability of wood as a raw material at a competitive price is a determining factor for the performance and potential added value generated by many EU industries. Wood is the highest cost component in most downstream sectors (in papermaking, wood accounts for more than 30 % of total costs; in the sawmilling industry, for 65 to 70%). The price of wood can fluctuate considerably depending on prevailing supply and demand conditions which are *inter alia* influenced by plant pests and diseases and their impact on the availability of wood of the required quality.

[7] Decision 2006/133/EC will be repealed and replaced by a new Decision applicable in all EU Member States. The proposal was voted in June 2012 and adoption is foreseen in autumn 2012.
[8] Source: DG ENT.
[9] Source: FCEC, 2011.
[10] Source: EUROSTAT.
[11] EUROSTAT, 2009.
[12] FCEC estimates (source: FCEC 2011).

- **Implementation of ISPM 15**

In 2002 the IPPC adopted a global standard for treating WPM: the International Standard for Phytosanitary Measures No. 15 (ISPM 15)[13]. This standard has been adopted by over 177 countries to date in order to regulate movement of WPM in international trade.

The EU pallet industry currently performs ISPM 15 HT for customers who require WPM to be shipped internationally; in all MS a system of registration and authorisation of operators for the purpose of the ISPM 15 is in place under the responsibility of the National Plant Protection Organisation (NPPO).

In recent years closed pallet pool companies in the EU have been purchasing HT pallets, and using HT/KD wood for repair[14], while the main EU open pool system has introduced a mandatory ISPM 15 requirement for all pallets newly manufactured in the EU under their standard. The capacity to heat treat has been increasing in the past decade, mostly in response to customers' requirements for international trade. However, the HT of pallets can result in quality deterioration, unless it is combined with kiln drying (KD)[15]. Partially in response to worker health and safety concerns this is becoming the standard practice in several key user sectors, including the transport of pharmaceuticals and food. However, the industry position is that they would not take a voluntary initiative to invest in HT, unless there is a specific regulatory requirement, as demonstrated by the fact that HT of WPM was introduced for internationally traded WPM only.

- **Objectives of the study, options analysed and methodology**

This study analysed the **potential economic, environmental and social impacts** of the **extension of the obligation to perform HT or HT/KD**[16] on WPM circulating within the EU under the following scenarios:

- *Status quo - Variant A:* **baseline** scenario, with the current extent of PWN outbreaks;
- *Status quo - Variant B*: new PWN outbreaks are supposed to have occurred, in a major forestry area in France, Germany, Spain and Latvia (one in each MS). The PWN emergency measures (Decision 2006/133) have been amended to cover all Member States and require that movements of WPM out of the respective demarcated areas in all cases require treatment and marking in accordance with ISPM No. 15;
- Option 1 – Mandatory implementation of ISPM No. 15 inside the EU, with a **short transitional period for old WPM**: a legal requirement would be adopted prohibiting the movement of all WPM (whether old, repaired or new) inside the EU, unless it has been treated and marked in accordance with ISPM No. 15, by 1 January 2015;
- Option 2 – Mandatory implementation of ISPM No. 15 inside the EU, with a **long transitional period for old WPM**: a legal requirement would be adopted prohibiting the movement of all WPM inside the EU, unless it has been treated and marked in accordance with ISPM No. 15, by 1 January 2015 for new and repaired WPM, and by 1 January 2020 for all WPM circulating in the EU;
- Option 3 – Mandatory implementation of ISPM No.15 inside the EU, **only for new and repaired WPM**: a legal requirement would be adopted prohibiting the movement of all WPM inside the EU, unless it has been treated and marked in accordance with ISPM No. 15, by 1 January 2015 for new and repaired WPM, and with no obligations for existing WPM circulating in the EU;
- Option 4 – **Repeal** of ISPM No. 15 requirements at import and as concerns movements out of demarcated areas. In this option, the implementation of ISPM No. 15 is no longer required,

[13] "Regulation of wood packaging material in international trade" (IPPC, 2009).

[14] It is noted that the PRA carried out in the US on the generalised introduction of ISPM 15 (USDA, 2011) concluded that the practices followed by (closed) pooled pallet companies, in particular the use of kiln dried wood and rapid repair of pallets, will greatly reduce or eliminate harmful organisms associated with WPM.

[15] Kiln drying is a process that reduces moisture content and prevents the development of mould (blue stains).

[16] As Sousa *et al.* (2011) found that moist pallets can be subject to cross-infestation with PWN, the study also assessed the costs of kiln drying pallets in addition to performing heat treatment.

neither for import nor for any intra-EU movements. It is assumed that infested WPM can freely enter and move within the EU.

The **timeline** considered in the study is that the announcement of the measures takes place in the course of 2013.

The FCEC methodology was based on an **analytical model** for the analysis of impacts under the status quo and the Options specifically developed for this project[17]. An analysis of the Net Present Value (NPV) of the investment and operational costs per unit of investment was also undertaken to understand whether economies of scale impact on costs and whether the investment is feasible in particular at the level of microenterprises. The study relied on extensive **stakeholder consultation**; the data relating to the WPM sector, underlying assumptions and results have been shared and validated by stakeholders throughout all the stages of the study.

In view of the extensive range of WPM products and the fact that pallets account for the bulk of susceptible WPM covered by ISPM 15 (see below), the study focussed on pallets.

The analysis was conducted for **three scenarios**, which vary depending on the approach taken for the treatment of repaired pallets. As for retreatment of pallets, the ISPM 15 requires retreatment only if more than one third of the pallet is repaired. This study found that it is actually commercially not viable to repair more than one third of the pallet (and indeed not more than 15-20% of the pallet[18]). The issue of multiple marking nonetheless remains important in terms of ensuring traceability. Taking into account the current significant differences in practice regarding the treatment of repaired pallets, the FCEC has developed three scenarios which capture the range of potential situations:

- Scenario 1: 100% of repaired pallets are to be retreated:
  - Scenario 1.a: assuming that old pallets circulating are treated and those repaired during the year are retreated;
  - Scenario 1.b: assuming that old pallets to be repaired during the year will be treated only once at the point of repair;
- Scenario 2: Two thirds of the total (yearly estimated) repaired pallets are repaired with HT wood and one third of the total (yearly estimated) repaired pallets is retreated.
- Scenario 3: 100% of repaired pallets are repaired with HT wood.

The EU wood packaging material sector

WPM, and in particular pallets, are a crucial component of transport and distribution logistics, being used worldwide in the shipment of 90% of goods. The **WPM sector** represents approximately **8.6% of the EU woodworking industry** value, i.e. ca. **€11.4 billion**[19]. The sector uses an estimated 24 million m^3 of timber annually, representing approximately 20% of the EU sawn timber volume. Currently **9,952 enterprises** in the EU produce wooden containers, employing **95,400 persons**[19], i.e. 5.5% of the total number of enterprises and 8.2% of total employees in the EU woodworking sector.

[17] The model uses a range of underlying assumptions based on available literature and our findings from data collection and consultation with MS CAs and the EU sawmilling, WPM manufacturing and WPM user sectors Extensive sensitivity analysis has been carried out to validate the range of parameters used. The model assumptions can be adjusted to take into account new evidence coming to light.

[18] E.g. 4-5 components over a total of 26 components of a 4-way pallet.

[19] EUROSTAT, 2008 data (latest available). The woodworking industries (excluding the furniture sector) have a turnover of €134 billion and generate an added value of €37 billion, employing 1.3 million people in 197,000 enterprises (source: DG ENT), most of which are small or medium-sized (The only exception are the wood-based panel sub-sector and a handful of sawmills, which mainly comprise large enterprises). Together the woodworking and furniture industry has an estimated production value of ca. €240-€260 billion. Trade of forest-based products is very important, particularly within the EU27: in recent years imports (intra-EU and extra-EU) have reached ca. €100-€110 billion and exports ca. €110-€120 billion. The EU is a net importer of forest-based products from third countries (2009: extra-EU imports worth €6.3 billion and exports worth €3.2 billion).

Pallets represent approximately 70% of the total production of WPM[20] and, also in view of the outcome of consultations with stakeholders with regard to the other two main types of WPM, this study therefore focuses mainly on pallets. In particular:

- Industrial Packaging (IP) would be less affected by any potential extension of ISPM 15 to WPM circulating within the EU, as this category of WPM is manufactured from heat treated wood (heat treated/kiln dried wood is purchased from sawmilling) and nearly all the IP produced is HT; IP is manufactured and sold for use within 100 – 200 km and is for the most part exported from the EU. The risk associated with IP is due to the use of dunnage when loading goods for shipment;
- As for Light Weight Packaging (LWP), the ISPM 15 is applicable to this type of WPM only for one of the components (the 3x3cm corners), and partly on wine boxes and cases. LWP producers do not have their own HT/KD installations, but purchase pre-treated softwood components from the sawmillers, therefore this would result in an impact on HT wood to be sourced from the sawmilling sector. This may potentially impact on the equipment needed at this level to cut the wood to specific dimensions.

Pallets and containers are manufactured using a variety of materials such as wood, wood-based composites, plastic, paper and metal. Wood is, however, the most important raw material used for this purpose, representing 90% - 95% of the EU pallet market. In the EU, an estimated **~515 million to ~530 million pallets are produced every year** and an estimated **~2.5 billion pallets are in circulation**. The production of pallets and WPM in any given year is strongly correlated with the economic activity level, and in particular that of the main sectors using WPM. It is important to note that this implies that any change in the economic outlook would impact on the volume of WPM produced and on HT equipment capacity utilisation[21]. According to industry sources, there are approximately 7,200 pallet manufacturing and repairing enterprises in operation directly employing some 80,000 persons (manufacturing), and indirectly employing 300,000 (repairing and trading).

WPM production largely takes place in **micro[22], small and medium size enterprises**, although a few larger enterprises are present in most of the key MS. There appears to be significant **concentration** in the manufacturing sector and a trend towards greater consolidation in recent years: a limited number of large manufacturers produce 75% of WPM by volume, while a large number of microenterprises produce the remaining 25%.

Pallets are used in the majority of economic sectors for the shipment of goods. The sector comprises **single use and reusable pallets**; the latter are continuously moved and repaired if damaged, reaching an estimated lifespan of five to seven years on average. The recycling of pallets has increased as it represents a cost-efficient alternative to producing new pallets. Pallets and in general WPM are not recorded in trade as they are seen as part of the goods they transport, and, as they are routinely repaired, their origin is rarely the same as the origin of the commodity that is transported with them. There is limited export of pallets and WPM in general as a commodity, although there appears to be trade in empty pallets within the EU, in particular in the case of neighbouring MS in continental Europe, which are most likely driven by price differentials between MS.

The activity of **pallet recovery and repair** is carried out by a large number of **microenterprises** in the EU: industry sources estimate that approximately 2,300 repairers operate, the great majority of whom do not belong to any professional organisation or may not even be registered. In general, a large number of very small operators account for 20% of the market by volume in most MS and these are considered the 'grey zone' of the industry.

A significant share of the wood pallets in the EU are part of **closed pool systems** (estimated at about a quarter of the annual circulation), where the pallets are rented by a company to various customers and then returned for maintenance, repair and reuse by other users. Pallet pool companies have the ownership of the pallets and act as service providers for the whole management cycle of the pallet. Prior to the pallets being returned for use in the pool they are inspected and repaired. The lifecycle of

[20] Source: FEFPEB.
[21] Estimates in this study are provided on the basic current data.
[22] Microenterprises defined as SMEs with ≤10 employees and a turnover or balance sheet of ≤ €2 million.

a pallet in the pooled pallet industry extends considerably further than the average life of a pallet, reaching as a minimum fifteen years.

The majority of wood pallets used in the EU are part of the **non – closed pools**; these include pallets produced according to specific industry standards and non standardised pallets. The original owners of these pallets (manufacturers or transport and logistics companies or end users) pass on the ownership of pallets along with their goods, whereas in the case of closed pool pallets, these are rented and the ownership stays with the pool.

- **Results of the study (FCEC analysis)**

Currently, with the exception of some countries, EU MS generally do not have sufficient capacity to carry out HT on all the pallets newly produced each year. In particular, the capacity to perform HT compliant with ISPM 15 is estimated at **~325 million new pallets**, i.e. ~ 60% of the total EU new production of pallets[23], whereas currently the number of newly produced HT/KD pallets is estimated at ~ 218.5 million. It is important to bear in mind the difference between theoretical and available capacity, and that the capacity has to be seen in conjunction with both the production of WPM (which varies from year to year) and the general economic climate (as demand for HT/KD wood may come from a range of sectors of economic activity). The economic outlook affects both the total number of pallets demanded by the industry (thereby increasing the total number of pallets used and requiring treatment), and the demand for wood from other sectors (e.g. construction), which in turn affect kiln capacity used by the woodworking sector (sawmilling) to dry wood to respond to this demand.

The extension of the obligation to perform HT of WPM in compliance with ISPM 15 will have **economic** costs for the industry sectors concerned, both in terms of the investment required to install the suitable treatment equipment, and in operational costs (labour, energy) required to perform the treatment. These costs will fall primarily on the WPM manufacturers and repairers but also on the sawmilling sector.

Given that in the Options 1-3 all newly produced pallets will systematically be treated starting from 2015, it is estimated that by 2020, there will be no untreated 'old' pallets circulating in the EU[24]; therefore Option 2 and Option 3 are identical in terms of costs, although there are some differences concerning enforcement, as the establishment of a date limit in Option 2 is likely to result in better implementation. Also, the introduction of the ISPM 15 requirement for new and repaired pallets could result in a higher use of old pallets with consequent higher rate of damage and therefore quicker exit from the system. Options 2 and 3 are therefore discussed together in the following summary of results.

[23] The FCEC has also carried out a survey of CAs in order to have an additional source of data concerning existing HT capacity. These data are reported for completeness but could not be used in the analysis given the different scope of information collected at MS level. Data on registered operators for the purposes of the ISPM from the MS CAs indicate that currently in the EU (22 MS) ~ 1,850 companies produce HT wood, and ~3,640 WPM companies produce HT WPM (have facilities on site) , whereas some 6,340 companies assemble or repair WPM from HT wood (do not have facilities on site). The available data suggest therefore that in the EU ~ 5,490 kilns are installed to perform HT of wood or WPM; however, little can be said about their capacity (in m^3 of wood or pallets/WPM), as these data are not consistently registered throughout MS).

[24]If it is assumed that repaired pallets are ISPM 15 compliant if repaired with HT wood, the volume of pallets ISPM 15 compliant every year is given by the sum of newly produced and repaired pallets. Thus, the stock of 'old' pallets to be treated decreases every year by this amount. Therefore, although the overlap between Option 2 and 3 may appear inconsistent given the average lifespan of pallets within closed pallet pools (~15 years), it still holds valid when using the definition of 'repaired' as above. *De facto*, therefore there will be no pallets circulating that have not been treated or repaired according to ISPM 15 within 5 years of the introduction of the rule for new and repaired pallets (at current volumes of production and circulation). As for the scenario with requirement of the KD treatment in addition to the HT, given that the number of HT/KD is lower in year n, it would take one more year for old pallets to disappear (96% in 2020); however, given that in the years before introduction of the requirement the number of HT/KD pallets may increase, this would effectively result in a quicker disappearance of the non treated pallets.

On the basis of the assumptions and the model developed for the analysis, the FCEC estimate the **current operational costs** to perform HT of pallets ('baseline': ***status quo* – variant A**) **at €86 million/year (for newly produced pallets only)**. Against this baseline, the ***status quo* – variant B** results in additional total investment and operational costs for the sector ranging from €121 - €179 million, in the four MS where PWN outbreaks hypothetically occur[25] in the first year of implementation, with annual operational costs in subsequent years estimated at **€35 million/year**. An estimate of costs in case the entire territory of the infested countries is considered to be a DA (as is the case with Portugal today) is also provided: investments and operational costs in the year of introduction would reach €536 – €785 million, whereas operational costs in the following years are estimated at **€148 million/year**.

In the case of **HT only**, Option 1 results in total investment and operational costs ranging between €650 - €2,224 million; Options 2 and 3 result in total investment and operational costs for the sector ranging between €206 - €876 million. Annual operational costs in the subsequent years are estimated at **€95 – €170 million/year**.

In the case of **HT and KD**, Option 1 results in total investment and operational costs for the sector ranging between €1,049 - €2,764 million; Option 2 and Option 3 result in total investment and operational costs for the sector ranging from €562 - €1,350 million. Annual operational costs in the subsequent years are estimated at **€258 – €333 million/year,** compared to current operational costs for HT/KD estimated at €108 million/year (for newly produced pallets only).

Additional costs may derive from transport of WPM to ISPM 15 service providers to perform the treatment; these could however not be quantified, as the extent of the transport is unknown. The investment costs are estimated in the current context and equipment supply conditions; they do not take into account such factors, as the increased availability of equipment suppliers and installed treatment capacity that might lead to cost reductions over time.

In terms of **environmental** impacts, the FCEC estimated the current energy consumption to perform HT of pallets ('baseline': *status quo* – variant A) at 525 million kwH/year and the current CO_2 emissions associated with such activity at 61,000 tons/year (for newly produced pallets only). The introduction of the obligation to perform ISPM 15 would result in additional energy consumption of 363 million kwH (in the case of variant B), and in annual additional consumption of 1,763 million kwH for HT and 4,971 million kwH for HT/KD (Options 1-3 in the years after 2015). In the case of Option 1, the additional energy consumption in 2015 to treat all the pallets circulating would be in the range of 3,091 million kwH to 4,505 million kwH in the case of HT only, and in the range of 6,443 million kwH to 7,587 million kwH in the case of HT/KD. Additional annual CO_2 emissions associated with the treatment of pallets are estimated at 42,000 tons/year in the case of variant B, and at 204,00 tons/year (HT) to 575,000 tons/year (HT/KD) in the case of Options 1-3 (in the years following 2015), i.e. an additional 40% and 2.3 to 8.4 fold increase from the baseline scenario respectively. In the case of Option 1, the additional CO_2 emissions in 2015 to treat all pallets circulating would be in the range of 358,000 tons – 521,000 tons in the case of HT only, and in the range of 746,000 tons – 909,000 tons in the case of HT/KD. Additional potential carbon emissions may derive from transport of WPM to ISPM 15 service providers to perform the treatment, but as explained above, these could not be quantified.

These environmental impacts have, however, to be balanced against the high environmental benefits of the ISPM15 measures. An indication of this value is the carbon stock of the pinewood forests protected, which is estimated at ~5billion tons of CO_2 in the EU 27 pinewood forests. It is noted that the infestation of forests from HOs in other parts of the world has led to a change in the function of forests, turning them from a net carbon sink to a net carbon source. Potential effects of PWN

[25] DAs in France (Aquitaine), Germany (Bavaria) and Spain (Galicia), the whole territory of Latvia.

extrapolated on this basis could lead to CO_2 emissions of infested pine forests in the EU27 estimated at roughly ~562 million tons over twenty years[26].

In terms of the **feasibility of the investment for individual operators**, the analysis of the NPV of the investment suggests that economies of scale operate and the investment breaks even at a minimum price premium/pallet required to cover costs, estimated at €0.2 to €0.6/pallet pallet in the case of HT only and €0.7 to €1.5/ in the case of HT/KD. Where in the range an operator falls depends on the scale of the enterprise, with microenterprises needing to achieve the top value of this range to justify the investment, but medium size and large size enterprises needing to achieve close to the lower value. This price premium differential provides a competitive advantage to larger enterprises performing the investment.

The WPM sector is characterised by a high presence of micro and small enterprises and has been consolidating in recent years, with increasing concentration of production in larger enterprises. The above results suggest that the introduction of ISPM15 would further favour this process, with microenterprises (less than 10 employees) particularly disadvantaged by the new rules[27]. This has however to be read against the scenario of non intervention, potentially leading to the destruction of the forestry resource base that forms the basis of this economic activity. In particular, the economic impact of Option 4 (total deregulation) **in absence of regulatory control measures** indicates that **the total potential impact of PWN on EU 27 forests is estimated €39 – €49 billion**.

The above analysis also applies to repairers, where the scale of operators of a part of this sector is even lower, given the low skills and low level of capital required for entry to the sector. The introduction of the obligation to carry out HT on repaired pallets would negatively affect the sector, which suggests strongly that the introduction of the obligation would lead to significant business closures, leading most likely to restructuring of the sector. In addition, the fragmented structure of the sector is expected to raise difficulties in terms of enforcement. In the case of introduction of the obligation to repair with HT wood, training for small repairers would be needed to ensure correct application of the regulation.

In the case of the new MS, these difficulties are expected to be compounded given that the WPM sector is even more dispersed and is not represented in any form in a national or European professional organisation.

In terms of impacts on **employment**, the above analysis suggests that the extension of the obligation to perform HT may result in business closures for small companies, especially repairers, and a potential consequent loss of jobs, estimated at ~1,440 to ~7,200 jobs[28]. These impacts have to be counterbalanced by the potential job creation following the introduction of the measure, estimated at an additional ~890 - ~3,400 (Options 2 and 3, HT only) to ~8,800 FTE jobs (Option 1, HT only), in the sawmilling and WPM sector (although in the case of Option 1 these are for the majority temporary, i.e. related to the treatment of all pallets in the first year of implementation)[29]. Further

[26] Effects of this order of magnitude have been documented in Canada following an outbreak of *Dendroctonus ponderosae*, the Mountain Pine Beetle, in British Columbia (Kurz et al., 2008). The estimates provided have to be read as a rough indication of the potential effect of a similar outbreak in the EU. This having been said, a more precise estimation would require detailed scientific work and therefore this estimate must be treated with considerable caution.

[27] It is noted that the introduction of ISPM 15 in Portugal resulted in the disappearance of 60% of WPM producers, nearly all of which were microenterprises, and the sawmilling sector was also particularly affected. This negative impact has, however, to be considered in the general context of negative impacts on the forestry and the wood processing sector as a whole deriving from PWN presence.

[28] It is not possible to estimate the potential loss of jobs following the introduction of this measure with any degree of certainty; some industry stakeholders suggest that up to 50% of small companies in some MS may have to leave the sector. Considering that the majority of the estimated 7,200 companies operating are microenterprises, a closure of 10% of small enterprises in the EU 27 would result in a potential job loss estimated in a range of 1,440 - 7,200 persons, assuming the average employment in such enterprises ranges between 2 and 10 persons.

[29] Potential additional job creation may derive from the equipment manufacturers sectors supplying kilns to the WPM and sawmilling sector; however, it has not been possible to estimate a potential for this impact.

additional employment could be created at the level of HT/KD equipment production and for the supervision and management of the system but this potential impact has not been possible to estimate.

In terms of **price transmission**, whether individual companies would be able to achieve the price premium indicated above will depend on the competitive conditions in the market and on the bargaining power between operators involved in different elements of the supply chain (i.e. WPM manufacturers/repairers versus logistics companies versus their customers); clearly, the lower the price premium charged, the more competitive WPM operators will be. Given the generally weak bargaining position of **WPM suppliers** vis à vis WPM users in the current market and competition from other materials and new products (e.g. plastics, pallets from recycled plastic), the transfer of this cost to customers is expected to be difficult. Furthermore, the introduction of compulsory treatment of WPM (Options 1-3) would bring a shift in the competitive environment from competition based on quality factors and price level to competition based on price level only (see also below). *A priori* therefore the extent of cost transmission is expected to be low[30].

In any case, the treatment premium represents 2% to 10% of the price of a pallet, and pallet costs represent a relatively small share of transport and distributions costs, therefore the final impact of the increased cost of pallets (due to HT or HT/KD) on the price of the transported goods is expected to be negligible[31].

It is noted, however, that given the variety of product prices within the pallet market[32], single-use pallets will be disproportionately affected (given their significantly lower unit value, treatment costs represent a more important share of the final price, compared to reusable pallets). Similarly, if the rules extend to the treatment of repaired pallets (rather than use of pre-treated wood), reusable repaired pallets will be more disproportionately affected than newly produced and treated pallets. Over time, it is expected that the new rules will provide a further incentive to the industry to recycle pallets for as long as possible and to increase the share of reusable pallets (to the extent possible, as some users tend to favour lower cost single use pallets), therefore reinforcing the trends of recent years to use higher quality, extended life, reusable pallets.

- **Stakeholder and Competent Authorities views**

The **industry (WPM sector)** noted that 3-5 years from announcement of measures will be required for completing the investment needed under Options 2-3, and in the scenario envisaging use of pre-treated wood for the repairs. The adjustment period required for Option 1 is considerably longer, although as noted this option is not considered to be feasible, both by the industry and the CAs. Option 1 would also result in a shortage of pallet supply in the EU market (until all old pallets have been treated). It is noted that a significant part of the capacity required under Option 1 requires the HT of old pallets in a short timeframe. Such pallets would only have a limited use, therefore the investment would not be profitable as the bulk of the total capacity for this purpose would remain idle during the remaining life of the investment. The sector is reported to operate with generally low margins as it faces a number of constraints that affect its competitiveness. A key constraint is the rising price of wood[33], which is the main cost component of WPM production, accounting on average for 70% of total production costs. Stakeholders indicated that in the current economic downturn the

[30] The logistics sector has indicated that the increased costs for purchasing HT pallets is relevant only for the companies directly managing them (i.e.: those that buy the pallets and package goods) and that prices of HT pallets have decreased over time. The freight forwarders' sector (and in general transporters) noted that if the obligation was to be introduced for intra EU trade, it would have a severe impact on this sector, but again, given its more fragmented structure, this is expected to be difficult to pass on to customers. The experience to date in Portugal has indicated that the WPM industry largely had to absorb the cost increase.

[31] The analysis here is based on real price effects; it cannot be excluded, however, depending on the bargaining position of the various players in this market that some suppliers may attempt to justify cost increases on the basis of the new rules.

[32] The price of pallets depends on the type, this can vary from 4 € to 20 € per pallet.

[33] Trends of wood supply are influenced by not only supply constraints (diminishing stocks), but also competition in demand for this raw material from other uses (e.g. biomass), and, as for treated raw material (kiln dried) by the construction sector.

credit availability to invest in non-productive equipment would be low, especially given the caution banks may demonstrate in a period of economic downturn.

The sector notes that, in current market conditions, ISPM 15 pallets can achieve a price premium of €0.5/pallet (HT) and €1 (HT/KD); however, if the ISPM 15 treatment becomes generalised throughout the EU, there are concerns that this price premium will no longer be sustainable, given that HT or HT/KD pallets will be widely on offer[34]. As it stands today, it is generally accepted along the EU27 supply chain that ISPM 15-compliant WPM is sold at an increased sales price given that the supplement allows access to export, although there are indications of a reduction over time of this price premium (also due to increased competition with pallets produced from alternative materials, e.g. plastic). The WPM industry has indicated that the strong bargaining position of some of their bigger customers would not allow them to transfer costs in the case of a generalised introduction of ISPM 15.

As for the repaired pallets, the WPM sector pointed out that currently the implementation of ISPM 15 (2009 rev.) provisions on repaired pallets by MS CAs is not harmonised across the EU[35] and has called for a discussion on this between MS CAs and stakeholders, but also at the level of the EU Standing Committee on Plant Health.

At the level of **sawmillers**, it has not been possible to obtain an estimate from the sector of the time required for the industry to adjust to the increased demand for pre-treated wood for the manufacturing and repair of WPM.

At the level of **HT/KD equipment manufacturers**, this sector indicated that they can relatively readily respond to the increased demand but there are currently at least six months to one year delays to respond; these delays can be expected to be longer in case of a significant increase in demand for kilns.

Although some **MS Competent Authorities** have argued that technically Option 1 in theory represents an optimal scenario, in practice the feasibility of this option remains low when all economic, enforcement, environmental and logistics factors are considered. By contrast, if Options 2 or 3 were to be introduced, all old pallets circulating in the market by 2020 will have been treated when produced, i.e. in the preceding years. In terms of difference between Options 2 and 3, banning the circulation of non compliant ISPM 15 (Option 2) within a fixed deadline would however result in higher feasibility and enforceability of controls after this date for the EU MS CAs.

- **Overall conclusions and recommendations**

As the results of the analysis show, *in the case of an extension of the obligation of ISPM 15 to WPM used for intra-EU trade*, **Options 2 and 3 (without kiln-drying) carry the lowest investment and operational costs** in comparison with Option 1 (kiln-drying may remove the residual risk of cross-pallet infestations while wood is still moist, but the additional costs of kiln-drying are disproportionate). Within Options 2 and 3, the scenarios that would minimise the costs (investment, operational and environmental) for the sector are those whereby repaired pallets are repaired with HT wood (or repaired with HT and then retreated). Options 2 and 3 also lead to investment in capacity that is adjusted to the longer terms needs, whereas Option 1 would lead to overcapacity. Any extension of the requirements for repairers would have to be associated with harmonisation of rules at EU level for this category of pallets, to ensure a playing level field at EU level.

The obligation to comply with ISPM 15 will result in an increase in costs of registration and inspection of operators[36]. Given the higher number of manufacturers and repairers this could result in additional burden for the phytosanitary services of MS, already under resource constraints in many

[34] The price premium and expected trends are in line with figures quoted by logistics representatives, indicating an increase in the price paid for a HT pallet of ca. €0.8-1.2 compared to a non-HT.

[35] Six MS stakeholders that responded to a specific enquiry on this have indicated that rules vary both in terms of the requirements for retreating repaired pallets, and for the multiple marking.

[36] This cost has not been estimated, given the high variation in fees applied at MS level and the frequency of inspections.

EU MS. Current practices differ in the EU MS with regard to fees charged for the service, cost recovery and involvement of stakeholders in the implementation of controls. In some MS the implementation of the system is shared with the industry (with controls performed by third parties), with full cost recovery through fees charged to operators and reduction of costs and burden for the CAs.

F**rom the enforcement point of view Options 2 and 3 would minimise costs** (compared to Option 1), as only places of production/repair would need to be inspected, and not the movement of pallets. However, to overcome any potential for fraud it was suggested that date marking of the pallets could be introduced, to distinguish date of production and treatment.

In terms of the control costs, **as DAs expand, the enforceability of the status quo variant B compared to Options 2 and 3 is expected to diminish**. Under the status quo, in the event of a PWN outbreak, fast implementation of ISPM 15 for all WPM produced in the infested MS will be very difficult, if not impossible. This increases the risk of spread until the measures can be implemented, or could result in significant disruptions to trade. The potential impact therefore, under the status quo could be as devastating as in the case of Portugal, but amplified. By contrast, **in the Options – particularly Options 2 and 3 - the industry is made aware and given time to prepare**.

Considering the results of the analysis, the MS CAs and industry views, the relatively best option is concluded to be Option 3 (in practice identical to Option 2) without kiln drying (although kiln drying may remove the residual risk of cross-pallet infestations while wood is still moist, its additional costs are disproportionate). Also, in view of the changed position of PWN within the EU, the present study recommends the introduction of the obligation for WPM circulating within the EU to be subject to treatment according to ISPM 15, with banning of non compliant newly produced and repaired WPM by 2015.

Impact	**Status quo - variant A** ***(Baseline)***	**Status quo - variant B**	**Option 1**	**Option 2**	**Option 3**	**Option 4** ***(Deregulation: PWN spread to EU27)***
Investment costs (million €)						**Economic impact**
HT		86-143	426 -1,788	112-706	112-706	**Potential loss of EU 27forest stock: €39 – €49 billion**
HT/KD			653-2,156	304-1,017	304-1,017	
Operational costs (million €)						
HT	86/year	35/year	358-521 (to 2015)	95-170/year	95-170/year	
HT/KD	108/year		746-909 (to 2015)	258-333/year	258-333/year	
Energy consumption (million KwH)						
HT	525/year	363/year	3,901-4,505 (to 2015)	1,763/year	1,763/year	
HT/KD	2,521/year		6,443-7,857 (to 2015)	4,971/year	4,971/year	
CO_2 emissions (Thousand tons)						**CO_2 emissions of coniferous forests (Thousand tons)**
HT	61/year	42/year	358-521(to 2015)	204/year	204/year	**562,000 over 20 years**
HT/KD	292/year		746-909(to 2015)	575/year	575/year	

Impact	Status quo - variant A *(Baseline)*	Status quo - variant B	Option 1	Option 2	Option 3	Option 4 *(Deregulation: PWN spread to EU27)*
Employment						
			Job losses: ~1,440 - ~7,200			**Job losses**
HT	(Current number of enterprises: 7,200; employees: 80,000 – 300,000)		Job creation: 3,414-8,806 (*although mostly temporary*)	Job creation: 887-3,397	Job creation: 887-3,397	**80,000 – 300,000 (WPM sector)**
HT/KD			4,943-10,335 (*although mostly temporary*)	2,133-4,643	2,133-4,643	

Notes:
- Costs for the options are additional to the baseline (Status quo – variant A);
- The range of values for investment costs presents costs at low and high investment costs (at normal use of kilns);
- Operational costs, energy consumption and CO_2 emissions in Option 1 after 2015 are equal to those of Options 2 and 3.

Part I: Economic, environmental and social impacts of potential changes of legislation concerning ISPM 15 within the EU

1 Introduction

1.1 Background and objectives

This study was launched by DG SANCO to assess the economic, environmental and social impacts of introducing mandatory treatment requirements for wood packaging material (WPM) circulating inside the European Union (EU). In particular this study aims to investigate the impacts of introducing legal requirements to implement FAO International Standard for Phytosanitary Measures (ISPM) 15 for WPM circulating inside the EU, using different options and transitional periods. The purpose of the present study is to provide economic data on impacts of various options aimed at revising the requirements for the movement of WPM within the EU. These data will form part of the analytical and descriptive inputs necessary for DG SANCO to complete its impact assessment and to fill existing knowledge gaps in this area.

The obligation to implement ISPM 15 for WPM is currently in place in the EU only for imports into the EU and for movements out of Pinewood Nematode (PWN) outbreak areas[37]. At the Council meeting in December 2009, the Chief Plant Health Officers of the Member States (MS) stressed the need for implementation of ISPM 15 requirements on WPM for all intra-EU trade and asked the European Commission (COM) to initiate the process by performing an impact study.

Decision 2006/133/EC[38] has been reviewed and will be repealed and replaced by emergency measures addressed to all MS[39]. In view of the changed status of PWN as an EU quarantine organism present in part of its territory, the European Commission is reflecting on the possibility of introducing a legal provision under Directive 2000/29/EC requiring that movements of WPM produced inside the EU should be prohibited unless such WPM has been subjected to the measures required under ISPM 15.

The potential extension of the ISPM 15 requirement to the entire EU territory required an assessment of the economic, social and environmental implications. These include in particular the need for investment in heat treatment (HT) capacity (and kiln drying (KD) systems), the knock-on effects including potential disruptions in the supply chain given the widespread use of WPM in internal and international trade, and the increased energy usage and associated environmental impacts (e.g. CO_2 emissions).

Impacts at various stages of the supply chain have been investigated, as well as the potential timeframe for the introduction of such a requirement. Social impacts such as potential job losses and the impact on small enterprises in particular, as well as the costs for the Competent Authorities (CAs) to carry out controls of WPM and inspections of HT facilities are additional aspects included in the analysis.

[37] Most third countries also require compliance with ISPM 15 for exports from the EU.

[38] Commission Decision of 13 February 2006 requiring Member States temporarily to take additional measures against the dissemination of *Bursaphelenchus xylophilus* (Steiner et Buhrer) Nickle *et al.* (the pine wood nematode) as regards areas in Portugal, other than those in which it is known not to occur.

[39] The adoption and publication of revised emergency measures for PWN is foreseen for the autumn of 2012 (the proposal was voted in June 2012).

The above potential costs have been weighed against the potential benefits in terms of preventing the risk of spread of PWN. In economic terms benefits extend over the commercial value and economic weight of the forestry, wood/wood products, WPM manufacturing and WPM user sectors. In the case of forestry, the economic value of the sector includes the recreational value of forests, while environmental benefits cover biodiversity and carbon sequestration aspects.

This report is structured as follows:

- In **Part I**, we present the results of the analysis for the various options and the assumptions on which the analysis is based;
- In **Part II**, we provide a description of the EU27 Wood Packaging Material sector, the heat treatment capacity, and the other relevant sectors. This provides the background for the development of the assumptions used in the FCEC analytical model.

1.2 Options analysed and approach

The study analysed the potential economic, environmental and social impacts of amendments to the legislation related to the obligation of ISPM 15 requirements for WPM, with the following specifications and timelines for implementation:

	ISPM No. 15 requirement on:			
	TCs	**Demarcated areas of affected MS**	**Whole EU**	
			New/repaired WPM	**Old WPM**
Baseline ('Status quo'):				
Variant A: Current extent of outbreaks (PT)		2012		
Variant B: Outbreaks in DE, ES, FR, LV (1 large outbreak in each MS)		2012		
Options:				
1. Mandatory implementation of ISPM No. 15 inside the EU, with a short transitional period for old pallets			As from January **2015**	As from January **2015**
2. Mandatory implementation of ISPM No. 15 inside the EU, with a long transitional period for old pallets			As from January **2015**	As from January **2020**
3. Mandatory implementation of ISPM No. 15 inside the EU for new and repaired pallets			As from January **2015**	
4. Repeal of ISPM No. 15 requirements at import and as concerns movements out of demarcated areas				

Timeline: The baseline is 2012, the adoption of the measures is assumed for 2013, and the introduction of the measures is dependent on the options as presented above. This implies that if measures are adopted in the course of 2013, this provides a transitional period of 1-2 years under Options 1-3 for new and repaired WPM (also for old WPM under Option 1), and of 6-7 years for old WPM under Option 2.

In the *status quo* scenario, variant B is intended to estimate the costs and impacts related to the extension of current measures (currently only being applied in Portugal) in the hypothetical event of significant outbreaks occurring in four selected MS (Spain, Latvia, France, Germany), and to estimate how the balance of costs changes among MS once the situation in the EU becomes significantly more serious than having PWN affecting Portugal only. The assumptions for this variant B scenario are that PWN spreads from Portugal to the selected MS through the main transport paths from Portugal and that in the selected MS there are small infested areas where eradication measures and regular surveys take place, whereas the wider areas, as identified below, are Demarcated Zones where ISPM 15 requirements are applied.

The variant B looks at fairly major outbreaks of PWN, the hypothetical scenarios considered were the following:

- ES: current situation, two isolated outbreaks (Galicia and Extremadura) where Spain is currently applying eradication measures;
- LV: the whole country (is a demarcated zone);
- DE: Bavaria is the demarcated zone;
- FR: Aquitaine is the demarcated zone.

The FCEC methodology was based on a **four step approach** for the analysis of impacts under the status quo and the Options, based on an analytical model specifically developed for this project, and a range of underlying assumptions based on available literature and our findings from data collection and consultation with MS CAs and the EU sawmilling, WPM manufacturing and WPM user sectors. The study relied on extensive **stakeholder consultation**; data, underlining assumptions and results have been shared and validated by stakeholders throughout all the stages of the study.

It is also noted that extensive sensitivity analysis has been carried out to validate the range of parameters used, while the model assumptions can be adjusted to take into account new evidence coming into light.

In particular, the four steps of the impact analysis were as follows:

Step 1: to estimate the current production and circulation of pallets in the EU27, and to estimate the current HT capacity at WPM manufacturing and sawmilling level;

Step 2: to estimate the additional capacity required for the treatment of the various types (new, repaired, old) pallets, as required under the different scenarios;

Step 3: to estimate the total costs for the sector to invest in the required additional capacity, the operational costs, the energy consumption and the CO_2 emissions;

Step 4: to calculate the Net Present Value (NPV) of the investment at enterprise level, to assess the profitability of the investment and the cost for operators over the lifetime of the investment.

2 Analysis of Status quo

2.1 Status quo – variant A

The status quo constitutes the baseline of the analysis and considers the costs currently borne by the industry and the CAs in the MS where outbreaks of PWN have occurred, and the costs borne by CAs in the other MS. Eradication costs are not included in the following analysis.

Table 1 Status quo - Industry and CA's costs

	Costs (€)	Recurrence of costs
Portugal – Industry		
Investment in equipment (200 kilns) for the treatment of 30 million pallets	80,000,000	2009-2012
Portugal – CA		
Controls of plants for the HT of wood and pallets	218,000	Annual
Costs related to the implementation of ISPM 15 are supported by the CAs but were not estimated.	*n.a.*	
Road controls	538,000	Annual
Spain – CA		
Inspections and sampling in industries	140,274	Annual
Road controls[40]	47,259	Annual
Analyses in laboratories	11,033	Annual
Implementation of ISPM 15 in 2011	600,000	Annual
EU MS CAs *(excluding PT and ES)*		
Control costs for PWN (12 MS)	*925,000*	*Annual*
Total annual costs	~2,479,566	
Total costs	**~82,479,566**	

Source: FCEC based on survey and consultations

In Portugal, the industry needed to treat 30 million pallets per year, which required an investment cost €80 million to install 200 kilns (source: AIMMP). The industry reported that the WPM sector was the main affected, with 95% of the kilns installed at this level. The major impact was registered on small operators, with a large number of them leaving the sector and leading to further concentration of the WPM sector in the country. In addition, there are annual operational costs for the sector for the treatment of WPM (labour, energy), which are not included in this estimate.

The Competent Authority (central and the regional services of agriculture) are carrying out official controls, performed on a regular basis in all heat treatment registered plants, and focuses on all aspects related to the heat treatment, namely:

- Validity of the reports of the chamber (temperature homogeneity) and probes calibration;
- Stacking rules;
- Correct placement of probes;
- Correction of set point, if applicable;
- Automatic temperature registration (4 probes records every 2 minutes) in order to control of temperature profiles and duration of heat treatment;

[40] This figure does not include costs of SEPRONA and Guardia Civil that collaborate in the checks (i.e. to stop trucks, for which phytosanitary inspectors have no power).

- Correct ISPM 15 marking or plant passport issuing.

Additionally to these routine controls, audits to heat treatment plants are performed at least once a year and random samples are collected from treated WPM to verify the efficacy of the heat treatment. Based in the calculated costs for 2010, the CA indicated that a total amount of **€218,000** was allocated to these controls performed by the official services. In addition, road controls are performed every week mainly along the border with Spain by the Guardia Nacional Republicana. In 2010 the total amount allocated to these actions was **€538,000.**

It is also noted that the status quo should indeed also reflect the current situation in Spain, where in the DAs the same rules applying in Portugal are currently established by the CA. Currently there are three Demarcated Areas in Spain corresponding to outbreaks of *Bursaphelenchus xylophilus*: one is in Galicia (outbreak in 2010), two in Extremadura (a first outbreak in 2008, the second in 2012). In the DAs in Spain the same obligations as applied in Portugal are put in place in relation to movement of susceptible wood and wood packaging material (WPM) from DAs (all the WPM going out from the DA has to be HT and the wood has to carry a Plant Passport), as agreed in the Standing Committee for Plant Health when the first outbreak of PWN occurred in Spain.

The number of enterprises in the DAs (sawmillers and WPM producers) is as follows:

Demarcated Area	**Number of authorised enterprises**	**Number of enterprises to whom licence was withdrawn[41]**
Galicia	13	3
Extremadura	1	2

According to the stakeholders consulted[42], in the Demarcated Area in Galicia there are 20 sawmillers. Of these, only 5 have the equipment in place to perform HT. This number has not changed since the demarcation of the area, i.e. none of the sawmillers in the DA has made the required investment (there were 5 sawmillers with HT capacity before the DA, there are 5 now). Those that are not able to HT have in most of the cases ceased their activity, whereas for those remaining in activity the five equipped companies provide the service at a 'solidarity cost' on an exceptional basis, as the situation (the obligation to HT) is considered temporary. Otherwise, these sawmillers would not be able to install the kilns.

The measures foreseen in Decision 2006/133/CE are also more stringent in relation to controls of the enterprises performing the treatment in the DAs. The Decision (Annex, second paragraph) foresees official continuous controls of the establishments at the time when the HT is performed ('*Official inspections of the authorised processing plants shall be carried out on a continuous basis to verify the effectiveness of the treatment as well as the traceability of the wood')*. In the DAs in Spain the inspectors are called to check that the HT has taken place and its efficacy at any time a treatment of wood/WPM is performed. Spain has in place a very strict system of controls at the following points:

- Forest;
- Wood industry (sawmillers and WPM): a census of sawmillers and wood industries has been established at the level of the Autonomous Region and controls are carried out on

[41] The CA notes that the COM Decision 2006/133/EC has more stringent requirements than the ISPM 15 standard, as the ISPM 15 allows enterprises to produce from treated wood or to subcontract the service of ISPM 15, whereas according to the COM Decision, enterprises in the DAs are only allowed to produce compliant WPM if they have the facilities for treatment installed at their premises. The enterprises in the third column are falling in this typology and therefore they lost their licence; as a consequence they went out of sawmilling or production of WPM.

[42] CEARMADERA.

the basis of their location in relation to the DA, and on the basis of notifications these sent on consignment of wood or other sensitive material from DAs;

- Road transport;
- Borders.

The costs of these controls for the year 2011 came to **€198,556**, of which 71% (€140,274) was for inspections and sampling in industries, 24% for road controls (€47,259)[43] and 5% for analyses in laboratories (€11,033). Costs for the implementation of ISPM 15 in 2011 came to €600,000. These costs have been stable in the past 3 years, with changes mainly due to the number of samples; they may decrease in the future.

In addition, the Competent Authorities of the EU 27 MS carry out control costs at various levels, although they have not always been able to quantify the amount spent, 12 MS indicated their annual costs at **~€925,000**.

[43] This figure does not include costs of SEPRONA and Guardia Civil that collaborate in the checks (i.e. to stop trucks, for which phytosanitary inspectors have no power).

Part I: Analysis of Options

3 Impact on the WPM and sawmilling sectors (Options 1, 2, 3)

In this section, the impact on this sector is examined first in terms of the additional HT/KD capacity required under Options 1-3, and the costs involved; an assessment of the impacts on employment and the microenterprises/SMEs is also provided.

Further discussion of the impacts of the options on CAs, others sectors and of the advantages/disadvantages of the options compared to the status quo is provided in the following sections.

3.1 Analysis of the additional HT/KD capacity needed

3.1.1 Estimates of additional capacity needed

The **first step** of the FCEC analysis has been to estimate the current production and circulation of pallets in the EU27, and to estimate the current HT capacity at WPM manufacturing and sawmilling level. This has been done through desk research and consultation with the sectors concerned (sectors, interviews, focus groups) and with the MS CAs (survey, interviews). Detailed discussion on these results is presented in section 7.4. As it was not possible to establish the current existing capacity at sawmilling level, the analysis of this sector has been based on extrapolations of findings from the WPM sector[44].

It is noted that the production of pallets and WPM in any given year is strongly correlated with the economic activity level, and in particular that of the main sectors using WPM: in Spain, for instance, the production of pallets reached its peak volume in 2007 (59 million) and it has decreased in the following years to 33 million in 2009 (source: INE). This implies that any change in the economic outlook would impact on the volume of WPM produced.

In particular, it is important to bear in mind the difference between theoretical and available capacity for HT/KD, in conjunction with both the fluctuating annual production of WPM as influenced by the general economic climate (given that demand for HT/KD wood may come from a range of sectors of economic activity). The economic outlook affects both the total number of pallets demanded by the industry (thereby increasing the total number of pallets used and requiring treatment), and the demand of certain user sectors (e.g. construction), which in turn also affects the kiln capacity required by the woodworking sector (sawmilling) to dry wood to respond to this demand.

The table below summarises these key findings, which constitute the baseline for our analysis.

Table 2 Baseline data for the analysis

Total production (upper end)	~527 million
Total new production HT (including potential spare capacity of Italy)	~325 million
Total new production HT/KD	~218.5 million
Circulating pallets	~2.4 billion
Repaired pallets	~818 million

The **second step** of the FCEC analysis has been to estimate the additional capacity required for the treatment of the various types (new, repaired, old) pallets, as required under the different scenarios. This has been based on the current HT capacity at the level of WPM

[44] A review of existing literature indicates that, due to lack of data, this approach tends to be followed by available studies in this sector.

sector, and certain assumptions regarding the structure of the production and the rate of use of the kiln capacity which have been developed on the basis of consultation of equipment manufacturers and WPM industry. The difference between HT and HT/KD is estimated on the basis of the different lengths of cycle required by the two processes (whether HT or KD or both HT+KD), which in the analysis is reflected in a lower number of working days for HT/KD. This issue is discussed further in section 3.3.2.

Table 3 Treatment capacity of kilns to perform HT and HT/KD treatment

Kiln capacity (annual treatment of pallets), by size of kiln ***(it is assumed it corresponds to size of enterprise)***	**Capacity/day**	**Capacity/year Normal use (220 working days)**	**Capacity/year Intensive use (340 working days)**
HT		*220*	*340*
Large	2,500	550,000	850,000
Medium	1,000	220,000	340,000
Small	200	44,000	68,000
	Capacity/day	**Capacity/year Normal use (100 working days)**	**Capacity/year Intensive use (150 working days)**
HT/KD		*100*	*150*
Large	2,500	250,000	375,000
Medium	1,000	100,000	150,000
Small	200	20,000	30,000

The total number of kilns required for the treatment of the residual number of newly produced pallets has been estimated as presented in the following tables. It is assumed that the investment will take place at WPM level. Whether some of the treatment will be carried out on the wood at sawmiller level for sale to WPM assemblers for assembly into pallets, cannot be estimated at any level of precision at EU level, due to lack of data on the proportion of pallet production that is assembled from HT wood (the limited data available suggests that this is generally relatively low, e.g. in Italy, ~90% of the newly produced HT pallets are produced at manufacturing level, with the remaining being assembled from pre-treated wood[45]). In Portugal the investments had to be made at the level of WPM manufacturers in 95% of cases (source: AIMMP).

As discussed in the sections below, however, it is likely that not all the small producers will be able to invest in the required kiln capacity, and that they will either go out of business, or buy pre-treated wood to produce WPM. On the basis of findings of case study in Italy, it is assumed that:

- 25% of the small producers will invest in the equipment;
- 75% will buy pre-treated wood.

The total volume of pallets that is estimated to be produced by small companies is therefore split, and the potential impact on sawmillers is estimated. Considering that medium chamber of treatment of wood would be 45 m^3 (corresponding to ~1,000 pallets), the number of additional kilns required to the sawmilling sector for the supply of HT wood is also estimated.

Note: the total number of kilns required for the treatment of the proportion produced at small size level is presented in the table concerning the WPM sector, therefore the kilns needed at WPM and sawmilling level should not be added.

[45] Source: CONLEGNO, 2011.

3.1.1.1 New production

Table 4 Estimates of the additional kilns required for the treatment of newly produced pallets (EU 27)

HT only			
Current production of HT pallets **(NEW)**		324,882,324	
Residual production to be treated **(NEW)**		202,107,054	
	% of output produced	**Production by size**	
Large enterprises	*50%*	101,053,527	
Medium enterprises	*30%*	60,632,116	
Small enterprises	*20%*	40,421,411	
		Normal use (220 cycles/year)	**Intensive use (340 cycles/year)**
Number of kilns large		184	119
Number of kilns medium		276	178
Number of kilns small		919	594
Total number of additional kilns for new production		**1,378**	**892**

Source: FCEC analysis

HT/KD			
Current production of HT/KD pallets **(NEW)**		218,550,066	
Residual production to be treated **(NEW)**		308,439,312	
	% of output produced	**Production by size**	
Large enterprises	*50%*	154,219,656	
Medium enterprises	*30%*	92,531,794	
Small enterprises	*20%*	61,687,862	
		Normal use (100 cycles/year)	**Intensive use (150 cycles/year)**
Number of kilns large		617	411
Number of kilns medium		925	617
Number of kilns small		3,084	2,056
Total number of additional kilns for new production		**4,627**	**3,084**

Source: FCEC analysis

Table 5 Estimates of the additional kilns required for the supply of HT wood to the WPM sector (EU 27)

Heat treated wood (m^3/pallet)	**0.031**	**0.045**
Supply for new production (75% of production of small producers) - HT	939,798	1,364,223
Supply for new production (75% of production of small producers) – HT/KD	1,434,243	2,081,965
Number of kilns		
Average size of a chamber (m^3)	45	
No. of working days	220	
Additional kilns required - HT	**95**	**138**
Additional kilns required – HT/KD	**145**	**210**

Source: FCEC analysis

3.1.1.2 Repaired pallets

As for repaired pallets, the additional capacity required will depend on the implementation of ISPM 15 revision of 2009 by MS CAs. The industry has pointed out that currently the implementation of ISPM 2009 provisions on repaired pallets by MS CAs is not harmonised across the EU. Six MS stakeholders that responded to a specific enquiry on this have indicated that rules vary both in terms of the requirements for retreating repaired pallets, and for the multiple marking. In particular, there are two ways this is implemented:

1. In case repair with HT material is the rule adopted in the MS without need for retreatment of the pallet, this would have an impact on the volume of HT raw material in demand from sawmillers, and therefore would impact on the number of kilns needed upstream on the chain, i.e. at the level of the sawmilling sector;
2. In case repair requires retreatment of the pallet, this will impact on the number of kilns needed to perform the treatment at repairers' level.

The analysis was conducted for three scenarios, which vary depending on the approach taken for the treatment of repaired pallets. As for the first point, this study found that is actually commercially not viable to repair more than one third of the pallet (and indeed not more than 15-20% of the pallet[46]), whereas the latter is important in terms of ensuing traceability. The industry has called for a discussion on this between MS CAs and the stakeholders, but also at the level of the EU Standing Committee on Plant Health.

On the basis of the current significant differences in practice regarding the treatment of repaired pallets, the FCEC has developed three scenarios which capture the range of potential situation that can prevail:

- Scenario 1: 100% of repaired pallets are to be retreated:
  - Scenario 1.a: assuming that old pallets circulating are treated and those repaired during the year are retreated;
  - Scenario 1.b: assuming that old pallets to be repaired during the year will be treated only once at the point of repair;
- Scenario 2: Two thirds of the total (yearly estimated) repaired pallets are repaired with HT wood and one third of the total (yearly estimated) repaired pallets is retreated.
- Scenario 3: 100% of repaired pallets are repaired with HT wood.

The 'average' repair constitutes around 10% of a pallet; this was reported in Moore (2011) for the UK and from the case study in Italy. The two sources however differ for what concerns the quantity of material used both for new and repaired pallets, as shown in the table below:

Repair: 10% volume of a pallet			
UK Wood Packaging Study (Moore, 2011)		Italy case study (CONLEGNO)	
Pallet production	0.031 m^3	1 EPAL pallet	0.045 m^3
0.0031 m^3 /pallet		0.0045 m^3 /pallet	

Therefore the analysis considers the range provided by these two sources: 0.0031-0.0045 m^3/pallet. On this basis, the number of pallets estimated to be repaired yearly is calculated as follows:

[46] 4-5 components over a total of 26 components of a 4-way pallet.

Table 6 Estimated of number of repaired pallets

Number of circulating pallets	*% of reusable pallets*[47]	*Rate of repair/year*[47]	*Number of repaired pallets/year*	*Volume of HT wood for repair (m3)*
2,371,452,200	*69%*	*0.5 (i.e. once/2 years)*	*818,151,009*	*2,536,268 to 3,681,680*

Source: FCEC analysis

Therefore, by combining these figures, the following estimates can be provided:

1. Volume of HT wood for the repair of pallets: 2,536,268 -3,681,680 m^3 or
2. Number of pallets to be retreated: 818,151,009.

The analysis in the case of repaired pallets indicates the number of kilns that would be required, based on medium capacity kilns, depending on the manner of implementation of ISPM for repaired pallets.

Table 7 Estimates of the additional kilns required for the treatment of repaired pallets (EU 27) – WPM sector (repaired pallets are treated) (scenario 1) and (scenario 2)

Treatment of repaired pallets	**No. of repaired pallets (100% treated)**			**No. of repaired pallets (one third treated)**		
	818,151,009	**Normal use**	**Intensive use**	272,717,003	**Normal use**	**Intensive use**
Total number of additional kilns for Repaired (*medium size*)		**3,719**	**2,406**		**1,240**	**802**

Source: FCEC analysis

This is a theoretical figure, as in practice the majority of the repairing activity is taking place at the level of very small recoverers/repairers with no current HT capacity and in most cases it is doubtful that they will be able to invest in acquiring the HT equipment. For example, even in one of the most regulated MS (Sweden), out of 50 repair companies, 4-5 only currently have a kiln for HT, and in Italy, out of the registered enterprises for ISPM 15, only 9 are repairers.

On the basis of the same size of kilns as for the treatment of pallets, and considering that a medium chamber of treatment of wood would be 45 m^3 (corresponding to ~1,000 pallets), the number of additional kilns required to the sawmilling sector for the supply of HT wood is estimated as follows:

[47] Source: FCEC survey and consultation with WPM sector. See section 7.3.1.

Table 8 Estimates of the additional kilns required for the supply of HT wood for repair of pallets (EU 27) - sawmilling sector (scenario 2 and scenario 3)

HT Wood for repair (m^3)	2,536,268	3,681,680
Number of kilns		
Average size of a chamber (m^3)	45	
No. of working days	220	
Repair (100%)	**256**	**372**
Repair (67%)	**171**	**248**

Source: FCEC analysis

These results apply both to the scenario with HT only and with HT/KD, as it is assumed that the treatment of repaired and old pallets would not require KD, as the moisture content of these typologies of pallets reduces with time and the KD would therefore not be required.

3.1.1.3 Old pallets

For the estimate of 'old' pallets, we consider *all remaining untreated pallets circulating in a given year, i.e. excluding the new production of pallets in that year and pallets treated in previous years.*

On the basis of the information collected through the survey, we estimated the treated pallets in circulation in years n and n-, as follows:

New production of pallets treated (year n-)		*New production of pallets treated ('intensified') (year n)*	*% of HT pallets (production of previous years) that stay in circulation (i.e. reusable not exported)*	
			< n+1	*> n+1*
HT	*303,882,324*	*340,882,324*	*40%*	*60%*
HT/KD	*218,550,066*			

Source: FCEC analysis

Where:

- n+1: is the year of introduction of the new requirements on ISPM 15;
- n and n-: is the year/s before the introduction of the new requirements on ISPM 15.

On this basis, the total additional kiln capacity that will be needed is estimated as follows:

- **Option 1** (old pallets to be treated by 2015):

- Scenario 1.a: ~1.6 billion pallets, assuming that old pallets circulating are treated and those repaired during the year are retreated: this would require an additional 4,666 – 7,212 kilns of medium capacity (in the scenario where the new production is HT only), and 4,911 to 7,589 (in the scenario where the new production is HT/KD);
- Scenario 1.b: ~770 - ~850 million pallets, assuming that old pallets to be repaired during the year will be treated only once at the point of repair: this would require an additional 2,260 – 3,493 kilns of medium capacity (in the scenario where the new production is HT only), and 2,504 to 3,870 (in the scenario where the new production is HT/KD).

Table 9 Estimates of the additional kilns required for the treatment of circulating pallets (EU 27)

	No. of circulating pallets (HT)		**No. of circulating pallets (HT/KD)**	
Treatment of circulating pallets (OLD) – Scenario 1.a	1,586,556,963		1,669,622,769	
	Normal use	Intensive use	Normal use	Intensive use
Total number of additional kilns for circulating (*medium size*)	**7,212**	**4,666**	**7,589**	**4,911**
	No. of circulating pallets (HT)		**No. of circulating pallets (HT/KD)**	
Treatment of circulating pallets (OLD) – Scenario 1.b	768,405,954		851,471,760	
	Normal use	Intensive use	Normal use	Intensive use
Total number of additional kilns for circulating (*medium size*)	**3,493**	**2,260**	**3,870**	**2,504**

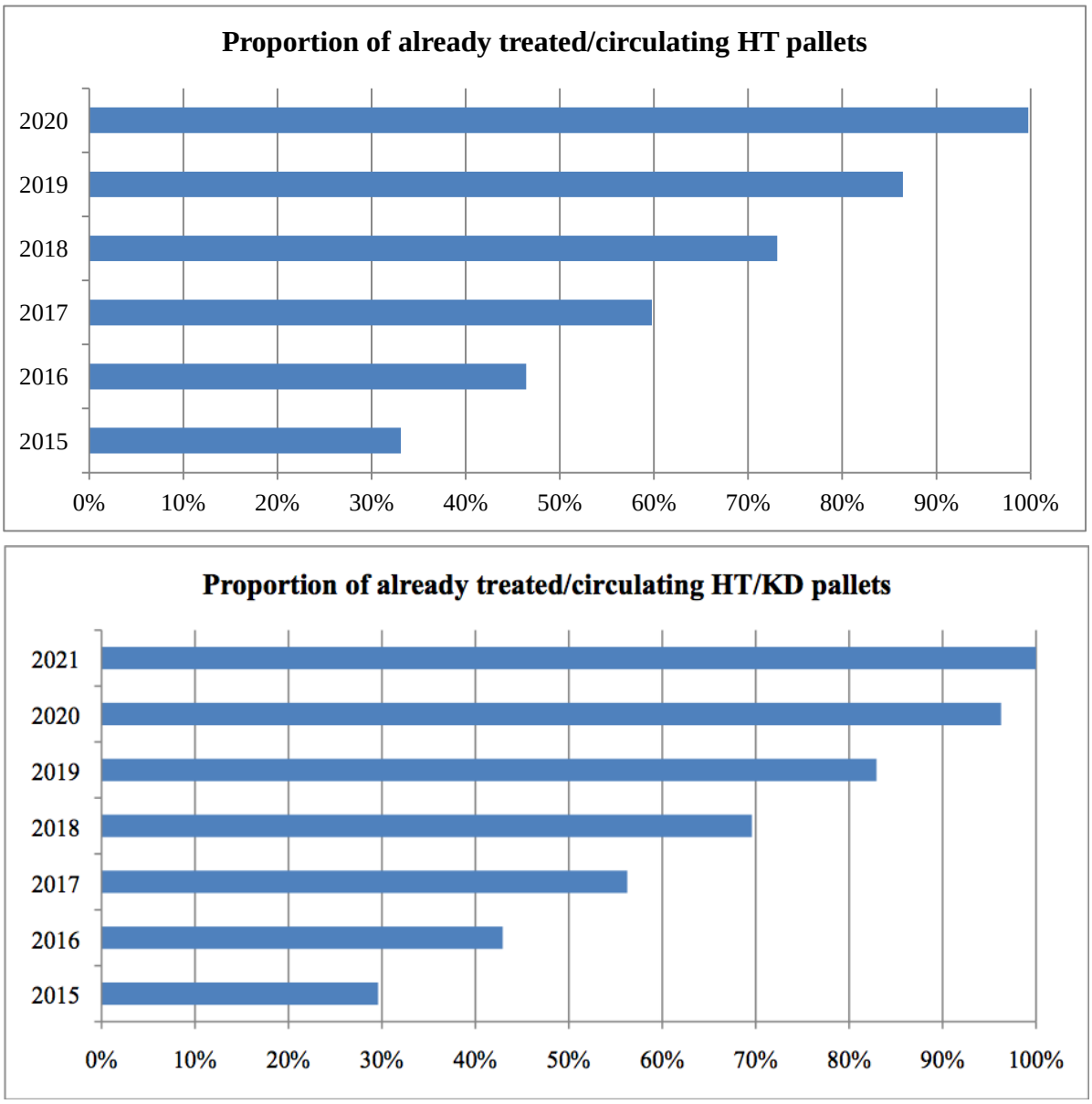
Source: FCEC analysis

- **Option 2** (old pallets to be treated by 2020):

  Given that all newly produced pallets will systematically be treated starting from 2015, our estimations conclude that by 2020, there will be no untreated 'old' pallets circulating in the EU. This progressive disappearance of 'old' untreated pallets from the circulation is shown in the graph below. As for the scenario with requirement of the KD treatment in addition to the HT, given that the number of HT/KD is lower in the year n, it would take one more year for old pallets to disappear (96% in 2020); however, given that in the years before introduction of the requirement the number of HT/KD pallets may increase, this would effectively result in a quicker disappearance of the non treated pallets.

  If it is assumed that repaired pallets are ISPM 15 compliant if repaired with HT wood, the volume of pallets ISPM 15 compliant every year is given by the sum of newly produced and repaired pallets. Thus, the stock of 'old' pallets to be treated decreases every year by this amount. Therefore, although the overlap between Option 2 and 3 may appear inconsistent given the average lifespan of pallets within closed pallet pools (~15 years), it still holds valid when using the definition of 'repaired' as above. *De facto*, therefore there will be no pallets circulating that have not been treated or repaired according to ISPM 15 within five years of the introduction of the rule for new and repaired pallets (at current volumes of production and circulation).

Figure 1 Proportion of already treated/circulating pallets



Source: FCEC analysis

Table 10 Estimated number of pallets to be treated under the different options

100% repaired pallets are treated	2015	2016
Status quo (variant A)	40,000,000	40,000,000
Status quo (variant B)	210,190,331	210,190,331
Option 1 - HT	2,931,697,349	1,345,140,387
Option 1 - HT/KD	3,014,763,156	1,345,140,387
Option 2 (HT and HT/KD)	1,345,140,387	1,345,140,387
Option 3 (HT and HT/KD)	1,345,140,387	1,345,140,387
100% pallets repaired with HT wood	**2015**	**2016**
Status quo (variant A)	40,000,000	40,000,000
Status quo (variant B)	210,190,331	210,190,331
Option 1 - HT	2,113,546,340	526,989,378
Option 1 - HT/KD	2,196,612,147	526,989,378
Option 2 (HT and HT/KD)	526,989,378	526,989,378
Option 3 (HT and HT/KD)	526,989,378	526,989,378
2/3 pallets repaired with HT and 1/3 treated	**2015**	**2016**
Status quo (variant A)	40,000,000	40,000,000
Status quo (variant B)	210,190,331	210,190,331
Option 1 - HT	2,386,263,343	799,706,381
Option 1 - HT/KD	2,469,329,150	799,706,381
Option 2 (HT and HT/KD)	799,706,381	799,706,381
Option 3 (HT and HT/KD)	799,706,381	799,706,381

Source: FCEC analysis

3.1.2 Summary of results for each option: additional kiln capacity

On the basis of the above assumptions and analysis for newly produced, repaired and 'old' pallets, the following conclusions can be reached on the total additional kiln capacity required under each Option.

Table 11 Estimates of the additional kilns required, under each category of pallets and each Option (EU 27)

	Newly produced		Repaired (100% of pallets repaired are treated)	Repaired (1/3 of pallets repaired are treated, 2/3 are repaired with HT wood)	Repaired (100% of pallets are repaired with HT wood)	'Old'	
	HT	**HT/KD**	**HT and HT/KD**			**HT**	**HT/KD**
Option 1	*892 – 1,378*	*3,084 – 4, 627*	*2,406 – 3,719*	*802 – 1,240*		*1.a: 4, 666 – 7,212* *1.b: 2,260 – 3,493*	*1.a: 4,911 – 7, 859* *1.b: 2,504 – 3,870*
Option 2	*892 – 1,378*	*3,084 – 4, 627*	*2,406 – 3,719*	*802 – 1,240*			
Option 3	*892 – 1,378*	*3,084 – 4, 627*	*2,406 – 3,719*	*802 – 1,240*			
Sawmilling sector	*95 - 138*	*145 - 210*		*171 - 248*	*256 - 372*		

Source: FCEC analysis

3.2 Analysis of costs of investment and operational costs for HT/KD

3.2.1 Estimate of total investment costs for the EU 27

The **third step** of this analysis has been to estimate the total costs for the sector to invest in the required additional capacity, as well as to estimate the annual operational costs for the treatment of the number of pallets in each of the scenarios. This has been done on the basis of the unit costs of the investment and operation (see 3.3.2), as gathered through consultation with equipment manufacturers and validated with the WPM industry. It has to be noted that each investment decision is based on the specific profile of each enterprise in the various MS; also, different energy costs and salary costs apply in the EU 27. The FCEC has used average inputs and applies average EU costs for energy and labour costs[48]; however, it should be noted that the estimate has to be considered as an indication of magnitude of costs.

The estimates of costs are additional to the baseline, i.e. they are a consequence of the regulatory change and do not take into account the costs currently supported by the operators for the performance of ISPM15, nor the environmental emissions linked to the current situation. The current operational costs to carry out ISPM 15 (status quo – variant A) have been estimated at €86 million/year for carrying out HT only and €108 million/year for HT/KD. It is noted that:

- Administrative costs are not included, given the high variance in the EU 27, which makes it not possible to use an average;
- The energy costs are calculated for kilns using gas and electricity, as it was not possible to estimate the costs for biomass sources;
- Marking (and deleting of marking in the case of repaired pallets) has been identified as an important operation in the case of extension of ISPM 15 but it has not been included in the analysis;
- It was not possible to identify the labour inputs required for the operation of kilns, as the indications from operators varied, as well as the quantification in terms of FTE's additional units: the assumption made is that the additional labour required would be 0.5 FTE for small kilns, 0.75 FTE for a medium size kiln and 1 FTE for a large size kiln. This does not take into account possible automation in larger enterprises, although it is understood that a certain input of labour is required in larger installations (e.g. for checking the HT process).

It is also noted that the model can be changed and the calculations run for the different parameters.

The unit costs and inputs applied in the analysis are presented in the table below.

[48]Labour: labour cost per employee in full-time units, per year, Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials. Source: EUROSTAT: Labour costs survey 2008 - Nace Rev. 2. Energy: EUROSTAT - Energy prices, EU 27 for gas, electricity and fuel ((LPG (GPL, Autogas).

Table 12 Investment and operational costs used in the analysis

Costs (fixed investment) - incl. Base equipment and installation cost	Low investment cost (€)	High investment cost (€)
Small	60,000	75,000
Medium	90,000	150,000
Large	225,000	375,000
Operational costs		
Labour: employee (FTE)/kiln		
Small enterprises	0.50	
Medium enterprises	0.75	
Large enterprises	1.00	
Cost of labour, per year (€)	25,009	
Energy costs		
Energy costs (€ per pallet) HT	0.07	
Energy costs (€ per pallet) HT/KD	0.47	
Fuel price (LPG (GPL, Autogas))/l	0.80	
CO_2 emissions (ton CO_2 /pallet)	0.0002	
CO_2 emissions (ton CO_2 /pallet) - HT/KD	0.0013	
Energy consumption (kwH) - HT (higher level)	1.73	
Energy consumption (kwH) - HT/KD (higher level)	11.53	

On the basis of the above and of the number of additional kilns estimated for the different scenarios, the total costs of investment have been estimated. These range from €80 – €685 million for Options 2 and 3 in the case of HT only, and from €268 to €986 million for HT/KD; in case of intensive use of kilns, these are estimated at €52 to € 443 million and from €179 to €689 million respectively. In the case of Option 1, estimated investment costs range from €394 to €1,767 million (for HT only) and from €617 to € 2,124 million (for HT/KD). In case of intensive use of kilns, these are estimated at €255 to € 1,143 million and from €404 to €1,426 million respectively.

In addition to this, the investment costs at sawmilling level have been estimated. These have to be considered only indicative, as they have been estimated on the basis of the same input data used for the assessment of cost for the WPM sector. The costs of investment are estimated at €9 to €21 million, for the supply of HT wood to small companies manufacturing new HT pallets, or €13 to €32 million in case HT/KD is required. Table 13 and Table 14 present the total investment costs (WPM and sawmilling sectors) for the different scenarios[49].

[49] Costs of investment at sawmilling level have been included considering the option with 0.031 m^3 at low investment cost and the option with 0.045 m^3 at high investment cost.

Table 13 Estimated investment costs for the WPM sector (EU 27) (million €)

Investment costs - WPM sector (million €)	Normal use of kilns		Intensive use of kilns	
	At low investment cost	At high investment cost	At low investment cost	At high investment cost
Total HT only (million €)	From	To	From	To
Option1- scenario 1.a	1,064	1,767	688	1,143
Option1 - scenario 1.b	729	1,209	472	782
Option 1 - scenario 2	506	837	327	542
Option1 - scenario 3	394	651	255	421
Option 2 (and 3) – scenario 1.b	415	685	268	443
Option 2 (and 3) – scenario 2	191	313	124	203
Option 2 (and 3) – scenario 3	80	127	52	82
	Normal use of kilns		**Intensive use of kilns**	
Total HT/KD (million €)	From	To	From	To
Option1- scenario 1.a	1,286	2,124	837	1,426
Option1 - scenario 1.b	951	1,566	621	1,065
Option 1 - scenario 2	728	1,194	476	824
Option1 - scenario 3	617	1,009	404	704
Option 2 (and 3) – scenario 1.b	603	986	395	689
Option 2 (and 3) – scenario 2	380	614	251	449
Option 2 (and 3) – scenario 3	268	428	179	328

Source: FCEC analysis

Table 14 Estimated investment costs for the sawmilling sector (EU 27) (million €)

Investment cost - Sawmilling sector (million €)	0.031 m^3 At low investment cost	0.045 m^3 At low investment cost	0.031 m^3 At high investment cost	0.045 m^3 At high investment cost
New (supply for small producers) - HT	9	12	14	21
New (supply for small producers) - HT/KD	13	19	22	32

Source: FCEC analysis

In the case of HT only, Option 2 and Option 3 result to total investment ranging from €112 to €706 million compared to Option 1, which results in total investment costs of €287 to €1,788 million. The Options with lower investment costs are those where repaired pallets are repaired with HT wood (total volume or two thirds), with costs ranging from €112 to €204 million and €215 to €371 million. In the case of HT and KD, Option 2 and Option 3 result to total investment for the sector ranging from €304 to €1,017 million compared to Option 1, which results in costs of €1,299 to €2,156 million.

These costs are calculated on the basis of currently prevailing market conditions, i.e. not taking into account any potential decrease in costs over time due to process improvements and increased presence of infrastructure for treatment.

The operational costs include labour, energy and fuel costs. Among these, the main component of cost is energy (gas and electricity), in particular in the scenarios where HT/KD are carried out, as this process requires a longer process and therefore higher energy inputs. In Options 2 and 3 for HT/KD, the estimates of energy costs and consumptions are based on the HT only, as it is assumed that repaired and old pallets would not need to be subject to KD.

On the basis of the above, the total investment and operational costs for the WPM and sawmilling sectors have been calculated (Table 15: only results for normal use of kilns are presented).

In the case of HT only, Option 2 and Option 3 result to total investment and operational costs for the sector ranging from €206 to €876 million compared to Option 1, which results in total investment and operational costs for the sector of €650 to €2,224 million. In the case of HT and KD, Option 2 and Option 3 result to total investment and operational costs for the sector ranging from €562 to €1,350 million compared to Option 1, which results in total investment and operational costs for the sector of €1,049 to €2,764 million.

Table 15 Estimated total investment costs for the different options and scenarios (EU 27) (million €)

Total investment costs (million €)	Normal use of kilns		Intensive use of kilns	
New (WPM + sawmilling for HT wood small) +all treated (old + repaired 100% treated)	At low investment cost	At high investment cost	At low investment cost	At high investment cost
Option 1 HT	1,072	1,788	697	1,164
Option 1 HT/KD	1,299	2,156	850	1,458
Option 2 and 3 HT	423	706	277	464
Option 2 and 3 HT/KD	616	1,017	409	721
New (WPM + sawmilling for HT wood small) + (Old - repaired: 100% treated)				
Option 1 HT	738	1,230	480	803
Option 1 HT/KD	964	1,598	634	1,097
Option 2 and 3 HT	423	706	277	464
Option 2 and 3 HT/KD	616	1,017	409	721
New (WPM + sawmilling for HT wood small) + (Old - repaired: Repaired with HT wood)				
Option 1 HT	426	728	287	498
Option 1 HT/KD	653	1,096	440	791
Option 2 and 3 HT	112	204	83	159
Option 2 and 3 HT/KD	304	515	215	416
New (WPM + sawmilling for HT wood small) + (Old - repaired: 1/3 treated, 2/3 repaired with HT wood)				
Option 1 HT	530	895	351	600
Option 1 HT/KD	757	1,263	505	893
Option 2 and 3 HT	215	371	148	261
Option 2 and 3 HT/KD	408	683	279	518

Source: FCEC analysis

Table 16 Estimated total operational costs for the different options and scenarios (EU 27) (million €)

Operational costs (million €) – At normal use of kilns	Labour		Energy		Fuel	
New (WPM + sawmilling for HT wood small)+all treated (old + repaired 100% treated)	2015	2016 and following years	2015	2016 and following years	2015	2016 and following years
Option 1 HT	219	84	184	72	32.49	13.46
Option 1 HT/KD	257	115	320	203	30.32	15.37
Option 2 and 3 HT	84	84	72	72	13.46	13.46
Option 2 and 3 HT/KD	115	115	203	203	15.37	15.37
New (WPM + sawmilling for HT wood small)+ (Old - repaired: 100% treated)						
Option 1 HT	150	84	126	72	22.68	13.46
Option 1 HT/KD	187	115	263	203	20.50	15.37
Option 2 and 3 HT	84	84	72	72	13.46	13.46
Option 2 and 3 HT/KD	115	115	203	203	15.37	15.37
New (WPM + sawmilling for HT wood small)+ (Old - repaired: Repaired with HT wood)						
Option 1 HT	85	19	126	72	12.86	3.64
Option 1 HT/KD	123	50	263	203	10.68	5.55
Option 2 and 3 HT	19	19	72	72	3.64	3.64
Option 2 and 3 HT/KD	50	50	203	203	5.55	5.55
New (WPM + sawmilling for HT wood small)+ (Old - repaired: 1/3 treated, 2/3 repaired with HT wood)						
Option 1 HT	106	41	126	72	16.13	6.91
Option 1 HT/KD	144	72	263	203	13.95	8.82
Option 2 and 3 HT	41	41	72	72	6.91	6.91
Option 2 and 3 HT/KD	72	72	203	203	8.82	8.82

Source: FCEC analysis

Table 17 Estimated total investment, operational and environmental costs for the different options and scenarios

	Investment and operational costs - 2015		Annual operational costs	Co2 Emissions (Thousand tons CO2)		Energy consumption (million KwH)	
	At low investment cost (million €)	At high investment cost (million €)	Million €	2015	Annual	2015	Annual
Status quo, Variant A - HT (est.)			86		61		525
Status quo, Variant A - HT/KD (est.)			108		292		2,521
Status quo, Variant B (4 Member States - selected regions are DAs) - HT	121	179	35		42		363
Status quo, Variant B (4 Member States - all the country is a DA) - HT	536	785	148		164		1,417
New, repaired and old (old - repaired: 100% treated)							
Option 1 HT	1,036	1,528	170	358	204	3,091	1,763
Option 1 HT/KD	1,435	2,068	333	746	575	6,443	4,971
Option 2 and 3 HT	593	876	170	204	204	1,763	1,763
Option 2 and 3 HT/KD	949	1,350	333	575	575	4,971	4,971
New, repaired and old (old - repaired: repaired with HT wood)							
Option 1 HT	650	952	95	358	204	3,091	1,763
Option 1 HT/KD	1,049	1,492	258	746	575	6,443	4,971
Option 2 and 3 HT	206	299	95	204	204	1,763	1,763
Option 2 and 3 HT/KD	562	773	258	575	575	4,971	4,971
New, repaired and old (old - repaired: 1/3 treated, 2/3 repaired with HT wood)							
Option 1 HT	778	1,144	120	358	204	3,091	1,763
Option 1 HT/KD	1,177	1,684	283	746	575	6,443	4,971
Option 2 and 3 HT	335	491	120	204	204	1,763	1,763
Option 2 and 3 HT/KD	691	966	283	575	575	4,971	4,971
New, repaired and old treated (old+repaired: 100% treated)							
Option 1 HT	1,508	2,224	170	521	204	4,505	1,763
Option 1 HT/KD	1,907	2,764	333	909	575	7,857	4,971
Option 2 and 3 HT	593	876	170	204	204	1,763	1,763
Option 2 and 3 HT/KD	949	1,350	333	575	575	4,971	4,971

Source: FCEC analysis

3.3 Status quo - variant B

Under variant B, the same approach for assessing costs as the one followed under Options 1-3 has been applied. Some assumptions have to be formulated in order to calculate the potential volume of WPM that would need to be treated under this scenario.

The potential scale of the need for additional capacity - in the event that these regions become DAs - can be demonstrated from available empirical data from the case of Portugal, where the industry needed to treat 30 million pallets per year. Extrapolating on this basis, it could be expected that at least 120-160 million circulating pallets per year would be subject to HT, in the event of four more PWN outbreaks in the EU of a scale comparable to that occurred in Portugal. It has to be considered that the application of the same measures as applied in Portugal would require HT of all the wood and WPM leaving the DAs, therefore this figure is also influenced by:

- The region's commercial specialisation and degree of trade, both of wood and wood products and of other goods - in particular in those that require WPM for transport -, which influence the volume of WPM used for transport of exports/imports from and to the region;
- The region's location and importance in European transport routes, which in turn influence the volume of WPM in transit that would need HT prior to exit the DA.

The FCEC has further refined the estimate above and calculated the potential impacts under this variant based on the following data in order to formulate some assumptions on circulation and the current HT capacity in place:

Table 18 Data and assumptions for calculation of impacts under Status quo- variant B

MS/region	Number of registered operators for the purpose of ISPM	Further information on economy/trade/transport	Assumption: % of circulating pallets to be treated
France: Aquitaine	34 operators have installed capacity, 70use pre-treated wood. This corresponds to 7% of total FR capacity (operators with HT equipment), and 11% of operators assembling pre-treated wood. Existing capacity estimated at 20% of output by industry[50]. According to industry's estimates[50], the region could be fully equipped in one year, on the condition that a demarcated zone applies.	Pine trees represent 7.3% of all exploited forestry area in France and 24% of total sold harvest. The exploitation of the forest generates 30,000 jobs in the region Aquitaine. The wood industry accounts for 5% of region's GDP[51]. Transit: 6 main road axes, 1 port, est. 3 railway routes. Transport axis for ES. Aquitaine is the 12th region of FR in export and import. The region accounts for 3.3% of total FR exports; 2.7% of total FR imports (in value). 13% of total FR exports of wood, 8% of wood products, 18% of wine, 13% of F&V, 5% of building and aeronautic sectors (in value) [52].	15%
Germany: Bavaria	Produces HT wood: 136 (37% of total DE capacity) Produces WPM from HT wood: 452 (17% of total DE	Transit: Major transit area for almost all traffic passing from North-West Europe to Austria, Italy, Slovenia, Croatia and continuing on to the south and south-	40%

[50] SYPAL: national association of pallet producers.
[51] Source: Centro de Innovación y Servicios Tecnológicos de la Madera de Galicia, 2006.
[52] Source : Douanes 2012, traitement CCIR.

MS/region	Number of registered operators for the purpose of ISPM	Further information on economy/trade/transport	Assumption: % of circulating pallets to be treated
	capacity) Produces HT WPM: 91 (12% of total DE capacity)	eastern regions of Europe (transport on road, railways, air, inland waterway).	
Latvia: whole territory	Produces HT wood: 8 Produces WPM from HT wood: 21 Produces HT WPM:48	Transit: One of the main transit points for both north-south and east-west trade flows, and the transit sector is one of the strongest industrial sectors in Latvia[53].	80%
Spain: Galicia and Extremadura (current situation)	Extremadura: 13 companies registered for the purpose of ISPM 15. Galicia: 70 sawmillers (~5.5% of total number of companies) are officially registered as operators and have installed kilns for the HT of wood (although some sawmillers are officially registered as WPM). 5 out of 20 sawmillers in the DA in Galicia have installed equipment to perform HT. In DA there has not been investment in additional capacity, sawmillers not able to invest have stopped being active in the sector, or the ones having kilns provide the service to the others, as this is considered a temporary situation given the strict eradication measures applied.	Galicia is the main producing region of sawn wood in Spain: 80% of the sawmillers of Galicia produce 40% of the total sawn wood produced in the country. An estimated 45% of the total production is supplied to the WPM sector. The region has 42954 sawmilling companies (approximately 27% of the total number in Spain), for a total production of 1,300,000 m3 in 2011. The majority of producers are micro-enterprises (50% are small enterprises, 46% are medium)[55]. The wood industry accounts for 6.5% of region's GDP[56].	Galicia: 5%

On the basis of these assumptions, and on the data on production and circulation, it is estimated that ~230 million pallets would need to be treated every year in the selected regions. Considering an estimated existing HT treatment capacity of ~21 million pallets/year, the capacity to be installed refers to the treatment of ~ 210 million pallets/year. The units used for the purpose of the calculation have been medium kilns at low and high investment costs for such equipment.

[53] Nearly 90% of turnover in Latvian ports and 75% of rail cargo is for transit traffic. More than 9% of Latvia's employees are engaged in the transportation and servicing of transit cargo. The importance of the transport, transit and storage sector in terms of GDP contribution is substantial at around 11%. Source: http://www.liaa.gov.lv/eng/trade_with_latvia/industry_profiles/transit_and_logistics/

[54] Source: Instituto Gallego de Estadística (IGE), 2010.

[55] Source: FCEC based on data provided by CONFEMADERA – Galicia.

[56] Source: Centro de Innovación y Servicios Tecnológicos de la Madera de Galicia, 2006.

Table 19 Assumptions used in the calculation of impacts for Status quo - variant B

Production	**210,270,122**
France	65,000,000
Germany	102,000,000
Latvia	11,270,122
Spain	32,000,000
Circulation	**942,796,695**
France	250,000,000
Germany	310,000,000
Latvia	67,796,695
Spain	315,000,000
Assumption on pallets to be treated (as % of circulating)	
France - Aquitaine	15% = 37,500,000
Germany - Bavaria	40% = 124,000,000
Latvia	80% = 54,237,356
Spain - Galicia	5% = 15,750,000
Total	**231,487,356**
Current estimated capacity in selected regions	
France - Aquitaine	2,275,000
Germany - Bavaria	16,320,000
Latvia	2,254,024
Spain - Galicia	448,000
Total	21,297,024
Circulating pallets to be treated not covered by current capacity	**210,190,331**

On the basis of the above, the results for variant B show that the costs (investment and operational) of this scenario for the industry are in the range of €85 (for a low investment with an intensive use of kilns) to €179 million (for a high investment with a normal use of kilns). This scenario will cost to the sector annual operational costs of €29 to €35 million, energy consumption of 363 million kwH/year and an annual additional emission of 42,000 tons of CO_2.

Table 20 Estimated number of additional kilns required under Status quo – variant B

Circulating pallets to be treated - *based on above assumptions*	210,190,331	**Normal use (220 cycles/year)**	**Intensive use (340 cycles/year)**
Total number of additional kilns for circulating *medium size*		955	618

Source: FCEC analysis

Table 21 Estimated cost of investment under Status quo – variant B (million €)*

	Normal use of kilns		Intensive use of kilns	
	At low investment cost	At high investment cost	At low investment	At high investment
Cost of investment	83	143	56	93

Source: FCEC analysis

* ***HT only***

Table 22 Estimated operational costs, energy consumption and CO_2 emissions under Status quo – variant B

	Labour cost (million €)	Energy cost (million €)	Fuel (million €)	CO_2 emissions (Thousand tons CO_2)	Energy consumption (Million kwH)
Normal use	18	15	2.52	42	363
Intensive use	12	15	2.52	42	363

Source: FCEC analysis

Table 23 Estimated total costs under Status quo – variant B

Only regions DAs	Investment and operational costs		Annual operational costs	Co2 emissions (Thousand tons CO2)	Energy consumption Million kwH
	At low investment cost	At high investment cost			
Normal use	121	179	35	42	363
Intensive use	85	122	29	42	363

Source: FCEC analysis

Representatives of the sawmilling sector in the region of **Galicia** highlighted the potentially high costs of the extension of the obligation of ISPM 15. This is in particular due to the structure of the sector – dominated by micro and small enterprises (50% of the total companies active in the sector are small enterprises, 46% are medium) - and in view of the general negative economic outlook that has already caused a shrinking of the sector (and of the woodworking industry in general) and that results in a lack of credit for the sector. Currently, only 2% of small enterprises, 16% of medium enterprises and 19% of large enterprises have the equipment required to perform HT[57]. Some enterprises have HT installations, but are not registered for the purposes of ISPM 15, nor are they able to use these kilns for HT (according to ISPM 15). They use them for natural/artificial drying but the equipment is not technically ready for HT and they do not have skilled workers to run this operation (the kilns also need Information Technology competence for the controls). The required cost for updating the facilities and hiring appropriately qualified/trained manpower

[57] FCEC calculations based on reply to the questionnaire of CEARMADERA.

would be too high[58] in the current economic context. Therefore the sector considers that the potential to do this in the next few years would be very limited (a small percentage might be able to do this if given a transitional period).

It was also noted that in the past, such a treatment represented a competitive advantage for enterprises towards customers, and the higher cost of production was remunerated through a price premium. Nowadays customers are apparently no longer willing to pay any price differential, if they ask for higher quality this does not necessarily result in a higher price. There are also factors that act as an obstacle to full utilisation of the current capacity, such as the geographic dispersal of enterprises and the associated costs of transport; these would increase costs, and these would not be recoverable. Therefore, this leaves only the option that all sawmillers would need to install their own HT equipment, which is not considered economically feasible at present, given that the majority are small enterprises, and those that are unable to do so, are expected to go out of business.

In the case of **France** (Aquitaine), consultation was carried out with the national and the regional CA in order to gather information on the potential cost of eradication of PWN, as well as to understand the economic and environmental value of the sector. Sawmillers in Aquitaine are specialized in indoor building materials (e.g. parquet production), which require complete drying. It can be concluded that firms in Aquitaine should be generally well equipped in HT/KD capacity. On the other hand, existing capacity is estimated by stakeholders to stand at only 20% of output, whereas they note that it varies with market conditions and that existing treatment capacity is not available only to HT pallets, especially if demand for kiln drying of other wood products is high in Aquitaine. SYPAL indicates that the Aquitaine region could be fully equipped within one year, on the condition that a demarcated zone applies.

As for the value of the sector, pine trees represent 7.3% of the exploited forestry area in France and 24% of the total harvest sold. The exploitation of the forest generates 30,000 jobs in the region. The pine forest of Aquitaine is almost entirely privately owned, except for a strip of land along the coast that is owned by the State. PWN has the potential to inflict large damage in the forest of Aquitaine. According to a study by the Ministry of Agriculture, if no measures are taken, the forest of Aquitaine could be 100% infested by PWN by 2030 and disappear within the next 20 years. The likelihood of the infestation is increased due to the recent issues the forest has faced, namely two storms in 1999 and 2009 and the outbreak of scolytes in 2010 that have weakened the trees. In this context, the surveillance and controls on PWN are seen as essential by the FR CA and the risk of introduction of the HO is perceived as high.

3.3.1 The Net Present Value of the investment at enterprise level

The **fourth step** of the analysis has been to calculate the Net Present Value (NPV) of the investment at enterprise level. This analysis was aimed at assessing the profitability of the investment and the cost for operators over the lifetime of the investment. Also, the analysis aimed to assess whether economies of scale are important and how the size of the investment may affect profitability. The parameters used in the analysis were the following:

[58] There would also be additional costs related to the maintenance and controls.

Table 24 Parameters used in the Discounted Cash Flow Analysis

Discount rate	5%	
Inflation rate	2%	
Time (years)	20	
Amortisation period (years)	7	
Costs (fixed investment) - incl. Base equipment and installation cost	Low investment cost	High investment cost
Small	60,000	75,000
Medium	90,000	150,000
Large	225,000	375,000
Maintenance costs (annual)		
In % of base investment	2%	
Small	1,200	1,500
Medium	1,800	3,000
Large	4,500	7,500
Number of pallets treated	Normal use	Intensive use
HT		
Small	44,000	68,000
Medium	220,000	340,000
Large	550,000	850,000
HT/KD		
Small	20,000	30,000
Medium	100,000	150,000
Large	250,000	375,000
Staff cost		
Cost of labour, per year	25,009	
Cost of labour, per hour	14	
Number of additional workers		
Small	0.5	
Medium	0.75	
Large	1	
Administrative costs		
Registration (one-off cost)	500	
Inspection/year	300	
Energy consumption		
Energy consumption (kwH) - HT (higher level)	1.73	
Energy consumption (kwH) - HT/KD (higher level)	11.53	
CO_2 emissions (tons CO_2 /pallet) - HT	0.0002	
CO_2 emissions (tons CO_2 /pallet) - HT/KD	0.0013	
(Conversion m^3 to kwH)	9.87	
Energy costs		
Gas prices (industry)/m^3	0.374	
Electricity prices (industry)/kwh	0.11	
Fuel price (LPG (GPL, Autogas))/l	0.8	
Energy costs (€ per pallet) HT	0.07	
Energy costs (€ per pallet) HT/KD	0.47	
Loading and unloading the chamber Fuel cost (forklift: 15l/h)	2,640	
Price margin (varies in sensitivity analysis)		
Price margin HT (€ per pallet)	0.5	
Price margin HT/KD (€ per pallet)	1.0	

The analysis suggests that economies of scale do operate and the investment breaks even at a minimum price premium/pallet required to cover costs, estimated at €0.2 to €0.6/pallet and €0.7 to €1.5/pallet in the case of HT only and HT/KD respectively. The range depends on the scale of the enterprise, with microenterprises needing to achieve the top value of this range to justify the investment, but medium and large size enterprises needing to achieve close to the lower value within the above ranges.

In current market conditions, ISPM 15 pallets can achieve a price premium of between €0.5/pallet (HT) and €1/pallet (HT/KD); however, if ISPM 15 treatment becomes generalised throughout the EU, there will be a shift from competition based on price and quality to competition based on price only, as HT or HT/KD pallets will be widely on offer. As it stands today, it is generally accepted along the EU27 supply chain that ISPM 15-compliant WPM is sold at a premium in the light of the fact that the supplement allows access to export, although there are indications of a reduction over time of this price premium. It was noted, by both WPM operators and users, that prices of HT pallets have decreased over time, also due to increased competition with pallets produced from alternative materials (e.g. plastic).

Figure 2 and Figure 3 show that the higher the investment (i.e. higher capacity of kilns, which is associated with a larger size of enterprise), the lower is the unit cost of treatment/pallet.

Figure 4 shows the relationship between the NPV and the price margin to be recovered through the price in order to generate a positive investment result overtime: as would be expected the price margin for smaller enterprises needs to be at the highest end, whereas for medium and large enterprises is at the lowest end of the range indicated above.

The WPM sector is characterised by a high presence of micro and small enterprises and has been consolidating in recent years, with increasing concentration of production in larger enterprises. The above results suggest that the introduction of ISPM15 would further favour this process, with microenterprises (less than 10 employees) particularly disadvantaged by the new rules[59]. This has however to be read against the scenario of non intervention, potentially leading to the destruction of the forestry resource that forms the base of this economic activity. The economic impact of Option 4 (total deregulation) indicates that **the total potential impact of PWN on EU 27 forestry is estimated at €39 – €49 billion in the absence of regulatory control measures**.

The above analysis also applies to repairers, where the scale of operators of a part of the sector is even lower, given the low skills and low level of capital required for entry to the sector. The introduction of the obligation of carry out HT on repaired pallets would negatively affect the sector, which suggests strongly that the introduction of the obligation would lead to significant business closures, leading most likely to restructuring of the sector. In addition, the fragmented structure of this sector is expected to the raise difficulties in terms of enforcement. In the case of introduction of the obligation to repair with HT wood, training for small repairers would be needed to ensure correct application of the regulation.

Whether individual companies would be able to achieve the price premium indicated above will depend on the competitive conditions in the market; clearly, the lower the price premium charged, the more competitive the WPM operators will be. As is noted above, the sector is quite fragmented, and its bargaining position vis à vis customers may therefore be weak thus limiting its ability to pass on any cost increases.

In current market conditions, ISPM 15 pallets can achieve a price premium of between €0.5/pallet (HT) and €1/pallet (HT/KD); however, if ISPM 15 treatment becomes generalised

[59] It is noted that the introduction of ISPM 15 in Portugal resulted in the disappearance of 60% of WPM producers, nearly all of which were microenterprises, and the sawmilling sector was also particularly affected.

throughout the EU, there will be a shift from competition based on price and quality to competition based on price only, as HT or HT/KD pallets will be widely on offer[60]. As it stands today, it is generally accepted along the EU27 supply chain that ISPM 15-compliant WPM is sold at a premium in the light of the fact that the supplement allows access to export, although there are indications of a reduction over time of this price premium. It was noted, by both WPM operators and users, that prices of HT pallets have decreased over time, also due to increased competition with pallets produced from alternative materials (e.g. plastic).

Figure 2 Investment cost and cost of HT/pallet (€)

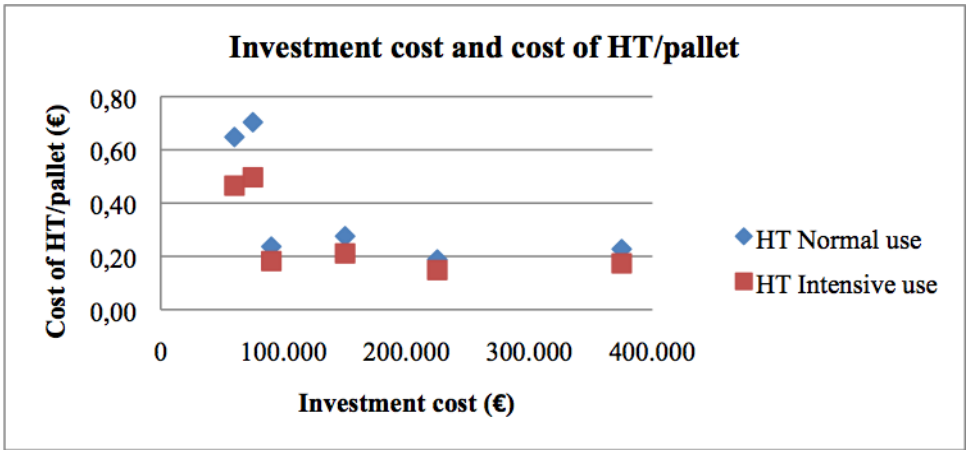
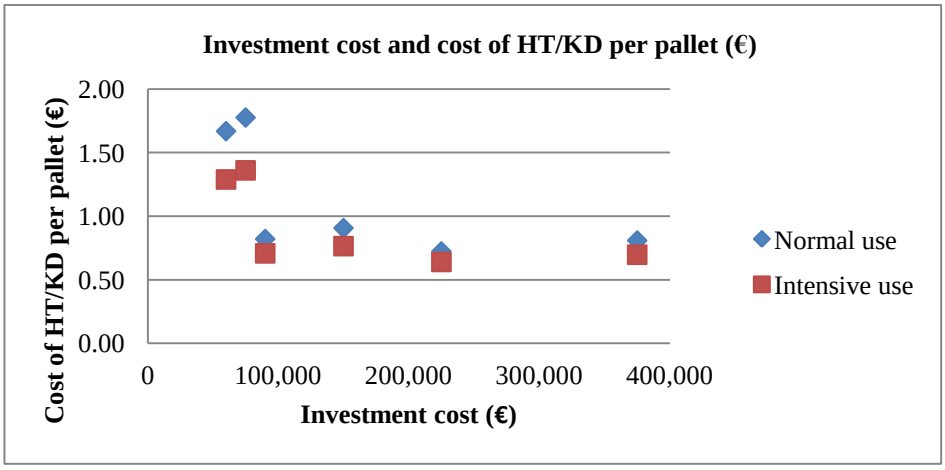


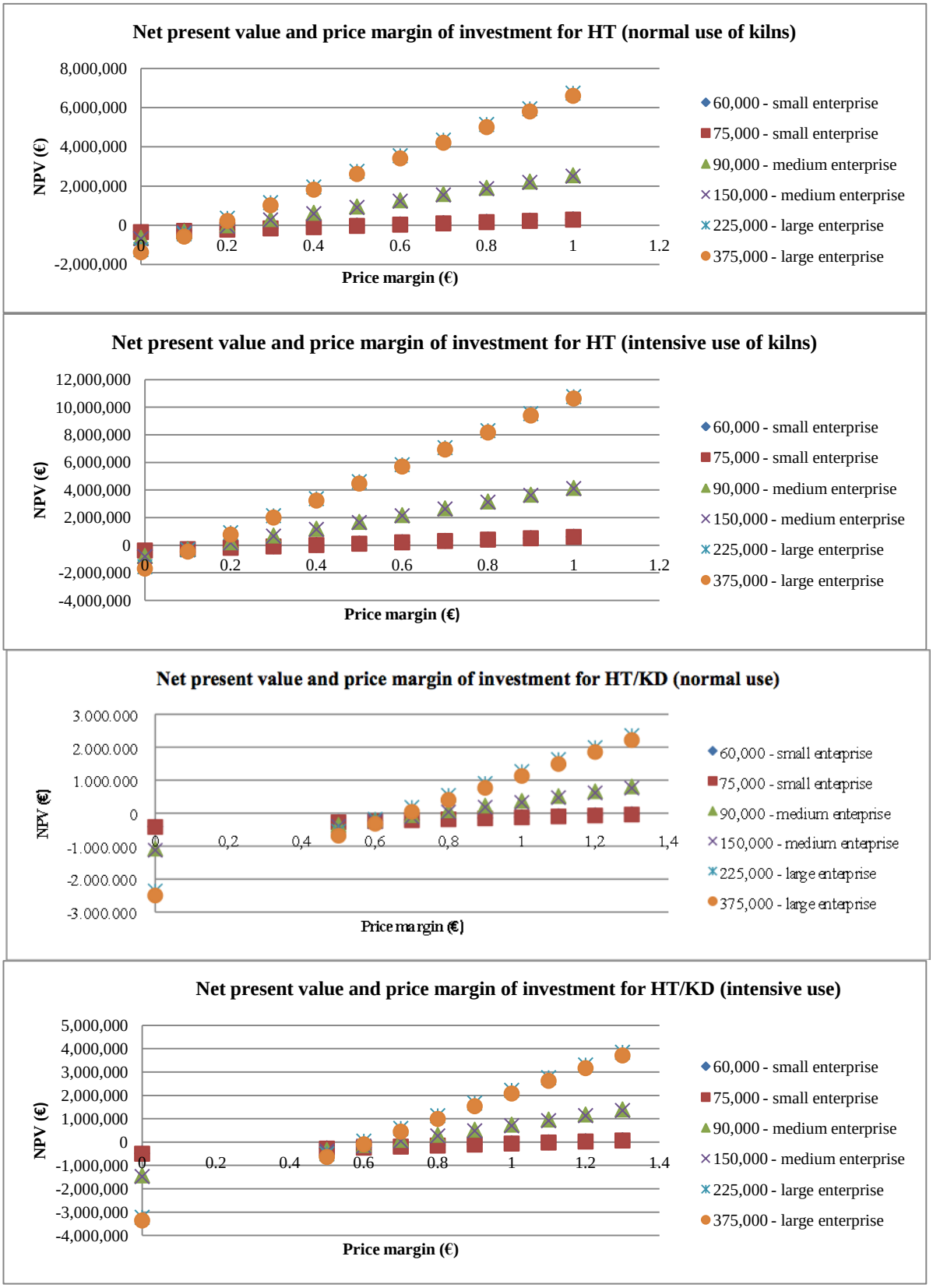
Figure 3 Investment cost and cost of HT/KD per pallet (€)



Source: FCEC analysis

[60] The price premium and expected trends are in line with figures quoted by logistics representatives, indicating an increase in the price paid for a HT pallet of ca. €0.8-1.2 compared to a non-HT.

Figure 4 Estimated Net Present Values and price margins of investments for ISPM 15 purposes



SSource: FCEC analysis

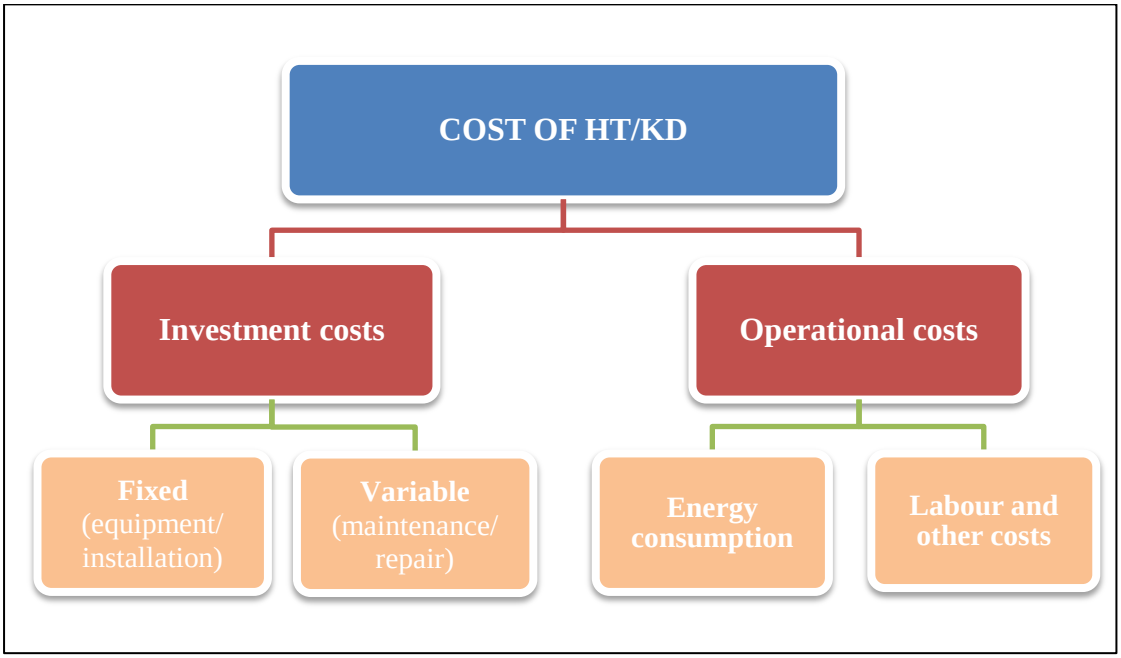
3.3.2 Overview of unit costs

It is important to note from the outset that both the WPM manufacturers and the HT/KD equipment manufacturers strongly emphasised the fact that this investment is tailored to the context and specifications of each customer; there is no standard cost for such an investment, but a range of factors enter into play to determine the final costs and expected returns over the lifetime of the investment, as also highlighted in our findings to date below. In fact, for each proposed investment, equipment manufacturers present to their prospective customers a detailed business plan, taking into consideration the range of technical and cost parameters, to identify the expected costs and returns on a range of alternative options for installing HT/KD facilities, depending on customer set up, specifications and planned output.

In view of this considerable variation at the potential level of the investment, the FCEC has focused on a range of key parameters and costs to determine the average range of the investment likely to be required for a small, medium and large scale HT/KD facility.

The main cost components considered in our model for the analysis of investment and operational costs for heat treatment (HT according to ISPM15) and kiln drying (KD) facilities are indicated in Figure 5.

Figure 5 HT/KD investment and operational costs considered by the FCEC analysis



In particular, the relevant costs analysed are as follows:

a. Investment costs

Fixed costs: These are one-off equipment and installation costs. Currently there are various models of HT and KD equipment, which vary in capacity, technical specifications and cost. Our approach has been to collect data from various sources (HT/KD equipment manufacturers, sawmillers, WPM manufacturers, and technical institutes), in order to estimate an average range of costs for three sizes of investment: small, medium and large.

Variable costs: The following costs are considered:

- Maintenance costs: these are included as average costs on an annual basis;
- Certification: these are included as average costs at EU level and will include registration, inspections and/or license fee, as applicable.

b. Operational costs:

Energy consumption: The following costs are considered:

- Thermal energy: costs depend on heating medium used / type of boiler for the heating of the chamber/s (mainly, gas/propane or biomass);
- Electric energy: EU average for cost of electric energy;

Labour: additional staff time required to operate the facility/ production of one unit; EU average for wage.

Typically, up to 4-5 HT/KD equipment suppliers are active in each MS; in the whole of Western Europe there are six top suppliers. These companies operate across MS, and the market is fairly competitive particularly between neighbouring MS (e.g. a number of FR or DE manufacturers are present in both DE and FR, but less present in the UK).

Several key parameters influence the cost of investment on HT/KD facilities. As the costs of investing in such facilities can vary considerably, the best approach is considered to be to provide a range of costs (rather than an absolute level).

a. **Equipment/installation**

a.1 Fixed costs

The main investment includes: the chambers or kilns where the heat treatment and/or kiln drying takes place, and the boiler that provides the heating to the chamber/s[61]. In addition, there are installation costs which relate to civil engineering and other labour costs, connection to energy and water sources, and building the necessary infrastructure (foundations) for installing this equipment.

The cost varies significantly depending on equipment specifications and capacity. There is significant variation in the equipment specifications on offer by each manufacturer and these have an impact on the investment costs, both fixed and variable. It is noted that the analysis below is based on the costs of **new equipment**; it is possible to install second-hand or used equipment at a lower cost, but the product specifications are generally also expected to be lower (in comparison to similar capacity new equipment).

The key parameters determining equipment/installation costs include:

- **Size of kiln**: installed usable capacity in number of pallets or volume (m^3) that can be loaded per cycle. The larger the capacity, the higher the total level of investment;
- **Type of kiln**: there is a wide range of kilns available on the market, whether HT, KD or both, and considerable innovation in new technologies. The objective of these innovations has been to both cut down on input costs (heating, electricity) and operational costs, and to increase output capacity (in terms of the number of cycles that can be achieved within a certain period of time). A key feature of the kilns developed in the last few years is the reduction in the length of cycle (i.e. the time needed for KD), from 2-3 days to 1 day (24 hours) per cycle, meaning that it is possible (at least from a technical point of view) to carry out HT within the same

[61] There is also need for investment in transport equipment (forklifts) for loading/unloading the wood/WPM to the kiln/s – this is discussed under loading/unloading costs. Other investment costs include separate storage areas for the treated WPM/wood (storage of HT/KD pallets/wood is under cover in specific built-for-purpose facilities) and potential investment in conveyor belts and other adjustments to improve access from wood/WPM production site to the kiln/s. These costs are not considered here.

cycle[62]. Another innovation relates to logistics that enable easy access to the material to be treated. For example, mobile facilities allow the kilns to come to the pallets/WPM, thus reducing handling (loading/unloading costs and delays) and allowing substantial savings to be made (these costs are important as discussed below)[63]. All these innovations carry a higher initial investment cost.

- **Type of boiler**: there are two main types of boiler, depending on the thermal energy feedstock used: gas or liquid propane (with boilers integrated in the kiln/chamber, or external); and biomass (which involves installing an external boiler)[64]. Technically, in simplified terms, the advantage of an integrated gas/propane boiler is that it provides full autonomy to each kiln/chamber, while the advantage of an external boiler (biomass or other) is that it can be connected to multiple chambers (≥2), thus offering the potential for economies of scale in thermal energy costs for bigger installations. The decision to install an external boiler will depend on energy efficiency versus cost considerations. The larger the installation (i.e. the total capacity in terms of pallets or m^3) to be treated, the more cost-efficient it becomes to invest in an external boiler. For investing on biomass, beyond the need to have an adequate scale to justify the investment, two further key considerations are: a) sufficient access to competitively priced biomass (relative to the price of gas or propane); and b) ability to comply with a range of environmental regulations. According to some of the consulted equipment manufacturers, when used for HT only (rather than KD), biomass also has some technical disadvantages compared to gas or propane, in that it cannot reach on a continuous basis the temperature required for HT according to ISPM15, unless the costs rise considerably, therefore it is not suitable or economically viable for HT only.
- **Installation costs are typically ~40-50% of the base investment costs**. This means that the higher and more complex the base investment, the higher will be the absolute level of installation costs, thus the total cost of the investment.

Taking all these parameters into consideration, the following range of costs has been provided by the various sources consulted[65] for the investment on HT (according to ISPM15) and KD, including equipment and installation costs.

[62] There seems to be some variation between MS regulatory authorities' requirements on this. Although ISPM15 does not explicitly rule on whether KD should be separate from HT, some MS NPPOs appear to allow both treatments to take place in the same cycle, while others (e.g. FR) do not allow this.

[63] An alternative adjustment that can be made to reduce such costs is to integrate the HT/KD operation in the production line, but the cost of this adjustment is fairly substantial and can therefore only be justified if undertaken as part of a more general updating or refurbishing process of the production facilities.

[64] A wide range of fuels can be used for running the KT/KD equipment, including oil and charcoal. As the main fuels used in new equipment are gas, propane and biomass, the analysis focuses on this type of equipment.

[65] The data presented in the table below represent a consolidation of the figures provided by the following sources consulted during the study: FEFPEB, equipment manufacturers (consultation both with associations and with individual companies, in particular in FR, DE, IT, ES, PL, and the UK).

Table 25 Fixed unit costs of HT (ISPM15)/KD investment (equipment and installation)

Size of HT/KD facility	Capacity: in number of pallets per cycle (a)	Cost of HT/KD facility (b)
Base equipment: kiln with gas/propane boiler (c)		
Small	100 to 200	~ €40,000 – €50,000 ***Lower value is the minimum base level of investment***
Medium	800 to 1,000	~ €60,000 - €100,000 *Range depends on capacity and cycle length, e.g.:* • *For 1,000 pallets and 2-3 day KD cycle: €75,000;* • *For 1,000 pallets and 1 day KD cycle: €95,000*
Large	1,500 -2,500	~ €150,000 - €250,000 *Range depends on capacity and cycle length, e.g.:* • *For 1,500 pallets and 1 day KD cycle: €150,000* • *For 2,500 pallets and 1 day KD cycle: €250,000*
Additional option: external boiler – biomass (d)		
		~ minimum €50,000 – €100,000 (e) *Range depends on quality of feedstock and automation level; above range is a minimum level of investment.*
Installation costs (f)		
Small	100 to 200	~ €20,000 – €25,000
Medium	800 to 1,000	~ €30,000 – €50,000
Large	1,500 -2,500	~ €75,000 – €125,000
Total cost, including base equipment and installation costs (g)		
Small	100 to 200	~ €60,000 – €75,000
Medium	800 to 1,000	~ €90,000 - €150,000
Large	1,500 -2,500	~ €225,000 - €375,000

(a) Capacity per day could be 2-3 times higher if the equipment is used for HT only, as it can complete (on average) 2-3 cycles per day for HT.

(b) All costs are provided as an approximate range of average figures per scale and type of investment (figures rounded); examples refer to specific quotes provided by equipment manufacturers.

(c) The base price of new equipment includes a gas/propane boiler; this can therefore be considered as the 'base' cost of the investment.

(d) The external biomass boiler is an additional option, but the cost can be justified once a minimum size/capacity has been reached – this is typically from a 'medium' level of investment up, which is >2 medium size kilns (an external boiler requires a minimum of 2 kilns for optimal energy use).

(e) The boiler cost quoted here is the minimum level of cost corresponding to a minimum installed power and

energy efficiency, in compliance with environmental regulations. Depending on the need for installed power, energy efficiency requirements, the level of automation and other product specifications (to adapt the technology to client requirements, including the ability to run on a wide range of types of wood fuel thus maximising the potential use of any type of cheap on-site wood waste, e.g. wet wood bark), the cost can considerably exceed the quoted range. **Environmental regulations are a particularly important factor affecting final investment cost and feasibility.** For example, for a 2 MW state of the art, top of the range boiler, sufficient for a facility treating 1,500 pallets/day (i.e. 0.5 million pallets/year, on a 1 day KD cycle) the cost (including infrastructure and installation costs) can be €0.5-€0.8 million.

(f) Includes civil engineering and other labour costs, connection to energy and water sources, and building the necessary infrastructure (foundations) for installing this equipment.

(g) Total cost per unit of base kiln equipment (with gas/propane boiler) including installation costs. The range of total costs depends on the capacity of treatment (i.e. number of pallets per cycle; length of cycle). **The cost of an external biomass boiler, an additional option possibly technically feasible for medium to large facilities (>2 medium kilns), is not incorporated in this total cost, as the feasibility and cost of such an investment can only be established on a case-by-case basis.**

Source: FCEC on the basis of industry consultation (WPM manufacturers; equipment manufacturers)

The above figures concern **HT (according to ISPM 15) and KD of pallets**, for new equipment invested at the level of pallet production. In particular:

- As a result of the ISPM15 options examined by this study, it is possible that - to a certain extent – certain pallet manufacturers, particularly the smaller class size, will shift to buying treated wood for final assembly into pallets, rather than investing on HT/KD equipment. Indeed, if the new measures are introduced, this will be the single most important management decision that certain WPM manufacturers/WPM assemblers will have to make: procure treated wood for WPM assembly, or invest? The extent to which this is likely to take place cannot be predicted with any level of certainty but will depend, *inter alia*, on the scale of the business in relation to the costs of the investment. Our consultations to date indicate that small businesses, in particular, are most likely to shift to buying treated wood. To some extent therefore, there will be increased demand by these WPM manufacturers who will not be investing on HT/KD. Given that the current spare capacity of sawmillers for HT/KD is minimal, the consequence will be a need for additional capacity for HT/KD of wood at the level of sawmillers, but the extent to which this might occur cannot be estimated, as it also depends on the level of their other activities (i.e. use of wood for other products in particular the building sector). The cost of this investment will also be highly variable, depending on the existing capacity and equipment base at the level of each sawmiller, and the modifications/adjustments that may be needed on this base.
- The fixed costs of the investment facilities required for HT alone could not be differentiated from those required for KD. The base equipment costs for installing new equipment for HT only are the same as for KD; on the other hand, when existing equipment is in place for HT or KD, some adjustments are necessary for enabling this to also perform both HT and KD. All of the equipment manufacturers consulted indicate that, as demand for both HT and KD lumber / pallets has expanded, most temperature treatment chambers are nowadays designed as full dry kilns[66], and that

[66] Technically, the heat treatment of pallets can be carried out as part of a standard drying cycle provided that the kiln air temperature is sufficient to increase the wood core temperature to 56ºC. According to another manufacturer, their experience has shown that a minimum air temperature of 65ºC should be used to achieve the required 56ºC core temperature in a reasonable time; however, this manufacturer recommends a kiln air temperature of 72ºC to achieve fast and efficient heat treatment times. Beyond these technical aspects, the

the additional cost of turning an HT kiln facility to a full KD facility is relatively low, unless significant update/renewal for older equipment is required;

- Regarding LWP and IP, manufacturers of LWP and IP tend to buy and use KD timber components, and this timber is usually HT as well as KD (e.g. NL).

The following conclusions can be drawn from the analysis of the base investment unit costs:

- Although the relation between company size in terms of the number of employees and required capacity to treat (i.e. output per company) is not necessarily linear, in general it can be expected that the larger a company, the higher the output to be treated and therefore the required investment in HT/KD facilities. *It can therefore be reasonably assumed that a small to medium WPM manufacturer may invest in a small KD/HT facility, a medium WPM manufacturer may invest in a medium KD/HT facility, and a large WPM manufacturer may invest in a medium to large KD/HT facility*;
- There are significant economies of scale: the larger the HT/KD facility, the lower the unit cost per pallet, or per m^3, of installed usable capacity. This applies not only to equipment / installation costs but also to operational costs. The economies of scale are more significant for pallets than for sawn wood (due to the more significant volume occupied by stacked pallets in the kiln compared to sawn wood);
- The minimum investment required (total fixed costs) is ~€50,000 for a small kiln;
- There do not seem to be significant differences in fixed costs between MS; in some cases, costs quoted in the UK were towards the upper end of the above range whereas costs quoted in PL were towards the lower end of the range, but these differentials appear to reflect mostly differences in equipment specification;
- Typically, the amortisation period of an investment is 5-7 years. Well maintained kilns are expected to be productive beyond 10 years and up to 25-30 years, without the need for significant repair during the first 5-10 year period, but provided they are appropriately maintained annually after the first 10 years.
- A significant part of the currently installed capacity is now 5-10 years old and, given significant technological improvements in this area (in particular the combination of KD and HT in the cycle, the reduction in the length of the cycle and the logistical improvements discussed above), with the introduction of the ISPM-15 measure, some companies may well decide that it is more cost-effective for them to re-invest to update/renew existing capacity.

The initial cost (including equipment and installation) of a KD/HT facility with an external biomass boiler can be 2- 5 times the cost for a similar capacity facility with a gas/propane boiler, and also involves higher maintenance costs and electric energy use. Furthermore, the market price of biomass has been rising considerably in recent years, reaching levels comparable to the other available feedstocks (gas or propane). Given the high initial investment cost and biomass costs, a KD/HT facility with a biomass boiler can be justified only under the following conditions: a) a minimum treatment capacity (estimated at $\geq$ 2,000-4,000 pallets/day or $\geq$ 0.5-1.4 million pallets per year, depending on the cost of the investment and the number of cycles/year); and, b) direct access to sufficient quantities of

carrying out of both HT and KD within the same cycle has to be allowed by the NPPO, but this does not appear to be always the case (e.g. not allowed in FR, as discussed above).

low cost biomass i.e. in-house wood waste[67].

The initial cost of the investment will also depend on environmental rules and safety standards, which can vary considerably between MS: for example, the emission of dust per m^3 of smoke allowed in DE is amongst the lowest in the EU, and this has implications on the biomass equipment specifications which result in a total investment cost that is twice as high in DE compared to FR (whereas the investment cost can be significantly lower in other MS, in particular some NMS). Furthermore, due to environmental and safety rules, such plants have to be located at a sufficient distance from inhabited areas, which is usually the case of sawmilling operations but not WPM manufacturing. Finally, from our consultation with equipment manufacturers, a further constraint on the use of biomass appears to be that it is not suitable (economically viable) for HT (according to ISPM 15), as there are technical constraints in reaching the temperature required which can only be overcome by raising considerably the energy and other costs.

The above conditions would only apply in the case of a large scale sawmiller with large scale WPM manufacturing operations on site; as discussed above, this is a relatively small part of the WPM production. **Given therefore the high investment costs, the variability in environmental and safety regulations between MS, uncertainty concerning the availability/price of biomass, and the various technical constraints, the feasibility and cost of such an investment will not be considered further in the analysis, as it can only be established on a case-by-case basis (i.e. at individual company level).**

a.2 Variable costs

Maintenance costs are generally relatively limited, although there can be some variation in these costs depending on the design and type of kiln including the energy source used for its heating (i.e. more significant for biomass). **On average, it is estimated that maintenance costs are ~2% per year of the base investment costs on a kiln** (and 4% per year of the initial cost of investing on an external boiler). These costs include labour for the cleaning of the kiln and any small repairs needed[68]. Regular maintenance is important for ensuring that the life of the equipment can extend to its full potential (i.e. >10 years and up to 25-30 years).

b. Operational costs

b.1 Energy costs

Costs arise from energy consumption both for electrical energy and thermal energy (the heating source of the chambers). These costs vary greatly between facilities, and also between MS, depending on technical factors, electricity costs and on the heating medium used. **On average, it is estimated that energy costs account for ~ up to 80% of the total treatment cost per pallet or m^3**.

Key parameters determining energy costs include:

- **Technical factors**, relating to the design and specifications of the WPM to be treated (HT or KD or both) and the HT/KD equipment to be used[69], can account for

[67] Such as wood bark, wood chips and off cuts from sawmilling activity or from a shredder plant using unrepairable pallets.

[68] According to information provided by a big manufacturer with good quality HT/KD facilities, kilns have to be shut down for maintenance for 1-1.5 days/every 2 months, and once per year for 2 days to perform an annual review; this suggests up to 20 days/year FTE for maintenance costs. The cost of disruption of the activity is already included in the calculation on the number of cycles that can be performed per year.

[69] From our interviews with equipment manufacturers, the two most critical factors in a well designed heat treatment kiln are 1. Heating capacity (expressed in kWh); and, 2. Air velocity (i.e. the air speed through the product; this is provided by electric motors usually directly connected to fans.). Heat input will vary by kiln

considerable variation in energy consumption[70] and therefore costs. **Moisture content** (MC) of the material to be treated is the single important factor affecting energy consumption, as it affects both the energy intensity required for the treatment and the length of the cycle. The **required drying time per cycle** will depend on both kiln specifications and MC (initial to final): it can range from one (1) HT in approx 6-8 hours and KD in approx 48-72 hours, to HT in approx 3-4 hours (3-4 times a day) and KD within 24 hours (the latest technology).

- The **cost of the heating medium used**: as indicated above, this is typically natural gas, liquid propane or biomass (e.g. wood waste) [71]. The price of these alternative inputs versus output (volume to be treated) will be the key consideration for deciding the optimal solution on the heating medium[72].

  For deciding on biomass as the heating source, given the cost of the biomass boiler equipment (as discussed above), two key criteria are to be taken into account: a) the volume of output to be treated has to be very significant to justify the initial (fixed) investment costs; and, b) in-house (on-site) availability (if a (large) sawmiller or WPM producer has significant wood waste it could make sense to invest in a biomass boiler). As an indication of the potential difference in costs between biomass and gas used for thermal energy, detailed figures provided by one equipment manufacturer suggest that, based on the availability of low-cost on-site wood waste, the total energy costs (thermal and electricity) are 5-6 times higher with gas (over wood waste) for HT only, and 3.5-6 times higher with gas (over wood waste) for KD including HT (the range depends on the initial versus final MC). However, the potential cost advantage of biomass diminishes significantly or is virtually eliminated if it has to be accessed in the open market: prices for this feedstock have been rising considerably in recent years and, expressed per kWh, are currently comparable in some cases to the price of gas. As discussed above, the biomass option is therefore mostly attractive to large scale sawmillers/WPM producers with significant in-house (on-site) availability of wood waste for raw material.

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manufacturer specifications, although there are some technically optimal levels. The air velocity should be sufficient to ensure no cold spots will occur in the KD or HT process. The cost in heat energy will vary depending on a number of other technical factors including the board thickness, **moisture content (initial MC and final MC to be reached)** and kiln design.

[70] Detailed data were provided in particular by two equipment manufacturers based in two different MS and these are broadly similar (small differences are attributed to technical specifications). As an indication, one equipment manufacturer provided detailed figures suggesting that energy consumption for HT only can vary from 0.74 to 1.68 kWh/pallet (for heat energy) plus 0.06 to 0.08 kWh/pallet (for air velocity), with the time required ranging from 3.55h to 4.30h; energy consumption for KD (to 20% moisture content) including HT, can vary from 2.8 to 8.5 kWh /pallet (for heat energy) plus 0.2 to 1.2 kWh/pallet (for air velocity),with the time required ranging from 12h to 48h. The other manufacturer provided thermal energy consumption of 0.85 to 1.33 kWh/pallet for heat energy and 0.07 kWh/pallet for electric energy for HT only, compared to 1.78 to 8.90 kWh/pallet for heat energy and 0.13 to 0.55 kWh/pallet for electric energy for KD including HT.

[71] As discussed above, most heating systems for timber drying kilns are based upon hot water boilers using oil, gas or biomass (i.e. woodwaste), but coal was also indicated as a heating medium in PL. Kilns can also be heated by steam or direct hot air, but these are less common and are not so efficient. As an indication, 2 kg wood with a moisture content of 20% has the same caloric value as 1 m^3 of natural gas.

[72] For information: there is 10.8 kw of energy in one litre of diesel; 2 kg wood with a moisture content of 20 % DB has the same caloric value as 1 m3 of natural gas.

Table 26 Energy consumption and costs

	Energy consumption per pallet (in kWh)		
	***Thermal (gas)** (a)*	***Electric***	**Total cost per pallet, in € (a)**
HT (ISPM15) only	*1.1 - 1.2 (avg)* *0.7 - 1.7 (full)*	*0.07 (avg)* *0.06 - 0.08 (full)*	~ € 0.05 to € 0.06 (**(b)** ~ € 0.04 to € 0.10 + (c)
KD including HT	*5.3 - 5.7 (avg)* *1.8 - 8.9 (full)*	*0.3 - 0.7 (avg)* *0.2 - 1.2 (full)*	~ € 0.23 to € 0.27 (b) ~ € 0.15 to € 0.55 + (c)

avg: average quotation of each source, averaged across different sources

full: full range of quotations across different sources

(a) Thermal energy consumption provided here is on the basis of gas; the thermal energy cost of gas vis a vis biomass depends on access to biomass raw material. If this is available on site (e.g. sawmiller) energy costs can be 5-6 times lower compared to gas for HT only, and 3-6 times lower for KD including HT. However, if biomass needs to be sourced in the open market, the cost differential diminishes significantly and can even completely disappear; for example, current prices of biomass quoted in the market are ~ €0.04 - €0.06/kWh which compares to gas prices (see next point).

(b) Cost on the basis of average consumption (quoted from different sources) and EU average electricity and gas prices for industrial users (2011).

(c) Cost on the basis of the full range consumption (quoted from different sources) and full range of EU electricity and gas prices for industrial users (2011).

Source: FCEC on the basis of industry consultation (WPM manufacturers; equipment manufacturers)

The main technical parameter accounting for the above range of costs is the **moisture content** of the material to be treated, which can potentially result in up to 50% higher costs for the HT of new pallets made from fresh wood (e.g. initial MC: 60-70%) compared to treatment costs for dry pallets or old (used/repaired) pallets (e.g. initial MC: 20-30%), while for KD and HT the treatment costs to achieve a final MC level of 20% can vary between the initial MC levels (e.g. initial MC: 70% vs 30%) by a factor of 4+.

b.2 Labour

Apart from the installation and maintenance of the kilns (see a.1 and a.2 above), labour is used for various operations during the HT/KD process, including for the:

- Supply of fuel to the boiler for heating the kiln/chambers (stoking costs);
- Preparation and stacking of the WPM/wood for loading/unloading of the ovens;
- Storage and stacking of treated WPM/wood;
- Monitoring of the equipment and other administrative costs.

Again the share of labour costs in total treatment costs will vary depending on the equipment specifications, in particular the level of automation of the equipment for all of the above functions, and the cost of labour as such (which can vary between MS). **On average, it is estimated that labour costs account for ~5% of total treatment cost per pallet or m^3** (this excludes labour for the installation and maintenance of the equipment which have been taken

into account in the previous cost categories).

As an indication, according to data submitted in support of the latest PT solidarity dossier[73], labour costs are distributed between the various tasks as follows (*note: the figures below include maintenance costs which are not included in the above ~ 5% estimate*):

	Pallets (€/hour)	**Sawn wood (€/hour)**	**Share for each task (%)**
stacker	6.5	5.9	21%
stoker (supply of fuel to boiler: biomass or diesel)	7.2	8.0	23% (pallets) - 28% (wood)
chamber maintenance	8.6	7.9	28%
administrative overheads [(a)]	8.8	6.3	29% (pallets) - 23% (wood)
TOTAL labour costs	***31.1***	***28.1***	***100%***

(a) Caused by the obligation to HT, including plant passporting of sawn wood, certification, keeping of records, inspection

b.3 Loading/uploading equipment costs

Operational costs will depend on the cost of the equipment used and the overall set up of WPM manufacturing/treating site. Currently, the HT/KD capacity is very rarely fully integrated in the production line. Some companies are investing in logistics to improve the loading, uploading and subsequent storage/stacking of the treated kiln(s). For example, instead of using forklifts, they are looking into loading and unloading automatically, directly from the production line with conveyor systems. In the case of one WPM manufacturing company visited (the biggest in BE), they are transferring part of the production line closer to the kilns, to minimize transfer times of the WPM from production to the kilns and associated business disruption costs (the longer the transfer the more the delays and disruption to production). These investments usually carry a considerably higher equipment cost, but can be justified longer term by savings in operational costs. **On average, it is estimated that loading/uploading equipment costs account for ~ 4-8% of total treatment cost per pallet or m^3** (this includes investing in forklifts and fuel costs, and excludes the labour costs, which have been taken into account in the previous cost category).

On the basis of the above findings to date, the relative share of the various costs involved in the overall cost of treatment is summarised below for a medium size investment on a HT/KD facility composed of a kiln with an integrated gas/propane boiler.

[73] Phytosanitary treatment of maritime pine wood: studies and substantiation of variable costs of heat treatment (HT) used to control PWN in Portugal, Porto, 29 February 2012.

Table 27 Cost composition, HT/KD facility (medium size)

	% share (est.) (b)
Investment/installation costs	
Base equipment amortisation (first 5-7 years) (a)	~ 6-10%
Operational costs	
Loading/unloading	~ 4-8%
Energy: thermal (gas) and electricity	~ 80%
Labour	~ 5%
Total cost (investment + operational costs)	**~ 100%**

(a) On the basis of a medium size HT/KD facility composed of kiln with gas/propane boiler. Includes installation and maintenance costs.

(b) Cost distribution, on the basis of average cost estimates; figures rounded.

Source: FCEC on the basis of industry consultation (WPM manufacturers; equipment manufacturers)

3.4 Stakeholder views of advantages and disadvantages of the options (qualitative)

For the majority of the consulted industry stakeholders there are few advantages associated with the introduction of compulsory ISPM 15 within the EU. Some stakeholders however acknowledged that such a measure would bring positive effects to the sector in that:

- It would strengthen the ISPM15 regime, and would be beneficial to the overall quality and competitiveness of WPM in Europe. In particular, it would prevent the spread of pests and therefore contribute to the protection of forests. This would also contribute to the improvement of the generally environment friendly image of WPM;
- It would contribute to the production of safer and longer life WPM, therefore favouring the shift to more reusable pallets. Also, it is believed to contribute to improving professionalism in the WPM sector;
- When associated with KD, HT would improve the quality of WPM (less mould, less weight of WPM and therefore reduction in energy costs for transport);
- It would tend to equalise the competitiveness conditions as well as increase transparency and harmonization of rules between countries;
- It would increase HT/KD equipment manufacturing employment, and increase employment for management and control systems;
- The existence of generalised ISPM 15 requirement within the EU would entail the application of the requirement for all third countries, and in this way, reduce the risk of importing infested wood and wood products into the EU.

The following key comments were made on the options by MS CAs and stakeholders:

With regard to all the options:

- The following **constraints** were highlighted by the industry stakeholders**:**
    - *Financial:*
        - The financial capacity of some WPM manufacturing companies to invest, in particularly of micro and small enterprises, is limited and would be an obstacle to implementation;
        - The financial capacity of repairers to invest – for the majority consisting of small enterprises – would be insufficient to respond to the need to invest in new HT/KD equipment;
    - *Physical:* another problem is related to the availability of space for facilities and storage and the restructuring of the storage space;
    - *Environmental protection regulations:* these constitute a limiting factor in terms of the potential expansion of HT facilities, particularly when located in urban/peri-urban sites;
    - *Skills:* training for the use of the equipment and compliance to ISPM 15 and schooling for repairers would be needed, especially for repairers;
    - *Feasibility:* The removal of existing markings and remarking of pallets after repair is not considered feasible / workable according to some stakeholders.

There is also an issue of differential requirements in this regard by the regional phytosanitary services and lack of harmonisation in this field across Europe.

- **Economic impact:**
    - The measure is expected to lead to an increase in the cost of production and in the price of pallets. It is argued however that, insofar as HT/KD is a quality factor, a price premium is paid, which would not be the case if were to become a compulsory generalized requirement;
    - The measure is expected to lead to an increase in the cost of repaired pallets. According to the closed pallet pools, the additional operational HT cost for a repaired pallet at €0.45, would cost the CPPC pools in excess of €100 million/year. These costs are not only related to the HT cost but also involve the transport cost of WPM to sites where it can be heat treated if the companies do not have their own facilities;

- **Environmental impact**: Increase in energy consumption and CO_2 emissions through the additional HT activity (on a larger scale for Option 1) than for Options 2 and 3 (the number of pallets circulating is 5-8 times higher than the number of newly produced pallets). This is seen as being contradictory to the intentions and objectives of Commission objectives, in particular of the DGs Environment and Energy to substantially reduce emissions;
- **Enforcement:** some stakeholders foresee an increase of counterfeiting and of unfair competition in the black market of repaired and old pallet. It is also reported that IPPC pallet markings are not necessary a guarantee that the pallet has been properly heat treated and this practice is already established is some MS, where the mark is applied without the HT being made (and for a premium of only € 0. 05 per pallet).

Option 1

- **Effectiveness/impact on the level of phytosanitary risk:** The phytosanitary risk of WPM would be significantly reduced compared to the status quo (if the treatment is undertaken properly), due to the improvement in the effectiveness of the controls. Currently in intra-community movements, it is considered difficult for CAs to monitor the WPM coming from DAs. Also, such a measure would cover risks not only from PWN but also from other wood related pests. However, compared to Options 2 and 3, the added value of applying ISPM15 on old material is questionable from a phytosanitary point of view, given the low moisture content of WPM and therefore the low potential of infestation by cross contamination from old wood/WPM (Sousa et al., 2011);
- Nonetheless, the overall **effectiveness** of the measure in limiting the phytosanitary risk of PWN is questioned by some stakeholders and CAs, as pallets are not considered to be the main problem; pests are considered to mainly spread by plants (e.g. bonsai trees), bark (for use in gardens) and other materials. In addition, the consistence with the lack of requirement for fresh timber it is questioned by some stakeholders. It is noted that if compulsory treatment of WPM is introduced, other wood materials which have a much higher phytosanitary risk (e.g. round wood with bark) must also be part of the discussion. ***This comment concerns also Options 2 and 3.***

- All the stakeholders and the CAs consider Option 1 to be unrealistic and not feasible, due to the volume of pallets to be treated and the practical constraints for the identification, recovery and collection of old pallets. Also, it is argued that when compared to Options 2 and 3, Option 1 does not improve effectiveness from a phytosanitary point of view, as it is empirically recognised that dried (because of time) circulating pallets, are no longer PWN carriers, so they do not consist a risk for the spread of HOs[74]. In relation to the unit value of WPM, it was noted that this option would result in particularly disproportionately high costs of HT of WPM already in use/circulation;
- In terms of the **supply of WPM:** there would be very substantial shortfall due to the enormous stock of existing pallets that would need to be treated;
- **Phytosanitary controls** would become even more complex for the CAs. The need for inspection of compliance would increase, leading to additional costs for the NPPOs. On the other hand, some MS CAs argued that control costs under Option 1, although potentially higher in the short term (first 1-2 years) until the CAs have inspected and verified levels of compliance, would eventually be reduced. This is because all WPM would be treated whereas, under Options 2 and 3, given the potential for fraud until all WPM circulating on the market is newly produced i.e. at least until 2020, there would be a need for continuous verification checks.
- **Enforcement:** Although in principle requiring all pallets to be treated should be the most effective way to implement ISPM15, in practice it is argued this will create significant bottlenecks at all levels, at least in the first few years following introduction of the requirement. It will require inspections both at the production sites, and at the premises of repairers and users, therefore it will necessitate the targeting of a significantly larger number of inspection sites, compared to production sites only (Options 2 and 3). Recalling old pallets is also considered to be very complex, as in some cases it will be difficult to identify the owner of the pallets and therefore establish liability for implementing the measure, for the CA to be able to effectively enforce compliance. These implementation constraints are expected to compromise effectiveness in practice.

Option 2 and Option 3:

- **Effectiveness/ Impact on the level of phytosanitary risk:** The phytosanitary risk of WPM would be significantly reduced compared to the status quo (if the treatment is undertaken properly), due to the improvement in the effectiveness of the controls. Currently in intra-community movements it is considered difficult for CAs to monitor the WPM coming from DAs. Also, such a measure would cover risks not only from PWN but also from other wood related pests;
- According to the CAs, the two-step introduction allows industry to implement the requirements and would therefore be feasible;
- **Feasibility of controls/capacity of enforcement:** Although in theory Options 2 and 3 could have more potential for fraud compared to Option 1, it still remains more feasible in practice under certain conditions. The potential for fraud stems from the fact that, currently, it is impossible to distinguish old WPM from new WPM (the date

[74] In particular, representatives from closed pallet pools stated that pallets in circulation in closed pools are dry and immune to carry or to be infected by pests.

stamping of WPM is not widely practiced in the EU). For this reason, the majority of MS CAs argue that it will in practice be difficult to maintain effective controls (with some MS CAs indicating that they faced a similar problem with WPM from Portugal before the emergency decision was amended to cover all WPM). To overcome these problems:

- Inspections will need to be reinforced: this does not necessarily imply a need for more inspections/inspection staff, but rather improving efficiency. Options 2 and 3 can contribute to this, as inspections will be focused on the places of production;
- Date marking is important to allow traceability thereby reducing the potential for fraud. However, to effectively implement this, there is a need for a harmonized system to ensure that an identification number for each batch is placed on the wood or WPM to check the month/year of production and HT application (i.e. to verify whether the WPM was produced before or after the introduction of the new requirements). This does not exclude the potential for fraud but could reduce it;
- The effective imposition of penalties is an additional means of ensuring enforcement. There is therefore a need for effective and harmonised measures in cases of non compliance (destruction, etc).

- **By 2020, all pallets circulating on the market should in any case be treated, as in principle these would have been produced after 2015. By targeting only newly produced and repaired pallets, Option 3 therefore improves the targeting of the controls and allows the CAs to focus better their resources and capacity** (although from a phytosanitary point of view the comments made above on the risk of spread of pests through WPM with low MC as described for Option 1 still apply).
- **Cost of controls:** It should make it easier, compared to the status quo, to check the conformity of the WPM as ISPM 15 will apply to all new WPM (irrespective of origin). Compared to Option 1, there would be efficiency gains in that inspections would be focusing on the places of production only. On the other hand, some MS CAs have expressed concerns that Options 2 and 3 could entail higher control costs than Option 1, to verify that non HT ISPM 15 circulating material was produced prior to the date of introduction of the new measures, and that date marking is not forged.

Table 28 Qualitative assessment of the options by the consulted stakeholders[75]

	Status quo - variant A	Status quo - variant B	Option 1	Option 2	Option 3
Effectiveness (phytosanitary risk)	Risk of spread of HOs (-)	Positive compared to variant A (+) although risk of spread (e.g. from areas where HOs are present but not yet detected) (-)	Phytosanitary risk significantly reduced compared to status quo (+) ISPM15 will also apply to third countries therefore reducing risk of imports of infested material (+) Not coherent with scientific evidence (old pallets no longer pose risk for spread of HOs) (-) According to industry and some CAs, pallets are not the main source of risk (-) Lack of consistency as no treatment required for fresh timber (-)	Phytosanitary risk significantly reduced compared to status quo (+) ISPM15 will also apply to third countries therefore reducing risk of imports of infested material (+) Not coherent with scientific evidence (old pallets no longer pose risk for spread of HOs) (-) According to industry and some CAs, pallets are not the main source of risk (-) Lack of consistency as no treatment required for fresh timber (-)	Phytosanitary risk significantly reduced compared to status quo (+) ISPM15 will also apply to third countries therefore reducing risk of imports of infested material (+) According to industry and some CAs, pallets are not the main source of risk (-) Lack of consistency as no treatment required for fresh timber (-)
Enforcement			Feasibility of enforcement (all the WPM to be treated by the same date) (+)	High risk of fraud in first 5 years due to coexistence of old and new pallets (-)	Some risk of fraud ,if persisting coexistence of old and new pallets >2020, but this is expected to be relatively limited (-)
Economic impact	Level of costs adjusted to risks (+)	Level of costs adjusted to risks (+) Potential disruptions to trade while installing capacity for treatment (-)	Improvement to the sector (trend towards more reusable, better quality WPM) (+) When associated with KD, it increases quality of WPM (+) Overall adverse impact on employment and SMEs (-), but potential for increase in employment in HT/KD equipment manufacturing sector and supervision of system (+) Very high investment costs (-) Low profitability of investment (-)	Improvement to the sector (trend towards more reusable, better quality WPM) (+) When associated with KD, it increases quality of WPM (+) Overall adverse impact on employment and SMEs (-), but potential for increase in employment in HT/KD equipment manufacturing sector and supervision of system (+) High investment costs (-) Cost increase (-)	Improvement to the sector (trend towards more reusable, better quality WPM) (+) When associated with KD, it increases quality of WPM (+) Overall adverse impact on employment and SMEs (-), but potential for increase in employment in HT/KD equipment manufacturing sector and supervision of system (+) High investment costs (-) Cost increase (-)

[75] Industry stakeholders (WPM sector) and MS Competent Authorities.

	Status quo - variant A	Status quo - variant B	Option 1	Option 2	Option 3
			Cost increase (not reflected in the quality of the product for old lower quality pallets) (-) Reduced potential for price premium (-) Supply shortages (-) Makes plastic pallets more competitive (-)	Reduced potential for price premium (-) Makes plastic pallets more competitive (-)	Reduced potential for price premium (-) Makes plastic pallets more competitive (-)
Control	Difficult to control intra-EU trade particularly in case of DAs only (-)	In principle controls focused on risk origins (+) but in practice hard to identify WPM origin (-) Difficult to control intra-EU trade particularly in case of DAs only (-) Increase in control costs for CAs (in proportion to the number of outbreaks and proximity with MS affected) (-) Effectiveness likely to diminish as DAs expand (-)	Major control difficulty as WPM movement will need to be subject to random checks (-)	Better targeted and more efficient controls (place of production and repair) (+)	Better targeted and more efficient controls (place of production and repair) (+)
HT capacity	Adjusted to need (+)	Insufficient (-) Difficult to install at short time (-) Adjusted to need (+)	Entirely insufficient and not possible to install capacity within timeline (-) Equipment overcapacity as only used once then idle (-)	Insufficient (even more so in case HT for repaired pallets required): 4-5 years to install capacity from date of announcement according to industry (-) Timeline allows sector to prepare (+) Treatment capacity adjusted to need (+)	
Environmental impact			It would prevent the risk of spread of HOs and therefore contribute to protection of forests (+) Environmental impacts of increased energy consumption and CO_2 emissions for treatment (-) Makes plastic pallets more competitive with consequent negative environmental impact) (-)		
Constraints			Impossible to recall all circulating pallets (-) Financial, environmental, physical, technical as for repaired (skills and feasibility of remarking) (-) Sawmilling sector more interested in supplying the	Financial, environmental, physical, technical as for repaired (skills and feasibility of remarking) (-) Sawmilling sector more interested in supplying the construction market (already got correct equipment	

	Status quo - variant A	Status quo - variant B	Option 1	Option 2	Option 3
			construction market (already got correct equipment and higher prices) (-)	and higher prices) (-)	

4 Impacts on other sectors (Options 1, 2, 3)

4.1 Impacts on MS Competent Authorities (enforceability and control costs)

Each of the Options examined in this study will require enforcement measures and will carry associated costs, at the level of the CA.

In the baseline scenario, variant A, CAs of EU MS bear some control costs on import checks of WPM coming from Portugal, and there are also control costs related to road checks from Portugal into neighbouring MS. In the case of variant B, these would extend to the affected areas in the four MS regions considered by the analysis and their neighbouring regions/MS.

Under Options 1-3, in principle, control costs would be expected to be reduced in the event of reduced checks as a consequence of the introduction of generalized requirements for HT of WPM circulating intra-EU. However, other control costs are expected to arise under these options, particularly in the case of a variable introduction of ISPM 15, whereby old WPM is exempted from treatment (i.e. Option 2 until 2020; Option 3 not applied at all).

In order to assess how the controls and their costs will vary in association with the Options, a question was included in the questionnaire to the EU-27 MS CAs. The CAs have provided information on the points at which controls are operated in the status quo (baseline, variant A) and were asked to provide the current costs borne to carry out such controls. It is noted that only 14 MS (out of 22 MS that responded to the survey) have quantified the annual control costs currently incurred, and in some cases these also include costs of inspection of the authorised operators for ISPM 15 (e.g. Finland), therefore they include general costs not related to the PWN situation in Portugal as such.

The data indicate that the total costs currently borne by MS CAs in relation to PWN controls amount to €1.6 million (14 MS). The costs range from ~ €5,100 to over €500,000 in countries MS that have experienced outbreaks (Portugal, Spain) and neighbouring MS. **This highlights the potential increase in control costs borne by CAs when PWN outbreaks occur.** Therefore, it can be expected that the more the total demarcated areas and neighbouring areas expand under variant B, the more controls on imports from these countries will strengthen and the more control costs will rise.

MS CAs were asked to what extent variant B and the Options 1-3 will result in a change in the level of controls carried out compared to the baseline. The results demonstrate very divergent views amongst MS on the likely impact of variant B and Options 1-3 on the monitoring and control costs, with many MS actually suggesting there will be an increase in costs under variant B. In terms of the impact of Options 1-3, some MS have suggested an increase in control costs at least in the short term to ensure enforcement of the ISPM 15, while others have pointed out that in the long term costs could be reduced due to a better targeting of the controls.

For the most part, MS were not able to provide specific estimates of the increase or decrease in these costs in quantitative terms.

Our analysis below presents in qualitative terms the MS positions on this, outlining the impact of the different options in comparison with *status quo* variant A in terms of the following parameters:

- Whether the regulatory measure increases or reduced the level of phytosanitary risk;
- Feasibility of controls/capacity of enforcement;
- Cost of controls;

- Feasibility of implementation by industry;
- Other considerations (if any).

Table 29 Impact of the different options in comparison with status quo variant A

	Variant B	Option 1	Option 2 and 3	Option 4
Impact on the level of phytosanitary risk	Positive	Positive	Positive	Negative
Feasibility of controls/capacity of enforcement	Poor	Poor	Good	
Cost of controls	Medium-high	Medium-high	Low -medium - budget neutral if controls focus on production places and more focus on self regulation)	
Feasibility of implementation by industry	Poor	Poor	Good	

Source: FCEC survey of CAs

It is noted that the level of control costs of Option 1 compared to Options 2 and 3 remains not conclusive, as some MS CAs expect these to be higher while other MS CAs expect them to be lower. However, by limiting the inspections to the places of production, the efficiency of the inspections can be improved, therefore resulting in small increase in cost or even remaining budget neutral compared to the status quo.

Variant B

Impact on the level of phytosanitary risk

Although ISPM 15 requirements are more risk-specific (focus on the DAs), it is questioned whether this is sufficient to avoid further spread (compared to the Options), i.e. the measure will not be sufficient to cover risks from areas where PWN could be present but not yet detected (e.g. due to delays in detection or asymptomatic WPM). However, this is an improvement compared to variant A and necessary if there is a spread of PWN into new areas.

Feasibility of controls/capacity of enforcement: good

Focus on goods arriving from a larger number of specific MS, therefore increased requirements for controls (compared to variant A), but these are targeted to risk specific origins if inspections manage to target effectively the risk WPM – the effectiveness of the controls as DAs expand is questioned (see next point).

Cost of controls: significant increase

By targeting inspections on high risk origins, this should represent a minimum drain on resources. However, it is questioned whether this can be done effectively, given the complexity of the situation that will arise. In particular:

- Experience has shown that these demarcated areas may expand considerably, therefore increasing the on workload from one year to another, making it difficult to determine a multi annual monitoring program which is sufficient to reduce risk of introduction of PWN.
- Also, several MS CAs pointed out that carrying out controls will become complicated, given the complex situations that will prevail in the market[76] (some WPM needing treatment depending on origin and circulation, other WPM not) and increased potential for fraud, and that it has proven in practice difficult to obtain information about WPM movements from Portugal or other MS with outbreaks, making it difficult to plan and conduct inspections.

Conclusion: As DAs expand, the cost advantage of variant B compared to Options 2 and 3 is expected to diminish, while the controls become more simplified therefore, eventually, better targeted and more effective.

Feasibility of implementation by industry

In the case of an outbreak a fast implementation of ISPM 15 for all WPM produced in the infested MS will be very difficult, if not impossible. This increases the risk of spread in the meantime (until the measures can be implemented, taking into account that fast action is needed in order to control PWN), or – if WPM cannot move – can result in significant disruptions of trade. The results could be as devastating as in the case of Portugal, but amplified. By contrast, in the Options – particularly Options 2 and 3, the industry is made aware and given time to prepare.

Option 1

Impact on the level of phytosanitary risk: positive

The phytosanitary risk of WPM would be significantly reduced compared to the status quo (if the treatment is done properly). Currently in intra-community movements, it is difficult to monitor the WPM coming from demarcated areas. Also, it would cover risks not only from PWN but also from other wood related pests.

It is noted that if compulsory treatment of WPM is introduced, other wood materials which have a much higher phytosanitary risk (e.g. round wood with bark) must also be part of the discussion.

Compared to Options 2 and 3, the added value of ISPM15 on old material is questionable from a phytosanitary point of view, given the low MC therefore potential of infestation by cross contamination of old wood/WPM (Sousa *et al.,* 2011). However, this point remains a controversial discussion between industry and MS CAs and between MS.

Feasibility of controls/capacity of enforcement: poor

Although requiring all pallets to be treated should in principle be the most effective way to implement ISPM15, in practice this will create significant bottlenecks at all levels, at least in the first few years of introduction. It will require inspections both at the places of production, and at the places of repair and users, therefore targeting a significantly larger number of inspection places, compared to places of production only (Options 2 and 3). In some cases

[76] For example, it will be difficult to determine whether the WPM has actually originated in, or is moved from, the infested DAs, since there could be WPM unmarked which has not originated from the outbreak country but it is travelling with other WPM coming from other MS.

(e.g. old pallets loaded with products that are stored away for prolonged periods of time, e.g. in defence sector) carrying out the ISPM 15 implementation is very complicated (if not impossible). Recalling old pallets will be also very complex, as in some cases it will be difficult to identify the owner of the pallets and therefore who carries the liability for implementing the measure, for the CA to be able to enforce compliance.

These constraints of implementation will compromise effectiveness in practice.

Cost of controls: significant increase

As above, Implementing ISPM 15 for all WPM would increase the need for inspection of compliance. This will lead to additional costs for the NPPO, and are difficult to justify in an uninfested country, both for the CA and for the industry; for the latter, additional costs will also arise from the ISPM15 treatment which (for WPM circulating in an uninfested country) would be treated unnecessarily. The resulting inspection costs would therefore be significantly higher than under Option 2 and 3.

On the other hand, some MS CAs have argued that control costs under Option 1, although potentially higher in the short term (first 1-2 years) until the CAs have inspected and verified levels of compliance, would eventually be reduced, because all WPM would be treated (whereas, under Option 2 and 3, given the potential for fraud until all circulating WPM on the market is produced after 1 January 2015 i.e. at least until 2020, there would be a need for continuous verification checks during this period).

The level of control costs of Option 1 compared to Options 2 and 3 remains non conclusive, as some MS CAs expect these to be higher while other MS CAs expect them to be lower.

Feasibility of implementation by industry: poor

The CAs pointed out the short time available to industry for implementation of new legal requirements, the significant implementation costs, and the fact that this would be particularly difficult to justify for non infested MS. Also, a significant part of the required investment on ISPM 15 HT/KD facilities for the treatment of old wood by 2015 would be used to full capacity for a relatively limited period and would remain idle thereafter, unless the implementation of ISPM15 can be phased in; this will require an additional period of at least 5 years, which in practice would bring Option 1 at the same timeline as Options 2 and 3.

In relation to unit value, it was noted that this option would result in particularly disproportionate high costs of HT of WPM already in use/circulation.

Options 2 and 3

Impact on the level of phytosanitary risk: positive

The phytosanitary risk of WPM would be significantly reduced compared to the status quo (if the treatment is done properly). Currently in intra-community movements, it is difficult to monitor the WPM coming from demarcated areas. Also, it would cover risks not only from PWN but also from other wood related pests.

It is noted that if compulsory treatment of WPM is introduced, other wood materials which have a much higher phytosanitary risk (e.g. round wood with bark) must also be part of the discussion.

Feasibility of controls/capacity of enforcement: good

Although in theory this Option could have more potential for fraud compared to Option 1, it still remains more feasible in practice under certain conditions. The potential for fraud stems from the fact that, currently, it is impossible to distinguish old WPM from new WPM (the date stamping of wood packaging material is not widely practiced in the EU). For this reason, the majority of MS CAs argue that it will be difficult in practice to maintain effective controls (with some MS CAs indicating that they faced a similar problem with WPM from Portugal before the emergency decision was amended to cover all WPM). To overcome these problems:

- Inspections will need to be reinforced: this does not necessarily imply a need for more inspections/inspection staff, but improving efficiency. Options 2 and 3 can contribute to this, as inspections will be focused on the places of production.
- Date marking is important to allow traceability thereby reducing the potential for fraud: need for harmonized system to ensure that an identification number of each batch is placed on the wood or WPM to check the month/year of production and HT application (i.e. to verify whether the WPM was produced before or after the introduction of the new requirements). This does not exclude the potential for fraud but can make reduce it.
- The effective imposition of penalties is an additional means of ensuring enforcement. Need for effective and harmonised measures in cases of non compliances (destruction, etc).

By 2020, all pallets circulating on the market should in any case be treated, as in principle these would have been produced since 2015.

Cost of controls: small increase / budget neutral

As above, many of the target inspection places (of production) are already registered in the CA system that is currently monitoring the implementation of ISPM 15. It should make it easier, compared to the status quo, to check the conformity of the WPM as the ISPM 15 will be apply to all new WPM (irrespective of origin). Compared to Option 1, there would be efficiency gains in that inspections would be focusing on the places of production.

On the other hand, some MS CAs have expressed concerns that this Option could entail higher control costs than Option 1, to verify that circulating material that is not HT ISPM15 was produced prior to the date of introduction of the new measures, and that date marking could be forged.

The level of control costs of Option 1 compared to Options 2 and 3 remains non conclusive, as some MS CAs expect these to be higher while other MS CAs expect them to be lower.

Feasibility of implementation by industry: good

Two-step introduction allows the industry to implement the requirements.

Option 4

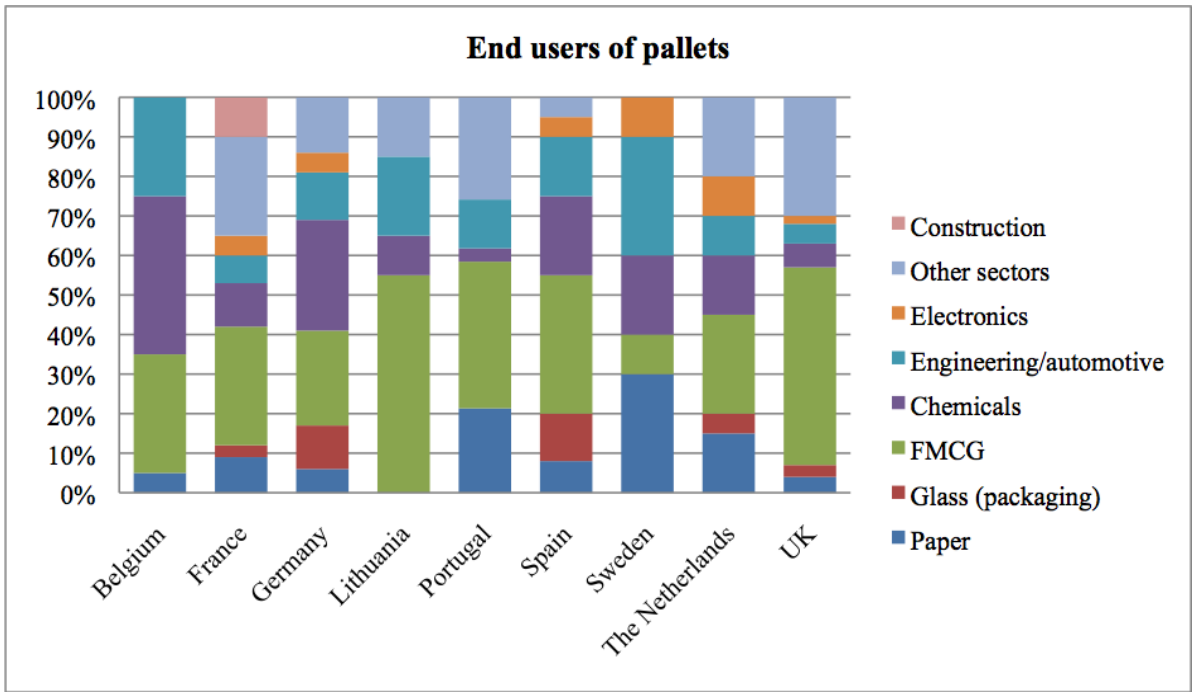
Impact on the level of phytosanitary risk

This is not a realistic option at all because the phytosanitary risk would increase in an unacceptable way. All MS CAs agree that this would lead to a great increase in the risk of PWN introduction to new areas and uncontrollable spread of PWN within the EU-27.

4.2 Impact on WPM prices and potential knock-on effects on prices of goods

Pallets and WPM are used in a broad range of manufacturing and services sectors; the main end users are the Fast Moving Consumer Goods sector (main sector served by the closed pallet pools), engineering and automotive sectors, chemical sectors.

Figure 6 Main end users of pallets in EU MS



Source: FCEC survey

Operators likely to be affected by any change in the requirements for the WPM sector are:

- Road haulage operators, shippers and forward, transport and logistics services;
- Manufacturers of goods.

The extent to which these will be affected is determined by the ownership of pallets by the different operators, and whether for instance manufacturers outsource the transport services.

Transport and logistics is a complex sector, which has undergone significant changes in the last two decades, partly driven by the shift of activity of industrial producers of manufacturing goods. These changes have significantly affected the structure and dynamics of logistics operations, e.g. some industrial manufacturers have moved away from stocking goods to supply chain management, some road haulage operators have moved to logistic operations such as storage and packaging. All of these sectors are today to varying degrees potential owners of WPM.

The complexity of the contemporary transport and logistics services has implications in terms of:

- Liability: this is related to the ownership of the WPM (pallets) and establishing liability in the case of WPM found to be non compliant;
- Enforcement: this is related to the point at which controls can take place and the feasibility of carrying these out;

- Price transmission: this is related to the extent to which this sector can pass on the increase in the price of WPM to their customers.

According to a representative of logistics sector, the increased cost for purchasing HT pallets is relevant only for the companies directly managing them (i.e. those that buy the pallets and package goods). It was indicated that there has been an increase in the price paid for a HT pallet compared to a non-HT (ca. €0.8-1.2), but it was noted that prices of HT pallets have decreased over time, also due to increased competition with pallets produced from alternative materials (e.g. plastic). Notwithstanding the fact that for some goods wood cannot be substituted, this trend is expected to continue in the future also due to the appearance of new materials (e.g. pallets from recycled plastic).

As for the freight forwarders' sector (and in general for transporters), it was noted that if the obligation was to be introduced for intra EU trade, it would have a severe impact on the sector, given the high incidence of intra EU movements on terms of total international trade movements (and considering the overall economic context). In case of extension of the ISPM 15 to intra-EU trade administrative costs (bureaucracy) would increase for the operators.

Transport and logistics representatives noted that extending the measure to intra EU movements under the different scenarios would require an increase in controls (e.g. road controls) to verify compliance. This will have an impact on time taken for deliveries, and therefore result in higher costs for the operators, in particular for those who are operating in express transports.

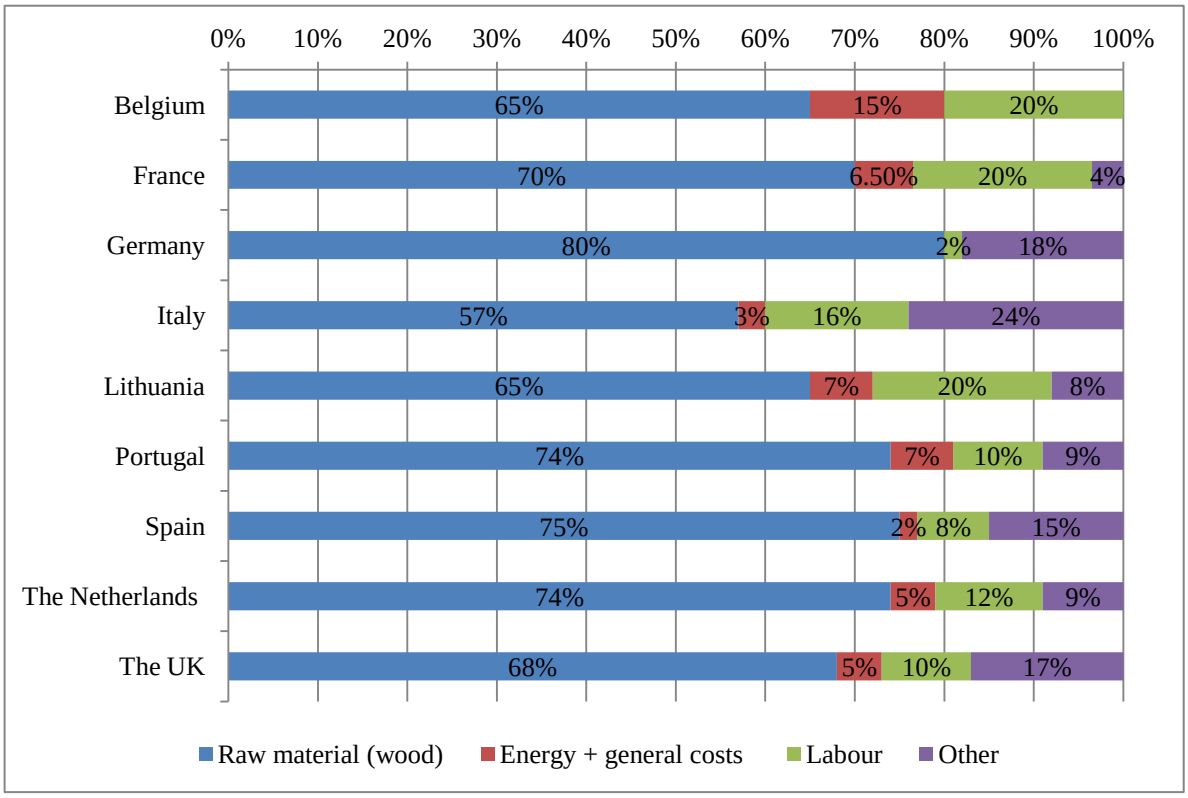
In general, the extent to which the increased cost of production would be passed on to customers depends on the level of competition and relative bargaining power between operators involved in different elements of the supply chain (i.e. WPM manufacturers/repairers versus logistics companies versus their customers), and on the availability of substitute products.

The sector is reported to operate with generally low margins as it faces a number of **constraints** that affect its competitiveness. A key constraint is the price of wood due to the fact that this is the main cost component of WPM production: as shown in Figure 7, wood account on average for 70% of total cost production of new pallets. Trends of wood supply are influenced by not only supply constraints (diminishing stocks), but also competition in demand for this raw material from other uses (e.g. biomass), and, as for treated raw material (kiln dried) by the construction sector.

As for the cost of production, energy accounts on average for 6%, labour for 13%, whereas other costs for an average 12%[77]. As for the price of pallets, it is noted that depending on the type, this can vary from 4 € to 20 €. The French representative also noted that the percentages attributed to the different categories of costs vary as well, i.e. depending on the type of energy (wood, gas, fuel oil), on the indicated proportion of costs, the cost of energy can vary from one to five percentage points (in terms of total of cost of production).

[77] Other costs indicated are: steel, material and structural costs, fixed costs, variable costs, nails, administrative and freight

Figure 7 Cost of pallet production, share (%) by cost component



Notes:
Belgium: % of wood includes also steel
France indicated for wood: 60 – 75%: it is assumed 70%; for energy and general costs: 4-9%: it is assumed 6.50%.
Source: FCEC survey

When applied, the cost of HT accounts for a percentage of the total cost of production varying from 4%-6% whereas HT/KD 10%-15%. Sweden indicated additional costs for KD/HT of €20-30/m^3 sawn timber. In absolute terms, the industry indicated that the price premium for pallets is on average **€0.5/pallet** in the case of HT and by **€1/pallet** in the case of HT/KD.

Table 30 Increase in cost of production (%) due to heat treatment and kiln drying

France (HT/KD)	Germany (HT)	Italy (HT)	Lithuania (HT)	Portugal (HT/KD)	Spain (HT)	The Netherlands (HT/KD)	The UK (HT/KD)
10% - 15%	4-5%	3.75%	5%	15%	6%	15%	15%

Source: FCEC survey

The experience to date in Portugal has indicated that the WPM industry largely had to absorb the cost increase. The WPM industry has indicated the strong bargaining position of some of their bigger customers would not allow them to transfer costs to them, particularly in the case of a generalised introduction of ISPM15.

As it stands today, it is generally accepted along the EU27 supply chain that ISPM 15-compliant WPM are sold at a majored sales price given that the supplement allows access to export, although there are indications of a reduction over time of this price premium.

However, the acceptance level looks likely to change if ISPM 15 was to become a compulsory measure, i.e. the introduction of compulsory treatment of WPM (Options 1-3) would bring a shift in the competitive environment from competition based on quality factors and price level to competition based on price level only. It is argued that this is a very competitive market and customers can easily switch to alternative suppliers. In the past, the HT component of the total product was indicated separately in the invoice, but nowadays the customer has come to expect that this cost should be borne by the producer, not by the customer. The margin is therefore further reduced. Price, rather than quality, remains the major factor for product choice by customers in this market, while the purchase of pallets is very controlled at the level of certain users (larger manufacturers, transporters), which makes it difficult to transfer this cost on them.

A stakeholder representative argued that – since the obligation would be introduced to protect forests, and therefore a public good – there should be a mechanism by which producers and users share by law the cost of such a treatment, i.e. towards a contribution to be paid in the invoice of the WPM purchased. Such a mechanism is in place for instance in Italy in relation to legislation for packaging recycling (CONAI[78]).

A detailed examination of price transmission was undertaken in the case studies. Only in the case of **France** it has been possible to obtain results, and these are reported in the following text box.

Concerning competition with other materials, plastics and cardboards are acquiring relative importance, in particular for LWP, whereas for the other typologies the market share of wood in packaging material was reported to be over 90%. Representatives of the sector in Italy, Spain and France noted that LWP are the main affected by alternative packaging materials. In France, it was noted a significant decline of market share in the retail industry for wooden LWP, where it holds less than 10% share of the packaging market against 50% for plastic packaging and 40% for cardboard. In other distribution channels, LWP accounts for 45%, cardboard 45% and plastic for 10%. These are levels that used to be the norm across all sectors a few years ago.

The industry expressed the high concern that the introduction of the ISPM 15 obligation would result in a decrease of WPM competitiveness vis à vis alternative packaging materials such as plastics and cardboard. Arguments against wood could grow if customers find difficult to use it (e.g. if due to phytosanitary concerns) the use of alternative materials such as plastics would be promoted and thus take further share. Plastics are significantly more expensive in longer cycles (e.g. exports), and competitiveness is mainly determined on price, but its relative competitiveness increases for shorter cycles and significant reuse. It is noted that if the decision to switch to plastics comes from a bigger user (e.g. plastic packaging is becoming more important in some supermarket chains), then the impact would be more substantial.

[78] CONAI – Consorzio Nazionale Imballaggi (National Consortium for Packaging) is a private consortium of packaging producers and users that has the objective of reaching the objectives of recycle of packaging material as foresees by EU legislation as transposed in national legislation (Ronchi Decree – Legislative Decree 152/06).

In any case, the treatment premium represents 2% to 10% of the price of a pallet, and pallet costs represent a relatively small share of transport and distribution costs[79], therefore the final impact of the increased cost of pallets (due to HT or HT/KD) on the price of the transported goods is expected to be negligible[80].

It is noted, however, that given the variety of product prices within the pallet market[81], single-use pallets will be disproportionately affected (given their significantly lower unit value, treatment costs represent a more important share of the final price, compared to reusable pallets). Similarly, if the rules extend to the treatment of repaired pallets (rather than use of pre-treated wood), reusable repaired pallets will be disproportionately affected compared to newly produced and treated pallets. Over time, it is expected that the new rules will provide a further incentive to the industry to recycle pallets for as long as possible and to increase the share of reusable pallets (to the extent possible, as some users tend to favour lower cost single use pallets), therefore reinforcing the trends of recent years to use higher quality, extended life, reusable pallets.

[79] On average, logistics costs account for 10-15% of the final cost of transported products (Source: DG TREN,2006). The study estimates the impact of increase in cost of other factors which affect transport and logistics: for example, an increase in the price of diesel by 40% will lead to an increase in transport costs of 8-12% (assuming a 20-30% share of fuel costs in total transport costs); with such an increase in fuel costs, total transport costs would rise, but still be less than 3%. The effect on total logistics costs would thus be modest.

[80] The analysis here is based on real price effects; it cannot be excluded, however, depending on the bargaining position of the various players in this market that some suppliers may attempt to justify cost increases on the basis of the new rules.

[81] The price of pallets depends on the type, this can vary from 4 € to 20 € per pallet.

Detailed examination of the potential impact on prices and downstream sectors following the introduction of ISPM 15 in France

Initially, the cost would be at the charge of pallet manufacturers. Among their clients, the closed pool CHEP for instance requires ISPM 15; pallets sold under the EPAL standard are already ISPM compliant. EU clients accept to pay an additional price because such pallets are suitable for export but also because they recognize EPAL pallets are stronger therefore a profitable investment on the long term. In these cases, the costs would be passed on to transporters.

Downstream in the supply chain, transport companies indicate that they carry all pallets-related costs for storage, management and services (repairing, administrative accountancy, pallet loss risk, etc.), i.e. providing their clients with the service for free. It seems unlikely that industrial clients accept an increase in cost due to ISPM 15, although it depends on the bargaining power with the clients and that transport may not take on the increase in pallet price in the first place.

Consultation was launched with manufacturing enterprises operating transport and packaging in-house, in order to understand the impact that the introduction of ISPM 15 for exports has had on the price and use of pallets. Results indicate that different approaches were adopted per sector:

- Food producers and pharmaceuticals industries for instance indicated a shift to all ISPM 15 compliant pallets to simplify stock management.
- Electric goods, canned food and nutrition/health professionals manage separately the two types of pallets.
- Alternatively, following the introduction of ISPM 15, international trade professionals opted for a change in material whenever possible, mainly to the benefit of carton pallets but also re-usable plastic pallets for trade with China and Japan.

If the standard was applying to intra-EU trade, other sectors such as electrical goods and pharmaceuticals producers recognise their potential shift to alternative pallet materials (mainly plastic). Canned food producers cannot use alternative packaging material due to the weight of products. Only food/healthcare and international traders consider it possible to pass the price increase on to clients.

Although these results are limited to one MS, they are indicative of the potential impacts of the ISPM 15 introduction on WPM prices and their knock on effects on downstream (WPM user) sectors. *FCEC attempts to conduct similar ad-hoc surveys in other MS failed, due to the lack of interest from corresponding national associations. The associations targeted were the relevant sectors' business associations in the MS, but this issue appears to be not at the top of their agenda, and therefore it has not been possible to explore further such impacts in the other MS or indeed at EU level.*

4.3 Impacts on employment

The analysis carried out in section 3.3 suggests that the extension of the obligation to perform HT may result in business closures for small companies, especially repairers, and a potential consequent loss of jobs. It is not possible to estimate the potential loss of jobs following the introduction of this measure with any degree of certainty; some industry stakeholders suggest that up to 50% of small companies in some MS may have to leave the sector[82]. Considering

[82] For example, 60% of WPM operators in PT closed down following the introduction of ISPM15.

that the majority of the estimated 7,200 companies operating in this sector are microenterprises, a closure of 10% of small enterprises in the EU 27 would result in potential job losses estimated in a range of 1,440 to 7,200 persons, assuming the average employment of such enterprises ranges from 2 to 10 persons.

These impacts have to be analysed against the potential job creation in the WPM manufacturing and repairing sector for the carrying out of the ISPM 15 treatment, as well as in the equipment manufacturing sector supplying kilns and for the supervision and management of the system (higher skilled jobs) which have not been possible to estimate. As shown in Table 31, the introduction of the new requirements under the different scenarios will generate job creation in the WPM (manufacturers and repairers) and sawmilling sectors. These are estimated at additional ~505 (manufacturing of HT new pallets) to ~1,700 (manufacturing of new HT/KD pallets) FTE employees. In addition to these, ~ 2,800 potential FTE employees would be required in the repairing sector in case treatment of repaired pallets would be obligatory. In case the requirement would be to use HT wood, additional ~ 130 to ~ 280 FTE would be required in the sawmilling sector and ~ 70 – ~160 FTE to supply HT wood for new production. In case Option 1 was to be implemented, it would result in the creation of estimated ~ 2,620 to ~ 5,690 FTE, the largest majority of which would however be temporary. Potential additional job creation may derive from the equipment manufacturers sectors supplying kilns to the WPM and sawmilling sector; however, it has not been possible to estimate this potential impact.

Table 31 Estimated impacts on employment

Option	Labour (calculated at normal use of kilns) - FTE
New HT	505
New HT+KD	1,696
Old + repaired HT	5,409
Old - repaired HT	2,620
Old + repaired HT/KD	5,692
Old - repaired HT/KD	2,903
Repaired	2,789
Sawmillers (supply HT for new) - HT - 0.031 m3	71
Sawmillers (supply HT for new) - HT/KD - 0.031 m3	109
Sawmillers (supply HT for new) - HT - 0.045 m3	103
Sawmillers (supply HT for new) - HT/KD - 0.045 m3	158
Sawmillers (supply HT for repair) 100% - 0.031 m3	192
Sawmillers (supply HT for repair) 67% - 0.031 m3	128
Sawmillers (supply HT for repair) 100% - 0.045 m3	279
Sawmillers (supply HT for repair) 67% - 0.045 m3	186

Source: FCEC analysis

4.4 Environmental impacts

Forests play a **strategic role in climate change mitigation**, as they act as carbon sinks by capturing carbon dioxide from the atmosphere and storing it in wood, thus reducing the climate-changing effect of this greenhouse gas. Carbon storage in harvested wood products can extend the carbon sequestration benefits provided by forests; their role in mitigating climate change is therefore important. The wooden pallet sector has an overall positive environmental impact, as demonstrated by the latest TIMCON study and by the Life Cycle Assessment of pallet EUR/EPAL (Dotelli, 2011), even when HT is taken into account.

As for carbon sequestration of forests, the available data (EUROSTAT, 2009) show that at least 9.6 billion tons of carbon are stored in the EU27 woody forest biomass; when considering the pinewood forests only, this is estimated at ~5 billion tons of CO_2 in the EU 27 pinewood forests (Table 32).

Outbreaks of organisms harmful to forests, such as the PWN and the mountain pine beetle (MPB, *Dendroctonus ponderosae*) have the potential to cause dramatic changes in the role of forests with regard to carbon sequestration. Evidence of impacts of MPB in Canada shows that tree mortality resulting from outbreaks may increase future carbon emissions (due to decay caused by killed trees) and reduce forest carbon uptake. With regard to the outbreak occurred in British Columbia (Canada) in 2008, the study (Kurz et al., 2008) estimated a cumulative impact over twenty years (2000-2020) of the beetle outbreak in the affected region of 270 carbon Mt (or 36 g carbon m(-2) yr(-1) on average over 374,000 km^2 of forest). The study concluded that '*this impact converted the forest from a small net carbon sink to a large net carbon source both during and immediately after the outbreak. In the worst year, the impacts resulting from the beetle outbreak in British Columbia were equivalent to approximately 75% of the average annual direct forest fire emissions from all of Canada during 1959-1999. The resulting reduction in net primary production was of similar magnitude to increases observed during the 1980s and 1990s as a result of global change',* and that '*insect outbreaks such as this represent an important mechanism by which climate change*[83] *may undermine the ability of northern forests to take up and store atmospheric carbon*'.

As an indication of the potential impacts of the PWN on the role of EU forests with regard to carbon sequestration, the impacts as recorded in Canada are applied to the potentially affected area in the EU, capably therefore to reach estimated carbon emissions of ~ **562 million tons** over twenty years. The mortality rate in the EU is estimated at 50% - 90% of the susceptible high risk forestry area, and up to 20% of the low risk area, against 80% in Canada; other factors (e.g. tree density, climate and type) do however differ, therefore the estimates provided have to be read as a rough indication of the potential impact of a similar outbreak in the EU. This having been said, a more precise estimation would require detailed scientific work and therefore this estimate must be treated with considerable caution.

[83]Climate change as contributed to the unprecedented extent and severity of this outbreak, in order of magnitude larger in area and severity than all previous recorded outbreaks.

Table 32 Estimated carbon stock of EU pinewood forests

	Pinewood forests (ha)	Carbon stock in living forest biomass (tonnes/ha)	Total carbon stock EU pinewood forests (tonnes)
Source:	*EUROSTAT*	*FAO (2011)*	FCEC estimates
AT	2,250,000	101	227,250,000
BE	274,635	95	26,090,325
BG	659,268	51	33,622,668
CZ	1,941,582	134	260,171,988
CY	173,400	n.a.	
DE	6,084,410	127	772,720,070
DK	314,000	68	21,352,000
EE	823000	74	60,902,000
EL	1,500,000	20	30,000,000
ES	5,532,385	23	127,244,855
FI	17,000,000	38	646,000,000
FR	4,470,000	76	339,720,000
HU	220,000	70	15,400,000
IE	461,310	31	14,300,610
IT	1,459,789	61	89,047,129
LT	939,000	71	66,669,000
LU	27,000	108	2,916,000
LV	1,538,433	81	124,613,033
MT	59	173	10,207
NL	150,000	76	11,400,000
PL	6,700,000	104	696,800,000
PT	1,000,000	30	30,000,000
RO	1,948,418	94	183,151,292
SE	22,000,000	45	990,000,000
SK	788,276	109	85,922,084
SI	500,000	142	71,000,000
UK	1,555,000	47	73,085,000
EU27	**80,309,965**		**4,999,388,261**

In terms of the environmental impact of the introduction of a compulsory requirement of HT for WPM, this is based on an average emission figure of 0.0002 ton CO_2 /pallet[84], with the total emission calculated on the basis of the additional number of pallets estimated to require treatment under each option.

On this basis, the FCEC has also estimated the current CO_2 emissions associated with the HT of pallets under the status quo (variant A and variant B). Currently, for the treatment of the newly produced pallets, it is estimated that ~61,000 tons of CO_2/year are emitted; in the case of variant B, the additional CO_2 emissions would amount to ~42,000 tons/year.

The introduction of the obligation to perform ISPM 15 under the different scenarios would result in additional annual CO_2 emissions associated with the treatment of pallets, estimated

[84] Dotelli (2011).

at ~204,000 tons/year (HT) to ~575,000 tons/year (HT/KD) in the case of Options 1-3 in the years following 2015.

In the case of Option 1, the additional CO_2 emissions in 2015 to treat all the circulating pallets would be in the range of ~358,000 tons/year to ~521,000 tons/year in the case of HT only, and in the range of ~746,000 tons/year to ~909,000 tons/year in the case of HT/KD.

5 Option 4

Option 4 describes the potential economic and environmental impacts of the spread of PWN in the EU, as it assumes complete deregulation, i.e. the scenario in absence of control measures. It is noted that ISPM 15 is relevant also for preventing the spread of other HOs[85].

According to literature, PWN is a serious threat worldwide to forest ecosystems (Mota and Vieira, 2008). The available literature indicates that many favourable factors collude for the introduction, spread and establishment of PWN in the EU. *Monochamus* spp (the vector of PWN) is considered present in most EU regions, therefore expected that in the long term PWN will become established in the EU (EU PRA, PHRAME[86]). PWN has already affected significantly two MS (ES[87] and PT), and has been the subject of several studies, including a review of options for the management of PWN by the FCEC for the European Commission in 2008, and the FCEC 2011 study on the potential costs and benefits of amendments to the EU plant health regime.

On the basis of available literature, the FCEC (2011) study estimated the potential loss of forestry value under four scenarios of no action taken against PWN. Depending on the extent of the PWN spread, the **potential loss of forestry value[88] could reach from €0.9-€1.7 billion** (scenario 1: no action – PWN widespread in PT) **to €39.0-€49.2 billion** (scenario 4: no action – PWN widespread in EU27) (Table 34). The assumption is that, given the high risk of introduction in new areas, spread and establishment, no action for PWN will result in gradual spread over the entire EU (i.e. at least scenario 3), as has occurred over several decades in Asia[89].

A recent bio-economic model by Soliman *et al.* (2011) estimated the potential impact of PWN within the range of impacts previously estimated by FCEC (2011), in terms of direct economic impact (loss of timber value) (Table 33).

[85] Including Anoplophora glabripennis and emerald ash borer (Agrilus planipennis).

[86] The total EU27 coniferous forest area extends over 79.6 million ha. According to PHRAME, some 12-16% of the total EU27 coniferous forest area (10-13 million ha) can be classified as high risk due to medium-high mortality rates reaching 50-90% of trees (regions with average temperature >20°C during July/August (high risk) period, i.e. extending over the south-west and Mediterranean region); in the remaining 84-88% of the EU regions (i.e. 68-71 million ha) mortality rates can be medium-low (with lowest risk regions in north EU attributed a 2.5% mortality rate, e.g. the UK and Scandinavian countries). At present, MS with findings of PWN (PT, ES; source: FVO) account for 6.8 million ha of coniferous forest, or 52-68% of the total EU 'high risk' coniferous forest area; this area includes the most susceptible species (Pinus spp. and other coniferous species), which increases the risk of PWN exposure/spread.

[87] Spain only had three outbreaks, however with big local impacts from the eradication measures.

[88] Based on prices in representative EU markets, the total productive value of EU27 coniferous forest area is estimated at €71.7 billion; the value of the above area at high risk from PWN is estimated at €12.8-€23 billion; similarly, the productive value of the total coniferous forest area in the MS already affected by PWN (ES and PT) is estimated at €12 billion.

[89] One of the most notable PWN epidemics in Asia has occurred in Japan, where pine wilt disease is estimated to have caused the destruction of some 26 million m^3 of timber since WWII.

Table 33 FCEC extrapolations on potential loss of forestry value from PWN outbreaks if no action taken

	50% mortality	90% mortality
scenario 1: PWN widespread in current area (PT)	€0.9 billion	€1.7 billion
scenario 2: PWN spreading in PT and ES	€4.6 billion	€12.0 billion
scenario 3:PWN spreading in high risk area of Southern Europe	€12.8 billion	€23.0 billion
scenario 4: PWN widespread in EU 27	€39.0 billion	€49.2 billion

Notes: Scenarios 1-3 include only regions/MS with medium-high mortality rates (50-90%). Scenario 4 includes regions/MS with low-medium mortality rates (20%). The above range of estimates in each scenario depends on mortality rate (lowest: 50%; highest: 90%), and includes forestry value only (i.e. excludes impacts on wood-working/furniture, WPM and adjacent sectors).

Source: FCEC (2011)

Table 34 Estimated potential direct damage of PWN in Europe

Country	Provence	Proportion of infested area (%)	Impact1000 (m^3)	Impact1,000 (€)
France	Aquitaine	17	13	641
France	Corse	55	9	445
France	Languedoc-Roussillon	51	17	815
France	Limousin	2	11	545
France	Midi-Pyrenees	23	17	829
France	Provence-Alps Cote d'Azur	39	12	591
France	Rhone-Alps	10	19	930
Italy	Italy	29	8	409
Portugal	Portugal	81	94,466	4,402,127
Spain	Spain	68	318,637	14,848,510
Total	**EU**	**26%**	**413,215**	**19,255,846**

Source: Soliman *et al.* (2011)

The study also estimated the indirect impacts that the loss of trees would have on the domestic supply of round wood (affected and non-affected producers), which is estimated to decrease by 26.9 million m^3 (9%), resulting in an increase in the domestic market price from 47 to 56 €/m3 (18%), and a decrease in domestic demand. The study concludes that the majority of the negative impact will be absorbed by the consumers. The net social impact (impact on producers and consumers) is estimated at €2,043 million, where the negative impact on consumers is €2,622 million and a positive impact on producers of €579 million.

In terms of potential export losses, the FCEC 2008 analysis of the socio-economic and environmental impacts of banning or not banning the movement of susceptible wood products from Portugal for stopping the spread of PWN had already provided some estimates of impacts under various scenarios for the EU as a whole. It was concluded that, in a worst case scenario where TC trading partners are reluctant to import from the EU altogether (or use PWN concerns as a justification to block exports), the total current EU exports might be affected. In this case, the impact could result in a loss of some €174 million in export value

and put 11,040 jobs at risk[90]. The worst affected MS would be DE, SE and FR, which together account for 50% of EU27 export of the EU export value. These would be the primary effects only on the susceptible wood and WPM; secondary effects on industries using WPM, transport and logistics and the wider economy would also be expected (source: FCEC, 2008). In this case there will be further jobs at risk among the forest-based industry (in total the forest-based industries, including all wood sectors and types of products/activities, employs an estimated 2.4 - 3 million people).

6 Overall conclusions and recommendations

As the results of the analysis indicate, *in the case of an extension of the obligation of ISPM 15 to WPM used for intra-EU trade*, Options 2 and 3 carry the lowest investment and operational costs in comparison with Option 1, and the scenarios that would minimise the costs (investment, operational and environmental) for the sector are those whereby repaired pallets are repaired with HT wood, (either in the totality or in the majority). Options 2 and 3 also lead to investment in capacity adjusted to the need, whereas Option 1 would lead to overcapacity. Any extension of requirement for repairers would have to be associated with harmonisation of rules at EU level for this category of pallets, to ensure a playing level field at EU level.

The obligation to comply with ISPM 15 will result in an increase in costs of registration and inspection of operators[91]. Given the higher number of manufacturers and repairers this could result in additional burden for the phytosanitary services of MS, already under resource constraints in many EU MS. Current practices differ in the EU MS with regard to fees charged for the service, cost recovery and involvement of stakeholders in the implementation of controls. In some MS the implementation of the system is shared with the industry (with controls performed by third parties), with full cost recovery through fees charged to operators and reduction of costs and burden for the CAs.

From the enforcement point of view, Options 2 and 3 would minimise costs (compared to Option 1), as only places of production/repair would need to be inspected, and not the movement of pallets. However, to overcome any potential for fraud it was suggested that date marking of the pallets could be introduced, to distinguish date of production and treatment.

In terms of the control costs, as DAs expand, the enforceability of variant B compared to Options 2 and 3 is expected to diminish, Under the status quo, in the event of a PWN outbreak fast implementation of ISPM 15 for all WPM produced in the infested MS will be very difficult, if not impossible. This increases the risk of spread until the measures can be implemented, or could result in significant disruptions to trade. The potential impact therefore, under the status quo could be as devastating as in the case of Portugal, but

[90] In the scenario for this calculation (FCEC, 2008), it was assumed that EU exports to third countries would not be affected, because the ISPM15 currently applied for all extra-EU exports will continue to apply. As the ISPM15 standard is currently applied for all extra-EU exports (source: FEFPEB), it is assumed that this would be sufficient to continue to guarantee the quality of EU exports. However, there could be a worst case scenario where TC trading partners are so reluctant to import from the EU altogether (or use PWN concerns as a justification to block exports) that the total current EU exports might be affected. In this case the impact could result in a loss of some € 174 million in export value and put 11,040 jobs at risk. These would be the primary effects only on the susceptible wood and WPM; secondary effects on industries using WPM, transport and logistics and the wider economy would also be expected but could not be estimated.

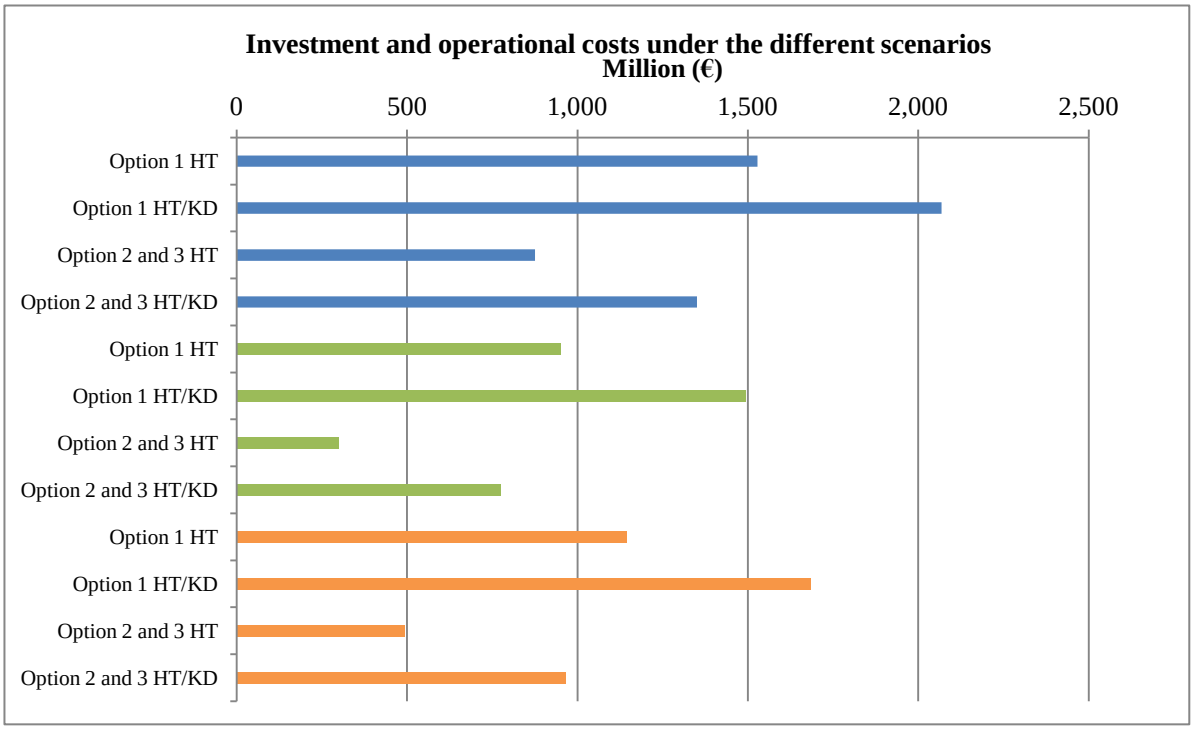
[91] This cost has not been estimated, given the high variation in fees applied at MS level and the frequency of inspections.

amplified. By contrast, in the Options – particularly Options 2 and 3 - the industry is made aware and given time to prepare.

The overall results have to be read against the scenario of non intervention, potentially leading to the destruction of the forestry resource that forms the base of the economic activity of the WPM sector and potentially of the woodworking sectors as a whole. In particular, the economic impact of Option 4 (total deregulation) indicates that **in absence of regulatory control measures the total potential impact of PWN on EU 27 forests is estimated at €39 – €49 billion**.

Considering the results of the analysis, the MS CAs and industry views, the relatively best option is concluded to be Option 3 (in practice identical to Option 2) without kiln drying (although kiln-drying may remove the residual risk of cross-pallet infestations while wood is still moist, its additional costs are disproportionate). Furthermore, in view of the changed position of PWN within the EU, the present study recommends the introduction of the obligation for WPM circulating within the EU to be subject to treatment according to ISPM 15, with banning of non compliant newly produced and repaired WPM by 2015.

Table 35 Overview of investment and operational costs under the different scenarios



Scenario 1.b: 100% of repaired pallets are treated (at point of repair)
Scenario 2: Two thirds of the total repaired pallets are repaired with HT wood and one third of the total repaired pallets is retreated.
Scenario 3: 100% of repaired pallets are repaired with HT wood.

**Results based on the top of the range unit investment costs for each size category*

Source: FCEC analysis

Part II: Background information

7 Description of the EU sector

7.1 Regulation of international trade of WPM and ISPM 15

Wood originating from living or dead trees may be infested by pests. WPM is frequently made of raw wood that may not have undergone sufficient processing or treatment to remove or kill pests and therefore remains a pathway for the introduction and spread of quarantine pests. Furthermore, due to the use of WPM (extensive movement, frequent reuse, repair or remanufacture during its lifespan), the true origin of any piece of WPM is difficult to determine, and thus its phytosanitary status cannot easily be ascertained.

ISPM 15 concludes therefore that the normal process of undertaking pest risk analysis to determine if measures are necessary, and the strength of such measures, is frequently not possible for WPM. For this reason, the standard describes internationally accepted measures that may be applied to WPM by all countries to significantly reduce the risk of introduction and spread of most quarantine pests that may be associated with this material (source: ISPM 15). To this end, two methods are currently approved for the treatment of WPM (see text box).

APPROVED TREATMENTS ASSOCIATED WITH WPM (ISPM 15 – Annex 1)

Use of debarked wood

WPM must be made of debarked wood. For this standard, any number of visually separate and clearly distinct small pieces of bark may remain if they are less than 3 cm in width (regardless of the length) or greater than 3 cm in width, with the total surface area of an individual piece of bark less than 50 square cm. For heat treatment, the removal of bark can be carried out before or after treatment.

Heat treatment (treatment code for the mark: HT)

Wood packaging material must be heated in accordance with a specific time–temperature schedule that achieves a minimum temperature of 56 °C for a minimum duration of 30 continuous minutes throughout the entire profile of the wood (including at its core). Various energy sources or processes may be suitable to achieve these parameters. For example, kiln-drying, heat-enabled chemical pressure impregnation, microwave or other treatments may all be considered heat treatments provided that they meet the heat treatment parameters specified in this standard.

Methyl bromide (MB) treatment is not allowed in the EU

Adoption of alternative treatments and revisions of approved treatment schedules

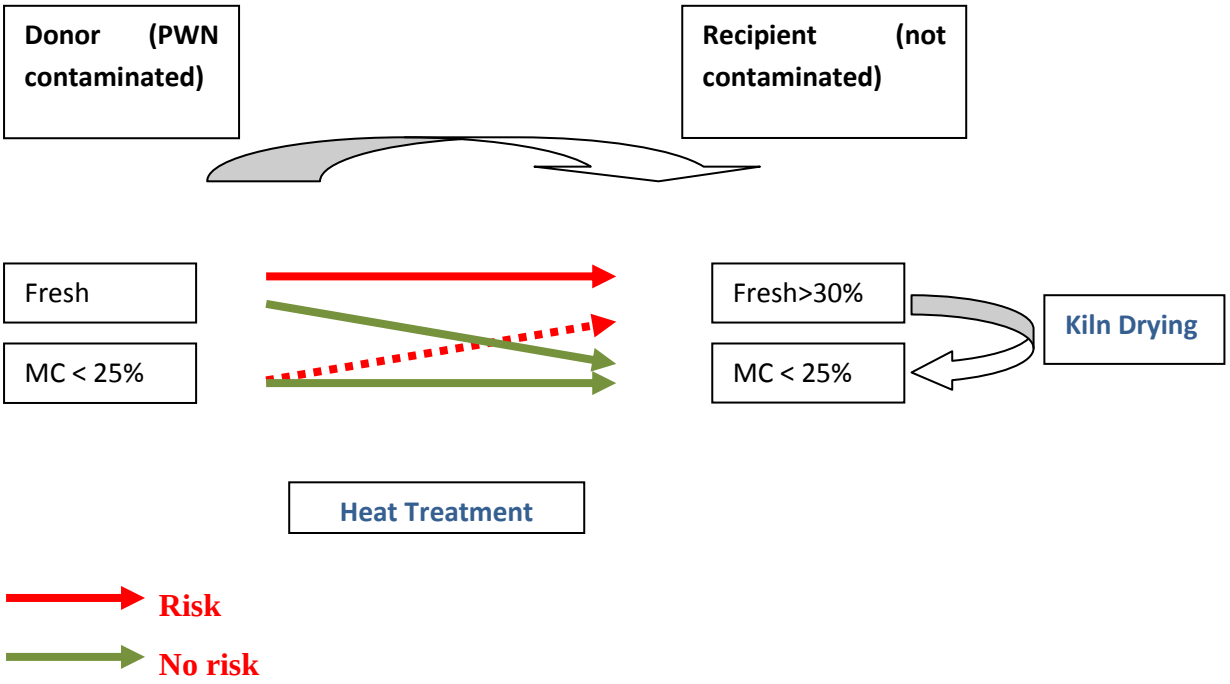
As new technical information becomes available, existing treatments may be reviewed and modified, and alternative treatments and/or new treatment schedule(s) for WPM may be adopted by the Commission on Phytosanitary Measures. If a new treatment or a revised treatment schedule is adopted for WPM and incorporated into this ISPM, material treated under the previous treatment and/or schedule does not need to be re-treated or re-marked.

Sousa *et al.* (2011) research concluded:

- The risk of cross-contamination depends on the Moisture Content (MC) of the recipient WPM (see Figure 8); if the recipient WPM has MC < 25%, the risk of cross-contamination is virtually eliminated;
- Manufacturing only HT WPM combined with repairing WPM only using HT wood will eradicate the risk of spreading PWN provided that MC<25%;
- The scientific research shows that wooden pallet timber boards and blocks naturally achieve MC < 25% after 6 weeks, i.e. at this MC level cross-contamination is virtually impossible (see first point).

We note that kiln drying (KD) is not aimed at reducing risk of pest infestation, but only at reducing MC of wood and at avoiding mould (this is a quality consideration for the industry; another advantage is the reduction in weight which results in lower transport costs).

Figure 8 Cross-contamination of WPM: results of Sousa *et al.* (2011)



Source: based on presentation made by Prof. Evans and Mr. Michielsen in the IFQRG, Canberra, September 2011

Consultation with the industry and with a scientific expert (Dr. Evans) emphasized the risk associated with two categories of WPM:

- Dunnage, as stressed also by ISPM 15 "*dunnage has been shown to present a high risk of introduction and spread of quarantine pests"*. The options suggested by the scientific expert for eliminating this risk are banning the use of dunnage or using only debarked wood for dunnage (as foreseen by ISPM 15 2009 revision).
- "Single-use" WPM presents the highest risk, because this is typically a low grade and low cost product, produced by small manufacturers and of unknown disposal or further use beyond its initial destination. Our preliminary interviews with the industry suggest that an exception to this general position would be the case of operators involved in different types of WPM (pallets, LWP, IP), who invest in HT capacity for multiple use pallets and

therefore have available capacity that could readily be used to heat treat the single – use WPM.

From consultation with the FEFPEB, we are aware that an alternative system for treatment of WPM is under examination at FAO/IPPC: Dielectric heating[92]. For the scope of this exercise we considered HT as the only available method for treatment.

7.2 Economic value of the EU forestry sector

Forests are a multi-functional resource offering landscape and amenity functions, a significant environmental role (including in the context of EU initiatives such as Natura 2000 and climate change mitigation targets), as well as supplying wood as a raw material to a range of downstream industries.

The total forest and wooded land area in the EU27 is 178 million ha, corresponding to 42% of the total EU land area. About 73% of the total forest area is available for wood supply, and of this, only 60-65% of the net annual increment is currently harvested in the EU, which is why EU forests are accumulating growing stock but also ageing. The estimated standing timber volume of EU forests is estimated at ca. 27 billion m³ and annual timber growth or net annual increment is estimated at ca. 610 million m³ (EUROSTAT, 2009; Forest Europe, 2011)[93].

The EU27 **forest-based industries**, with a **production value** of **€365 billion**, and an **added value** of **€120 billion** account for more than **3 million jobs** in **344,000 enterprises** (DG ENT)[94]. In addition to their economic weight, many parts of these industries play an essential role in maintaining sustainable employment in rural areas, and in the woodworking and printing sectors, SMEs are particularly present.

In recent years, total EU27 wood production has ranged at ca. 400 million m^3 of roundwood per year, consistently maintaining its position as one of the main roundwood producers in the world, and ca. 100 million m^3 of sawnwood per year (source: EUROSTAT). In 2010, the

[92] DH is a Technical and Scientific proposal submitted to FAO by EMitech (an Italian company) in 2004 through the coordination of MIPAAF-(Italian Ministry of Agriculture, Food and Forestry Policies) and IFQRG/FAO International Forestry Quarantine Research Group/Food and Agriculture Organization. This technology is used to heat materials that are not good heat conductors, and the heating is achieved with electromagnetic energy rather than via heat transfer. The use of microwaves as treatment method involves the exposure of wood to the electromagnetic radiation which makes materials containing water rise in temperature. When these materials are irradiated by microwaves, it is possible to observe heating and consequently drying of wood provoked by rotation and friction of polar molecules, mostly water molecules contained in wood and in insects infesting it. Currently this method is not yet approved and the industry reports there may not be sufficient manufacturing capacity to provide such equipment. From preliminary studies, the technology would appear to produce higher initial investment costs, but would allow energy savings in the treatment process (due to lower time needed to achieve the required 56° temperature). Source: Presentation (October 2011) on FEFPEB website.

[93] Source: JRC, forest data and information systems. Note: differences in data between sources due to classification and data collection methodology. Forest Europe indicates that in 2010 total EU27 forest and other wooded land was 157 million ha accounting for 38% of total land area, of which 85% were available for wood supply (133 million ha); the average felling rate (as percent of net annual increment) was 64% (Forest Europe: State of Europe's Forests 2011). Therefore, in practice, less than 55% of the total EU forest area is actually harvested for wood.

[94] Note: differences in data quoted between sources due to different sub-sector coverage. Data from UNECE: €221 billion/year; 365,000 companies; 2.4 million workers (there are also many more full-time and part-time jobs in micro-enterprises, which are not counted in the official statistics). Data from CEI-Bois: annual turnover of €270 billion (of which: €130 billion in furniture industry); 380,000 companies (of which: 150,000 in furniture industry); 3 million workers.

EU27 **annual roundwood production** was roughly valued at ca. **€16.1 billion**[95]; (Forest Europe, 2011).

In addition, NWGs are an important source of income and their share of the total economic value generated by forests is increasing. In 2010, Christmas trees, fruits and berries, and cork were the most important NWGs. The total annual value of **marketed NWGs** represents ca. 15% of the roundwood value (or **€2.4 billion**)[96]. The annual value of total **marketed services**[97] represents ca. 7% of the roundwood value (or **€1.1 billion**)[96]. In total, therefore, EU forests supply primary goods and services valued at nearly **€20 billion per year**.

The protection of the EU27 forestry sector from PH threats is relevant to a range of industries downstream the forestry sector as such. Indeed, the availability of wood as a raw material at a competitive price is a determining factor for the performance and potential added value generated by many EU industries. Wood is the highest cost component in most downstream sectors (in paper making more than 30 % of total costs are for wood; in the sawmill industry 65 to 70%). The **price of wood**[95] can fluctuate considerably depending on prevailing supply and demand conditions which are *inter alia* influenced by plant pests and diseases and their impact on the availability of wood at the required quality.

The **woodworking industries** (excluding furniture sector) have a **turnover** of **€134 billion** and generate an **added value** of **€37 billion**, employing **1.3 million** people in **197,000 enterprises** (DG ENT[94]). Most companies are small or medium-sized; the only exception are the wood-based panel sub-sector and a handful of sawmills having large enterprises. Together the **woodworking and furniture industry** has am estimated **production value of ca. €240-€260 billion** and is dominated by 5 MS (DE, IT, FR, UK, ES), which together account for €170 billion or two thirds of the EU27 output value.

Trade of forest-based products is very important, particularly within the EU27: in recent years imports (intra-EU and extra-EU) have reached circa €100-€110 billion and exports circa €110-€120 billion. The EU is a net importer of forest-based products from TCs (2009: extra-EU imports worth €6.3 billion and exports worth €3.2 billion).

On average, **13% of forest areas in the EU-27 have protective functions**; however, most forests have many functions and may be protective without being officially designated as such[98] (source: EUROSTAT, 2009).

[95] At an average value of €40/m^3 across all categories of roundwood (source: Forest Europe). Prices of roundwood and sawnwood vary considerably between MS and year on year depending on market conditions. According to EUSTAFOR, it would be difficult to make comparisons across the EU, as supply and demand factors are very specific in each MS market. The subject has been extensively discussed at the Advisory Committee on forestry and forest based industries of DG ENT, with price data presented by EUSTAFOR as follows: FI average price of roundwood (pine and spruce logs) at €55/ m^3 (standing or 'stumpage'; 2009); AT average price of roundwood (spruce and beech) at €75/ m^3 (at roadside; 2009/10).

[96] On the basis of countries reporting these values.

[97] The reported marketed services are forest-dependent or mainly forest-related and include social services (e.g. hunting or fishing, recreation and tourism), ecological services (such as environmental functions as well as infrastructure and managed natural resources), biospheric services (e.g. related to functions provided by protected and conservation sites).

[98] Certain stands are protected, e.g. in national parks, where the trees themselves are protected as well as all the habitats they provide for other plants and animals. Other stands have protective functions, e.g. for water resources or to prevent erosion (soil, water and other ecosystems functions) and to prevent landslides and avalanches in mountainous areas (infrastructure and managed natural resources functions). Forests growing on very steep slopes can thus protect other forests growing below them, settlements, roads and railways in ways that would be very expensive to replace by manmade structures.

From an environmental viewpoint, forests and forest-based industries have a **strategic role in climate change mitigation**. Forests act as carbon sinks by capturing carbon dioxide from the atmosphere and storing it in wood, thus reducing the climate-changing effect of this greenhouse gas. Carbon storage in harvested wood products can extend the carbon sequestration benefits provided by forests; their role in mitigating climate change is therefore important. The available data (EUROSTAT, 2009) show that at least 9,580 million tonnes of carbon are stored in the EU27 woody forest biomass; additional amounts are stored in the forests' deadwood (in addition, carbon is stored in similar biomass on other wooded land, but this has only been estimated in certain MS).

The **wider benefits of forests** have been estimated in some studies. For example, in the UK, in earlier studies (Willis et al, 2003), the social/environmental benefits of British forests (ca. an area of ca. 2.8 million ha) were estimated at over £1 billion (€1.2 billion) per year. Evidence from more recent studies suggests benefits are considerably higher than this figure. Estimates from DEFRA 2010 Forestry CBA for the National Forest project (forest area covering 52,000 ha) value these benefits at £228 million (€263 million) in present value (PV) over a 20 year period. The landscape/recreational value, and the biodiversity/carbon sequestration value have been estimated by the UK Forest research (2010) for specific tree species: e.g. oak (*Quercus* spp.): £240 million (€270 million) and £750 million (€844 million) per year, respectively; Corsican pine: £42 million (€47 million) and £28 million (€32 million) per year, respectively. The high values of these environmental benefits of forests in one MS point to the extensive wider environmental value of forests in the EU27 as a whole; the total UK coniferous and broadleaved area accounts for ca. 2% of the total EU27 forestry area[99]. By simple extrapolation on these UK estimates, the landscape/recreational value and the biodiversity/carbon sequestration value of EU27 forests could therefore be valued at ca. €56 billion.

7.3 Structure of the WPM sector in the EU

7.3.1 Production and circulation of wood packaging material

Wood packaging material (WPM), and in particular pallets, are a crucial component of logistics infrastructure, being used worldwide in the shipment of 90% of goods. The WPM sector represents in value approximately 8.6% of the woodworking industry, i.e. approximately €11.4 billion (EUROSTAT, data for 2008) and uses yearly an estimated 24 million m^3 of timber, representing approximately 20% of European sawn timber, for the production of approximately 570 million[100] flat pallets and 136 million box pallets (EUROSTAT, 2010[101]).

The main categories of WPM[102] are the following:

[99] Oak comprises 23% of the broadleaf area in Britain (223,000 ha); pine comprises almost 30% of the conifer growing area in Britain (409,000 ha).

[100] As discussed in section 7.3.5, there is variation in the figures of pallets between the different sources, which in part reflects differences in product definition and geographical coverage.

[101] Flat pallets and pallet collars of wood (ProdCom code: 16241133), Box pallets and load boards of wood (excluding flat pallets) (ProdCom code: 16241135). This excludes approx. 2 million tons of cases, boxes, crates, drums and similar packings of wood (excluding cable drums).

[102] For the purpose of this analysis types of WPM, as defined in Council Directive 2000/29/EC and Commission Decision 2006/133/EC are considered: dunnage, spacers and bearers, including that which has not kept its natural round surface; packing cases, boxes, crates, drums and similar packings; and pallets, box pallets and other load boards, pallet collars. Excluding boxes entirely composed of 6mm of thickness or less.
We understand from preliminary interviews with FEFPEB that there is no information available on dunnage and cable drums, but if any information becomes available on these products, it will be included in the general description and data on the sector.

Type of WPM	Features
Pallets	These account approximately for 70% of total production
Industrial packaging (IP)	Produced ad-hoc for shipment of voluminous goods, not reusable
Light-weight packaging (LWP)	Wooden crates for horticultural products, generally not reused, produced mostly in Mediterranean MS. Alternative materials are increasing in importance, e.g. plastics for the fast moving consumer goods (FMCG) such as fresh products, although from a currently relatively low base.

In some countries, companies tend to be specialized in the **production** of one type of WPM, e.g. the Netherlands, but there are also some cases of companies working across the range of WPM products, e.g. in Germany WPM producers are generally active in all sectors, i.e. pallets, IP and LWP, and only a few firms are completely specialised.

Historically, the WPM sector grew out of the sawmilling sector, but over time it has largely become a separate manufacturing operation. Despite this there are still some vertically integrated enterprises whose activities extend from sawmilling to WPM manufacturing. In bigger countries there is more margin for specialisation (WPM producers specialise in more than one type of WPM), whereas in smaller countries and in Eastern European countries there are more activities of WPM production at sawmiller level.

Currently 9,952 enterprises in the EU produce wooden containers[103], employing 95,400 persons (EUROSTAT, 2008 data), i.e. 5.5% of the total number of enterprises working in the woodworking sector in the EU and 8.2% of total employees (EUROSTAT, 2008 data).

Pallet manufacturing and repairing enterprises are estimated to number approximately 7,200 (industry source). According to FEFPEB, amongst their members, an estimated number of 80,000 employees work directly in the sector (manufacturing), and 300,000 employees work indirectly in the sector (repairing and trading).

With regard to the specialization of enterprises, from the results of the survey it appears that the majority of them (for the MS that provided a reply to this question) operate in the production of pallets (76%-91%), with the exception of Italy, where the majority of enterprises operate in the IP sub-sector (54%). LWP is mainly produced in Mediterranean countries (Portugal, Italy, Spain), where 14%-21% of all the WPM enterprises operate in the LWP sub-sector.

[103] Annual detailed enterprise statistics for industry (NACE Rev.2 B-E). The definition used in this classification covers a wider range of WPM than pallets.

Table 36 Distribution of WPM enterprises by type of products produced

	Pallet	IP	LWP	Total
Belgium	70	10	3	**83**
France	500	114	38	**652**
Germany*	124	138		**150**
Italy	350	750	300	**1,400**
Lithuania	60		4	**64**
Portugal	205	19	46	**270**
Spain	400	15	65	**480**
The Netherlands	210	15	7	**232**
The UK	380	110		**490**

* Germany: data only refer to companies with >20 employees (out of 787 companies, 637 have <20 employees). Data do not add up to total figure, due to multiple activity of certain enterprises.

Source: FCEC survey

WPM production comprises mostly small and medium size enterprises (the above EUROSTAT statistics suggest an average enterprise size of 8 employees), although a few larger enterprises are present in most of the key MS.

Our findings from the survey confirm the above data, with the companies being mainly situated in the small and medium class size[104] (1-25 employees) for what concern IP and pallets (see Figure 12).

Data concerning the LWP sector were provided by Portugal, showing the greatest majority being small enterprises and only 3 of medium size, in the Netherlands 3 enterprises are reported to be small and 4 medium, whereas in Lithuania the 4 enterprises operating in the sector are equally divided between the medium and the large class size. As for LWP, however, findings from the case study in Italy suggest that for this sub-sector enterprises are generally larger, due to the high cost of the equipment (in Italy, 80% of the output is produced by medium sized enterprises and the rest equally divided between small and large).

There appears to be significant **concentration** in the WPM manufacturing sector and a trend of consolidation in recent years: a limited number of large manufacturers produce 75% of WPM by volume, e.g. three companies in Portugal, four in Spain, four-five in the Netherlands, while a large number of small companies produce the remaining 25%. This finding was confirmed by the FCEC survey, i.e. the great majority of the output is produced by large and medium enterprises, with the exception of France, where small enterprises (89% of the total number of enterprises) account for ca. 45% of the production.

FEFPEB members represent on average 85% of total production in each MS (i.e. in their 12 member countries), the remaining 15% of production in these MS comes from very small operators who are not members of FEFPEB or any national organization, with a typical size of 2-3 employees.

[104] In our survey, enterprises active in the sector are classified on the basis of employment (number of full time equivalent (FTE) staff), as follows: Small: 1-5, Medium: 6-25 and Large: 25+

Table 37 Economic indicators for the WPM sector in the EU MS

	No. of enterprises Source: FCEC survey	No. of enterprises Source: EUROSTAT (NACE), 2009	Number of employees Source: FCEC survey	Number of employees Source: EUROSTAT (NACE), 2009	Average number of employees	Turnover Source: FCEC survey (million €)	Turnover (million €) Source: EUROSTAT (NACE), 2009	Production value (million €) Source: EUROSTAT (NACE), 2009
EU 27	**7,200**	**9,866**	80,000 (+300,000 indirectly employed)	77,336	8		9,008.40	8,421.40
Austria	108	108		992	9		126.8	120.2
Belgium	Ca. 83	151		1,265	8	260	306.7	291
Bulgaria		152		1,209	8		25.3	23.4
Czech Republic								
Cyprus								
Denmark	50	62(2008)		803 (2008)	13		143.4 (2008)	135.9 (2008)
Estonia		75		1,066	14		37.2	36.9
Latvia		103		1,348	13		80.4	74
Lithuania	64	116	1,035 (+210 indirectly employed)	2,216	19	54	53.6	51.0 (2008)
Finland		151		1,149	8		144.5	142.8
France	652	1,086 (2008)	13,000 (+5,000 indirectly employed)	14,321	13		2,516.1 (2008)	2,392.7 (2008)
Germany	787	803	10,400	11,425	14	1,626	1,546.50	1,432.30
Greece		261		486	2		90.2	42.3
Hungary		310		2,262	7		107.3	78.8
Ireland								

	No. of enterprises Source: FCEC survey	No. of enterprises Source: EUROSTAT (NACE), 2009	Number of employees Source: FCEC survey	Number of employees Source: EUROSTAT (NACE), 2009	Average number of employees	Turnover Source: FCEC survey (million €)	Turnover (million €) Source: EUROSTAT (NACE), 2009	Production value (million €) Source: EUROSTAT (NACE), 2009
Italy	1,400 (excluding repairers)	1,172	11,000	8,021	7	1,720	1,435.20	1,386.20
Luxembourg		3			0			
Malta								
Netherlands	232	143 (2008)	1,730 (+465 indirectly employed)	1,915 (2008)	13			
Poland	Ca. 1,750	1,631		9,500	6		393.7	364.1
Portugal	270	156		1,178	8		70.1	67.1
Romania		184		1,344	7		35.6	31.2
Slovakia		76		891	12		46	40.3
Slovenia		159		404	3		25.4	21.5
Spain	732 (source: INE)	893	3,380	7,158	8	285	887.1	858.3
Sweden	Ca. 400	373	1,350	2,158	6		331.7	320.7
United Kingdom	490	407	4,370 (+1,490 indirectly employed)	6,225	15		605.6	510.7

7.3.2 Industrial Packaging

The production of IP for the members of FEFPEB providing this information in the survey was as follows:

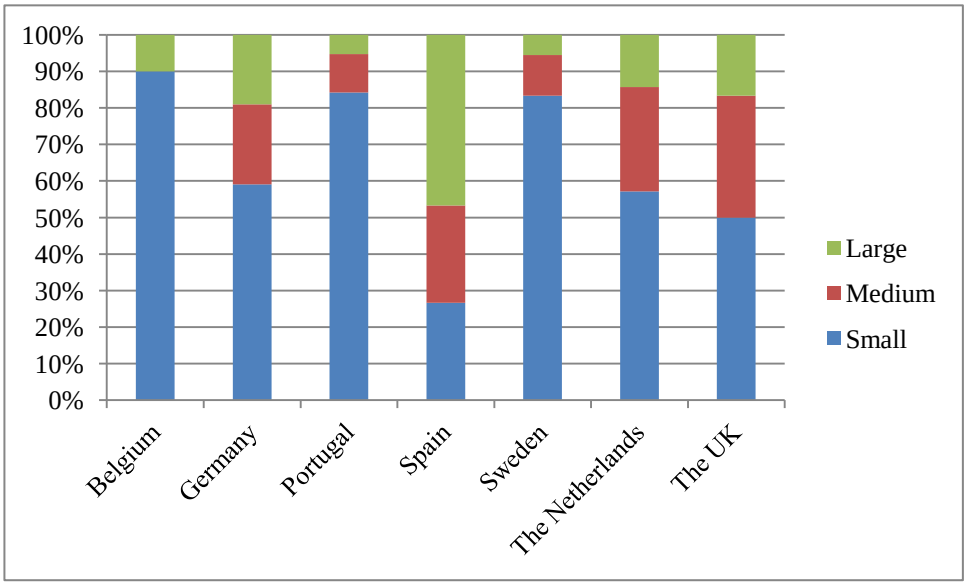
Table 38 Production of industrial packaging (m^3)

Member State	IP Production	Total WPM production
France	1,010,000 m^3	
Germany	1,392,223 m^3	4,461,163 m^3 (production of companies with > 20 employees, representing 85% of the market share)
Italy	1,200,000 m^3	5,600,000 m^3
The Netherlands	60,000 m^3	
The UK	200,000 m^3	

Source: FCEC survey

Enterprises are mainly small to medium (1-25 employees), with the exception of Spain.

Figure 9 Distribution of enterprises (%) manufacturing IP, by class size (number of employees)



Source: FCEC survey

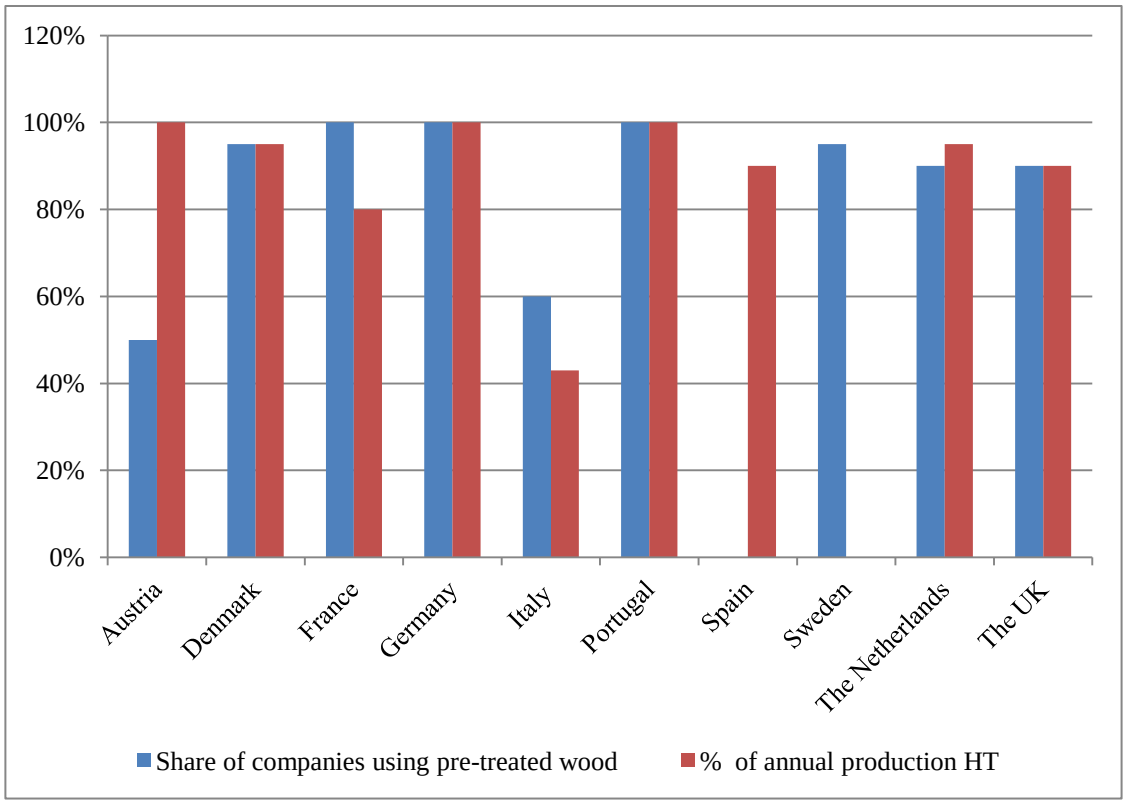
This is generally a labour intensive activity, when compared to the other typologies of WPM, as products are not standardized. Production of IP takes place in close proximity to the manufacturing operations of the industries using the packaging material; in general this is within 200 km of the WPM factory.

Outcomes of consultations with the ISPM 15 Task Force and with stakeholders in the case studies have consistently pointed out the fact that the category of IP would be less concerned by any potential extension of ISPM 15 to WPM circulating within the EU. Generally the IP industry felt less concerned, for the following reasons:

- Industrial Packaging is manufactured from HT wood (HT/KD wood is purchased from sawmilling – IP is hardly ever treated at manufacturer level) and nearly all the IP produced is HT (see Figure 10);
- IP is manufactured and sold for use within 100 – 200 km and is for the majority leaving the EU (see **Figure 11**);
- The main suppliers of wood for IP are Sweden, Finland, Norway and the Baltic countries, with 75% of wood coming from Scandinavian countries (therefore HT/KD).

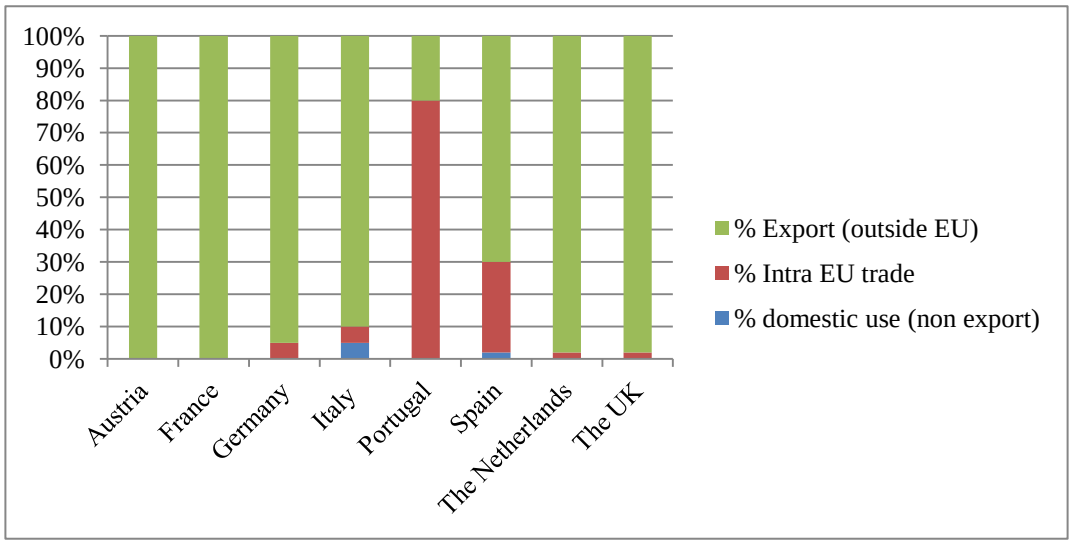
However, the case study in Italy pointed out that the risk associated with this IP is due to the use of dunnage when loading goods for shipment. This operation is distinct from IP production, as it falls in the responsibility of the operators in charge of loading the goods, e.g. in Italy 90% of phytosanitary problems (for goods shipped) are considered to be due to the use of dunnage.

Figure 10 Industrial packaging, use of pre-treated wood for production and share of HT production



Source: FCEC survey

Figure 11 Destinations of HT industrial packaging



Source: FCEC survey

7.3.3 Light – Weight Packaging

LWP is mainly produced in Mediterranean countries (Portugal, Italy, Spain), and some in France, Germany.

Germany, Italy and Spain, produced respectively 65,000 m^3, 800,000 m^3, 500,000 m^3 of LWP. The total number of enterprises in the countries surveyed is 463, for a total turnover of at least €535 million (Italy did not provide data).

Table 39 Light weight packaging sector

Member State	Light weight packaging					
	No. of companies	**Total production**	**% of total output**	**No. of employees directly employed***	**No. of employees indirectly employed***	**Turnover (€)**
Belgium						
TOTAL	**3**					
France						
TOTAL	ca. 38		**100%**			240,000,000
Germany						
TOTAL		65.000m³ (pealed or sawn poplar, some beech, but no pine)	**100%**	**300**		**16,000,000**
Italy						
Small: 1-5			10			
Medium: 6-25			80			
Large: 25+			10			
TOTAL	**300**	800,000 m^3	**100%**			
Lithuania						

Member State	Light weight packaging					
	No. of companies	**Total production**	**% of total output**	**No. of employees directly employed***	**No. of employees indirectly employed***	**Turnover (€)**
Small: 1-5						
Medium: 6-25	2			60	9	330,000
Large: 25+	2			140	16	870,000
TOTAL	**4**	9,000,000 pcs	**100%**	**200**	**25**	**1,200,000**
Portugal						
Small: 1-5	43		93			
Medium: 6-25	3		7			
Large: 25+	0		-			
TOTAL	**46**		**100%**			
Spain						
TOTAL	**65**	500,000 m3/ year (poplar plywood, poplar and pine. Only 160,000 m3/year is sawn wood susceptible of ISPM-15 regulation)	100%	1,500		278,000,000 (2010)
The Netherlands						
Small: 1-5	3		10%	7	3	
Medium: 6-25	4		90%	39	7	
Large: 25+						
TOTAL	**7**	5,000,000 pcs	**100%**	**46**	**10**	
TOTAL	**463**					**535,200,000**

Source: FCEC survey

ISPM 15 is applicable to this type of WPM only for one of the components (the corners of 3x3cm). Some wine cases and boxes have sawn wood parts thicker than 6 mm, so they have to fulfill ISMP-15 requirements as well. No data were found on the market share of this product, but it was suggested that in Spain it would be smaller than that of fruit boxes[105].

LWP producers do not have their own HT/KD installations, but purchase softwood pre-treated components from the sawmillers. It was noted in Italy that the equipment needed to cut the wood (for use as LWP components) prior to HT/KD also requires additional investments at sawmillers' level.

In Italy, the share of ISPM 15 compliant LWP is very limited (ca. 1% of total production). The same applies to Germany, where the representative of the sector stated that there has not been a trend of producing ISPM 15 compliant LWP and that crate producers are under very

[105] It was added that the wine cases market is very seasonable (e.g. in Spain they are used mainly as a gift box for Christmas holidays), and that this subsector has lost in the past part of its market, being substituted by Asian products that are imported.

strong market pressure forced by plastic crate producers and they would not be able to invest in HT equipment.

On the other hand in Spain the representative of the sector considers that there is sufficient capacity (near 100%), also due to the spare capacity that is currently made available following the construction sector crisis in the country (i.e. they are devoting more material to packaging sectors). In this MS it was also added that the majority of wood suppliers to LWP sector provide ISPM-15 compliant wood for quality reasons; the industry indicated that although the trend is more to KD[106], also HT is used.

7.3.4 Pallets

Pallets represent approximately 70% of the total production of WPM (source: FEFPEB). Pallets and containers are manufactured using a variety of materials such as wood, wood-based composites, plastic, paper and metal[107]. Wood is the most important raw material used for this purpose, representing **90% - 95%** of the pallet market.

The **supply** chain of the pallet sector includes the following operators:

- Manufacturers;
- Repairers;
- Importers and distributors;
- Pools (renters).

The activities of these companies are not homogenous; the coverage of manufacturing and repairing activities is variable and they also have different ways of serving the market. Manufacturers mostly sell their output directly to customers while pallet pool operators rent pallets and provide all the related services (collection, inspection, repair).

Pallet manufacturers

According to the survey among FEFPEB members, there are 2,910 pallet manufacturers in 10 MS. There is a dominance of small enterprises (58%), followed by medium (29%) and large (13%) enterprises (see Figure 12).

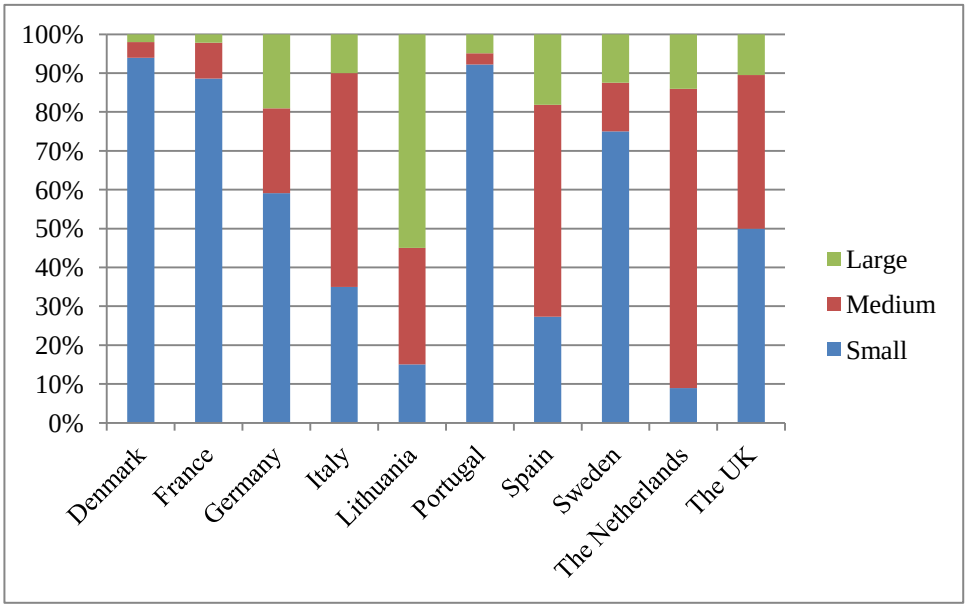
Pallet repairers

Wooden pallets are repaired or reconditioned to extend their life. There is a vast market for used wooden pallets of all sizes and weights, which are bought and then, if necessary, repaired or reconditioned for onward sale.

The activity of repairing is performed by a large number of operators (CHEP estimates that in the EU operate approximately 2,300 recoverers), the great majority of whom do not belong to any professional organization or may not even be registered In general a large number of very small operators account in volume for 20% of the market in most MS and these are considered the 'grey zone' of the industry. This situation, coupled with the fact that there are no firm data on the number of times that a pallet gets repaired, makes it extremely difficult to estimate the actual number of repaired pallets on the market.

[106] 'Mostly KD has helped the pine corner of the fruit crates to enhance performance in the whole crate, as when this is dried it does not give any longer natural wood humidity to the rest of the crate components'.
[107] Wood (Lumber: New Pallets, Refurbished Pallets; Engineered Wood: New Pallets, Refurbished Pallets); Plastics (HDPE, Other Resins); Metal (Steel, Aluminium); Corrugated Paper; Fasteners.

Figure 12 Distribution of enterprises (%) manufacturing pallets, by class size (number of employees)



Notes:
Italy: class size adapted, as definition of class sizes were as follows:
Small: 1-10 employees: 60% of enterprises;
medium: 30 employees: 30%;
large: > 30 employees: 10%.
Germany: distribution is for the pallet and IP sub-sectors
Source: FCEC survey

Table 40 Number of pallet repairers

Member State	No. of companies repairing pallets	EPAL repairers
Austria	Approx. 100 including forwarders	
Belgium	Belgium counts +/- 40 repairers with an EPAL quality licence. These repairers are the bigger ones. Since pallet repair requires very few investments, there are many more small repairers (without any quality licence), some of them part time and/or not declared.	38
Denmark	10	
France	Estimate: 1,000 (300 as their major activity, 600 to 800 as an additional work)	175
Germany	400 - 500	427
Italy	600 (est.)	135
Lithuania	14	
Poland		103
Portugal	Approx. 50	
Spain	350	18
Sweden	50 (source: PAREBO)	
Netherlands	145	25
The UK	275	

Source: FCEC survey

Production of new pallets

The industry originally estimated that approximately 400 – 450 million new pallets are produced every year by FEFPEB members and that an estimated 3.2 billion pallets are currently in circulation in the European Union for transportation of goods, from raw materials to finished products (source: FEFPEB). According to FEFPEB, 12 MS not currently members of the association account for an estimated 20% of the EU WPM industry; of these, Poland is a key producer and has been the subject of a case study in the course of this assignment in order to gather information on the sector. This will therefore give a figure of a total EU production of ca. 500 - 562.5 million pallets.

Data collected through the survey have been compared and supplemented with data available in EUROSTAT (ProdCom[108]). It is noted that some discrepancies are found in the data reported in ProdCom and data reported by the industry. Likely reasons for such discrepancies are discussed in section 7.3.5. If the data are adjusted to take into account information from the survey (i.e. substituting information for the countries surveyed), the figure of new manufactured pallets in the EU 27 amounts to **515.3 million** per year. The countries surveyed (i.e. FEFPEB countries plus Poland) account for 87% of the total EU 27 pallet production. It is noted that data are not available for some small MS (Cyprus, Luxembourg, Malta); on the basis of the EUROSTAT figures on total production, an additional 2% is added to this figure. On this basis, the total EU27 production of new manufactured pallets can be estimated at **~515 – ~527 million pallets** per year. The production of pallets and WPM in any given year is strongly correlated with the economic activity level, and in particular that of the main sectors using WPM. It is important to note that this implies that any change in the economic outlook would impact on the volume of WPM produced and on HT equipment capacity utilisation.

A further indicator of pallet production is the size of the country's population: as a rule of thumb, the industry representatives use the ratio 1:1 (1 pallet: 1 inhabitant) to estimate the annual production. As is evident from the data below, however, some countries do not follow this rule. This is the case for those countries that seem to have a production mainly destined to exports: it appears to be the case for the Baltic countries (Estonia, Latvia and Lithuania) and the Eastern European MS (Czech Republic and Poland), where the share of exported pallets in terms of the total quantity of pallets (production and imports) is quite high (see **Figure 13**). It is noted that these figures refer to total exports of the MS, however, almost the totality are traded within the EU.

There is limited export of pallets and WPM in general as a commodity[109], although there appears to be trade of empty pallets within the EU, in particular in the case of neighbouring MS in continental Europe[110], which is most likely driven by differences in price among MS (see **Figure 14** and **Figure 15**). However, caution should be used in comparing data in this figure, as the unit value, as reported by ProdCom, may be distorted by way the total number

[108] ProdCom statistics, code: 16241133: Flat pallets and pallet collars of wood.

[109] The total number of exported pallets (empty) is estimated at approximately 10 million units, i.e. 2% of the total EU annual production. Based on EUROSTAT data for 2010: some 292,935 tons of pallets, box pallets and other load boards, of wood; pallet collars of wood were exported in 2010, which – at an average weight of 28 kg for one pallet gives a figure of approximately 10 million pallets, i.e. 2% of total annual estimated production. This number however relates to s the number of empty pallets exported, and does not include the number of loaded pallets which are used to transport exported goods. These pallets are not registered in statistics as separate goods. Pallets directed to the international market have generally a different standard than the European ones (and vary by country of destination, the USA requiring a different specification from Australia for instance) and they are as a rule heat treated to ensure compliance with ISPM 15.

[110] Examples of this are trade flows from PT to ES; from the NL to DE and BE, and from PL and CZ to DE.

of pieces sold is estimated: as discussed below, if recycled pallets are also considered in the total figure for production for some countries, the unit value of a pallet may be lower due to the inclusion of recycled/repaired pallets (e.g. in the case of Italy or the UK).

Pallet pools

Pools of pallets can be "open" or "closed":

- **Open pools: EPAL and Chemical Pallets.** Open pools are exchange schemes for pallets produced according to specific standards. The ownership of the pallet belongs to the manufacturer that buys the pallets and uses them for the shipment of its goods. In principle the transporter has responsibility for returning to the owner a number of pallets equal in quantity and quality to those originally received.
- **Closed pallet pools: CHEP, La Palette Rouge, IPP-Logipal, RPS pallet pooling**. Closed pallet pools own and manage pallets, providing to the customer a full range of services. The pallet pooling company delivers to the client the required number of pallets, goods are loaded and shipped to destination and when the shipment is completed the pallet pooling company recovers the empty pallets and brings them to the closest centre, where controls and repair interventions are undertaken. In addition to these, some smaller local pools exist at national (industry) level.

In Germany, similarly to Austria, Switzerland and Italy, the pallet sector is dominated by the EUR/EPAL standard; while CHEP pallets are more often found in Spain, France, the Benelux and the Netherlands. EUR/EPAL comply with ISPM 15 (and are KD) since January 2010. This implies that in countries where EPAL pallets are more used, pallet manufacturers are likely to be better prepared for a potential extension of ISPM 15 than other EU counterparts. Although also CHEP requires ISPM 15 compliant pallets from the producers supplying the pool, the annual newly produced pallets that enter CHEP pools are 12 – 15 million, whereas EPAL pallets are in total ca. 60 million (data on EPAL production/repair are provided in Table 41). Producers that supply CHEP pools are located in Belgium, the Netherlands, France, the UK, Germany, Italy, Spain and Portugal.

Number of repaired and circulating pallets

In order to calculate the impact of the various options (and in particular the impact concerning repaired and old pallets), the FCEC has sought information on the share of re-usable and limited use pallets, whereby the following definitions are used:

Type of pallet	Lifespan
Limited use (including one trip pallets)	These pallets can circulate between 5-10 times and are generally **not** repaired
Reusable (including pallet pools)	This includes limited reuse (10-15 times), and fully reusable (extended life pallets). The limited re-use category can be repaired while the fully reusable category are generally extensively repaired

In terms of new production, the share of reusable pallets as a proportion of total pallets varies by MS from 27% to 70% (

Figure **16)**; on average, the reusable pallets are 56% of the total, confirming the preliminary information provided by FEFPEB during the inception phase. In terms of circulating pallets, the share of reusable as a proportion of the total circulating pallets varies between 20% and

100% (in Sweden), as shown in Figure 17; on average the reusable pallets are 69% of the total. These percentages were be used by the FCEC (for the countries where the information is missing) in order to assess the volume of pallets that would need to be treated under the different scenarios.

Results from the FCEC survey show that the ratio of circulating pallets over newly produced pallets is variable and ranges from 0.8 (Lithuania) to 9.8 (Spain) , i.e. for 1 pallet produced, there are 0.8 pallets – 9.8 already in circulation. This figure is likely to depend on a number of factors, such as the volume of production in previous years (i.e. in the UK), the presence of open and closed pools, and the industry practice such as re-usage (outside closed pools and EPAL circuits), which determine a longer life of pallets. The higher ratio of circulating pallets/produced is observed in countries where a higher share of pallets is re-usable, which can be considered as an indication of higher presence of pools (Figure 17), while the lower ratio could also be attributed to significant exports of production (e.g. Baltic countries). Also, the more developed the supply and the distribution chains are, the higher the number of reusable pallets in the country. The figures provided by Spain and the UK are based on studies carried out to assess the volume of pallets in circulation.

By taking into account the two ends of the spectrum, i.e. 3 and 3.8 for Germany and France, and 7.3 and 9.8 for the UK and Spain, the average circulation ratio for the whole EU would be 6 (i.e. for each new pallet produced, 6 are circulating), roughly corresponding to the average life of a pallet. By applying a ratio of 4-5 to the figures of newly manufactured pallets, the circulating pallets would be in the range of 2.1 to 2.7 billion.

Reusable pallets are repaired several times in their lifespan; this is dependent on the:

- Quality of pallets: e.g. pool pallets are high quality and their lifespan could reach beyond 10-15 years, therefore they are repaired several times;
- Market conditions: i.e. availability, price of pallets and raw materials: when prices are low, repairing a pallet might not cover the labour cost, on the other hand, in case of high differential in price with new pallets, pallets are repaired a higher number of times;
- Management of pallets: pallets in closed pools are continuously repaired and their lifespan can reach over 20 years.

FEFPEB members have indicated that pallets are repaired several times: a minimum of 3 times was indicated, an average of 5-8 times and a maximum of 25 times. For the purpose of our analysis, it is important to determine in a year n, how many times a pallet will reach a pallet repairer and need to be repaired, i.e. the number of times pallets rotate and when the repair occurs. The FEFPEB Task Force on ISPM 15 stated that on average pallets rotate:

- 3-4 times/year in a pool;
- 2 times/year outside the pool

At the end of 2011 surveys have been conducted in France on the number of rotations of pallets. The reusable pallet chosen for these surveys was the so called “Europallet type” size 800mm x 1200mm i.e. EUR-EPAL pool, renting pools and private pools using pallets reusable produced in conformity with the standard EN 13698-1 (UIC code 435-2). The surveys provided the following result:

- Life duration average: 8 years (6 to 9 years)
- Number of cycles: 3.5 per year (a cycle is considered from a producer/repairer/trader to a repairer/trader).

Depending on the sector they are used and how it is taken care of them, pallets can be repaired every second cycle or some time only every seven cycle, i.e. considering 3.5 cycles per year, this would mean repair of approximately once/year or 0.5 times/year; therefore, considering a lifespan of 8 years, this would be 4 – 8 repair/life of a pallet. The French representative indicated therefore an average of 8 times, but as this number is highly variable, this average should be regarded with extreme caution.

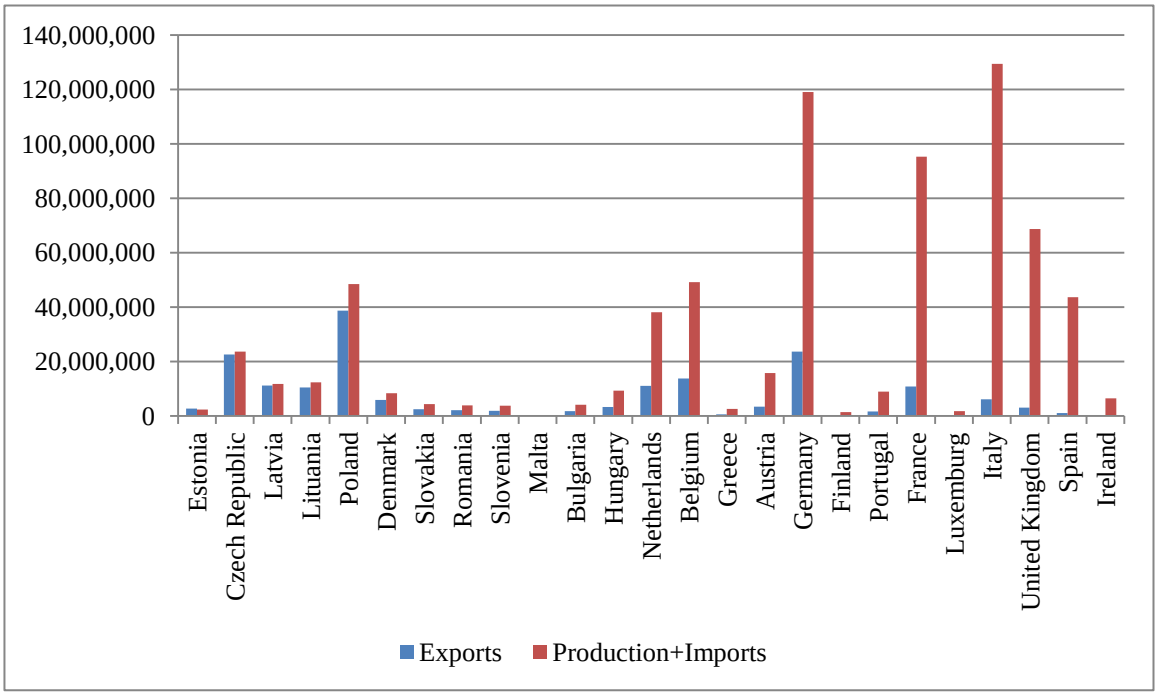
As for closed pallet pools, the representative of the main pool stated that around 100% of the pool is being repaired once a year, Therefore, as the estimated lifespan of a pallet in pools is minimum 15 years, the number of times a pallet is repaired can go up to 15 to 20 times in a pallet's life cycle. The other pools indicated an estimated number of times a pallet is repaired in 6 times over the lifespan.

On the basis of information provided by the industry, **reusable pallets are repaired on average 0.5 times/year**.

Table 41 Number of produced pallets in EU MS (2010)

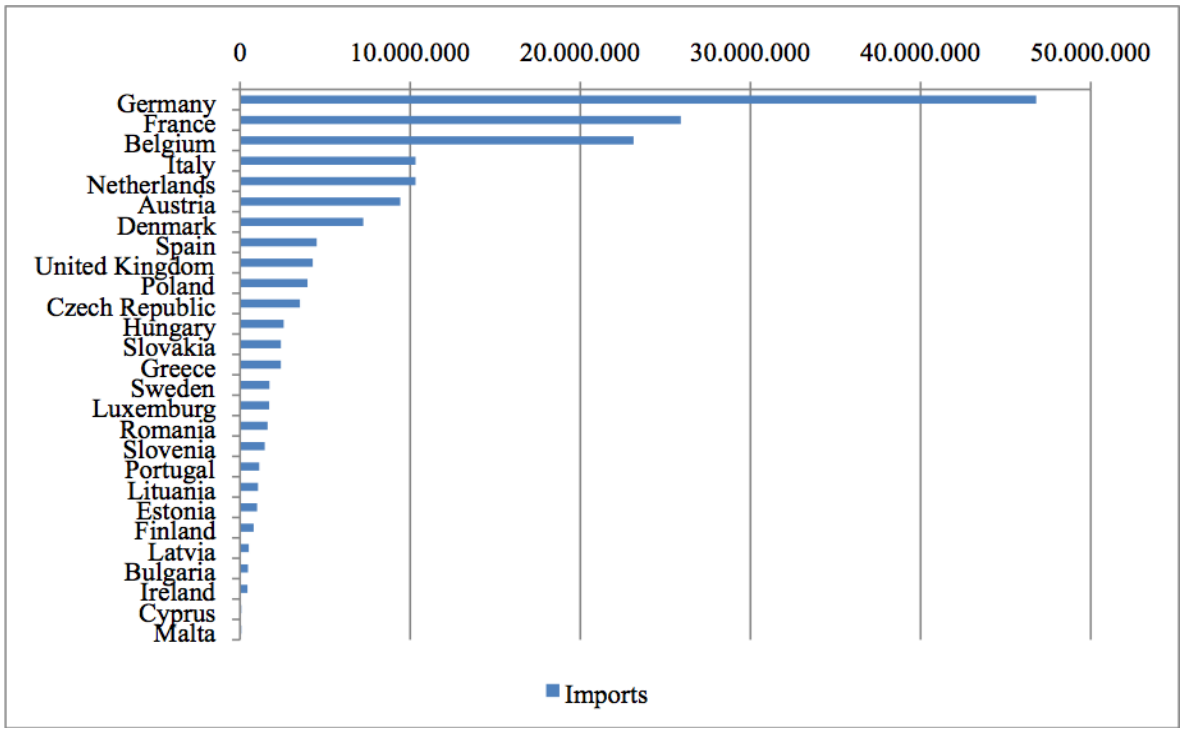
Member State	Production (no. of pallets, 2010)	Production (no. of pallets)	% of total EU production
Source of data	ProdCom	ProdCom and survey data for countries surveyed	FCEC calculation
Austria	6,351,559	6,351,559	1.2%
Belgium	26,037,879	23,000,000	4.4%
Bulgaria	3,617,332	3,617,332	0.7%
Cyprus	0	0	0.0%
Czech Republic	20,053,404	20,053,404	3.8%
Denmark	1,035,184	7,000,000	1.3%
Estonia	1,380,257	1,380,257	0.3%
Latvia	11,270,122	11,270,122	2.1%
Lithuania	11,212,634	13,000,000	2.5%
Finland	571,412	571,412	0.1%
France	69,331,372	65,000,000	12.3%
Germany	72,176,082	102,000,000	19.4%
Greece	200,692	200,692	0.0%
Hungary	6,688,425	6,688,425	1.3%
Ireland	6,010,743	6,010,743	1.1%
Italy	119,055,432	70,000,000	13.3%
Luxemburg	0	0	0.0%
Malta	0	0	0.0%
Netherlands	27,803,000	19,000,000	3.6%
Poland	44,469,000	60,000,000	11.4%
Portugal	7,750,552	18,755,000	3.6%
Romania	2,204,105	2,204,105	0.4%
Slovakia	1,983,464	1,983,464	0.4%
Slovenia	2,232,965	2,232,965	0.4%
Spain	39,131,357	32,000,000	6.1%
Sweden		13,000,000	2.5%
United Kingdom	64,417,342	30,000,000	5.7%
Total (Sum)	**544,984,314**	**515,319,480**	**100.0%**
Total (Estimated)	**570,326,000**	**526,989,378**	
FEFPEB members	**457,302,393**	**399,106,559**	76%
FEFPEB members + PL		**459,106,559**	87%

Figure 13 Exported pallets and total available pallets, by MS (2010)



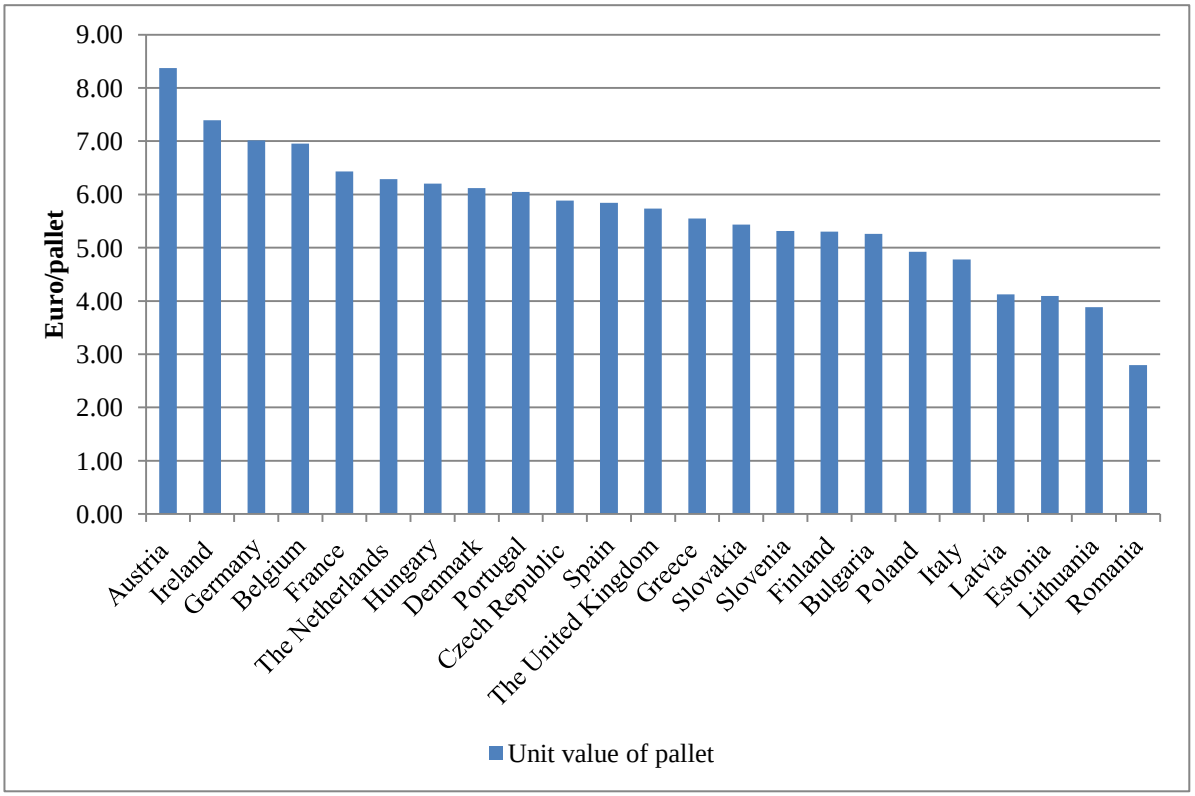
*Data for Cyprus and Sweden are not included as data for production are not available in ProdCom
**** Data refer to total exports, however, almost the totality concerns intra-EU trade.**
Source: FCEC elaboration on ProdCom data

Figure 14 Imports of pallets by MS (2010)



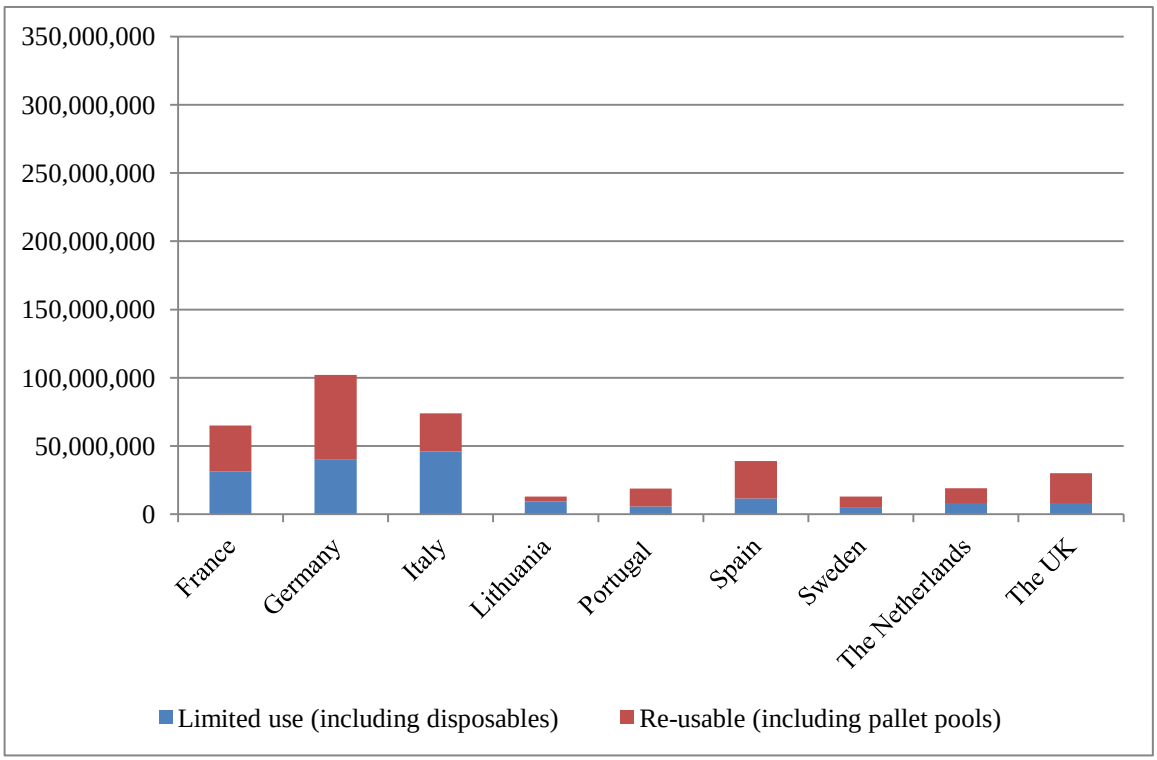
Source: ProdCom

Figure 15 Unit value of a pallet, 2010



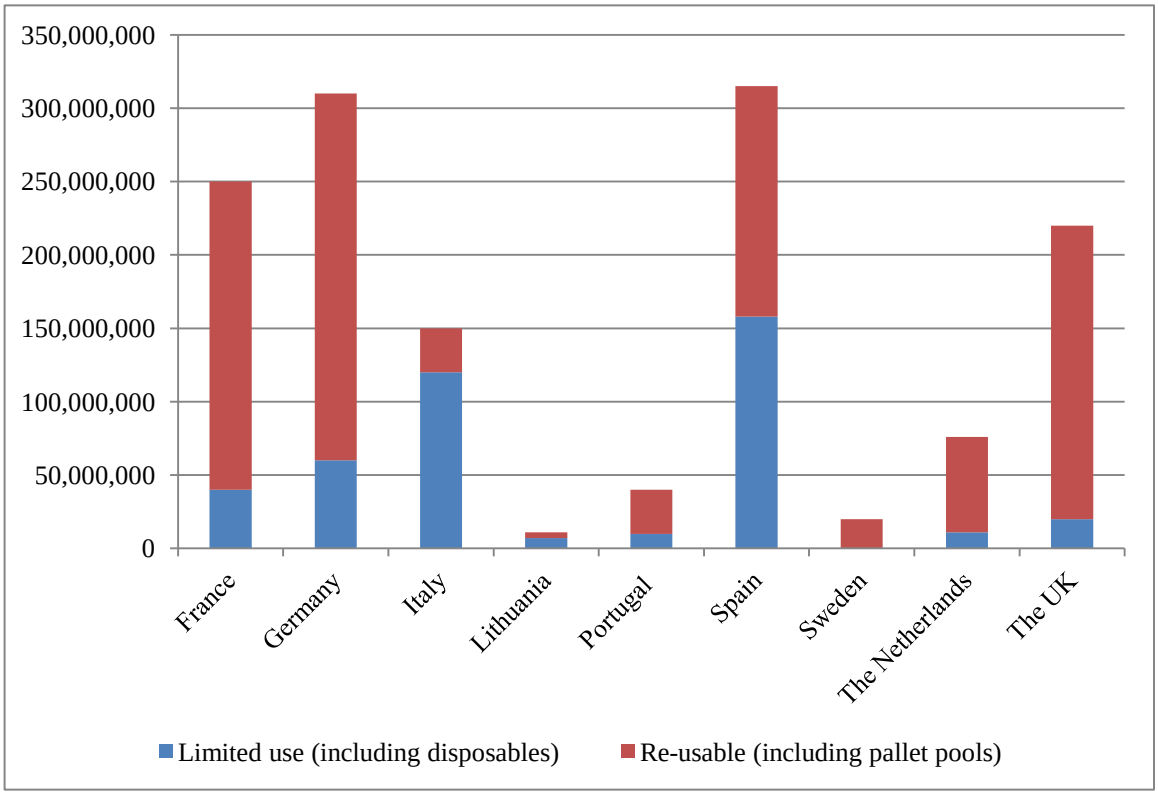
Source: ProdCom

Figure 16 Share of limited use and re-usable pallets in the production of new pallets



Source: FCEC survey

Figure 17 Share of limited use and reusable pallets in the circulating pallets



Source: FCEC survey

7.3.5 Discrepancies between EUROSTAT data and data provided by the industry

ProdCom[111] data are detailed production data on an 8 digit level which report the physical volume of production sold during the survey period and the value of production sold during the survey period[112]. Data are collected by Member States by means of survey questionnaire conforming to the requirements of the regulation. Member States may also use other sources of information to supplement the survey.

In undertaking the Prodcom survey, there are three conditions to be met:

- in each Member State at least 90% of production in each (four digit) class of NACE Rev. 1 must be recorded;
- any enterprise of 20 or more employees should be taken into account;
- if a Member State's production in each NACE class represents less than 1% of the Community total, then data for the headings in that class does not need to be collected (production is reported as zero).

Reasons for discrepancies between data reported by ProdCom and resulting from the FCEC survey may derive from the sampling method of the survey: whereas all wooden container

[111] ProdCom regulation is to be found in the Official Journal No L374/1.

[112] ProdCom headings are classified according to sold (volume and value manufactured by the enterprise and sold outside the enterprise during the reference period or total production (the products manufactured during the reference period including those sold outside the enterprise and those retained for reuse by the enterprise as input to the manufacture of other products. The preferred variable is production sold, in value and in quantity, because this corresponds most closely to the part of the production that is put on the market.

manufacturers employing 20 or more people form part of the PRODCOM inquiry, only a low number of sampled companies in the smaller employee bands contribute to the survey. Therefore this may lead to a high variance in estimation in a sector, such as the wood packaging material sector, which is highly populated with small to medium enterprises. Even though in the final estimates allowance should be made for the smaller companies, this factor may explain the differences e.g. for Denmark, where the market is composed by one major producer (with 350 employees), two medium enterprises (25 employees), and a large number of small companies below 5 employees (source: FCEC survey). However, as for the figure for Denmark the industry representative responding to the survey stressed the fact that such a figure is based on an estimate, as no formal association exists in the country for WPM and Pallet manufactures.

Moore (2010 and 2011) found additional reasons for discrepancies between these data sources. However, conclusions were not exhaustive on the reasons for discrepancies, but concluded the '*there are some estimation anomalies within the ProdCom for pallets*'. One of the most likely reason for such a difference is the computation and estimate of recycling activity: the 2009 Wood Packaging Study concluded that Prodcom's measurement of a proportion of recycled pallets was insufficient and the short interim report in March 2011 entitled "Production of Pallets in the UK - A Short Report on the Differences between ProdCom and (the WoodPackaging Study for) Timcon" stated that ' the central difference between ProdCom and the Timcon Wood Packaging Study is with the quantity of recycled activity'**.**

In particular, the main reason may be that some companies completing the Prodcom Inquiry have (incorrectly) omitted or misinterpreted the requirement to report recycling activity and/or that Prodcom has incorrectly interpreted sales as being (mostly) newly manufactured pallets and made estimates based upon this incorrect assumption. In other words, it may be the case that ProdCom has been counting all activity as manufacturing but in reality it is a mixture of newly manufactured and recycled. It is also very likely that a pallet manufacturer's sales value of annual production in the ProdCom Inquiry would include newly produced pallets and repaired and remanufactured pallets (and possibly re-used) all of which are likely to be reported as sales.

These factors may justify the discrepancies concerning mainly Italy and the UK.

7.4 Heat treatment and kiln drying capacity in the EU (current position)

The current HT capacity in the EU was estimated by FEFPEB in the course of the inception phase of this work at 20% of the new produced pallets (i.e. 80 million/year). The FCEC has sought to refine this figure in the main phase of the study in order to estimate the additional capacity needed in the various options examined.

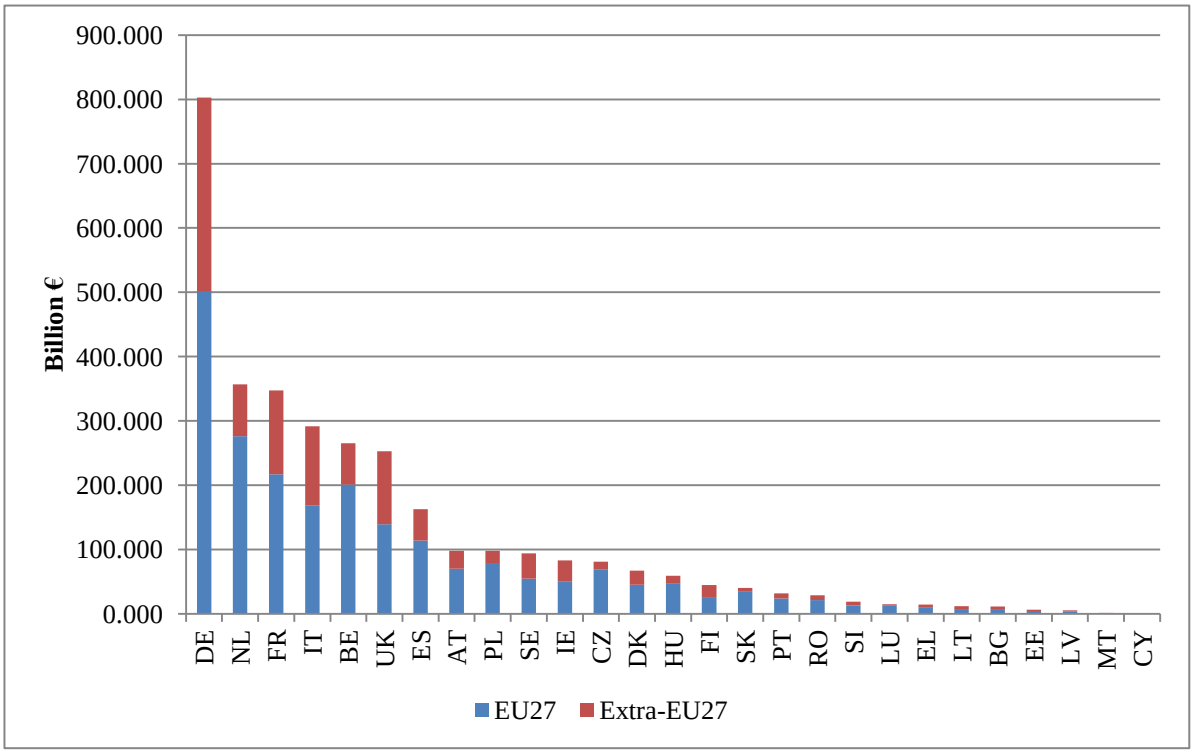
Taking into account that ca. 60 million/year new EPAL pallets are produced (HT and KD since January 2010), and the number of pallets produced for closed pools that have the specific requirement to only use HT pallets (e.g. CHEP, 12-15 million), this already gives a figure close to the one indicated above. In addition to this, there may be additional quantities of HT pallets for those customers that prefer not to manage two separate stocks of pallets, or that require KD pallets for quality reasons. Also, pallets intended for exports (other than EPAL) need to be HT (according to destination, but it is the case for the main extra – EU trade partners).

As the ISPM 15 has been implemented to date only for pallets destined to exports, an indication of the capacity in place in the EU could be based on the share of EU extra-EU exports over the total EU trade. In Germany, for instance, the share of pallets produced in

compliance with ISPM 15 is in line with the export ratio: annually, 75% of the new production of HT pallets is sent outside the EU for export trade, and 25% remains within EU's borders (and this is in line with the figure of 80% HT new pallets provided by the sector). This ratio appears to be consistent also for Italy, where 45% of new production of pallets is treated, reflecting the share of extra-EU trade of the country.

Such an estimate however cannot be carried out in an accurate way for the whole EU within the remits of this study, as it has to take into account a variety of different goods with high differences in weight and size (and therefore in number of pallets/unit traded); nor it can be done in value terms. However, as an indication it could be said that in terms of value, extra-EU exports account for 33% of the total EU exports (Figure 18).

Figure 18 EU MS exports, intra-EU and extra-EU, value in billion €, 2009



Source: DG MOVE, 2011

Stakeholders pointed out some difficulties when trying to estimate HT capacity at country level, as a number of constraints exist that inhibit the full use of the theoretical HT capacity for the treatment of WPM/pallets.

In particular, the kiln capacity available at any point in time for pallet treatment depends on the economic outlook; and is affected by two parameters:

- demand for kiln dried wood from the construction sector;
- demand for pallets from the manufacturing sector (with specific requirements for HT/KD depending on the sector).

The building sector is tightly linked with the business activity and when this is growing, it generates significant pressure on kiln capacity. In addition to the high volume to be processed, wood used in construction needs to be kiln-dried, thus increasing again the time spent in kilns and reducing available capacity for WPM. When economic growth resumes, there would be increased pressure on the availability of kiln capacity from a parallel growing

demand for ISPM 15 pallets. In this context, estimates of available (spare) kiln capacity must be used with caution and the difference between what might be in theory available and the actual available capacity must be borne in mind.

Theoretical capacity represents the total volume of timber used for the manufacturing of pallets that could be treated in the existing kilns, if no other products but only pallets were treated (pretreated wood and finished products). The *available capacity* is the capacity that is actually available for treating pallets, as opposed to other wood products.

Similarly, it was stressed that it is not possible to add up all the capacity (in volume) of the different manufacturers – the *theoretical capacity* of treatment on the basis of the total registered capacity in m^3 - as the available HT capacity is spread throughout the country and the location of the installed kilns could entail high costs of transport, therefore making their full use economically not feasible. Therefore those who have the HT capacity cannot necessarily act as service providers to those that do not have any capacity or have insufficient capacity in place.

The stakeholders responding to the survey have provided information concerning the estimated HT capacity in their country, stressing the fact that the above constraints should be taken into account when considering such capacity. Focusing the analysis on pallets, results of the survey show that:

- In some MS the capacity in place is sufficient to treat approximately half of the total annual production: these countries are Italy (45%), France (50%), Lithuania (55%), the United Kingdom (57%), and Poland (67%). The total production of these countries is 238 million pallets, i.e. ca. 43.9% of total production;
- In some MS the HT capacity is sufficient to HT approximately two thirds or more of the annual production: these countries are Belgium (70%[113]), the Netherlands (75%) and Germany (80%). The total production of these MS is 144 million pallets, i.e. 26.5% of total production;
- In some MS the HT capacity in place is sufficient to treat entirely or nearly entirely the whole new production: these countries are Austria, Denmark and Sweden. A similar pattern is reasonably expected in Finland. In addition to these countries, the entire production and circulation of pallets in Portugal is treated. The total production of these countries is ca. 45 million pallets, i.e. 8.4% of the total new production;
- As for Spain, consultation with the sector in Spain during the case study suggested that 20% of the new production on average is treated. Also, it was noted that 20% of the companies – the biggest – are able to treat up to 100% of their production. Knowing that in Spain 40 companies (ca. 20% of total companies) account for 70% of the total output, it would appear that the capacity in this MS is much above the actual reported 20% of the total volume. It can therefore be assumed that up to 70% of the total output could in theory be treated, although in practice the constraints outlined before, might actually reduce the real capacity available.

The FCEC has also sought to identify whether the capacity in place is fully utilized, or whether there is spare capacity. The results of the survey indicate that in a few cases there is some spare capacity, but this is limited. Only in the case of Italy was this more significant (an

[113] Although it is specified that this refers to reusable quality pallets and for other types of pallets, this figure should be lower. In this preliminary estimate it is taken this percentage for simplicity; further refinement could be done, provided the information exists.

additional 30% of new production could be treated with the existing capacity), as it could also be confirmed during the case study.

Considering the potential spare capacity for Italy, the current HT treatment capacity for the newly manufactured pallets in the EU (MS above) would be at ~297 million pallets treated/year (taking a conservative estimate for Spain of 20%), i.e. 56-58% of the total EU production.

As for the capacity to kiln dry the pallets, information was received by six MS (France, Germany, Lithuania, Sweden, the Netherlands and the UK) that account for 47% of total EU pallet production. On average, KD treatment is lower than HT by ~20% (except for Sweden) and the above countries apply KD on 67% of the new production they HT, or apply KD on 46% of their total new production. On this basis, the figure for HT/KD pallets in the EU would amount to ~218.5 million pallets.

The above 13 countries account for 85% of the total EU production. The other relatively important MS not included in the above are the Czech Republic (20 million pallets produced) and Latvia (ca. 11 million pallets), together accounting for 5.8% of total EU production, the rest of the production being made by Hungary and Ireland (approximately 6 million produced in each), followed by Bulgaria (3.6 million pallets), Romania, Slovakia, Slovenia, producing approximately 2 million each, and Estonia (1 million) (and considering that in Cyprus, Greece, Luxembourg and Malta the production of pallets is very limited and well under 0% of total EU production).

Another source of information concerning the capacity in place for the purpose of ISPM 15 are the EU MS CAs. Since the entry into force of the standard, MS NPPOs have to implement the system for the production destined to exports. As described in ISPM 15, treatment and application of the mark (and/or related systems) must always be under the authority of the NPPO. NPPOs that authorize use of the mark have the responsibility for ensuring that all systems authorized and approved for implementation of this standard meet all necessary requirements described within the standard, and that WPM (or wood that is to be made into WPM) bearing the mark has been treated and/or manufactured in accordance with this standard. The NPPOs' responsibilities include:

- authorization, registration and accreditation, as appropriate;
- monitoring treatment and marking systems implemented in order to verify compliance (further information on related responsibilities is provided in ISPM No. 7: Export certification system, 1997);
- inspection, establishing verification procedures and auditing where appropriate.

In some MS the implementation of the ISPM 15 is delegated to industry consortia under the authorization of the NPPO; this is however - according to our finding to date - limited to few MS, such as Italy, the Netherlands and the UK.

It has been consistently remarked by all the stakeholders interviewed that harmonization should be sought with regard to the implementation of the ISPM 15 in the EU, as a number of elements seem to differ from MS to MS. Such elements include the methods for control of the HT, the number of inspections carried out by year, the derogations on the application of the marks, and - concerning repaired pallets - the number of times a pallet can be repaired before retreatment. The uneven application of these provisions is considered by stakeholders to potentially lead to competitive disadvantages for companies in certain MS, and this lack of a level playing field could be accentuated if extension of the obligation is envisaged.

The costs related to authorization (registration, initial inspection for approval, license – where applicable -, routine inspections) for the purpose of ISPM 15 also show a great variation among MS. Differences between MS are also found with regard to the frequency of inspections of operators. These costs are either borne by the state entirely, or by the sector entirely, or partially/totally recovered through fees paid by the operators. Some CAs also noted that a revision of the system in place in their countries is ongoing, also in the context of the overall EU revision of EU plant health and official controls legislation.

The number of enterprises authorized for the purpose of ISPM 15 in the EU (22 MS) are the following[114]:

A. Companies producing HT wood: these are sawmillers selling pretreated wood to the WPM sector: **1,848**;

B. Companies producing WPM from HT wood: these are WPM assemblers and repairers that do not have facilities at their premises: **6,340**;

C. Companies producing HT WPM: these are WPM manufacturers and repairers treating WPM after production and having therefore facilities on site: **3,641**.

Excluding WPM assemblers and repairers buying pretreated wood (category B), the above figures suggest that in the EU (21 MS) currently there are **5,489** enterprises having kilns at their premises registered and authorized for the purpose of the ISPM 15 production, either of HT wood (category A), or for the treatment of WPM (category C). This suggests that there is a minimum number of 5,489 kilns currently operating in the EU (22 MS), although the actual number might be higher than this, as registered enterprises may have more than one kiln (for instance in Italy 255 enterprises are registered for a total of 307 kilns).

Some MS also register the net capacity of the kilns authorized and some MS have also provided estimates of the total pallets and quantity of wood that could be treated on the basis of such capacity. The FCEC has also tried to estimate on the basis of an average size of the kiln the potential capacity for treatment, however, such an exercise could lead to erroneous conclusions, as the number of registered WPM operators may use their kilns for the treatment of other wood products, not only pallets, and for kiln drying rather than HT. In France for instance, 50% of IP producers (ca. 55 enterprises) have installations to treat IP, and therefore this capacity is in place for the treatment of other WPM as well; in Italy only 57% of the total HT WPM compliant production was related to pallets as such.

For the other MS where information is missing, by applying as a minimum average the 20% estimated capacity of HT (as provided by FEFPEB), the number of new produced pallets that are HT at EU level is estimated at ~325 million pallets (i.e. ca. 60% - 62% of new production).

The number of HT/KD pallets in the total EU is estimated at ~218.5 million pallets (i.e. ~40% of new production).

[114] This data is presented for the record only; it should be noted that it has not been used for the purposes of the calculation of the impact of the options because it was though that industry data provided a more accurate picture of the capacity.

Annex A: Metholodogy

The study relied on extensive **stakeholder consultation**; data, underlining assumptions and results have been shared and validated by stakeholders throughout all the stages of the study.

Surveys

Surveys have been carried out targeting the following stakeholders:

- National CAs;
- National members of FEFPEB (12 MS) and, within this association:
    - a separate survey was addressed to the closed pools;
    - a separate set of questions was addressed to the Task Force on ISPM 15,
- National members of EOS (13 MS, potentially more through CEI-Bois membership).

In addition, the consultation with some of the other EU/national associations (e.g. IRU, ESC, CLECAT and national members) was conducted via a consultation guide focusing in particular on the potential implications of the options.

Case studies

Field visits were carried out in France, Germany, Italy, Poland and Spain. Interviews were carried out with the following stakeholders:

MS	CA	Body responsible for ISPM 15 implementation	WPM producers/ repairers/traders	Sawmilling industry	Transport and logistics association	Others
DE	√		HPE	BSHD		
ES	√		FAPROMA FEDEMCO CALIPAL	CONFEMADERA CEARMADERA	ASTIC	
FR	√	DRAAF/SRAL Aquitaine (phone interview)	SYPAL (pallets) SEIL(LWP) SEILA (IP)	FNB	AUTF (written contribution) TLF	FCBA Cathild industrie (Equipment manufacturers)
IT	√	CONLEGNO	FEDERLEGNO ASSOIMBALLAGGI		FEDESPEDI	

MS	CA	Body responsible for ISPM 15 implementation	WPM producers/ repairers/traders	Sawmilling industry	Transport and logistics association	Others
PL	√	Wood Technology Institute	EPAL-Poland and Director of Palimex (pallet producer) RSP w Rzecka (Pallet producer/repairer) HEP	PIGPP		Equipment manufacturers

Interviews

In total (including case studies) over **30 interviews** (including focus groups) were carried out in the course of the assignment (inception and main phase of the study), resulting in consultation of **over 70 experts**. The bulk of the interviews was carried out face-to-face.

The **groups targeted** for the interviews were:

- Competent Authorities;
- Industry: WPM sector;
- Industry: wood and sawmilling sector;
- Industry: transport and logistics; users of WPM (manufacturers);
- Equipment manufacturers;
- Others: these include academic experts and Wood Technology Institutes.

Annex B - Terms of Reference

Terms of Reference (task specification) for assignments relating to impact assessment and ex-ante evaluation

1. Title of the assignment

Quantification of the economic, environmental and social impacts of introducing mandatory treatment requirements for wood packaging material circulating inside the European Union.

2. Context of the assignment

This assignment relates to the impacts of introducing legal requirements to implement FAO International Standard for Phytosanitary Measures (ISPM) No. 15[115] for wood packaging material (WPM) circulating inside the European Union.

Contents of ISPM No. 15

ISPM No. 15 (Annex 1) describes phytosanitary measures that reduce the risk of introduction and spread of quarantine pests associated with the movement in international trade of wood packaging material (pallets, crates etc.) made from raw wood[116]. Pests associated with wood packaging material are known to have negative impacts on forest health and biodiversity. Implementation of this standard is considered to reduce significantly the spread of pests and subsequently their negative impacts.

ISPM No. 15 describes internationally approved measures for treatment of WPM, a mark to be applied to treated WPM and rules concerning the use of that mark. The measures consist of the use of debarked wood (with a specified tolerance for remaining bark) and the application of approved treatments (as prescribed in Annex 1 of ISPM No. 15). The application of the recognized mark (as prescribed in Annex 2) ensures that wood packaging material subjected to the approved treatments is readily identifiable.

The approved treatments consist of a heat treatment at 56°C for at least 30 minutes in the core of the wood or a treatment with the fumigant methyl bromide. Since the use of methyl bromide is known to deplete the ozone layer, the EU has phased out its use. No alternative fumigants have been approved. Consequently, the only available method for implementing ISPM No. 15 for WPM produced and moved inside the EU is the above-mentioned heat treatment. Other methods are currently under discussion but this assignment does not take into consideration the possible adoption of new approved treatments in the near future.

Treatment and application of the mark must always be under the authority of the National Plant Protection Organizations (NPPOs) of exporting and importing countries. NPPOs that authorize the use of the mark should supervise the application of the treatments, use of the mark and its application, as appropriate, by producer/treatment providers and should establish inspection or monitoring and auditing procedures. Specific requirements apply to wood packaging material that is repaired or remanufactured.

NPPOs of importing countries accept the approved phytosanitary measures as the basis for authorizing entry of wood packaging material without further wood packaging material-

[115] IPPC, 2009: Regulation of wood packaging material in international trade.

[116] Wood packaging material covered by this standard includes dunnage but excludes wood packaging made from wood processed in such a way that it is free from pests (e.g. plywood).

related phytosanitary import requirements and may verify on import that the requirements of the standard have been met. On the other hand, as wood packaging material used for transportation of goods is not covered by CN code, it is not subject to principles of import control in collaboration with Customs Authorities.

Union legislation in force as concerns WPM

Council Directive 2000/29/EC, Annex IV, Part A, Section I, point 2 requires that wood packaging material (WPM) coming from third countries, except Switzerland, may be imported into the EU only when it is virtually free from bark and has been subjected to one of the approved treatments specified in Annex II to ISPM No. 15.

No such requirement is in place for production and movement of WPM inside the whole Union territory. The justification for the stricter import requirements is that several main quarantine pests – "harmful organisms" in the jargon of Directive 2000/29/EC – used to be absent from the Union.

However, one such main quarantine pest, the pine wood nematode (PWN; caused by *Bursaphelenchus xylophilus*), is now present in Portugal, where it is under strict control but widespread in the continental territory and in the island of Madeira. Strict measures are in place to inhibit the spread of PWN to other Member States, including measures to stop natural spread across the buffer zone along the border with Spain and measures to inhibit spread with wood and wood products in trade. The measures are laid down in Council Decision 2006/133/EC (the "emergency measures" against PWN).

The measures to inhibit PWN spread from out of Portugal to other Member States with wood or wood products include an obligation to ensure that all coniferous WPM leaving the demarcated areas in Portugal, whether or not originating in Portugal, must have been treated in accordance with ISPM No. 15 and marked accordingly. Decision 2006/133/EC is addressed to Portugal only. The obligation to implement ISPM No. 15 for wood and WPM thus does not apply to the other Member States.

All Member States are responsible for control of both, wood packaging material from third countries and movements out of PWN outbreak areas (currently PT).

Considerations to implement ISPM No. 15 in the entire Union

The original outbreak of PWN took place in a limited area south of Lisbon (the Setubal peninsula). For many years, it was considered to be successfully contained there (among others by large-scale felling activities including a 300 km-long and 3-km-wide precautionary clearcut across uninfested territory at distance of the outbreak) and the objective was to achieve full eradication. In 2008, the Portuguese authorities notified a large outbreak in central Portugal and declared the entire continental territory of Portugal (and in 2010, that of the island of Madeira) to be infested with PWN. They consider that the pest cannot be eradicated any more from the Portuguese territory.

Two PWN outbreaks have occurred in Spain, close to the Portuguese border. Both outbreaks are subject to very drastic eradication measures aimed at complete elimination of PWN from the Spanish territory.

Since 2008, several interceptions of PWN-infested susceptible pine wood, WPM and bark coming from Portugal have been notified to the Commission by other EU Member States.

The European Commission is reviewing Decision 2006/133/EC and considers to replace it by emergency measures addressed to all Member States, reflecting the changed status of PWN as EU quarantine organism present in part of its territory.

The changed reality necessitates reconsidering whether it is appropriate to maintain the current ISPM No. 15 requirement only for imports into the Union and for movements out of PWN outbreak areas. An alternative would be to introduce a legal provision under Directive 2000/29/EC requiring that also movements of WPM produced inside the Union shall be prohibited unless that WPM have been subjected to the measures of ISPM No. 15. Such EU-wide implementation of ISPM No. 15 would not only help combat PWN, but also step up prevention against other dangerous quarantine pests carried with WPM (e.g. citrus longhorn beetle (*Anoplophora chinensis*), Asian longhorn beetle (*Anoplophora glabripennis*) and various bark beetles (e.g. *Ips duplicatus, Dendroctonus micans*)).

At the Council meeting in December 2009, the Chief Plant Health Officers of the Member States stressed the need for implementation of ISPM No. 15 requirements on WPM for the intra-EU trade and asked the Commission to initiate the process by performing an impact study.

Background information on the EU plant health regime

Council Directive 2000/29/EC is the main legal basis of the EU plant health regime (PHR). Background information on the regime is provided in Annex 2.

3. Description of the assignment

3.1. Purpose and objective of the assignment

The study, which is the subject of this assignment, should quantify the economic, environmental and social impacts of introducing mandatory treatment requirements for wood packaging material circulating inside the European Union in accordance with ISPM No. 15.

The impacts should be assessed for various options (specified below). The assessment should provide the Commission with the necessary information to discuss the options with the Member States and stakeholders and adopt appropriate legislation with appropriate justification as concerns potential impacts.

The study should advise the Commission on the possible means to introduce ISPM No. 15 for intra-EU movements in such a way that the negative side impacts are minimised.

3.2. Scope of the assignment (operational, temporal, geographical…)

The scope of the assignment is the EU-27, using the year 2010 as the reference point.

3.3. Specification of tasks

The contractor should provide a description (with relevant figures) of the WPM sector in the Union (economic value, number of employees, concentration, location and other relevant economic parameters).

The contractor should evaluate the economic, environmental and social impacts of the options given below compared to the baseline:

Options

Baseline – Status quo

Variant A

This is the baseline scenario, with the current extent of outbreaks, without any generalised requirement to implement ISPM No. 15 for intra-EU movements of WPM. As today, only WPM imported into the Union from third countries shall have been treated and marked in accordance with ISPM No. 15, as well as WPM made of coniferous wood moved out of the current demarcated areas for PWN (regardless of the origin of the wood).

Variant B

This variant is the same as variant A, except that new PWN outbreaks are supposed to have occurred, for which EU-wide emergency measures would be in place. The differences from Variant A are:

It is supposed that a new PWN outbreak has occurred in a major forestry area in France, Germany, Spain and Latvia (one in each MS); and

It is supposed that the PWN emergency measures (Decision 2006/133) have been amended to cover all Member States, and require that movements of WPM out of the respective demarcated areas in all cases require treatment and marking in accordance with ISPM No. 15.

Thus, no requirement would be in place for implementation of ISPM No. 15 in the entire Union, while, like today, movements out of demarcated areas would require treatment according to ISPM No. 15. The supposed new outbreaks would allow assessing the impacts of establishing multiple areas and climate zones across the Union for which ISPM No. 15 would require implementation.

Option 1 – Mandatory implementation of ISPM No. 15 inside the Union, with a short transitional period

In this option, a legal requirement would be adopted prohibiting the movement of all WPM (whether old, repaired or new) inside the Union, unless it has been treated and marked in accordance with ISPM No. 15. The requirement would enter into force by 1 January 2015.

Recent research by Sousa et al. (submitted for publication) shows that moist heat-treated WPM can be recolonised from out of PWN-infested untreated WPM. According to this paper, cross-contamination can be blocked by ensuring that the PWM is not only heat treated but also subject to kiln drying to <20% moisture content.

The contractor should evaluate the impact of Option 1 for a variant with only heat treatment and for an alternative variant with heat treatment as well as kiln drying (implying that the hypothetic costs of kiln drying in the baseline scenario need to be estimated too in order to allow for comparison with the baseline scenario).

Option 2 – Mandatory implementation of ISPM No. 15 inside the Union, with a long transitional period

This option is identical to Option 1, except for the entry into force of the requirement by 1 January 2015 only for newly produced and repaired WPM, and by 1 January 2020 for all WPM circulating in the Union.

The contractor should evaluate the impact of Option 2 for a variant with only heat treatment and for an alternative variant with heat treatment as well as kiln drying.

Option 3 – Mandatory implementation of ISPM No.15 inside the Union, without transitional period

Option 3 is identical to Option 2 except for the entry into force of the requirement by 1 January 2015 only for newly produced and repaired WPM, and with no obligations for existing WPM circulating in the Union (not by 2020 nor by any other date; the old WPM would simply be phased out by itself over time).

The contractor should evaluate the impact of Option 3 for a variant with only heat treatment and for an alternative variant with heat treatment as well as kiln drying.

Option 4 – Repeal of ISPM No. 15 requirements at import and as concerns movements out of demarcated areas

In this option, the implementation of ISPM No. 15 is not required any more, neither for import nor for any intra-EU movements. It is assumed that infested WPM can freely enter and move within the Union.

Impacts to be analysed

The contractor should assess the impacts of the above options, taking into account what this means for (i) the private sector, (ii) the competent authorities of Member States and (iii) the European Union and also taking account of differences between Member States in composition of the private sector (e.g. small and big forestry companies).

The assessment should examine the impacts for different types of WPM (addressing as appropriate dunnage, light WPM, short-lived and long-lived pallets, industrial packaging material), taking account of ownership aspects (e.g. pallet pools) as the roles of the different WPM types in the chain differ substantially.

The following aspects should, as a minimum, be included in the assessment:

Economic impacts:

Investments of WPM producers in treatment equipment / facilities, operational costs (installation costs, operational costs, energy, labour, maintenance, delayed throughput, stocks), investment recuperation period and final profit

Additional costs for WPM already in circulation (to be collected and treated); costs related to materials that are not compliant on time and cannot be used temporarily

Packaging prices, economic weight and attractiveness of possible substitute products (plastic pallets), competitiveness (impact on demands, internal market, export market)

Costs for Member State authorities for implementation and supervision of operators applying ISPM No. 15 (these costs could in principle be recovered from the sector) and for control of movement of wood packaging material, including WPM moved out of PWN outbreak areas and coming from third countries.

Economic impacts on the logistics sector (road, rail, sea, air transport)

Economic impact on consumers and on the economy at large

Economic value of forest and trees to be protected from future damage of pests through setting requirements for the WPM pathway

Social impacts:

Employment / jobs

Natural resources (social value of trees and forest to be protected from future damage of pests)

Environmental impacts:

Energy consumption

Emission / capture of carbon dioxide

Natural resources (protection of forest, trees, flora from future damage of pests)

The assessment of the options should be provided in quantitative economic terms (costs/benefits, prices, knock-on effects, trade impacts, other relevant economic parameters as appropriate) including a quantification of social impacts (employment, recreational values) and environmental impacts (energy consumption, carbon emissions, ecosystems services). It should be accompanied by a qualitative assessment of the advantages and disadvantages of each option and the extent to which that option is supported by the relevant stakeholders and the Member States.

Definition of WPM

The scope of the heat treatment obligation would include all WPM (defined as in Council Directive 2000/29/EC and Commission Decision 2006/133/EC).

Affected sectors

WPM producers, assemblers, repairers, recyclers, sawmilling sector, and composite wood sector

WPM owners (to be subdivided as appropriate, e.g. pallet pools such as EPAL and CHEP, green pallets, industry owned, including large international companies already using WPM treated in accordance with ISPM No. 15, etc.)

Producers of heat treatment and kiln drying systems (ovens, driers, …)

Heat treatment or kiln drying service providers (if any)

WPM users (logistics sector, industries, traders, private persons)

Forestry sector (including forest nursery stock sector)

Competent authorities involved in controls and official supervision

Data collection

The study should provide data (figures and figure estimates, where appropriate), analytical and descriptive inputs presented in a format that facilitates their analysis and further use by DG SANCO. For each of the issues to be addressed in the assignment, the consultant shall gather the necessary data and integrate them in tables, spreadsheets and other impact calculation support tools, as appropriate, and include these in electronic form in the deliverables. This should allow the Commission services to study the possible impact on the various stakeholders of different options, including new variants developed in the course of the assessment.

Some data have been collected during previous studies (evaluation of the regime: http://ec.europa.eu/food/plant/strategy/index_en.htm; economic study to support the impact assessment: not yet published but available to the contractor on request; study on the impacts of banning or not banning the movement of susceptible wood products from Portugal for stopping the spread of pine wood nematode (PWN): http://ec.europa.eu/food/plant/organisms/emergency/Impact_assessment_study.pdf). The contractor should consult these reports for in-depth information on the regime and on the data collected so far.

Advice

The contractor should advise the Commission on the possible means to introduce ISPM No. 15 for intra-EU movements in such a way that the negative side impacts are minimised.

3.4. Expertise required from the contractor

The preparation of this report will require expertise in current implementation of ISPM No. 15, forestry, the wood products sector, the wood packaging industry, the logistics industry, environmental issues, the EU plant health regime (legislation, harmful organisms, …), economics, statistics and impact analysis.

Given the specialised nature of the subject matter that has to be studied, the assessment team is expected to comprise members with specific expertise in these sectors.

3.5. Other specific tasks to be carried out under the assignment

Stakeholder consultation is to be organised by the contractor as an important part of the study to which these Terms of Reference refer, at the level of EU stakeholder organisations and where appropriate national organisations.

The contractor should similarly consult the competent authorities of the Member States.

The contractor should carry out on-site visits for a selection of 5 MS. The choice should be well justified (e.g. based on a questionnaire aimed at investigating the situation in each MS); the most affected 5 MS will be selected for on-site visits.

3.6. Reporting and deliverables

The assignment includes the submission of a series of deliverables: reports, calculation tools and presentations.

The contractor will deliver the following reports at key stages of the process: inception report, interim progress report, draft final report and final report. Each report should be written in English, professionally edited, and critically assessed as it provides the basis for tracking the quality of the work done by the contractor. The contractor will attend four specific meetings with the Commission, first at the Kick-off meeting and subsequently to present and discuss the progress of the work after the submission of the inception report, the interim report and the draft final report[117]. The contractor is requested to draw up minutes of each meeting and to submit them to the Commission for approval the week following the meeting.

In the course of the project, coordination meetings with Commission services may be organised as appropriate.

Inception report – at the latest six weeks after the signature of the contract

[117] Some meetings may coincide with meetings of an Inter-Service Steering Group for this impact assessment.

The inception report completes the structuring phase of the report preparation. It aims to describe the organisation of the work, and to adapt and substantiate the overall approach, the methodology proposed and the work plan outlined in the proposal. It should set out in detail how the proposed methodology will be implemented and in particular lay out clearly in tabular form how the report will be constructed and prepared. The inception report should include enough detail for the Commission to gain a good understanding of the approach, method and timing proposed.

The known sources of information as well as the way the contractor will interact with stakeholders and MS competent authorities will be fully clarified at this stage.

The inception report will be submitted to the Commission which will discuss on this basis with the contractor and may request changes and improvements.

Interim report – 4 months after the signing of the contract

This report will be presented to the Commission services and will provide information on the progress, along with intermediate results and an initial analysis of data collected. The contractor should already be in a position to provide: a) spreadsheets with data, models, simulations in relation to the assignment, b) preliminary findings, and c) draft layout and content. The report will provide the Commission with an opportunity to check whether the work is on track and whether it has focused on the specified information needs.

The contractor will define in agreement with the Commission the table of contents and structure of the draft final report. A document outlining the latter must be submitted in advance of the meeting by the contractor. It will serve as a basis for the discussion.

Draft final report and final report

Draft final report:

The contractor must provide the Commission services with a written and oral presentation on the draft final results, accompanied by the requested calculation tools. The draft final report will be clearly based on evidence generated through the analysis. The draft final report should include an executive summary of not more than 10 pages (synthesis of main analyses and conclusions), the main report (presenting the results of the analyses in full, conclusions and recommendations), technical annexes (one of which will be the Task Specifications) and a draft two-page summary on the Key Messages of the report.

The Draft Final Report shall comprise the outcome for all Tasks.

The draft final report will be submitted at the latest 6 months after the signature of the contract.

Final report

The contractor must provide the Commission services with a written and oral presentation on the final results, accompanied by the requested calculation tools, at the latest 7.5 months after the signature of the contract. The final report will take into account the results of quality assessment and discussions with the Commission Services about the draft final report. The final executive summary and Key Messages page will be part of it. The final report should have the same structure as the draft final report. The contractor should provide the final report in both MS-Word and Adobe Acrobat (PDF). *The contractor should also provide a PowerPoint presentation of key aspects and findings of the study, together with speaking notes.* The Commission will hold the copyright of the reports.

The Commission Services may ask after consultation and in mutual agreement for complementary information or propose adjustments in order to redirect the work when

necessary. Deliverables must be acceptable to the Commission. With work progressing and in the light of new findings, revisions of deliverables already approved may be necessary. The contractor will be expected to respond to and take into account comments of the Commission.

Deliverables shall be drafted in a concise and easily understandable language. The presentation of the texts, tables and graphs has to be clear and complete and correspond to commonly recognised standards for studies to be published. They should be accompanied, where requested, by appropriate annexes. All reports and presentations are to be submitted in electronic format in accordance with the deadlines set in the time-schedule specified below.

The volume of final deliverable text will not exceed 120 pages (Times New Roman 12 or equivalent, excluding annexes). The core text has to be concentrated on the assessment of the main study items. An executive summary of between 10 and 15 pages (1500 characters/page) should be included in the final report. Background information should be presented in annexes.

3.7. Organisation, methodology and timetable

As part of the bid, the contractor should identify the team of personnel to be involved, describe their skills and qualifications, quantify the input of each member of the team in terms of days and explain the distribution of tasks between the different members.

The bid should clarify the resources attributed to the tasks described in Chapter 3.3 and demonstrate that the resources attribution is in line with the relative weight of the various needs.

The bid should demonstrate an excellent understanding of the issues at stake and should be effective to address the underlying needs of DG SANCO described in these Terms of Reference. For further detail on methodological guidelines, please refer to Annex E.

Access to data

Access to data and information will be given to the consultant, who will also gather data and - where necessary - opinions of interested parties (European Commission, stakeholders and other relevant persons and organisations) through interviews and bilateral contacts.

Key stakeholders' organisations at EU level (provided in the Annexes) and where relevant at national level should be consulted.

The consultant that has been chosen will receive access to relevant data generated by the evaluation and owned by the Commission.

For collected data, a specification should be given of the sources from which the data were obtained, the assumptions that were made, where appropriate the model that was used to generate them, and the model outcome. Such specification should allow for verification of the data reliability. The contractor shall coordinate with the Commission services on the methods to collect the data and the spreadsheets, models and simulations to be used.

The study should specify where data are interconnected during to cross-influence of the options selected for the various recommendations. A separate matrix should be provided to clarify such interconnectedness.

Confidentiality

In the context of the assignment, data of a confidential nature may have to be collected, such as expenditure made by stakeholders as part of the administrative costs for complying with certain provisions of the EU legislation. These data shall be handled with due confidentiality.

Data included in the Final report remains the property of the Commission and should be treated as confidential.

Methodology

The methodology must be drawn by the contractor taking into account the scope and objectives above and the establishment of good practice. The contractor is expected to develop and implement a methodology ensuring that all the components presented under chapters 3.1 to 3.4 are sufficiently well covered and that clear conclusions can be drawn.

The contractor is required to clearly detail the different steps of the design, summarising the methodology in a table format.

Collection, analysis and assessment of the data to be gathered in this study should be done in consultation and coordination with the stakeholders of the regime and, where appropriate, the MS competent authorities. To this end, the contractor shall consult an appropriately balanced and representative selection of the key EU-level stakeholders organisations and MS competent authorities (listed in the Annexes to these Terms of Reference). The consultation should be carried out as early as possible and should comprise plenary meetings[118] and interviews (face to face, by phone or through e-mail). The possible use of questionnaires is left to the judgment of the contractor. The results obtained (and estimates made) should be validated with the stakeholders (where appropriate: MS competent authorities) in a later stage of the study.

Apart from stakeholder consultation, data may be collected through literature and database searches.

The data and other inputs shall be consistent with the policy requirements, quality and standards necessary to conform to the Commission's Guidelines on Impact Assessment. Where appropriate, the Standard Cost Model (Administrative cost of obligations under EU legislation) should be used.

Elements of the methodology should be:

Desk research, classification, mapping and review of data from the readily available resources (among others, those provided in the web-links, further references and Annexes of this Task Description)

On-site visits

Interviews as and when required

Economic analysis

Stakeholder consultations

The consultant may propose other tools for data collection and analysis as he/she may see fit including focus groups, questionnaires, workshops, a support board (experts from private sector, competent authorities and academia), etc.

Regarding the economic model to be developed following the request of the evaluation panel and in relation to the TOR, the following has been agreed.

The model should establish a relationship between economic gains and the upfront investment as well as continuous investment costs of implementing the measure in relation to

[118] Stakeholder consultation is to be organised by the contractor as part of the current consignment. In addition, stakeholder consultation may be organised by DG SANCO in the framework of the Working Group on Plant Health of the Advisory Group for the Food Chain, Animal and Plant Health of DG SANCO.

different outbreak scenarios as well as different levels of policy ambitions (expressed e.g. in short, medium and long transition periods etc). There is therefore a requirement to work out, on a best effort basis, such model describing the evolution of the cost-benefit relationship that can be established for investments into heat treatment or kiln drying systems of WPM to avert the introduction and spread of quarantine pests such as PWN.

Contractors are expected not to restrict themselves to these minimum requirements. Proposals for additional methodological and descriptive tools that may contribute to meeting the objectives of the study in a more satisfactory manner will be considered positively when evaluating the proposals.

Timetable

The Service order has a maximum duration of 7½ months. It is due to start in December 2011. A detailed work plan should be submitted together with the bid, building on the time-schedule summarised below. It should be updated with the Inception Report.

The draft final report should be delivered in June 2012 and the final report by the end of July 2012, thus allowing ongoing interaction between DG SANCO and the contractor up to the completion of the impact assessment (end of July 2012).

What	By
Kick-off meeting with the contractor	December 2011
Inception report	January 2012
Interim report	April 2012
Draft final report	June 2012
Final report	July 2012

3.8. Quality assessment

In order to ensure the necessary level of quality for this report, contractors should always bear in mind that:

- The report must respond to the information needs, in particular as expressed in the Task Specifications and following discussions with the Commission;
- The methodology and design must be appropriate for completing the report and made explicit;
- The collected data must be appropriate for their intended use and their reliability must be ascertained;
- Data must be analysed systematically to cover all the information and presentational needs in a valid manner;

- Findings must follow logically from and be justified by, the data/information analysis and interpretations based on the pre-established criteria and rationale;
- To be valid, conclusions must be non-biased and fully based on findings.

An Inter-Service Steering Group may be set up to supervise the study assignment in order to ensure that it will be conducted in line with the Terms of Reference. The Steering Group may advise the Deputy Director-General on whether or not to approve the inception, progress and final reports delivered by the consultant.

3.9. Budget

Maximum indicative budget is €…… . Budget line is 17 01 04 01.

3.10. Special requirements

The study should be provided in final form in electronic (MS Word and Adobe pdf) and paper versions.

4. References

4.1. Other existing documentation/data and how to access it

Annex 1: FAO International standard for phytosanitary measures No. 15

Annex 2: Background information on the EU plant health regime

Annex 3: Contact details of the Chief Officers for Plant Health

Annex 4: Contact details of key stakeholders' organisations at EU level

4.2. Useful web-links

SANCO website on Europa on the review of the plant health regime, containing the CPHR evaluation report as well as links to further pages on the evaluation (http://ec.europa.eu/food/plant/strategy/index_en.htm)

Commission's impact assessment guidelines (http://ec.europa.eu/governance/impact/key_docs/key_docs_en.htm)

Recommended methodology for calculating "Administrative cost of obligations under EU legislation" (http://ec.europa.eu/governance/docs/sec_2005_0791_anx_10_en.pdf)

Food and Veterinary Office of DG SANCO (http://ec.europa.eu/food/fvo/index_en.htm)

European Food Safety Authority (www.efsa.europa.eu)

International Plant Protection Convention (https://www.ippc.int/IPP/En/default.jsp)

European and Mediterranean Plant Protection Organisation (http://www.eppo.org)

International Forestry Quarantine Research Group (http://www.forestry-quarantine.org)

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USDA, 2011. Risk assessment for the movement of domestic wood packaging material within the United States. May 2011. (http://www.aphis.usda.gov/plant_health/plant_pest_info/downloads/RiskAssessment-WPM.pdf)

4.4. Further enquiry

The contractor may obtain further information for the study from DG SANCO (Unit E2). Further enquiry may be made with the French institute FCBA (www.fcba.fr; 10 Avenue de Saint-Mandé, 75012 Paris, tel. +33 1 4019 4919, fax +33 1 4340 8565), which provided helpful input for developing these Terms of Reference.

Annex 1: FAO International standard for phytosanitary measures No. 15 (2009)

Relevant link:

https://www.ippc.int/file_uploaded/1285321495_ISPM_15_Revised_2009_E.pdf

Adobe Acrobat Document

Annex 2: Background information on the EU plant health regime

Nature of the EU plant health regime

Plant health is a cornerstone for sustainable and competitive agriculture, global food security and environmental protection.

In several aspects, plant health is a public good. Healthy crops are essential to ensure food security for the ever-growing global population world-wide. Entry and establishment of harmful organisms often results in increases of pesticide use and could impact negatively on the environment and, in some cases, on food safety. Prevention of entry of new harmful

organisms and diseases helps limiting the use of pesticides. Moreover, for a number of regulated pests and diseases there are no curative treatments possible at all. Furthermore, citizens value an unspoilt landscape and are concerned about the rapid loss of natural habitats, biodiversity and plant resources worldwide. Entry and establishment of harmful organisms may lead to serious damage to amenity trees, public and private green, recreational forests and to disruption and loss of natural ecosystems and habitats. Due to climate change, forests and natural ecosystems become increasingly susceptible to invading pests and pathogens. Massive forest death due to plant pests may accelerate climate change by changing forests from a carbon sink into a carbon source.

Plant health is also a private good since plant health measures may equally serve to protect the economic value of plants and plant products in agriculture, forestry and trade. Buyers and sellers of plants and plant products do not have the same information on the health status of the materials (seemingly healthy material may be infected inside). Such so-called information asymmetry is known to lead to market failure: the free market does not itself correct this. Regulation of plant health is therefore of interest for the private sector as well.

Objectives of the regime

The specific objectives of the current EU plant health regime are:

To protect the EU territory against the entry, establishment and spread of harmful organisms that so far do not occur in the EU or, if present, to a very limited extent and under control (the main objective currently being to protect agriculture, forestry and horticulture);

To ensure the availability and use of healthy plant material at the beginning of the chain of production (prevention of the spread of harmful organisms occurring in the EU with plants-for-planting);

To control harmful organisms of still limited distribution which are so harmful that strict control on further spread is needed;

To secure safe trade by establishment of EU import requirements for plants and plant products and EU internal movement requirements for certain plants.

Legal basis and budget

The PHR is the product of decades of legislation. The basic structure of the current PHR was conceived in 1977 with Council Directive 77/93/EEC. This Directive considered that systematic eradication of harmful organisms within Member States (MS) would have only a limited effect if protective measures against their introduction were not applied at the same time and that national plant health provisions needed to be harmonized. To this end, a framework was created governing import into the EC and intra-Community trade, building on the framework already provided in 1952 by the International Plant Protection Convention (IPPC). Harmful organisms were listed in Annexes to the Directive. With the introduction of the EU internal market in 1993, the concept of plant passports was introduced so as to allow free movement of plants and plant products between and within MS. Since the 2000 codification, the basic legal framework is known as Council Directive 2000/29/EC.

In addition to the core Directive, which relates to eradication and containment of harmful organisms spread via movements of plants and plant products, a limited set of Council Directives regulates the control of specific harmful organisms of potatoes which have become established in parts of the EU.

The annual budget available for the regime is at present approximately 12 million euro, for co-financing of measures to eradicate or contain outbreaks (the so-called "solidarity regime").

EU payments in practice serve to co-finance the costs incurred by MS competent authorities for implementing such measures. While Directive 2000/29/EC allows coverage of losses of growers from imposed official measures, this has not been put in practice so far.

Instruments

The CPHR legislation is transposed by the Member States into national legislation and implemented by the national competent authorities.

Apart from EU funding of research projects under the Framework Programmes of DG RTD, scientific research to support the regime and diagnostic infrastructures currently are not a part of the regime (this is addressed at Member State level).

Further information

Further information can be found in the report of the evaluation of the regime (available at http://ec.europa.eu/food/plant/strategy/index_en.htm) and the report of an economic study in support of the impact assessment for the new EU plant health law (not yet public; available to the contractor on request).

Annex 3: Contact details of the Chief Officers for Plant Health

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Annex 4: Contact details of key stakeholders' organisations at EU level (not exhaustive)

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