

3 Methodology of the cumulative cost assessment

3.1 A cumulative approach to cost assessment

The aim of this study is to identify the cumulative costs of the most financially burdensome EU legislation and policies that companies in the forest-based industries (F-BI) which are active in the EU28 have to comply with. While impact assessments traditionally focus on one specific action undertaken by the European Commission and other relevant EU institutions (new legal act, white paper, etc.), this study adopts a **cumulative approach**, by providing a quantitative assessment of all direct costs (monetary obligations, capital expenditure, operating expenses and administrative burden) and (where possible) indirect costs incurred by F-BI companies in the EU, in relation to the most relevant EU legislation and policies (e.g. specific indirect costs from ETS for the pulp, paper and paperboard industry).

This study **does not assess the benefits of EU legislation** or policies and does not aim to provide insights related to the proportionality of costs and benefits of legislation or policies, nor their efficiency or effectiveness. Furthermore, a **cumulative approach is to be distinguished from a non-cumulative approach** as traditionally used in a cost-benefit analysis (CBA). The cost-benefit approach examines the incremental costs and benefits related to policy proposals against a baseline. This implies that a CBA focuses on the net change in costs and benefits, relevant to a specific policy decision, not the aggregate (or cumulative) level of regulatory costs and benefits (European Commission, 2015). On the other hand, the cumulative cost assessment (CCA) focuses on whole sectors, rather than focusing on a particular policy proposal or legislation, and aggregates the costs generated by a selection of relevant existing EU legislation and other policy instruments. Hence, this cumulative cost assessment does not focus on a policy field and does not aim at assessing whether the regulatory framework is fit for purpose in a policy field, which is an approach used when conducting fitness checks. Thus, a CCA can point out which are the most burdensome regulatory areas (legislative packages) and which have instead a limited impact, which constitutes very important information for policy-making.

The assessment of cumulative cost impacts of specified EU legislation and policies on European forest-based industries (CCA F-BI) falls under the framework of the EU's Regulatory Fitness and Performance Programme (REFIT¹¹), which is aligned to the principle of Smart Regulation, which is an expression of the European Commission's commitment to a simple, stable, clear and predictable regulatory framework for business, workers and citizens.

While there is not yet any recognised standard methodology for the assessment of cumulative impacts, the methodology of this study draws on previous similar cumulative cost assessment exercises performed by Member States (e.g. Kostengestuurd Aanpak Regeldruk, by SIRA consulting for the Netherlands) and the European Commission. For the overall CCA approach the previous studies on the aluminium and steel industries (CEPS, 2013a and CEPS, 2013b) have been consulted; and a similar methodological approach to the CCA for the Chemical Industry (Technopolis, 2016) has been adopted. However, with regard to the quantification of the impact of the single regulatory items or areas and their attribution to the various costs categories, CCA studies are based on the established methodologies that have been used for several years by Member States and the European Commission. This includes the Standard Cost Model, and the Cost-driven Approach to Regulatory burdens (CAR) developed for the Dutch Government.

The Standard Cost Model methodology (SCM) is used by several Member States (Network Standard Cost Model, 2005), as well as the European Commission, as part of its REFIT programme¹² and the "Better Regulation Toolbox" (European Commission, 2015). The CAR methodology, which is used by the Dutch government (SIRA, 2015) is similar to the SCM, but its scope is broader regarding the types

¹¹ Better Regulation, REFIT, http://ec.europa.eu/smart-regulation/refit/index_en.htm

¹² http://ec.europa.eu/smart-regulation/refit/admin_burden/scm_en.htm

of cost covered and gives more emphasis to linking legislation cost with the cost structure of companies.

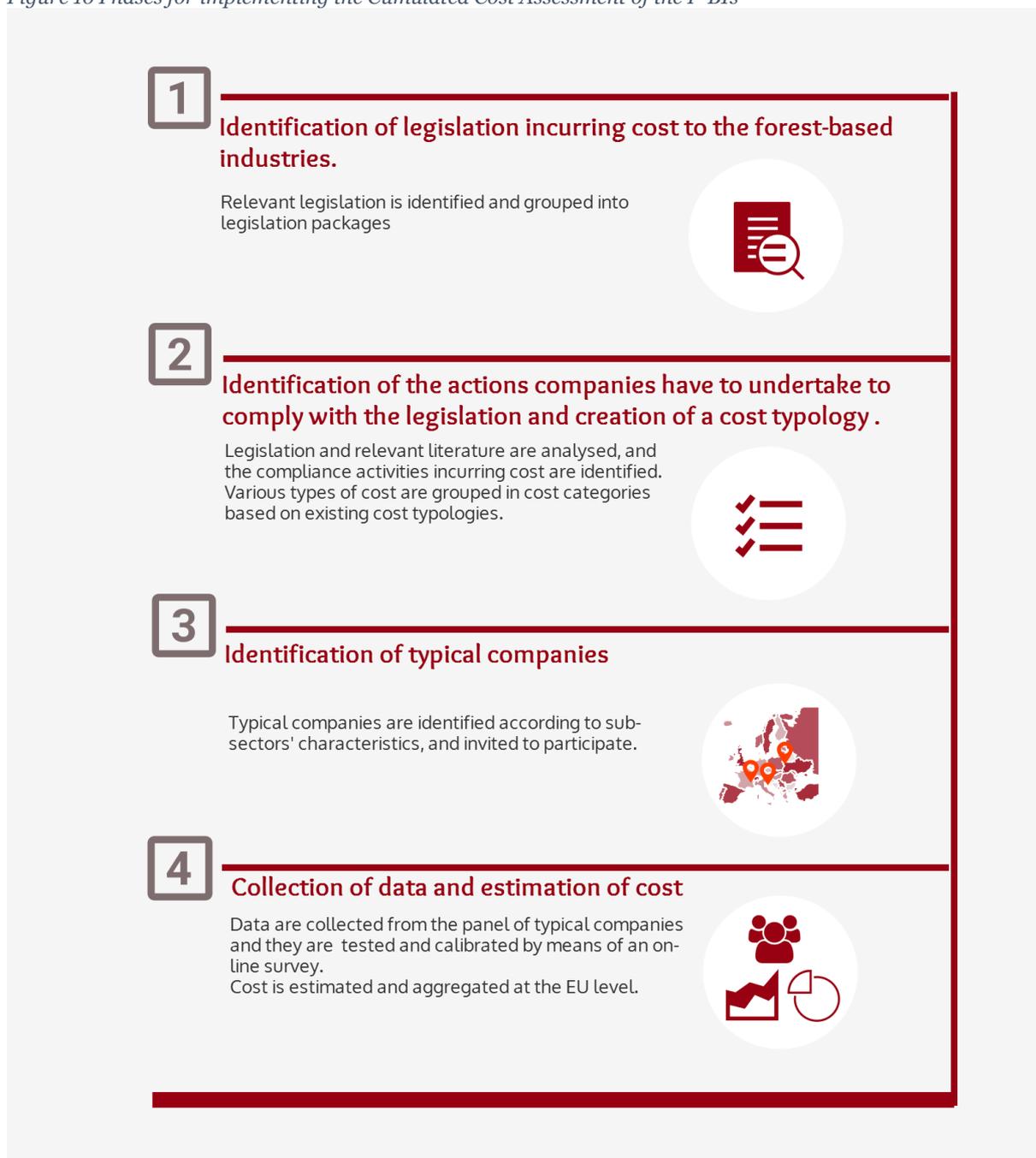
Methodologies to measure legislative burdens follow this principle summarised by the European Commission in its presentation of the SCM: “the purpose of the SCM methodology is to produce estimates that allow **an order of magnitude** of the burdens in different regulatory areas to be identified. Considering the level of detail and the number of parameters, **it is not cost-efficient to seek statistically valid results, rather than more general estimates**” (European Commission, Better Regulation Toolbox, 2015).

Applying statistical methods would require large samples with a significant number of strata, due to the complexity of the system. Such approaches are disproportionately expensive and time-consuming, and they are not feasible within the time frame and budget of a cost assessment exercise. Thus, instead of statistical valid samples, the concept of **typical companies (based on plants that are typical of their product group)** is used, for example, in the Better Regulation Toolbox (European Commission, 2015, p.369) or the methodology used by the Dutch government (SIRA, 2015, p.40). A typical plant **is not an average firm in statistical terms** but an entity that is neither particularly efficient nor inefficient in terms of complying with the legislation. Thus, short of being statistically representative, it can be taken as reasonably representative of the sample population.

Following a variation of the above approach, data collection in the current study **did not rely on statistical methods**. Detailed data were collected from a panel of **typical plants** identified using a set of tangible criteria, which were then validated in two workshops and calibrated using a larger sample of companies by means of an on-line survey. Finally, the data were aggregated to the whole population. The method is explained in more detail in the following sections. Despite the significant advantage regarding feasibility, the method is less accurate compared to statistical methods, and it can only provide an **estimate of the order of magnitude of cost** borne by companies due to EU legislation.

Figure 16 presents four key phases followed to implement this CCA. Firstly, the identification of legislation that incurs costs to the forest-based industries was carried out. Further, the actions that companies have to undertake to comply with the identified pieces of legislation were scoped and the cost typology was created. The third step concerned the analysis of F-BI characteristics and the identification of typical plants. Finally, the last phase comprised all activities related to the collection of data and the estimation of costs.

Figure 16 Phases for implementing the Cumulated Cost Assessment of the F-BIs



Source: Authors' elaboration

3.2 Phase 1: Identification of legislation incurring costs for European forest-based industries

The project team articulated an **initial list of legislation**, regulatory measures and policy documents drawn from study terms of reference and the Forest Policy and Innovation Database of the European Forest Institute Central-East European Regional Office (EFICEEC).¹³ The database focuses exclusively on international and EU policy documents having an impact on the forest-based sector as a whole. The first screening indicated that as many as 570 policies (some international but mostly EU documents)

¹³ <http://policydatabase.boku.ac.at>

might have an impact (direct or indirect) on EU forest-based industries (comprising the four sub-sectors that were initially considered). This list was further reviewed resulting in a list of 245 policy entries, divided across nine policy areas or ‘legislative packages’. The division into different legislative packages was made in terms of commonly identified policy areas (e.g., competition, and climate).

The **second step** was to bring the draft list of legislative acts and non-legislative policies to 12 Industry Associations representing the four sub-sectors initially included in the study. This was done, in part, through scoping interviews and by distributing a policy matrix where each association (representing respective sub-sectors and product groups as noted in Table 2) could highlight and prioritise the most relevant policy documents, using a 1 to 5 scale reflecting cost impact, as well as indicate which legislation they think incur direct or indirect costs. This process resulted in a reduced list of 106 legislative acts and non-legislative policies across eight packages. One legislative package (Industry and Other Policies) was at this stage deleted, as it was not ranked as important enough nor considered by the industries as generating any direct costs.

Table 2 Industry associations contributing to the prioritisation of legislation

Industry Association	Sub-sector/product group (NACE codes)
International Confederation of Paper and Board Converters in Europe (CITPA) and the Alliance for Beverage Cartons and the Environment (ACE)	(17.21) Packaging (industrial and food & beverage packaging); (17.29) Other articles of paper & paperboard.
Confederation of European Paper Industries (CEPI)	(17.11) Manufacture of pulp; (17.12) Manufacture of paper and paperboard;
European Disposables and Non-wovens Association (EDANA)	(17.22) Household and sanitary paper goods; (13.95) Non-woven cellulose products.
European Federation for Print and Digital Communication (INTERGRAF)	(18.1) Sheet-fed offset printing; Heat-set offset printing; Rotogravure printing; Flexography printing.
European Organisation of the Sawmill Industry (EOS)	(16.1) Sawnwood
European Confederation of Woodworking Industries (CEI-Bois)	(16.22) Solid Wood products (16.22) Flooring (16.23) Other builders’ carpentry and joinery
European Panel Federation (EPF)	(16.21) Wood-based panels
European Federation of Wooden Pallet and Packaging Manufacturers (FEFPEB)	(16.24) Wooden pallets and other wooden packaging
European Furniture Industries Confederation (EFIC) and the European Federation of Furniture Manufacturers (UEA).	(31) Contract Furniture Domestic Furniture
European Biomass Association (AEBIOM)	(16.29 & 19.20) Bioenergy products

Source: Author’s elaboration

The **third and final step** was to further reduce the list of legislative acts and non-legislative policies to a manageable number. This was, in part, done by grouping legislative acts (e.g. EU Emission Trading System) based on the similarity of their cost generation mechanism and removing some non-legislative policies that would only generate unquantifiable costs (e.g. Europe 2020 strategy) as well as through continued iterations with the industry associations and a final consultation with the European Commission. This process resulted in a list of 57 policy entries. This final list of legislative acts and non-legislative policies was at this stage further distinguished into two categories: one category consisting of 41 policy entries where the calculation of regulatory costs was considered possible (e.g.

REACH and ECHA regulations) and one category of 16 policy entries where a qualitative approach seemed more appropriate (e.g. key roadmaps, strategies and reports).

The final prioritised EU policy framework, consisted of the following:

- eight packages grouped on the basis of their overarching and specific policy objectives: Competition, Climate and Energy, Environment, Forest-related, Products, Employment, Transport, Trade (see Figure 17)
- 57 policy entries where several entries cover more than one legislative act and non-legislative policies.

The number of policy areas for which cost data was collected was dependent on the legislation that was prioritised for each product group. Figure 17 illustrates each legislative package to be filled by product group.

Figure 17 Legislative packages per product group

Sub-sectors	Packages							
	Competi- tion	Climate & Energy	Environ- ment	Forest- related	Employ- ment	Products	Transport	Trade
Sawnwood and solid wood products		●	●	●	●	●	●	
Wood-based panels		●	●		●	●		
Other builders' carpentry and joinery		●	●	●	●	●	●	
Wooden containers and packaging		●	●	●	●	●		
Flooring		●	●	●	●	●	●	
Bioenergy products		●	●			●		
Furniture manufacturing*	●	●	●	●	●	●		●
Pulp	●	●	●	●	●	●	●	●
Paper and paperboard	●	●	●	●	●	●	●	●
Paper stationery	●	●	●	●	●	●	●	●
Packaging		●	●	●	●	●		●
Household, sanitary and non-woven products			●			●		
Other articles of paper and paperboard	●	●	●	●	●	●	●	●
Printing**	●	●	●	●	●	●		●
Biochemicals	●	●	●	●	●		●	●

Notes: * Furniture manufacturing covered semi-solid/ solid wood, panel-based, upholstered and metal-based furniture. Please note that upholstered and metal-based furniture did not prioritise the competition and forest-related packages. **Printing covered sheet-fed offset, heat-set offset, rotogravure and flexo printing. Source: Authors' elaboration

The complete list of legislative acts and non-legislative policies covered in the study can be found in Chapter 4.

3.3 Phase 2: Identification of the actions required for compliance and creation of a cost typology

The selected pieces of legislation, grouped into eight packages, were analysed and the actions that companies have to take to comply with them were identified. The actions were then associated with cost categories identified in the European Commission's Better Regulation Toolbox (European Commission, 2015a), and previous cumulative cost assessment studies for the steel and aluminium industries (CEPS, 2013a and CEPS, 2013b) and the Chemical industry (Technopolis Group, 2015). Chapter 5 presents the results of the analysis per legislative package.

Those studies had identified two main categories of costs: direct costs and indirect costs.¹⁴

Direct costs are directly incurred due to compliance with the legislation. Two types of costs can be identified under this category:

- Specifically identified cost types defined in detail in the legislation or other administrative acts, so the exact cost amount can be reliably estimated (e.g. REACH registration fees, taxes or levies, etc.)
- Costs not identified as such in the legislation but directly borne by companies in order to comply with the requirements and standards set by the legislation, although the exact cost is defined by investment decisions of the companies, the specific business environment and price structures, the technologies available or other factors not directly related to or affected by the legislation. An example of such types of cost is investment in technologies to reduce emissions, to comply with the limits set by legislation. Although the legislation defines the limits – and often requires the use of the best available technology – the final selection of the specific technology and equipment, and hence its cost, is the firm's decision. The estimation of such cost is straightforward although the accuracy of the estimate depends on information provided by the companies.

Indirect costs are also generated as a result of legislative requirements. However, either they are incurred by other companies upstream in the value chain, and passed on to F-BI companies through the price of inputs (e.g. wood), or they are related to opportunity costs due to the substitution of products and the loss of markets. Although some of the passed-on (also referred as pass-through) costs could be estimated (e.g. the effect of climate legislation on electricity prices), several of its components (e.g. opportunity cost) are difficult to quantify and their estimation can only be based on strong assumptions.

In the context of this report, scenarios for the quantification of indirect costs due to carbon pass-on in electricity prices for the pulp, paper and paperboard sector are made in chapter 5. Lack of plant level information on electricity consumption for the woodworking companies and other information did not allow the same exercise to be run for the woodworking sector as a whole. Nonetheless, indirect costs for climate and energy are analysed qualitatively for the panel product group. Other than this, due to the ambiguities of the indirect costs and the limited, mainly qualitative, information provided by companies, no robust assumptions could be made for the estimation of other indirect cost and, therefore, they have had to be excluded from the assessment.

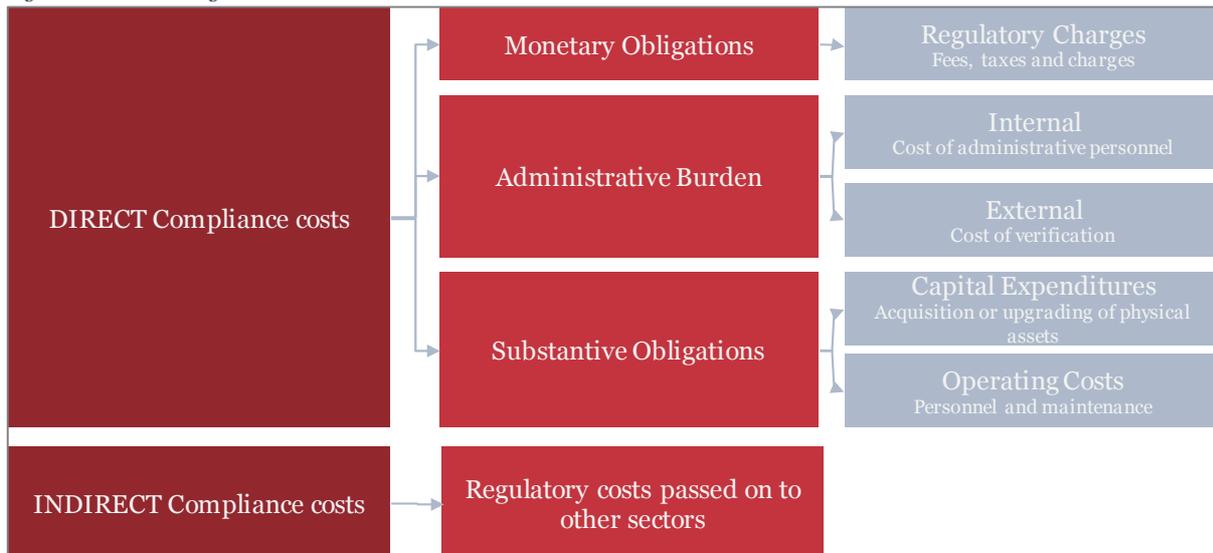
Thus, **the typology of cost used in this study includes the following types of direct costs**, which are illustrated in Figure 18.

- **Monetary obligations** are regulatory charges such as fees, levies, or taxes on certain stakeholders. The identification and computation of such costs are rather straightforward, as regulatory charge amounts are usually known and their extent is clearly communicated to a company. Examples include national environmental taxes and charges, and net costs for CO₂ emission allowances for industries covered by the EU's Emissions Trading Scheme (ETS).

¹⁴ A third category named "enforcement cost" is also included in the cost classification, however it is incurred by the public administration and the authorities responsible for the enforcement of the legislation and thus not included in costs to industry.

- **Administrative burden** is defined as the additional cost of fulfilling the **information obligations** to public authorities or other third parties as required by legislation. It is important to note that administrative burden is thus different from administrative cost, as administrative burdens only represent part of administrative cost and do not integrate business-as-usual costs that would nonetheless occur in the absence of legislation. Administrative burden can be incurred internally (e.g. staff time) or externally by retaining help and advice such as verification, which may or may not be mandatory. The types of administrative burden identified in previous studies on cumulative costs include: cost of personnel, laboratory testing (internal or subcontracted), consultants, and necessary training.
- A methodological challenge in the assessment of administrative burden relates to the difficulty of identifying the origin of the burden – whether burdens can be solely attributed to the minimum requirements of EU legislation or to going beyond minimum requirements (“gold-plating”) at national level. This was taken into account by asking companies surveyed to report the portion of administrative burden attributable solely to implementation of the European legislation. However, there is no obvious way to ensure that there is no overlap in administrative burden estimates.
- **Substantive Compliance Costs:** Substantive Compliance Costs are provisions made to comply with regulations, which can be further broken down according to the following categories: capital costs (CAPEX) and operating costs (OPEX).

Figure 18 Cost categorisation



Source: Author’s elaboration

Capital costs include any acquisition or upgrading of physical assets, (land, building or equipment), usually “fixed costs”, but also investment costs from investments necessary to meet legal obligations. Investment costs can be one-off costs (e.g. new equipment needed) or recurrent costs (periodical training or tests). Operating and Maintenance Costs include additional expenses for personnel (wages), energy inputs, materials, consumables associated with legal acts, and are usually “variable costs”. Indirect compliance costs are related to the fact that other stakeholders in the value chain have to comply with other legislation. Such costs are passed on by upstream companies or passed back to producers by downstream users. A number of undue effects of legislation, like transaction costs, reduced competition and adjudication or litigation costs, generate indirect costs that are relevant for the competitiveness of the industry but are very difficult to quantify, given the fact that very often they are one-off costs, and very variable across sub-sectors.

3.4 Phase 3: Identification of typical plants

3.4.1 *Criteria for selecting typical plants*

Plants selected for the interviews with the companies must comply with legislation with a degree of efficiency that should be “typical” of their product group in order not to bias the outcomes of the analysis. Therefore, an effort was made to collect data on **plants** that were typical regarding their product group and not only their company. This **compliance efficiency** of plants was expected to vary according to several factors and the group of plants should therefore reflect a series of ex-ante criteria at the selection stage. In this regard, the aim of the selection process was to have a group of plants that satisfies the criteria of the CAR (Cost-driven Approach to Regulatory burdens) methodology (SIRA, 2015) – as was the case for the steel and aluminium CCAs, which defines three criteria that a “typical” plant should conform to:

- The plant of a company should be considered as representative in terms of activities and structure of the other plants of the same product group. A panel of plants that reflect the production chains, processes and products of the product group should also present a degree of compliance efficiency that can be considered as typical for the product group.
- The plant should be comparable to other plants in the product group in terms of business and business operations. This implies that large and small plants should be selected and that the size effect is to be taken into account in the calculations (large vs SME).
- The plant should present clear business operations and one should be able to associate costs to specific activities. For large plants, one must therefore be able to target the analysis in terms of sites and activities.

Overall efficiency of the plants should also be comparable to the product group efficiency (i.e. efficiency not specifically related to complying to the legislation, but to the general activities of the firm) as legislative cost is part of the wider operating and production costs and this overall efficiency also affects compliance efficiency. Turnover per employee has been used as a proxy for overall efficiency to compare the panel of plants and the product group as a whole. Added value would be a better indicator, but it is not available at plant level. The comparison between the panel and the product group overall should show if the selected plants are close to the product group average or diverge from it. In case larger (lower) productivity indicators be observed in the panel of firms, one can expect costs figures to be under(over)-estimated.

The **online survey** (see Phase 4 below) also contributes to verifying the typicality of the set of companies by adding more (but less detailed) data points to the information compiled during the earlier parts of study. A sensitivity analysis over different sets of weights for the online survey and the in-depth interviews was implemented. Overall, results after the adjustment were stable according to the various scenarios and the direction of the adjustment is not systematic. The lack of a systematic bias supports the assessment that the approach is robust. The results of the sensitivity analysis are also presented in Appendix A.

3.4.2 *Selection of companies for pilot and in-depth interviews*

Forest-based industries were first analysed according to fundamental parameters (e.g. number of companies, size, turnover, employment, country distribution, etc.). This provided an initial overview of the F-BIs, the sub-sectors and their product groups. Firms were then invited to participate to the study through in-depth interviews (initially through a Pilot phase that enable fine-tuning the questionnaire based on pilot companies’ feedback).

The selection of the interviews was performed on the basis of the above criteria (representativeness of activities and structure, comparability of companies and clear business operations) with the support of industry associations. Not all companies were willing to participate to the study during the interview phase because of significant constraints in terms of burden (data collection represents a time-consuming and costly process, especially when cost of legislation is not systematically identified by the

companies) and confidentiality issues (sensitivity of the collected information due to their strategic value).

As a result, not all companies contacted responded positively to the invitation. Table 3 presents an overview of the final panel of companies that took part in the in-depth interviews. While not all pre-selected companies were involved in the interviews, this final panel of companies still reflects the initial selection criteria.

Table 3 The panel of typical plants

NACE code	Label	Large	Small	Countries	% covered of product variety in the sector*
16.1	Manufacture of sawnwood and planing of wood	2	2	SE, DE, EE	91%
16.21	Manufacture of veneer sheets and wood-based panels;	4	2	FI, BE, RO, IT, UK, PT	82%
16.23	Manufacture of other builders' carpentry and joinery	2	2	AT, FI, PT, IT	77%
16.24	Manufacture of wooden pallets and other wooden packaging		5	IT, IT, UK, PT, SP	98%
17.11	Manufacture of pulp	11		DE, AT, SE, FI, IT, PT, UK	100%
17.12	Manufacture of paper and paperboard	19		FI, SE, ES, AT, FI, IT, UK, NL, FR, PT,	100%

Source: Author's elaboration * Note: Based on production value

Concerning the *representativeness of activities and structure of the product groups*, the production value of each product group by detailed products as they are reported in Prodcum for the EU28 (Total production by PRODCOM list NACE Rev.2, table DS-066342, 2014)) was put into perspective with our group of typical plants (see Table 3 and Table 4). Companies that participated in in-depth interviews cover the majority, if not all, of the most important products (in terms of sold production value of EU28 companies) for each product group. The product group for which the coverage of products is the lowest is 16.23 “Other builders and carpentry”. For this product group, interviewed companies do not cover windows of wood (22% of value of sold production) nor shuttering for concrete constructional work, shingles and shakes of wood (1% of sold production value). However, the coverage of the group of companies includes the main products of the product group, which represent together 77% of the sold production value (builders’ joinery and carpentry of wood, prefabricated buildings of wood, and doors and their frames and thresholds of wood).

Overall, the coverage of products by the companies interviewed effectively illustrates the heterogeneity of the activities, production processes and technologies associated with the different products in each product group. Furthermore, the country coverage of the panel of companies also supports the fact that the selected companies are present in countries that account together for the large majority of the activities of the EU forest-based industries. In terms of turnover, the countries covered by the study represent more than 90% of the woodworking, and more than 83.5% of pulp, paper and paperboard industries in the EU.

Table 4 Value of production sold by product group

Products by product group	Sold production value of the sector (Prodcom)	Coverage by interviewed companies
16.1 Sawnwood		
Spruce wood (<i>Picea abies</i> Karst.), fir wood (<i>Abies alba</i> Mill.)	29%	yes
Coniferous wood; sawn or chipped lengthwise, sliced or peeled, of a thickness > 6 mm, end-jointed, sanded or planed	21%	yes
Pine wood (<i>Pinus sylvestris</i> L.)	14%	yes
Coniferous wood in chips or particles	8%	yes
Wood, sawn or chipped lengthwise, sliced or peeled, of a thickness > 6 mm (excluding coniferous and tropical woods and oak blocks, strips and friezes)	8%	yes
Coniferous wood continuously shaped (including strips and friezes for parquet flooring, not assembled)	6%	yes
Coniferous wood sawn or chipped lengthwise, sliced or peeled, of a thickness of > 6 mm (excl. planed or sanded, and spruce " <i>Picea abies</i> Karst.", silver fir " <i>Abies alba</i> Mill." and pine " <i>Pinus sylvestris</i> L.")	5%	yes
Other	9%	yes (also other products)
16.21 Wood-based panels		
Particleboard, of wood	31%	yes
Fibreboard (excluding medium density fibreboard [MDF]), of wood or other ligneous materials, whether or not bonded with resins or other organic substances, of a density exceeding 0,8 g/cm ³	10%	yes
Medium density fibreboard (MDF), of wood or other ligneous materials, whether or not bonded with resins or other organic substances, of a thickness exceeding 9 mm	8%	yes
Oriented strand board (OSB), of wood	6%	yes
Veneered panels and similar laminated wood (excluding with block board, laminboard or batten board)	5%	yes
Medium density fibreboard (MDF), of wood or other ligneous materials, whether or not bonded with resins or other organic substances, of a thickness not exceeding 5 mm	5%	yes
Coniferous and tropical wood veneer sheets and sheets for plywood, sawn lengthwise, sliced or peeled, of a thickness ≤ 6 mm excluding end-jointed, planed or sanded	5%	no
Plywood consisting solely of sheets of wood (excluding of bamboo), each ply not exceeding 6 mm thickness, with at least one outer ply of non-coniferous wood (excluding tropical wood)	5%	no
Medium density fibreboard (MDF), of wood or other ligneous materials, whether or not bonded with resins or other organic substances, of a thickness exceeding 5 mm but not exceeding 9 mm	5%	yes
Veneered panels and similar laminated wood with blackboard, laminboard or batten board	4%	yes
Plywood consisting solely of sheets of wood (excluding of bamboo), each ply not exceeding 6 mm thickness (excluding products with at least one outer ply of tropical wood or non-coniferous wood)	3%	yes
Fibreboard (excluding medium density fibreboard [MDF]), of wood or other ligneous materials, whether or not bonded with resins or other organic substances, of a density	3%	yes

Products by product group	Sold production value of the sector (Prodcom)	Coverage by interviewed companies
exceeding 0,5 g/cm ³ but not exceeding 0,8 g/cm ³		
Particle board and similar board of ligneous materials (excluding wood)	3%	yes
Other	8%	no
16.23 Other builders and carpentry		
Builders' joinery and carpentry of wood (excluding windows, French windows and doors, their frames and thresholds, parquet panels, shuttering for concrete constructional work, shingles and shakes)	29%	yes
Prefabricated buildings of wood	26%	yes
Doors and their frames and thresholds, of wood	22%	yes
Windows, French windows and their frames, of wood	22%	no
Shuttering for concrete constructional work, shingles and shakes, of wood	1%	no
16.24 Wooden containers and packaging		
Flat pallets and pallet collars of wood	48%	yes
Cases, boxes, crates, drums and similar packing's of wood (excluding cable drums)	29%	yes
Casks, barrels, vats, tubs, and coopers products and parts thereof of wood (including staves)	11%	yes
Box pallets and load boards of wood (excluding flat pallets)	9%	yes
Cable-drums of wood	2%	no
17.11 Pulp		
Chemical wood pulp, soda or sulphate, other than dissolving grades	77%	yes
Chemical wood pulp, dissolving grades	11%	yes
Mechanical wood pulp; semi-chemical wood pulp; pulps of fibrous cellulosic material other than wood	7%	yes
Chemical wood pulp, sulphite, other than dissolving grades	4%	yes
17.12 Paper and paperboard		
Graphic paper	40.5%	yes
Packaging paper and paperboard	47.5%	yes
Sanitary and household paper	7.7%	yes
Other paper and paperboard	4.3%	yes

Source: Eurostat (Prodcom) and Historic Statistics 1991-2014, CEPI

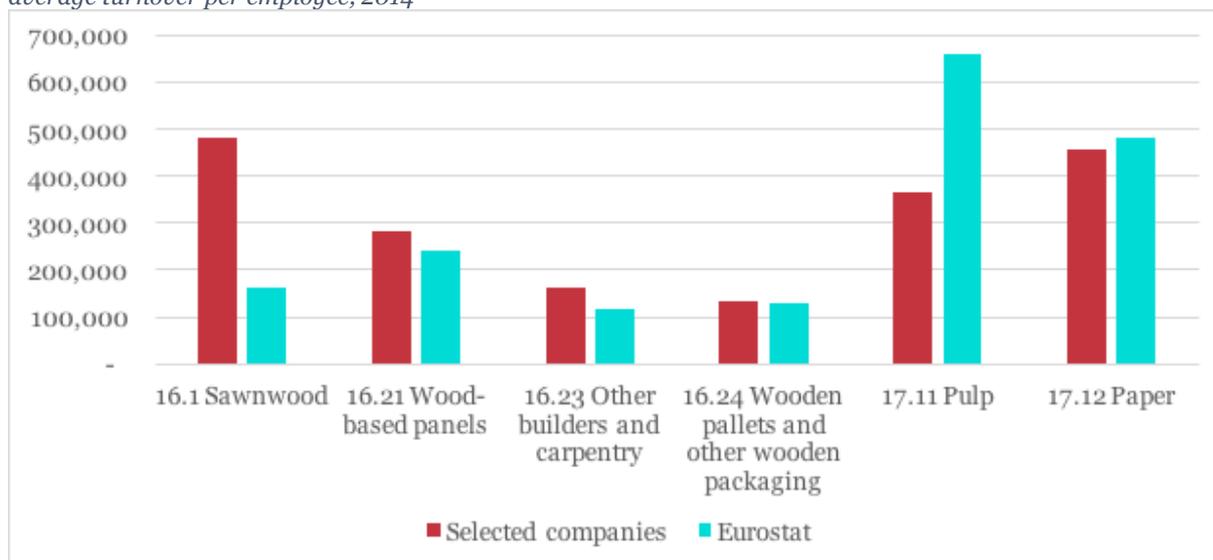
In order to ensure *comparability* of the data collected, companies were asked to report data for a plant or mill that they considered as typical, i.e. average in terms of productivity, cost-efficiency and overall characteristics. This reduces the possibility to observe data related to plants/mills that are outliers within a given company. Furthermore, cost data were rescaled (see Appendix A on main assumptions) during the calculations in order to transform the cost figures in figures that are more comparable and

appropriate for aggregation. Size (SMEs or large) was also a characteristic that was taken into account during the data collection process and the production of cost figures.¹⁵

A critical aspect of the data collection process consisted in ensuring that data provided by the companies were correctly referring to the targeted activities (i.e. the company has *clear business operations* and it is possible to focus the data collection on a specific activity). This issue especially concerned large companies. In order to address this aspect, the interviewers ensured that companies responded for a specific plant/mill in order to reduce the scope of the data collection to a specific activity, product group and country of operation.

In addition to the above criteria (CAR criteria), *overall efficiency* of the interviewed companies was assessed for each product group by comparing their productivity (in terms of turnover per employee) with the same indicator for the product group in Eurostat. According to Figure 19, indicators of productivity are comparable in terms of scale for all product groups. For the Sawnwood product group, there is a more pronounced divergence between the figures of the panel of companies and Eurostat figures, indicating that the sample is characterised by a larger productivity in comparison with the product group as a whole at EU28 level. This implies that there was a larger risk of underestimating the cost figures for this sector based on the interview data only, which led to an adjustment of cost ratios with survey answers (see section 3.5). Conversely, for the pulp product group, there was a risk of overestimating the cost figures based on the interview data. However, survey answers were in line with the initial cost figures.

Figure 19 Comparison between the panel of interviewed companies and Eurostat sub-sectors – average turnover per employee, 2014



Source: Sub-sector data from Eurostat; panel data from authors

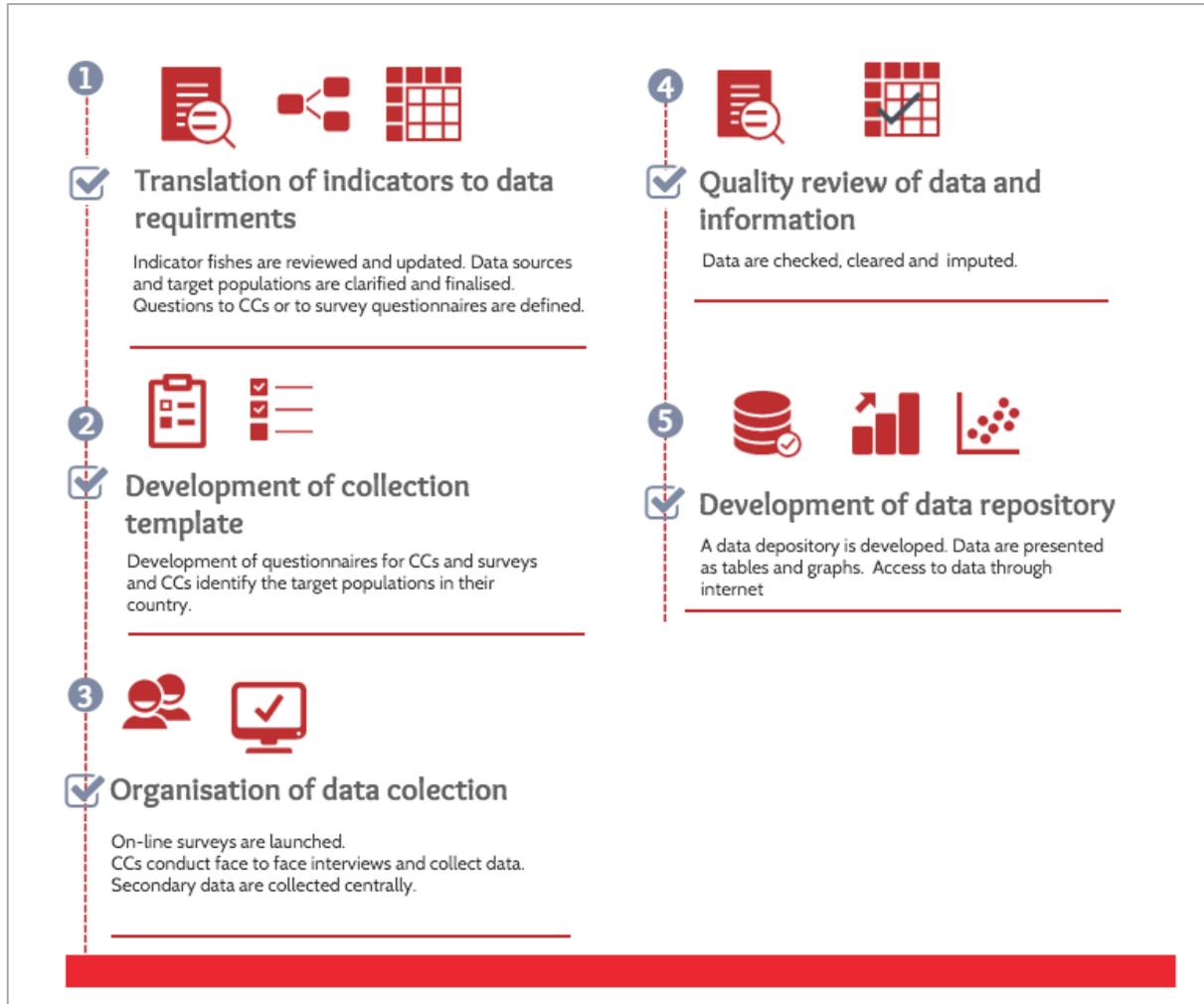
3.5 Phase 4: Collection of data and estimation of cost

The legislative cost borne by F-BI companies was estimated by following a six-stage approach illustrated in Figure 20. The first step included the development of a questionnaire and its distribution to a panel of typical plants. Next, data were collected through in-depth interviews with the selected companies. On the basis of these data, an estimation of the costs for the panel companies was performed. This estimation was further validated through two validation and discussion workshops. In addition to this validation, testing and calibration of the cost estimates were done using the results

¹⁵ SMEs are defined as companies with less than 250 employees. Large companies are companies with 250 or more employees.

from the online survey. Lastly, the results and input from all steps were aggregated producing a cumulative overview of regulatory costs at EU level.

Figure 20 Summary of methodology for estimating the cumulative cost of legislation



Source: Authors' elaboration

Step 1: Development of a questionnaire and its distribution to a panel of typical plants

Four sub-sector-specific questionnaires¹⁶ were designed together with the respective industry associations, company stakeholders and the European Commission in order to collect primary data from companies. The questionnaires were designed in such a way as to maintain comparability across cost categories and legislative packages, and to spot possible inconsistencies during data collection. By filling in the questionnaires, companies were expected to provide information about the typical total cost per legislative act and hence also per legislative package. A company information form, to collect company plant-level data on relevant information for the CCA, was also sent together with the questionnaire. During this step, also detailed guidelines for companies on how to fill out the questionnaire were developed. A help-desk was set-up to support the companies at any point during the process.

¹⁶ In total, one questionnaire for pulp and paper, and three for woodworking (a general questionnaire, one for panels (16.21) and one for packaging (16.24)) were designed. The questions and legislative packages are the same across sectors and product groups. Taking into account the prioritisation of different legislations across sectors and product groups in woodworking, some legislations included under specific legislative packages varied.

Step 2: Data collection and interviews

A set of pilot interviews with companies was performed to test the questionnaire, obtain the first absolute cost figures and thence adapt the questionnaire and its distribution process to the industrial realities of the F-BI sub-sectors. Further in-depth interviews, with a selected pool of companies, were carried out to collect the necessary source data for all targeted sub-sectors and product groups. A number of interviews, in particular for woodworking sector, were performed on-site which allowed the inter-active gathering of additional qualitative insights from companies on the issues of EU regulatory burden.

All legislative acts included in the questionnaires were scanned by the interview team in order to support the process of data collection (i.e. guide the companies) and also to assess whether the answers received were in line with what the prior literature review had suggested. Also national industrial experts were contacted in some cases (e.g. Finland, Germany, Portugal and Italy), to make sure that the answers were referring to European and national legislation.

During this stage secondary quantitative data were collected for multipliers, comparators and validation and filling in missing values in time series. To have a solid basis for comparability, whenever possible secondary data used were taken from Eurostat. Other secondary data (e.g. number of pallets – see step 5) were also used to identify inconsistencies and outliers, as well as to validate data collected via the questionnaires. In cases of inconsistencies or outliers, data were checked again with the companies and adjusted taking into account the additional information received and secondary data (see Appendix A). Data sources and uses can be summarised as follows:

Table 5 Sources and uses of data

Type of data	Source	Use
Regulatory costs	<p>Primary data from interview questionnaire</p> <p>Primary data from online survey</p> <p>Secondary data from additional reports, mostly related to indirect costs</p>	Build numerator of cost ratio
Comparators at company/plant level	<p>Primary data from panel companies (turnover, # of employees, production quantity, etc.)</p> <p>Secondary data from RISI database (company turnover, # of employees, production quantity)</p>	Ensure a diversified sample
Comparators at sub-sector level	<p>Secondary data from Eurostat, Structural Business Statistics, time series: turnover, added value, gross operating surplus</p> <p>Secondary data from other sectoral reports, e.g. Historical Statistics 1991-2014, CEPI: production quantity, EBITDA, EBIT</p>	Transpose initial cost/turnover ratio to other comparators (cost/EBIT, cost/EBITDA, etc.).
Indicators to validate group of companies	<p>Secondary data from RISI database for detailed plant presentation: type of products, capacity, turnover, # of employees, etc.</p> <p>Secondary data from Eurostat, Structural Business Statistics, time series: turnover, added value, gross operating surplus</p> <p>Secondary data from Prodcom database, Eurostat, 2014: production value by product and product group.</p>	Compare the panel of plants with sectoral characteristics

Source: Author's elaboration

Step 3: Estimation of legislative costs for the groups of companies

The outcome of Step 1 and Step 2 was an initial set of grids with proxy companies' cost estimates covering all pieces of legislation concerned. At that stage costs were aggregated in order to produce, where possible, a preliminary view of costs per sub-sector, product group and the evolution of costs over time as share of added value. Details on the calculations are presented in Appendix A.

Step 4: Validation of cost estimates

Three validation workshops¹⁷ were organised to present the results of the initial calculations to companies and other pre-identified stakeholders (mainly, experts from industry, industry representatives and European Commission representatives). The first validation workshop presented the results of the pulp and pulp-based manufacturing value chain. The second validation workshop concerned the results for woodworking value chain. The validation workshop for woodworking concluded that the trends and the order of magnitude of the data provided were generally in line with the expected results. For pulp, paper and paperboard, the industry association CEPI asked for further investigation on outliers, comparators and indirect costs. A third validation workshop was performed in Finland, in order to submit interim results to three Finnish experts (on climate/energy, environment and transport), which were found consistent with the Finns' own assessment of highlighted legislation and subsequent costs.

Step 5: Testing and adjustment of data with an online survey

In parallel to the validation workshops an online survey was conducted to validate the computed cost estimates. The survey was in two parts: 1) a cost validation for predefined cost types and legislative packages and 2) an assessment of indirect costs in relative terms, with close-ended questions, without asking for absolute figures.

In order to increase the response rate, the online survey was kept simple and short. Companies were asked to select the most appropriate cost range among a list of ranges, expressed as a percentage of turnover, for each legislative package and each category of direct cost. The link to the questionnaire was distributed to companies through national associations and to the companies e-mail addresses found in company databases such as Orbits. In total, 103 responses (91 complete, 12 partial) were provided to the survey. Overall, respondents had to provide answers for at least three legislative packages to be taken into account.

Responses from companies with 250 employees or more cover 52.4% of the sample, which indicates a bias towards larger enterprises, e.g. only 5.8% of the sample is from small enterprises with less than 10 employees. There is a close to 50/50 split between the sub-sectors (47.5% from pulp, paper and paperboard and 52.5% from woodworking). The least represented sub-sectors are builders' carpentry and joinery (6.8%) and pulp production (8.7%). Companies from 21 different countries replied to the online survey. There are many replies particularly from Austria, Germany and Sweden (corresponding to 35.9% of the total sample). Otherwise, the distribution is quite even across the remaining 17 countries. The three countries from which the most responses were received (Austria, Germany and Sweden) already cover over 70% of EU woodworking (NACE code 16, manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials), and of pulp, paper and paperboard (NACE code 171, manufacture of pulp, paper and paperboard) in terms of production value. Overall, the 21 countries cover over 98% of both woodworking and pulp,

¹⁷ Upon the request of Finnish Forest Industries Federation, a small additional validation workshop was held on 15 February 2016 in Helsinki

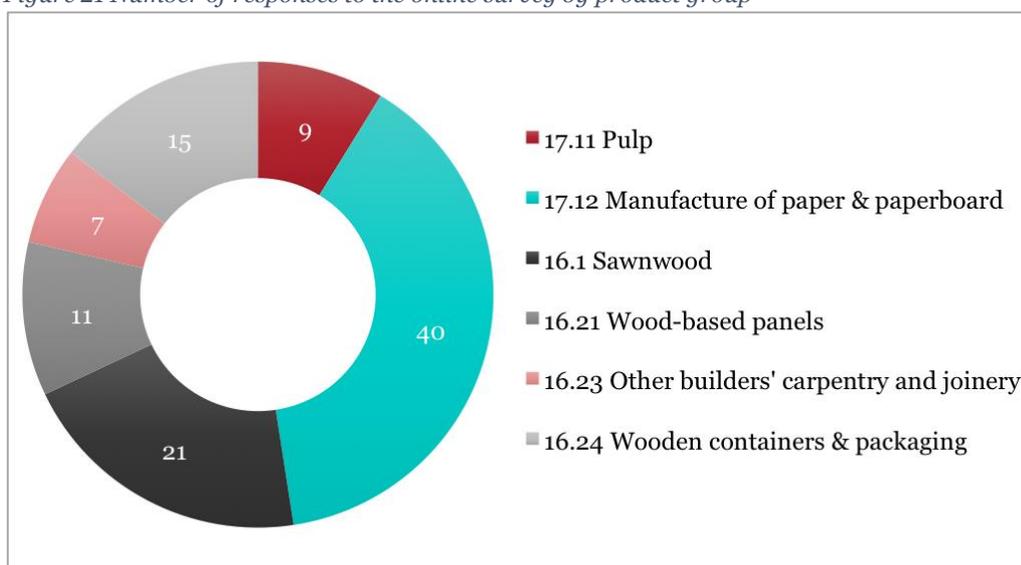
paper and paperboard sectors, as only countries with very little production value in these sectors are missing (e.g. Ireland, Greece, Croatia, Cyprus, Luxembourg, Hungary, and Malta)¹⁸.

Table 6 Number of responses to the online survey by product group

Country	Panel of typical plants	Online Survey	Total number of responses
17.11 Manufacture of pulp	11	9	20
17.12 Manufacture of paper & paperboard	19	40	59
16.1 Sawnwood	4	21	25
16.21 Wood-based panels	6	11	17
16.23 Other builders' carpentry and joinery	4	7	11
16.24 Wooden pallets and other wooden packaging	5	15	20
Total	49	103	152

Source: Authors' elaboration

Figure 21 Number of responses to the online survey by product group



Source: Authors' elaboration

¹⁸ Data for production value can be sources on Eurostat, Structural Business Statistics, Table [sbs_na_ind_r2], last available data 2014.

Table 7 Number of responses to the online survey by country

Country	Panel of typical plants	Online Survey	Total number of responses
Austria	6	11	18
Belgium	1	5	6
Bulgaria		3	3
Czech Republic		1	1
Denmark		1	1
Estonia	1	3	4
Finland	6	5	11
France	1	3	4
Germany	5	10	15
Italy	8	3	11
Latvia		4	4
Lithuania		3	3
Netherlands	2	4	6
Poland		4	4
Portugal	5	5	10
Romania	1		1
Slovak Republic		2	2
Slovenia		4	4
Spain	2	8	10
Sweden	7	15	22
United Kingdom	4	6	10
Total	49	103	152

Source: Authors' elaboration

The online survey was used to adjust the initial results calculated based on the pilot and in-depth interviews. Costs were adjusted by size, product group, legislative package and cost category. The survey results also account for country variability due to transposition of EU legislation into national legislation. For each category, the initial average cost figures were adjusted (upwards or downwards) based on the difference observed between the initial figure and the on-line survey results.

The idea of the adjustment is to take into account information from additional companies in the calculations. The set of interviewed companies was indeed limited in order to collect detailed information at the legislative level, on the evolution of costs in time and qualitative clarifications from the companies. Such detailed information was necessary to ensure a good understanding of the cost

data collected. However, as explained in section 3.4, while the typicality of interviewed companies was ensured to the extent possible, cost figures for some sectors could still be underestimated or overestimated because of specificities of interviewed companies that cannot be easily observed. Hence, information from a larger set of companies can help to address potential biases.

However, combining data from the interviews with data from the on-line survey might not improve cost figures if results from the latter source are even more biased (with the same direction of bias) than results from interview data. Survey data, while covering a larger set of companies, might not necessarily provide a more precise information at the company level. The analysis performed in section 3.4 gives an insight on the direction of a potential bias in the initial calculations. For example, cost figures for the sawnwood product group were likely to be underestimated if the calculations are based on the interviewed firms only. This allowed us to assess the **relevance of the direction of the adjustments**. Furthermore, the weight given to the initial cost figures is larger and survey results account only for 25% of the final cost figures (different weights were tested). This lower weight for the on-line survey reflects the importance of the validation process (time dedicated to interviews, workshops) that was applied to the initial figures before conducting the survey. Hence the adjustment consists of a marginal correction of the initial figures. The detail of the calculations with the survey are available in Appendix A.

The final cost of phytosanitary treatment for pallet producers was calculated separately in order to avoid extrapolating this specific cost to other products in the product group 16.24 Wooden pallets and other wooden packaging. The average cost for a single pallet was calculated based on the detailed information provided by the pallet producers during the in-depth interviews. This cost was multiplied by the number of pallets observed in Prodcom (Eurostat). As a consequence, the average cost related to the environmental legislative package was reduced from 3.5% to 2.8% of turnover for this product group.

Step 6: Aggregation of costs at EU level

To present total costs at EU level, during the last step the core multipliers were applied and data was presented in relative terms. Results are grossed up using turnover. Grossed-up costs are then presented as share of added value, gross and operating surplus for all sub-sectors. Depending on the availability of public and private data, €/tonne and percentage of EBIT and EBITDA were also used as comparators. Accordingly, this was only possible for pulp, paper and paperboard but not for woodworking.

3.6 Quantitative estimation of ETS indirect costs

This section is concerned with the impact of ETS on electricity prices, and more specifically on the extent that this effect is passed-through to the price that the pulp, paper and paperboard sector pays for electricity. A quantitative estimation of ETS indirect cost was only performed for the pulp, paper and paperboard sub-sector but not for the woodworking product group, as woodworking companies in general did not report any significant burden occurring from this ETS indirect costs and thus there was no basis for calculation. (Indirect costs related to the price of raw materials such as wood were also reported as significant to woodworking companies and are addressed qualitatively in section 5.1.3).

An explanation of the main effect of the ETS on electricity prices and subsequently on pass-on rates, along with a literature review on pass-on rates as well as an assessment of the pass-on rates to be used for the calculation of pass-on rate for the pulp, paper and paperboard sector, can be found in Appendix B.

For energy-intensive industries, like pulp, paper and paperboard, electricity prices can be a determinant factor in influencing competitiveness. The introduction of the ETS in 2005, has developed a market around carbon emission allowances (European Union Allowances: EUAs), traded as a commodity, and has triggered other industrial mechanisms of response and adaptation; one of these is

the extent by which the price paid for carbon allowances can be passed-on to industrial and final consumers (i.e. pass on rates).

The objective was to provide the indirect cost of ETS per year between 2005 and 2014. Such computation was only performed for the pulp, paper and paperboard sectors, as data were only available for this sub-sector.

The equation used to calculate the indirect costs is an adapted version of the one used in the steel and aluminium studies (CEPS, 2013):

Indirect cost of ETS (€)

$$= \text{electricity purchased (kWh)} \times \text{carbon intensity of electricity} \left(\frac{\text{tonne of CO}_2}{\text{kWh}} \right) \\ \times \text{CO}_2 \text{ price} \left(\frac{\text{€}}{\text{tonne of CO}_2} \right) \times \text{pass on rate} - \text{State Aid compensations (€)}$$

Indirect costs were computed for pulp, paper and paperboard activities together, as the electricity purchase related to pulp, paper and paperboard separately were not available.

According to this equation, the five components of indirect costs were:

- **Electricity purchased:** amount of electricity in kWh purchased from the grid to produce pulp, paper and paperboard
- **Carbon intensity of electricity:** emission of CO₂ in tonnes per kWh
- **CO₂ price:** market price of CO₂
- **Pass-on rate:** proportion of ETS costs that the electricity providers pass on to the pulp, paper and paperboard sub-sector - their customers, which can be also defined as the proportion of the price paid for carbon allowances that is passed on to the industry.
- **State Aid compensations:** compensations specifically addressing indirect costs of ETS for the pulp, paper and paperboard industry.

In order to assess the sensitivity of results, we considered different values for some parameters, where relevant, i.e. CO₂ prices and pass-on rates. Hence, our analysis is performed with two CO₂ prices for 2007 so as to take into account the transition between Phase I and Phase II of ETS, and different pass-on rates were used in the calculations.

3.6.1.1 Component 1: electricity purchased (kWh)

Data on electricity purchased from the grid at the country level between 2005 and 2014 are used for the indirect costs computation (source: RISI database, provided by CEPI). Data were converted from GWh to kWh. The data cover the following countries: Austria, Belgium, Czech Republic, Finland, France, Germany, Italy, Netherlands, Poland, Portugal, Slovak Republic, Spain, Sweden and United Kingdom. The data cover fewer countries than the ones included in the general cumulative cost exercise; however, they are representative of over 95% of EU production value of pulp, paper and paperboard and have thus not been adjusted as electricity purchased can be directly correlated with the production of pulp, paper and paperboard. All electricity data can be differentiated for each country; this allows to also differentiate the other components of the above equation by country.

The above formula only relates to electricity **purchased** from third-party electricity providers and not bio-electricity produced by pulp, paper and paperboard mills in order to isolate indirect costs from direct costs of ETS (the latter are taken into account in the direct compliance costs figures).

The steel and aluminium studies use a ratio kWh/tonne representing electricity intensity, instead of an absolute electricity figure. In this report, indirect costs were directly calculated in Euros instead of cost per tonne. This is due to the fact that electricity data are available for the production of pulp, paper and paperboard together. Hence, it is not possible to identify a specific cost per tonne of pulp and a cost per tonne of paper.

3.6.1.2 Component 2: carbon intensity of electricity (tonne of CO₂/kWh)

Data on maximum regional carbon intensity of electricity were used to approximate the carbon intensity of electricity. As in the studies on steel and aluminium, such data were sourced in the Communication from the Commission: Guidelines on certain State aid measures in the context of the greenhouse gas emission allowance trading scheme post-2012 (2012/C158/04). This data source provides maximum regional carbon intensity per country for 2012. Given the lack of data to produce time series and which could be considered as rather stable, we used data from 2012 for the whole period.

The table below summarises estimates of CO₂ emissions per kWh from electricity generation, per country, per year.

Table 8 Carbon intensity (CO₂/Mwh and CO₂/kwh per year)

Country	Mwh	Kwh
Austria	0.76	0.00076
Belgium	0.76	0.00076
Czech Republic	1.06	0.00106
Finland	0.67	0.00067
France	0.76	0.00076
Germany	0.76	0.00076
Italy	0.6	0.0006
Netherlands	0.76	0.00076
Poland	0.88	0.00088
Portugal	0.57	0.00057
Slovak Republic	1.06	0.00106
Spain	0.57	0.00057
Sweden	0.67	0.00067
United Kingdom	0.58	0.00058

Source: Communication from the Commission: Guidelines on certain State aid measures in the context of the greenhouse gas emission allowance trading scheme post-2012 (2012/C158/04).

3.6.1.3 Component 3: CO2 price

Spot prices and future prices for allowances (European Allowances: EUA) on auction markets (main market is the European Energy Exchange EEX) provide the prices of CO2 used for the calculations. We suggest to use the prices from the steel and aluminium study until 2012. The prices are calculated as follows:

- 2005: yearly average spot price, reported daily by the European Environment Agency)
- 2006-2012: yearly average of settlement prices for December future of the same year (source: EEX).
- Prices for 2013 and 2014 have been added using yearly average sport price based on weekly data points.
- As 2007 corresponds to the end of Phase I of the ETS and to the beginning of Phase II, we provide scenarios with the actual yearly average of settlement prices for the December future price of the same year (price=0.74), which reflects the drop in the spot price due to an over-allocation of permits, and – as an alternative – a computation based on the average of weekly settlement prices for the December future price of the next year, namely 2008 (price=19.56) - this includes market expectations and possibly reflects price trends).

Table 9 CO2 price (euros per tonne)

2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
21.82	18.62	0.74 or 19.56	23.03	13.31	14.48	13.77	7.56	4.47	5.95

Source: CEPS (2013) and EEX.

Future prices are used between 2006 and 2012, not spot prices. Historical spot prices for EUA over this period were not available from EEX. These spot prices would have been a direct reflection of the effective prices on the market. However, the study uses future prices with a short horizon (December of the year in this case). As future prices converge to spot prices when approaching maturity, such future prices are expected to be a good proxy of the effective CO2 price on the market, even if prices in first months of the year will be a reflection of short-term expectations.

3.6.1.4 Component 4: pass-on rate

The steel and aluminium studies used a fourth component in the equation (so-called pass-on rate) according to different scenarios: rate being equal to 1 (upper-bound scenario) i.e. a pass-on of full costs, 0.8 (intermediate scenario) and 0.6 (lower bound scenario), i.e. only 60 % of costs passed on.

In this report, different scenarios for the rate are used and measure indirect costs accordingly. A thorough analysis and choice of pass-on rates should be ideally done at country level (to take into account differences in the electricity markets). However, this level of detail is not possible in the context of this study as the literature does not provide relevant pass-on rates for each country and for the whole time period. Based on a thorough-going analysis of literature (see Appendix B), it is proposed to use pass-on rates of 0.5 and 1 for all countries.

3.6.1.5 Component 5: State Aids compensations

Compensation via subsidies occurred from 2014 onwards and so should ideally be subtracted from the calculation of indirect costs. Such cases of compensations are consultable in the COMP database on cases (<http://ec.europa.eu/competition/elojade/isef/index.cfm>). Table 10 presents the amounts of the compensations reported in this database. However, identified amounts of compensation schemes are provided for a list of sub-sectors and cannot be split in a straightforward way. As compensations were only introduced from 2014 onwards, results from 2005 to 2013 will not be affected by this change.

Table 10 State Aids compensation including the pulp, paper and paperboard sector¹⁹

Country	Expenditure (in millions)
United Kingdom ²⁰	2014: GBP 19.632
Germany	2014: EUR 314.2
Spain	2014: EUR 0 (5 million EUR 2013-2014)
Netherlands	2014: EUR 53.455
Greece	2014: EUR 14.4
Lithuania	2014: EUR 0 (13.1 million EUR 2014-2020)
Slovakia	250 million EUR 2014-2020

Source: DG COMP database, <http://ec.europa.eu/competition/elojade/isef/index.cfm>, as consulted on May 2016

¹⁹ State Aids compensation schemes are drafted for a group of sectors and public data does not allow any disentangling of aid per sector. Sectors under the different schemes (in different countries) cover different sectors.

²⁰ The Carbon Price Floor compensation scheme is outside the scope of this decision.