

Forest Product Calculations: The Case of Fibreboard

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Thünen Institute of International Forestry and Forest Economics (1/14)



Forestry in Germany



Forestry worldwide

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- \rightarrow We analyse national as well as international framework conditions for forestry, forest based livelihoods and the forest based industry
- \rightarrow With our Forest Products Markets team we analyse the utilization of wood as a resource on national and international level ...











Fibreboard: Joint Questionnaire and Definitions

| | | | Year -1 | Year | | IMP | ORT | | | EXP | ORT | |
|---------|--|---------------------|----------|----------|----------|-------|----------|-------|----------|-------|----------|-------|
| Product | (F (| Unit of | 2018 | 2019 | 20 | 18 | 20 | 19 | 20 | 18 | 20 | 19 |
| Code | | quantity | Quantity | Quantity | Quantity | Value | Quantity | Value | Quantity | Value | Quantity | Value |
| | PRODUCTION | | | | | | | | | | | |
| 8 | WOOD-BASED PANELS | 1000 m ³ | | | | | | | | | | |
| 8.1 | PLYWOOD | 1000 m ³ | | | | | | | | | | |
| 8.2 | PARTCICLE BOARD, OSB AND SIMILAR | 1000 m ³ | | | | | | | | | | |
| 8.3 | FIBREBOARD | 1000 m ³ | | | | | | | | | | |
| 8.3.1 | HARDBOARD | 1000 m ³ | | | | | | | | | | |
| 8.3.2 | MEDIUM/HIGH DENSITY FIBREBOARD (MDF/HDF) | 1000 m ³ | | | | | | | | | | |
| 8.3.3 | OTHER FIBREBOARD | 1000 m ³ | | | | | | | | | | |

Definitions (in brief):

8.3 FIBREBOARD

A panel manufactured from fibres of wood or other ligno-cellulosic materials ... It includes ... flat-pressed and moulded fibreboard products. It is reported in cubic metres solid volume.

8.3.1 HARDBOARD

Wet-process fibreboard of a density exceeding 0.8 g/cm³. It excludes...

8.3.2 MEDIUM/HIGH DENSITY FIBREBOARD (MDF/HDF)

Dry-process fibreboard. When density exceeds 0.8 g/cm³, it may also be referred to as "high-density fibreboard" (HDF).

8.3.3 OTHER FIBREBOARD

Fibreboard of a **density not exceeding 0.8 g/cm3**. This includes mediumboard and softboard (... insulating board, ... **produced** in a wet or a dry process).

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Source: JFSQ (2020)



Data Source 1: Official Statistics on Production of Fibreboard

| Statistical | Description | | JFSQ | Production | Sales | Companies |
|------------------------|--|--|-------|--------------------------|------------------------|------------------|
| Code | Description | | Code | 2019 in m ³ | 2019 in m ³ | (prod./sale) |
| 1621 15 230 | MDF, thin, thickness ≤ 5mm, rough/sanded/mac | hined surface | 8.3.2 | | 248.416 | 5/5 |
| 1621 15 260 | MDF, light, thickness 5-9mm, density below 650 | kg/m³ | 8.3.2 | | $?_1$. | 1/1 |
| 1621 15 291 | MDF, > 9mm, density 650-800 kg/m ³ , rough/san | ided | 8.3.2 | 722.915 | 7 519.137 | 8/8 |
| 1621 15 299 | MDF, > 9mm, density 650-800 kg/m ³ , other (coa | ited or laminated) | 8.3.2 | 273.307 | 273.307 | 8/8 |
| 1621 15 431 | HDF-Boards, densitiy > 800kg/m ³ , rough/sanded | 1 | 8.3.2 | 2.274.988 | 7 ,1.886.564 | 9/10 |
| 1621 15 439 | HDF-Boards, density > 800kg/m ³ , laminate floor | ing (in m²) | | 155.932.197 | 155.932.197 | 13/13 |
| 1621 15 460 | Other fibreboard, density 500-800kg/m ³ | | 8.3.3 | <mark>4</mark> 1.258.732 | 1.258.732 | 5/5 |
| 1621 15 491 | Other fibreb. (no MDF), density < 500kg/m ³ mag | de of wood-polymers | 8.3.3 | | 28.830 | 5/5 |
| 1621 15 499 | Other fibreb. (no MDF), density < 500kg/m ³ , and | d similar made of straw, flax, hemp | 8.3.3 | | • 5 | 2/2 |
| Hardboard | | Hardboard | 8.3.1 | 0 | 0 | |
| \rightarrow Cut-off | thresholds not relevant for panels | MDF/HDF | 8.3.2 | 3.519.626 | 2.927.424 | |
| \rightarrow Confide | ential data are problematic " . " | Other Fibreboard (incl. LDF) | 8.3.3 | 1.287.562 | 1.287.562 | |
| \rightarrow Double | counting (compare production+sales) | Total (of reported volumes; also combination of production and sales, if needed) | 8.3 | 4.807.188 | 4.214.986 | |
| \rightarrow Someti | mes its difficult to allocate JQ-codes | Specific query at statistical office | | Production | Sales | |
| to the s | statistical codes | MDF | 8.3.2 | 1.353.615 | | |
| \rightarrow Informa | ation from official statistics are not | HDF | 8.3.2 | 2.274.988 | 1.886.564 | |
| always | reliable, need to be checked | Other Fibreboard (incl. LDF) | 8.3.3 | | | |
| annays | | Total | 8.3 | | 5.109.413 | |



Data Source 2: Wood Resource Monitoring

Material and energy use of wood Roundwood Forest residues Bark Landscaping residues Sawmill Other wood by-products processing residues Waste wood slide 5 **Holger Weimar**

09.02.2021

Challenge: \rightarrow imprecise official statistics \rightarrow relevant information is missing Objective: quantification of complete wood use in Germany (1st processing stage) Method: collection of empirical data (complete inventory/sample data) Year of survey 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 P = Parent population; S = Sample; L = Literature/available statistics Markets Use / Demand Year of survey = reference year of data PP/ Sawmill industry P s P P P P P Pulp and paper industry P P P P P Wood-based panel industry L/S Other material use Veneer and plywood, WPC, Bio refinery a. o. S/L Bark and mulch production L P P P P Large Biomass power plants > 1MW L/S S/L S/L S/L Small BPP < 1 MW Other Pplants (Coal, Cement, Waste) P P S S S S S Households Biofules L/S L P Pellet industry (wood briguettes) Supply L Stemwood (sawlogs/ veneer logs) L L L L L L L Industrial roundwood L L L L Forest residues P P/S s S S S S Sawmill by-products s S/L S/L s Other industrial wood residues S S/L S/L Chips S/L S/L S Black liquour L/S S Bark P P P S Post-consumer wood Forest Product Statistics Capacity Building L L Landscape care wood

S

P

Data Source 2: Wood Resource Monitoring

Production sites of panel industry 2015



Use of wood fibres 2015 and production



| Study results 2015 | | Production | Capacity |
|--------------------|-------|------------|-----------|
| MDF/HDF | 8.3.2 | 3.927.000 | 4.153.000 |
| LDF | 8.3.3 | 917.000 | 1.368.000 |
| Total | 8.3 | 4.844.000 | 5.521.000 |

Source: Döring et al. (2017b)



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Summary of data [in m³]

| Production Statistics 2019 | | Production | Sales | |
|--|--------|------------|-----------|-------------------|
| Hardboard | 8.3.1 | 0 | 0 | |
| MDF/HDF | 8.3.2 | 3.519.626 | 2.927.424 | |
| Other Fibreboard (incl. LDF) | 8.3.3 | 1.287.562 | 1.287.562 | |
| Total (of reported volumes; also combination of production and sales, if needed) | 8.3 | 4.807.188 | 4.214.986 | |
| Specific query at statistical office | | Production | Sales | |
| MDF | 8.3.2 | 1.353.615 | | Additional |
| HDF | 8.3.2 | 2.274.988 | 1.886.564 | production: |
| Other Fibreboard (incl. LDF) | 8.3.3 | | | (Diff.)388.424 |
| Total | 8.3 | | 5.109.413 | <u>+5.109.413</u> |
| | | | | 5.497.837 |
| Wood Resource Monitoring Results | s 2015 | Production | Capacity | |
| MDF/HDF | 8.3.2 | 3.927.000 | 4.153.000 | ? |
| LDF | 8.3.3 | 917.000 | 1.368.000 | ? |
| Total | 8.3 | 4.844.000 | 5.521.000 | |
| | | | | |

| Info from European Panel Federation | | in 2019 | Capacity |
|-------------------------------------|-------|---------|-----------|
| MDF/HDF | 8.3.2 | | 3.800.000 |

| Result for JSFQ 2019 | | Production |
|----------------------------------|-------|------------|
| Hardboard | 8.3.1 | 0 |
| MDF (1.525.012) /HDF (2.274.988) | 8.3.2 | 3.800.000 |
| Other Fibreboard (incl. LDF) | 8.3.3 | 1.697.837 |
| Total | 8.3 | 5.497.837 |

- → All collected information should be considered
- → Sometimes there is more than one possible solution and sometimes there can still be conflicts of information
- → Experts can help with further information (here: EPF)



Summary & Conclusion

- \rightarrow Get an understanding of the branches in your country
- Do not necessarily take data from official statistics (or any \rightarrow other data base) for granted
- Do not use only one source for your JFSQ data (if possible) \rightarrow
- \rightarrow Review all possible data sources and (try to) discuss results with colleagues and other experts
- \rightarrow And in the end its often...guesswork \odot

slide 8

| | | Country: | 0 | Date: |
|--|--|---|-------------------------------|----------|
| | where where a state of the second sec | Name of Of | ficial responsible for reply: | |
| | | | | |
| | | | | |
| | ALCON MARK INC. | Official Add | Iress (in full): | |
| | | 0 | | |
| | FOREST SECTOR QUESTIONNAIRE JQ1 | | | |
| | TOREOT DEOTOR GOLOTION MAINE O'G I | | | |
| | PRIMARY PRODUCTS | Telephone: | 0 | |
| | Removals and Production | E-mail: | Ó | |
| | | coman. | | |
| | | | Tear -1 | Tear |
| Product | Product | Unit | 2018 | 2019 |
| Code | | | Quantity | Quantity |
| | REMOVALS OF ROUNDWOOD (WOOD | IN THE ROU | IGH) | |
| | ROUNDWOOD (WOOD IN THE ROUGH) | 1000 m'ub | | |
| 11 | WOOD FUEL (INCLUDING WOOD FOR CHARCOAL) | 1000 m'ub | | |
| .1.C | Coniferous | 1000 m ³ ub | | |
| .1.NC | Non-Coniferous | 1000 m ³ ub | | |
| ,2 | INDUSTRIAL ROUNDWOOD | 1000 m ³ ub | | |
| 20 | Coniferents | 1000 m ³ ub | | |
| 2 NC | Non-Coniferous | 1000 m3/b | | |
| 2 NC 7 | of which: Tranical | 1000 m UD | | |
| - Nul | or written (Tropical | durm outri | | |
| .2.1 | SAWLOGS AND VENEER LOGS | du'm ouor | | |
| .z.1.C | Coniterous | 1000 m ³ ub | | |
| .2.1.NC | Non-Coniferous | 1000 m ³ ub | | |
| | PULPWOOD, ROUND AND SPLIT (INCLUDING WOOD FOR PARTICLE | | | |
| | BOARD, OSB AND FIBREBOARD) | du'm ouur | | |
| 220 | Coniferents | 1000 m ³ ub | | 1 |
| 2 2 NC | Non-Coniferous | 1000 m ³ - | | |
| | | JUU III UD | | |
| -2-3 | OTHER INDUSTRIAL ROONDWOOD | du'm ouor | | |
| .z.3.C | Coniterous | du^m 0001 | | |
| .2.3.NC | Non-Coniferous | 1000 m ³ ub | | |
| _ | PRODUCTION | | | |
| | WOOD CHARCOAL | 1000 mt | | |
| | WOOD CHIPS, PARTICLES AND RESIDUES | 1000 m ³ | | |
| L1 | WOOD CHIPS AND PARTICLES | 1000 m ³ | | |
| 12 | WOOD RESIDUES (INCLUDING WOOD FOR AGGLOMERATES) | 1000 m ³ | | |
| | | 1000 m | | |
| | MOOD BELLETS AND OTHER AGOLOMERATES | 1000 mt | | |
| | | 4000 mit | | |
| | WOODPELLEIS | 1000 mit | | |
| .2 | UTHER AUGLOMERATES | 1000 mit | | |
| • | SAWNWOOD (INCLUDING SLEEPERS) | 1000 m ² | | |
| I.C | Coniferous | 1000 m ⁴ | | |
| LNC | Non-Coniferous | 1000 m ³ | | |
| I.NC.T | of which: Tropical | 1000 m ³ | | |
| | VENEER SHEETS | 1000 m ³ | | |
| .c | Coniferous | 1000 m ³ | | |
| NC | Non-Coniferous | 1000 m ³ | | |
| | of anticka Templani | 4000 m3 | | |
| .NG.I | or which: Iropical | 1000 mi | | |
| | WOOD-BASED PANELS | 1000 m* | | |
| .1 | PLTWOOD | 1000 m ³ | | |
| I.1.C | Coniferous | 1000 m ³ | | |
| I.1.NC | Non-Coniferous | 1000 m ³ | | |
| .1.NC.T | of which: Tropical | 1000 m ³ | | |
| 12 | PARTICLE BOARD, ORIENTED STRAND BOARD (OSR) AND SIMILAR BOARD | 1000 m ³ | | |
| 21 | of which: ORIENTED STRAND BOARD (OSR) | 1000 m ³ | | |
| | EIEPEER ARD | 1000 m ² | | |
| | TILLED AND | 1000 m ³ | | |
| 1.3.1 | HANDBUAND | 1000 m ⁴ | | |
| 1.3.2 | MEDIUM/HIGH DENSITY HEREBOARD (MDF/HDF) | 1000 m ³ | | |
| 1.3.3 | OTHER FIBREBOARD | 1000 m ³ | | |
| | WOOD PULP | 1000 mt | | |
| | MECHANICAL AND SEMI-CHEMICAL WOOD PULP | 1000 mt | | |
| .1 | | | | |
| .1 | CHEMICAL WOOD PULP | 1000 mt | | |
| .1 .2 .2.1 | CHEMICAL WOOD PULP SULPHATE PULP | 1000 mt 1000 mt | | |
| 1.1 1.2 1.2.1 1.2.1.1 | CHEMICAL WOOD PULP SULPHATE PULP of which: BLEACHED | 1000 mt 1000 mt | | |
| 1.1 1.2 1.2.1 1.2.1.1 1.2.2 | CHEMICAL WOOD PULP SULPHATE PULP of which: BLEACHED SULPHITE PULP | 1000 mt 1000 mt 1000 mt | | |
| 1.1 1.2 1.2.1 1.2.1.1 1.2.2 1.3 | CHEMICAL WOOD PULP SULPHATE PULP of which: BLEACHED SULPHTE PULP DISSOLVING GRADES | 1000 mt 1000 mt 1000 mt 1000 mt | | |
| 1.1 1.2 1.2.1 1.2.1.1 1.2.2 1.3 0 | CHEMICAL WOOD PULP SULPARE PULP of which: BLEACHED SULPARE PULP DISSOLVING GRADES OTHER PULP | 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt | | |
| 1.1 1.2 1.2.1 1.2.1.1 1.2.2 1.3 0 0.1 | CHEMICAL WOOD PULP SULPARTE PULP of whick, BLACHED DESOLUTING RARKS OTHER PULP PULP FROM FIRES OTHER THAN WOOD | 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt | | |
| 1.1 1.2 1.2.1 1.2.1.1 1.2.2 1.3 0 0.1 0.2 | CHEMICAL WOOD PULP SUFANET PULP of which: BLEACHED SUFATE PULP DISSULTING GRADES OTHER PULP PULP FROM RBRES OTHER THAN WOOD RECOVERD PULP | 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt | | |
| 1.1 1.2 1.2.1 1.2.1.1 1.2.2 1.3 0 0.1 0.2 1 | CHEMICAL WOOD PULP SUPATE PLACED of which: BLACKED DESCUPET CONCES DESCUPET CONCES DESCUPET CONCES DESCUPET CONCES DESCUPETO PARE OTHER THAN WOOD RECOVERED PARE PLACE | 1000 m1 1000 m1 1000 m1 1000 m1 1000 m1 1000 m1 1000 m1 | | |
| 1.1 1.2 1.2.1 1.2.1.1 1.2.2 1.3 0 0.1 0.2 1 2 2 | CHEMICAL WOOD PUIP BUIPATE PUIP BUIPATE PUIP BUIPATE PUIP DISSOLVING SALES OTHER PUIP RECOVERD PARE PUIP RECOVERD PARE RECOVERD PARE RECOVERD PARE | 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt | | |
| 1.1 1.2 1.2.1 1.2.1 1.2.2 1.3 0 0.1 0.2 1 2 2.1 | GRAINCA, WOOD PULP SULPART, ETU, DACADO SULPART, ETU, DACADO DISSOLVAY, GARLES TRAUE, PROJ. PROSES, DATABAN, MODO RECOVERED REPORT RECOVERED RECOVERED RECOVERED REPORT RECOVERED REPORT RECOVERED REPORT RECOVERED REPORT RECOVERED REPORT RECOVERED REPORT RECOVERED RECOVERED RECOVERED REFORT RECOVERED REFORT RECOV | 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt | | |
| 1 1.2 1.2.1 1.2.2 1.3 0 0.1 0.2 1 2 2.1 2.1.1 2.1.1 | Gesinda, wood nutz w krieka Ekscherb BURVET RUFZ BURVET RUFZ BURVET RUFZ BURVET RUFZ RUFZ ROAF FIRES CHERT HAN WOOD RUFZ ROAF FIRES SUCCESS DAVE SUCCESS DAVE SUCCESS SUCCESS DAVE SUCCESS | 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt 1000 mt | | |
| 11 12 121 121 122 13 0 0.1 0.2 1 2 2.1 2.1.1 2.1.2 | Gesicul, WOOD NLF w revelse BLAGED BEILUMPT RUL BEILUMPT RUL BEILUMP | 1000 mt 1000 mt | | |
| 11 12 12 12 13 0 0.1 0.2 1 2 2 1 2 1.2 1.3 0 0.1 0.2 1 2 2 1.2 1.3 0 0 0.1 0.2 1 2.1 1 2.2 1.3 0 0 0 1 2.2 1.3 0 0 0 1 2.2 1.3 0 0 0 1 2.2 1.3 0 0 0 1 2.2 1.3 0 0 0 1 2.2 1.3 0 0 0 1 2.2 1.3 0 0 0 1 2.2 1.3 0 0 0 1 2.2 1.3 0 0 1 2.2 1.3 0 0 0 1 2.2 1.3 0 0 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 1 2 1 2 1 2 1 2 1 2 1.3 2 1.3 2 1.3 2 1.3 2 1.3 2 1.3 2 1.3 2 1.3 2 1.3 2 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 | GRAINCAL WOOD PALE SULVARE TRUE ADARDS SULVARE TRUE ADARDS DESIGNING ADARDS DESIGNING ADARDS TAULF PADIA FRANKE OTHER THAN WOOD RECOVERED INSEE TOTHER THAN WOOD RECOVERED INSEE TOTHER THAN RECOVERED INSEE TOTHER THAN RECOVERED INSEE TOTHER THAN RECOVERED INSEE TOTHER DESIGNED ADARDS DESIGNED ADARDS DE | 1000 mt 1000 mt | | |
| 11 12 12 12 13 0 0 1 2 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 1 2 2 1 2 2 1 2 2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 | Gesilad, wood hut war war in Exceeds a war war in Exceeds a war war in Exceeds a war | 1000 mt 1000 mt | | |
| 11 12 12 12 12 12 12 12 12 12 | Gesical, wood nuc w choice BLACHD BLACHT RULE BLACHT RULE BLACK AND AND AND AND AND AND AND BLACK AND AND AND AND AND AND AND AND AND AND AND AND AND AND AND AND AND | 1000 mt 1000 mt | | |
| 11 12 12 12 13 0 0.1 0.1 0.2 1 2 2.1 2.1.1 2.1.2 2.1.1 2.1.2 2.1.3 2.1.4 2.2 2.3 2.1.4 2.2 2.3 2.1.4 2.2 2.3 2.1.4 2.2 2.3 2.1.4 2.2 2.3 2.1.4 2.2 2.3 2.1.4 2.2 2.1.5 2.1.5 2.1.5 2.1.5 2.2 2.1.5 2.2 2.1.5 2.2 2.1.5 2.2 2.1.5 2.2 2.1.5 2.2 2.1.5 2.5 2.1.5 | GREATICAL WOOD PALE BULMART ETU, BACHED BULMART ETU, BACHED DISSICHTWO GRADES DISSICHTWO GRADES DISSICHTWO GRADES TAULF PROUT RIKES OTHER THAN WOOD RECOVERED PREUP UNCOATED WECKWINGL UNCOATED WECKWINGL UNCOATED WECKWINGL UNCOATED WECKWINGL UNCOATED WECKWINGL UNCOATED WECKWINGL | 1000 mt 1000 mt | | |
| 11 12 12 12 13 12 13 12 13 12 13 14 21 21 21 21 21 21 21 21 21 21 | Gesilad, wood nuc with the EAGABCH BULLY AND AND AND AND AND AND AND AND AND BULLY AND | 1000 mt 1000 mt | | |
| 11 12 12 12 13 0 0 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 1 2 2 2 2 2 3 2 3 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 | Gesland, wood huiz w since Exceeds set universe Exceeds Set Study Set Stu | 1000 mt 1000 mt | | |
| 11 12 12 12 12 13 0 0 1 2 1 2 1.1 2 1.2 2 1.3 2 1.4 2 2 1.1 2 2 1.2 2 1.3 2 1.2 2 1.1 2 2 1.2 2 1.2 2 2 1.1 2 2 2 1.2 2 2 1.2 2 2 1.2 2 2 1.2 2 2 2 1.2 2 2 1.2 2 2 2 1.2 2 2 3 3 2 3 3 2 3 3 2 3 3 2 3 3 3 3 3 3 3 3 3 3 3 3 3 | GRAINCA, WOOD RUE SULVALET, PULVACED SULVALET, PULVACED SULVALET, SULVALET, | 1000 ml 1000 ml | | |





Thank you for your attention!



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The Johann Heinrich von Thünen Institute, Federal Research Institute for Rural Areas, Forestry and Fisheries – Thünen Institute in brief – consists of 14 specialized institutes that carry out research and provide policy advice in the fields of economy, ecology and technology.

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Annex

Literature:

Döring P, Gieseking L, Mantau U (2020): Sägeindustrie 2018. Einschnitt- und Produktionsvolumen. Hamburg. TI-WF (2020): Fellings and Roundwood Use. (https://www.thuenen.de/en/wf/figures-facts/production-and-use/fellings-and-roundwood-use/)

Picture credits:

Slide 1: Roundwood 1+2: Holger Weimar; Timber: Thünen-Institut/Dr. Michael Welling; Fibreboard: Vaderluck, GNU Free Documentation License, CC BY-SA 3.0

Slide 2: Forest top left: aid/Peter Meyer; Forest bottom left: Thünen-Institut/Dr. Jobst-Michael Schröder; Timber: Thünen-Institut/WF; Signpost: Thünen-Institut/Dr. Markus Dög

Slide 5: Sawn timber: Laidler139, GNU Free Documentation License, CC-BY-SA-3.0, https://upload.wikimedia.org/wikipedia/commons/9/9c/Timber.jpg, downloaded 20.11.17; wood pellets, Particle board, Fire wood: Thünen-Institut/Christina Waitkus; Toilet paper, cartboard: in the public domain Slide 9: Roundwood: aid/Peter Meyer; Forest: Thünen-Institut/Dr. Markus Dög; Timber: Thünen-Institut/Dr. Michael Welling

