14.04.2011

Submission of information on forest management reference levels by Germany

as requested in Decision 2/CMP.6: The Cancun Agreements: Land use, land-use change and forestry

The content of this submission is the same as that included for Germany with the separate submission made by Hungary and the European Commission on behalf of the European Union and its Member States.

Submission of information on forest management reference levels by Germany

1. Forest management reference level value

Table 1: Forest management reference level (RL) value (RL 2013-2020).

Proposed Reference Level [1], [4] ($GgCO_2eq$ per year)	
applying first order decay function for HWP [2]	assuming instantaneous oxidation of HWP [3]
-21.582	**-2.067**

(1) The reported values are averages of the projected FM data series for the period 2013-2020, taking account of policies implemented before mid-2009 only.

(2) Including emissions/removals from HWP estimated using the product categories, half lives and methodologies as suggested in para 27, page 31 of FCCC/KP/AWG/2010/CRP.4/Rev.4. Activity data is starting from 1964 for HWP and 1990 for FM.

(3) Provided for transparency reasons only.

(4) The reference level includes emissions and removals from natural disturbances of the period 2000-2008 in the historical data.

2. General description

The forest management reference level represents a projection for the period 2013 – 2020 based on WEHAM BAU scenario (WEHAM =: Waldentwicklungs- und Holzaufkommensmodellierung, forest development and timber harvest potential model). WEHAM estimates growth, stocks, and the potential roundwood harvest availability based on NFI[1] data. WEHAM is a single tree model consisting of three sub-models for tree growth, for exploitation/harvest, and for timber assortments, respectively (detailed description under chapter 4, further explanation on WEHAM and the derivation of the reference level can be found under: http://www.holzundklima.de/lulucf).

The elements contained in footnote 1 of paragraph 4 of the decision [-/CMP.6] on LULUCF are considered as follows:

(a) Removals or emissions by forest management as shown in greenhouse gas inventories and relevant historical data:

Using latest available country specific inventory data as described in NIR (2010), the RL is based on the NFI comprising increment and outflow of a significant sample as reported in the NIR.

(b) Age-class structure:

The age class structure is taken into account by using the latest available country specific inventory data (NFI 2002 and Inventory Study 2008) in WEHAM.

(c) Forest management activities already undertaken:

The RL is calculated inter alia on historical data of the NFI, thus comprising all management activities with meaningful impact of that period.

(d) Projected forest management activities under a business-as-usual scenario:

Projected FM activities considered are based on the sylvicultural guidelines of the federal states in the last decade. The model was developed in 2003. No post 2009 domestic policies are included.

(e) Continuity with the treatment of forest management in the first commitment period:

Same treatment is applied as in the 1st commitment period.

(f) The need to exclude removals from accounting in accordance with decision 16/CMP.1, paragraph 1:

There is no need to exclude removals from the establishment of the reference level. Including all removals in the reference level is a conservative approach. There might be a need to exclude removals from accounting for instance discounting or capping or factoring out.

[1] National Forest Inventory

3. Pools and gases

Table 2: Pools and gases (*"Yes/No" indicates if the pool or gas is included or not in the projections used to set the reference level. A carbon pool is not included only if it is expected to be not a source in the second commitment period. In any case, full consistency will be ensured with paragraphs 12 quater, 12 quinquies and 25 of the document FCCC/KP/AWG/2010/CRP.4/Rev.4).*

Change in C pool included in the reference level						GHG sources included in the reference level					
Above-ground biomass	Below-ground biomass	Litter	Dead wood	Soil		Fertilization	Drainage of soils	Liming	Biomass burning		
				mineral	organic	N_2O	N_2O	CO_2	CO_2	CH_4	N_2O
yes	yes	yes	yes	yes	yes	yes	yes	yes	yes*	yes	yes

** Carbon emissions from biomass burning (in Germany only caused by wildfires, as controlled burning is not allowed) are implicitly **included** in the stock change method used for reporting of the carbon pool above ground biomass. Explicit data are therefore not available and reported as included elsewhere.*

4. Approaches, methods and models used

The historical data are taken from the last National Inventory Report (NIR, CRF) to the UNFCCC from April 15, 2010. Data are based on two national forest inventories (NFI 1987 and NFI 2002) and data from the national forest inventory study in 2008.

The projection for above ground and below ground biomass development is calculated by WEHAM (BAU scenario). WEHAM has been used as the core instrument for nation-wide future forest resource assessments since 1987 and has been reviewed, improved and adjusted continuously. The applied model estimates the potential round wood availability and related potential forest development, especially the growing stock over the next 40 years under BAU conditions. WEHAM is a single tree model consisting of three sub-models for tree growth (growth simulator), for exploitation / harvest (management simulator), and for timber assortments (grading model), respectively and considers the guidelines for sustainable forest management in the federal states in the last decade. The growth sub-model is based on data mentioned above under 'historical data'. It is used for extrapolating tree increment on a regional and species' related scale. The exploitation sub-model implements assumptions about parameters such as thinning intensity and frequency, age and the minimum threshold diameter of the final harvest cut. WEHAM provides estimates for the growing stock volume of the main stand only. The WEHAM-model excludes economic parameters, technical conditions for logging (e.g., slope, forest road density) and tree mortality. The management simulator of WEHAM runs according to the sylvicultural guidelines of

the Federal States. These guidelines for sustainable forest management have been developed for all kinds of forests stands under the specific climatic and soil conditions in Germany.

The provided data assume a BAU scenario (e.g. describes the course of forest management planned in 2003) which results in:

1.) a high and nearly constant level of growing stock in private forests,

2.) a growing stock in the state forests comparable to the level of private forests,

3.) a further increase of growing stocks for coniferous tree species (as current stem diameters for spruce and pine in the dominant age classes are below the threshold values for harvesting), and

4.) a decrease of growing stocks for deciduous tree species (as the current stem diameters for beech and oak in the dominant age classes have reached the threshold values for harvesting).

The projection for soil organic matter, litter, and dead wood was conducted as a technical adjustment based on a conservative extrapolation of historical data. In case of increasing historical emissions a linear extrapolation was applied (dead wood) and in case of declining emissions the mean of historical emission (litter and soil as well as emissions from forest fires, drainage and fertilization) was used. In the period 2002-2008 big storms happened and therefore an extraordinary high accumulation of dead wood above business as usual was observed.

As dead wood does not accumulate endlessly and the used technical adjustments contain large uncertainties in particular for dead wood and soil, the calculations have to be validated resp. updated with more sophisticated models when the data from new forest measurements (NFI3 in 2012) respectively from the second forest soil inventory become available. Then recalculation of NIR-data is planned.

WEHAM itself does not contain data or assumptions about economic development of markets or societies, thus also no assumptions on future harvest demand but only the harvest potential. This potential, however, is based on scenarios incorporating economic conditions and ecological restrictions as foreseeable at the time of scenario construction. It does not need ex-post calibrations and could be run anytime should the need for technical recalculations arise.

5. Description of construction of reference levels

I. Description of how each of the following elements were considered or treated in the construction of the forest management reference level, taking into account the principles in decision 16/CMP.1

(a) Area under forest management

The area under forest management is considered to remain constant from 2008 on. Deforestation is subject to legal restriction in Germany and affects comparatively small areas only. An inclusion in the RL would not result in greater accuracy of the projection, but would increase the emissions considered in the RL. This underestimation of emissions is a conservative approach. Table 3 shows the historical development:

Table 3: Forest Areas and changes in Germany[2].

Year	Forest Area (ha)	Forest Land remaining Forest Land (ha)	Cropland converted to Forest Land (ha)	Grassland converted to Forest Land (ha)	Wetlands converted to Forest Land (ha)	Settlements converted to Forest Land (ha)	Other Land converted to Forest Land (ha)
1990	11.016.751	10.998.901	2.201	12.103	1.207	2.338	0
2008	11.212.480	10.873.318	41.834	229.962	22.940	44.425	0

[2] GHG 2011 inventory submission of Germany. <http://cdr.eionet.europa.eu/de/eu/ghgmm/envttbyfg> (preliminary version, corrections pending)

(b) Emissions and removals from forest management

1) Historical (1990-2008) and projected (2009 onwards: WEHAM BAU) emissions and removals from forest management

The historical time series is based on forest inventories in 1987, 2002, and the forest inventory study 2008. Detailed information can be found in the NIR at the UNFCCC website.

Table 4: Historical time series of emissions and removals from FM (FM all pools)

	Net Removals (-) or Net Emissions (+) ($GgCO_2eq$ per year) [1]									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
FM applying first order decay function for HWP [2]	-75.997	-72.479	-72.432	-72.628	-76.355	-75.763	-75.203	-76.221	-75.437	-75.752
FM assuming instantaneous oxidation of HWP [3]	-65.424	-65.418	-65.313	-65.367	-65.325	-65.319	-65.291	-65.276	-65.254	-65.250
Disturbances in the context of force majeure [4]	-	-	-	-	-	-	-	-	-	-

	2000	2001	2002	2003	2004	2005	2006	2007	*average of 1990-2007*
FM applying first order decay function for HWP [2]	-79.499	-75.096	-33.488	-35.937	-40.189	-41.831	-43.369	-43.574	*-63.403*
FM assuming instantaneous oxidation of HWP (3)	-65.247	-65.230	-20.337	-20.343	-20.373	-20.379	-20.371	-20.361	*-50.327*
Disturbances in the context of force majeure (4)	-	-	-	-	-	-	-	-	-

Table 4 (cont.).

	Net Removals (-) or Net Emissions (+) ($GgCO_2eq$ per year) [1]					
	2008	2009	2010	2011	2012	*average of 2008-2012*
FM applying first order decay function for HWP [2]	-29.721	-14.641	-23.672	-22.578	-21.810	*-22.484*
FM assuming instantaneous oxidation of HWP [3]	-20.331	-0.280	-0.278	-0.276	-0.274	*-4.288*
Disturbances in the context of force majeure [4]	-	-	-	-	-	-

	2013	2014	2015	2016	2017	2018	2019	2020	*average of 2013-2020*
FM applying first order decay function for HWP [2]	-21.271	-23.373	-23.112	-22.457	-21.930	-21.495	-19.667	-19.347	*-21.582*
FM assuming instantaneous oxidation of HWP [3]	-0.272	-2.747	-2.745	-2.743	-2.741	-2.739	-1.277	-1.275	*-2.067*
Disturbances in the context of force majeure [4]	-	-	-	-	-	-	-	-	-

(1) GHG inventory 2011 (in prep.)

(2) emissions/removals from HWP estimated using the the product categories, half lives and methodologies as suggested in para 27, page 31 of FCCC/KP/AWG/2010/CRP.4/Rev.4. Activity data is starting from 1964. Mean over period shown.

(3) provided for transparency reasons only

(4) included elsewhere (historical data) and not included in RL

German forests currently store one of the highest amounts of carbon (per ha and in total) in Europe as well as in the German history. Large clear cuts during and following the Second World War and subsequent reforestation led to relatively high increment rates in the past decades. In the 1990s the net removal (living biomass only) amounted to some 63.000 $GgCO_2eq$ /a. Since then more stands reached harvestable diameters and were harvested, while at the same time the increment rate decreased with advance in forest age. The result was a continuously diminishing sequestration rate up to some 17.000 $GgCO_2eq$ /a in the period 2002 – 2008 (latest forest inventory). This is caused by the age-class structure effects in combination with markets impacts.

The “jump” in the time series between 2001 and 2002 is caused by the stock change method, described in the IPCC GPG and elected from Germany to estimate carbon stock changes. The stock change method is GPG conform and was and will be used. Data required/recommended for the default method are not available or of poorer quality than the NFI data used for the stock change approach. The stock change method compares the carbon stocks in two points of time, each estimated by a nationwide inventory conducted at these respective dates. The annual carbon stock changes were derived by a linear interpolation. The reason for such a “big jump” in the time series is caused by the relative long inventory intervals and due to different mean harvesting amounts within these two periods.

2) The relationship between forest management and forest land remaining forest land as shown in GHG inventories and relevant historical data, including information provided under Article 3.3., and, if applicable, Article 3.4 forest management of the Kyoto Protocol and under forest land remaining forest land under the Convention

The term „human induced” is related to any forest land-use in Germany, thus no difference between forest management and forest land remaining forest land is to be explained. The same data are used for the reporting under the convention as under the KP. The data presented in Table 4 and Table 5 are valid for both, FM and FLrFL.

(c) Forest characteristics and related management

1) age class structure

The projected age class structure is given in Figure 1. The total area of forest is assumed to remain constant at the level of the year 2008 until 2020 and shifts between age classes are entirely due to growth and management.

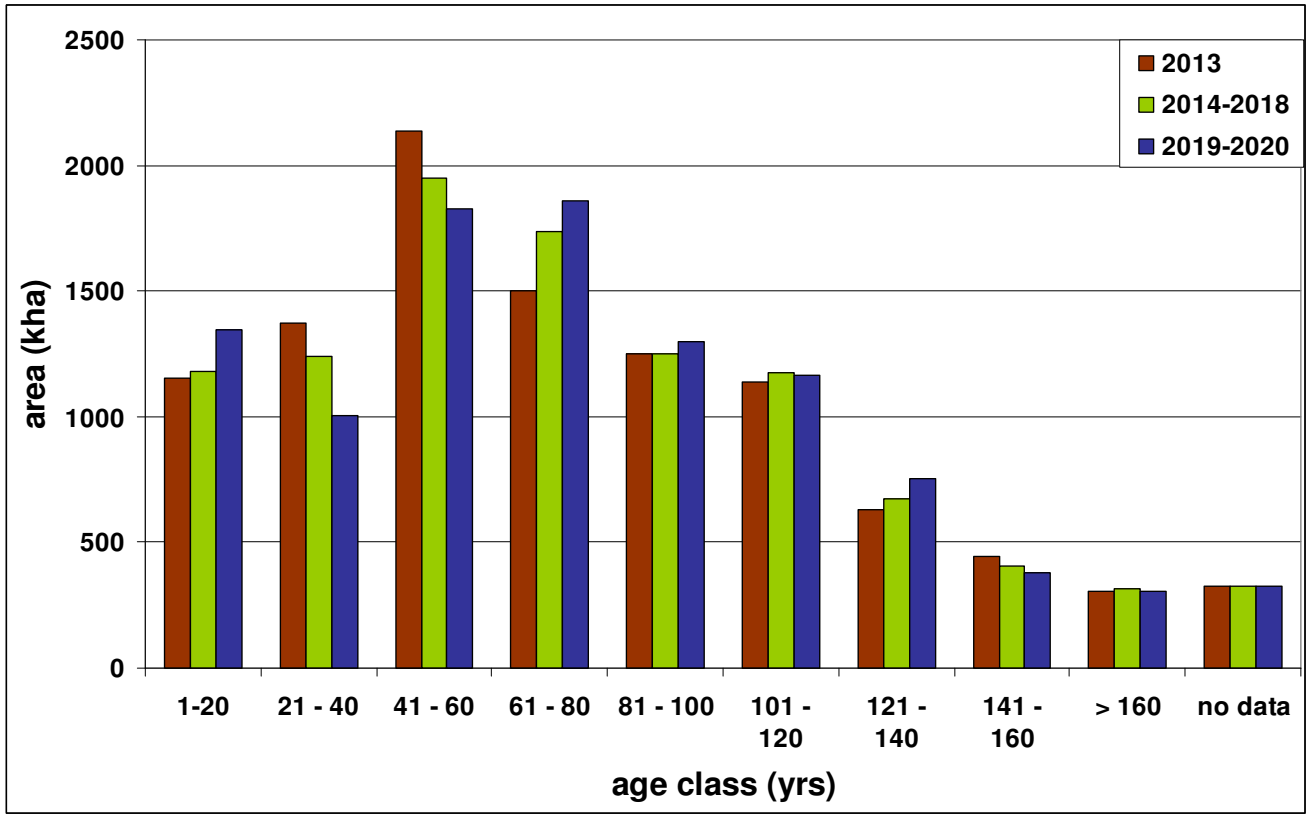

Figure 1: Age class distribution of Forest Land remaining Forest Land, according to NFI results (period 2009 – 2013) and WEHAM (2014-2020).

2) increment

Table 5: Increment rates (m^3/ha/a), country data (NFI 1990 – 2008, WEHAM model results 2009 – 2020):

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
12,7	12,7	12,7	12,7	12,7	12,7	12,7	12,7	12,7	12,7	12,7
2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
12,7	12,7	11,1	11,1	11,1	11,1	11,1	11,1	10,1	10,1	10,1
2012	2013	2014	2015	2016	2017	2018	2019	2020		
10,1	10,1	9,9	9,9	9,9	9,9	9,9	9,9	9,9		

The decrease in annual increment from 1990 – 2020 is caused by the maturation of the forests.

3) rotation length

See chapter 4 below

4) information on forest management activities under "business as usual"

The WEHAM "BAU" scenario has been derived from sylvicultural guidelines. It incorporates differences between region, species and type of forest ownership. Table 6 shows the most important variables used in the BAU and their range.

Table 6: Variables for the main tree species used in WEHAM and their range:

	Range (in relation to federal state and type of forest ownership)
Beech (*Fagus sylvatica* L.)	
Rotation age	140 – 160
Tolerance for final harvest*	10 – 30
Target DBH[3]	55 – 70
Reduction factor	1,0 – 1,7
Oak (*Quercus* spec.)	
Rotation age	150 – 200
Tolerance for final harvest	20 – 40
Target DBH	60 – 80
Reduction factor	0,9 – 1,7
Norway spruce (*Picea abies* (L.) Karst.)	
Rotation age	80 – 160
Tolerance for final harvest	10 – 30
Target DBH	40 – 60
Reduction factor	0,85 – 1,4
Scots pine (*Pinus sylvestris* (L.))	
Rotation age	130 – 160
Tolerance for final harvest	10 – 50
Target DBH	45 – 60
Reduction factor	0,9 – 1,4

*(*Tolerance for final harvest: Final harvest takes place within this frame of the rotation period and also depends on the age the target DBH is reached. The Reduction factor is used to adjust nation-wide derived growth values to regional conditions and situations. See WEHAM documentation for more details.)*

[3] Diameter at Breast Height (1.3m above ground)

5) other relevant information

Sensitivity of the projected carbon stock changes to variation of the assumed harvest:
Table 7 shows the influence of a deviation of +/- 10% of the conducted harvest from the harvest level calculated by WEHAM.

Table 7: Deviation of actual from projected harvest (+/- 10% of projected harvest, 2013 – 2020 annual average)

Scenario	net emissions (living biomass)	deviation from RL
harvest reduced by 10%	- 6.000 $GgCO_2$	- 6.900 $GgCO_2$
harvest increased by 10%	+ 7.700 $GgCO_2$	+ 6.900 $GgCO_2$

The figures given under „deviation from RL" are the absolute value of changes of carbon stocks caused by an increase resp. decrease of harvest levels as given above. The figures given under „net emissions" are the emissions resulting from the addition resp. substraction of the „deviation" from the living biomass-related part of the RL (assuming that all other pools are not affected).

(d) Harvesting rates

1) Historical harvesting rates

Table 8: Historical harvesting rates, roundwood over bark in 1.000 m^3 (country data, economic account for forestry)

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
(-)	45.646	49.480	51.314	53.530	54.535	54.988	57.971	58.608	58.426
2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
74.989	58.816	60.711	65.762	73.925	82.947	87.118	96.055	80.184	76.812*

* preliminary data

This time series represents historical harvest rates given in volume of standing timber which is removed from the forest, measured in m³ o. b. The data presented in Table 8 are derived from national production statistics, i.e. data being collected e. g. from saw mills.

This data deviates from values given in e. g. FAO statistics (roundwood production Item 1863+) which, for Germany, is given in merchandized cubic meter. Those values, given in m³ u. b., exclude losses of bark (appr. 10 %), harvesting (appr. 10 %), and forest wood residues remaining on the forest site. Data presented by FAO represent empirical data collected from the supply side, i.e. forest management units. Information from private and municipal forest owners concerning their roundwood harvest, however, appears to be underrepresented in these statistics. Thus, FAO statistics tend to underestimate the actual removals for Germany.

2) Assumed future harvesting rates

Table 9: Assumed future harvesting rates, roundwood over bark in 1.000 m^3 (country data, WEHAM model for 2010, 2015, 2020, and interpolated figures in italics).

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
95.723	*96.893*	*98.063*	*99.233*	*100.403*	101.573	*102.078*	*102.583*	*103.089*	*103.594*	104.099

The harvesting rates projected by WEHAM are based on e. g. current market conditions, technological possibilities and restraints and known intentions of forest owners. Thus, they are not a direct prolongation of the actual harvest conducted during the last years.

(e) Harvested wood products

The contribution of HWP to the reference level of Germany amounts to -19.514 $GgCO_2$.

It was calculated using the C-HWP-Model, which estimates delayed emissions on the basis of the annual stock change of semi-finished wood products as outlined in the 2006 GL (Rüter, 2011). The estimation uses the product categories, half lives and methodologies as suggested in para 27, page 31 of FCCC/KP/AWG/2010/CRP.4/Rev.4.

The activity data (production and trade of sawnwood, wood based panels and paper and paperboard) is derived from the TIMBER database (UNECE 2011, time series 1964-2009).

In order to achieve accurate results, the HWP numbers have been calculated applying the sub-categories of sawnwood, wood based panels and paper and paperboard as specified in Table 10. Sawnwood includes the Items 1632 and 1633, wood based panels comprising of Items 1634, 1640, 1646, 1647, 1648, 1649 and 1650, and paper and paperboard corresponds to Item 1876.

Following conversion factors have been used:

Table 10: Conversion factors of considered commodities*.

Classification		Description of commodity	Air dry density	C conv. factor	Source
FAO	UNECE		[g/cm³]	[Gg C/1.000m³]	
1866	1.2.C	Industrial roundwood, coniferous	0,450	2,250E-01	Kollmann (1982), (oak, beech)
1867	1.2.NC	Industrial roundwod, non-coniferous	0,670	3,350E-01	Kollmann (1982), (oak, beech)
1632	5.C	Sawnwood, coniferous	0,450	2,250E-01	Kollmann (1982), (oak, beech)
1633	5.NC	Sawnwood, non-coniferous	0,670	3,350E-01	Kollmann (1982), (oak, beech)
1634	6.1	Veneer sheets	0,590	2,950E-01	IPCC (2003)
1640	6.2	Plywood	0,480	2,402E-01	IPCC (2003)
1646	6.3	Particle board	0,630	2,898E-01	Hasch (2002), Barbu (2011)
1647	6.4.1	Hardboard	0,850	4,165E-01	Kollmann (1982), Barbu (2011)
1648	6.4.2	Medium density fibreboard	0,725	3,190E-01	Hasch (2002), Barbu (2011)
1649	6.4.x	Fibreboard, compressed	0,788	3,504E-01	(50 % hardboard / 50 % medium density fibreboard)
1650	6.4.3	Other board (Insulating board)	0,270	1,148E-01	Kollmann (1982), Barbu (2011)
1876	10	Paper and paperboard	0,900**	4,500E-01**	IPCC (2006)

* Items 1866 and 1867 are needed for methodological reasons only (see following section), ** in [g/g] and [Gg C/1.000t]

In order to only estimate emissions from HWP removed from forests which are accounted for by Germany under Article 3, in a first step, the annual share of carbon in HWP coming from domestic forests has been calculated.
The following equations were used as industrial roundwood is assumed to serve as raw material for the production of HWP.

(1) $$ratio_{INDRW\ consumption\ from\ dom\ harvest} = \frac{(Production_{INDRW} - Export_{INDRW})}{(Production_{INDRW} + Import_{INDRW} - Export_{INDRW})}$$

(2) $$Production_{HWP\ from\ dom\ harvest} = Production_{HWP} \bullet ratio_{INDRW\ consumption\ from\ domestic\ harvest}$$

The ratio (Equation 1) was calculated both for coniferous and non-coniferous industrial roundwood (*INDRW*, Items 1866 and 1867). For coniferous sawnwood and paper and paperboard, the ratio for coniferous industrial roundwood was applied. For non-coniferous sawnwood the

ratio for non-coniferous industrial roundwood was applied. For the other HWP, the ratio of the annual mass weighted average of coniferous and non-coniferous industrial roundwood was applied.
As a result, this share of HWP produced from domestically harvested timber is presented as a percentage in Table 11.

The presented approach follows the initial assumption that all forests in Germany are managed, and in order to simplify matters,

it is presumed that all harvest is allocated to forest management. This assumption is to be verified and corrected where necessary. The final allocation of carbon in HWP to forests which are accounted for under Article 3 shall be part of a technical correction as suggested in para 15 quater, page 27 of FCCC/KP/AWG/2010/CRP.4/Rev.4.

Table 11: Historical time series of amounts and share of accountable carbon Inflow to the HWP pool [in 1.000t C and %]

1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
5.555	5.737	5.853	5.935	6.263	6.673	6.948	7.301	7.534	8.247	8.246	7.314	8.213	8.462	8.578	8.912
92,8%	92,6%	92,8%	93,7%	92,7%	91,1%	91,8%	93,4%	92,9%	94,0%	93,9%	92,9%	93,5%	93,5%	93,3%	93,5%
1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
8.980	8.571	8.399	8.823	9.451	9.277	9.503	9.756	10.354	11.186	11.524	10.777	10.933	11.131	12.404	12.565
93,6%	92,9%	93,4%	93,1%	93,7%	93,2%	93,7%	93,7%	93,3%	94,1%	97,3%	91,4%	91,4%	96,0%	95,2%	94,6%
1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009		
12.722	13.270	13.291	13.562	14.859	13.912	15.024	16.022	17.600	18.528	19.432	19.967	16.445	15.751		
95,6%	94,3%	92,2%	89,9%	92,0%	88,0%	91,1%	92,8%	94,1%	92,2%	91,3%	92,1%	85,7%	83,9%		

The annual carbon Inflow (= carbon in produced HWP) to the HWP pool prior to the year 1964 (first year for which activity data from TIMBER database (UNECE 2011) is available for Germany) has been calculated from the 5 years average from 1964 to 1968 and was assumed to be the constant carbon pool Inflow for the time period 1900-1963.
In order to provide a projection for the development of the HWP pool consistent with the assumptions on the future harvest, the rates of change of the projected harvest (Model WEHAM) as compared to the last 5 years average of historical harvest, for which up-to-date data is available, was calculated (cf Table 12).

These projected growth rates as cp. to the average of the years 2005-2009 for Germany were applied to the same 5 years average of historical carbon Inflow to the HWP pool in order to receive the future Inflow to the HWP pool.

Table 12: Projection of carbon Inflow to the HWP pool

Average of historical harvest (2005-2009) [in 1.000m3]	84.623										
Average HWP pool Inflow* (2005-2009) [in 1.000t C]	18.025										
years	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Projected harvest rate [in 1.000m3]	95.723	96.893	98.063	99.233	100.403	101.573	102.078	102.583	103.089	103.594	104.099
Change as cp to historical harvest (2005-2009) [in %]	13,12%	14,50%	15,88%	17,26%	18,65%	20,03%	20,63%	21,22%	21,82%	22,42%	23,02%
Projected carbon Inflow to HWP pool [in 1.000t C]	20.388,8	20.638	20.887,3	21.136,5	21.385,7	21.634,9	21.742,5	21.850,1	21.957,7	22.065,3	22.172,9

*a similar approach was chosen by Kangas and Baudin (2003): ECE/TIM/DP/30

For calculating the pool of HWP in use, three half-lives for application in the first order decay function have been used as suggested by para 7, page 31 of FCCC/KP/AWG/2010/CRP.4/Rev.4.

- Sawnwood: 35 years
- Wood based panels: 25 years
- Paper and paperboard: 2 years

The projected net-emissions are calculated from the annual stock change estimates following the calculation method provided in IPCC 2006, Vol.13, Ch. 12 (Equation 12.1.A).

Table 13: Historical (up to 2009) and projected net-emissions from HWP pool [in 1.000t CO_2]

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
-10.573	-7.061	-7.119	-7.261	-11.030	-10.444	-9.912	-10.945	-10.183	-10.502	-14.252	-9.866	-13.151	-15.594	-19.816	-21.452
2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	
-22.998	-23.213	-9.390	-14.361	-23.394	-22.302	-21.536	-20.999	-20.626	-20.367	-19.714	-19.189	-18.756	-18.390	-18.072	

(f) Disturbances in the context of force majeure

GHG Emissions from natural disturbances are not separately quantified in the projections (see entry data table in Chapter 4 of the July 2010 submission[4]) but are included in the historical data measured by the NFI and the Inventory Study.
Emissions caused by forest fires or wind throws are not included in the projections because only small areas are affected by forest fires (the area burnt annually is less than 0.1% of the total forest area) and wind throw events are excluded because of their rarity. Including disturbances would increase emissions included in the reference level, so their exclusion is a conservative approach.
Further on, none of these disturbances exceed 5 % of the national emissions, so they are not relevant under the force majeure context.

(g) Factoring out in accordance with paragraph 1(h) (i) and 1(h) (ii) of decision 16/CMP.1

Factoring out was not applied. Germany followed the judgment of IPCC in 2003 that factoring out is not possible in a scientifically and sound manner.

II. Description of any other relevant elements considered or treated in the construction of the forest management reference level, including any additional information related to footnote 1 in paragraph 4 of decision [-/CMP.6]

No other relevant elements have been excluded or neglected.

6. Policies included

I. Pre-2010 domestic policies included

All relevant EU regulations, all national and federal state level laws and ordinances concerning forest management and having been in effect prior to 2009 have been taken into consideration. Non legally binding policies and incentives have been included in the BAU scenario as far as their influence could be identified and verified.

II. Confirmation of factoring out policies after 2009

All current, but pre-2009 policies which influence forests and forest management are included as published in the laws of Germany and Germany's Federal States. No post 2009 policies are included in establishing the reference level.

[4] SUBMISSION BY BELGIUM AND THE EUROPEAN COMMISSION ON BEHALF OF THE EUROPEAN UNION AND ITS MEMBER STATES Brussels, 23th of July 2010 Subject: reference levels for Forest Management.