Submission of information on forest management reference levels by Poland

Submission of information on forest management reference levels (FM RL) by Poland
as requested by Decision 2/CMP.6: The Cancún Agreements: Land use, land-use change and forestry

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

1. *Forest management reference level value*

The figures provided in Table 1 represent the averages of the projected forest management (FM) data series for the period 2013-2020, taking account of policies implemented before mid-2009, with emissions/removals from harvested wood product (HWP) using the first order decay functions (A), and assuming instant oxidation (B).

Table 1. Values of proposed reference levels for forest management including HWP with first order decay function (A) and HWP with instant oxidation (B) (Gg CO2eq per year)

	Reference levels	
	(A)	**(B)**
Poland	**-24 032**	**-22 750**

This submission updates and replaces previous information informally submitted by Belgium and the European Commission on behalf of the European Union and its Member States to the UNFCCC dated 23rd July 2010. The projections are methodologically consistent with assumptions described in NIR, minor changes are due to new input data on projected harvesting rates which have been aligned with those used as inputs in the estimations applied in the NIR 2010 as well as in the NIR 2011.

2. *General description*

The approach was to calculate the FM-RL as an annual average of projected emissions and removals for the period 2013-2020, including the impacts of policies adopted and implemented by mid-2009, to address the notion of additional action during the next commitment period.

3. *Pools and gases*

The table 2 presents the list of pools and gases included in the reference level.

Table 2. Carbon pools and GHG sources included in the reference level

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[(2)]		
				mineral	organic	N_2O	N_2O	CO_2	CO_2	CH_4	N_2O
yes	yes	no	yes	yes	no	no	no	no	yes	yes	yes

4. *Approaches and methods used in projections*

The historical data on GHG emissions and removals are taken from the National Inventory Report 2011 (CRF Submission 2011 v1.2) submitted to the UNFCCC on April 15, 2011. The GHG balance was estimated mainly based on national forest inventory (NFI 2010), statistical information generated by Central Statistical Office (CSO) and information derived from country-wise forest research and inventory projects.

The area of cultivated histosols in Poland was estimated as a case study for the purposes of national inventory [Oświecimska–Piasko 2008]. Based on information collected from Computer database on peat lands in Poland "TORF" as well as from the system of Spatial Information on Wetlands in Poland

the area of histosols was assessed for mid–1970s and mid–1990s. Estimation of cultivated histosols area for entire time series was made using interpolation for the 1975–1995. Total organic soils area in 2009 was estimated for 242 740 ha, with the following split for subcategories: forest land under FM – 235 575 ha, land converted to forest land – 9 345 ha. Additionally the area of cultivated histosols was assessed for 2015 for the purpose of GHG emission projections which amounts to 680 thousand ha [PL NC5 2010]. Similarly to the previous period interpolation of histosols areas was applied between 1995 and 2015. Described approach was used to exclude cultivated organic soils from GHGs estimation process concerning carbon changes in mineral soils on forest land being a subject of FM.

For soil organic matter, litter, and dead wood pools technical adjustments were conducted based on a conservative extrapolation of historical data. In case of constant 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. As dead wood does not accumulate endlessly and technical adjustments applied contain large uncertainties in particular for dead wood and soil, the calculations will be validated as well as updated with more sophisticated methods when the data from new forest measurements (NFI 2 in 2011) become available. Then recalculation of data contained in annual submission is planned.

5. Description of construction of reference level

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 with the time series since 1990

The area reported under forest management has been constantly decreasing since 1990 due to deforestation. Deforestation is strictly controlled by existing national regulations and pertains to relatively small areas.

Table 3. Historical area under forest management [kha]

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
FM area [kha]	8884	8883	8883	8882	8882	8881	8881	8880	8880	8879

Table 3. Historical area under forest management [kha] cont.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
FM area [kha]	8879	8878	8878	8877	8877	8876	8875	8875	8874	8873

b) Emissions and removals from forest management

1. Historical emissions and removals from forest management as well as forest land remaining forest land

Table 4. Historical emissions and removals from forest land remaining forest land. Net CO_2 emissions/ removals [Gg CO_2eq.]

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
FL_FL	-26905.50	-29198.37	-31209.69	-36865.16	-35407.05	-28304.33	-27440.67	-26787.58	-26889.64	-28656.10	-28693.76	-29310.28

Table 4. Historical emissions and removals from forest land remaining forest land. Net CO_2 emissions/ removals [Gg CO_2eq.] Cont.

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
FL_FL	-30172.52	-29216.92	-34569.36	-35401.57	-37815.30	-38620.42	-43283.90	-44288.70	-39 810.64	-44 402.10

Table 5. Historical emissions and removals from forest land subject to Forest Management. Net CO2 emissions/ removals [Gg CO2eq.]

Year	2008	2009
FM	-39823.20	- 44454.08

Table 5. Historical emissions and removals from forest land subject to Afforestation/Refforestation. Net CO2 emissions/ removals [Gg CO2eq.]

Year	2008	2009
AR	-6 720.10	-7 061.39

Table 5. Historical emissions and removals from forest land subject to Deforestation. Net CO2 emissions/ removals [Gg CO2eq.]

Year	2008	2009
D	255.52	263.91

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

Under the Kyoto Protocol, a Party shall report the area of forest land subject to Forest Management since 1990. Poland has reported FL_FL area changes for Convention purposes since the year 1988, which has been selected by Poland as the base year. Since 1988 until 1990 there was an increase in total forest land considered as the FM area. The 1990 value has been adopted as the starting point for reporting under the Kyoto Protocol. This value exceeds the 1988 FL_FL area by 18 683 ha and this difference has remained constant. The term „human induced" is related to any forest land-use in Poland, thus no difference in methodology of emission and removals balance estimation between forest management and forest land remaining forest land is to be explained. The same AR and D data was used for the reporting under the Convention and the Kyoto Protocol. Emissions and removals balance reported under the Kyoto Protocol and the Convention follows the requirements of GPG for LULUCF.

3. Projected emissions and removals from forest management

Table 6. Emissions and removals from FM as estimated within country projections [Gg CO2eq]

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Biomass (1)	-13629	-12457	-11285	-10112	-8940	-7767	-6595	-5422	-4250	-3077	-1905
Non-biomass pools	-16912	-16906	-16901	-16896	-16890	-16885	-16880	-16874	-16869	-16864	-16858
GHG sources (2)	134	134	134	134	134	134	134	134	134	134	134

(1) summarized above and below-ground biomass
(2) as listed in table 2

c) Forest characteristics and related management

1) Age class structure

Stands aged 41–80, representing age classes III and IV, prevail in the age structure of forests under State Forests administration, covering 24.7 per cent and 19.2 per cent of the area, respectively. As of 1999, stands under private and commune ownership aged 21–40 occupy 35 per cent of forest area and stands in age class III – 25 per cent. Stands older than 100 years, including stands in the restocking class (KO), stands in the class for restocking (KDO) and stands with selection structure (BP) under the management to the State Forests account for 14 per cent of the area. The share of non-forested land in private and commune-owned forests accounts for nearly 5 per cent, while in the State Forests, it is 1.3 per cent (Fig. 1, Table 7). The proportion of stands older than 80 years continues to increase, from c. 0.9 million hectares in 1945, to c. 1.55 million hectares (excluding the KO and KDO classes) in 2008. The average age of stands within the State Forests did not change and was 60 years compared to 2007, and 40 years in private forests in 1999.

Table 7. Age class structure in light of the ownership forms

Ownership form	Forest land [ha]	[%]	Unforested forest land	I age class	III age class	VI and older age classes	Average age [years]
			[%]				
Total	9089092	100	3.7	11.8	27.1	10.3	56
National State Forest Holding	7068372	77.8	2.9	12.6	25	11.4	57
National Parks	183891	2	7.5	2.5	18.4	29	73
State Treasury Agricultural Assets Agency	37800	0.4	3.9	8.4	23.3	22.4	63
Other State Treasury	60510	0.7	3.6	10.6	20	23.9	63
Commune Owned	83523	0.9	3.1	5.9	20.7	15.2	66
Private owned	1654996	18.2	6.7	9.9	38	2.1	46

source: Forest Management and Geodesy Bureau; 2011

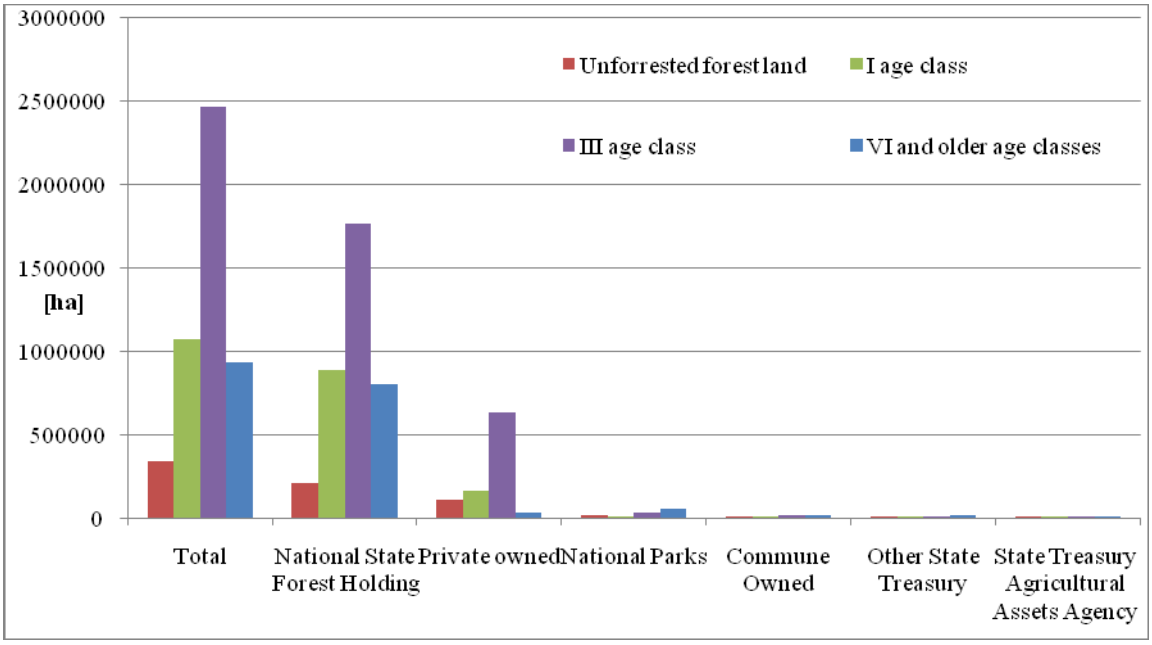

Figure 1. Age class structure in light of ownership forms (as of January 2011)
source: Forest Management and Geodesy Bureau; 2011

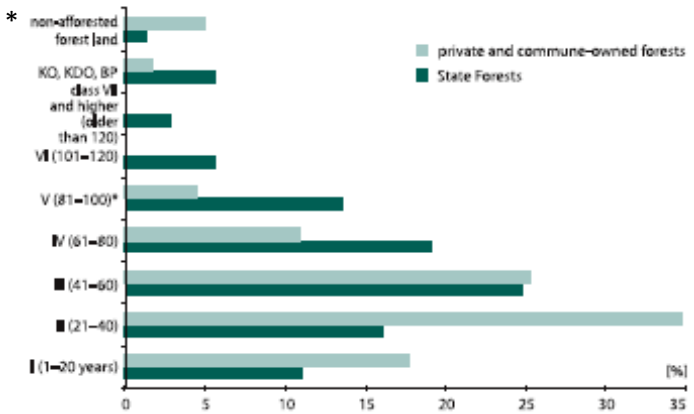

Figure 2. Area share of stands by age class in the State Forests (as of 1 January 2008), private and commune-owned forests (as of 1 January 1999)
*refers to private and commune-owned forests

source: Forest in Poland. State Forest Information Centre; 2009

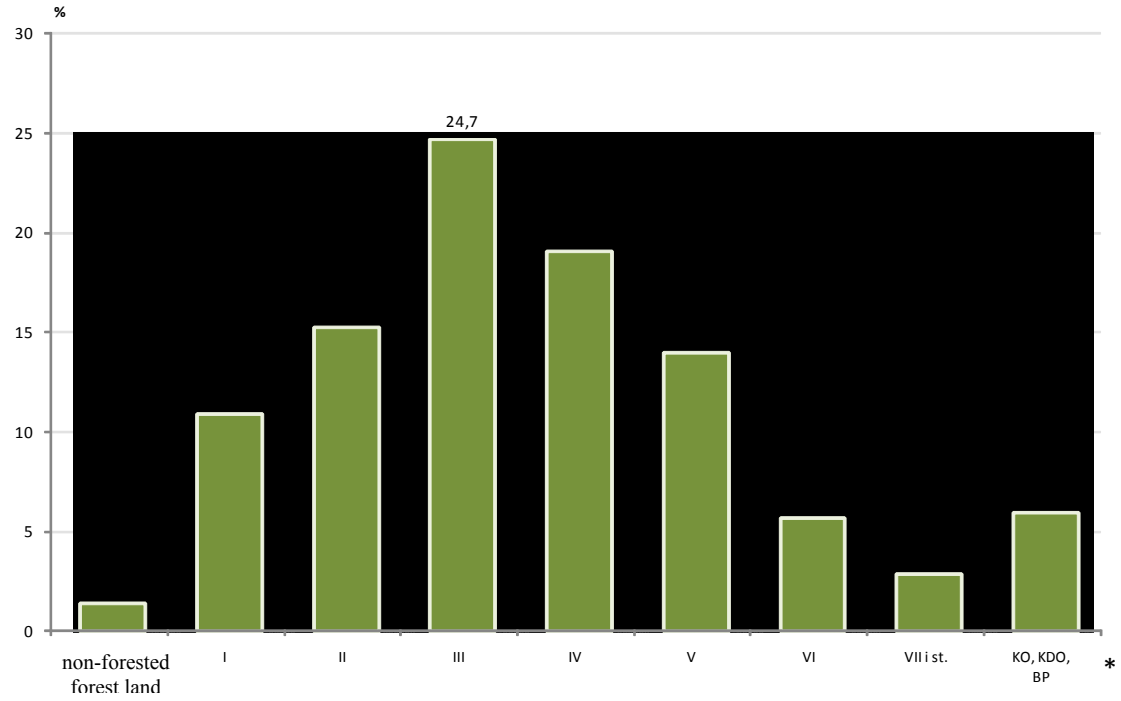

Figure 3. Area share of stands by age class in the State Forests (as of 1 January 2009)
* refers to Restocking class as a type of vertical stand structure in which there is simultaneous utilisation of the stand and regeneration under the canopy of the parent stand, and in which the level of regeneration allows to proceed with subsequent stages of tending (cf. class for restocking). KDO refers to class for restocking (KDO) as a type of vertical stand structure in which there is simultaneous utilisation of the stand and regeneration under the canopy of the parent stand, and in which the level of regeneration does not yet meet the assumed requirements (cf. Restocking class). BP Selection structure as a type of vertical structure of stands, representing groups and clumps of uneven-aged and sized trees.
source: Forest Management and Geodesy Bureau;2010

2) Increments

From January 1988 to January 2008, gross merchantable timber increment in the forests managed by the State Forests National Forest Holding was estimated to be equal to about 1017 million m3. During that period, 558 million m3 of merchantable timber was harvested which means that 459 million m3 of gross merchantable timber representing about 45 per cent net increase in merchantable timber volume compared to the base year. The average annual increment, in gross merchantable timber calculated for the last 20 years (1988–2008) from the difference in volume at the end (January 2008) and beginning of the period (January 1988) including harvest and per hectare of forest land, is 7.16 m3/ha. The observed changes in volume of standing timber resources in the past several decades (as shown in the diagram) is the result of a existing policies of utilization level. The volume of stands aged 41–60 years (age class III) and older has largely increased, while the contribution of young stands under 20 in the total merchantable timber volume is insignificant. The decrease in the volume of stands in age classes I and II is the result of changes in applicable area.

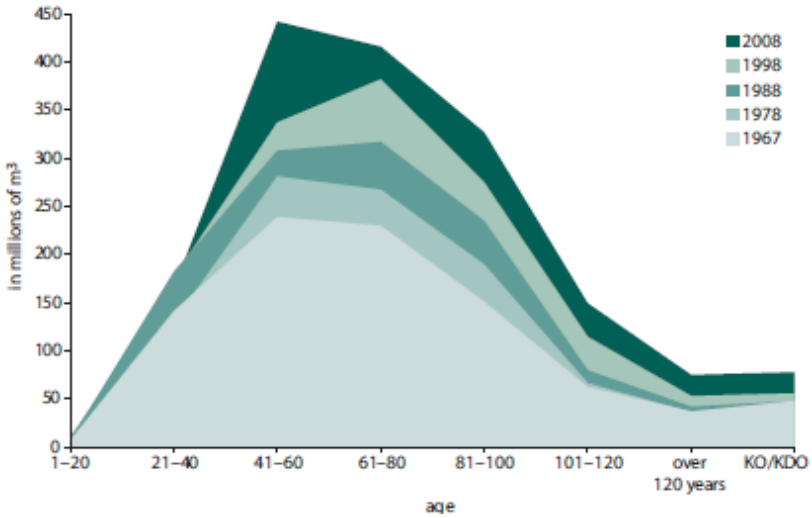

Figure 4. Changes in forests resources in the State Forests by age class
source: Forest in Poland. State Forest Information Centre; 2009

3) Rotation length

The rotation length for a particular stand is determined in a relevant and approved forest management plan. Such factors as the ecosite and stand conditions, as well as the ultimate managerial objective provide the basis for the above determination. Hereafter, the rotation length ranges for the specific main species are specified.

Table 8. Rotation length ranges for the main tree species in Poland

Species	Rotation length range
Scots Pine	80-120
Norway Spruce	80-110
Fir	120-140
Oak	130-240
Beech	100-120
Alder	80-90
Birch	70-90
Aspen & Poplar	40-60
Ash	120-140
Maple	80-100
Hornbeam	80

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

The aging forest age structure will likely have an impact on the average increment rate over the projected timeframe. Forest management planning principles generally supports practices that strengthen the biodiversity and resilience of the stands. This consequently amplifies the effect of ageing of the average age of the country forest ecosystems and impacts the GHG removal dynamics in addition to the current direction of the age structure trajectories. One more factor supporting the generally slowing rate of removal effect is the policy to remodel the stands from originally productive-function monocultures to a more diverse composition and vertically diverse structure.

5) **other relevant information**

d) Harvesting rates

Historical harvesting rates and assumed future harvesting rates

Table 9. Historical harvesting rates. [thous. m^3]

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
18676	18196	22037	21631	21922	22492	22058	23497	24917	26018

Table 9. Historical harvesting rates. [thous. m^3] Cont.

2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
27659	26671	28957	30836	32733	31945	32384	35935	34273	34629

Source: Forestry; Central Statistical Office 1990-2010

Table 10. Assumed harvesting rates. [thous. m^3]

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
35350	36070	36790	37520	38240	38960	39680	40400	41130	41850	42570

The assumed harvesting rates in 2020 are based on "Forecast of wood fiber availability in light of NATURA 2000 constrains" by Dr. J. Głaz of Forest Research Institute, 2010. Annual harvesting rates for a period of 2010−2019 were derived by applying linear interpolation between current values and projected rates for 2020 resulting from the above mentioned forecast.

Table11. Forecast of wood fiber availability in light of NATURA 2000 constrains

Ownership form	Assumed harvesting rate in 2020 [mln m^3]
National State Forest Holding	37,33
National Parks	0,25
State Treasury Agricultural Assets Agency	0,18
Other State Treasury	0,28
Commune Owned	0,43
Private owned	4,10
Total	42,57

Source: "Forecast of wood fiber availability in light of NATURA 2000 constrains" by Dr. J. Głaz of Forest Research Institute, 2010.

e) Harvested wood products

The contribution of HWP to the reference level of Poland amounts to **-1,282 Mt CO2.** This value 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 for Poland (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 12. Sawnwood includes the Items 1632 and 1633, wood based panels comprising of Items 1634, 1640, 1646, 1647, 1648, 1649, 1650 and paper and paperboard corresponds to Item 1876.

Table 12. Conversion factors of considered commodities*

Classification		Description of commodity	Air dry density	C conv. factor	Source
FAO	UNECE		[g/cm³]	[Gg C/1000m³]	
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/1000t]

In order to only estimate emissions from HWP removed from forests which are accounted for by Poland under Article 3, in a first step, the annual share of carbon in HWP coming from domestic forests has been calculated.

As suggested by document FCCC/KP/AWG/2010/CRP.4/Rev.4, the estimation calculates delayed emissions on the basis of the annual stock change of semi-finished wood products using the first order decay function as outlined in the 2006 IPCC Guidelines. The presented approach follows the initial assumption that all forests in Poland 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 FCCC/KP/AWG/2010/CRP.4/Rev.4.

Table 13. Historic time series of amounts and share of accountable carbon Inflow to the HWP pool [in 1000 t C and %]

1964	**1965**	**1966**	**1967**	**1968**	**1969**	**1670**	**1971**	**1972**	**1973**	**1974**	**1975**
1856	2143	2181	2216	2308	2315	2394	2483	2573	2733	2819	3069
98,7%	99,3%	98,6%	98,4%	98,7%	98,8	98,9%	99,0%	99,2%	99,6%	99,2%	99,2%
1976	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**	**1985**	**1986**	**1987**
3099	9123	3143	2941	2896	2649	2612	2725	2774	2777	2843	2774
99,2%	99,3%	98,9%	99,1%	98,8%	98,9%	99,1%	99,0%	99,2%	99,1%	99,2%	99,2%
1988	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**
2636	2383	2016	1847	2044	2162	2573	2278	2352	2669	2904	2950
98,9%	98,7%	99,6%	99,4%	99,5%	100%	99,8%	98,1%	98,0%	98,7%	98,5%	97,6%
2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**		
3160	2929	3163	3525	3840	3734	4027	4563	4351	4317		
97,3%	96,7%	97,5%	97,9%	97,2%	93,9%	94,6%	94,3%	94,9%	94,8%		

Source: Projection of Net-Emissions from Harvested Wood Products in European Countries. Sebastian Rüter.VTI

Table 14. Projected carbon Inflow to the HWP pool [in 1000t C]

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
3840	3820	3801	3781	3761	3742	3722	3702	3683	3663	3643

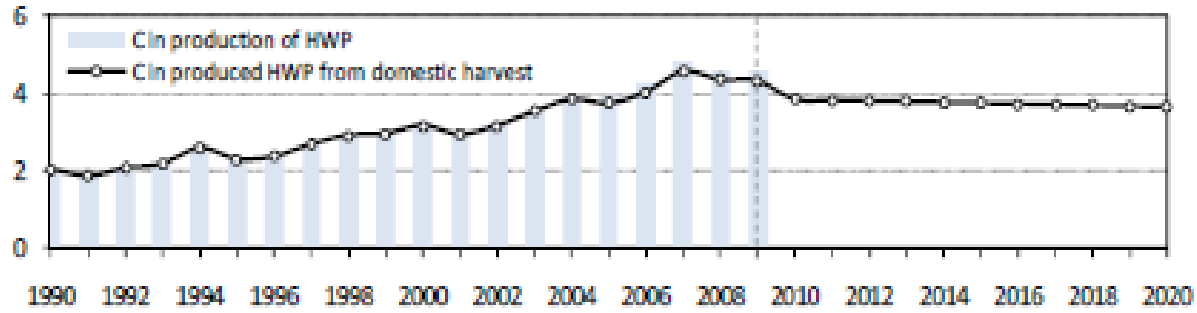

Figure 5. Carbon in production of HWP and accounted pool inflow [in Mt C]

The annual carbon inflow (= carbon in produced HWP from domestic harvest) to the HWP pool prior to the year 1964 has been calculated from the five year average from 1964 to 1968 and was assumed to be the constant carbon pool inflow for the time period 1900-1963

Table 15. Historic (up to 2009) and projected net-emissions from HWP pool [in 1000t CO2]

1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
998	1487	6888	239	-1222	-34	-194	-1213	-1901	-1384	-2455
2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
-1398	-1999	-3021	-3851	-3156	-3945	-5508	-4493	-8067	-2064	-1916
2012	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**		
-1780	-1655	-1538	-1427	-1322	-1221	-1124	-1031	-941		

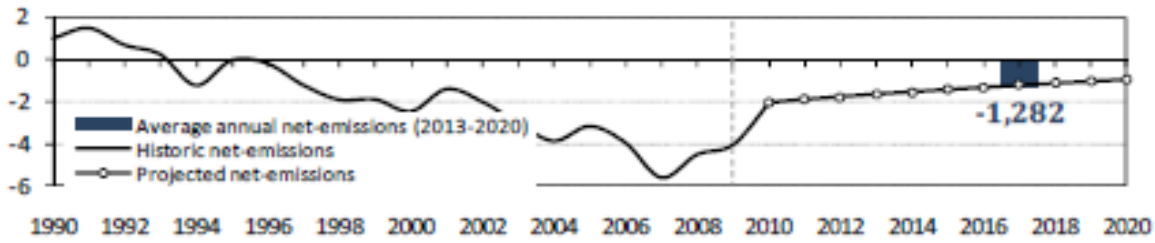

Figure 6. Historic and projected net-emissions from the HWP pool [in Mt CO2]

f) Disturbances in the context of force majeure

The projection methodology incorporates the average rate of past disturbances (for the period 2000-2008) into the projections. For transparency reasons, the emissions from GHG's sources presented in the tables in the current report refers to the average area of forest fires from 1990-2008.

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

The indirect and natural GHG emissions and removals were not factored out.

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 [2/CMP.6]

Policies included

I. Pre-2010 domestic policies included

In Poland, for many decades, Hartig's principle of normal model forest have been incorporated into regular forestry practices. Consequently, most originally natural stands have been transformed into pine and spruce-dominated monocultures. Timber production focus led to decreasing biodiversity values across the country. These trends partially reversed two decades ago. Other goals have been equalized with the economic one, through inclusion of explicit provisions within such documents as the Forestry Act (1991) and the State Forest Policy (1997). Conservation and Protection of forest have been brought forward and raised in the rank of the daily managerial objectives in forestry sector. Furthermore, considerable total area of Natura 2000 protection sites in the country's forests moved the focus on active implementation of safeguards preserving species and sites.

II. Confirmation of factoring out policies after 2009

There were no decisions undertaken after mid-2009 that would have a potential impact on hereby presented projected reference level for the country. In setting the reference level, the projections concerning future utilization levels were used from the expertise by dr. J Glaz titled "Forecast of wood fiber availability in light of NATURA 2000 constrains", which is based on pre-existing forest and economic policies.