Submission of information on forest management reference levels by Slovenia

as requested by the Cancún decisions, i.e. „Consideration of further commitments for Annex I Parties under the Kyoto Protocol, Draft conclusions proposed by the Chair", contained in FCCC/KP/AWG/2010/L.8, and its Addendum: Draft decision [-/CMP.6], Land use, land-use change and forestry, contained in FCCC/KP/AWG/2010/L.8/Add.2

Republic of Slovenia, Ministry of Agriculture, Forestry and Food[1]
Slovenian Forestry Institute (SFI)[2]
Slovenia Forest Service (SFS)[3]

1. *Forest management reference level value*

For the period	Proposed Reference Level (1000t CO_2ekv/yr) (1)	
	applying first order decay function for HWP (2)	assuming instantaneous oxidation of HWP (3)
2013-20	-3.171	-3.033

(1) The reported values are averages of the projected FM data series for the period 2013-2020, taking account of policies implemented before the end of 2009.
(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 1946.
(3) provided for transparency reasons only

2. *General description*

Following guidance from the LULUCF Cancun document[4], and basic data and decisions provided in the forest management plans, which define management of Slovenian forests in future, the reference level for forest management - assuming instantaneous oxidation of HWP - is set as the difference between expected increase in carbon stocks due to living biomass growth and expected annual decrease in carbon stocks due to living biomass loss. In forestry terms it means the difference between expected increment and allowable cut, taking into account conversion factors as applied in the National Inventory Reports.

In the construction of the forest management reference level, the elements contained in footnote 1 of paragraph 4 of the decision ([-/CMP.6]) were taken into account as described below.

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[1] Golob, A. (MSc) - Editor, Zafran, J. (MSc)
[2] Kušar, G. (PhD), Piškur, M. (MSc) - HWP, Simončič, P. (PhD)
[3] Veselič, Ž. (MSc), Poljanec, A. (PhD), Pisek, R. (MSc), Matijašić, D.
[4] http://unfccc.int/files/meetings/cop_16/application/pdf/cop16_lulucf.pdf

Points (c), (d) and (e) below were applied where relevant. The forest management reference levels also took into account the need for consistency with the inclusion of carbon pools. Reference levels including and excluding force majeure can not be presented, because there is no clear threshold available at both international and national levels to differentiate between ordinary natural disturbances and natural disturbances that would have a status of force majeure. Natural disturbances are included in the reverence level.

(a) *Removals or emissions from forest management as shown in greenhouse gas inventories and relevant historical data* were taken into account in the context of management planning procedure as well as procedure for adopting the National forest programme, where future management decisions including allowable amount of felling are set on the basis of analyses of past management.

(b) *Age-class structure* was compared with models developed for regional forest management plans (Veselič 2000). The rate of consistency between the actual structure and the models indicates the level of allowable felling in future.

(c) *Forest management activities already undertaken* were analysed on the basis of annual recording of forestry activities as carried out by the Slovenia Forest Service. They were assessed in the context of the past socio-economic conditions in the country and were used to project future management activities of forest owners, bearing in mind that 80 percent of the forests are privately owned.

(d) *Management activities under a business as usual scenario* were projected on the basis of the ascertained state of the forests, analyses of past management and the evaluated functions of the forest, including biodiversity. Such a procedure has been implemented since 1970 in the whole country and should be understood as business as usual for setting future forest management goals, guidelines and measures.

(e) *Continuity with the treatment of forest management in the first commitment period.* Forest management decisions taken into account for construction of the forest management reference level value represent continuity with the principles applied for forest management in the first commitment period.

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

According to existing knowledge and literature the CO2 and N-fertilizing effect on pools cannot be defined and factored–out easily, without consequences on data quality and errors in data estimates. The removals in line with the above decision have therefore not been excluded.

3. ***Pools and gases***

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	no	no	no	no	no	no	no	no	no	no

Due to strict rules on protection of forests and the fact that clear cutting as a method of forest management is forbidden by law and that primarily continuous cover silviculture is practised, it is pretty safe to predict that the content of carbon in litter, dead wood and soil pools will not diminish. These pools have therefore not been taken into account in construction of the reference level. However, dead wood will continue to be monitored on 4 by 4 km sampling grid in the beginning and at the end of accounting periods. Carbon content in litter and mineral soils for 8 x 8km net will be analysed and finished in near future (current soil stocks evaluations were prepared on the basis of 16 by16 km sampling grid). According to the international literature, data on carbon content in litter and forest mineral soil should be relatively constant, especially due to the Slovenian forest management praxis. To confirm such behaviour of the forest soil carbon stocks, several national expertises will be carried out (repeating forest soil sampling for period of 15-20 years, use of YASSA model etc).

4. __Approaches, methods and models used__

I. Forests

The reference level for forests was constructed on the basis of the GPG-LULUCF Equation 3.2.3 (IPCC 2006):

$$\Delta C_{FF(LB)} = \Delta C_{FF(G)} - \Delta C_{FF(L)} \qquad (1)$$

Where:
$\Delta C_{FF(LB)}$ = annual change in carbon in living biomass (includes above- and belowground biomass) in forest land remaining forest land, tonnes C yr^{-1}
$\Delta C_{FF(G)}$ = annual increase in carbon stocks due to biomass growth, tonnes C yr^{-1}
$\Delta C_{FF(L)}$ = annual decrease in carbon stocks due to biomass loss, tonnes C yr^{-1}

$$\Delta C_{FF(G)} = Iv * D * BEF * (1 + R) * CF \qquad (2)$$

Where:
Iv = average annual increment in volume
D = biomass wood density, tonnes d.m. m^{-3}
BEF = biomass expansion factor for conversion of annual net increment (including bark) to aboveground tree biomass increment, dimensionless
R = root-to-shoot ratio appropriate to increments, dimensionless
CF = carbon fraction of dry matter (default = 0,5), tonnes C (tonne d.m.)$^{-1}$

$$\Delta C_{FF(L)} = L * D * BEF * (1 + R) * CF \qquad (3)$$

Where:
L = annual carbon loss due to fellings, including for fuelwood and sanitary fellings (salvage wood)

Values for factors applied in equations (2) and (3) – the same as in NIR (2010):

	D	BEF	R	CF	C→ CO_2
Coniferous	0,407 tonnes/m^3	1,15	0,230	0,50	44/12
Broadleaved	0,567 tonnes/m^3		0,240		
Total	0,496 tonnes/m^3		0,245		

Taking into account the above factors, the factor for conversion from volume in m^3 into metric tonnes of CO^2 is 1,256 tonnes/m^3.

Taking into account projected increment, described in chapter 5 (c) 2), projected harvesting rate, described in chapter 5 (d) 2) and the conversion factor, equation (1) turns out the result for the reference level for living biomass:

$RL_{2013-2020}$ = - (9.660.626 – 7.245.470) * 1,256 = - 3.033.437 tonnes CO_2ekv/yr**.**

The method, described above, was used for NIR2009 and older. For NIR2010 stock change method was used, which however is difficult to apply for construction of the reference level. In this case a growing stock for the years 2013 and 2020 should have been predicted, which would be more difficult to explain than the default IPCC approach.

II. Harvested wood products

Reference level for HWP was calculated taking into account primary product groups and conversion factors as specified in Table HWP1.

Table HWP1: Conversion factors and primary product groups used in calculation

Classific ation	**Description of commodity**	**Air dry density**	**C conv. factor**	**C conv. factor**	**Source**
UNECE		**[g/cm³]**	**[Gg C/1000 tonnes]**	**[Gg C/1000m³]**	
5.	Sawnwood	-	-	0,23	IPCC (2003, national estimate based on composition of coniferous and broadleaved sawnwood)
6.1	Veneer sheets	-	-	0,295	IPCC (2003)
6.3	Particle board	0,65	0,425	0,28	National estimate based on IPCC and data from producers of particle boards in Slovenia
6.4.	Fibreboard	0,81 – 1,00	0,425	0,344 - 0,425	National estimate based on IPCC and data from producers of fibreboards in Slovenia
7	Wood pulp	1,00*	0,45	-	UNECE, IPCC (2003, 2006)
7.1	Mechanical wood pulp	1,00*	0,45	-	UNECE, IPCC (2003, 2006)
7.3	Chemical wood pulp	1,00*	0,45	-	UNECE, IPCC (2003, 2006)

*“air dried metric ton” is assumed to be 10% mcw (pulp and paper moisture content is reflected on a “wet basis” (mcw) - one air-dried metric ton of pulp is assumed to be 900 kg of oven dry fibre and 100 kg of contained water (UNECE)

The product group ‘’Plywood’’ was not considered in our calculations as these products originate from sawnwood and veneer and as such would cause a double counting of carbon inflow. Carbon input from domestic pulpwood in paper and paperboard production was estimated using data for production of wood pulp (mechanical and chemical pulp).

Revised FOD ("first order decay") method was used according to IPCC GL (2006) and Pingoud and Wagner (2006). The calculation of net emissions follows recommended method as outlined in IPCC 2006, Vol.4, Ch. 12 (Equation 12.1). The estimation uses the product categories, half lives and methodologies as suggested in paragraph 27, page 31 of FCCC/KP/AWG/2010/CRP.4/Rev.4.

Half-lifes of selected primary product groups were determined as outlined in FCCC/KP/AWG/2010/CRP.4/Rev.4:

- Sawnwood: 35 years,
- WBP (Particle boards, Fibreboards, Veneer): 25 years,
- Paper and Paperboard: 2 years.

Method for calculation of Carbon Inflow

Carbon Inflow to HWP pool is calculated according to equations 1 and 2.

$$Inflow\ HWP = \sum_{i}^{n} (F_{DPPA\ i} \times HWP_i) \tag{1}$$

Where:

HWP_i – primary product i (sawnwood, veneer, particle boards, fibreboards, wood pulp)

$F_{DPPA\ i}$ – factor for selected primary product groups defining the share of domestic INDRW input compared to all wood consumption in the production (total wood consumption covers roundwood, woodchip, wood particles and wood residues)

$$F_{DPPAi} = \frac{Domestic\ INDRW\ Consumption_i}{WOOD\ Consumption_i} \tag{2}$$

Factors and data sources for primary product groups

Time series of factors representing share of accountable Carbon Inflow to the HWP pool (= share of domestic industrial roundwood in wood consumption for national production of selected primary wood products) are presented in Appendix (Table HWP2).

1. F_{DPPAi} for sawnwood and veneer (**F_{SW+V}**)

$$F_{SW+V} = \frac{Production\ LOGS - Export\ LOGS}{Production\ LOGS + Import\ LOGS - Export\ LOGS} \tag{3}$$

Data sources for calculation of amounts of domestic roundwood accounted in product group sawnwood and veneer are based on data from Statistical Office of the Republic of Slovenia (SORS), industrial reports and independent national studies. Due to changes in statistical data collection amounts of produced sawnwood in period 1996-2009 are calculated using conversion factors and mass balance of logs consumption.

2. F_{DPPAi} for particle boards and fibreboards (**F_{WBP}**)

$$F_{WBP} = \frac{Domestic\ INDRW\ Consumption_{WBP}}{WOOD\ Consumption_{WBP}} \quad (4)$$

Data sources are industrial reports, official statistical data and national studies.

3. F_{DPPAi} for wood pulp **(F_{WP})**

$$F_{WP} = \frac{Domestic\ INDRW\ Consumption_{WP}}{WOOD\ Consumption_{WP}} \quad (5)$$

Data sources are industrial reports, official statistical data and national studies.

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

Year	1990	1995	2000	2005	2008	2009
Area (ha)	1.077.000	1.097.929	1.134.227	1.169.196	1.185.145	1.186.104

Source: Table 11.3.3. NIR2010–SVN, year 2009 – ZGS (2009)

All forests that are part of forest management plans are included. Following the policy of the NFP, no further increase or decrease of area under forest management is envisaged in the period 2013-2020.

(b) Emissions and removals from forest management

Historical and projected emissions and removals from forest management

	Historical Net Removals (-) or Net Emissions (+) from FM (1000 tCO2 eq)				
	1990	1995	2000	2005	2010
FM applying first order decay function for HWP	-8.324	-8.390	-9.509	-9.910	-7.406
FM assuming instantaneous oxidation of HWP	-8.257	-8.418	-9.424	-9.725	-7.259
Disturbances in the context of force majeure (*)	Not applicable				

Source: Table 11.3.3. NIR2010–SVN – only living biomass is taken into account

(*) Biomass loss due to disturbances has always been added to registered regular felling figures, so emissions from disturbances are included in the FM emissions.

	Projected Net Removals (-) or Net Emissions (+) from FM (1000 tCO2 eq)							
	2013	2014	2015	2016	2017	2018	2019	2020
FM applying first order decay function for HWP	-3.179	-3.177	-3.175	-3.172	-3.170	-3.167	-3.164	-3.162
FM assuming instantaneous oxidation of HWP	-3.033(**)							
Disturbances in the context of force majeure (*)	Not applicable							

Source: SFI calculation

(*) Biomass loss due to disturbances is projected to be added to registered regular felling figures. The sum will represent total biomass loss.

(**) Average figure – net removals will gradually decrease, but the slope of the line is difficult to predict.

Projected net removals equal the reference level starting in 2011 when regional forest management plans based on NFP goals and guidelines enter the valuation period 2011-2020.

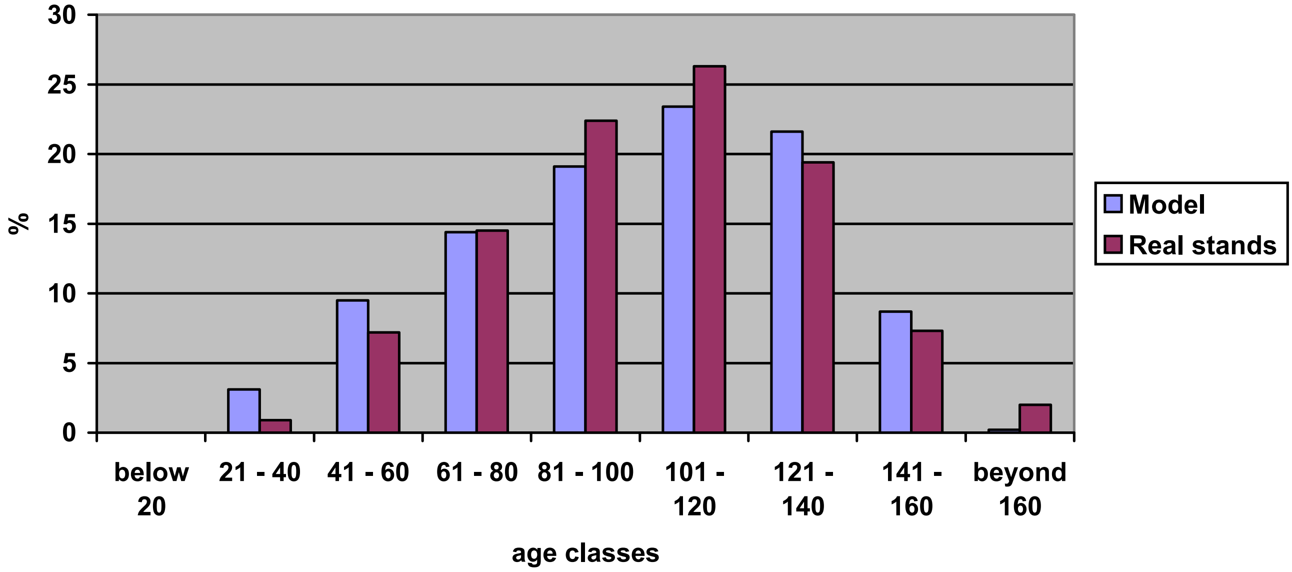
1) **The relationship between forest management and forest land remaining forest land as shown in GHG inventories and relevant historical data, including information provided under Article 3.3., and, if applicable, Article 3.4 forest management of the Kyoto Protocol and under forest land remaining forest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

Reporting under UNFCCC Inventory considers all forest according to land cover categories and definition of the forest from ALUM (agricultural land use map, Ministry of Agriculture, Forestry and Food). The forest area reported for KP LULUCF is slightly smaller than that for UNFCCC, because it includes only managed forests. All forests covered by forest management plans are considered as managed forests. Forests, which are not covered by management plans do not fall into category of managed forests and are consequently treated as unmanaged and are not applicable for Article 3.4 of the Kyoto Protocol.

(c) Forest characteristics and related management

1) age class structure

The histogram bellow shows the comparison between age class structure of model and real stands for all Slovenian forests (age class structure according to the European forest types is shown in the appendix).



The age class structure is generally very close to the model. Young trees are apparently missing and there is a moderate surplus of middle-aged trees and large surplus of very old trees.

Because the actual age structure of Slovenian forests is very close to the model, based on rotation periods, described under point (3) of this chapter, there is no need to further accumulate increment and increase the growing stock. This means that harvest rates should be close to increment, leading to equilibrium between forest biomass growth and loss and zero removals of CO_2 from the atmosphere.

The model distribution of biomass in trees according to age classes as presented above turns an average growing stock of 330 m^3 per hectare. The height of the model growing stock equals average optimal growing stock indicated in the NFP. Actual growing stock for Slovenian forests presented in FRA 2010 is 332 m^3 per hectare, also indicating that there is a need to close the gap between increment and harvesting levels as early as possible, not only from the perspective of maximising increment, but also from the perspective of assuring all forest functions and ensuring sustainable forest management.

2) increment

Annual increment of a stand (Iv) is defined as gross increment of (starting) volume of trees (growing stock), which incorporates also ingrowth (Kohl, 1994, Zalokar, 2003). Increment is calculated on the basis of data derived from monitoring of forests and forest ecosystems (MGGE), which SFI carried out on sample plots of the 4 x 4 km sampling grid in 2000 and 2007 based on methodology described by Kušar *et al.* (2009).

Average annual increment for the period 2000-2007 was 6,96 m3 per hectare and is shown in the table bellow together with the assessment of average harvesting rate (felling) and growing stock in the year 2000.

Forest area	Growing stock (GS) 2000	Average annual increment (Iv) 2000-2007			Average annual felling 2000-2007		
ha	m3/ha	m3/ha	m3	% of GS2000	m3/ha	m3	% of Iv
1.169.200*	276,65	6,96	8.141.112	2,52	3,40	3.975.266	0,49

*for the year 2005 (NIR 2010)

Average annual increment for the period 2011-2020 is calculated so that the percentage of increment in relation to growing stock in the year 2000 (2,52%) was multiplied with growing stock in the year 2007.

Forest area	Growing stock (GS) 2007	Average annual increment (Iv) 2011-2020		Average annual felling 2011-2020		
ha	m3/ha	m3/ha	m3	m3/ha	m3	% of Iv
1.186.104	323,61	8,14	9.660.626	6,11	7.245.470	0,75

3) rotation length

In close-to-nature forestry signified by natural regeneration as practiced in Slovenia, two rotation periods should be considered: gross and net rotation period. The net model rotation period is based on the yield tables. The gross model rotation period is up to 20 years longer than net model rotation period because it includes additional time, needed for young growth to achieve its adequate development stage under the canopies of old stand.

In the graphs of our models, trees are distributed into individual age classes with regard to their normal growth, regardless of their slower growth under the old trees, enabling comparison of the state of the forests with yield tables and models of even aged forests. Rejuvenation period signified by the overlapping of old stand and young growth is reflected there in the lesser growing stock of the highest age classes.

But in fact, if we analyse the complete lifetime of individual forest stand, we have to conclude, that its development lasts up to 20 years longer than its net rotation period. That's why we quote in brackets also the gross model rotation period for the stands of prevailing tree species of individual EU forest types.

Review of the net and gross rotation periods of the forest stands of prevailing tree species of individual EU forest types

Nemoral spruce forest (2.3)

Tree species	Net rotation period	(Gross rotation period)
Norway spruce	120 years	(130 years)
Silver fir	135 years	(150 years)

Subalpine and montane spruce forest and montane mixed spruce-silver fir forest (3.2) and Subalpine larch-arolla pine and dwarf pine forest (3.1)

Tree species	Net rotation period	(Gross rotation period)
Norway spruce	130 years	(140 years)
Silver fir	140 years	(155 years)
Larch	175 years	(180 years)

Acidophylous oakwood (4.1) and Alpine Scots pine and black pine forest (3.3)

Tree species	Net rotation period	(Gross rotation period)
Sessile oak	170 years	(180 years)
Other hard wood	150 years	(170 years)

Sessile oak-hornbeam forest (5.2), Pedunculate oak-hornbeam forest (5.1) and Riparian forest (12.1)

Tree species	Net rotation period	(Gross rotation period)
Sessile oak	130 years	(140 years)
Ash	110 years	(115 years)
Other hard wood	110 years	(120 years)
Alder, willow, poplar	60 years	(65 years)

Central European submontane beech forest (6.4)

Tree species	Net rotation period	(Gross rotation period)
Beech	120 years	(130 years)

Illiryan submontane beech forest forest (6.6) Other mesophytic deciduous forests (5.9)

Tree species	Net rotation period	(Gross rotation period)
Beech	140 years	(150 years)
Ash, maple	110 years	(120 years)

Illiryan montane beech forest (7.4)

Tree species	Net rotation period	(Gross rotation period)
Beech	135 years	(145 years)
Silver fir	140 years	(155 years)

Other thermophilous deciduous forests (8.8)

Tree species	Net rotation period	(Gross rotation period)
Other hard wood	130 years	(150 years)

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

Under the term "business as usual" it is assumed that forest management activities of forest owners (80% of forests are owned by more than 300.000 private forest owners) have to be performed in the framework of forest management plans, which are being drawn up in a participative process - taking into account the views of forest owners and other stakeholders - by the SFS in accordance with regulations and the NFP. Allowable cut for ten year periods is set in every management plan as described in chapter 2. Forest owners have the right to cut the whole amount of allowable cut, but cannot exceed it. As an optimal growing stock of forests has already been achieved, forest owners would not agree that allowable cut was less than 75% of increment as agreed in the general forest policy document in 2007 (NFP) in whose adoption their organisations actively took part. The allowable cut for the next planning period is harmonised with the reference level for the second commitment period.

(d) Harvesting rates

1) Historical harvesting rates (roundwood overbark 1000 m3)

	1990	1995	2000	2005	2009
Coniferous	1450	1248	1423	2033	1854
Broadleaved	985	844	1186	1203	1520
Total	2435	2092	2609	3236	3374

Source: SFS

Harvesting or felling rates given above were recorded by the SFS, which is according to the Forest Act responsible to monitor the state and development as well as forest management activities in all forests. Having insight in all activities is quite difficult in Slovenia because of very small ownership structure (over 400.000 forest owners). Veselič (2004), Medved and Matijašić (2008) and Piškur and Krajnc (2007) have found out that the above figures are underestimated by at least 20%.

2) Assumed future harvesting rates

The sum of planned harvesting rates in regional forest management plans for the period 2011-2020 will follow the guideline of the NFP, stipulating that 75% of increment should be cut. Thus the amount of allowable cut will be 7.245.470 m3 per year, where coniferous species will represent 47% and broadleaved 53%.

As the forest owners have the right to cut the whole amount of allowable cut, it would not be acceptable to assume that the future harvesting rates will be lower, especially because past harvesting rates show clear growing trend. It is also expected that wood prices will grow together with the energy prices and that forest owners will respond to growing demand.

Rounwood use	Assessment for allowable cut 2011-2020 %		
	Coniferous	Broadleaved	Total
Sawn wood	77	23	52
Wood for pulp and boards	16	13	15
Firewood	7	64	33
Total	100	100	100

The height of the planned allowable cut is determined by respecting the principle of sustainable forest management, actual state of the forests as well as goals and guidelines as laid down in the NFP.

Main elements for determining the amount of allowable cut for the period 2011-2020 are:

1. State of the forests:
   Age structure, as presented in this document, does not justify further increase in growing stocks. The average growing stock of Slovenian forests has already attained an optimal amount under the assumption that environmental, economic and social functions are taken into account and well balanced.

2. Goals and guidelines in the NFP:
   The planned allowable cut is absolutely in line with the goal of increasing utilisation of production potential of forest sites and reaching 75% of increment.

We assume that harvest in the period 2011-2020 will be increasing gradually and that it will achieve the planned amount in average for the whole period. The harvesting rate also follows the measures adopted in the Rural development programme for Slovenia for the period 2007-2013 with the aim to improve competitiveness of Slovenian forest sector.

(e) Harvested wood products

Data on carbon inflow to HWP pool and emissions from HWP pool

Carbon Inflow to HWP pool for each year in the time period 1946-2009 is presented in Appendix, Table HWP3.

Annual and projected net emissions from HWP pool are calculated from annual stock change estimates for primary products originating from domestic industrial roundwood. The results are presented in Appendix, Table HWP4.

Construction of reference level (RL) for HWP

General assumption in construction of RL for HWP is that the annual C Inflow to HWP pool is not dependent on annual production of roundwood. This assumption is based on results of statistical analysis showing no significant relationship for period 2004-2009 (2010). The rationale for choosing this period lies in large structural changes after Slovenia had become a member of EU in 2004. Period following the year 2004 can be described with exponential growth of roundwood export and increased use of woodfuel for heating.

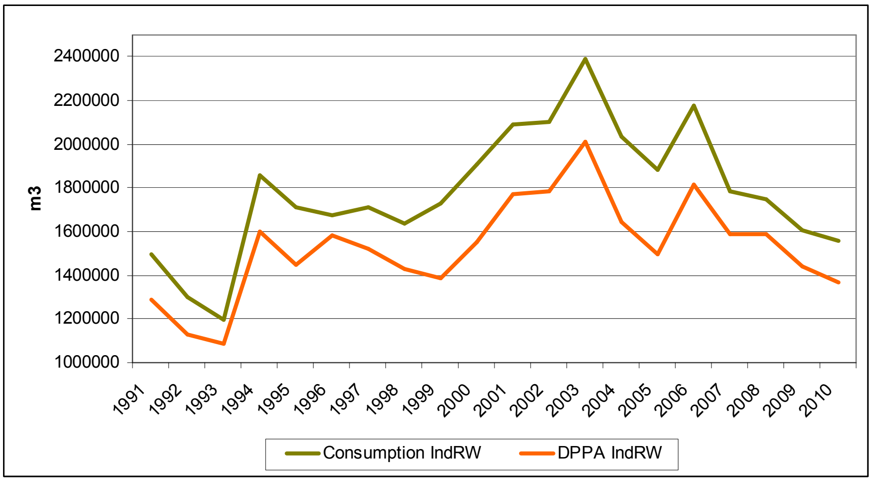
Reference level for HWP was calculated using BaU approach. Projected Carbon Inflow is based on average Inflow in period 2004-2009 with exceptions for sawnwood and pulp production:

- Veneer: 2005-2009
- Particle Boards: 2005-2009
- Fibreboards: 2005-2009
- Pulp: 2007-2009 (closure of chemical pulp plant in 2006 – see Figure 2)
- Sawnwood: 2003-2005 and 2009 (based on structural crisis in wood processing industry and downturn of sawnwood production also in 2010 – see Figure 1)

Annual Carbon Inflow in HWP pool in the period 2013-2020 amounts to 0,227 Mt C/year.

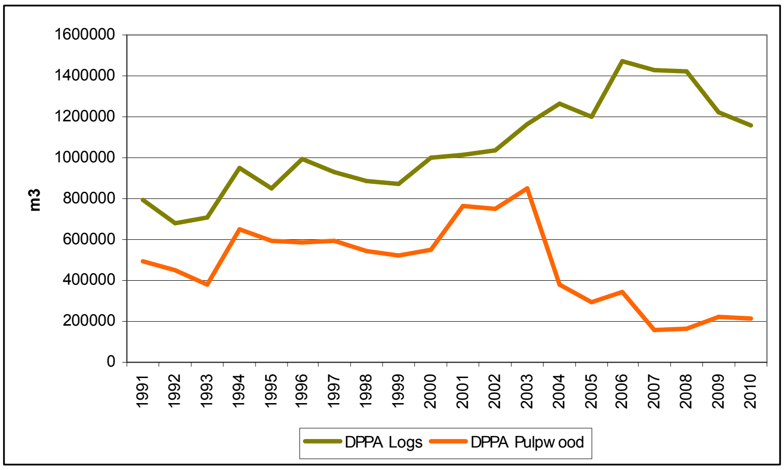
The contribution of HWP to the reference level amounts to -0,138 Mt CO_2/year. The projected net emissions from HWP pool are calculated from annual stock change estimates for primary products originating from domestic industrial roundwood. The results are presented in Table HWP4.

Figure 1: Time series representing total and domestic industrial roundwood consumption



Data for year 2010 are preliminary.

Figure 2: Time series representing domestic consumption of logs and pulpwood



Data for the year 2010 are preliminary.

Verification of consistency between carbon Inflow to HWP pool and amount of carbon in consumption of domestic industrial roundwood

Table HWP5: Comparison between C Inflow and C in domestic INDRW (1.000 t C)

	2005	2006	2007	2008	2009	Average
Domestic INDRW*	292	382	329	324	299	325
Inflow - model	242	251	275	251	237	251
Share HWP Inflow/Dom. INDRW	0,83	0,66	0,83	0,77	0,79	0,77

*Carbon in consumption of domestic INDRW is calculated separately for coniferous and broadleaved INDRW using basic densities 0,40 t/m3 and 0, 58 t/m3, respectively.

Estimates of carbon Inflow are consistent with consumption of domestic industrial roundwood. The difference present losses which occur during processing to selected primary products.

(f) Disturbances in the context of force majeure

Area damaged by different agents and fire

Year	Area damaged by different agents						Primarily damaged by fire	
	Total area	Primarily damaged by biotic agents		Damage primarily human induced		Primarily damaged by abiotic agents		
		Insects and disease	Wildlife and grazing	Forest operations	Other	Storm, wind, snow, etc.		
	1000 ha						1000 ha	No. of fires
2005	2,168	0,99	0,01	0,078	0,11	0,39	0,59	119
2000	1,49	0,46	0,02	0,11	0,11	0,49	0,30	85
1990	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0,37	n.a.

Source: State of Forests and Sustainable Forest Management in Europe 2011, National data reporting forms on MCPFE indicators for sustainable forest management

Quantity of wood damaged by different agents and fire

Year	Growing stock (m^3)		
	Coniferous	Broadleaved	Sum
1995	491.353	97.694	589.047
2000	404.228	149.135	556.363
2005	1.078.283	133.740	1.212.023
2009	698.045	231.036	929.081

Source: SFS

The above figures comprise both small scale and large scale disturbances.

There is no clear definition in Slovenian legislation to delimit regular disturbances from disturbances which would qualify as force majeure. Major disturbances in the past were:

- Icebreak in winter 1996/97 on the whole forest area of Slovenia, as a consequence of which 897.101 m3 of timber had to be removed from the forest (35% of total felling in that year).
- Fire on Komenski Kras in summer 2003 on the area of 1.050 ha, of which 750 ha forests
- Fire on Komenski Kras in summer 2006 on the area of 950 ha, of which 710 ha forests (arround 80.000 m3 of trees were burnt)
- Windbreak on Jelovica in summer 2006 on the area of 180 ha, 85.000 m3 of trees were broken down.
- Windbreak on Črnivec in summer 2008 on the area of 700 ha, 150.000 m3 of trees were broken down.

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

For both processes, for elevated carbon dioxide concentrations above their pre-industrial level and for accounting excluding removals resulting from indirect nitrogen deposition, an accurate system of the factoring out is not available. According to existing knowledge and literature the CO2 and N-fertilizing effect on pools cannot be defined and factored–out easily, without consequences on data quality and errors in data estimates.

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]

6. <u>Policies included</u>

I. Pre-2010 domestic policies included

In Slovenia forests cover more than 60 percent of the land surface. They are biologically very diverse and rich in biomass content (growing stock is with 332 m3 per hectare highest in the EU), which has been steadily growing due to forest policy promoting sustainable, multifunctional and close-to-nature forest management. Slovenia is the only country in Europe where clear cutting as a system of forest management is forbidden by law.

Following the principle of sustainable forest management, which was traditionally respected in forestry until the second half of the eighteen century, in the second half of the nineteen century a considerable number of forestry estates introduced forest management planning as a basic instrument to ensure sustainability of the forest resource. Based on these traditions, forest management planning became mandatory for all forests, irrespective of ownership in 1970.

The present forest policy is defined by the Forest Law of 1993[5] and the Resolution on National Forest Programme[6]. It is implemented through plans for managing forests, which define conditions and measures for coordinated forest use, necessary extent of silvicultural and protection measures, allowable cut and conditions for wildlife management as well as guidelines for the sanitary measures

[5] http://www.mkgp.gov.si/fileadmin/mkgp.gov.si/pageuploads/Act_on_forests.pdf
[6] http://www.mkgp.gov.si/fileadmin/mkgp.gov.si/pageuploads/GOZD/NFP_RS.pdf

in damaged forests. These shall be based on the ascertained state of the forests, analyses of past management and the evaluated functions of the forest. The plans are set up at three different planning levels: i. regional forest management plans (for 14 regional forest units), ii. forest management unit plans (for 236 forest management units) and iii. detailed silvicultural or executive plans.

Regional forest management plans designed for 10 year periods are being prepared for these regions for the fifth time this year and will be valid for the period 2011-2020, covering all forests in the country. Regional forest management plans will have to respect the guidelines as adopted by the Parliament in the NFP. They should not be regarded as a new forest policy, but rather as implementing instrument for the policy adopted already in 2007.

More detailed rules on the content of plans for managing forests are set in regulations[7], where detailed provisions are set stipulating how among other the following parameters should be assessed before any new forest management plan is adopted:

- forest area and its division to forest management classes,
- growing stock and its structure according to tree species and diameter classes,
- annual increment according to diameter classes,
- amount and structure of dead trees.

According to the rules, forest inventory is a part of forest management planning at the forest management unit level. The mean inventory period is 10 years; every year approximately 10% of the total forest area of Slovenia is re-measured by the SFS. Forest inventory is a combination of forest stand assessment and permanent sampling plot inventory, with systematic sampling of forests with sampling grid of 250 by 250 m or 250 by 500 m. For the purposes of regional forest management plans, forest management unit inventory data are recalculated and synchronised with data gathered periodically on 4 by 4 km sampling grid of permanent sample plots by the SFI in line with the rules on protection of forests[8].

Regulation on the forest management and silviculture plans stipulates that decisions concerning allowable cut as set out in the plans, should in addition to socio-economic and environmental criteria, take into account production period, rotation period, average regeneration period and final growing stock of the stands.

II. Confirmation of factoring out policies after 2009

The Resolution on National Forest Programme as referred to above, was adopted on 20 November 2007 by the National Assembly of the Republic of Slovenia and has never been amended after. It represents the major forest policy document.

[7] http://www.uradni-list.si/1/objava.jsp?urlid=201091&stevilka=4838

[8] http://zakonodaja.gov.si/rpsi/r05/predpis_PRAV315.html

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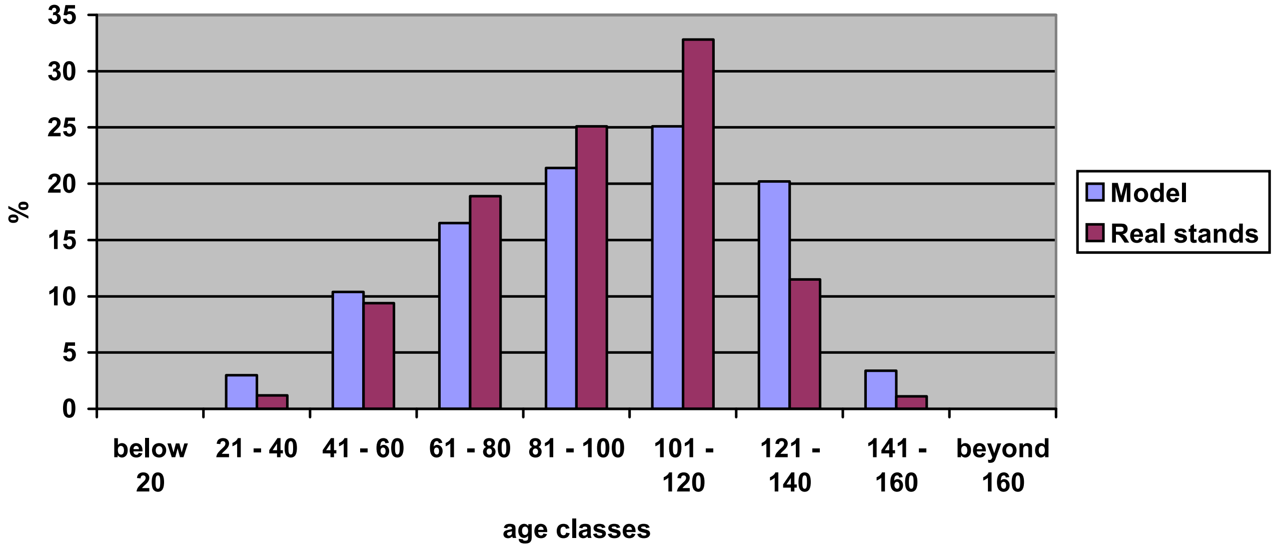
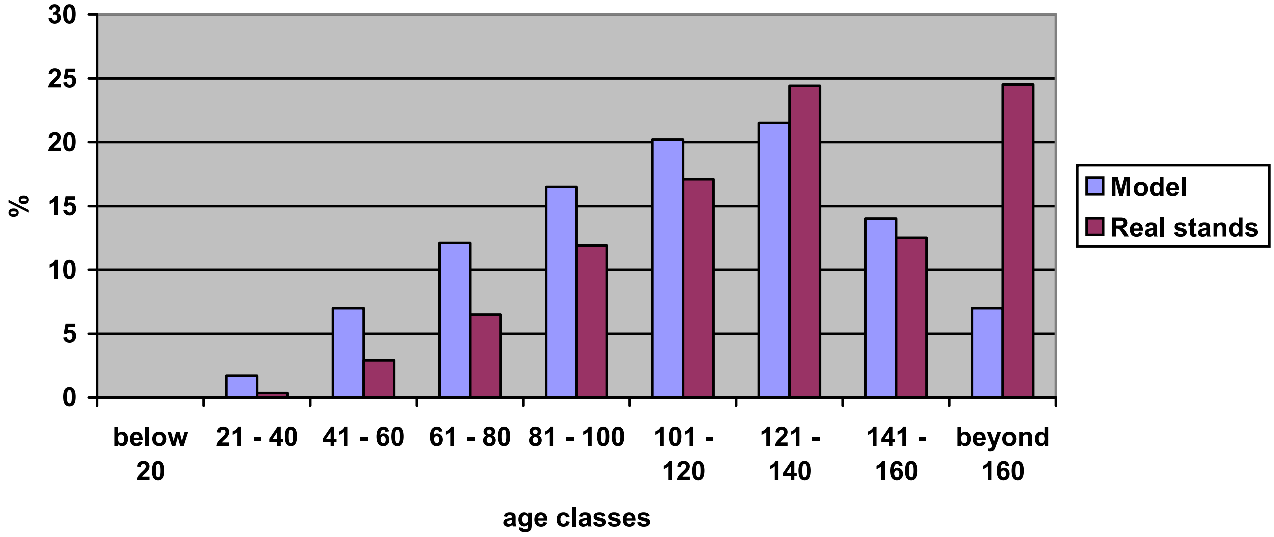
Appendix

Age class structure according to the EU forest types[9]

Nemoral spruce forest (2.3) – 5,2 % of total forest area

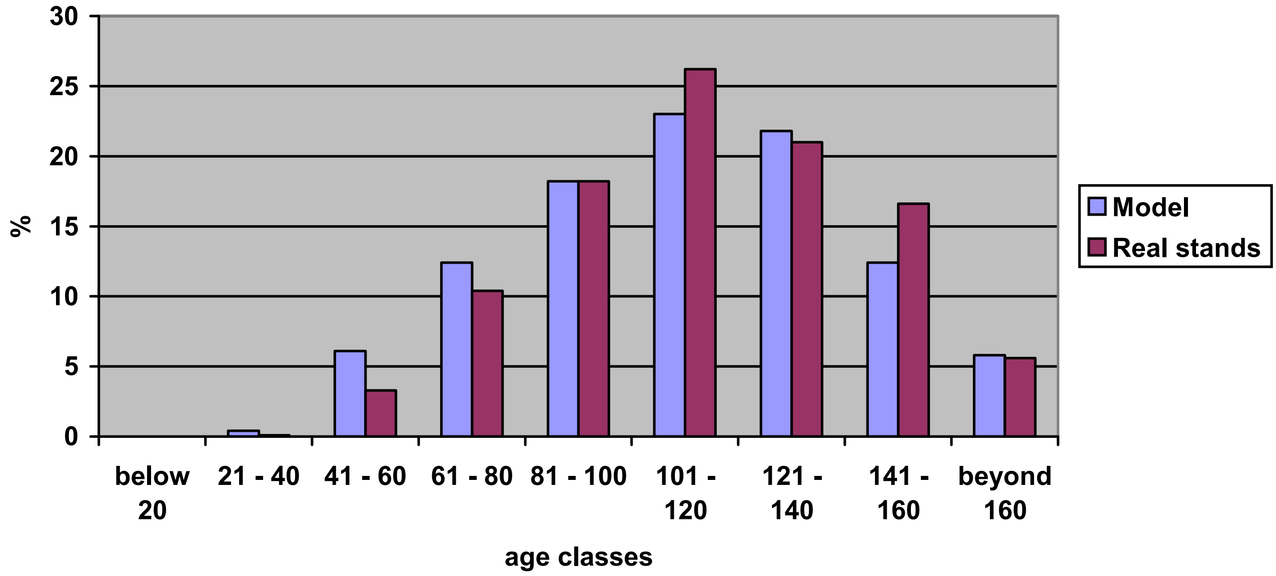


Subalpine and montane spruce forest and montane mixed spruce-silver fir forest (3.2) and Subalpine larch-arolla pine and dwarf pine forest (3.1) – 2,6 % of total forest area

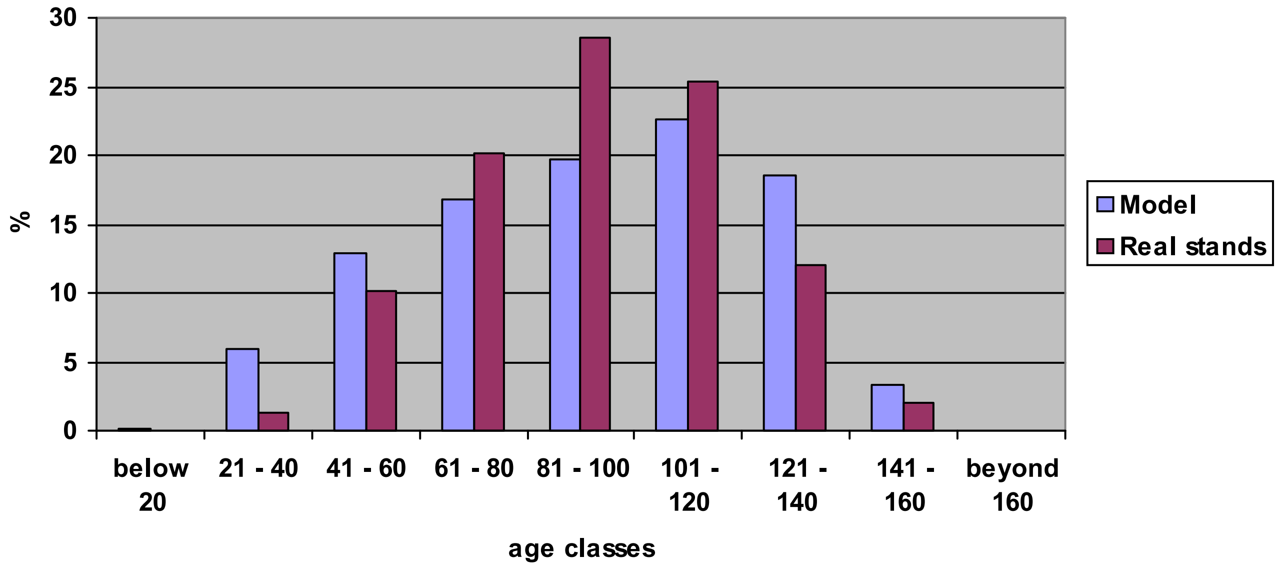


[9] prepared by the SFS

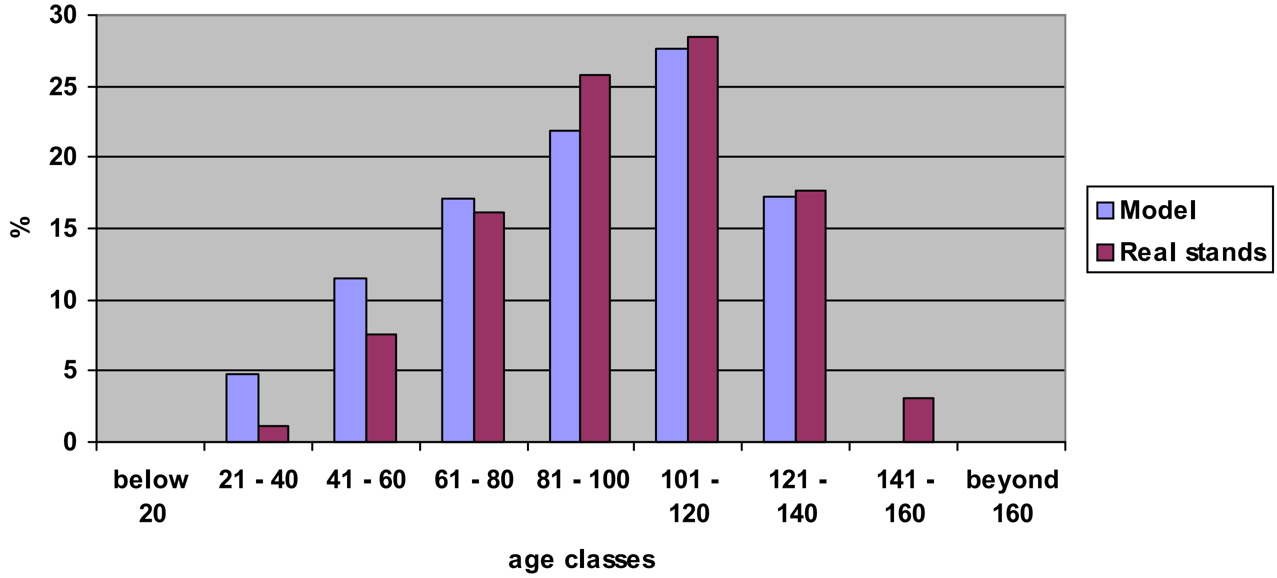
Acidophylous oakwood (4.1) and Alpine Scots pine and black pine forest (3.3) – 3,5 % of total forest area



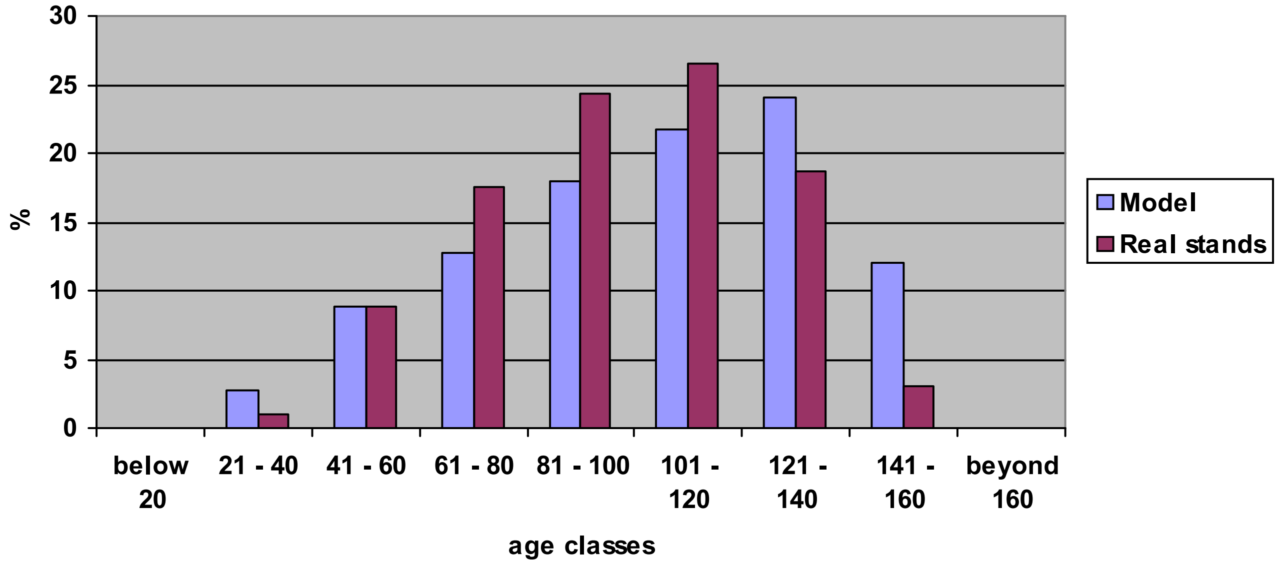
Sessile oak-hornbeam forest (5.2), Pedunculate oak-hornbeam forest (5.1) and Riparian forest (12.1) – 9,0 % of total forest area



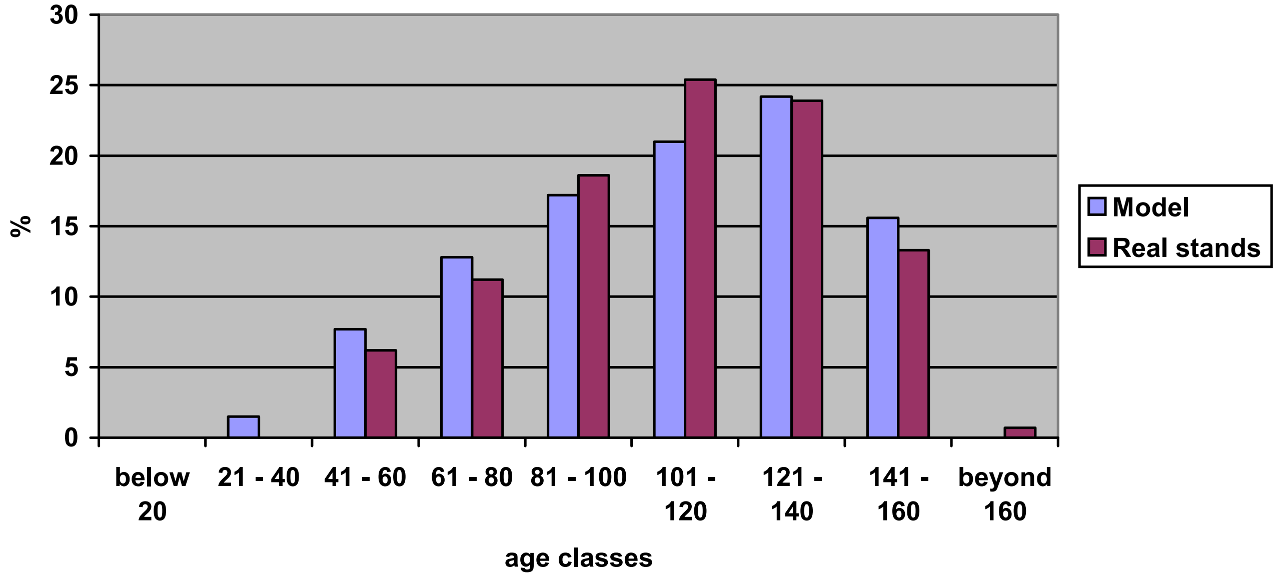
Central European submontane beech forest (6.4) – 21,1 % of total forest area



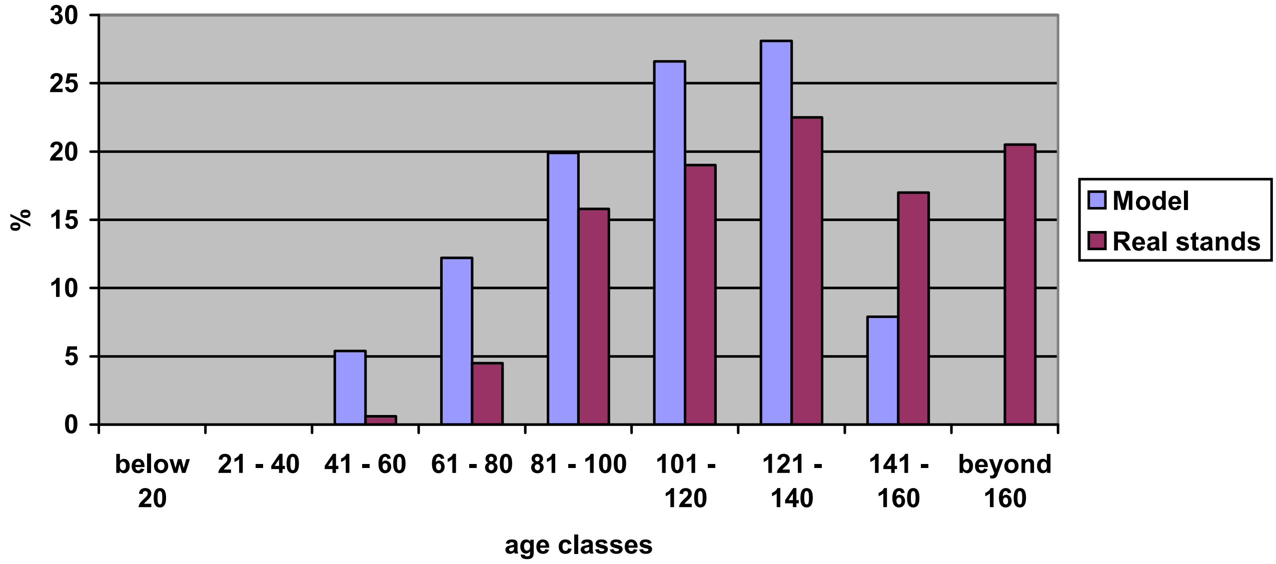
Illiryan submontane beech forest forest (6.6) Other mesophytic deciduous forests (5.9) – 22,3 % of total forest area



Illiryan montane beech forest (7.4) – 28,1 % of total forest area



Other thermophilous deciduous forests (8.8) – 8,2 % of total forest area



Harvested wood products data[10]

Table HWP2: Factors representing share of accountable carbon Inflow to the HWP pool in different years (= share of domestic industrial roundwood in wood consumption for national production of selected primary wood products)

Year	**1946**	**1947**	**1948**	**1949**	**1950**	**1951**	**1952**	**1953**	**1954**	**1955**	**1956**	**1957**	**1958**
SW+V	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
WBP	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
WP	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.96	0.92

Year	**1959**	**1960**	**1961**	**1962**	**1963**	**1964**	**1965**	**1966**	**1967**	**1968**	**1969**	**1970**	**1971**
SW+V	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.99	1.00	0.98	0.96
WBP	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.50
WP	0.87	0.83	0.79	0.75	0.70	0.66	0.62	0.58	0.53	0.49	0.45	0.33	0.36

Year	**1972**	**1973**	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**
SW+V	0.96	0.95	0.97	0.97	0.97	0.96	0.97	0.96	0.95	0.96	0.96	0.97	0.98
WBP	0.46	0.43	0.41	0.50	0.43	0.46	0.43	0.39	0.33	0.36	0.41	0.37	0.33
WP	0.41	0.34	0.30	0.30	0.30	0.24	0.25	0.25	0.23	0.28	0.31	0.30	0.38

[10] SFI – Piškur M.

Year	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
SW+V	0.98	0.98	0.99	0.99	0.98	0.93	0.96	0.96	0.98	0.98	0.98	0.99	0.98
WBP	0.35	0.29	0.36	0.34	0.38	0.25	0.25	0.26	0.26	0.27	0.27	0.27	0.28
WP	0.37	0.40	0.46	0.45	0.39	0.29	0.30	0.31	0.32	0.33	0.35	0.36	0.37

Year	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
SW+V	0.98	0.96	0.97	0.97	0.96	0.96	0.96	0.95	0.96	0.97	0.98	0.97
WBP	0.28	0.29	0.29	0.30	0.30	0.31	0.31	0.30	0.37	0.38	0.37	0.48
WP	0.38	0.39	0.40	0.41	0.42	0.43	0.44	0.49	0.42	0.66	0.66	0.66

SW –Sawnwood; V –Veneer; WBP –Wood based panels; WP Wood pulp for paper and paperboard production

Table HWP3: Time series of amounts of accountable carbon Inflow to the HWP pool (in 1.000 ton C)

Year	**1946**	**1947**	**1948**	**1949**	**1950**	**1951**	**1952**	**1953**	**1954**	**1955**	**1956**	**1957**	**1958**
Total	106	143	208	250	224	141	97	112	97	103	127	133	144

Year	**1959**	**1960**	**1961**	**1962**	**1963**	**1964**	**1965**	**1966**	**1967**	**1968**	**1969**	**1970**	**1971**
Total	162	184	191	218	226	236	219	231	224	229	219	220	228

Year	**1972**	**1973**	**1974**	**1975**	**1976**	**1977**	**1978**	**1979**	**1980**	**1981**	**1982**	**1983**	**1984**
Total	218	230	253	257	278	309	313	311	300	297	319	318	329

Year	**1985**	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
Total	328	308	314	307	287	215	183	168	155	167	171	190	172

Year	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Total	199	193	207	206	213	223	234	242	251	275	251	237

Projection of accountable carbon Inflow for years 2010-2020 are based on BaU approach with constant inflow **227,0** kt C/year.

Table HWP 4: Net-emissions from HWP pool (in 1.000 ton CO_2)

Year	**1986**	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
Total	-457	-460	-416	-329	-67	39	77	106	45	28	-43	24

Year	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Total	-72	-40	-85	-78	-98	-129	-164	-185	-219	-311	-229	-183

Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Total	-147	-148	-147	-146	-144	-142	-139	-137	-134	-131	-129