

**CROATIA'S
SUBMISSION OF INFORMATION
ON FOREST MANAGEMENT
REFERENCE LEVELS**

Zagreb, 2011

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1. GENERAL DESCRIPTION

1.1. CONSTRUCTION OF THE FOREST MANAGEMENT REFERENCE LEVEL

The basic commitment of forest management in Croatia, which has a long tradition, is the sustainable forest management which means that the fellings are below the increment enough to maintain economic, natural, ecological and sociological values of the forest. Today, forest land makes about 47 % of Croatia's mainland and, in this sense, no significant changes are predicted in the following long term period. In 2009, Croatia reported removal from forest management activity of 8,642 Gg CO₂-eq which makes about 30 % of total annual emission. The cap for the Kyoto protocol amounts 972 Gg CO₂, that is about 11 % of total removal and about 3 % of total emission in 2009.

Croatia determines its reference level based on 'business as usual' projection scenario and this scenario is a result of the planning documents within the forestry and energy sector that have been adopted till the end of 2009. Based on these documents, it is assumed that the forests' age class structure and the way forests are managed will basically remain the same in the following period. The increment is predicted to remain approximately at the level as it is now while fellings will increase to a certain extent making about 67 % of the increment in the period from 2013-2020. As a reference level, projected removal in 2020 is proposed which is 5,149 Gg CO₂.

1.2. ACCOUNTING OF EACH REQUIRED ELEMENT IN THE CONSTRUCTION OF THE FOREST MANAGEMENT REFERENCE LEVEL

- a) Emissions/removals from forest management as shown in GHG inventories an relevant historical data

Croatia determines reference level in consistency with the data, assumptions and calculation methods applied in the last emission inventory submitted to the Convention (NIR 2011).

Table 1.1-1 and Figure 1.1-1 shows the historical removal of CO₂ due to forest management activities. Average removal for the period from 1990-2009 amounts 7,388 Gg CO₂.

Table 1.1-1: Historical removals of CO₂ from forest management

	Gg CO ₂									
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Removal	7,059	6,913	6,836	6,878	6,908	6,826	6,425	6,631	6,803	6,974

Table 1.1-1: Historical removals of CO₂ from forest management, cont.

	Gg CO ₂									
	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Removal	7,172	7,348	7,506	7,683	7,926	8,053	8,154	8,423	8,594	8,642

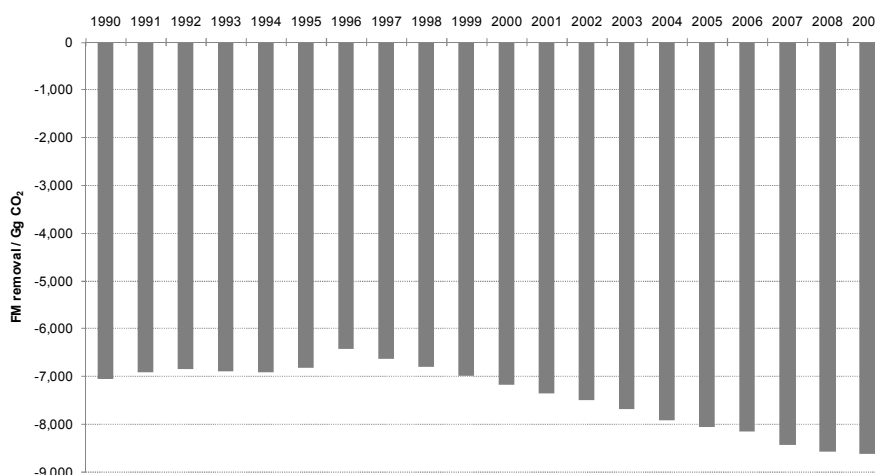


Figure 1.1-1: Removals from Forest Management

Up to the *Addendum to NIR 2010* submitted in October 2010, Croatia used Tier 1 methodology to calculate emission/removal from Forest land. Afterwards, Croatia attained more detailed data which enabled improvements to be made and to raise the methodology level at Tier 2 but in regards to the state forests managed by “Croatian Forests Ltd.”. The entire historical series from 1990-2007 were recalculated. In NIR 2011, reporting was further improved by more detailed spatial disaggregation (16 forest districts), again regarding state forests managed by “Croatian Forests Ltd.”.

b) Age-class structure

Increment projections are based on the assumption that current age-class structure of forests will remain the same. More information is provided in the subchapter 4.1.3.

c) Forest activities already undertaken

Croatia has a long tradition of forest management with a comprehensive, vertically structured, national system for monitoring, data collection and reporting on the condition and activities in forestry sector. Forest land¹ in Croatia constitutes one forest management area which is established in order to ensure unique and sustainable management of the forest land. The area is managed based on the Forest Management Area Plans (FMAPs) for the Republic of Croatia for a period of 10 years which are approved by the Ministry of Regional Development, Forestry and Water Management. The FMAPs, among other, appoint activities which will be performed in the forests for the next 10 years but also, to some extent, describes the former management (management in the previous 10-year period) and the status of forests at the beginning of the new 10-year period. The first FMAP was prepared for the period from 1986 - 1995 (FMAP 1986-1995). The second FMAP relates to the period from 1996 – 2005 (FMAP 1996-2005) while current management is based on the FMAP adopted in 2006, which is valid till 2015 (FMAP 2006-2015).

It is important to emphasize that during the war conditions in the period from 1991 – 1995, forest management was performed in significantly different circumstances and that this period does not represent the usual management approach.

Based on ownership, forests in Croatia are divided to:

- a. State forests owned by the state and managed by

¹ In national frames, based on *Regulation on Forest Management* (OG 111/06, 141/08), forest land is divided as forest land with tree cover and forest land without tree cover.

- the public enterprise “Hrvatske šume d.o.o.” (“Croatian Forests Ltd.”)
- legal bodies owned by the state (e.g. national parks, Faculty of Forestry, Ministry of Defence, “Croatian Waters” etc.)

b. Private forests

State forests make about 78 % of forest area while the remaining 22 % are privately owned. Considering that both state and private forests are within the forest management area which is managed based on FMAPs, all forests in Croatia are sustainably managed.² Within the forestry sector of the Republic of Croatia, two ‘types’ of sustainable forest management are applied: even-aged (trees of the main species are of similar age and the management is based on forest stands) and uneven-aged (trees are of different heights and diameter at breast height, the management is single-tree or for a group of trees).³ Furthermore, it is important to emphasize that, considering forest stands, the artificial ones (cultures and plantations) made only about 3 % of forest land with tree cover in Croatia in 2006.

The system of state forests managed by “Croatian Forests Ltd.” is divided on 16 organizational and territorial units – forest districts, 170 forest units, 653 management units and further on compartments and subcompartments. The compartment is considered as the permanent, basic unit regarding the management forest division while the subcompartment is the smallest variable, basic area regarding the management division of forests.

For private forests, Forest Advisory Service (FAS) was established in 2006 (began working in 2007). Its function is to assist private owners in management and improvement of private forests' condition. This service has recently been merged with the “Croatian Forests Ltd”.

d) Projected forest management activities under business as usual scenario

Planning in forestry sector is described in Chapter 5.1. The basic for future forest management is the Forest Management Area Plan which appoints activities which will be performed in the next 10 years. The last such document, the FMAP 2006-2015 covering the period from 2006 to 2015, describes goals and the forest management depending on forest purpose, forest stand, etc. In order to maintain the management continuity, in the following period spatial forest distribution based on management units will be widely preserved. However, there will be certain changes due to changes in ownership (asset return). In terms of management, and also in terms of the availability of more reliable, higher quality data, positive changes in the next period can be expected in private forests. Forest management activities will also be influenced by other planning documents, such as the Croatian Energy Strategy (OG 130/09) prescribing certain goals for whose fulfilment forestry sector is also important.

It is assumed that the area of total Kyoto forest in Croatia till 2020 will not change significantly. Furthermore, it is assumed that the relationship between maquia and scrub, and high forests, coppice, cultures and plantations will remain approximately at the same level as it is now. The projection of fellings are based on the increase according to FMAP and also on the increase regarding renewable energy sources and fulfilling the goals in accordance with the Croatian Energy Strategy adopted in 2009. The latter does not jeopardize the sustainability of management since, considering the projections of all relevant parameters, fellings would make on average about 67 % of the increment in the period from 2013-2020.

² The management system of „Croatian Forests“ has the FSC certificate (Forest Stewardship Council A.C.) which proves that these state forests are managed on a sustainable manner according to strict ecological, social and economic standards.

³ Based on the forest management type, forests are distributed as regular (83 % of area) and uneven-aged forests (17 % of area).

Detail explanations of the definitions and the scope of certain parameters important for the development of projections and planned changes in the next period are presented in Chapters 3 and 4.

e) Continuity with forest management in the first commitment period

Organisational structure of forest management is supposed to remain the same as it is now. The current change is the merge of the Forest Advisory Service to Croatian Forests Ltd. which has already established a long-term management practice. It is expected that the data quality regarding private forests will be improved in the following years.

f) *Factoring out* removals resulting from elevated carbon dioxide concentrations, indirect nitrogen deposition or the dynamic effects of age structure

Croatia does not see the need to separate indirect effect of elevated carbon dioxide concentrations above the pre-industrial level and indirect nitrogen deposition when using the reference level approach as these effects cancel out when subtracting the reference level from net emissions/removals occurred during the commitment period. As for the dynamic effects of the age structure, it is assumed that the structure will remain the same as it is now.

2. POOLS AND GASES

2.1. IDENTIFICATION OF POOLS AND GASES INCLUDED AND EXCLUDED FROM THE REFERENCE LEVEL CONSTRUCTION

In projections and the reference level construction, aboveground and belowground biomass are included while other carbon pools (dead wood, litter, soil) are not included due to a lack of required data/information. Since data on wood products are also not available, they are not included in the emission/removal calculation historically or in projections.

As for gases, only CO₂ is included.

2.2. EXPLANATION OF CONSISTENCY

The inclusion of only aboveground and belowground biomass in the reference level construction is consistent with the submitted National Inventory Reports.

Regarding harvested wood products, both historically and in the projections instantaneous oxidation is assumed.

Uncertainty related to pools is not build in the construction of reference level.

Croatia considers important for FM accounting rules to allow recalculation of the reference level upon the inclusion of other pools or any change in the methodology.

3. APPROACHES, METHODS AND MODELS USED

3.1. GENERAL DESCRIPTION OF APPROACHES, METHODS AND MODELS USED IN THE CONSTRUCTION OF THE FOREST MANAGEMENT REFERENCE LEVEL

In the construction of the reference level, the Republic of Croatia used the same historical data, assumptions and the same approach as described in NIR 2011. The main data source are FMAPs. Quality, the level of detail and accuracy of data used is not identical for state forests managed by “Croatian Forests” when compared to state forests managed by other legal bodies and also private forests.

Four (4) most relevant parameters used for reference level construction are as follows:

a) Forest area

As stated before, based on ownership, forests in Croatia are divided to:

- a. State forests owned by the state and managed by:
 - the public enterprise “Hrvatske šume d.o.o.” (“Croatian Forests Ltd.”)
 - legal bodies owned by the state (e.g. national parks, Faculty of Forestry, Ministry of Defence, “Croatian Waters” etc.)⁴
- b. Private forests

State forests make about 78 % of forest area within which state forests managed by “Croatian Forests” make about 75 %. The remaining 22 % are privately owned.

According to Kyoto definition, forest is land spanning more than 0.1 hectares with trees higher than 2 meters and canopy cover more than 10 percent, or trees able to reach these thresholds *in situ* (Table 3.1-1). This definition is used for both the UNFCCC and the KP reporting. Subsequently, the reporting of Croatia to the UNFCCC and the KP is harmonized and comparable; *Forest land remaining forest land* under the UNFCCC corresponds to the selected activity *Forest management* under the KP Article 3.4.

Table 3.1-1: Thresholds in defining forest

Parameter	Range	Selected value
Minimum land area	0.05 - 1 ha	0.1 ha
Minimum crown cover	10 - 30 %	10 %
Minimum tree height	2 - 5 m	2 m

Based on the definition of forest, forest stands that fall within these thresholds are high forests, plantations, cultures, coppice, maquia and scrub. However, since a complete dataset required for emission/removal calculation is not available for maquia and scrub, the estimation of carbon stock change in biomass for the related forest stands is not performed; thus, these areas are excluded from the reporting. The latter is shown in Table 3.1-2.

⁴ In the document, often referred to as other state forests.

Table 3.1-2: Overview of the national forest division in relation to the UNFCCC and KP definitions

Forest stands	High forests	Plantations	Cultures	Coppice	Maquia	Scrub	Garigue	Shrub
National division								
Area of Forest land with tree cover (100%)*	53.4%	0.1%	2.9%	22.2%	2.3%	15.0%	1.0%	3.1%
Kyoto definition	Yes			Yes	Yes		No	No
Area of total Kyoto forest (100%)*	58.8%			23.2%	18.0%			
NIR, 1990-2008								
Area of Forest land remaining forest land = Area under Forest management	Yes			Yes	No	No	No	No
Area (100%)*	71.7%			28.3%				
Projections 2013-2020								
Area under Forest management	Yes	Yes	Yes	Yes	No	No	No	No

*The data refer to the year 2006

The projection of total Kyoto forest area (includes maquia and scrub) relates to 2010, 2015 and 2020 while for the years in between interpolation was used. The projection of Kyoto forest area without maquia and scrub was performed based on the projected total Kyoto forest and the assumption that the relationship between high forests, plantations, cultures, coppice and maquia and scrub will not change significantly in the next period concerned, that is that it will remain approximately at the level as it is now. The abovementioned is presented in Table 4.1-1 and Figure 4.1-1.

b) Growing stock

Growing stock from the national forestry inventory system presents the volume of heavy wood (includes branches thicker than 7 cm) for all trees above taxation level which is 10 cm in diameter at breast height (130 cm). It is sampled on 10 % area each year in order to obtain complete and updated data on growing stock for the 10-year cycle which is encompassed by FMAP.

Regarding regular forests (even-aged forest management), growing stock includes all age classes except the first class – field measurements are not performed for the first age class. Growing stock of maquia and scrub is also not measured.

Growing stock was used for the calculation of the increment in state forests managed by “Croatian Forests”.

c) Harvest

Harvest presents gross volume felled in state forests managed by “Croatian Forests”, other state and private forests. The latter includes volume felled for direct commercial purposes and also volume felled after wildfires and other natural disturbances (diseases). Fellings in private forests are based on officially recorded data which were used for emission calculation for the historical series. According to the legal provisions, every volume that appears on the market must be recorded/approved at the stage of its cutting which means that each tree is selected, marked and measured before cutting. However, it is assumed that additional fellings are present for private purposes which have not been recorded.

The projection of harvest is based on the Forest Management Area Plan for the period from 2006 – 2015 (FMAP 2006-2015) and the Croatian Energy Strategy (OG 130/09).

Historical and projected harvest is presented in Table 4.1.4 and Figure 4.1-4.

d) Increment

The methodological approach related to the historical increment is described in NIR 2011.

The increment in state forests managed by “Croatian Forests” is calculated based on the difference in growing stock in two points in time and annual fellings.

The increment in state forests managed by other legal bodies is based on the FMAP 2006-2015 data. In the emission/removal calculation, increment for 1996 and 2006 was directly taken from the FMAP while, for the years in between, interpolation was applied. Regarding 1990, considering the fact that more reliable data for this type of ownership are not available, it was assumed that the increment in 1990 is the same as the one in 1996. For the period after 2006 (2007-2009), the increment is determined based on the FMAP 2006-2015 data according to which the percentage of growing stock increment in other state forests is 2.4 %.

The increment in private forests is also based on the FMAP 2006-2015 data and the same approach as for other state forests was applied. The difference is that, for the period after 2006 (2007-2009), the increment is determined based on the FMAP data according to which the percentage of growing stock increment in private forests is 2.7 %.

Since the emission/removal calculation is based on the broadleaved/coniferous distribution, the related data were also taken from the FMAP 2006-2015. For state forests managed by “Croatian Forests”, growing stock and fellings of deciduous and coniferous trees, used for the increment calculation, are available. As for other state forests, most accurate data on this distribution is known for 2006 and the latter was assumed the same for the entire period concerned. This type of assumption was also applied for private forests, of course based on the 2006 data for private forests.

The increment projections are based on the FMAP 2006-2015 and projections include all forests, regardless of their ownership, and all forest stands which are part of the current emission/removal calculation. It is assumed that the relationship between the broadleaved and coniferous forests is the same as an average ratio in the period 2006-2009.

Historical and projected increment is presented in Table 4.1-3 and Figure 4.1-3.

e) Natural disturbances

Having in mind that the total volume felled (total gross fellings) includes the volume felled after it was affected by some disturbance, natural disturbances can be considered as included in the projections through harvest projections.

Biomass expansion factors (BEF 1 and BEF 2), root-to-shoot ratio, basic wood density and carbon fraction of dry matter are taken as default values from the IPCC Guidelines (*Good Practice Guidance 2003*). These values are used for the historical period and also in the emission/removal projections (Table 3.1-3).

Table 3.1-3: Default values for the emission/removal calculation

	<i>tonnes d.m.m⁻³</i>	<i>dimensionless</i>			<i>(tonnes d.m)⁻¹</i>
	D	BEF1	R	BEF2	CF
Broadleaved	0.588	1.2	0.24	1.4	0.5
Coniferous	0.4	1.15	0.23	1.3	

4. CONSTRUCTION OF THE FOREST MANAGEMENT REFERENCE LEVEL

4.1. RELEVANT ELEMENTS CONSIDERED IN REFERENCE LEVEL CONSTRUCTION

4.1.1. Area under forest management

Considering certain specifics of the forestry sector in Croatia, a short overview of the sector is provided aiming to present more clearly the national circumstances and what the Kyoto Protocol includes in this regard. According to the *Regulation on Forest Management* (OG 111/06, 141/08), forest land is divided on forest land with tree cover and forest land without tree cover (productive forest land without tree cover, non-productive forest land without tree cover, barren forest land). Forest land with tree cover, regardless of the ownership, includes several forest stands and they are as follows: high forests, plantations, cultures, coppice, maquia, scrub, garigue, shrub (Table 3.1-2).

Forest land in Croatia constitutes one forest management area which is established in order to ensure unique and sustainable management of the forest land on the territory of the Republic of Croatia. The area is managed based on the Forest Management Area Plans (FMAPs). Therefore, according to national criteria, in Croatia both forest land with and without tree cover is sustainably managed regardless of the ownership, purpose, forest stand, etc. The area of Forest Management in accordance to the KP is not identical to forest management area in the national frame since it refers only to one part of the forest land with tree cover which is in line with the Kyoto definition of forest (Table 3.1-2). Therefore, the area under forest management for the KP reporting refers to the area of high forests, cultures, plantations and coppice, excluding at this moment maquia and scrub due to unavailability of the complete dataset. Table 4.1-1 and Figure 4.1-1 show forest area (with and without maquia and scrub) for the period from 1990-2020.

Table 4.1-1: Historical and projected forest area

	kha						
	1990	1995	2000	2005	2010	2015	2020
Kyoto forest area without maquia and scrubs	1,793	1,748	1,792	1,859	1,880	1,882	1,884
Total Kyoto forest area	2,053	2,057	2,156	2,279	2,316	2,318	2,321

**In general, changes in forest area in Croatia are also a result of omissions within the monitoring system – there are areas already covered with trees which were not encompassed by forest management plans so far but which are additionally registered afterwards.”*

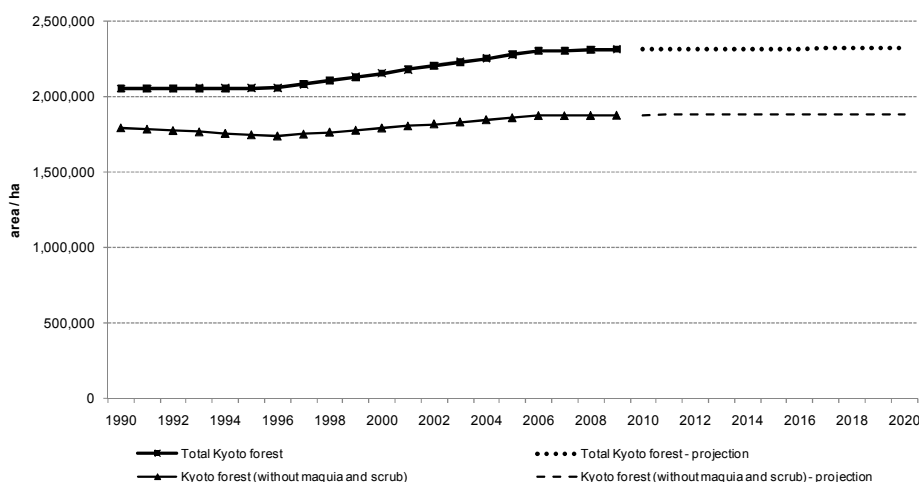


Figure 4.1-1: Historical and projected forest area

4.1.2. Emissions and removals from forest management and 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

Considering that the same definition of forest is used both in the UNFCCC and the KP reporting frame, the area on which the activity Forest Management is performed (Article 3.4 of the Protocol) corresponds to the UNFCCC land category *Forest land remaining forest land*. The reporting frame to the UNFCCC and the KP is also equivalent in regard to the Article 3.3; the area of afforestation corresponds to the area encompassed by the land category *Land converted to forest land* and deforestation area, within the UNFCCC frame, is presented as *Land converted to settlements*. All abovementioned is in line with the information provided in the *Addendum to NIR 2010* and *NIR 2011*.

The relationship between KP activities and the reported UNFCCC land categories is shown in the following table:

UNFCCC		KP	
Land use category	Subcategories	Article	Activities
Forest Land	<i>Forest land remaining Forest land</i>	3.4	Forest management
	<i>Land converted to Forest land</i>	3.3	Afforestation
Settlements	<i>Forest land converted to Settlements</i>		Deforestation

Historical emissions/removals from afforestation, deforestation and forest management are in line with the methodology/approach described in the *NIR 2011*. Emissions/removals are presented in Table 4.1-2.

Table 4.1-2: Historical emissions/removals from afforestation, deforestation and forest management

Year	Emission/removal / Gg CO ₂			
	Forest management	Afforestation	Deforestation	Total
1990	-7,059	-11	137	-6,934
1991	-6,913	-17	95	-6,834
1992	-6,836	-28	33	-6,832
1993	-6,878	-40	84	-6,835
1994	-6,908	-56	92	-6,872
1995	-6,826	-67	30	-6,863
1996	-6,425	-73	26	-6,472
1997	-6,631	-83	30	-6,684
1998	-6,803	-91	34	-6,860
1999	-6,974	-100	46	-7,029
2000	-7,172	-106	61	-7,218
2001	-7,348	-108	68	-7,388
2002	-7,506	-115	65	-7,557
2003	-7,683	-123	56	-7,750
2004	-7,926	-125	117	-7,935
2005	-8,053	-130	83	-8,100
2006	-8,154	-134	72	-8,215
2007	-8,423	-137	54	-8,506
2008	-8,594	-140	91	-8,643
2009	-8,642	-145	75	-8,712

4.1.3. Forest characteristics including age class structure, increments, rotation length, and other relevant information, including information on existing and projected forest management activities

As stated before, in Croatia there are even-aged (regular) forests, managed as a forest stand since all trees are approximately of the same age, and uneven-aged which are managed as single trees or group of trees since they are different heights and breast diameters.

Regular forests, which made about 83 % of forest land with tree cover (excluding certain forest stands⁵) in 2006, are distributed in 7 age classes. Each age class can encompass time period of 5, 10 or 20 years depending on the prescribed rotation. Growing stock for the first age class is not determined. In Figure 4.1-2, age structure of regular forests in 1996 and 2006, regardless of the ownership, is compared according to the data provided in the FMAP 2006-2015.

⁵ Forest stands maquia, scrub, garigue and shrub are not age-distributed but they are classified under the even-aged management system.

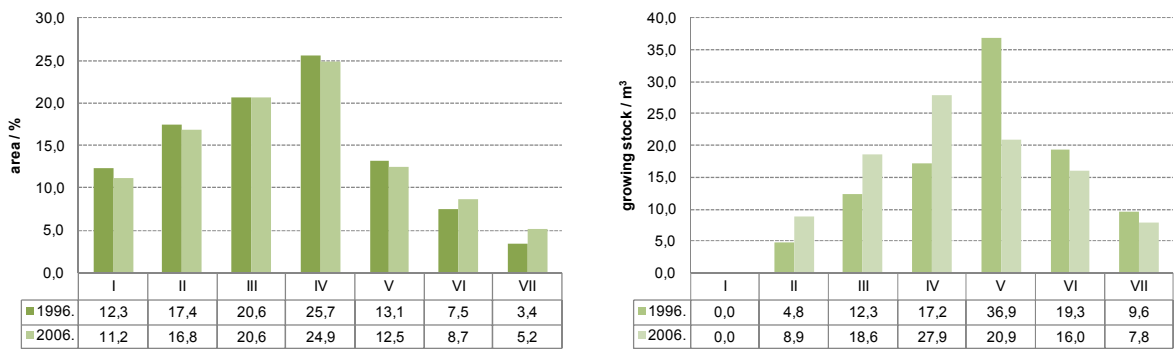


Figure 4.1-2: The comparison of age structure of regular forests in 1996 and 2006

The stand structure of uneven-aged forests consists of diameter classes, since uneven-aged forests have trees on the same area that are of different age.

Age structure of forests in Croatia has not significantly changed even before 1990 if it is taken into account that the majority of forests are a result of natural regeneration while the artificially raised stands make only a small proportion in the area of forest land with tree cover. According to the newest FMAP 2006-2015, in 2006 cultures and plantations made only about 3 % of forest land with tree cover in Croatia or about 4 % of the Kyoto forest area. Also, according to the *Forest Act* (OG 140/05, 82/06, 129/08, 80/10, 124/10), clear cutting is forbidden - it is strictly regulated and approved only in certain situations (for example for road construction).

Subsequent to all mentioned, in the projections it is assumed that the age structure of forests will not change significantly and that it will remain approximately on the level as it is now. Regarding the increment, significant changes in comparison to the past few years are also not expected (Table 4.1-3, Figure 4.1-3).

Table 4.1-3: Increment in the period from 1990-2020

	mil. m ³						
	1990	1995	2000	2005	2010	2015	2020
Increment	8.865	7.510	8.539	9.565	10.191	10.433	10.676

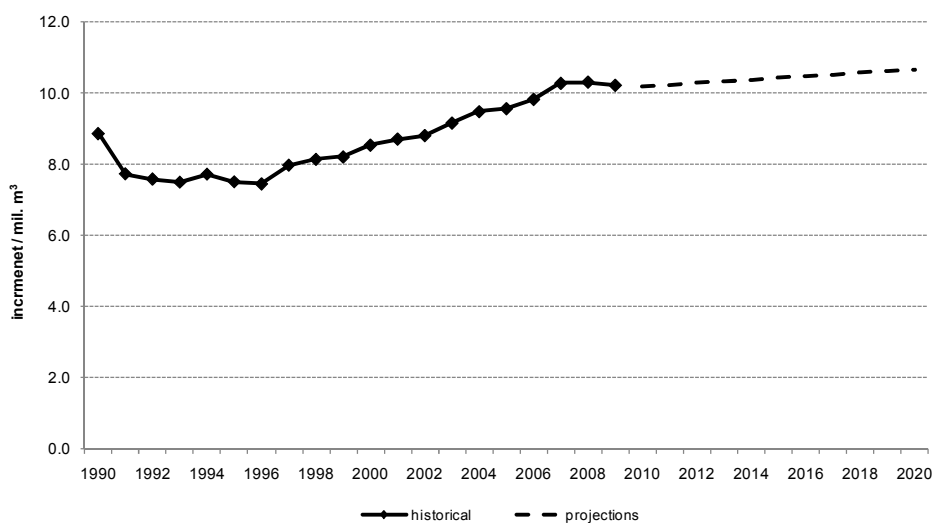


Figure 4.1-3: Historical and projected increment

The goals and the management within the forestry sector are determined by the *Forest Act* (OG 140/05, 82/06, 129/08, 80/10, 124/10). Forest management goal determines the rotation of the main specie in even-aged stands (regular forests). For certain tree species, the rotation length is different (e.g. for common oak it is 140 years, beech 100 year etc.). Rotations in uneven-aged forests refer to the time interval during which the same harvest type is performed in all parts of the forest in a certain organizational unit after which it returns to the starting point.

4.1.4. Historical and assumed harvesting rates

Historical harvest data are consistent with the data submitted in NIR 2011. Historical and projected harvest data are presented in Table 4.1-4 and Figure 4.1-4.

Table 4.1-4: Historical and projected fellings

	mil. m ³ overbark						
	1990	1995	2000	2005	2010	2015	2020
Harvest	4.674	3.395	4.281	4.773	5.150	6.600	8.000

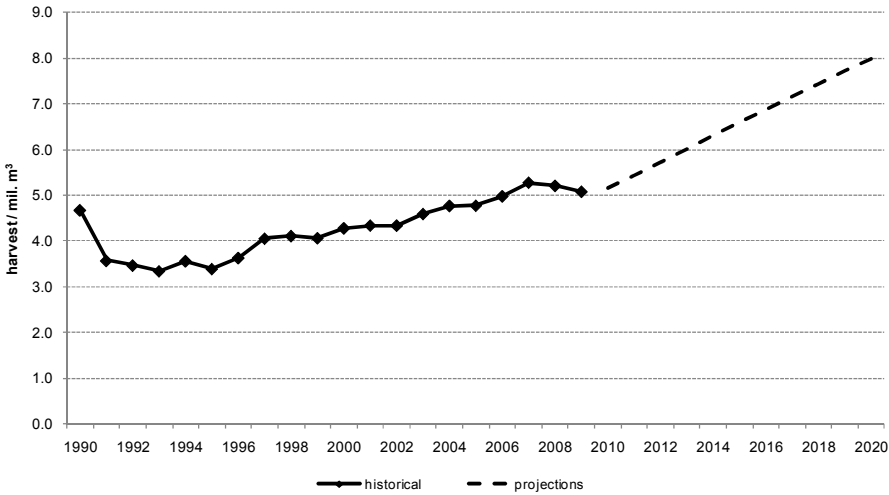


Figure 4.1-4: Historical and projected harvest

From the historical harvest trend, a significant decrease of volume felled in the war period from 1991-1995 in relation to 1990 is evident. In this period, forest management was performed in very specific and unusual circumstances. After the war, forestry sector began to revitalize. Projection of harvest is based on the Forest Management Area Plan for the period 2006-2015 and relevant documents related to the energy sector policy (Energy Strategy, see Chapter 5).

4.1.5. Harvested wood products

Historically and in the projections, regarding the harvested wood products, instantaneous oxidation is assumed. In this way, consistency with the previously reported data/information is ensured.

4.1.6. Disturbances in the context of force majeure

Natural disturbances addressed so far in NIRs are forest fires. The volume burnt was already included in fellings; thus, CO₂ emissions were allocated within fellings. Briefly, CO₂ emissions from natural disturbances are not separately quantified.

The quantitative criteria for *force majeure* is not addressed in Croatia's forest management practice, and thus the latter is not included in the projection.

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

Croatia does not see the need to separate indirect effect of elevated carbon dioxide concentrations above the pre-industrial level and indirect nitrogen deposition when using the reference level approach as these effects cancel out when subtracting the reference level from net emissions/removals occurred during the commitment period. As for the dynamic effects of the age structure, it is assumed that the structure will remain the same as it is now.

Based on all aforementioned in this document, projected removal values for the period from 2010 to 2020 are presented in Table 4.1-5.

Table 4.1-5: Removal projections

Year	Removal/ Gg CO ₂
2010	-8464
2011	-8125
2012	-7786
2013	-7447
2014	-7109
2015	-6770
2016	-6446
2017	-6121
2018	-5797
2019	-5473
2020	-5149

As the reference value, the removal in 2020 is proposed which amounts 5,149 Gg CO₂.

4.2. OTHER SIGNIFICANT ELEMENTS

No other elements apart from those in previous subchapter are considered.

5. POLICIES

5.1. DESCRIPTION OF THE DOMESTIC POLICIES CONSIDERED IN THE CONSTRUCTION OF THE FOREST MANAGEMENT REFERENCE LEVEL

Planning activities in the forestry sector in Croatia is regulated by the *Forest Act* (OG 140/05, 82/06, 129/08, 80/10, 124/10). Forest management plans determine conditions for harmonious usage of forest and forest land and procedures in that area, necessary scope regarding cultivation and forest protection, possible utilization degree and conditions for wildlife management. Forest management plans are as follows:

- Forest Management Area Plan for the Republic of Croatia (FMAP)
- Forest Management Plan for management units
- Programmes for management of management units on karst
- Programmes for management of private forests
- Programmes for forest renewal and protection in specially endangered area

- Programmes for management of forest with special purpose
- Annual forest management plans
- Annual operative plans

Basically, all forests are managed according to FMAPs which determine the ecological, economic and social background for forest improvement in terms of biology and for the increase of forest productivity. FMAPs are approved for a 10-year period. So far, there have been three FMAPs:

- FMAP encompassing the period from 1986-1995
- FMAP encompassing the period from 1996-2005
- FMAP encompassing the period from 2006-2015

All forest management plans, their renewal and revision is approved by the Ministry of Regional Development, Forestry and Water Management based on the proposal of "Croatian Forests Ltd."

Projection of forest area and increment for 'business as usual' scenario is based on FMAP 2006-2015, that has been adopted in the year 2006. The harvest is projected based on the FMAP and goals set by the Republic of Croatia in the Energy Strategy adopted in October 2009 (OG 130/09).

Subsequent to all mentioned the demand for biomass will increase and in the projection it is estimated that total harvest will reach 8 mil. m³ in the year 2020.

5.2. RELEVANT CONFIRMATION

As stated in the previous subchapter, two main documents used are the FMAP 2006-2015 adopted in 2006 and the Energy Strategy adopted in October 2009. The binding legal frame is summarized in Table 5.2-1 with dates showing when these legal provisions were adopted/entered into force and therefore confirming that, within the process of reference level construction, assumptions about changes to domestic policies adopted and implemented after December 2009 or new domestic policies have not been included.

Table 5.2-1: Legal frame

Provision	Official Gazette	Adopted/Entered into force - date
Forest Act⁶	no. 140/05, no. 82/06, no. 129/08	December 2005 July 2006 November 2008
Regulation on Forest Management	no. 111/06, no. 141/08	October 2006 December 2008
FMAP 2006-2015		2006
Energy Strategy	no. 130/09	October 2009

⁶ Forest Act has been changed/amended two times after 2009 (OG 80/10, 124/10), but these changes and amendments have not affected the determination of the reference value.