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Report of the technical assessment of the forest management reference level submission of Italy submitted in 2011

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Contents

I. Introduction and summary

A. Overview

1. This report covers the technical assessment (TA) of the submission of Italy on its forest management reference level (FMRL), submitted on 19 April 2011 in accordance with decision 2/CMP.6. The TA took place (as a centralized activity) from 30 May to 4 June 2011 in Bonn, Germany, and was coordinated by the UNFCCC secretariat. The TA was conducted by the following team of nominated land use, land-use change and forestry experts from the UNFCCC roster of experts: Mr. Aquiles Neuenschwander (Chile), Ms. Oksana Butrim (Ukraine), Mr. Mamadou Khouma (Senegal), Mr. Kyeong-hak Lee (Republic of Korea), Mr. Doru Irimie (Romania) and Ms. Anke Benndorf (Germany). Mr. Aquiles Neuenschwander and Ms. Oksana Butrim were the lead reviewers. The TA was coordinated by Ms. María José Sanz-Sánchez (UNFCCC secretariat).

2. In accordance with the "Guidelines for review of submissions of information on forest management reference levels" (decision 2/CMP.6, appendix II, part II), a draft version of this report was communicated to the Government of Italy, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Proposed reference level

3. In its original submission, Italy proposed an FMRL of –16.239 million tonnes of carbon dioxide equivalent (Mt CO_2 eq) per year applying a first-order decay function for harvested wood products (HWP) and –14.331 Mt CO_2 eq per year assuming instantaneous oxidation of HWP. Owing to a technical correction in the calculation matrix of the HWP model used for setting the reference level, Italy forwarded to the secretariat, on 11 May 2011, a communication[1] proposing an FMRL of –15.315 Mt CO_2 eq per year applying the first-order decay function for HWP. Decay of HWP accounts for removals of –0.984 Mt CO_2 eq per year (in comparison with –1.908 Mt CO_2 eq as stated in the original submission).

4. In response to a question raised by the ERT during the TA, a number of changes were applied to the models used by the Joint Research Centre (JRC) of the European Commission to develop projections in collaboration with two European Union (EU) modeling groups. These changes include updated age structure data; inclusion of the dead organic matter pool in the FMRL; updated data on future harvest demand; and a correction of the forest management area used as input in the G4M model (Global Forestry Model). Following the rerun of the models, Italy proposed a revised FMRL value of –21.182 Mt CO_2 eq per year assuming instantaneous oxidation of HWP, and –22.166 Mt CO_2 eq applying a first-order decay function for HWP. The value of HWP did not change in comparison with the previously submitted data (i.e. removals of –0.984 Mt CO_2 eq per year).

[1] <http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_italy_corr.pdf >.

II. General description of the reference level

A. Overview

5. Italy is one of the member States of the EU for which the JRC of the European Commission developed projections in collaboration with two EU modelling groups. The models, G4M[2] from the International Institute for Applied Systems Analysis (IIASA), and EFISCEN (European Forest Information Scenario Model)[3] from the European Forest Institute (EFI), project annual estimates of emissions and removals for forest management up to 2020 for the above- and below-ground biomass carbon pools. Further details about the approach, methods and models used can be found in paragraphs 16–18 below.

B. How each element of footnote 1 to paragraph 4 of decision 2/CMP.6 was taken into account in the construction of the reference level

1. Historical data from greenhouse gas inventory submissions

6. The historical data used for the calculation of the FMRL come from Italy's 2011 national inventory report submission (2011 NIR). Emissions and removals of greenhouse gases (GHGs) from forest management are provided from 1990 to 2008 for living biomass (above- and below-ground), dead organic matter and GHG emission sources (i.e. forest wildfires). The FMRL includes above- and below-ground biomass and dead organic matter, which is consistent with pools reported in the GHG inventory.

2. Age-class structure

7. The present age-class structure is based on a preliminary assessment of the information publicly available, such as yield tables and the latest national forest inventory (2005 NFI) (figure 2, page 10, of the FMRL submission shows the evolution of forest age-class structure and additional information can be found in the NFI[4]). For the present decade, 2011–2020, Italy's forests will be predominately in the 21–60 years age classes.

8. During the TA, Italy submitted an updated age-class structure based on the latest data available from the 2005 NFI, which shows that most even-aged forests in Italy are within the 21–80 year age classes, with the majority being between 21–40 years. The updated age-class structure was used in the rerun of the models used by the JRC to develop projections. The updated age-class structure is reported in the annex to this document.

3. The need to exclude removals from accounting in accordance with decision 16/CMP.1, paragraph 1

9. Italy assumes that the indirect effects of elevated CO_2 concentrations above pre-industrial levels and indirect nitrogen deposition cancel each other out when subtracting the reference level from net emissions/removals during the commitment period.

[2] The G4M model relies on spatial data. These data may or may not have been provided by countries. Other forest and forest management parameters (e.g. age-class structure, increment and historical harvest) were taken from NFIs or other country statistics.

[3] EFISCEN uses as data input the forest area data from national forest inventories scaled to match the forest area reported in the national inventory report (the forest land remaining forest land area, from which the deforested area is deducted, or the forest management area if elected under the Kyoto Protocol) and provides projections on basic forest inventory data (stem wood volume, increment, age-class structure, as well as carbon in forest biomass and soil.

[4] <http://www.sian.it/inventarioforestale/jsp/documentazione.jsp>.

4. Other elements

Forest management activities already undertaken

10. In Italy's FMRL, past forest management activities are indirectly taken into account through the use of the latest available forest time-series data (from the NFI or other country statistics) that reflect forestry practices. Projections are based on macroeconomic drivers and policies and legislative provisions adopted by April 2009. These policies are those included in the baseline scenario of the EU model PRIMES, which is the starting point of the projections for the FMRL. Policies adopted after 2009 are factored out.

Forest management activities under a 'business as usual' scenario

11. During the TA, Italy provided a brief overview of the Italian forests, indicating that 41 per cent (3,663,143 ha) of forests in Italy are coppice forests, and around 3 million ha (36 per cent of total forest area) are high forests, while the remainder is represented by special cultural types (e.g. chestnuts) and unclassified forests. The Party indicated that although coppice products are used mainly for bioenergy, poles can also be produced. As indicated by Italy in a written response to questions from the expert review team (ERT), the main management characteristic on which the EFISCEN model bases its projections is rotation length. The ERT recommends including this information in the FMRL submission.

Continuity with the treatment of forest management in the first commitment period

12. Italy has elected forest management under Article 3, paragraph 4, of the Kyoto Protocol for the first commitment period and therefore forest management is expected to continue to be an elected activity in the second commitment period.

C. Pools and gases

1. Pools and gases included in the reference level

13. Above- and below-ground biomass, dead organic matter and HWP are included in the FMRL. Non-CO_2 GHGs from forest wildfires are also included in the submission.

2. Consistency with inclusion of pools in the estimates

14. In reporting under the Convention and the Kyoto Protocol, dead organic matter and soil organic carbon are included, while, in the initial submission, they were excluded from the FMRL. In response to an inquiry by the ERT during the TA about the reasons for their exclusion from the submission, Italy stated that the area of organic soils is negligible and that there is a very high uncertainty on the emissions/removals related to these pools. In addition, Italy cited a publication (Chiti et al., 2010) documenting a study using the CENTURY (4.5) model, showing that positive variations in soil organic carbon are observed at all sites tested. The study concludes that the soils are a biospheric sink of carbon and will continue to store carbon during the Kyoto Protocol commitment periods under the two scenarios discussed in the study ("world market-fossil fuel intensive" and "local sustainability"). Italy later included dead organic matter in its FMRL, as requested by the ERT. Historical emissions and removals from forest management, including above- and below-ground biomass, and dead organic matter are reported in the annex to this document.

15. The ERT notes that when reporting forest management for the first commitment period, pools are to be excluded only when it can be demonstrated, in accordance with the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, that these are not a source. The inclusion of pools in

Italy's FMRL will be consistent with the inclusion of pools in the calculation of emissions and removals during the second commitment period.

D. Approaches, methods and models used

1. Description

16. As described in paragraph 5 above, Italy is one of the member States of the EU for which projections were developed by the JRC of the European Commission in collaboration with two EU modelling groups (IIASA and EFI). To estimate the FMRL, the emissions and removals estimated by the models for the time series 2000 to 2020 were calibrated/adjusted using historical data from the Party for the period 2000–2008.[5] In this post-calibration, a constant offset is added to models' results for 2000–2020 to match the average historical data provided by each country for the period 2000–2008 in order to ensure consistency with national historical data in terms of the absolute level of emissions and removals and coverage of pools and gases.

17. Future harvest demand under a 'business as usual' scenario was derived from macroeconomic drivers (e.g. gross domestic product, population) and policies enacted in Italy. This information is used as data input to the GLOBIOM (Global Biomass Optimization Model) model, which projects demand for timber. Italy's projected harvesting rate (for both timber and fuel wood) is 16,879,000 m^3 by the year 2020. The underlying methodological approach used by all these models could provide useful future trends for Italy. However, the quality of timber demand projections will be dependent on how well macroeconomic variables can predict timber demand for Italy.

18. Only biomass pools and emissions from biomass burning have been projected assuming a constant net change, for the period 2009–2020, equivalent to the historical average change reported for the period 2000–2008. Italy's approach (in line with the general approach of the EU) is to await a decision by the Conference of Parties on provisions on "disturbances"/"force majeure" before making any adjustments to historic trends. During the TA, Italy indicated that once accounting rules have been agreed, a technical correction, where necessary, will be made to ensure consistency between the FMRL and accounting rules during the commitment period.

2. Transparency and consistency

19. The description of methods used in the estimation of the FMRL is transparently documented in the FMRL submission. Clarification, when requested, was provided following consultation with Italy during the TA. Although the ERT considers that the submission with the related documentation (2011 NIR) fulfilled the required assessment criteria of the TA as outlined in decision 2/CMP.6, it noted that in table 5 of the FMRL submission, biomass removals are the same as that reported under the Kyoto Protocol, while emissions from biomass burning are derived from data reported under the Convention. Italy stated that the data for non-CO_2 GHG emissions from forest fires, as reported in the latest national GHG inventory submission (2011), were used in calculating it FMRL, due to the fact that at the time of submission, for non-CO_2 GHG emissions, only the time series from 1990 was available. In addition, the Party added that the difference between the values for 2008 reported under the Convention for 'Forest land remaining Forest land' with those reported under the Kyoto Protocol (common reporting format

[5] 2008 forest management data are taken as provided by the Party in its 2010 greenhouse gas inventory submission. From 2000 to 2007, forest management estimates were provided in communication from the Party in 19 April 2011.

tables) is due to the differences in area of forest management and area reported as forest land remaining forest land.

20. The methodological approach is internally consistent. The main forest parameters and characteristics used by the models and the GHG inventory are provided in table 8 of the FMRL submission. The models and the GHG inventory do not always consistently use the same parameters, which may be reflected as differences in levels of biomass in model predictions and data reported in the GHG inventory. This, however, should not have an impact on the trends.

E. Description of the construction of the reference level

1. Area under forest management

21. The forest management area reported in the FMRL submission and under the Kyoto Protocol is equivalent to the area reported in GHG inventories as forest land remaining forest land. The same definition of 'forest' is applied to forest land remaining forest land, as well as to activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol. All forests that fulfil this definition are considered to be managed.

22. The time series for the area reported under forest management was constructed for the period prior to 2008. A description of the back-casting is given in the 2011 NIR (chapter 7.2.4, p. 184). A model was used and applied on a regional scale. The input data was derived from the first NFI (1985) and the 2005 NFI. The annual increment per hectare was calculated from the initial growing stock volume of 1985, using the derivative Richards function to calculate the increment for each successive year for each forest typology (according to national yield tables), and including losses due to harvest, mortality and fire.

23. During the TA, Italy alerted the ERT to an error in the area used as input by the G4M model for the year 2000. The correct area was used in the rerun of the G4M model, and is reported in the annex to this document.

2. Relationship of the forest land remaining forest land category with the forest management activity reported previously under the Convention and the Kyoto Protocol

24. Italy uses the same forest definition under the Convention and under the Kyoto Protocol, and considers all forests to be managed. Thus, the area reported under the Convention as forest land remaining forest land corresponds to the area reported under the Kyoto Protocol as forest management (Article 3, para. 4) and afforestation and reforestation (Article 3, para. 3).

3. Forest characteristics

25. Italy has a mixture of mountain and Mediterranean forests. The Party provided information on the age-class structure, which was elaborated by JRC/IIASA/EFI on the basis of the available information at that moment (Italy's 2005 NFI, yield tables, 1985 NFI). During the TA, Italy provided an updated age-class structure from the latest results of the 2005 NFI, showing that most of the forests are within the 21–80 year age classes, with a majority being between 21–40 years.

26. The increment estimated by G4M is 4.7 m^3 ha^{-1} per year for the year 2000 and is predicted to decrease to 4.0 m^3 ha^{-1} per year by 2020. EFISCEN estimated an increment of 3.6 in 2010, which decreases to 2.7 in 2020. Following a rerun of the models, the increment estimated by G4M is slightly different from the previous value, resulting in 4.3 m^3 ha^{-1} per year for the year 2000 and is predicted to decrease to 4.0 m^3 ha^{-1} per year by 2020.

EFISCEN estimated a higher increment of 4.9 m^3 ha^{-1} in 2010, decreasing to 4.6 m^3 ha^{-1} in 2020.

27. Data on rotation length as well as information on forest management activities under 'business as usual' were provided during the TA (see the annex), upon request by the ERT.

4. Historical and assumed harvesting rates

28. Data from 1998 to 2007 are from national statistics or other country data. Under the 'business as usual' scenario (table 9 of the submission) Italy's harvesting rates are projected to increase by 28 per cent from 2005 to 2020, based on the estimations by the PRIMES and GLOBIOM models. This results in an average removal of –21.182 Mt CO_2 eq assuming instantaneous oxidation of HWP for the years 2013–2020. No other scenario is provided.

29. During the TA, JRC/IIASA/EFI clearly identified that, in previous runs, models erroneously used fellings (removals + residues) as model inputs, while models needed harvest expressed as round wood overbark (i.e. removals with no residues) as input data. Therefore, models have reduced the historical harvesting rate previously used by 15 per cent, on the basis of IPCC default factors. This technical error has been corrected in the model reruns. This correction has affected the absolute level of harvest used by the models, but did not affect the assumptions on future harvesting rates used by models, which remain the same as in the previous run. The corrected historical harvesting rates as well as the harvesting projections are provided in the annex to this document.

5. Harvested wood products

30. The estimated annual accumulation of –0.984 Mt CO_2 eq per year in HWP pools included in Italy's FMRL is estimated using the approach proposed in document FCCC/KP/AWG/2010/18/Add.1 (chapter II, annex I, paragraph 27) with annual production data, specific half-lives for product types, application of the first-order decay function using equation 12.1 from the *2006 IPCC Guidelines for National Greenhouse Gas Inventories* with default half-lives of two years for paper, 25 years for wood panels and 35 years for sawn wood and instantaneous oxidation assumed for wood in solid waste disposal sites. Historical data since 1900 are taken into account. The estimates exclude exports.

6. Disturbances in the context of force majeure

31. Although Italy did not consider force majeure in the construction of the FMRL, the post-calibration procedure applied automatically incorporates the average rate of past disturbances (for the period 2000–2008) into the projections. The emissions from forest fires for the period 1990–2008 (5.260 Mt CO_2 eq on average) represent the major natural disturbance type and represent, on average, 1 per cent of the total 1990 GHG emissions, while annual records are always lower than 2.9 per cent of the 1990 total GHG emissions of the country.

7. Factoring out

32. Use of a projected reference level, which includes age-class structure, is considered to factor out dynamic age-class effects. With the present state of scientific knowledge, the effects of elevated CO_2 concentrations and indirect nitrogen deposition occur in the FMRL and in the information for the period in which estimates are made (i.e. the commitment period), and therefore they can be assumed to be factored out.

F. Policies included

1. Description of policies

33. Policies and measures that were implemented before mid-2009 are considered in Italy's FMRL, except for the potential impacts of the EU climate and energy package. Italy provided additional information related to forest policies during the TA, indicating that the PRIMES model used a set of policies and measures at both the EU and national levels, covering the range of regulatory measures, and financial support as well as national measures. Continuation of current forest management with regard to timber is assumed. Wood energy demand is derived from an analysis of country-specific policies implemented by April 2009. The increase of harvesting rates for wood for energy will result in more intensive forest management, moving toward the lower rotation lengths of the ranges provided.

2. How policies are taken into account in the construction of the reference level

34. All energy policies implemented at the EU and national levels are taken by the PRIMES model as input values for estimating wood fuel demand driven by these policies, combined with the expected global market effects (for the GLOBIOM model). The future demand for wood for material use (i.e. timber not bioenergy) is projected by GLOBIOM as compared to a base year (2000) based on GDP and population growth, which drive demand for timber through conventional demand functions applying demand price elasticities taken from Rametsteiner *et al.* (2007)[6] combined with the expected global market effects (by GLOBIOM). Outputs of PRIMES and GLOBIOM are further used as input for next step models (i.e. C-HWP-Model). Although forest management policies are not used by models as input parameters, the impact of these policies is integrated in the projection process through increment and harvesting rates, and changes in age-class structure. Furthermore, Italy confirmed that no domestic policies other than those included by PRIMES have been taken into account when estimating the FMRL.

III. Conclusions and recommendations

35. The FMRL of Italy is presented in a transparent manner. The approach used in the construction of the FMRL is consistent with previously reviewed and recent NIR submissions.

36. It should be noted that a technical adjustment was performed, as the Party provided information on the following: the rerun of the G4M model with the corrected forest management area; the update of both the models with newly available data on age-class structure and updated harvesting rates data. The dead organic matter pool has also been included in the FMRL assessment, as requested by the ERT.

37. Italy has calculated an FMRL in a well-documented and transparent manner. In response to the requests of the ERT during the TA, Italy submitted a revised FMRL, resulting from updated data on harvest demand, age-class structure and the inclusion of the dead organic matter pool in the FMRL. In addition, Italy has corrected errors detected regarding the area data used by G4M, before the model rerun. The ERT recommends that Italy makes a technical adjustment to the FMRL when final agreement on the HWP estimation is reached.

[6] Rametsteiner E, Nilsson S, Böttcher H, Havlik P, Kraxner F, Leduc S, Obersteiner M, Rydzak F, Schneider U, Schwab D and Willmore L. 2007. Study of the Effects of Globalization on the Economic Viability of EU Forestry. Final Report of the AGRI Tender Project: AGRI-G4-2006-06, EC Contract Number 30-CE-0097579/00-89.

Annex

Documents and information used during the technical assessment

A. Reference documents

Submission of information on forest management reference levels by Italy, 19 April 2011. Available at <http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_italy_2011.pdf>.

Communication of 11 May 2011 regarding harvested wood products value by Italy. Available at <http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_italy_corr.pdf>.

Submission of information on forest management reference levels by Hungary and the European Commission on behalf of the European Union, 13 April 2011. Available at <http://unfccc.int/5896.php>.

National greenhouse gas inventory of Italy submitted in 2010. Available at <http://unfccc.int/5270.php>.

National greenhouse gas inventory of Italy submitted in 2011. Available at <http://unfccc.int/5888.php>.

National forest inventory of Italy, 2005. Available at <http://www.sian.it/inventarioforestale/jsp/documentazione.jsp>.

Chiti T, Papale D, Smith P, Dalmonech D, Matteucci G, Yeluripati J, Rodeghiero M and Valentini R. 2010. Predicting changes in soil organic carbon in Mediterranean and alpine forests during the Kyoto Protocol commitment periods using the CENTURY model. *Soil Use and Management*. 26(4): pp.475–484.

B. Additional information provided by the Party[1]

Table on rotation length, as used by the models, provided by Italy on 9 June 2011.

Forest types	Management type (H=hight forest; C= Coppice)	Rotation lengths
Spruce, Fir, Larch	H	120-140
Other Conifers	H	60-80
Pine	H	100-125
Oaks	H	100-125
Oaks	C	20-30

[1] Reproduced as received from the Party.

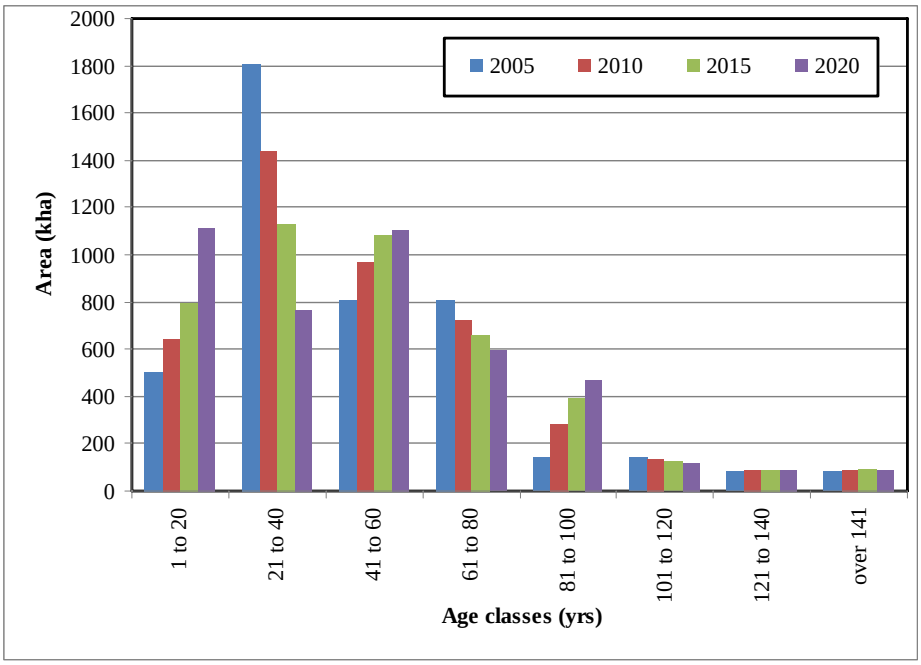
Beech	H	120-140
Beech	C	20-30
Chestnut	C	15-20
Chestnut	H	80-100
Hornbeam	C	20-30
Hornbeam	H	60-80
Other Broadleaves	C	20-30
Other Broadleaves	H	60-80

Corrected data on area under forest management used by the G4M model

	AREA of FM in 2008						**AREA of FM in 2020 used by models**	
	from 2011 GHG inventories		**used by models**		**difference % models vs. GHG inventories**			
	area (kha)	**source**	**G4M**	**EFISCEN**	**G4M**	**EFISCEN**	**G4M (2)**	**EFISCEN (3)**
Italy	7451	(1)	7451	7451	0.0	0.0	7440	7443

(1): area of FM from KP LULUCF reporting (2011). For years between 2000 and 2007, the annual area of deforestation under KP reporting was considered.
(2): from 2008 onward FM area was estimated considering the deforestation estimated by G4M (as explained in the Annex of EU submission).
(3): from 2008 onward FM area was estimated assuming the continuation of the deforestation trends (average 1990-2008) reported under the KP

Updated age class structure on the basis of the latest NFI (2005)



Updated harvest demand applied by models in the new run (1000 m^3 yr^{-1}, overbark)

2000	2005	2010	2015	2020	ratio (av. 2013-2020)/2005	Ratio (av. 2013-2020)/2000	Source of historical data (till 2007)
12720	12322	13841	15360	16879	1,28	1,24	country data corrected June 2011

Updated time series including the DOM pools.

Country's historical emissions and removals from FM (living biomass, DOM and GHGs, Gg CO2eq)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Biomass (1)	-16002	-28275	-26601	-16025	-26223	-29489	-28353	-20822	-18610	-24278	-22161
Non-biomass pools and GHG sources (2)	161	-4392	-4202	-2770	-4255	-4619	-4424	-3276	-2965	-3910	-3556
TOTAL	-15841	-32666	-30803	-18794	-30478	-34107	-32777	-24099	-21575	-28188	-25717

	2001	2002	2003	2004	2005	2006	2007	2008	av. 2000-2008
Biomass (1)	-28594	-31164	-25470	-28860	-30421	-29450	-14402	-25637	-26240
Non-biomass pools and GHG sources (2)	-4478	-4820	-4014	-4492	-4687	-4551	-2320	-2586	-3945
TOTAL	-33072	-35985	-29484	-33352	-35108	-34002	-16723	-28223	-30185

(1) Above and belowground (2) DOM and GHG sources

New FMRL resulting from the re-run of the models

Emissions and removals from FM as estimated by models (above-ground biomass, Gg CO2eq), calibration of models' results, and sensitivity analysis

			av. 2000-2008	2000	2005	2010	2015	2020	av. 2013-2020
Step 1: models' results (only biomass)		EFISCEN (1)	-35196	-34970	-36101	-32139	-25970	-20863	-24517
		G4M	-19401	-20805	-19416	-15826	-12879	-10142	-12073
		Average of models	-27298	-27888	-27759	-23982	-19424	-15502	-18295
Step 2: ex-post processing	Offset (2)	Biomass	1058						
		non-biomass pools and GHG sources	-3945						
		total offset	**-2887**						
	Calibrated average of models (3)		-30185	-30774	-30646	-26869	-22311	-18389	**-21182**
Sensitivity analysis (4)		*+10% harvest*				*-22620*	*-18303*	*-14135*	*-17072*
		-10% harvest				*-28874*	*-24351*	*-20313*	*-23212*

(1) Efiscen does not estimate data for all countries for 2000 and 2005. When data were missing, backward extrapolation was applied as follow: sink in 2005 = sink in 2010 x ratio of harvest 2010/2005; this approach assumes that in the short term harvest is the main factor determining the sink. Estimates were extrapolated for the following countries: Bulgaria, Czech Republic, Estonia, Hungary, Italy, Latvia, Lithuania, Netherlands.

(2) The "offset" is distinguished between:

- Biomass: calculated as difference between [average of country's emissions and removals from biomass for the period 2000-2008] and [average of models' estimated emissions and removals from biomass for the period 2000-2008]
- Non-biomass pools and GHG sources: calculated as the sum of non-biomass pools and GHG sources as reported by the country for the period 2000-2008.

(3) The calibrated average of models, which is used for the setting of reference level, is obtained by adding the offset to the models' average.

(4) Preliminary simulation of the impact of +/-10% harvest as compared as BAU harvest on the emissions and removals from FM. Data are calibrated averages of models' results.