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Report of the technical assessment of the forest management reference level submission of Romania 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 Romania on its forest management reference level (FMRL), submitted on 10 March 2011 in accordance with decision 2/CMP.6. The TA took place from 30 May to 3 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 (LULUCF) experts from the UNFCCC roster of experts: Ms. Thelma Krug (Brazil), Mr. Atsushi Sato (Japan), Mr. Kumeh Assaf (Liberia), Ms. Marina Shvangiradze (Georgia), Ms. Rosa Rivas Palma (New Zealand) and Mr. Karsten Dunger (Germany). Ms. Thelma Krug and Mr. Atsushi Sato 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 Romania, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Proposed reference level

3. Romania originally proposed an FMRL of –28.466 million tonnes of carbon dioxide equivalent (Mt CO_2 eq) per year applying a first-order decay function for harvested wood products (HWP) and –28.044 Mt CO_2 eq per year assuming instantaneous oxidation of HWP. HWP accounts for annual net removals of –0.422 Mt CO_2 eq per year.

4. The annual net emissions using a first-order decay function for HWP were recalculated by the Party during the TA, owing to identified errors in the model used. The new estimate for HWP was –0.349 Mt CO_2 eq per year, resulting in a proposed FMRL of –28.393 Mt CO_2 eq per year when applying the first-order decay function for HWP.

5. The expert review team (ERT) was informed by Romania that on 27 August 2010, the Compliance Committee found the Party to be in non-compliance with the Kyoto Protocol, inter alia, due to incomplete and inaccurate forest management estimates,[1] as indicated in the 2011 individual review of the annual submission.[2] Romania indicated that on 11 August 2011, it submitted a new estimation methodology and the provisional results of this methodology to the UNFCCC secretariat[3] which were reassessed in the context of the in-country review that took place from 26 to 30 September 2011.

[1] Enforcement Branch of the Compliance Committee, Final Decision CC-2011-1-8/Romania/EB, 27 August 2011. Available at <http://unfccc.int/files/kyoto_protocol/compliance/questions_of_implementation/application/pdf/cc-2011-1-8_romania_eb_final_decision.pdf>.

[2] Report of the Individual Review of the Annual Submission of Romania submitted in 2010, Compliance Committee, CC/ERT/ARR/2011/21, 11 May 2011. Available at <http://unfccc.int/files/kyoto_protocol/compliance/plenary/application/pdf/cc-ert-arr-2011-21_arr_2010_of_romania.pdf>.

[3] Romania's national inventory report (NIR), the common reporting format and its GHG inventory 2011 were published on the UNFCCC website, the former two on 15 September 2011 and the latter on 22 September 2011.

6. Romania provided a revised estimation of the FMRL during the TA based on the new estimation methodology referred to in paragraph 5 above, details are presented in the annex to this report. The revised FMRL, applying instantaneous oxidation of HWP, is –15.444 Mt CO_2 eq per year.

II. General description of the reference level

A. Overview

7. Romania is one of the European Union (EU) member States for which the Joint Research Centre (JRC) of the European Commission developed projections in collaboration with two EU modelling groups. The net annual removals from HWP were estimated using the C-HWP model which is the commonly used approach for several EU member States.

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

8. Romania did not include all the information required for this section in its original submission. However, in response to questions from the ERT, additional information was provided by the Party during the review week, which is reflected in this report.

1. Historical data from greenhouse gas inventory submissions

9. The National Forest Inventory and other forest statistics provided the historical activity data for the greenhouse gas inventory. In the original submission, forest land remaining forest land reported under the Convention for the periods 2000–2007 was used as proxy for forest management data. For 2008, the forest management data reported under the Kyoto Protocol were used. In the new submission based on the new greenhouse gas (GHG) inventory, the historical data for forest land remaining forest land reported under the Convention for the periods 2000–2008 was used as proxy for historical forest management.

10. Regarding the original submission, the ERT noted that the net removals from forest land remaining forest land have decreased during the period 2000–2007 by approximately 5 per cent. The area of forest land remaining forest land for the entire period 1990–2007 remained relatively stable, with the minimum and maximum values being 6,456.3 thousand hectares (kha) (2000) and 6,747.3 kha (2004). In 2008, the forest management area and net removals from forest management reported under the Kyoto Protocol corresponded to 99.5 and 99.4 per cent, respectively, of the forest land remaining forest land area and the removals from forest land remaining forest land reported under the Convention. The information provided in Romania's original submission is consistent with that in the 2010 and 2011 GHG inventory.

11. The ERT notes that the net removals from forest land remaining forest land in the new GHG inventory for 2011, which are approximately 63 to 70 per cent of what was reported in the old version of the GHG inventory due to resolving the overestimation of removals, are reported as almost stable for the period 1990–2008. The area of forest land remaining forest land in the new GHG inventory for 2011 is reported as smaller, reflecting a decreasing trend of around 6,200 kha with the minimum and maximum values being 6,236 kha (1990) and 6,183 kha (2008) respectively.

2. Age-class structure

12. Romania included in its submission the estimated age-class distribution of its forests as modelled by EFISCEN (European Forest Information Scenario Model, from the European Forest Institute).[4] Areas are defined under each of the six age classes for 2005, 2010, 2015 and 2020, indicating a systematic reduction of forests in the youngest age class (1–20 years) from 2005 to 2020, and a continuous increase in the areas of older age classes (above 61 years), particularly in the oldest age class (101–120 years).

13. Romania clarified during the review that for 2005 figures, the JRC models used a six age-class distribution for several member countries and assumed for Romania that 3 per cent of forests were above 120 years because most high forests undergo restocking before 120 years of age.

14. In 2005, about 45 per cent of the total area was concentrated in the age classes above 61 years old. This figure increased to approximately 55 per cent in 2020. In contrast, the area in the age class 1–20 years fell from 17 per cent to 12 per cent between 2005 and 2020.

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

15. This is achieved by the provisions of factoring out (see para. 33 below).

4. Other elements

Forest management activities already undertaken

16. Romania informed the ERT during the review that its forest management activities are consistent with the policies outlined in its FMRL submission, consisting of a set of technical norms and activities to achieve forest management objectives. Romania further stated that the relatively high sink potential of forest management (relative to the country's total forest resource) results from the following: the favourable forest structure (i.e. standing volume, annual growth); the conservation of large sinks within large nature protection areas with forests having assigned protection functions; the limitation of the annual harvest to approximately half of the annual growth; the inclusion of natural disturbances in the annual allowable quota; the extent of 'close-to-nature' forestry (based on natural regeneration); the legal limitation of deforestation activities; the management of forests in accordance with the provisions of management plans; and other related measures. All these are reflected in the proposed FMRL.

Projected forest management activities under a 'business as usual' scenario

17. Under a 'business as usual' scenario, Romania anticipates a slow decrease in removals from forest management for the period 2012–2020 and the continuation of management activities such as straight planting, thinning, disease control and regeneration cutting programmes. The expected decrease is consistent with the projection of a reduction (of approximately 34 per cent) of the forest management area under the age class 1–20 years from 2005 to 2020 and the corresponding reduction in the annual increases in wood volume. Additionally, the expected increase in the area under the age class 100–120 years (of more than 18 per cent from 2005 to 2020), of which a large proportion are forest

[4] 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.

protected areas, indicates that a lesser volume of wood has been harvested as indicated in table 14 of the submission. Romania indicates that large-scale investment in forest infrastructure (i.e. the transportation network which is among the poorest in Europe) and increased large-scale natural disturbances may result in reduced removals from forest management (due to increased emissions from land conversion and deforestation). The ERT notes, however, that Romania assumes low deforestation rates in the models, reflected in the projected areas under forest management until 2020.

18. In response to questions from the ERT during the review, Romania stated that it has elected forest management during the first commitment period of the Kyoto Protocol (2008–2012) and provided the ERT with a list of ongoing activities related to forest management. These measures and policies are expected to guide the Romanian forestry sector which, in turn, will lead to the maintenance of significant removal figures from forest management activity in a close-to-nature 'business as usual' scenario.

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

19. Not applicable.

C. Pools and gases

1. Pools and gases included in the reference level

20. Romania includes all pools (living biomass, dead organic matter and soil organic carbon) in the construction of the proposed FMRL, consistent with the pools reported for forest land remaining forest land under the Convention and for forest management under the Kyoto Protocol. For the dead organic matter and soil organic carbon pools, Romania provides estimates of changes in carbon stock using the default (tier 1) approach in the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry*, where the annual transfers into these pools are the same as the transfers out (i.e. carbon in these pools is stable). The ERT notes that in the original report Romania states that dead organic matter and soil organic carbon have not been included in the construction of the FMRL. However, the ERT also notes that the pools have been included, assuming no annual changes. Fertilization and liming do not occur in forest management areas. Drainage of organic soils in forest management areas has not been performed since 1990. Hence, it is assumed that the associated nitrous oxide emissions are zero. Non-CO_2 emissions from biomass burning have been included, consistent with the 2011 national inventory report (NIR).

2. Consistency with inclusion of pools in the estimates

21. The pools included in the FMRL are consistent with those reported in the 2010 and 2011 GHG inventories. However, during the review Romania informed the ERT that it is moving towards estimating the emissions and removals for the dead organic matter and soil organic carbon pools using tier 2 or tier 3 approaches. The ERT notes that in this case, a technical correction may be necessary to make the future forest management estimates consistent with the construction of the FMRL.

D. Approaches, methods and models used

1. Description

22. As noted in paragraph 7 above, Romania is one of the member States of the EU for which the JRC developed projections in collaboration with two EU modelling groups. The

models, G4M (Global Forestry Model)[5] from JRC and EFISCEN, project annual estimates of emissions and removals for forest management until 2020 for living biomass, and GHG emissions from biomass burning. To construct the FMRL, the average of the net emissions estimated by the models for the period 2000–2008 was calibrated/adjusted using the historical net emissions for forest land remaining forest land as reported by the country in its GHG inventory for the same time period, to make the two sets (historical and estimated) more consistent. This calibration/adjustment defines the offset value, which is applied to the average of the projected results from the two models. The FMRL is the average of the calibrated/adjusted values for the period 2013–2020.

23. Future harvest demand under a 'business as usual' scenario was projected using the model GLOBIOM (Global Biomass Optimization Model) based on future macroeconomic drivers (e.g. gross domestic product, population) and policies enacted in Romania up to April 2009.

24. The underlying methodological approach from all these models can provide useful future trends for Romania. However, the ERT notes that the quality of the projected data depends on how closely the macroeconomic variables included in the GLOBIOM model are related to the timber demand for the country.

25. The revised FMRL value provided by Romania is the result of recalculations of the historical forest management data for the period 2000–2008 based on the improvement of the GHG inventory. The ERT notes that the resubmitted historical averaged value for the period 2000–2008 in table 8 of the annex below, which was used for the ex-post calibration/adjustment in the EU common approach, is consistent with what was reported in the new GHG inventory, while the projected figures from the G4M and EFISCEN models in the resubmission have not changed from the original submission: the ERT therefore, concludes that the two models have not been rerun based on the new GHG inventory data. The ERT could not assess the results of the two models' calculation derived from the new GHG inventory data and recommends that the FMRL figure is subject to a technical correction as appropriate when the rerun data of the two models with the new GHG inventory data is available.

2. Transparency and consistency

26. Romania's submission and the replies received during the review to the questions posed by the ERT have been transparent enough to allow the TA to be adequately performed. The approaches taken in the construction of the FMRL and the estimation of future emissions and removals from forest management are consistent with those used in the latest GHG inventory.

E. Description of the construction of the reference levels

1. Area under forest management

27. The area under forest management was estimated for the period 1990–2007 using the area reported under the Convention for forest land remaining forest land. For 2008, the forest management area in the FMRL corresponded to that reported for forest management under the Kyoto Protocol in the original submission. However, on 27 August 2010, the Compliance Committee found Romania to be in non-compliance with the Kyoto Protocol, inter alia, due to incomplete and inaccurate forest management estimates, including its

[5] 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.

information contained by the land matrix which was considered inconsistent. Romania submitted a new estimation methodology and provisional results on 11 August 2011 to the UNFCCC secretariat which are subject to the in-country review from 26 to 30 September 2011. The new area of forest management was partially reflected in the revised FMRL (see paragraph 25 above for details).

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

28. See paragraphs 9 to 11 above.

3. Forest characteristics

29. Forests and woodlands cover approximately 28 per cent of Romania's territory, and have been fairly stable over the past 20 years, owing to low land-use transitions. Details of age-class distribution are provided in paragraphs 12 and 14 above.

4. Historical and assumed harvesting rates

30. Romania provides in its submission the historical harvesting rates reported under the Convention for the period 1989–2008 (figure 3), as well as the projected harvesting rate used by the G4M and EFISCEN models for the years 2000, 2005, 2010, 2015 and 2020. The harvest data used by the models for 2000 and 2005 originate from the Food and Agriculture Organization of the United Nations (FAO) (2010), and are higher than the data reported in the 2010 GHG inventory by approximately 14.8 per cent and 19.7 per cent, respectively. The average harvest volume for the period 1990–2008 from data reported in the 2010 GHG inventory is approximately 13.738 million m^3 per year (figure 3 of the original submission). The 2011 NIR includes information about the volume harvested per forest type (conifer, beech, oak and mixed hardwood) for the period 1989–2008, the largest volume corresponding to conifers (approximately 41.2 per cent of the total volume harvested), followed by beech, oak and mixed hardwood with 33.4 per cent, 11.5 per cent and 13.4 per cent, respectively. The average of the data reported for 2000 and 2005 is 13.606 million m^3 per year and the average of the corresponding data from the FAO source is 15.965 million m^3 per year, a difference of 17.4 per cent. Considering the sensitivity of the FMRL to the harvesting rate, the ERT notes with concern the difference between the two data sets (country and FAO) and recommends that the Party provide reasons for the discrepancies. In response, Romania indicated during the TA that the FAO data on wood harvest are slightly higher than those reported in the GHG inventory because the FAO data include harvest data from deforestation, woodland, etc., which results in a difference of about 5 per cent in comparison with the inventory data. The ERT has not been able to assess this issue in depth but notes that the impact on the FMRL will be small.

5. Harvested wood products

31. As mentioned in paragraph 4 above, the estimated annual accumulation in HWP of –0.349 Mt CO_2 eq per year has been used in the construction of the FMRL. The HWP estimate was based on the approach proposed in document FCCC/KP/AWG/2010/18/Add.1, with annual production data, specific half-lives for product types, and the 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 dating back to 1964 and an extrapolation of these data back to 1900 by using the average from 1964 to 1968 are considered. The estimates include exports. The ERT recommends that the Party carry out an evaluation of the need to

revise the FMRL after agreement is reached on the treatment of HWP in the construction of the reference level.

6. Disturbances in the context of force majeure

32. Romania indicated in its submission that both CO_2 and non-CO_2 emissions from wildfires are presented separately in its GHG inventories, and are considered to be low compared with the total net removals from forest management. For the non-CO_2 emissions from biomass burning, the 2011 GHG inventory indicates negligible emissions relative to the total CO_2 emissions from LULUCF. In addition to wildfires, other disturbances such as windthrow, which affected more than 72 kha in 2005 for example, and insect outbreaks (e.g. bark beetles), may have a significant effect on the merchantable wood volume available; this is considered in the HWP estimates and hence incorporated into the FMRL.

7. Factoring out

33. Romania's FMRL submission notes that factoring out according to the annex to decision 16/CMP.1, paragraph 1(h)(i) and (ii), follows the same approach as that reported under the Kyoto Protocol for Article 3, paragraphs 3 and 4, activities. Romania does not factor out the indirect and natural effects from the changes in carbon stock or hence from the associated emissions and removals. The ERT notes, however, that since these effects are already included in the construction of the FMRL, the use of a net–net approach will cancel out these effects since they will also be included in the estimation of the future forest management net removals. Even if the total effect is not removed, the ERT notes that it is expected that most of the effects will be cancelled due to the nature of the net–net approach.

F. Policies included

1. Description of policies

34. Romania has not provided information on the EU energy policies implemented up to April 2009, or on how these EU-level policies are being implemented at the national level and the expected impact on the FMRL. Only EU policies/instruments used by the PRIMES model for bioenergy projections have been considered.

35. Romania's submission, however, mentions that all the policies having an effect on forest management (e.g. Forest Law (no. 46/2008, no 26/1996 and no. 3/1962)), approved forestry technical norms and all EU regulations in force before 2009 have been considered in the construction of the FMRL. Romania provided further information during the review week concerning the EU policies with direct impact on its forest management activities, such as the habitat directive (1992), the birds directive (1979), the European Agricultural Fund for Rural Development regulations (1290/2005, 1698/2005 and 1974/2006) governing the support granted to forest-related measures, the EU Forestry Strategy and the Forest Action Plan (2006). In response to the request of the ERT that Romania provides information on the effects of these national and EU policies on the FMRL, Romania explained that the policies had direct effect on deforestation, afforestation, cuttings, harvesting rates and figures, all of which are factors affecting forest management removal estimates. The ERT notes that the effect of national and EU policies on the construction of the FMRL was conceptually explained, while it is not possible to quantify the exact effect of these policies.

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

36. Romania's submission notes that all energy policies implemented at the EU and domestic levels are included in the PRIMES model as input values for estimating the future wood fuel demand driven by these policies. Output of PRIMES is further used as input for the G4M and EFISCEN models. Forest management policies are not directly taken by the models as an input parameter but the impact of such policies is integrated into the modelling process via the annual biomass and volume increments and harvesting rates, and changes in the age-class structure. Furthermore, Romania confirms that no domestic policies other than those included by PRIMES have been taken into account when estimating the reference level.

III. Conclusions and recommendations

37. Romania has calculated its FMRL on a transparent basis, adequate for consideration by the Conference of the Parties. Romanian forest land has historically been a net sink of GHGs owing to its low deforestation rate. The ERT, however, notes the uncertainty regarding the future harvesting rate due to potential infrastructure developments and the possibility of more favourable prices for wood in the future. These could increase the harvesting rate which, considering the sensitivity of the FMRL to this particular information, might lead to less reliable estimates of the FMRL.

38. The GHG inventory data including net removals and areas of forest land remaining forest land which were used as a proxy for historical forest management data were recalculated after the original submission of the FMRL in March. The new GHG inventory data were used for the ex-post calibration process of the EU common approach, while the modelled projections have not been rerun based on the new GHG inventory data. The ERT recommends technical corrections when updated modelled results based on the new GHG inventory become available.

39. The construction of the FMRL is consistent with the reported pools and gases in the GHG inventories. The ERT notes that all pools are reported; however, estimates for dead organic matter and soil organic carbon apply a tier 1 approach of net zero emissions. The ERT recommends technical corrections when Romania applies a higher tier approach in the future to ensure consistency.

40. The ERT notes that Romania does not include the information about age-class structure in its 2011 GHG inventory, but the information contained in the 2009 State of the Forest Report was provided by Romania to the ERT. However, the ERT could not make an assessment of the quality of projected age-class distribution data provided by the models. Considering that the age-class distribution of forests impact future net emissions from forest management, the ERT recommends this information to be provided by Romania in future submissions.

41. The ERT notes that technical corrections to the FMRL may be necessary after agreement is reached on the treatment of HWP in the construction of the reference level or if higher-tier approaches are used, to estimate dead organic matter, soil organic matter and other GHG sources.

42. The ERT has not been able to review the new material submitted by Romania to the UNFCCC secretariat on 11 August 2011, which is reviewed from 26 to 30 September 2011 as part of the general review process in accordance to Article 8 of the Kyoto Protocol (see paragraph 24 above). The ERT encourages Romania to submit a revised FMRL with the necessary supporting documentation addressing the recommendations by the ERT in paragraphs 37 to 41 above.

Annex

Documents and information used during the technical assessment

A. Reference documents

Submission of information on forest management reference levels by Romania, 10 March 2011. Available at <http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_romania_2011.pdf>.

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

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

The 2009 State of the Forest Report of Romania. Available at <http://www.mmediu.ro/paduri/management_forestier/2011-09-13_management_forestier_stareapadurilor2009.pdf>

B. Additional information provided by the Party[1]

1. Revised tables/figures in the ROU FMRL submission March 2011 (based on NGHGI 2011 rev August 2011)

Forest management reference levels **Table 1**

FM RL including HWP decay functions [Mt CO_2eq]	FM RL assuming HWP instant oxidation [Mt CO_2eq]
(-15.444 - 0.349) **-15.793**	**-15.444**

Time series of historical removals from FM activity, included in the Romania's NIRs *****

Table 5

[Gg CO_2eq]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	av. 2000-2008
Biomass (1)	-23234	-24564	-25449	-26860	-27505	-26709	-25617	-25995	-28348	-26359	-26155	-27138	-24170	-23712	-22761	-24554	-24362	-22865	**-23166**	**-25238**
Non-biomass pools	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GHG sources (2)	12	8	20	14	9	6	6	2	4	10	98	28	98	21	3	6	26	80	23	43
TOTAL	-23222	-24556	-25249	-26846	-27494	-26703	-25611	-25993	-28344	-26349	-26057	-27110	-24072	-23691	-22758	-24548	-24336	-22785	**-23143**	**-25203**

(1) Above and below ground biomass (2) GHG emissions from forest fires

*) Considered equal with FL_FL data below

Time series of historical removals from Forest Land remaining Forest Land, included in the Romania's NIRs

[1] Reproduced as received from the Party.

Table 6

[Gg CO_2eq]	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	av. 2000-2008
Biomass (1)	-23234	-24564	-25449	-26860	-27505	-26709	-25617	-25995	-28348	-26359	-26155	-27138	-24170	-23712	-22761	-24554	-24362	-22865	**-23166**	**-25238**
Non-biomass pools	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
GHG sources (2)	12	8	20	14	9	6	6	2	4	10	98	28	98	21	3	6	26	80	23	43
TOTAL	-23222	-24556	-25249	-26846	-27494	-26703	-25611	-25993	-28344	-26349	-26057	-27110	-24072	-23691	-22758	-24548	-24336	-22785	**-23143**	**-25203**

(1) Above and below ground biomass (2) GHG emissions from forest fires

Emissions and removals (Gg CO_2eq) from AR, D and FM activities, based on the 2010 (2008) KP-LULUCF reporting

Table 7

A. Article 3.3 activities			
A.1 Afforestation / Reforestation		A.2. Deforestation	B.1 Forest management
A.1.1 Lands not harvested	A.1.2 Lands harvested		
-149	NA,NO	1,190	22,893

Emissions and removals from FM as estimated by models, calibration of models' results, and sensitivity analysis

Table 8

		Gg CO_2eq	av. 2000-2008	2000	2005	2010	2015	2020	av. 2013-2020
Step 1: models' results (only biomass)	EFISCEN (1)		-42965	-47513	-41092	-39090	-41851	-36656	-39696
	G4M		-34795	-38367	-34425	-27344	-21293	-17692	-20396
	Average of models		-38880	-42940	-37758	-33217	-31572	-27174	-30046
Step 2: ex-post processing	Offset (2)	biomass	14560						
		non-biomass pools and GHG sources	43						
		total offset	**14602**						
	Calibrated average of models (3)		-24278	-28338	-23156	-18615	-16969	-12572	**-15444**
Sensitivity analysis (4)		*+20% harvest*				-16835	-15439	-11254	-13971
		-20% harvest				-20541	-18643	-13863	-16993