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Report of the technical assessment of the forest management reference level submission of Germany 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 Germany on its forest management reference level (FMRL), submitted on 14 April 2011 in accordance with decision 2/CMP.6. The TA took place (as a centralized activity) from 23 to 27 May 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. N.H. Ravindranath (India); Mr. Robert Waterworth (Australia); Mr. Walter Oyhantcabal (Uruguay); Ms. Naoko Tsukada (Japan); Mr. Lucio Santos (Colombia) and Ms. Marina Vitullo (Italy). Mr. N.H. Ravindranath and Mr. Robert Waterworth 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 Germany, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Proposed reference level

3. In its submission, Germany proposed an FMRL of 22.41 million tonnes of carbon dioxide equivalent (Mt CO_2 eq) per year and takes into account harvested wood products (HWP) using a first-order decay function. For transparency reasons, Germany also provided an FMRL assuming instantaneous oxidation of HWP (–2.07 Mt CO_2 eq per year). Owing to a technical correction in the calculation matrix of the HWP model used for setting the reference level, Germany forwarded a communication to the secretariat on 2 June 2011[1] relating to the HWP value where decay of HWP accounted for removals of –20.35 Mt CO_2 eq per year in comparison with –19.51 Mt CO_2 eq per year as stated in the original submission. Therefore, Germany provided a revised FMRL of –22.41 Mt CO_2 eq per year prior to this review. The FMRL inscribed by Germany in appendix I to decision 2/CMP.6 was –2.07 Mt CO_2 eq per year and has not changed.

II. General description of the reference level

A. Overview

4. Germany's FMRL includes emissions and removals for forest management and HWP. The area of forest management in Germany is consistent with the area reported under Article 3.4 of the Kyoto Protocol for the first commitment period. The same definition for forest land was used for reporting under the Convention and under the Kyoto Protocol.

5. The FMRL represents a projection for the period 2013–2020 based on the WEHAM (Germany's forest development and timber harvest model) 'business as usual' scenario and the results of the European Union (EU) wood products modelling (Rüter, 2011). The proposed FMRL is projected to be a net sink. The FMRL is calculated as the average

[1] <http://unfccc.int/meetings/ad_hoc_working_groups/kp/items/5896.php>.

emission of the period 2013–2020 and is projected to be a net removal of 22.41 Mt CO_2 eq per year.

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. Germany reports using the country-specific inventory data as described in its national inventory report (NIR) in 2010. The FMRL is based on the national forest inventory (NFI) comprising biomass increment through growth and loss due to harvest as reported in the NIR. In its FMRL submission, Germany states that the soils pool has been included in setting the FMRL, and that the projection for soil organic matter, and dead wood was conducted as a technical correction based on a conservative extrapolation of historical data.

7. During the review, Germany provided clarification regarding the time series on carbon stock in soil and litter. The soil pools were reported in the context of UNFCCC reporting based on the Intergovernmental Panel on Climate Change tier 1 method. For reporting under the Kyoto Protocol, Germany assumes that the soil pool is not a source of emissions and therefore excludes it from the report and the common reporting format tables. Therefore, the contribution of forest mineral soils and litter to the FMRL is zero. Germany noted that the data from the next NFI (NFI3 due in 2012) will include estimates for soils and litter, which will be available in the near future. Once this data becomes available, Germany will change from tier 1 methodology to tier 2 and recalculate the time series data regarding forest mineral soils and litter in the FMRL. The expert review team (ERT) commends Germany on its intention to undertake this technical correction.

2. Age-class structure

8. The age-class structure is taken into account by using the latest available country-specific inventory data (obtained from NFI 2002 and Inventory Study 2008) in WEHAM. The projected age-class structure is given according to NFI results (period 2009–2013) as per the age-class distribution of forest land remaining forest land. However, the ERT notes that further historical series of data should be incorporated to ensure that the construction of the FMRL does not include assumptions about changes to domestic policies adopted and implemented after December 2009.

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

9. This is achieved by the provisions for factoring out, which are below (see paragraph 31).

4. Other elements

Forest management activities already undertaken

10. The FMRL is calculated, inter alia, using historical data of the NFI. The FMRL therefore comprises all management activities already undertaken.

Projected forest management activities under a ‘business as usual’ scenario

11. The ‘business as usual’ scenario has been derived from silvicultural guidelines. It incorporates differences between region, species and type of forest ownership, as well as a

consideration of the further increase of growing stocks in evergreen species and a decrease of the same for deciduous species.

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

12. The 'business as usual' forest management scenarios used for the projection of biomass have been in place since 2004, and were also used during the last inventory cycle (2002–2008).

C. Pools and gases

1. Pools and gases included in the reference level

13. Germany has included above- and below-ground biomass, litter, dead wood, mineral and organic soil and HWP pools in the FMRL. No change in the carbon stock of soil or litter is reported (tier 1 approach).

14. In the course of this TA, Germany was requested to supply further information on how the estimated carbon stock changes in soil and litter pools (time series and extrapolated data) will be taken into account in the FMRL assessment when new data becomes available. Germany indicated that it would conduct a technical correction when this new data became available.

2. Consistency with inclusion of pools in the estimates

15. The pools included in the FMRL are consistent with Germany's GHG inventory estimation for the Convention.

D. Approaches, methods and models used

1. Description

16. The FMRL represents a projection for the period 2013–2020 based on the WEHAM 'business as usual' scenario. The historical data are taken from the last national inventory report to the UNFCCC of 15 April 2010. WEHAM estimates growth, stocks, and the potential round wood harvest availability based on NFI data. The model tends to maximize the capture and storage of carbon through the maintenance of age-class structure and potential harvest to produce HWP.

2. Transparency and consistency

17. Germany's submission and the replies received to questions raised by the ERT during the review are found to be transparent by the ERT.

18. The ERT noted that the projections for round wood production in the FRML submission show that while the projected harvest increases (WEHAM Model, table 9), the removals of HWP (from the HWP Model; Rüter, 2011: table 12) decreases. The ERT requested Germany to explain this apparent discrepancy. Germany clarified during the review that the historic inflow into the HWP pool is calculated using the production of sawn wood, wood-based panels and paper and paperboard from the United Nations Economic Commission for Europe (UNECE) Timber Database. It is not calculated from the harvesting rates. To ensure consistency between the WEHAM and HWP models, Germany adjusted the inflow to HWP using a ratio correction based on the projected changes for the harvest from WEHAM and the historic production of HWP (i.e. sawn wood, wood-based panels, paper and paperboard) from the UNECE timber statistics as used in the HWP

model. This ratio correction is based on the average structure of usage for the years 2005–2009 (i.e. the percentage of material use from harvest). Therefore, the average proportion of historic harvest (average the harvest in 2005–2009 from the economic account for forestry (table 8)) that is incorporated in HWP is used to calculate the production of HWP (average of the period 2005–2009 from statistics on HWP) for the period 2013–2020.

19. At the request of the ERT, Germany also provided further information on the cause of the declining removals in the HWP pool during 2012–2020. Germany explained that the decline is a direct consequence of the decreased input of the HWP pool (see the annex below). The ERT suggests that Germany includes this explanation in any revised version of the FMRL submission.

E. Description of the construction of the reference level

1. Area under forest management

20. The area under forest management in Germany is consistent with that reported in the forest management activities section under Article 3.4 of the Kyoto Protocol. This area is considered to remain constant from 2008 onwards and is equal to 10.873 million ha. Deforestation is not included in the FMRL. This is a conservative approach.

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

21. The same definition for forest land is used for Convention reporting (i.e. forest land remaining forest land) and for Kyoto Protocol reporting (i.e. forest management). This shared definition, and consequently the same forest-managed area, is used to calculate the FMRL.

22. Germany currently has a small amount of deforestation (132,559 ha in 2008 and 139,535 ha in 2009) that has not been accounted for in the development of the FMRL. While this is likely to be a conservative approach, the ERT suggests that Germany considers including an estimate of the area of land subject to deforestation in the FMRL in any future submission. The ERT notes that deforestation lands will need to be removed from the forest management lands during the period 2013–2020.

3. Forest characteristics

23. Germany's main tree species used in WEHAM are beech, oak, Norway spruce and Scots pine. Approximately 60 per cent of the trees in the forest area are aged between 0 and 80 years.

4. Historical and assumed harvesting rates

24. The historical harvesting data are derived from national production statistics.

25. The share of harvested material used for HWP is calculated by the historic harvest (average of the years 2005–2009) divided by the historic production of HWP (average of the years 2005–2009). This average proportion of harvest being used for the production of HWP (i.e. material use of wood products) in the historic five-year period (2005–2009) is applied to calculate the future HWP product pool inflow from the projected amounts of harvest.

26. The harvesting rates projected by WEHAM are based on the age-class structure and current silvicultural practices. Thus, they are not a linear extrapolation of the historical

harvest trend but rather are formed from the current state of the forests (in particular, age class) and current policies and guidelines for forest management.

27. In the course of the technical assessment, ERT requested Germany to explain the assumptions that lead to the projected harvesting rate from 2010 onwards being considerably higher (at 100.7 million m^3 per year) than the average harvest over the years 2005–2009 (at 84.6 million m^3 per year). In particular, the ERT requested Germany to provide a transparent explanation regarding the marked increase in the harvesting rate as seen between 2009 and 2010 and how this will be maintained in the period 2013–2020. Germany explained that the historic harvest referred to is taken from national statistics and varies significantly from year to year due to the effects of storms (e.g. those of 2000 and 2007) and short-term economic trends (e.g. market declines in 2008 and 2009). Germany also noted that the data for 2009 is only preliminary and so should not be considered for trend analysis. However, the ERT notes that data for 2008 are also lower than those for 2005, 2006 and 2007. Given the lack of a clear trend in the period 2005–2009, the ERT recommends that Germany conducts a technical revision of the FMRL that includes the final 2009 harvesting data once it becomes available. Furthermore, the ERT recommends that Germany includes preliminary data for the 2010 harvest volumes as an opportunity to validate the projected harvesting rate in 2010.

28. The ERT strongly recommends that Germany provides further information on the calibration and validation of the WEHAM Model in any future FMRL submission. In particular, the ERT recommends that comparisons between predicted and actual harvesting rates in 1990–2009 be clearly indicated in the submission. The ERT notes that the existing model has been subject to constant quality assurance/quality control by the government and by industry, and commends such efforts but also notes that the model results must still be able to reproduce historical data without bias for the purposes of calculating the FMRL. Showing such data in the FMRL would greatly increase confidence in the results and increase transparency.

5. Harvested wood products

29. The contribution of HWP to the reference level of Germany amounts to –20.351 Mt CO_2 eq. This value differs from the value in the original submission (–19.514 Mt CO_2 eq), which was amended by Germany as part of the corrections made to the EU wood products modelling of Rüter (2011). The estimation uses the product categories, half-lives and methodologies as suggested in para. 27, page 31 of FCCC/KP/ AWG/2010/CRP.4/Rev.4. The activity data (production and trade of sawn wood, wood-based panels and paper and paperboard) is derived from the Timber Database (UNECE 2011, time series 1964–2009).

6. Disturbances in the context of force majeure

30. Emissions caused by natural disturbances, like forest fires or windthrows, are not included in the projections because only small areas of the country are affected by forest fires (the area burned annually is less than 0.1 per cent of the total forest land) and windthrow events are excluded because of their rarity.

7. Factoring out

31. 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 are considered to be approximately the same in the reference level and in the estimated period (i.e. the commitment period), and therefore they can be assumed to factor out.

F. Policies included

1. Description of policies

32. All relevant EU regulations, all national and federal-state-level laws and ordinances concerning forest management and having been in effect prior to 2009, have been taken into consideration.

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

33. The ERT encouraged Germany to provide more information on the policies included in the construction of FMRL. In response to the ERT request, Germany provided detailed information on forestry policies (see the annex below). Germany's forestry policies have been incorporated into its silvicultural guidelines for sustainable forest management. The current silvicultural guidelines were developed in 2003 and are still valid. No post-2009 domestic policies are directly or indirectly included in the FMRL. The construction of the FMRL assumes that existing domestic forest-related policies, as of December 2009, remain unchanged. This encompasses all other related policies (e.g. bioenergy policies) that may affect emissions during 2013–2020. The ERT suggests that Germany includes this expanded explanation in any revised FMRL submission.

III. Conclusions and recommendations

34. Germany made its FMRL submission on 14 April 2011. The ERT concludes that the FMRL submission of Germany has been prepared and reported in accordance with decision 2/CMP.6. The submission and the responses to the ERT are in the most part transparent and consistent. However, the documentation and explanation of the predicted harvesting rates from the WEHAM Model provided in the FMRL submission are insufficient to allow a thorough assessment of the results.

35. In the course of the technical correction, the ERT formulated a number of suggestions and recommendations relating to the FMRL as listed below:

(a) Recommends that Germany conduct a technical correction when data on soils and litter become available from the next NFI;

(b) Recommends that Germany provides further information in any revised submission on the calibration and validation of the WEHAM Model and the assumptions applied for predicting harvesting rates in the period 2013–2020. In particular, the ERT recommends that a detailed analysis of how the model performs at estimating the historical data presented in the FMRL be included in any revised submission;

(c) Suggests that Germany includes further information in any revised submission on the policies that were in place as at December 2009, which form the basis of the FMRL;

(d) Notes that Germany's approach of not including deforestation is a conservative one;

(e) Suggests that Germany provides greater detail in any revised submission on the inputs of carbon to the HWP pools and how this is related to the WEHAM Model.

Annex

Documents and information used during the technical assessment

A. Reference documents

Submission of information on forest management reference levels by Germany, 14 April 2011. Available at <http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_germany_2011.pdf>.

Communication of 2 June regarding revision of harvested wood value by Germany. Available at <http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_germany_corr.pdf>.

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

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

Rüter S. 2011. *Projections of Net-Emissions from Harvested Wood Products in European Countries for the Period 2013-2020*. Institute of Wood Technology and Wood Biology Work Report 2011/01. Hamburg: Johann Heinrich von Thünen-Institut. Available at <http://www.holzundklima.de/aktivitaeten/lulucf/dokumente.html>.

Greenhouse gas inventories (THG). Available at <http://www.vti.bund.de/en/startseite/institutes/forest-ecology-and-forest-inventory/research-projects/greenhouse-gas-inventories.html>.

Instructions for the second national forest inventory survey. Available at <http://www.bundeswaldinventur.de/enid/e25c021bfbbddcd5390c83089239fd5f,4e0ad6305f7472636964092d09313037/3e.html>.

National forest inventory survey 2008. Details available at <http://www.vti.bund.de/en/startseite/institutes/forest-ecology-and-forest-inventory/research-projects/greenhouse-gas-inventories/subprojects-ghg/invetory-study-2008.html>.

National forest inventory survey (2002). Details available at <http://www.bundeswaldinventur.de/enid/a9.html>.

B. Additional information provided by the Party[1]

Explanation of how Germany ensures consistency between the historical data and projections of both harvesting rates and the net-emissions from the HWP pool.

Table 9 of the submission shows the projected harvest (WEHAM Model). Table 12 shows the annual change rates of the projected harvest as compared to the average of the historic harvest from 2005-2009 (see Table 8 of the submission), given in percentage. The growth rates of the projected harvest as compared to this average historic harvest (2005-2009),

[1] Reproduced as received from the Party.

which are given for each year of the projection (Table 12), were equally applied to the same 5 years average of historic carbon inflow to the HWP pool.

This historic carbon HWP pool inflow is calculated separately (C-HWP-Model) from the production of sawnwood, wood based panels and paper and paperboard (cp. IPCC 2006 and para 27 of FCCC/KP/AWG/2010/CRP.4/Rev.4). The data are provided e.g. by international statistics (i.e. UNECE Timber Database), and are thus not calculated from the harvest. By applying the projected changes for the harvest, given in percentage, equally to the historic production of HWP (i.e. sawnwood, wood based panels, paper and paperboard) in the C-HWP-Model, it is assumed that the average structure of usage of the years 2005-2009 (i.e. percentage of material use from harvest) will remain the same within the projected time period. In consequence, the average proportion of historic harvest (average of the years 2005-2009 from the economic account for forestry (Table 8)) being used for the production of HWP (average of the years 2005-2009 from statistics on HWP) is applied to calculate the future HWP product pool inflow from the projected amounts of harvest.

As shown in the above table, the harvest rates decreased in the years 2008 and 2009. The same trend is reflected in the data on the production of HWP (UNECE Timber Database). In result, the HWP pool inflow decreases as well. Due to the change in the relation of carbon being emitted from the pool ("inherit emissions" from historic carbon pool inflow, calculated in accordance with method provided in IPCC 2006, Vol.13, Ch. 12 (Equation 12.1.)) to the amount of carbon flowing into the pool (i.e. production of HWP), the HWP pool (or stock) declines. The net-emissions (presented as net-carbon changes in the table above (= carbon inflow minus carbon outflow)), however, are calculated from annual pool- or stock-changes of the HWP pool by applying the method provided in IPCC 2006. In consequence of the diminution of the pool, the "sink-effect" of the HWP pool decreases as well, which is illustrated in the table above (year 2007). The reverse effect crops up in the year 2000.

The decrease of the harvest rate causing a reduced "sink effect" of the HWP pool, is thus not a discrepancy, but the inevitable consequence of the relation of harvest (raw-wood) serving as raw material for the subsequent production of HWP.

More information about how policies have lead the construction of FMRL beyond 2010.

Forest policies have been incorporated in the sylvicultural guidelines for sustainable forest management of the federal states. These guidelines are one input factor for the management simulator which is one of three modules beside the growth simulator and the grading model (please see submission and related information http://www.holzundklima.de/aktivitaeten/lulucf/dokumente.html). These sylvicultural guidelines based on the year 2003 and thus only policies before 2003 have been included in the RL. No post 2009 domestic policies are directly or indirectly included in the management simulator. The construction of the Forest Management reference level assumes existing domestic forest-related policies, as of December 2009, remain unchanged. This encompasses all other related policies e.g. bioenergy policies. The other modules of WEHAM (see above) run free from policies input at all.

Furthermore the construction of the German reference level neither includes assumptions about changes to domestic policies adopted and implemented after December 2009, nor considers impacts from new domestic policies adopted and implemented after December 2009.

Further information on the calibration and validation of the WEHAM model

The WEHAM model has been under constant QC during its development. All modeling steps and all scenario parameters and parameter values have been tested by various working groups in the Federal and different State Forest Research Institutes. External QA has been explicitly conducted by the Federal Research and Training Centre for Forests, Natural Hazards and Landscape / Federal Forest Office of Austria as integral part of the development and by various working group meetings of the Developers with federal states' forest authorities and representatives of the forest and wood-using industry as stakeholders. The performance was assessed for the period 2002 – 2008, like shown in previous explanations.
By design, it is impossible to do any "reverse modeling" with WEHAM. WEHAM is a single-tree plot-based growth model. Management decisions are made at the plot level and the results are then aggregated, so going backwards would require a quite substantial amount of guessing.

Literature on WEHAM tests and performance exist in German only. The most important can be accessed via:

http://www.bundeswaldinventur.de/enid/e25c021bfbbddcd5390c83089239fd5f,4e0ad6305f7472636964092d09313037/3e.html (section "Informationen zur zweiten Bundeswaldinventur"). Other information can be acquired from the authors and the THG working Group at the vTI-WOI (http://www.vti.bund.de/en/startseite/institutes/forest-ecology-and-forest-inventory/research-projects/greenhouse-gas-inventories.html)