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

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Contents

I. Introduction and summary

A. Overview

1. This report covers the technical assessment (TA) of the forest management reference level (FMRL) of Spain submitted on 14 April 2011 in accordance with decision 2/CMP.6. The TA took place (as a centralized activity) 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 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 Spain, 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, Spain proposed an FMRL of –23.89 million tonnes of carbon dioxide equivalent (Mt CO_2 eq) per year applying a first-order decay function for harvested wood products (HWP) and –21.44 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, Spain forwarded to the secretariat, on 13 May 2011, a communication[1] relating to the HWP value in which decay of HWP accounted for removals of –2.29 Mt CO_2 eq per year in comparison with –2.45 Mt CO_2 eq per year as stated in the original submission. Spain proposed a revised FMRL of –23.10 Mt CO_2 eq per year applying a first-order decay function for HWP and –20.81 Mt CO_2 eq per year assuming instantaneous oxidation of HWP.

II. General description of the reference level

A. Overview

4. Spain is one of the member States of the European Union (EU) for which the Joint Research Centre (JRC) of the European Commission developed projections in collaboration with two EU modelling groups. The models, G4M (Global Forestry Model)[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

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

[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, historical harvest) were taken from national forest inventories 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 reports (forest land remaining forest land area deducting

annual estimates of emissions and removals for forest management up to 2020 for the above- and below-ground biomass carbon pools. To estimate the FMRL, the emissions and removals estimated by the models for the time series 2000–2020 were calibrated/adjusted using historical data from the country for the period 2000–2008.[4]

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

5. Spain's CORINE Land Cover (CLC), national forest inventory (NFI) and other forest statistics provide the historical data used for Spain's greenhouse gas (GHG) inventory and for the calculation of the FMRL. CLC data are available for 1990 and 2006 and the NFI has been elaborated for the years 1970, 1990 and 2000 as reference dates.

2. Age-class structure

6. Information on the age-class structure in figure 2 of the FMRL submission is taken into account in the construction of projections by the EFISCEN model. Spain, however, stated that most of the national forests are uneven aged and cannot be classified by age-class structure. Since the two linked models used to project an FMRL require an age-class structure, a preliminary estimation was made by the modellers, based on diameter classes and taking into account different species, in which almost 49 per cent of the trees are within the 1–60 years age class in 2010. This approach was accepted by Spain as stated in the response to the initial draft of the TA report. Under the circumstances, the expert review team (ERT) recommends that Spain make efforts in the future to improve the classification of the age-class structure following in-country research.

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

7. This is partly achieved by the provisions of factoring out explained below (see para. 23 below).

4. Other elements

Forest management activities already undertaken

8. Past forest management activities are indirectly taken into account through the use of the latest available forest time-series data from national forest inventories.

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

9. Spain currently has a National Forest Plan (NFP) for the period 2002–2032, which is the framework policy for forest activities in the country. In the FMRL submission it is stated that, depending on available resources, Spain plans to review the NFP during 2011, and expects the revision to be ready by 2012. In the initial draft report of this TA, the ERT invited Spain to describe any foreseen revisions to the NFP and possible implications for the FMRL as submitted. In response, the Party indicated that the proposed FMRL

either the deforested area or the forest management area, if elected under the Kyoto Protocol) and provides projections on basic forest inventory data (stemwood volume, increment, age-class structure), as well as carbon in forest biomass and soil.

[4] Forest management data for 2008 are taken as provided by the Party in its 2010 GHG inventory submission. For 2000 to 2007, forest management estimates were provided in a communication from the Party in January 2011.

considered the current NFP and that it is not yet possible to anticipate the result of the NFP review.

C. Pools and gases

1. Pools and gases included in the reference level

10. Above- and below-ground biomass and HWP are included in the FMRL. Litter, dead wood and soil organic carbon pools are not included as Spain, in its 2011 national inventory report (NIR), does not consider these pools to be a source. Furthermore, the Party stated that as these pools are not included in the historical data, their influence can not be projected into the future. As stated in the footnote to table 5 of the FMRL submission, CO_2 emissions from forest fires are contained in the annual increment of biomass, calculated as the difference in carbon stocks between the two latest NFIs. Non-CO_2 GHGs from fires are included. Emissions from fertilization, liming and drainage are not included as these activities are not commonly practised in Spain.

2. Consistency with inclusion of pools in the estimates

11. The inclusion of pools in Spain's FMRL is consistent with the inclusion of pools in the GHG inventory.

D. Approaches, methods and models used

1. Description

12. As described in paragraph 4 above, Spain 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 2000–2020 were calibrated/adjusted using historical data from the Party for the period 2000–2008. In this post-calibration, a constant offset is added to the model's results for 2000–2020 to match the average historical data provided by Spain 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.

13. Future harvest demand under a 'business as usual' scenario was derived from macroeconomic drivers (e.g. gross domestic product, population) and policies enacted in Spain up to April 2009. This information is used as data input to GLOBIOM (Global Biomass Optimization Model), which projects demand for timber.

14. The underlying methodological approach used by all these models could provide useful future trends for Spain. However, the quality of timber demand projections will be dependent on how well macroeconomic variables can predict timber demand for Spain.

2. Transparency and consistency

15. The description of methods and models used in the estimation of the FMRL is transparently documented in the FMRL submission, as was complementary information provided through responses to questions posed by the ERT prior to, during and following the TA. In the original submission, the sources of data on the area under forest management and historical harvesting rates used by the models (G4M and EFISCEN) were not consistent and the ERT recommended that the Party ensure that the data used in both models were consistent with those presented in the NIR 2011. In response, Spain noted the

inconsistency and after rerunning the models with consistent data proposed a revised FMRL (see para. 3 above).

E. Description of the construction of the reference level

1. Area under forest management

16. The forest land remaining forest land area for the 1990–2009 time series, which is 12.582 thousand hectares (kha) in 1990 and 12.576 kha in 2009 (with minimum variations in time), is reported in the NIR 2011 tables 7.1.2 and 7.2.6. The forest management area reported for 1990, 2008 and 2009 is the same as the area reported for forest land remaining forest land. The forest management area used by the models, however, differs slightly (see table 4 of the FMRL submission). The EFISCEN model used the same area as that reported in the NIR 2011 for projections, while the G4M model used values that are 24 per cent higher, resulting in an area of 15,678 kha in 2000 and a projection of 15.670 kha in 2020. Through correspondence and in consultation with the Party and the modellers, the ERT assumed that this difference was owing to the fact that the G4M model uses the CLC database, whose definitions of forest land use differ from those used by Spain in reporting under the Convention and its Kyoto Protocol. In response to the initial draft report of this TA, Spain acknowledged the problem and indicated that following a rerun of the G4M model, using the same area for forest management as that reported by Spain to the secretariat and used by EFISCEN, the problem had been corrected. This correction is satisfactory to the ERT.

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

17. The FMRL submission uses the same area basis as the forest land remaining forest land area and the forest management area (as indicated in para. 16 above).

3. Forest characteristics

18. The Spanish territory is divided into four biogeographical regions: Mediterranean, Atlantic, Alpine and Macaronesian. The forests of the Mediterranean region occupy just over 82 per cent of the national forest area (distributed on most of the peninsula area and the Balearic Islands). The most representative species of this region are oaks, aleppo pine (*Pinus halepensis*) and maritime pine (*Pinus pinaster*). The Atlantic region, the second largest on the peninsula, comprises 14 per cent of the forest area of Spain (north and north-west of the peninsula), and the main forest species are pendunculate oak (*Quercus robur*) and durmast oak (*Quercus petraea*). Atlantic mixed forests are dominated by pendunculate oak, chestnut, eucalyptus and beech. The Alpine forests, which make up less than 3 per cent of the national forest area, consist mainly of Scots pine (*Pinus sylvestris*), mountain pine (*Pinus uncinata*), silver fir (*Abies alba*) and beech. The Canary Islands, which contain the national forests that fall within the Macaronesian region, account for 0.7 per cent of the national forest area and consist mainly of pine forests and mixed formations of fayal-brezal and laurel.

19. The ERT noted that the annual biomass increment rates as estimated by the models (G4M and EFISCEN), contained in table 9 of the FMRL submission (i.e. gross biomass increment of 2.3 cubic metres per hectare (m^3 ha^{-1}) per year in 2000 to 3.7 m^3 ha^{-1} per year in 2020), are in the range of the Intergovernmental Panel on Climate Change *Good Practice Guidance for Land Use, Land-Use Change and Forestry* table 3.A.1.5 for temperate forests. During the TA, Spain expressed concern that these values overestimate the annual increment and suggested that it would be more realistic if both models used a constant

value of 1.62 m^3 ha^{-1} per year in the time series 2000–2020, based on the difference of total volume between the second and third NFIs, estimated according to forest type and administrative distribution. Spain further explained that the determined biomass is the net volume estimated from the NFIs, which is based on the total biomass growth minus the total biomass losses from harvesting and forest fires, resulting in a net biomass increment. In response to the initial draft report of the TA, Spain reran the models and recalculated the gross biomass increment factors, which rose from 2.2 m^3 ha^{-1} per year in 2000 to 3.2 m^3 ha^{-1} per year in 2020 according to both models. The ERT is satisfied with the Party's efforts to use the more precise information on annual biomass increment rates required by the models to project the biomass increment through the 2013–2020 time series.

4. Historical and assumed harvesting rates

20. In Spain's NIR 2011 submission, section 11.3.1.2, page 11.18, it is reported that harvesting in managed forests was stable in the 1990–2007 period; this is confirmed in the table on page 11.20, where the minimum value is 13.59 million m^3 over bark in 1993 and the maximum is 17.05 million m^3 over bark in 2006. In table 11 of Spain's FMRL submission, however, it is stated that data for historical harvest rates and projected 'business as usual' demand used by the models were obtained from the FAOSTAT database in June 2010, where the values of harvesting volume for 2000 and 2005 are 14.7 per cent higher than the values reported in the NIR 2011. A ratio (1:06) of the average of 2013–2020 divided by the 2005 values was applied to the FAOSTAT data and expressed in 1000 m^3 over bark roundwood, resulting in an assumed projected harvest of 17.02 million m^3 in 2000 and 19.23 million m^3 in 2020, which is more than 15 per cent more than the historical data in the time series. The Party, in response to the initial draft report of the TA, explained that the models used the FAOSTAT harvesting data, since these data include included firewood collection, which the NIR does not.

5. Harvested wood products

21. In its original submission, Spain stated that the contribution of HWP to the FMRL was –2.45 Mt CO_2 eq per year. However, as described in paragraph 3 above, Spain forwarded to the secretariat a corrected value of –2.29 Mt CO_2 eq per year. This was calculated using the C-HWP model as outlined in the *2006 IPCC Guidelines for National Greenhouse Gas Inventories*. The activity data on the production and trade of sawn wood, wood-based panels, and paper and paperboard are derived from the TIMBER database (United Nations Economic Commission for Europe 2011, time series 1964–2009). The historical CO_2 net emissions between 1990 and 2009 from the HWP pool are reported in table 15 of the FMRL submission, where it can be noted that there is not a clear tendency in emissions, since there was a minimum of –2.30 Mt CO_2 eq per year in 1998 and a maximum of –5.53 Mt CO_2 eq per year in 2006 (which is a 240 per cent difference), with many fluctuations between annual values. In response to the initial draft report, Spain presented new values of CO_2 emissions from the HWP pool for the 1990–2009 time series; for these, the annual values show more fluctuation than those in the FMRL submission, with extreme values of a minimum of –1.64 Mt CO_2 eq per year in 1998 and a maximum of –5.06 Mt CO_2 [eq [per year]?] in 2009 (which is a 308 per cent difference). In the case of the 2010–2020 time-series projections, in the original submission emissions from the HWP pool were estimated to be –3.40 Mt CO_2 eq per year in 2010 and –2.28 Mt CO_2 eq per year in 2020, which is a 32 per cent decrease during the period. In response to the initial draft report, Spain presented new annual values of –2.90 Mt CO_2 eq per year in 2010 and –2.16 Mt CO_2 eq per year in 2020, which is a 25 per cent decrease during the period.

6. Disturbances in the context of force majeure

22. Spain, in its FMRL submission (page 2), stated that as force majeure has not yet been defined it is difficult to exclude from the FMRL emissions from extreme events, which in Spain consist mainly of forest fires. As seen in table 16 of the submission, the average emissions from forest fires in the period 1990–2008 amount to 1.851 Mt CO_2 eq per year, with the high emission years being 1994 (6.228 Mt CO_2 eq) and 2006 (6.140 Mt CO_2 eq). Emissions from forest fires account for 2.2 per cent of the total GHG emissions in 1990.

7. Factoring out

23. Spain uses a projected reference level that includes age-class structure, which is considered to factor out dynamic age-class effects. According to the present state of scientific knowledge, the effects of elevated CO_2 concentrations and indirect nitrogen deposition in the estimated period (i.e. the commitment period) are taken into consideration by the FMRL and therefore they can be assumed to be factored out.

F. Policies included

1. Description of policies

24. Energy policies taken into consideration in the FMRL are provided in annex II to Spain's submission. In addition to the EU energy policies implemented up to April 2009, national measures are also listed in the annex. Information on how these EU-level policies are being implemented at the national level and their anticipated impact on the FMRL is provided.

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

25. All energy policies implemented at the EU and domestic levels are taken by the EU model PRIMES as input values for the estimation of wood fuel demand driven by these policies. The output of PRIMES is further used as input for next step models (i.e. C-HWP model). Models do not directly use forest management policies as input parameters, but the impact of forest management policies is integrated in the projection process through increment and harvesting rates and through changes in the age-class structure. Furthermore, Spain confirmed that no domestic policies other than those included by PRIMES had been taken into account when estimating the FMRL.

III. Conclusions and recommendations

26. Spain has calculated projections (2013–2020) for an FMRL consistent with the methodology used for the current estimates of emissions and removals from forest management. This report is based on Spain's submission of 14 April 2011 and on complementary information provided in response to questions raised by the ERT prior to, during and following the TA. The reviewers assumed the accuracy of the methodological assumptions indicated by the Party and concentrated on assessing the methodology and data used in the construction of the FMRL proposed in relation to forest management estimates.

27. The ERT notes that the Party has responded to requests to provide the information needed to assess transparency and consistency and believes that the projections are consistent with the historical inventory data and continuance of established policies. The FMRL of Spain has been presented in a transparent manner and the approach used in the

construction of the FMRL is consistent with previously reviewed and recent NIR submissions.

28. Spain considered questions raised by the ERT before and during the TA and addressed the recommendations elaborated by the ERT in the initial draft of the TA report. Although the responses to the initial draft report adequately addressed the original concerns relating to the FMRL submission, the ERT recommends that in the future Spain continue making an effort to improve the data on the classification of the age-class structure following in-country research.

29. The ERT recommends also that Spain ensure that the data used in both the G4M and the EFISCEN models are consistent with those presented in the NIR 2011.

Annex

Documents and information used during the technical assessment

A. Reference documents

Submission of information on forest management reference levels by Spain, 14 April 2011. Available at <http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_spain_2011.pdf>.

Communication of 13 May regarding the harvested wood product value by Spain. Available at <http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_spain_corr.pdf>

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

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

B. Additional information provided by the Party[1]

Reviewed Information on Forest Management Reference Level value after taking into account ERT suggestions.

Following the expert review of the submission on Spanish proposed reference levels for forest management for the second commitment period of the Kyoto Protocol, the new proposed values are reflected below:

Table 1. Value of revised proposed reference levels (Gg CO2eq).

Reference level*	
(A)	(B)
-23.097	-20.814

* The reported reviewed values are averages of the projected FM data series for the period 2013-2020, taking account of policies implemented before April 2009. (A) with emissions/removals from HWP using the first order decay functions; (B) assuming instant oxidation (provided for transparency reasons only)

These data are the result of the re-run of G4M model with the area under forest management in Spain as submitted in its National GHG Inventory.

Table 2. Area used by models

	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)
Spain	12577	(1)	12577	12577	0.0	0.0	12566	12571

(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).

[1] Reproduced as received from the Party.

(3): from 2008 onward FM area was estimated assuming the continuation of the deforestation trends (average 1990-2008) reported under the KP

Therefore, the new area used for the models (that would replace table 4 in the submission on FMRL) are:

Table 3: Area for FM as used by models (kha)

	2000	2005	2008	2010	2015	2020
G4M	12.581	12.579	12.577	12.576	12.569	12.566
EFISCEN	12.581	12.579	12.577	12.576	12.574	12.571

Due to the changes in the area, also increments were modified for G4M. These are the results (this table would replace table 9 in the submission on FMRL):

Table 4: Increments as estimated by models (m^3 ha^{-1} yr^{-1}):

	2000	2005	2010	2015	2020
G4M	**2.5**	**2.7**	**2.9**	**3.1**	**3.2**
EFISCEN	**2.2**	**2.3**	**2.4**	**2.5**	**2.5**

With these new figures, the results of both models, their calibration, and the sensitivity analysis can be found in table 5 (that would replace table 8 in the submission on FMRL):

Table 5: Emissions and removals from forest management as estimated by models (above and below-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)	-20489	-20873	-19985	-21541	-21295	-21179	-21270
		G4M	-10400	-7700	-11029	-12490	-14012	-15020	-14309
		Average of models	-15444	-14286	-15507	-17016	-17653	-18099	-17789
Step 2: ex-post processing	Offset (2)	-3194							
		170							
		-3024							
	Calibrated average of models (3)		-18469	-17311	-18532	-20040	-20678	-21124	**-20814**
Sensitivity analysis (4)		*+10% harvest*				*-17447*	*-18137*	*-18453*	*-18224*
		-10% harvest				*-23160*	*-23383*	*-23768*	*-23517*

(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.