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

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I. Introduction and summary

A. Overview

1. This report covers the technical assessment (TA) of the submission of Slovakia on its forest management reference level (FMRL), submitted on 18 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 (LULUCF) experts from the UNFCCC roster of experts: Mr. Kumeh Assaf (Liberia), Mr. Karsten Dunger (Germany), Ms. Thelma Krug (Brazil), Ms. Rosa Rivas Palma (New Zealand), Mr. Atsushi Sato (Japan) and Ms. Marina Shvangiradze (Georgia). Ms. Krug and Mr. 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 Slovakia, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Proposed reference level(s)

3. Slovakia has proposed an FMRL of –1.084 million tones of carbon dioxide equivalent (Mt CO_2 eq) per year. This consists of net emissions of 0.358 Mt CO_2 eq per year without consideration of harvested wood products (HWP), plus a net accumulation of –1.442 Mt CO_2 eq per year in the HWP pool.

4. Slovakia's FMRL submission was revised twice. In the first revision, dated 4 May 2011, the net accumulation in the HWP pool was recalculated from –1.415 Mt CO_2 eq per year to –1.442 Mt CO_2 eq per year. And in the second revision, after the models referred in paragraph 5 below were rerun (see annex and para. 7 below), the figures listed in paragraph 3 above were updated.

II. General description of the reference level

A. Overview

5. Slovakia 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)[1] (from the International Institute for Applied Systems Analysis) and EFISCEN (European Forest Information Scenario Model)[2] (from the European Forest Institute), project annual

[1] 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.

[2] 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

estimates of emissions and removals for forest management until 2020 for the living (above- and below-ground) biomass carbon pool. To estimate the FMRL, the emissions and removals estimated by the models for the period 2000 to 2020 were calibrated/adjusted using historical data from the country for the period 2000–2008.[3] Slovakia has not selected forest management for the first commitment period of the Kyoto Protocol and, therefore, the reference level is constructed for the area defined as forest land remaining forest land under the Convention.

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. Slovakia's Permanent Forest Inventory (1990–2008) and National Forest Centre provide the historical data used for Slovakia's greenhouse gas (GHG) inventory submitted in 2010, and for the calculation of the FMRL submitted by Slovakia on 18 April 2011. While, Slovakia's GHG inventory submission of 2011 is based on new information provided by the Office of Geodesy, Cartography and Cadastre Authority of the Slovak Republic.

7. In the submission of 18 April 2011, the historical emission and removal figures from the forest land remaining forest land category used in the construction of the FMRL (net CO_2 emissions from living biomass reported under the forest land remaining forest land category) were consistent with the 2010 national inventory report (–1.482 Mt CO_2 eq in 2008) but not with the 2011 GHG inventory report (–2.033 Mt CO_2 eq in 2008) that are approximately 37.2 per cent higher. The expert review team (ERT) recommended the Party to use the data from the latest GHG inventory submitted in 2011. The ERT noted that the use of the 2011 figure in the construction of the FMRL would lead to a more conservative reference level. Slovakia conducted rerun of the models and submit the updated figures during the technical assessment (see the annex for the latest recalculations).

2. Age-class structure

8. About 31 per cent of the forest area reported under the forest land remaining forest land category is covered by trees in the age class 80–120 years and above 120 years. Information on the projected changes of the average volume of biomass stock for each age class was provided by the Party during the review, indicating that more than 45 per cent of the present volume stock is concentrated in the age class 80–120 years, and this is projected to increase by 2020. For younger age classes (40–80 years), a decrease in volume by 2020 is anticipated. The information provided by Slovakia in the original submission and in the responses to the ERT questions does not clarify whether the changes in volume stock are gross or net. The ERT recommends that the Party clarifies this issue.

9. Based on the net historical changes (natural increment plus harvest), the annual average net increment in merchantable volume is estimated and forecasted by models. The decrease in the projected annual increment rate (in m^3 ha^{-1} per year) seems to be the result of the increasing harvesting rate projected by the Party due to the expected impact of the policy measures (see para. 11 below) and the age-class distribution. The ERT noted that transparency could be increased by providing more information on the relation between the

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.

[3] 2008 forest management data are taken as provided by the Party in the 2011 greenhouse gas inventory submission. From 2000 to 2007, forest management estimates were provided by the Party using the values reported for the forest land remaining forest land category under the Convention as a proxy.

policies implemented and the increase in the harvesting rates projected. In its response regarding the role of national forest management policy in the FMRL projection, Slovakia explained that the projection is based mainly on the demand for timber, which is driven by gross domestic product (GDP) and population growth. The rationale behind these assumptions is that policies affecting timber demand are difficult to quantify, and their effect is likely to be relatively modest in the short term; thus, the models assumed continuation of current policies for the projection (i.e. no specific additional policies affecting timber demand was considered).

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

10. This is achieved through the implementation of the provisions for factoring out, which are elaborated in paragraphs 32 and 33 below.

4. Other elements

Forest management activities already undertaken

11. The FMRL submission of Slovakia does not provide sufficient information to assess the national policy on LULUCF in a transparent manner. Slovakia, in response to the request by the ERT, provided additional information during the review week that clarified the following: almost the total forest area of Slovakia is managed; and forest management is a planned activity (all forests have a forest management plan renewed every 10 years) covering regeneration and afforestation, clearing, regular thinning, logging (timber felling, skidding and hauling), and forest protection. All areas that have been clear-cut must be regenerated by law within two years. All forest management activities are regularly inspected by State authorities. In addition, the fifth national communication (NC5) of Slovakia provides information on forest management activities conducted by the country. According to the NC5, the forestry sector of Slovakia is regulated by several acts, which have been issued by the Government since 2005 and implemented by the Ministry of Agriculture and Rural Development. These include Act 360/2007, which has direct or indirect impacts on emissions in the LULUCF sector. It provides a basic framework for the conservation of forests soils, forest management, sustainable harvesting and the exploitation of forests.

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

12. See paragraph 11 above.

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

13. See paragraph 11 above.

C. Pools and gases

1. Pools and gases included in the reference level

14. Above- and below-ground biomass, HWP and all direct GHG emissions from biomass burning are included in the FMRL. The following are not included: dead wood, litter and soil pools; nitrous oxide from fertilization and soil drainage; and CO_2 from liming. In its GHG inventories, Slovakia reports that these omitted pools and gases as not occurring in the forest land remaining forest land category. Emissions from forest fires are included.

15. During the review week, Slovakia explained that it applies the tier 1 approach in the Intergovernmental Panel on Climate Change (IPCC) *Good Practice Guidance for Land Use, Land-Use Change and Forestry* for estimating the changes in carbon stock in the dead organic matter pool and mineral soils, thus assuming that the changes are equal to zero. Regarding the changes in carbon stock in the soil organic carbon pool, Slovakia informed the ERT that organic soils cover only a small fraction of the territory and are not in areas under forest management. The ERT notes that Slovakia does not provide enough information to support the supposition that dead organic matter and soil carbon pools are not a source of emissions. The ERT recommends that the Party is consistent in the inclusion of the dead organic matter pool and mineral soils in its FMRL and its commitment period calculation.

2. Consistency with inclusion of pools in the estimates

16. Slovakia reports emissions from dead organic matter, mineral and organic soils pools as non-occurring in the GHG inventory submission in 2011, while reporting estimates for the soil organic carbon pool in mineral soils and biomass. The ERT notes, that Slovakia doesn't include dead organic matter and the soil organic carbon pool in mineral soil in the construction of its FMRL. Slovakia considers that the emissions of both pools are zero following the IPCC tier 1 approach, this is consistent with the 2010 and 2011 GHG inventories. The treatment of the soil organic carbon pool in mineral soils is not consistent in the FMRL and the most recent GHG inventory submission.

D. Approaches, methods and models used

1. Description

17. The FMRL is based on the two models referred to in paragraph 5 above (G4M and EFISCEN), which use estimates provided by other models (PRIMES and GLOBIOM (Global Biomass Optimization Model)) as input data. PRIMES and GLOBIOM provide projections of forest management parameters based on national forest management data and energy policies implemented by countries and by the EU up to April 2009. GDP, population growth and future market demand for timber and HWP for bio-energy are considered in the projections, as well as future areas under forest management, harvesting rate, age-class structure of forests and rotation lengths.

2. Transparency and consistency

18. Slovakia's FMRL submission includes a transparent description of the approach models used for the construction of the FMRL, models and methods are described in the submission and the sources of the main parameters and characteristics as used in the models. The replies received to questions posed by the ERT during the TA improved the transparency, but did not provided sufficient information to assess the impact of policies adopted before 2009 in the future harvest rates. The ERT believes that the transparency of Slovakia's submission should be improved, in particular in relation to the impact of forest policy on the projection of the harvesting rate.

E. Description of the construction of the reference levels

1. Area under forest management

19. As mentioned in paragraph 5 above, the forest management area used in the construction of the FMRL is based on the area under forest land remaining forest land used as a proxy. The 2010 GHG inventory indicates an almost stable forest land remaining forest

land area in the period 1990–2003, an increase in 2004 and stabilization thereafter. The 2011 GHG inventory provides a recalculation of the forest land remaining forest land area that indicates a consistently increasing area for the entire period 1990–2008.

20. Slovakia stated that in the new runs of the models (see the annex), the original discrepancy between the area used in G4M and EFISCEN has been eliminated, and that the data used is consistent with the data reported in the GHG inventory submitted in 2011 for the year 2008. The forest land remaining forest land area in 2008, as reported in the 2010 GHG inventory, equals 1,880 thousand hectares (kha); in the 2011 GHG inventory, it was reported as 1,962.62 kha; in the new run of models, it is 1,975.00 kha, and the projection shows almost no change in the forest management area from 2008 and 2020.

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

21. Slovakia's FMRL is constructed using the area defined as forest land remaining forest land under the Convention as a proxy for the area under forest management, because the Party did not elect forest management for the first commitment period.

3. Forest characteristics

22. Forests in Slovakia face several problems, with health (forest quality) being the most serious one. Control of pests, as bark beetles, in non-harvesting zones is among the measures for improvement of the forest quality. In 2007, forest land corresponded to approximately 41 per cent of the national territory. Since a new act on forests entered into force, this percentage has been decreasing as a result of the elimination of forests affected by pollutants. The decrease in commercial forest areas has halted and the areas of protected forest land have stabilized. The NC5 of Slovakia states that every year the volume of trees felled exceeds the carrying capacity of forests and since 2000, the excess has been 16.7 per cent, reaching 27.8 per cent in 2005–2007.

23. According to the information provided in the FMRL submission the prevailing age class by area (about 70 per cent) is below 80 years, with the area in the age class 61–80 years being the largest. Net annual increments provided by both the G4M and EFISCEN models show an insignificantly decreasing trend. Forecasted data for age classes and the net increment affecting the harvesting rates are not analysed in Slovakia's submission, and the impact of the existing forest management policy is not considered. Rotation length data per species is provided, showing minimum and maximum rotation lengths of 80 and 180 years, respectively. This excludes the poplar species, for which the maximum rotation length is 35 years. Information on how this rotation length is taken into consideration for the construction of the reference level and the impact of this age-class structure on the FMRL was not provided in the submission.

24. During the review week, the Party and JRC provided additional clarification regarding how rotation length and other parameters are considered by models in the construction of the FMRL. In this initial response, an explanation is given of the role of the rotation length in the projection process in the case of the EFISCEN model. According to this explanation, two levels of forest management are considered by the model. Firstly, a basic management regime defines the period during which thinning can take place and a minimum age for final felling. Such regimes can be regarded as constraints on the total harvesting level. If demand for wood products is high, management is intensive and rotation lengths are close to the lower limit defined in the management regimes. Secondly, if demand for wood is low, rotation lengths are longer, because less felling is needed to fulfil the demand. This additional information and clarification should be incorporated into the submission in order to assess the transparency of the approach.

25. In its response to the draft version of this report, Slovakia confirmed that rotation length was considered in the projection through historical and assumed harvesting rates. Bearing in mind that the harvesting rate is driven mainly by GDP and population growth, and that the forest management policy is not expected to have a significant impact on this process in the short run, the ERT notes that the rotation rate is not expected to have a significant impact on the FMRL.

4. Historical and assumed harvesting rates

26. Forest regulation policy existing in Slovakia (in particular Act 360/2007) has a significant impact on the increasing trend in the harvesting rate. The harvesting scenario provided by the Party in its FMRL submission assumes that the annual harvest could increase by about 6 per cent per year in the period 2013–2020. The historical harvesting rate up to 2007 has been estimated using data from national statistics since 1993, whereas data for 2020 are estimated by the models PRIMES (wood for bioenergy) and GLOBIOM (timber). Data in the period 2008–2020 have been lineally interpolated. There are some discrepancies between the modelled harvesting data and the actual data in 2000 and 2005 provided in the FMRL; the models' approach is more conservative, showing a lower harvesting rate than the actual rate. The historical annual harvesting rate provided in the NC5 (page 27) for 2005 is 31 per cent higher than that modelled and 10 per cent higher than the figure reported in the construction of the FMRL. The values for the harvesting rate, which are used by the models are more conservative than the historical data.

5. Harvested wood products

27. The annual accumulation of –1.442 Mt CO_2 eq per year in HWP pools included in the FMRL is estimated using the approach proposed in document FCCC/KP/AWG/2010/18/Add.1 with annual production data, specific half-lives for product types, and 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 for 1900–1992 have been assessed on the basis of the averages of the earliest available five years (1993–1997). Slovakia confirms that all models involved in the construction of the FMRL using the harvesting rate as input value use the same source of information (the FAOSTAT database). The ERT recommends that Slovakia makes a technical correction to the FMRL when final agreement on HWP estimation is arrived at.

6. Disturbances in the context of force majeure

28. Slovakia did not consider force majeure in the construction of its FMRL. Hence, the post-calibration procedure incorporates the effect on the net emissions from past disturbances and force majeure, if it occurred (for the period 2000–2008), into the projections. The country considers that major disturbances are emissions from forest fires during the period 1990–2008 (0.0059 Mt CO_2 eq), and has an insignificant share (close to 0 per cent) of the total 1990 GHG emissions in the country.

29. In its NC5 and its response provided during the review week, the Party expressed serious concern regarding the current quality of Slovakia's forests, in particular with regard to bark beetles and the health of trees. Paragraph 24 above highlights the increase in cutting in 2005–2007 caused by the forests' health status. In response to questions from the ERT regarding how this natural disturbance has been taken into consideration, Slovakia explained that the current health status leading to the increased cutting is not considered to be force majeure and is not reflected as such in its FMRL calculation. The increased felling is reflected in harvesting rate data. Based on the high harvesting rate, the projected future

rate is also high, which is not conservative if this intensive cutting policy is linked to a temporary disturbance due to pest attacks in Slovakia's forests. The ERT recommends that the Party assess whether this is a temporary disturbance that lead to a temporary increase in harvest, which does not correspond to the normal forest harvesting rate driven by forest management and wood demand.

7. Factoring out

30. 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 reference level and in the estimated period (i.e. the commitment period), and therefore they can be assumed to be factored out.

31. In its FMRL submission, Slovakia mentions that factoring out in accordance with decision 16/CMP.1, paragraph 1(h) (i–ii), is not relevant for the Party. In its response to the draft version of this report, Slovakia confirmed that the statement made in paragraph 32 above is relevant in the case of Slovakia.

F. Policies included

1. Description of policies

32. Energy policies taken into consideration in the FMRL are provided in annex II to the submission. Along with the EU energy policies implemented up to April 2009, national measures are also listed in the annex. Information is not provided on how these EU-level policies are being implemented at the national level and the expected impact on the FMRL.

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

33. All energy policies implemented at the EU and national levels are taken by the PRIMES model 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. Forest management policies are not directly taken by models as input parameters but the impact of forest management policies is integrated into the projection process through increment and harvesting rates, and changes in age-class structure. Furthermore, Slovakia 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

34. Slovakia has calculated an FMRL on a transparent basis suitable for consideration by the Conference of the Parties. The ERT notes that the soil organic carbon pool in mineral soils is not included in the construction of the FMRL while it is reported in the latest GHG inventory submission (2011). The ERT recommends the Party to be consistent in the inclusion of mineral soils in its FMRL and its commitment period calculation, and to provide more substantive information on why the dead organic matter pool is consider not to be a source of emissions. The ERT also recommends that Slovakia should:

(a) Clarify whether the increments provided in its submission refer to gross or net increments (see para. 8 above);

(b) Provide more information to support the projected impact of forest policy on the projection of the harvesting rate (see para. 18), explain the policy elements facilitating the increase in the harvesting rate and how this is linked to the forest health problem (see para.

18), and provide information as to how the EU-level policies are being implemented at the national level and the expected impact on the FMRL (see para. 32);

(c) Assess whether the forest health problem is a temporary disturbance that lead to a temporary increase in harvest that does not correspond to the normal forest harvesting rate driven by forest management and wood demand (see para. 29).

Annex

Documents and information used during the technical assessment

A. Reference documents

Submission of information on forest management reference levels by Slovakia, 18 April 2011. Available at <http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_slovakia_2011.pdf>.

Communication of 5 May regarding the harvest wood products value by Slovakia. Available at <http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_slovakia_corr.pdf>.

Fifth national communication of Slovakia. Available at <http://unfccc.int/resource/docs/natc/svk_nc5.pdf>.

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

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

B. Additional information provided by the Party[1]

Final results from recalculation of Slovak FMRL based on the 2011 GHG´s inventory.

Main difference as compared to previous run is new area by G4M and even more new 2011 GHG data from Slovak inventory.

Model results:

			av. 2000–2008	2000	2005	2010	2015	2020	av. 2013–2020
Step 1: models' results (only biomass)		EFISCEN (1)	–3871	–6936	–2382	–2167	–1166	549	–598
		G4M	–4414	–6564	–3682	–1964	–1504	–599	–1199
		Average of models	–4142	–6750	–3032	–2066	–1335	–25	–899
Step 2: ex–post processing	Offset (2)	biomass	1232						
		non–biomass pools and GHG sources	25						

[1] Reproduced as received from the Party.

		av. 2000–2008	2000	2005	2010	2015	2020	av. 2013–2020
	total offset	**1257**						
	Calibrated average of models (3)	–2885	–5493	–1775	–809	–78	1232	**358**
Sensitivity analysis (4)	*+10% harvest*				*489*	*1342*	*2227*	*1660*
	–10% harvest				*–1943*	*–990*	*–91*	*–687*

(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.

Area:

	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 (6)**	**EFISCEN**	**G4M**	**EFISCEN**	**G4M (7)**	**EFISCEN (8)**
Slovakia	1975	(2)	1975	1976	0.0	0.0	1970	1971

(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): area of FL–FL in 2008 from GHG inventory 2011. For years between 2000 and 2007, the annual area of deforestation under KP reporting was considered.

(3): area of FM from KP LULUCF reporting, excluding overseas territories. For years between 2000 and 2007, the annual area of deforestation under KP reporting was considered.

(4): Since the FM area reported under KP is not correct, this estimate has been obtained as (e.g. (area of FL in 1990) – (area AR in 1990 (estimated as area AR in 2008 / 19)) – (area of D in 2008)). This estimate is very similar to FL–FL in 2008. For years between 2000 and 2007, the annual area of deforestation under KP reporting was considered.

(5): Forest under Kyoto definition, from CRF table 5A (2011)

(6): Given the amount of work required for adjusting the area of G4M, no correction of area was done in cases where the difference with GHG inventories is very small (Bulgaria, Estonia, Latvia, Luxembourg, Netherlands). Given the ex–post calibration of models' results, the impact of the remaining area discrepancies on FMRL can be considered absolutely negligible.

(7): from 2008 onward FM area was estimated considering the deforestation estimated by G4M (as explained in

the Annex of EU submission).

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