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Report of the technical assessment of the forest management reference level submission of Bulgaria 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 Bulgaria 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 experts from the UNFCCC roster of experts: Mr. Zhang Xiaoquan (China) and Mr. Richard Volz (Switzerland), Ms. Tuija Lapveteläinen (Finland), Mr. Hector Ginzo (Argentina), Mr. Sandro Federici (San Marino) and Mr. Justin Goodwin (United Kingdom of Great Britain and Northern Ireland). Mr. Zhang Xiaoquan and Mr. Richard Volz were the lead reviewers. The TA was coordinated by Ms. María José Sanz Sanchez (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 Bulgaria, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

B. Proposed reference level

3. Bulgaria has proposed an FMRL of –7.950 million tonnes of carbon dioxide equivalent (Mt CO_2 eq) per year applying a first-order decay function for harvested wood products (HWP) and –8.168 Mt CO_2 eq per year assuming instantaneous oxidation of HWP.

4. The values of the FMRL and of the HWP pool in paragraph 0 above include a correction[1] and a recalculation[2] of those values contained in Bulgaria's official FMRL submission.

II. General description of the reference level

A. Overview

5. Bulgaria, together with other member States of the European Union (EU), has adopted a common methodological framework, implemented by a team of research groups coordinated by the Joint Research Centre (JRC) of the European Commission, to calculate its FMRL.

[1] The correction was required because in the model version used for the calculation of the HWP pool an equation related to non-coniferous industrial round wood was not applied correctly owing to a shifted cell in the calculation matrix.

[2] The recalculation was done in order to address findings and comments provided by the expert review team (see the "Conclusions and recommendations" chapter and information provided in the annex).

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. Historical data are those contained in Bulgaria's 2010 greenhouse gas (GHG) inventory, including supplementary information reported under the Kyoto Protocol. The methodology applied to calculate the FMRL ensures that historical data are used to determine the magnitude of expected anthropogenic emissions and removals in the future.

2. Age-class structure

7. In the present decade (2011–2020) Bulgarian forests will be predominantly composed (more than 50 per cent) of middle-aged (41–60 years) and pre-harvesting (61–80 years) classes. Forests in harvesting and mature classes (81–100, 101–120 and over 120 years) will cover about 15 per cent of the total area. The high percentage of age classes characterized by active growth results in an expected increase of increments during the period.

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

8. No specific information is reported; see paragraph 24 below.

4. Other elements

Forest management activities already undertaken

9. This element is indirectly taken into account through the use of the latest available forest time-series data (from the national forest inventory (NFI) or other country statistics).

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

10. The estimation of the evolution of harvest demand by 2020 is based on macroeconomic drivers and the application of policies implemented in the EU member States by April 2009.

C. Pools and gases

1. Pools and gases included in the reference level

11. Bulgaria includes in the FMRL above-ground and below-ground biomass pools, the HWP pool and non-CO_2 emissions from forest fires. Dead organic matter and soil organic matter are assumed in equilibrium, consistent with Intergovernmental Panel on Climate Change (IPCC) tier 1 practice.

2. Consistency with inclusion of pools in the estimates

12. The same pools and gases have been estimated in the FMRL as those in the forest land remaining forest land category in the GHG inventory.

D. Approaches, methods and models used

1. Description

13. Bulgaria is one of the 15 member States of the EU for which the JRC developed projections in collaboration with two EU modelling groups. The models, G4M (Global Forestry Model)[3] from the International Institute for Applied Systems Analysis and EFISCEN (European Forest Information Scenario Model)[4] from the European Forest Institute, project 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 post-calibrated using historical data from the country for the period 2000–2008.[5] In this post-calibration, a constant offset is added to the models' results for 2000–2020 to match the average historical data provided by each country for the period 2000–2008 in order to ensure consistency with national historical data in terms of the absolute level of emissions and removals and coverage of pools and gases. In practice, this post-calibration fixes the magnitude of the projected net emissions and removals while the model outputs determine only the trend and its shape. The FMRL has therefore been estimated by the combined and concurrent action of models and historical data; the trend and magnitude of historical data and the models' outputs may be compared, ensuring full transparency.

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

15. Dead organic matter and soil organic matter pools, and other sources of emissions, have been projected assuming a constant net change for the period 2009–2020, equivalent to the historical average change reported for the period 2000–2008.

2. Transparency and consistency

16. Bulgaria's submission and the replies received to questions posed during the TA are transparent. The models and methods are described in the FMRL submission and the sources of the main parameters and characteristics as used in models are provided.

17. Bulgaria applies the stock change method for estimating changes in the living biomass pool by using data from a time series from NFIs. Data for the years following the last NFI have been extrapolated by assuming constant net change. This has caused an apparent relevant discrepancy between historical data and model outputs for the period 2000–2008. The issue has been addressed by Bulgaria by providing data from the most recent NFI (2011), which prove to be very close to the model outputs (see annex). An

[3] 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.

[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.

[5] For the period 2000–2008, forest management estimates were provided by the Party.

inconsistency was found in area data as described in paragraph 18 below. Other information contained in the FMRL submission is consistent with that provided in the GHG inventories.

E. Description of the construction of the reference level

1. Area under forest management

18. The expert review team (ERT) notes that Bulgaria reported in its 2011 GHG inventory submission recalculated data and that there is an issue of consistency among forest area figures used by the G4M model (3,373 thousand hectares (kha) in 2010), the EFISCEN model (3,753 kha in 2010) and the area reported as forest land remaining forest land for 2009 in the 2011 GHG inventory (3,504 kha). Bulgaria has rerun the EFISCEN model using the updated area data in order to recalculate the FMRL. Given the small difference in the forest area used by the G4M model and considering the post-calibration of the models' outputs, such a minor discrepancy in areas can be considered negligible.

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

19. Bulgaria includes in the FMRL all managed forests reported under the category forest land remaining forest land in its national GHG inventory.

3. Forest characteristics

20. Forestry in Bulgaria is based on sustainable management of high forests, observing the principles of sustainable harvesting, the protection of all functions of forests, the promotion of indigenous species and the conservation of valuable genetic resources. The rotation period of the main tree species range according to site conditions and defined economic or protection purposes as follows: Scots pine 100–140 years, Norway spruce 100–120 years, silver fir 100–120 years, beech 100–120 years and oak 100–140 years.

4. Historical and assumed harvesting rates

21. Five-year averages for 2000 and 2005 are provided as historical harvest data. Data for 2020 were estimated by the models PRIMES (wood for bioenergy) and GLOBIOM (timber). Data between 2008 and 2020 have been interpolated. The assumed harvesting rate 2013–2020 is 8 per cent lower than the five-year average of 2005.

5. Harvested wood products

22. The annual accumulation of 0.218 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, chapter II, annex I, paragraph 27, with annual production data, specific half-lives for product types, application of the first-order decay function using equation 12.1 from the IPCC *2006 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 1900 are taken into account. The estimates include exports.

6. Disturbances in the context of force majeure

23. Bulgaria did not consider force majeure in the construction of the FMRL; the post-calibration procedure applied automatically incorporates the average rate of past disturbances (for the period 2000–2008) into the projections. The annual average emissions from forest fires for the period 1990–2008 (556 Gg CO_2 eq per year) seem to represent the

major natural disturbance type and represent 0.5 per cent of the total 1990 GHG emissions and are always lower than 1.8 per cent of the 1990 total GHG emissions of the country.

7. Factoring out

24. The 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 estimates of the commitment period, and therefore they can be assumed to factor out.

F. Policies

1. Description of policies

25. Energy policies taken into consideration in the FMRL are provided in annex II to the submission. The EU energy policies implemented up to April 2009 are listed in this annex, but national measures are not. Information on how these EU-level policies are being implemented at the national level and the expected impact on biomass demand was provided during the TA and is reported in the annex.

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

26. All energy policies implemented at the EU and domestic 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 used as input in the model GLOBIOM, which is a static partial equilibrium model integrating the agriculture, bioenergy and forestry sectors, whose output is used as input in the G4M and EFISCEN 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, Bulgaria confirms that no domestic policies other than those included by PRIMES have been taken into account when estimating the FMRL.

G. Other issues

27. The ERT notes that Bulgaria reported in its GHG inventory CO_2 emissions from forest fires in common reporting format (CRF) table 5(V). Considering that Bulgaria reports carbon stock changes in the living biomass pool applying the stock-change method, the ERT notes that Bulgaria is double accounting CO_2 emissions due to forest fires. For each year of the time series 1990–2004 for which net changes in the living biomass pool have been estimated as the difference between stocks registered by two consecutive NFIs, the over-accounting equals the CO_2 emissions reported in CRF table 5(V). For each year of the time series 2005–2009 where net changes in the living biomass pool have been extrapolated, the over-accounting is limited to the annual average amount of losses (550.78 Gg CO_2 eq per year – see table 1 in the annex) due to forest fires, which is embedded in the latest NFI data set available at the time when the 2011 GHG inventory was prepared (i.e. 2005 NFI).

III. Conclusions and recommendations

28. The ERT concludes that by using an approach common to 14 other Parties, Bulgaria strengthens the comparability of its proposed FMRL. Moreover, the interaction of more

models and the post-calibration of model outputs with the historical data builds confidence in the proposed FMRL. Some inconsistencies among data used as model inputs and those used for preparing the GHG inventory were identified during the TA and addressed by the Party in a revised FMRL value to be taken as Bulgaria's FMRL for the second commitment period of the Kyoto Protocol. Having assessed the revised FMRL value, the ERT found that it addressed all inconsistencies previously found.

29. The ERT found an overestimation of CO_2 emissions from forest fires (see para. 27 above) and recommends that Bulgaria consider the following actions to address the issue:

(a) Add to the annual living biomass net stock change value of the years 2005–2009 the difference between the CO_2 emissions reported in CRF table 5(V) and the annual average amount of CO_2 emissions from forest fires (550.78 Gg CO_2 eq per year) embedded in the most recent NFI data set (i.e. 2005 NFI). In response to recommendations from the ERT, Bulgaria has submitted new data for its FMRL where the overestimation as been addressed;

(b) Revise its FMRL without including in the calculation the average amount of CO_2 emissions reported in CRF table 5(V), as is currently done.

30. With reference to the information provided in paragraph 22 above, the ERT recommends a technical correction to the FMRL when final agreement on the HWP estimation is reached.

Annex

Documents and information used during the technical assessment

A. Reference documents

Submission of information on forest management reference levels by Bulgaria, 15 April 2011. Available at <http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_bulgaria_2011.pdf>.

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

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

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

B. Additional information provided by the Party[1]

1. Additional information on expected wooden Biomass use under the business-as-usual scenario

Firewood is the main part of the timber production in Bulgaria with a share of 45–60 %. The average annual amount of firewood is about 3.1 million m^3. Over the past 10 years the use of firewood in Bulgaria has increased about 3 times due to its relatively low price compared to continuously rising prices of liquid fuels, natural gas and coal.

A Long-term National Program has been developed in Bulgaria to promote the biomass use for energy production for the period 2008–2020. The program puts the indicative targets for the use of renewable energy according to Directive 2003/30/EC and the new targets for increasing the share of renewable energy use adopted by the European Council in 2007.

The EU's common energy policy under Renewable Energy Directive 2009/28/EC has been implemented in Bulgaria since the adoption of the Renewable Energy Act (2011). It clearly gives certain preferences for energy production from biomass.

The new Forest Act (adopted 2011) is linked to the incentive of increasing production from biomass. The Forest Act provides the opportunity to the state forest enterprises to enter into long term contracts, for up to 15 years, with traders, for both production and sales of timber. These long-term planning activities give the opportunity to enable the secure of timber resources as well as sustainable production, management and implementation of the intended use of forests. Additional facilitation for production of biomass in forest territories is given by Art. 88, para 5 (2) declaring that plantations of tree or shrub species, established for accelerated production of biomass are not managed as forests. This means that the plantations created of fast-growing species are not subject of the limitations and requirements related to the usual forest management practice, such as: rotation period is not

[1] Reproduced as received from the Party.

determined; no forest management plans and projects for such plantations are required; no limitations in relation to type or intensity of cuttings are defined.

2. Additional information on historical data on stock changes

Bulgaria in its NFI uses different reporting forms for forestry fund: forest areas (1FF), afforested area (2FF), tree biomass stock (3TR), stock by groups of forests and forest cover (4FF), wood harvest (5FF), age and density (6FF) and types of forest stands (7FF). The reporting forms 1FF and 5FF are updated annually and the remaining forms every other 5th year (e.g. 1985, 1990, 1995, 2000, 2005).

Since Bulgaria applies carbon stock change method in its GHG Inventory report, the estimates of biomass sink are based on reporting form 3 – tree biomass stock, which is updated every 5th year. Hence, the figures for biomass stock remain constant for the period of 5 years. So, in the estimates of the biomass stock Bulgaria uses the data for the years 1990, 1995, 2000 and 2005. The stock changes of the wood volumes were obtained by estimating the difference between the periods divided by 5. Since the reporting form 3 was updated in 2010, but was published by the National Statistical Institute by the end of April 2011, we couldn't use it in order to update the figures between the years 2005–2009 prior to the submission of the FMRL. Therefore the biomass stock remains constant for the years 2001-2009.

During the review on the FMRL Bulgaria provided ERT with preliminary figures of the updated carbon stocks in living biomass. After the review more accurate estimation of the living biomass stock has been done. We estimated an average C stock change per ha for each year on basis of the average volume stocks per ha for the years 1990, 1995, 2000, 2005, 2010 and then, multiplied the average stock change per ha with the areas for the respective years. This approach resulted in recalculation of the biomass stock during the whole time series. Please find below (Table 2) the new data – changes in living biomass and removals by sink from FlrFl:

Therefore, JRC-IIASA-EFI team implemented the most updated data from NFI as inputs for models and for the post-calibration. This results in a change of the figure of FM RL for Bulgaria. While using the latest data, the calibrated average of models has the figure of -8622 $GgCO_2eq$.

However, JRC-IIASA-EFI team prefers NOT to apply the calibration for 2000–2009 because:

- Only few EU countries were asked to do so; for consistency reasons, we have a strong preference to apply the same approach to all EU MS.
- Models implement BAU energy policies in place up to April 2009; this means that, in theory, a policy implemented in mid 2009 reflect already a deviation from BAU. Including also 2009 in the calibration would mean mixing the assumption of BAU scenario with policies potentially additional to BAU scenario.

Table 1. Changes in living biomass stock

		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
FlrFL area coniferous	Kha	1161	1 161	1 168	1 166	1 161	1 155	1 147	1 136	1 126	1 112	1 109	1 108	1 106	1 114	1 103	1 100	1 089	1 077	1 066	1 058	1 056	1 053	1053
FlrFL area deciduous	kha	2188	2 199	2 209	2 215	2 220	2 250	2 248	2 243	2 256	2 266	2 292	2 305	2 316	2 351	2 368	2 371	2 406	2 418	2 425	2 426	2 421	2 429	2429
Stock coniferous	m3 o.b/ ha			119.1					148					180					202					225
Stock deciduous	m3 o.b/ ha			96.8					107					112					119					125
Stock coniferous	Gg C			36					45					55					62					69
Stock deciduous	Gg C			38					42					44					47					49
	Gg C	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.77	1.98	1.98	1.98	1.98	1.98	1.34	1.34	1.34	1.34	1.34	1.36	1.36	1.36	1.36	1.36
	Gg C	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.77	0.40	0.40	0.40	0.40	0.40	0.56	0.56	0.56	0.56	0.56	0.50	0.50	0.50	0.50	0.50
Net change coniferous	Gg C	2 055	2 055	2 067	2 065	2 055	2 046	2 030	2 012	2 234	2 207	2 200	2 198	2 194	1 491	1 476	1 473	1 459	1 443	1 445	1 435	1 432	1 428	1 427
Net change deciduous	Gg C	1 693	1 701	1 709	1 714	1 718	1 740	1 739	1 735	911	915	925	930	935	1 308	1 318	1 320	1 339	1 346	1 208	1 209	1 206	1 210	1 210

Table 2. Removals from forest land remaining forest land

		1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998
5.A.1 FlrFL	in Gg CO_2	–13742	–13770	–13844	–13855	–13833	–13882	–13821	–13738	–11530	–11447	–11460

		1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
5.A.1 FlrFL	in Gg CO_2	–11471	–11473	–10266	–10247	–10242	–10260	–10224	–9730	–9692	–9673	–9674	–9671

Table 3. New data on the FMRL

			av. 2000-2008	2000	2005	2010	2015	2020	av. 2013-2020
Step 1: models' results (only biomass)	EFISCEN (1)		-7726	-9331	-6975	-6714	-7369	-7616	-7413
	G4M		-11349	-14145	-10165	-9097	-7846	-7240	-7713
	Average of models		-9537	-11738	-8570	-7906	-7608	-7428	-7563
Step 2: ex-post processing		biomass	-663						
		non-biomass pools and GHG sources	58						
	Offset (2)	total offset	-605						
	Calibrated average of models (3)		-10142	-12343	-9175	-8511	-8213	-8033	-8168
Sensitivity analysis (4)		+10% harvest				-7811	-7524	-7330	-7503
		-10% harvest				-9476	-9040	-8654	-8956

Table 4. Historical time series (Gg CO_2 eq)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
only biomass	–13844	–13855	–13833	–13882	–13821	–13738	–11530	–11447	–11460	–11471
biomass + non–CO2 GHG	–13840	–13853	–13814	–13816	–13755	–13736	–11522	–11444	–11434	–11441

	2000	2001	2002	2003	2004	2005	2006	2007	2008	aver. 2000–2008
only biomass	–11472,93	–10266	–10247	–10242	–10260	–10224	–9730	–9692	–9673	–10201
biomass + non–CO2 GHG	–11263	–10193	–10223	–10223	–10256	–10219	–9716	–9534	–9654	–10142

3. Emission from forest wildfires 1988-2009

Table 173 CO_2 Emissions from forest wildfires 1988-2009

year	area burnt (ha)	CO_2 emission CO_2 equivalent Gg	CH_4 emission CO_2 equivalent Gg	N_2O emission CO_2 equivalent Gg
1988	462,00	14,00	1,36	0,31
1989	223,00	6,76	0,66	0,15
1990	1041,00	31,56	3,07	0,70
1991	511,00	15,49	1,51	0,35
1992	5243,00	158,94	15,48	3,54
1993	18164,00	550,62	53,62	12,26
1994	18100,00	548,68	53,43	12,22
1995	549,00	16,64	1,62	0,37
1996	2150,00	65,17	6,35	1,45
1997	777,00	23,55	2,29	0,52
1998	6967,00	211,20	20,57	4,70
1999	8291,00	251,33	24,48	5,60
2000	57915,40	1755,64	170,98	39,10
2001	20173,04	611,52	59,55	13,62
2002	6513,00	197,43	19,23	4,40
2003	5105,55	154,77	15,07	3,45
2004	1139,90	34,55	3,37	0,77
2005	1446,20	43,84	4,27	0,98
2006	3706,54	112,36	10,94	2,50
2007	43434,60	1316,67	128,23	29,33
2008	5439,10	164,88	16,06	3,67
2009	2270,80	68,84	6,70	1,53

Source: 2009 national greenhouse gas inventory of Bulgaria.

Note: The average value of CO_2 emissions of the period 2005–2009 equals 550.78 Gg CO_2 yr^{-1}.