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**Report of the technical assessment of the forest management  
reference level submission of Ukraine 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 Ukraine on its forest management reference level (FMRL), submitted on 14 March 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 (LULUCF) experts from the UNFCCC roster of experts: Mr. Jim Penman (United Kingdom of Great Britain and Northern Ireland), Mr. Sandro Federici (San Marino), Ms. Gro Hysten (Norway), Mr. Agustín Inthamoussu (Uruguay), Mr. Mattias Lundblad (Sweden) and Mr. Nalin Srivastava (India). Mr. Penman and Mr. Federici 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 Ukraine, 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, Ukraine proposed an FMRL corresponding to its 1990 net emissions, –46.6 million tonnes of carbon dioxide equivalent (Mt CO<sub>2</sub> eq) per year for the period 2013–2020. During the TA, Ukraine provided a preliminary revised estimate of –48.7 Mt CO<sub>2</sub> eq per year based on the projected removals for the period 2013–2020.

## **II. General description of the reference level**

### **A. Overview**

4. In the submission, Ukraine proposed using a historical FMRL based on 1990 data on forest management emissions and removals in that year. Ukraine estimated the reference level based on the methods used in its national greenhouse gas (GHG) inventory for 1990–2008. Estimates made by the expert review team (ERT) during the TA suggested that –49.5 Mt CO<sub>2</sub> eq per year would better reflect removals from overripe and mature forests. Following discussion with the ERT, Ukraine has produced an interim revised estimate of –48.7 Mt CO<sub>2</sub> eq per year, based on projected removals for the period 2013–2020. Documentation concerning the interim revised estimate can be found in section D of 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**

5. Using data from its GHG inventory for 1990, Ukraine proposed an FMRL of  $-46.6$  Mt CO<sub>2</sub> eq per year. The ERT noted that this is less than the figure for net removals from the forest land remaining forest land category as was reported by the Party for 1990 in its 2011 national inventory report (NIR), which is  $-56.7$  Mt CO<sub>2</sub> eq per year. This is because Ukraine excluded overripe and mature forests from its FMRL, although these have been reported as an active sink for 1990 in the forest land remaining forest land category, and under forest management. Excluding overripe and mature forests from the area used to calculate the FMRL is likely to lead to an underestimation of the FMRL, since according to the NIR these forests account for significant removals amounting to  $-10.1$  Mt CO<sub>2</sub> eq per year (i.e.  $-56.7$  less  $-46.6$ ). The ERT recommended Ukraine to use an area for the estimation of FMRLs consistent with the area reported under forest management activity in the first commitment period. Ukraine's revised interim estimate uses historical area data that are consistent with those used for estimating forest land remaining forest land and forest management in its latest (2011) GHG inventory submission, including submitted supplementary data on LULUCF activities under Article 3, paragraphs 3 and 4, of the Kyoto Protocol.

**2. Age-class structure**

6. Ukraine has used three age-class structures for estimating the emissions/removals from forest management: the age-class structure estimated for the year 2002 is used for the period 1990–2002; the age-class structure estimated for the year 2005 for the year 2005; and the age-class structure estimated for the year 2006 is used for the period 2006–2009. Ukraine has also used the 2006 age-class structure for projecting increments for the period 2010–2020 based on the assumption that the age-class structure will be stable from 2006 onwards. The ERT believes that because the harvesting rates in Ukraine have fluctuated since 1990, the age-class structure in 1990 was probably not the same as that in 2002. However, since Ukraine uses a constant increment rate for all age classes, the assumption will not have affected its FMRL estimate. The supporting documentation for Ukraine's interim revised estimate in section D of the annex provides time-series data and projections for six age classes and corresponding increment data. The ERT welcomes this step, although Ukraine appears to have retained the previous simplified age-class data for the calculations needed to make the interim revised estimate. The ERT notes that there are issues with continuity and consistency in the new time series of age structure, and the revised increment rates are substantially lower than those used for the GHG inventory or for reporting under the Kyoto Protocol for 2009.

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

See paragraph 20 below.

**4. Other elements**Forest management activities already undertaken

7. Ukrainian forests are affected by various management activities and practices such as fire suppression, pest control, thinning and forest restoration.

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

8. Ukraine has used the data from the state special-purpose programme, “Forests of Ukraine”, to project the forest management emissions or removals for the period 2010–2015 and, by extrapolation, for the period 2016–2020. The programme includes reforestation, harvesting and other forest management activities. A list of these activities is provided by Ukraine in its submission.

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

9. Not relevant.

## **C. Pools and gases**

### **1. Pools and gases included in the reference level**

10. Ukraine has included above- and below-ground biomass, dead wood, litter pools and CO<sub>2</sub> emissions from the drainage of organic soils in its FMRL. Ukraine has not included the emissions of non-CO<sub>2</sub> gases from biomass burning in its FMRL, whereas it has included these emissions in its Kyoto Protocol reporting. Ukraine has included non-CO<sub>2</sub> gases in its interim revised estimate.

### **2. Consistency with inclusion of pools in the estimates**

11. Coverage of carbon pools and gases for the estimation of Ukraine’s FMRL is consistent with its current reporting of forest management under Article 3, paragraph 4, of the Kyoto Protocol with the exception of the non-CO<sub>2</sub> gases from biomass burning and the exclusion of the effect on carbon pools of carbon stock changes in overripe and mature forests.

## **D. Approaches, methods and models used**

### **1. Description**

12. Ukraine has estimated its FMRL using methods similar to those used in the reporting of forest management emissions/removals under Article 3, paragraph 4, of the Kyoto Protocol in the first commitment period. Ukraine has used the gain–loss method for all the carbon pools. In estimating the gains in the biomass pool, Ukraine has used a single value of increment applied for all strata identified by stratifying the forest area of Ukraine by climatic zone, region and species type. The biomass losses due to wood harvest and forest fires have been estimated on the basis of an average value for all forests. The data on wood harvest have been obtained from the State Committee on Statistics of Ukraine. The dead wood and litter pools have been estimated using age-dependent parameter values developed by the Ukrainian Research Institute of Forestry and Forest Melioration.

### **2. Transparency and consistency**

13. Ukraine has provided the details of the methods, equations and parameters in its national GHG inventory report in a transparent manner. Ukraine also provided additional information on gains and losses in different carbon pools and the areas used for estimating the FMRL in its submission and responses to the questions raised by the ERT during the TA.

## **E. Description of the construction of the reference level**

### **1. Area under forest management**

14. Ukraine has estimated its FMRL using an area of 7,632.6 million hectares (ha). This is less than the area reported for the forest land remaining forest land or forest management categories in the GHG inventory, which is 8,899.8 million ha. This difference is due to the exclusion of overripe and mature forests from the FMRL. The interim revised estimate addresses this discrepancy.

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

15. As explained in paragraph 14 above, the area used for estimating the FMRL is not consistent with the forest management activity area currently reported under the Kyoto Protocol and that reported as forest land remaining forest land under the Convention. The interim revised estimate addresses this discrepancy.

### **3. Forest characteristics**

16. Forest land in Ukraine is dominated by hardwood broadleaved plantations that account for nearly 43.6 per cent of the total forest area, followed by coniferous and softwood broadleaved forests (42.6 per cent). The most common species are pine, spruce, oak, beech, birch, alder and aspen.

### **4. Historical and assumed harvesting rates**

17. In calculating the FMRL, the 1990 historical harvesting rate has been used, leading to a carbon loss of 4.061 Mt C per year. The information provided with the interim revised estimate includes the projected harvesting rates up to 2020 that were used to estimate the FMRL.

### **5. Harvested wood products**

18. Ukraine has assumed instantaneous oxidation of harvested wood products (HWP) in its estimation of the FMRL.

### **6. Disturbances in the context of force majeure**

19. Ukraine assumes no significant impact of force majeure events on the forest management emissions.

### **7. Factoring out**

20. With the present state of scientific knowledge, the effects of elevated CO<sub>2</sub> concentrations and indirect nitrogen deposition are considered to occur both in the reference level and in the commitment period estimates and therefore they can be assumed to factor out. The dynamic age-class effects will remain over any given commitment period but may eventually be removed from accounting by being cancelled out over successive commitment periods.

## **F. Policies included**

21. As Ukraine's proposed FMRL is set at the historical emission level of 1990, the policies developed from 1990 onwards have no impact on it.

### III. Conclusions and recommendations

22. Through its FMRL submission and subsequent responses and interactions with the ERT, Ukraine has provided transparent information on the methods, assumptions and data used for estimating its FMRL.

23. To address the problem referred to in paragraph 5 above, the ERT recommends that Ukraine ensure consistency between areas used for estimating its FMRL and the forest land remaining forest land category for reporting under the Convention, and the current reporting of forest management for the first commitment period under the Kyoto Protocol, which means that overripe or mature forests should be included in the FMRL.

24. The ERT also recommends that Ukraine develop and use age-dependent biomass increment rates and other parameters that should be applied to the actual age-class structure for 1990 instead of the one for 2002. If the age-class structure for the year 1990 is not available, Ukraine could consider deriving it from the 2002 value by using the annual harvesting rates from 1990 to 2002.

25. During the TA the ERT noted that both these issues could be addressed by using an average value of biomass increment, suitable for the entire area under forest management for 1990, derived by averaging values reported by comparable countries with similar climate conditions and forest types, using the whole forest area reported for 1990 in the forest land remaining forest land category in their 2011 GHG inventories. A calculation of this type is set out in section C of the annex. The resulting value is  $-49.51$  Mt CO<sub>2</sub> eq per year for the FMRL assuming instantaneous oxidation of HWP, rather than  $-46.6$  Mt CO<sub>2</sub> eq per year as originally proposed.

26. The ERT notes that although omission is conservative, Ukraine should consider including the non-CO<sub>2</sub> gases in its FMRL estimations as it does for the reporting of the forest management emissions/removals under the Kyoto Protocol in order to maintain consistency with the treatment of forest management in the first commitment period.

27. The ERT notes that Ukraine has provided an interim revised FMRL based on new research, which goes some way to addressing these recommendations, as noted above (see paragraphs 5, 14 and 15, as well as paragraph 6). The ERT notes that the FMRL originally proposed ( $-46.6$  Mt CO<sub>2</sub> eq per year), the illustrative calculation by the ERT ( $-49.5$  Mt CO<sub>2</sub> eq per year) and Ukraine's interim revised estimate ( $-48.7$  Mt CO<sub>2</sub> eq per year) are within about 6 per cent of each other. The ERT encourages Ukraine to complete its research in order to produce a revised estimate that is fully self-consistent and consistent with its GHG inventory, and to propose a technical correction to the original estimate when this has been done.

## **Annex**

### **Documents and information used during the technical assessment**

#### **A. Reference documents**

Submission of information on forest management reference levels by Ukraine, 14 March 2011. Available at  
<[http://unfccc.int/files/meetings/ad\\_hoc\\_working\\_groups/kp/application/pdf/awgkp\\_ukraine\\_2011.pdf](http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_ukraine_2011.pdf)>.

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

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



## B. Additional information provided by the Party<sup>1</sup>

### 1. Areas covered by Forest Management for Ukraine

	<b>Table 1</b>													
	<b>1990</b>	<b>1991</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>
<b>Polyesye</b>	2514,8	2526,6	2526,5	2537,8	2548,3	2568,0	2565,8	2568,4	2585,4	2590,3	2593,4	2596,8	2597,4	2598,5
<b>Wooded Steppe</b>	2665,5	2676,6	2672,7	2668,8	2677,3	2704,5	2698,6	2704,6	2663,5	2671,5	2704,2	2706,7	2722,2	2723,9
<b>North Steppe</b>	796,1	797,8	792,3	793,3	798,8	763,1	753,4	755,0	742,2	747,2	748,1	744,6	750,2	751,2
<b>South Steppe</b>	215,5	215,7	212,6	215,1	215,4	187,5	189,0	196,9	178,8	181,6	179,2	179,3	184,2	187,7
<b>Carpatian Mts.</b>	1357,8	1365,5	1362,0	1356,8	1358,6	1376,2	1378,2	1377,3	1400,7	1400,4	1399,6	1401,1	1400,8	1405,4
<b>Crimea Mts.</b>	82,8	83,7	82,8	85,2	82,8	86,0	86,6	86,8	88,1	89,0	89,0	89,0	90,5	90,7
<b>Total</b>	<b>7632,6</b>	<b>7666,0</b>	<b>7648,8</b>	<b>7657,0</b>	<b>7681,2</b>	<b>7685,4</b>	<b>7671,5</b>	<b>7689,1</b>	<b>7658,7</b>	<b>7679,9</b>	<b>7713,5</b>	<b>7717,6</b>	<b>7745,2</b>	<b>7757,5</b>
	<b>2004</b>	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2020	
<b>Polyesye</b>	<b>2600,0</b>	2712,0	2746,2	2741,7	2736,9	2737,3	2737,3	2768,7	2803,7	2846,0	2892,4	2943,2	2984,4	
<b>Wooded Steppe</b>	<b>2725,1</b>	2698,3	2699,8	2692,9	2681,7	2672,7	2672,7	2703,4	2737,6	2778,9	2824,2	2873,7	2913,9	
<b>North Steppe</b>	<b>751,0</b>	797,6	786,8	784,2	777,1	758,4	758,4	767,1	776,8	788,5	801,3	815,4	826,8	
<b>South Steppe</b>	<b>186,6</b>	241,7	246,5	246,3	233,6	229,8	229,8	232,4	235,4	238,9	242,8	247,1	250,5	
<b>Carpatian Mts.</b>	<b>1404,2</b>	1289,4	1288,4	1287,8	1287,2	1286,9	1286,9	1301,6	1318,1	1338,0	1359,8	1383,6	1403,0	
<b>Crimea Mts.</b>	<b>90,2</b>	152,7	213,0	211,9	211,0	209,2	209,2	211,6	214,3	217,5	221,1	224,9	228,1	
<b>Total</b>	<b>7757,0</b>	7891,8	7980,8	7964,8	7927,5	7894,3	7894,3	7984,9	8085,8	8207,8	8341,6	8488,0	8606,7	

<sup>1</sup> Reproduced as received from the Party.

**C. Suggested revised value for the forest management reference level**

Net greenhouse gas (GHG) removals for forest land remaining forest land (which is the same as that reported for forest management under the Kyoto Protocol) in 1990 from Ukraine’s 2011 national inventory report: –56.7 million tonnes of carbon dioxide equivalent (Mt CO<sub>2</sub> eq) per year.

Area under forest land remaining forest land (forest management) in 1990: 8,899.84 kilohectares.

Average gain in carbon stock in living biomass assumed by Ukraine consistent with this estimate: 2.02 tonnes of carbon (t C) ha<sup>-1</sup> per year.

Average gain in carbon stock in living biomass suggested by averaging the value with neighbouring countries: 1.799163 t C ha<sup>-1</sup> per year.

Net CO<sub>2</sub> emissions from forest management using average gain in carbon stock in living biomass from neighbouring countries (table 2): –49.51 Mt CO<sub>2</sub> eq.

**3. Net CO<sub>2</sub> emissions from forest management using average gain in carbon stock in living biomass from neighbouring countries**

Table 2

GREENHOUSE GAS SOURCE AND SINK CATEGORIES	ACTIVITY DATA		IMPLIED CARBON-STOCK-CHANGE FACTORS					CHANGES IN CARBON STOCK					Net CO <sub>2</sub> emissions/removals		
	Sub-division	Area (kha)	Carbon stock change in living biomass per area <sup>(9)</sup>			Net carbon stock change in DOM per area	Net carbon stock change in soils per area		Carbon stock change in living biomass			Net carbon stock change in DOM		Net carbon stock change in soils	
			Gains	Losses	Net change		Mineral soils	Organic soils	Gains	Losses	Net change			Mineral soils	Organic soils
			(Mg C/ha)					(Gg C)					(Gg)		
Forest Management: Forest Land remaining Forest Land	8,899.84	169.50	1.80	-0.46	1.34	0.19	NO	-0.68	16,012.26	-4,060.39	11,951.87	1,666.81	NO	-115.26	-49,512.55

## D. Interim revised estimate submitted by Ukraine on September 2, 2011

### Responses to initial draft report of the individual technical assessment of the forest management reference level submission of the Ukraine submitted in 2011

Ukraine indicated the reference level in original submission “Submission under the Ad-hoc Working Group on Further Commitments for Annex I Parties under Kyoto Protocol (AWG-KP)” – 46.6 Mt CO<sub>2</sub>-e. After consideration of Ukrainian FMRL report, the “Report of the individual technical assessment of the forest management reference level submission of Ukraine submitted in 2011” was prepared by ERT. In the draft report the ERT makes five recommendations and comments and proposed the adjusted RL – 49.5 Mt CO<sub>2</sub>-e. Ukraine responded to these recommendations and changed RL was received – 48.7 Mt CO<sub>2</sub>-e which is higher than previous 4.3% and lower than proposed by ERT 1.7%. However, the special researches in Ukraine have started and will be completed in 2011, so the proposed value of reference value will be able some change. In case of changes of FMRL after the completion of research, the updated value with reason will be announced.

#### Response to ERT recommendations

##### Recommendation a states:

*The ERT recommends that Ukraine ensures consistency between areas used for estimating its FMRL and forest land remaining forest land for reporting under the Convention, and the current reporting of forest management for the first commitment period under the Kyoto Protocol, which means that over-ripe or mature forests should be included in the FMRL (see the second comment in para “Conclusions and Recommendations”).*

##### Response

Ukraine has started and is currently completing new research on the establishment geodata base for preparing the reporting on the activities under paragraphs 3 and 4 of Article 3 of the Kyoto Protocol. Area data with the corresponding activities have used for the preparation the submission 2011. Now the latest data already has used for the calculation FMRL. These area values are the same as indicated in CRF for LULUCF (5A.1 Forest Land remaining Forest Land) and for KP-LULUCF (NIR 2 Forest Management). These values (see tab. 1) included all area of Ukrainian managed forest.

Table 1. Area of Forest Management per age classes, k ha

Year	Age classes						Total*
	up 20	up 40	up 60	up 80	up 100	up 120	
1990	565,84	1409,22	4124,53	1421,71	1049,37	329,17	8899,84
1991	560,75	1415,86	4143,97	1428,41	1054,32	330,72	8934,04
1992	553,68	1414,01	4139,49	1427,48	1053,21	329,75	8917,62
1993	547,56	1417,34	4144,15	1430,92	1055,64	330,75	8926,36
1994	543,09	1422,44	4159,54	1436,18	1058,72	331,25	8951,21
1995	535,67	1418,79	4171,68	1444,51	1057,81	327,63	8956,09
1996	527,49	1418,23	4169,23	1443,29	1057,20	327,60	8943,04
1997	523,40	1422,87	4179,75	1445,58	1059,99	329,74	8961,33
1998	519,92	1414,62	4161,80	1448,63	1059,84	326,55	8931,35
1999	518,05	1418,12	4173,85	1451,78	1063,02	328,10	8952,90
2000	516,06	1421,53	4198,60	1455,84	1065,97	328,90	8986,90
2001	512,96	1421,92	4202,94	1457,47	1066,86	329,10	8991,25
2002	508,75	1426,18	4221,01	1460,91	1070,80	331,64	9019,29
2003	628,28	1450,13	2934,24	2147,07	1124,66	747,43	9031,81

Year	Age classes						Total*
	up 20	up 40	up 60	up 80	up 100	up 120	
2004	621,65	1451,21	2936,66	2149,05	1125,48	747,62	9031,66
2005	616,95	1452,69	2941,34	2152,39	1126,74	748,07	9038,19
2006	602,00	1389,22	2986,45	2144,18	1152,57	759,09	9033,50
2007	582,49	1387,67	2989,56	2146,07	1153,31	759,35	9018,45
2008	559,19	1378,84	2985,78	2145,95	1153,17	759,32	8982,26
2009	538,19	1363,93	2987,77	2147,25	1153,57	759,61	8950,32
2010	531,18	1347,09	2987,47	2147,71	1153,86	759,78	8927,10
2011	520,72	1339,83	2987,47	2147,71	1153,86	759,78	8909,38
2012	511,45	1316,91	2987,47	2147,71	1153,86	759,78	8877,18
2013	485,91	1275,65	2987,47	2147,71	1153,86	759,78	8810,38
2014	457,58	1234,25	2981,12	2147,71	1153,86	759,78	8734,31
2015	421,76	1186,91	2956,57	2147,71	1153,86	759,78	8626,60
2020	399,70	1157,71	2939,37	2147,71	1153,86	759,78	8558,13

Area values for 1990-2009 were used for calculation of carbon stock change in Forest Land remaining Forest Land (LULUCF, 5A.1-CRF) and in Forest Management (3.4 KP-LULUCF, NIR 2 & 5(KP-I)B.1-CRF). The area for projected period based on the prediction indexes of State programme "Forests of Ukraine 2010-2015".

**Recommendation states:**

*The ERT recommends that Ukraine develop and use age-dependent biomass increment rates and other parameters to be applied to the actual age-class structure for the year 1990 instead of that one for 2002. In case the age-class structure for the year 2002 is not available, Ukraine could consider deriving it from the 2002 value by using the annual harvest rates from 1990 to 2002. (see the third comment in para "Conclusions and Recommendations").*

**Response**

Ukraine has used three age class structures for estimating the emissions/removals from forest management: 2002 for 1990-2002; 2005 for 2005; and 2006 for 2006-2009. Ukraine has also used the 2006 age class structure for projecting forward for the period 2010-2020 based on the assumption that the age class structure will be stable from 2006 onwards. According ERT recommendation also was included information about annual harvesting: values of carbon losses of harvesting was excluded together with carbon increasing in live biomass for afforestation area and rest of the cutting were included in forest management (see tab. 3 below).

**Recommendation states:**

*The ERT recommends that "For the time being, both these issues could be addressed by using an average value of biomass increment, suitable for the entire area under forest management for the year 1990, derived by averaging with values reported by comparable countries with similar climate conditions and forest types, using the whole forest area reported for the year 1990 as forest land remaining forest land in their 2011 GHGs. A proposed value is set out below in Appendix III<sup>2</sup>. When Ukraine has available a new methodology then a technical correction should be applied." (see the forth comment in para "Conclusions and Recommendations").*

**Response**

Ukraine appreciates to ERT for good advice, but the national values of coefficients for annual carbon increasing were used for preparing of new value the FM. These coefficients are the results of scientist research which has been started and is conducting in Ukraine (see tab. 2). The Ukrainian FMRL will be able correct after total complete this research.

Table 2. Coefficients of carbon increasing in different pools of forest management

<sup>2</sup> The RL vale proposed by ERT is indicated in the first paragraph of this document.

Biomass increment per age-class structure, t/ha/year										
Tree species	20	40	60	80	100	120	140	160	180	200
Conifers (pine in Wooded Steppe) <sup>3</sup>	2,54	3,38	3,29	3,15	2,96	2,71	2,4	2,06	1,71	1,4
Deciduous (beech in Crimea Mts.) <sup>4</sup>	6,75	5,28	3,25	2,37	1,54	1,2	0,7			
The increasing of carbon in forest litter per age-class structure, t C/ha/year <sup>2</sup>										
Tree species	10 <	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	
Conifers	0,1	0,09	0,07	0,06	0,04	0,03	0,01	0	-0,01	
Deciduous	0,08	0,05	0,03	0,03	0,02	0,02	0,02	0,01	0,01	
Wood Stock in pool of dead biomass per cycle of research and forest type, m <sup>3</sup> /ha <sup>5</sup>										
Research cycle	D <sub>2</sub> -Д*		B <sub>2</sub> -C*		C <sub>2</sub> -Д		C <sub>2</sub> -C		Total	
	1**	2**	1	2	1	2	1	2	1	2
1999-2002	8.1	5.0	8.3	0.6	2.2	0.0	14.2	4.5	8.8	3.9
2003-2006	9.3	7.8	3.6	6.2	5.9	6.7	7.6	16.9	7.5	7.0

\* “Д” – Deciduous; “C” – Conifers.

\*\* 1 - dead standing trees; 2 – deadfallen wood

#### Recommendation states:

*The ERT recommends that Ukraine should consider to include the non-CO<sub>2</sub> gases in its FMRL estimations as it does for the reporting of the forest management emissions/removals under the Kyoto Protocol in order to maintain consistency with the treatment of forest management in the first commitment period. (see the fifth comment in para “Conclusions and Recommendations”).*

#### Response

Ukraine agrees with this ERT recommendation. All emissions have included in GHG emissions from wildfire. The total emission value has included in FMRL as indicated in tab. 3.

Table 3. Emissions in Forest management of Ukraine, Gg CO<sub>2</sub>-e

year	Wildfire,	Harvesting (exclude 3.3)	Dry of soils	Total

<sup>3</sup> From studies by V.P. Pasternak in article: Біопродуктивність лісів північного сходу України в контексті зміни клімату. – дис. на здобуття наукового ступеню доктора сільськогосподарських наук. Київ, 2011, 350 с.

<sup>4</sup> From studies by V.I. Rogovyi in article: Ткач В. П. Моделювання ходу росту букових деревостанів Криму / В. П. Ткач, В. І. Роговий, В. П. Пастернак // Лісівництво і агролісомеліорація. – Х. : УкрНДЦЛГА, 2009. – Вип. 115. – С. 80–89.

<sup>5</sup> From studies by V.P. Pasternak in article: В.П. Пастернак, В.Ю. Яроцький. Запаси та динаміка відмерлої деревини у лісах північного сходу України.// Науковий вісник Національного університету біоресурсів і природокористування України / Серія «Лісівництво та декоративне садівництво» / – К., 2010. – Вип. 152, ч. 2. – С. 93-100.

1990	95,51	14888,79	422,62	15406,92
1991	55,52	12710,16	422,62	13188,31
1992	137,57	13186,40	422,62	13746,59
1993	188,36	13169,32	443,07	13800,75
1994	538,87	12416,66	444,31	13399,85
1995	162,68	12279,40	445,81	12887,88
1996	429,37	14524,59	444,81	15398,76
1997	30,24	14278,43	446,06	14754,73
1998	157,86	12144,12	450,05	12752,02
1999	209,28	11850,74	454,04	12514,06
2000	39,18	13420,74	458,03	13917,94
2001	161,30	14084,77	462,01	14708,08
2002	127,53	15479,79	464,67	16071,99
2003	64,00	16817,44	468,44	17349,88
2004	9,99	18237,51	469,22	18716,71
2005	59,77	18051,87	469,99	18581,63
2006	101,75	18721,79	475,98	19299,52
2007	1202,31	20043,82	467,00	21713,13
2008	382,56	18645,57	458,03	19486,16
2009	172,27	16736,44	479,22	17387,93
2010	172,27	15618,01	479,22	16269,5
2011	172,27	15731,22	479,22	16382,71
2012	172,27	15785,94	479,22	16437,42
2013	172,27	15809,76	479,22	16461,25
2014	172,27	15907,38	479,22	16558,86
2015	172,27	15911,17	479,22	16562,66
2020	172,27	15911,17	479,22	16562,66

### Conclusion

The calculation methodology of FMRL preparation is in the line with the previous original submission of FMRL and with all inventory submissions which were send to Secretariat of UNFCCC and GPG LULUCF, 2003. The national politics for manage practice in forest for future period considered in preparing on FMRL and based on State programme "Forests of Ukraine 2010-2015".

Total values of CO<sub>2</sub> absorption, emission and budget value are shown in tab. 4.

Table 4. The CO<sub>2</sub> budget in forest management, Gg CO<sub>2</sub>

	Live biomass	Litter	Dead wood	Total absorption	Total emission	Budget
1990	-62417,7	-180,7	-5139,7	-67738,1	15406,9	-52331,2
1991	-62651,2	-181,1	-5159,4	-67991,7	13188,3	-54803,4
1992	-62527,9	-180,4	-5149,9	-67858,2	13746,6	-54111,6
1993	-62547,2	-180,3	-5155,0	-67882,5	13800,7	-54081,8
1994	-62706,0	-180,5	-5169,3	-68055,8	13399,8	-54656,0
1995	-62822,0	-180,1	-5172,1	-68174,2	12887,9	-55286,3
1996	-62731,8	-179,5	-5164,6	-68075,9	15398,8	-52677,2

	Live biomass	Litter	Dead wood	Total absorption	Total emission	Budget
1997	-62836,1	-179,7	-5175,2	-68190,9	14754,7	-53436,2
1998	-62715,8	-178,7	-5157,9	-68052,3	12752,0	-55300,3
1999	-62845,7	-178,9	-5170,3	-68194,9	12514,1	-55680,9
2000	-63071,2	-179,4	-5189,9	-68440,6	13917,9	-54522,7
2001	-63099,1	-179,4	-5192,4	-68470,9	14708,1	-53762,8
2002	-63268,7	-179,6	-5208,6	-68657,0	16072,0	-52585,0
2003	-62619,8	-160,4	-5215,9	-67996,1	17349,9	-50646,2
2004	-62605,9	-160,1	-5215,8	-67981,8	18716,7	-49265,1
2005	-62628,1	-160,0	-5219,6	-68007,7	18581,6	-49426,0
2006	-62539,2	-158,0	-5216,8	-67914,1	19299,5	-48614,6
2007	-62406,2	-156,8	-5208,2	-67771,2	21713,1	-46058,1
2008	-62160,1	-155,0	-5187,3	-67502,3	19486,2	-48016,2
2009	-61944,2	-153,2	-5168,8	-67266,3	17387,9	-49878,3
2010	-61794,9	-152,1	-5155,4	-67102,4	16269,5	-50832,9
2011	-61653,9	-151,1	-5145,2	-66950,2	16382,7	-50567,5
2012	-61430,6	-149,7	-5126,6	-66706,9	16437,4	-50269,5
2013	-60946,2	-146,8	-5088,0	-66181,0	16461,2	-49719,7
2014	-60405,2	-143,6	-5044,1	-65592,8	16558,9	-49034,0
2015	-59660,1	-139,4	-4981,9	-64781,3	16562,7	-48218,7
2020	-59184,6	-136,9	-4942,3	-64263,9	16562,7	-47701,2

Value of proposed reference level -48668,4 Gg CO<sub>2</sub>-eq. The proposed values are averages of the projected FM data series for the period 2013-2020, taking account of policies implemented before April 2009. Ukraine will be able correct reference level after completing the special researches about values of coefficients for carbon stock change of pools in managed forest. These researches had started and is completing in 2011.