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**Report of the technical assessment of the forest management  
reference level submission of Ireland 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 Ireland 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 23 to 27 May 2011 in Bonn, Germany, and was coordinated by the UNFCCC secretariat. The TA was conducted by the following team of nominated land use, land-use change and forestry experts from the UNFCCC roster of experts: Mr. N.H. Ravindranath (India); Mr. Robert Waterworth (Australia); Mr. Walter Oyhantcabal (Uruguay); Ms. Naoko Tsukada (Japan); Mr. Lucio Santos (Colombia) and Ms. Marina Vitullo (Italy). Mr. N.H. Ravindranath and Mr. Robert Waterworth were the lead reviewers. The TA was coordinated by Ms. María José Sanz-Sánchez (UNFCCC secretariat).

2. In accordance with the: “Guidelines for review of submissions of information on forest management reference levels” (decision 2/CMP.6, appendix II, part II), a draft version of this report was communicated to the Government of Ireland, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

### **B. Proposed reference level**

3. Ireland has proposed an FMRL of  $-0.14207$  million tonnes of carbon dioxide equivalent (Mt CO<sub>2</sub> eq) per year by applying first-order decay function for harvested wood products (HWP), and  $-0.00798$  Mt CO<sub>2</sub> eq per year by assuming instantaneous oxidation of HWP.

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

### **A. Overview**

4. Ireland’s proposed FMRL is based on a ‘business as usual’ projection approach for the period 2013–2020. The reported FMRL is estimated using forecasting models constructed mainly using data from the national forest inventory (NFI) and the forest management plan prescribed by Coillte (the State forest company). The forecasted harvesting rate is based on policies implemented before December 2009 only. The projected values include estimated emissions from wildfires, which are part of the background level of non-human-induced emissions and would not be of sufficient magnitude to qualify as force majeure disturbances.

### **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. Ireland provided historical emission/removal data from the forest land remaining forest land category and from land converted to forest land in its latest annual greenhouse gas (GHG) inventory submission for the period 1990–2009. Since Ireland did not elect to

account for the emissions/removals from forest management under Article 3, paragraph 4, of the Kyoto Protocol during the first commitment period, emissions/removals from forest management are not included in its common reporting format. However, Ireland did present assumed removals from forest management under Article 3, paragraph 4, of the Kyoto Protocol during the period 1990–2009 as reference information in its FMRL submission and its national inventory report (NIR) for 2011. The FMRL was constructed taking into account these historical data in a consistent way.

## **2. Age-class structure**

6. The projected emissions in Ireland are mainly driven by the age-class structure of the forests and Coillte's prescribed rotation cycle. A large proportion of forest land in Ireland has been established from 1920s. These forests are managed on a rotation cycle of around 40 to 60 years. The age-class structure of planted forestry in Ireland shifted gradually from a younger age-class distribution to an older age-class distribution during the mid- to late twentieth century, and then reversed to the younger age-class distribution by 2006, as a result of felling and replanting in pre-1990 forests. Ireland projects that the average age-class will continue to decline until 2012, before increasing again by 2020. This projected shift of age-class structure influences the future emissions under forest management by decreasing the annual biomass increment, and causing a decrease in the dead-wood carbon pool due to the residual decomposition of harvest residue following the first rotation.

7. The expert review team (ERT) considered the information provided by Ireland valid and documented in a transparent manner.

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

8. This is achieved by the provisions for factoring out, which are outlined below (see paragraph 28).

## **4. Other elements**

### Forest management activities already undertaken

9. Ireland did not elect to account for forest management during the first commitment period of the Kyoto Protocol. To construct its FMRL, Ireland interpreted the definition of forest management under Article 3, paragraph 4, of the Kyoto Protocol as all systems of practices implemented in a managed forest. This definition results in all the forest area established before 1990 being defined as forest management area, unless it has been deforested. The effects of activities already undertaken in the forest management area such as harvesting and replanting are reflected appropriately in the construction of the FMRL.

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

10. In Ireland, 89 per cent of the forest management area is managed by Coillte following its forest management plan. For this part of the forest management area, projected forest management activities under a 'business as usual' scenario are based on the future forecasted harvesting volume and management plans prescribed by Coillte. During the centralized review, Ireland provided further information explaining that these harvesting forecasts are based on Coillte's actual rotation cycle and since Coillte is a commercial company, rotation age is primarily driven by the need to maximize the return from investment while taking into account relevant national policies and regulations for sustainable forest management. The ERT concludes that there is no bias in the 'business as

usual' scenario and that it is appropriate to apply this forecasting as a 'business as usual' scenario.

11. The rest of the forest management area (11 per cent) is privately owned. Information on harvest and management plans for private forests in pre-1990 forests is currently not available. Therefore, Ireland has assumed that there is no harvest from the private forests during the period 2013–2020. The ERT concludes that this approach will result in conservative estimates for the FMRL.

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

12. Not relevant.

## C. Pools and gases

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

13. Ireland includes all five carbon pools: above- and below-ground living biomass, litter, dead wood and soil in its FMRL. Nitrous oxide (N<sub>2</sub>O) and methane (CH<sub>4</sub>) emissions from biomass burning are only reported under the above- and below-ground biomass carbon pools. This is consistent with 2011 NIR.

14. Information about N<sub>2</sub>O emissions due to drainage of forest land was not provided in the initial submission. In response to the question posed by the ERT regarding this, Ireland provided additional information about the source of the emissions and included them in the FMRL, thereby improving completeness and consistency.

### 2. Consistency with inclusion of pools in the estimate

15. The pools in the FMRL are consistent with current reporting in the 2011 NIR.

## D. Approaches, methods and models used

### 1. Description

16. To estimate emissions in the five carbon pools in a consistent way, Ireland used CARBWARE (the Irish carbon reporting system) to estimate its FMRL. CARBWARE uses growth models and research information from the present and previous COFORD programmes<sup>1</sup> funded projects. The model describes changes in biomass carbon stocks based on tree-level allometric functions and stocking for representative species, according to Forestry Commission yield models. The model also simulates changes in carbon stock in the litter and dead-wood [carbon?] pools. Mineral soil stock changes were assumed to be at a steady state following a land-use transition into forestry. Peat soils are assumed to be a source of CO<sub>2</sub> and are calculated using a tier 2 emissions factor.

17. The ERT considers Ireland's approach, method and models to be in line with the Intergovernmental Panel for Climate Change (IPCC) *Good Practice Guidance for Land Use, Land-Use Change and Forestry*. Details of the model construction are provided in 2011 NIR.

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<sup>1</sup> Competitive Forest Research for Development (COFORD) was previously called the Council for Forest Research and Development. See <<http://www.coford.ie/aboutcoford/>> for further information.

## **2. Transparency and consistency**

18. Ireland provided information in a transparent and consistent way in its submission. Historical data was consistent with its latest annual GHG inventory and methodology and parameters used in the future projection are consistent with its annual GHG inventory and with IPCC guidance.

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

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

19. Since Ireland defined all forest land excluding afforested land after 1990 as forest management land, forest management areas are initially determined at 1990 levels and can only decrease over time due to deforestation events. The average deforestation rate of 427 ha per year, for the period 1990–2009 (2011 NIR), was used for the projected forest management area. It is assumed that the total area of forest management will be 442.59 kha in 2020. During the review, the ERT recognized some inconsistencies between the values provided in Ireland's submission and that of its 2011 NIR. The ERT also found that the forest management area had been miscalculated. Ireland recalculated these estimates and the ERT concluded that the revised estimates provided during the review were consistent with 2011 NIR.

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

20. As described above, Ireland defined forest management as all systems of practices implemented in managed forests under the Convention. The total area to be reported under the Kyoto Protocol, including forest management land and afforestation and reforestation land, is equal to the total area of forest land reported under the Convention. This relationship and the areas in each subcategory for the period 1990–2009 are presented transparently in the revised FMRL submission and are consistent with 2011 NIR.

### **3. Forest characteristics**

21. Most of the forest land in Ireland has been established from 1920s through the introduction of national afforestation programmes. The age class of forests is generally young. The main species in pre-1990 planted forests are lodgepole pine and Sitka spruce. These species are managed on mean rotation ages of around 40–60 years to maximize the commercial return. A large proportion of these forests were planted in the mid-1900s. Ireland forecasts that these forests will reach the second rotation age during the period 2006–2012, and will then shift to an older stage towards 2020.

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

22. Ireland's historical harvesting rate was obtained from the United Nations Economic Commission for Europe/Food and Agriculture Organization of the United Nations. All harvested timber was assumed to come from the pre-1990 forests until the end of the 2006. In 2007, limited harvest (thinning) in the afforested and reforested forests was initiated. The amount of timber from afforested and reforested forests is subtracted from the harvesting data. Harvesting volume in the forest management area has been fluctuating annually in the period 1990–2008, but this has been in an overall increasing trend towards 2003, before decreasing subsequently towards 2008. Average harvesting volume over the period 1990–2008 was 2.643 million m<sup>3</sup>.

23. Projected harvesting volume for the period 2009–2020 is delivered from the Coillte’s stand level data/NFI sample plots data and management plans. To project future harvesting volume, Ireland applies this management plan as a ‘business as usual’ scenario. Since harvesting data is unavailable for private forests, Ireland assumed that no harvest will occur in these areas. As noted in paragraph 11 above, this is a conservative assumption.

24. Annual harvesting volumes in the period 2009–2020 are projected to increase. To eliminate fluctuations in the harvesting estimate, the forecast over the period 2015–2020 was smoothed. The average harvest volume for the period 2009–2020, based on the smoothed data, is 2.491 million m<sup>3</sup>. The ERT agreed that this smoothing approach is consistent with the methods applied by Coillte to smooth timber harvesting volumes.

## 5. Harvested wood products

25. Ireland provided an estimation of emissions from the HWP pool during the period 2010–2020 for each of the four major product categories (pulpwood, sawlog, wood-based panel and sawn wood) using the first-order decay approach. To establish a basis for the inclusion of emissions from HWP arising only from domestic harvest in the forest management area under the Article 3, paragraph 4, of the Kyoto Protocol over the period 2013–2020, Ireland estimated the annual production of HWP over the same period. Production of HWP in the period 2010–2020 was estimated by establishing a relationship between domestic round wood harvest in the forest management area of the two top diameter assortments<sup>2</sup> (pulpwood and sawlog) for the years 2005–2009 inclusive and wood-based panel and sawn-wood production, respectively. This relationship was then applied to the projected level of harvest of the two assortments over the period 2013–2020, to arrive at an estimate of HWP production in those years.

26. Projected emissions/removals from HWP using the first-order decay approach is 207.25 Gg CO<sub>2</sub> of emissions in 2013 and –270.91 Gg CO<sub>2</sub> of removal in 2020. Removals from HWP in Ireland’s proposed FMRL is –134.091 Gg CO<sub>2</sub> being listed as the average for the period 2013–2020.

## 6. Disturbances in the context of force majeure

27. Ireland has included the background level of emissions caused by natural disturbances in its FMRL to maintain consistency between the reference level and the accounting in the commitment period. However, Ireland does not take into account any specific disturbances in the context of force majeure. The only natural disturbances taken into account in the FMRL were CO<sub>2</sub>, CH<sub>4</sub> and N<sub>2</sub>O emissions from wildfires. Projected emissions from wildfires were estimated using the annual emission in 2008 (12.0 Gg CO<sub>2</sub>) as a background emission. The ERT recognized that, considering the high inter-annual variation in historical data of emissions from wildfires provided by Ireland during the period 1990–2009, choosing the 2008 emissions value as the background emissions level is a conservative approach.

## 7. Factoring out

28. 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<sub>2</sub> concentrations and indirect nitrogen deposition are considered to be approximately the same in the reference level and in the estimated period (i.e. the commitment period), and therefore they can be assumed to factor out.

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<sup>2</sup> Top diameter assortments correspond to the classification of round wood based on the size of the diameter of the upper cross-sectional surface. These are used to determine the types of product obtainable from total round wood.

## **F. Policies included**

### **1. Description of policies**

29. In its submission on its FMRL, Ireland does not include any specific information regarding national policies established by the government to guide the forestry sector. Responding to the questions from the ERT, Ireland has indicated that there are policies and regulations governing forest management. These have been included in a revised submission:

(a) Under the Forestry Act (1946), all tree felling is a licensed activity. With a few exceptions (in the case of specified exempted activities such as public-road construction and utility installation), any person or company wishing to harvest forestry must obtain a felling licence from the Department of Agriculture, Fisheries and Food beforehand. There are penalties for non-compliance. Factors taken into account when issuing licences include the European Union (EU) Habitats Directive; the EU Water Framework Directive; archaeology legislation and effects on the landscape, as well as silvicultural considerations such as rotation length, suitability for thinning and owners' objectives.

(b) National forest policy is set out in *Growing for the Future* (1996), supported by the *Irish National Forest Standard* (NFS) (2000) and the *Code of Best Forest Practice* (CBFP) (2000). These policies and compliance standards incorporate sustainable forest management measures and indicators together with environmental guidelines, such as those on water quality, archaeology, landscape, biodiversity and forest protection. Compliance with the NFS, CBFP and environmental guidelines is mandatory for all forestry operations which require consent or licence. All these policies and regulations have been implemented before December 2009 and it is assumed that they will continue until 2020. The FMRL was formulated based on the Coillte harvesting forecast for round wood production to 2020, which was published in 2006. This forecast is driven by silvicultural considerations, mainly thinning and rotation age under the sustainable forest management and environmental guidelines outlined in the policies above.

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

30. Economic impacts are not included in the model assumption. The aim of forest management in Ireland is to provide a constant level of wood supply to the forest products industry. Increased demand for wood energy is envisaged in national policies; however, Ireland explained that since wood for energy use is mainly supplied from afforested and reforested areas in its forecast, this is not considered to have an impact on the FMRL.

## **III. Conclusions and recommendations**

31. The ERT commends Ireland for providing prompt responses and clarifications to the questions raised during the centralized review, and notes that Ireland calculated its FMRL in a consistent and transparent manner.

32. Some inconsistencies and errors found by the ERT during the centralized review included an inconsistency in the forest management area between Ireland's FMRL submission and its 2011 NIR and the omission of N<sub>2</sub>O emissions from the drainage of forest land. These issues were addressed by Ireland during the review and correct data was provided in their revised submission.

33. The ERT notes that Ireland has a comprehensive carbon accounting system using the tier 3 model and methodology and that parameters used in the model can be updated in the



future. The ERT encourages Ireland to continue its effort to improve its forest carbon accounting system and also encourages the Party to apply a technical adjustment to its FMRL when methodological changes have been applied to ensure consistency with the NIR.

## Annex

### Documents and information used during the technical assessment

#### A. Reference documents

Submission of information on forest management reference levels by Ireland, 18 April 2011. Available at <[http://unfccc.int/files/meetings/ad\\_hoc\\_working\\_groups/kp/application/pdf/awgkp\\_ireland\\_2011.pdf](http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_ireland_2011.pdf)>.

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

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

Böttcher, H, Kurz, WA, Freibauer A. 2008. Accounting of forest carbon sinks and sources under a future climate protocol — factoring out past disturbance and management effects on age-class structure. *Environmental Science and Policy*. 11(8): pp. 669–686 (only abstract).

#### B. Additional information provided by the Party

Additional forest data and information from Ireland to accompany the informal submission by Sweden on behalf of the European Community and its member States on forest data (November 2009). Available at <<http://www.coford.ie/media/coford/content/toolsservices/euforestdata-nov09.pdf>>.

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