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**Report of the technical assessment of the forest management  
reference level submission of Iceland 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 Iceland on its forest management reference level (FMRL), submitted on 24 February 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. Nagmeldin G. Elhassan (Sudan), Mr. Giacomo Grassi (European Union), Ms. Rehab Ahmed Hassan (Sudan), Mr. Vladimir Korotkov (Russian Federation), Mr. Rae-Hyun Kim (Republic of Korea), and Mr. Kevin Black (Ireland). Mr. Nagmeldin G. Elhassan and Mr. Giacomo Grassi 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 Iceland, which provided comments that were considered and incorporated, as appropriate, into this final version of the report.

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

3. Iceland has proposed a projected FMRL of  $-0.1544$  Million tonnes of carbon dioxide equivalent (Mt CO<sub>2</sub> eq) per year for the period 2013–2020. Emissions from natural disturbances and harvested wood products (HWP) are not included in the FMRL.

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

### **A. Overview**

4. Iceland uses a projected FMRL based on historical trends and current inventory information. Different methodological approaches are implemented for the two major forest management categories. Models using inventory data as input parameters and initial conditions generate projected emissions and removals for carbon pools in plantation forests. Projections for natural birch forests, however, are determined assuming that the current emissions and reductions (see the national inventory report (NIR) submitted in 2011) represent the ‘business as usual’ scenario for 2013–2020.

### **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. Iceland’s first national forest inventory (NFI) was completed in 2009. The second NFI cycle is expected to be completed in 2019. The 2009 inventory data and historical greenhouse gas (GHG) inventory data (2011 NIR) provide information for the projection of the plantation forest category. The historical data for 2009–2010 are assumed to represent

the ‘business as usual’ scenario for both natural birch forests and future tree harvest . While this takes the historical data into account, it does not consider other elements mentioned in the footnote to paragraph 4 of decision 2/CMP.6.

**2. Age-class structure**

6. The age-class structure is considered in the projection of sinks for the less dominant plantation forest category. Derived variations in biomass increment, for example, are well explained by the age-class structure. The managed plantation forests in Iceland are relatively young, showing a characteristically ‘left-skewed’ frequency distribution. Harvesting trends show a large increase since 2005 because plantations are increasingly being harvested for commercial thinning, as reflected by the age-class distribution and indicative rotation ages for different species. Age-class frequency distribution is expected to continue to shift to the right (i.e. forests are getting older) until clearfell harvesting is implemented in the plantation forest category. However, with the exception of some willow species, it is likely that all harvests from this forest category over the FMRL period would come from thinning.

7. The natural birch forest category projected reference levels do not consider future age-class or forest structure shifts. Historical changes in the natural forest sink capacity are reported to be related to a release of grazing pressure rather than age-class legacies indirectly brought about by forest management activities. Since natural forests are, in theory, unevenly aged, the size-class distribution may better reflect the future sink capacity and the emissions associated with mortality. Release of grazing pressure would theoretically result in shifts in the size-class distributions and in the stocking densities of such natural birch forests.

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

8. The Party does not consider factoring out approaches. However, the expert review team (ERT) suggests that the use of projections as the approach for the proposed FMRL does address this issue (see para. 29 below).

**4. Other elements**

Forest management activities already undertaken

9. Forest management activities already undertaken in plantation forests are considered and reflected in the historical and projected time series. However, the ERT cannot identify any direct forest management activities that could have influenced the emission and reduction profile of the natural birch forest, unless a decrease in grazing pressure is considered as a management activity. If this is the case, it would be difficult to predict how future grazing pressure or its cessation would influence the reference level trends.

**C. Pools and gases**

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

10. Iceland includes emissions and removals of CO<sub>2</sub> associated with above- and below-ground biomass, litter, drained organic soils and mineral soils. Non-CO<sub>2</sub> gas emissions include N<sub>2</sub>O from drained soils.

11. Dead wood carbon stock changes are excluded from the FMRL. Iceland indicated that a second forest inventory is required before these pools can be reported. The ERT

acknowledges these issues but would like to highlight that a technical correction may be needed for the inclusion of any new pools in future commitment periods.

12. Harvested wood products are not included in the FMRL submission (see chapter II.E.5).

13. Emissions due to liming of soils or from forest fires are not included in the FMRL.

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

14. The inclusion or omission of pools in the FMRL submission is consistent with those reported in the 2011 NIR and related common reporting format (CRF) tables.

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

### **1. Description**

15. Iceland adopts a projected time series based on existing historical information and national forest inventory data. Projection of the future reference level for plantation forests in this category uses transparently described and calibrated models based on current information. However, the plantation forests only represent a small percentage (less than 10 per cent) of the total forest management, although their emissions and removals account for 30 per cent of the total projected value of  $-0.1544$  Mt CO<sub>2</sub>. In contrast, natural birch forests account for most of the area and emissions and removals in the projected times series. There is also evidence that this forest category is the major driver of changes in historical biomass increment trends. Given the lack of modelling capacity and repeat inventory information, a rather simplistic assumption is applied, where the current (2009–2010) biomass increment and harvest levels are used as an indication of future emissions and removals in the projected reference level for the birch forests. The ERT acknowledges the national circumstance, but questions whether the forest age-structure outlined in decision 2/CMP.6 TA guidelines was taken into account in the projected time series for this forest category. During the review, the Party indicated that a technical adjustment to the projected time series can be made when new inventory information becomes available upon completion of the second inventory cycle.

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

16. The description of projections for the plantation forest category is transparently documented and fulfils most of the required assessment criteria of the TA as outlined in decision 2/CMP.6 TA guidelines. A transparent and accurate projection of the dominant natural birch forests is confounded, in part, by a lack of periodic forest inventory data and modelling capacity for these forest types. This is highlighted by Iceland and acknowledged by the ERT. The current harvest rates are assumed to represent the 'business as usual' scenario as justified by Iceland citing economic drivers as the determinant factor.

17. The natural birch forests showed a marked increase in biomass stock changes from 2000 to 2009. Based on the areas submitted in the 2011 NIR, it is evident that the changes are driven by a 2-fold increase in the biomass increment per unit area (see the 2011 CRF tables). This is consistent with the data supplied in table 3 of the FMRL submission and implies that the observed change in the historical emission and removal trends are related to the increased growth increment of the natural birch forest. Iceland verified that this could be due to reduced grazing pressure over the same time period. It seems logical to assume that the observed biomass increment will continue to increase due to the reduced grazing pressure on these forests, unless current or future inventory information suggests otherwise. The ERT recognizes the national circumstances in relation to lack of repeat NFI data and modelling capacity for these forest categories. The ERT suggests that the current biomass

pool increment estimates are being underestimated over the FMRL projection period. The Party has indicated that a technical adjustment to the projected reference level can be done by remapping the natural birch forest in the period 2010–2014 and remeasuring field plots in the period 2015–2019.

18. Historical and current GHG submissions for forest land remaining forest land does not correlate with areas under forest management in the FMRL submission (see chapter II.E.2). However, there is a consistent use of forest areas and definitions in both. Although the historical time series is recalculated to reflect differences in the forest areas under forest management, for both the same implied emission factors and areas are applied to the most dominant forest category projection (natural birch forests).

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

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

19. The forest management area (60.89 thousand hectare (ha)) is dominated by natural birch forest (90 per cent of the pre-1990 area) with small areas of plantation forestry. Iceland shows areas under cultivated forest based on the number of seedlings needed for the establishment of the new forest land. However, there is no indication of changes in the natural birch forest area. Iceland mentions that a decrease in grazing has resulted in a recovery of the natural birch forest since 1990. Following consultation with the Party during the TA more information was provided to clarify the areas and distribution between forest categories under forest management (see annex).

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

20. Iceland did not elect forest management under Article 3, paragraph 4, of the Kyoto Protocol, so no direct comparisons can be made to previously reported land under the Kyoto Protocol.

21. The areas under forest management in the FMRL submission are different from those reported in Iceland's NIR for forest land remaining forest land because of Iceland's use of a 50-year transition period, where land converted to forest land is moved into the forest land remaining forest land category after 50 years. This is a common feature of many reporting Parties. This was also verified following consultation with Iceland (see annex to this document and CRF table 5A, 1990 to 2011).

22. The reported pools and implied emission factor are consistently applied across all reporting formats (see 2011 NIR). Although the historical net CO<sub>2</sub> emission and removal values are different in the FMRL, when compared with forest land remaining forest land reported in the NIR this is primarily because of the above-mentioned differences in area.

### **3. Forest characteristics**

23. Current and historical changes in the composition of forest categories and the age-class structure of the existing plantation forest are well developed by Iceland. The cultivated forest model used to predict projected trends takes the age-class structure and silvicultural characteristics into account for the construction of the time series. The effect of age-class structure in biomass increment was well illustrated in figure 6 of the FMRL submission, where the drop-off in biomass increment is manifested by a shift in age-class structure. This was confirmed by consultation with Iceland during the TA.

24. The plantation forest category represents less than 10 per cent of the forest management area. In addition, the observed changes in the historical trend are driven by changes in the natural birch forest, presumably due to the release of grazing pressure. However, data on the characteristics of the natural birch plantations were not provided. The current assumption that biomass increment and harvest are to stay constant does not take into account the projections for future forest age-structure. The ERT encourages the Party to consider using new inventory information, when available, to reflect more accurately an assessment of forest dynamics in the natural birch forest category.

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

25. Historical and current harvesting trends show a marked increase in thinning harvests from the plantation forests. Based on the reported age-class structure and silvicultural characteristics, these harvest levels would be expected to further increase in the future. This prediction is supported by the high demand for forest products under the current economic climate as mentioned in the submission. However, the Party has chosen to use the current harvest rate in 2010 as the 'business as usual' scenario.

26. Harvests from the natural birch forests are not included in the FMRL submission. However, it is mentioned that traditional harvesting does occur. Following consultation with Iceland it was clarified that harvests from these forests are reported as mortality in table 3 of the submission. Given that instantaneous oxidation is assumed for HWP and that dead wood pools are not reported, the ERT suggests that there is no significant bias in the use of this assumption. The ERT also acknowledges that the tracking of non-commercial timber use is challenging.

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

27. HWP are not included in the submission. The Party reports that most of the wood products are instantaneously oxidized within one year following harvest. Most of the wood products are used for heating or as short-lived wood products.

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

28. The Party notes that the occurrences of natural disturbances are rare, but emphasizes that the risk of future events may increase owing to the change in the forest age/height structure. These risks would include windthrow, fire and insect outbreaks. However, given their low occurrence, natural disturbances are not included in the submission.

#### **7. Factoring out**

29. No factoring out of indirect human-induced activities are considered in the FMRL due to a reported poor understanding of these influences. However, the ERT points out that the use of a projected reference level is considered to factor out dynamic age-class effects. In addition, given the present state of science and 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 period and in the commitment period, and therefore they can be assumed to factor out.

## **F. Policies**

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

30. No description of policies is included in the FMRL submission. Consultation with Iceland confirmed that there are no current policy drivers influencing forest management.

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

31. There are no current policies which may influence future harvests. However, Iceland emphasizes that changes in the economic climate have resulted in an increased demand for domestic wood products.

**III. Conclusions and recommendations**

32. Iceland has constructed the projected FMRL in a transparent manner. The Party has not included HWP or dead wood pools in the projection. It should be noted that a technical adjustment may be needed for the inclusion of HWP in the future, on an agreed basis. It should also be noted that a further technical correction may be needed in projections for future commitment periods to account for any pools that are excluded from the submitted FMRL.

33. The ERT concluded that the Party has constructed the projected FMRL taking into account all the elements outlined in the footnote to paragraph 4 of decision 2/CMP.6. The methodology used complies with the principals set out in decision 16/CMP.1. However, the ERT considers the current natural birch forest biomass projections to be underestimated and are, therefore, not conservative. The ERT recognizes the lack of inventory information and modelling approaches to provide an accurate assessment of biomass increment for this forest category. The Party has indicated that information that will be available for a technical correction of the FMRL will reflect more accurate and consistent estimates of the biomass stock changes for the natural birch forest category.

## Annex

### Documents and information used during the technical assessment

#### A. Reference documents

Prediction of reference level for the period 2013-2020 for forest management in Iceland, 24 February 2011. Available at  
<[http://unfccc.int/files/meetings/ad\\_hoc\\_working\\_groups/kp/application/pdf/awgkp\\_iceland\\_2011.pdf](http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_iceland_2011.pdf)>

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

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

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

##### 1. Additional information on forest areas provided by Iceland

Forest land remaining forest land, as defined in the Icelandic 2011 NIR, includes three categories. The area of each category for the year 2009 is as follow:

1. Afforestation older than 50 years: 0.43 kha
2. Natural Birch Forest: 55.09 kha
3. Plantation in natural birch forest: 1.09 kha

Category 1 and 3 are defined as cultivated forest but category 2 is the natural birch forest as a whole.

All these categories do meet the definition of forest management and are included in the Forest Management Reference Level Prediction Report (FMRLPR) of Iceland.

In addition, a part of the categories defined under land converted to forest land is defined as land under forest management and included in FMRLPR. For the year 2009 these are afforestation/reforestation (AR) areas where the AR is initiated after the year 1960 and before 1990. The area of this part can be found by subtracting the area of afforestation as reported in table 5(KP-1)A.1.1. for the year 2009 (File: KP-ISL-2011-2009-v1.1.xls) from the area reported under land converted to forest land:

1. Land converted to forest land: 33.09 kha
2. KP Article 3.3 activities (AR): -28.70 kha
3. Afforestation 1960–1989: 4.39 kha

The area of cultivated forest before 1990 together with the area under categories 1 and 3 for forest land remaining forest land and the area under category 3 in land converted to forest land, amount to 5.86 kha. This is consistent with figure 1 and table 1 in the Icelandic FMRLPR where “Cultivated forest until year 1989” where it is reported as 5,800 ha. Instead of using the age distribution as estimated directly from the sample data of the NFI,

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

Iceland used the age distribution as calculated by the model calibrated down to the total forest area for the year 1989, that is 5,800 ha.

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