



Brussels, 18.6.2019  
SWD(2019) 213 final

**COMMISSION STAFF WORKING DOCUMENT**

**ASSESSMENT OF THE NATIONAL FORESTRY ACCOUNTING PLANS**

**REGULATION (EU) 2018/841 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation(EU)No 525/2013 and Decision No 529/2013/EU**

*Accompanying the document*

**Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions**

**United in delivering the Energy Union and Climate Action - Setting the foundations for a successful clean energy transition**

{COM(2019) 285 final} - {SWD(2019) 212 final}

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## 1. INTRODUCTION

The land use, land use change and forestry ('LULUCF') sector has the potential to provide long-term climate benefits, and thereby contribute to the achievement of the Union's greenhouse gas emissions reduction target and to the long-term climate goals of the Paris Agreement. The LULUCF sector also provides bio-materials that can substitute fossil- or carbon-intensive materials and therefore plays an important role in the transition to a low greenhouse-gas-emitting economy.

Sustainable management practices in the LULUCF sector can contribute to climate change mitigation in several ways, in particular by reducing emissions and enhancing stable sinks and carbon stocks through sequestration. In addition, sustainable management practices can maintain the resilience, productivity, regeneration capacity and vitality of the LULUCF sector, thereby promoting economic and social development while reducing the carbon and ecological footprint of all sectors.

Sustainably managed forests normally are sinks, contributing to climate mitigation. In the reference period from 2000 to 2009, the reported average removals by sinks from managed forest land were 372 million tonnes of CO<sub>2</sub> equivalent per year for the Union as a whole. While afforested land and managed grassland represent other carbon sinks in the LULUCF sector, deforested land and managed cropland are net sources. The total LULUCF sink in 2005 was 299 million tonnes of CO<sub>2</sub>.

Member States should ensure that sinks and reservoirs, including forests, are conserved or enhanced with a view to meeting the ambitious greenhouse gas emissions reduction targets of the Union by 2030 and strategies to reduce emissions to net zero by 2050, in line with the Paris Agreement.

To help achieve these goals, Regulation 2018/841<sup>1</sup> (hereafter, 'LULUCF Regulation') sets out a robust accounting system. This Regulation sets a binding commitment for each Member State to ensure that accounted emissions from land use are at least compensated by an equivalent removal of CO<sub>2</sub> from the atmosphere through action in the sector. This is known as the 'no debit' rule.

Emissions and removals from forest land depend on a number of natural circumstances, notably dynamic age-related forest characteristics, and on past and present management practices that differ substantially between the Member States. The relevant accounting rules should therefore provide for the use of 'reference levels' to exclude the effects of natural and country-specific characteristics. Forest reference levels should take account of any unbalanced age structure of forests and should not unduly constrain future forest management intensity, so that long-term carbon sinks can be maintained or strengthened.

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<sup>1</sup> Regulation of the European Parliament and of the Council (EU) 2018/841 on the inclusion of greenhouse gas (GHG) emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU (LULUCF Regulation)

The forest reference level is based on the continuation of sustainable forest management practice as documented in the reference period 2000-2009, thus providing a projected, forward-looking benchmark against which reported emissions and removals from managed forest land from the period 2021 – 2025 will be accounted.<sup>2</sup>

## **2. SUBMISSION OF THE NATIONAL FORESTRY ACCOUNTING PLANS**

Article 8(3) of the LULUCF Regulation requires Member States to submit to the Commission their national forestry accounting plans (NFAP), including a proposed forest reference level for the period from 2021 to 2025, by 31 December 2018.

As of 15 May 2019, 27 Member States have submitted their national forestry accounting plans. Links to the plans published on the respective national webpages can be found on the registry of the Land Use, Land Use Change and Forestry Expert Group.

## **3. PRINCIPLES AND REQUIREMENTS FOR THE TECHNICAL ASSESSMENT OF THE NATIONAL FORESTRY ACCOUNTING PLANS**

The Commission, in consultation with experts appointed by the Member States, civil society and other stakeholders (forming the LULUCF Expert Group, see section 4), undertook a technical assessment of the NFAPs submitted by Member States, with a view to assessing the extent to which the proposed forest reference levels have been determined in accordance with the following requirements:

- The principles set out in Article 8(5) and other related articles of the LULUCF Regulation
- The criteria set out in Section A of Annex IV of the LULUCF Regulation
- The elements listed in Section B of Annex IV of the LULUCF Regulation

For Croatia, its forest reference level may also take into account, in addition to the criteria set out in Section A of Annex IV of the LULUCF Regulation, the occupation of its territory, and wartime and post-war circumstances that had an impact on forest management during the reference period.

The following sections explain in more detail how these requirements have been applied but are without prejudice to the LULUCF Regulation.

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<sup>2</sup> With regard to the other land categories under the LULUCF Regulation, different accounting methods are applied: Emissions and removals from managed cropland, managed grassland and managed wetland will be accounted for against average annual values from the base period 2005 to 2009. Emissions and removals from afforested and deforested land will be accounted as a sum of total emissions and removals in the compliance period, with no comparison to a base year or reference.

### 3.1 Principles: Article 8(5)

#### *Subparagraph 1*

*‘The forest reference level shall be based on the continuation of sustainable forest management practice, as documented in the period from 2000 to 2009 with regard to dynamic age-related forest characteristics in national forests, using the best available data.’*

This principle establishes the forest reference level (FRL) as a baseline with the view to projecting how carbon stocks of managed forest land would develop in the compliance period of 2021-2025, if there were no changes to the forest management practice of the reference period 2000-2009. Parameters defining the forest management practice (e.g. rotation lengths, rates of harvest in ‘thinnings’ and ‘final cuts’, for a given forest species, etc.) during the reference period need to be documented in detail and remain constant in the projection. Assumed future impact of policies or market development is not to be included in the estimation of the FRL. However, the impact of age-related dynamics on forest characteristics of the managed forest land is taken into account when modelling the FRL, e.g. characteristics such as the mean age of a stand, its biomass density, age-related diameter class distribution or net increment.

For modelling their FRL, Member States shall use ‘*best available data*’. This relates to the description of the forest management practice in the reference period and the definition of the state of the forest (e.g. total area of the managed forest land, age related information, increment, species composition etc.) Comprehensive data from the most appropriate National Forest Inventories and latest greenhouse gas (GHG) inventories shall be used. A FRL projected in this way represents the combination of forest management practice from the reference period with the impact of age-related dynamics on forest characteristics and will therefore allow changes in the future forest management practices to be accounted properly.

#### *Subparagraph 2*

*‘Forest reference levels as determined in accordance with the first subparagraph shall take account of the future impact of dynamic age-related forest characteristics in order not to unduly constrain forest management intensity as a core element of sustainable forest management practice, with the aim of maintaining or strengthening long-term carbon sinks’*

Allowing the age-related characteristics of the managed forest land to develop over time in the FRL modelling means that the harvest volumes may also vary between years in the compliance period as well as differ from harvest volumes during the reference period ‘*in order not to unduly constrain forest management intensity*’. Any projected variation in harvested volumes in the compliance period must therefore be justified by the age-related dynamics of forest characteristics.

The projected FRL shall at the same time be consistent with *‘the aim of maintaining or strengthening long-term carbon sinks’*. In order to allow for the assessment of compliance with this principle, qualitative and quantitative information shall be provided on the long-term emissions and removals from the managed forest land consistent with long-term strategy required under 2018/1999. This part of the principle is closely linked to the criterion (a) set out in Annex IV, Section A and will be addressed there.

### ***Subparagraph 3***

*‘Member States shall demonstrate consistency between the methods and data used to determine the proposed forest reference level in the national forestry accounting plan and those used in the reporting for managed forest land.’*

The criterion related to this subparagraph is embedded in criterion (h) of Annex IV, Section A and will be addressed there.

## **3.2 Criteria: Annex IV, Section A**

*‘A Member State’s forest reference level shall be determined in accordance with the following criteria:’*

### ***Criterion (a)***

*‘The reference level shall be consistent with the goal of achieving a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century, including enhancing the potential removals by ageing forest stocks that may otherwise show progressively declining sinks.’*

This criterion links the LULUCF Regulation to the Paris Agreement and requires the Member States to take into consideration the long-term development of the forest sinks in constructing their FRLs. The criterion suggests that a temporary increase in harvest volumes can be warranted if it results in enhancing the potential removals by forest increment in the long-term. In order to assess compliance with this criterion, information on the implications of the forest management practice used in the modelling of the FRL on the evolution of the forest sink beyond the compliance period must be provided. The Commission suggests providing qualitative and quantitative information until at least 2050 consistent with long-term strategy required under Regulation (EU) 2018/1999.

### ***Criterion (b)***

*‘The reference level shall ensure that the mere presence of carbon stocks is excluded from accounting.’*

This criterion reflects the need of the FRL to account for net changes in forest carbon stocks, rather than accounting for total existing carbon stocks in forests, in order to encourage their enhancing. A properly applied FRL approach by definition ensures that *‘the mere presence of carbon stocks is excluded from accounting.’*

### **Criterion (c)**

*‘The reference level should ensure a robust and credible accounting system that ensures that emissions and removals resulting from biomass use are properly accounted for.’*

This criterion reflects a key objective of the LULUCF Regulation to correctly account for emissions from biomass use elsewhere in the climate policy framework within the LULUCF sector. For example, emissions from the combustion of wood for bioenergy are excluded from energy sector accounting. To this end, the FRL needs to be based on the continuation of forest management practices applied during the reference period in order to allow for the ‘robust and credible’ accounting of the biomass use.

### **Criterion (d)**

*‘The reference level shall include the carbon pool of harvested wood products, thereby providing a comparison between assuming instantaneous oxidation and applying the first-order decay function and half-life values.’*

The LULUCF Regulation encourages sustainable production of harvested wood products (HWP) from forest biomass in order to limit emissions and enhance removals through their substitution effect. This criterion asks Member States to include the HWP carbon pool in their FRL projection and to provide a comparison to an FRL where instantaneous oxidation is assumed, i.e. a counterfactual where the HWP carbon pool is assumed to be zero.

### **Criterion (e)**

*‘A constant ratio between solid and energy use of forest biomass as documented in the period from 2000 to 2009 shall be assumed.’*

Compliance with this criterion requires that a ratio between solid use of forest biomass, i.e. paper, wood panels and sawn wood as specified in Article 9(1), and its energy use as documented in the reference period is established, and is applied as a constant parameter in the determination of the FRL. This approach provides a direct accounting incentive for favouring solid biomass in the downstream use of wood.

### **Criterion (f)**

*‘The reference level should be consistent with the objective of contributing to the conservation of biodiversity and the sustainable use of natural resources, as set out in the EU forest strategy, Member States’ national forest policies, and the EU biodiversity strategy.’*

This criterion is tied to the notion of sustainable forest management practice, as documented in the reference period, upon whose continuation the FRL should be based (Article 8(5)). Qualitative information should therefore be provided to document how the forest management practice of the reference period is consistent with ‘the objective of contributing to the conservation of biodiversity and the sustainable use of natural resources’.

### **Criterion (g)**

*'The reference level shall be consistent with the national projections of anthropogenic greenhouse gas emissions by sources and removals by sinks reported under Regulation (EU) No 525/2013.'*

This criterion links the FRL submitted within the LULUCF Regulation to the overall policies and requirements as set out in Regulation (EU) No 525/2013, now replaced with Regulation (EU) 2018/1999. In case the FRL projection differs quantitatively from these national projections of greenhouse gas emissions, a clear explanation and rationale of such differences should be provided.

### **Criterion (h)**

*'The reference level shall be consistent with greenhouse gas inventories and relevant historical data and shall be based on transparent, complete, consistent, comparable and accurate information. In particular, the model used to construct the reference level shall be able to reproduce historical data from the National Greenhouse Gas Inventory.'*

The FRL is a benchmark for accounting for the managed forest land accounting category, which is directly based upon data collated from the national GHG inventories. In order to assess compliance of the FRL with this criterion, therefore, it needs to use data and methods consistent with those used in the latest GHG inventories. The regulation (Art 5(1)) also requires that the methods used for FRL modelling must be transparent, complete (in terms of mandatory pools and greenhouse gases included), accurate, consistently applied over time and comparable to IPCC methods.

To demonstrate this consistency, the model used to construct the FRL must be able to reproduce historical data (e.g. on biomass gain, biomass losses and net greenhouse gas emission/removals) as reported in the GHG inventories, in particular for the reference period (2000-2009).

## **3.3 Elements: Annex IV, Section B**

*'The national forestry accounting plan submitted pursuant to Article 8 shall contain the following elements:'*

### **Element (a)**

*'A general description of the determination of the forest reference level and a description of how the criteria in this Regulation were taken into account.'*

The NFAP should contain a description of how the FRL was determined. A summary section explaining how the criteria of the LULUCF Regulation were addressed should be included.

### **Element (b)**

*'Identification of the carbon pools and greenhouse gases which have been included in the forest reference level, reasons for omitting a carbon pool from the forest reference*

*level determination, and demonstration of the consistency between the carbon pools included in the forest reference level.'*

The NFAP must describe which carbon pools and greenhouse gases are included in the FRL calculation. In case a carbon pool was omitted, a justification needs to be provided. A description of the methodological consistency of calculating emissions and removals among different carbon pools is also to be included in the NFAPs. Recommendations under this element may include consistency of carbon pools and greenhouse gases with the national GHG inventory.

***Element (c)***

*'A description of approaches, methods and models, including quantitative information, used in the determination of the forest reference level, consistent with the most recently submitted national inventory report, and a description of documentary information on sustainable forest management practices and intensity as well as of adopted national policies.'*

A comprehensive description of the methodology used in the FRL modelling as well as documentation of input data in the NFAPs must be provided in the NFAP. This will permit the full technical understanding of the derivation of the FRL. Documentary information of the forest management practices of the reference period, as well as relevant national policies, is also expected to be included in the plan. Furthermore, the methodology and data used must be consistent with the latest National Inventory Report.

***Element (d)***

*'Information on how harvesting rates are expected to develop under different policy scenarios.'*

The FRL is in effect a 'business as usual' scenario; which is likely to be compared with a 'with existing measures' or 'with additional measures' scenario, thus providing a comparison of sink and (among other parameters) harvesting rates. This underpins the planning objective of the exercise to help identify the expected impact of policies (such as promotion of HWP) on forest sink and biomass use in the LULUCF sector.

***Element (e)***

*'A description of how each of the following elements were considered in the determination of the forest reference level:'*

*(i) the area under forest management*

The total area of managed forest land included under the accounting category (as defined in Art 2(1) of the LULUCF Regulation) must be consistent with the latest national GHG inventory. Member States may choose to provide a dynamic development of managed forest land area taking into account afforested and deforested land moving between accounting categories during the compliance period.

*(ii) emissions and removals from forests and harvested wood products as shown in greenhouse gas inventories and relevant historical data*

The FRL must include emissions and removals aggregated in accordance with carbon pools and gases, as specified in Annex I of the LULUCF Regulation, consistent with the latest national GHG inventory, applicable through the reference period 2000-2009.

*(iii) forest characteristics, including dynamic age-related forest characteristics, increments, rotation length and other information on forest management activities under 'business as usual'*

A detailed description must be included in the NFAPs of how age-related forest characteristics (e.g. mean age of stands, diameter class, growing stock volume, etc.) were considered in the determination of the FRL. Forest management practices for the reference period have to be documented comprehensively by including, for example, information on thinning and harvesting rates, rotation lengths, etc., related to the age-related forest characteristics.

*(iv) historical and future harvesting rates disaggregated between energy and non-energy uses*

Information (for the reference period and projected for the compliance period) must be provided on harvesting rates, disaggregated between energy and non-energy uses.

#### **4. TECHNICAL ASSESSMENT**

Following the submission of the NFAPs and in accordance with Article 8(6) of the LULUCF Regulation, the Commission, in consultation with experts appointed by the Member States, stakeholders and the civil society, undertook a technical assessment of the NFAPs.

To this end, the Commission established the expert group on land use, land use change and forestry ('the LULUCFEG'). The LULUCFEG includes representatives from Member States, technical specialists, NGOs and research organizations, representatives of Norway, Iceland and the EFTA Surveillance Authority, and observers from various interested stakeholder groups. The precise composition of the LULUCFEG can be found in the Register of Commission Expert groups<sup>3</sup>.

The LULUCFEG was convened in Brussels on the 6 February 2019 and during 1 April to 12 April 2019. During this latter period, experts and observers were divided in five sub-groups to assess Member State NFAPs and develop synthesis report conclusions in a parallel process. Conclusions were presented in plenary sessions to the whole expert

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<sup>3</sup> <http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupDetail&groupID=3638&news=1>

group for comments and adoption. The compilation of synthesis reports and the minutes of the expert group are publicly available<sup>4</sup>.

## 5. TECHNICAL RECOMMENDATIONS

With a view to facilitating the technical revision of the proposed forest reference levels and reflecting the conclusions of the technical assessment, while taking into account the expert group's request to harmonise and ensure fair treatment of each Member State, the Commission has formulated the following technical recommendations on the submitted NFAPs.

Technical recommendations are issued for each Member State, depending on whether the forest reference level was determined in accordance with the Article 8(5) principles, criteria set out in Annex IV, Section A, and elements of Annex IV, Section B. Each technical recommendation links to one of the principles or requirements that are explained in section 3.

### 5.1 Belgium

Technical recommendations on Article 8(5) Principles

No recommendation

Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- c) Provide credible and robust evidence for the model to reproduce historical data. Assess if the increasing area of Douglas fir entering the size classes with high annual growth is the sole or key driver for the overall trends in growth and harvest. Provide information on projected growth in light of the projected increase in harvest.
- d) Provide information such as partitioned quantities of tree biomass felled / dead into e.g. dead organic matter, harvested timber, felling residues, fuel wood, industrial roundwood, and the into different product classes including energy wood, or any other class that is appropriate.
- e) Ensure the consistency and comparability of definitions such as 'timber', 'harvest' etc. and the grading of felling in the data sources used for the ratio calculated from these data.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate

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<sup>4</sup> <http://ec.europa.eu/transparency/regexpert/index.cfm?do=groupDetail.groupMeeting&meetingId=12931>

the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period.

#### Technical recommendations on Annex IV, Section B Elements

- a) Provide an estimate of the FRL with the correct sign. Provide information if and how natural disturbances have been taken into account.
- b) Include the carbon pools and greenhouse gases required by Regulation (EU) 2018/841 in the FRL and the national GHG inventory. Assure consistency for the starting point of projections for all carbon pools, including the HWP pool.
- d) Provide information on harvesting rates for at least one different policy scenario.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) ii Distribute simulated harvest data into HWP pools. Compare simulated harvests to reported historical harvest data.
- e) iii Provide additional information on the characteristics of the virtual forests used by model and a verification with actual field data in order to improve the confidence on the modelling approach.
- e) iv Provide the historical and future harvesting rates disaggregated between energy and non-energy uses.

## 5.2 Bulgaria

#### Technical recommendations on Article 8(5) Principles

- 1) Provide information on the continuation of harvest levels by sustainable forest management practices and according to age-dynamics. Justify the reasons for the increase of the harvest during the projected period.

#### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- c) Clarify how the values of the actual harvest used for FRL have been produced. Describe data sources of harvests.
- e) Provide a ratio between solid and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed Forest Reference Level.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Estimate the FRL based on carbon pools and greenhouse gases as indicated in Annex IV, Part B (b). Demonstrate the ability of the model used to construct the FRL to reproduce consistently historical data from the national GHG inventory for the reference period.

#### Technical recommendations on Annex IV, Section B Elements

- b) Include the carbon pools and greenhouse gases consistent with those applied in the latest national GHG inventory.
- c) Provide explanations on how harvest from illegal logging is considered in the adopted policies

- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) iii Provide information about increments by forest management practice and age-class. Clarify how the values for the actual harvest used for the FRL has been produced.
- e) iv Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

### 5.3 Czechia

#### Technical recommendations on Article 8(5) Principles

No recommendation

#### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- e) Provide complete and transparent information on logging residues. Provide information on dataset used and methods applied to assess the use of the logging residues across the entire time series and on the method applied for projecting these quantities beyond 2017.
- f) Provide information on the provisions of the Czech Forest Act on sustainable management and biodiversity conservation together with a table that shows the evolution from 2000 to 2030 of the total forest growing stock.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period. Provide information on the changes in the level of agreement in the period 2000-2017 between the projected increment and the actual increment and assess its potential impact on the FRL.

#### Technical recommendations on Annex IV, Section B Elements

- b) Noting the inclusion of additional carbon pools in the FRL, include those pools in the next submission of the national GHG inventory to ensure consistency between the FRL and the national GHG inventory.
- c) Provide information if the factors used in the national GHG inventory have also been applied to the FRL. Assure that modelling starts the year after describing the state of the forest.
- d) Provide detailed information on how harvesting rates are expected to develop under different policy scenarios.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) ii Harmonize the information for comparison between table 8 and figure 10.

- e) iii Provide information on the use of the forest age to determine the current annual increment and on how the annual area from an age-class to the following is calculated.
- e) iv Provide information on dataset used and methods applied to assess the use of the logging residues across the entire time series and on the method applied for projecting these quantities.

## 5.4 Denmark

### Technical recommendations on Article 8(5) Principles

- 1) Clarify which and how the different National Forest Inventory sources (i.e. 2002, 2012 and 2017) were used to develop the FRL; in particular, the time period, data source and method used to generate the survival curves and carbon stocks, and HWP projections could be clarified more clearly. Indicate if data outside the reference period (2000-2009) were used, and if so, provide a justification.

### Technical recommendations on Annex IV, Section A Criteria

- c) Clarify the period, data source and method used to generate the survival and growth models, in particular the number of national forest inventory cycles used to generate the models. In addition, demonstrate how the energy use of domestic harvest trend line endpoint is representative of the reference period and how consistency is assured in relation to the other elements of the reference period.
- d) Clarify that the method employed to estimate the HWP pool to ensure that this is consistent with the stock change approach applied, and that the total amount of harvest is consistent with the assumptions made for the other pools.
- e) Provide a ratio between solid and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Use the conversion period for Land converted to forest land (Afforested Land) consistent with the latest national GHG inventory. Demonstrate the ability of the model used to construct the FRL to reproduce consistently historical data from the national GHG inventory for the reference period.

### Technical recommendations on Annex IV, Section B Elements

- b) Noting the inclusion of additional greenhouse gases in the FRL, include those greenhouse gases in the next submission of the national GHG inventory to ensure consistency between the FRL and the national GHG inventory. Assure consistency for the starting point of projections for all carbon pools, including the HWP pool.
- d) Provide information on harvesting rates for at least one different policy scenario.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection. Given the use of the dynamic area approach, provide a detailed disaggregated calculation of the managed forest land area at annual time steps for the entire time series since, at least, year 2000. Document and check the Forest Land area in the FRL, including how deforestation is addressed.

- e) ii Explain more clearly the HWP pool computation methodology with respect to the fraction of biomass remaining for bioenergy use.
- e) iii Provide additional information on increments. Document the National Forest Inventory periods employed in the models and correct (see Table 2 of NFAP) the use of age class for stratification.
- e) iv In function of Annex IV, Part B (e) ii, revise historical and future harvesting rates disaggregated between energy and non-energy uses.

## 5.5 Germany

### Technical recommendations on Article 8(5) Principles

- 1) Provide qualitative and quantitative description of forest management practices for the period 2000-2009. Demonstrate that forest management practices as documented in the period 2000-2009 are captured by the stock changes measured from 2002 to 2008, in particular those related to natural disturbances. Ensure that changes in forest management practices are not internalized in the determination of the FRL after 2009.

### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- d) Provide FRL by assuming instantaneous oxidation of HWP.
- e) Check and correct the inconsistency about the harvest volume between the value reported at page 10, Annex I of the NFAP of Germany and the value reported in Table 6 of the NFAP of Germany.
- f) Improve the information on the consistency between the FRL and the objective of contributing to the conservation of biodiversity and sustainable use of natural resources, as set out in the EU forest strategy, national forest policies, and the EU Biodiversity Strategy.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period.

### Technical recommendations on Annex IV, Part B Elements

- a) Clearly explain how the general criteria set out by the Regulation were taken into account in the determination of the FRL.
- c) Provide information on sustainable forest management practices and intensity as used in the determination of the FRL.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection. Clarify how the afforestation area less than 20-year transition period is excluded from managed forest land.
- e) iii Provide information on increments and rotation lengths related to forest management activities.

## 5.6 Estonia

### Technical recommendations on Article 8(5) Principles

- 1) Noting the projected decrease in sink in the compliance period, demonstrate that the approach used in the determination of the FRL ensures the continuation of forest management practices as documented in the period 2000-2009, and revise the FRL if applicable. Clarify that those practices applies to all forest lands including those being subject to privatization. Provide detailed information on the consistency between the actual felling ages and the legally allowed felling ages.

### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- e) Provide a ratio between solid and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- f) Provide information on how the projected increase in harvest rates is consistent with the objective of contributing to the conservation of biodiversity, in particular of old-growth forest stands.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Estimate the FRL based on carbon pools and greenhouse gases as indicated in Annex IV, Part B (b). Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period.

### Technical recommendations on Annex IV, Part B Elements

- b) Include the greenhouse gases consistent with those applied in the latest national GHG inventory.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) iii Provide additional information on increments, dynamic age-related forest characteristics, actual management activities, harvesting rates and rotation lengths.
- e) iv Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

## 5.7 Ireland

### Technical recommendations on Article 8(5) Principles

No recommendation

### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.

- c) Provide more information on the correlation between the reduced harvest levels (i.e.<70% of net growth) and the negative biomass stock changes (Table 19 at page 51 and Table C1 at page 66, NFAP of Ireland) in the period 2020-2025. Provide more information complementing the statement about the robust accounting system (Table 1, page 4, NFAP of Ireland). Provide detailed information of the implemented accounting system, in particular in relation to biomass and instantaneous oxidation assumption, in a dedicated section.
- f) Provide information on the consistency between forest management practices and the objectives set by the European Biodiversity and Forest Strategies. Provide further information on how the biodiversity issues associated with the conversion of grasslands and wetlands into forest land are taken into account.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Use the conversion period for Land converted to forest land (Afforested Land) consistent with the latest national GHG inventory.

#### Technical recommendations on Annex IV, Part B Elements

- b) Noting the inclusion of additional carbon pools in the FRL, include those pools in the next submission of the national GHG inventory to ensure consistency between the FRL and the national GHG inventory.
- c) Provide a justification for a different starting year of projection than 2010. Provide information on the forest model.
- d) Provide information on harvesting rates for at least one different policy scenario.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection. Given the use of the dynamic area approach, provide a detailed disaggregated calculation of the managed forest land area at annual time steps for the entire time series since, at least, year 2000.
- e) iii Provide additional information on increments.

## 5.8 Greece

#### Technical recommendations on Article 8(5) Principles

- 1) Demonstrate that the approach used in the determination of the FRL ensures the continuation of forest management practices as documented in the period 2000-2009, and revise the FRL if applicable.
- 2) Demonstrate how dynamic age-related forest characteristics have been taken into account and revise the FRL, if applicable.

#### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- c) Provide a justification for the harvest fraction used as biomass for energy.
- d) Revise the HWP estimates, taking into account also paper and paperboard data for 2000-2009, ensuring consistency with the national GHG inventory estimates

- e) Provide a ratio between solid (HWP) and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period.

#### Technical recommendations on Annex IV, Section B Elements

- b) Include the carbon pools required by Regulation (EU) 2018/841 in the FRL and the national GHG inventory.
- c) Justify why best available Forest Management Plans data, as used in national GHG inventory, have not been used in the area assessment for FRL. Demonstrate the validity of the applied modelling framework for the estimation of the increment.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection. Explain and justify why the class of “other wooded Land” and “unmanaged forest” is included in the managed forest land area estimate for the FRL.
- e) iii Provide information on forest characteristics, such as increments, rotation lengths and dynamic area characteristics.
- e) iv Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

## 5.9 Spain

#### Technical recommendations on Article 8(5) Principles

No recommendation

#### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- c) Provide credible and robust evidence for the use of the model for the FRL and revise the FRL, if applicable, including a complete and transparent description of the model, a demonstration of its performance over the period 2010-2017, and an explanation on the discrepancies between projected harvest and historical data.
- e) Provide a ratio between solid (HWP) and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate

the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period.

#### Technical recommendations on Annex IV, Section B Elements

- a) Correct header information in Tables 14 and 15 of the NFAP (2025 instead of 2015). Provide information if and how natural disturbances have been taken into account.
- b) Include the carbon pools required by Regulation (EU) 2018/841 in the FRL and the national GHG inventory.
- c) Provide a complete and transparent description of the FRL model including a validation during the reference period. Demonstrate how the modelled forest management approach is consistent with the forest management approach observed during the reference period. Provide a full and transparent description of the calibration process and the results. Provide more information on the National Forest Inventory such as the number of sample plots in each maturity class. Explain the unexpected behaviour of harvest early in the historic period. Review the accuracy of the input data to the projection model, in particular for the total biomass in a Eucalyptus plantation at maturity in the northern region. Describe the evolution of growth and harvest across the projected period. Provide evidence that the increase in harvest projected over the commitment period is not influenced by the projected very high harvest in the beginning of the projection period. Clarify if the model takes natural disturbances into account.
- e) i) Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) ii) Provide detailed data on the evolution of HWP for the historical and the projection period and on the evolution with time of the harvest rate. Specify the half-life values used for the HWP categories.
- e) iii) Provide more information on the modelled increment and harvest.
- e) iv) Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

### 5.10 France

#### Technical recommendations on Article 8(5) Principles

- 1) Demonstrate that the approach used in the determination of the FRL ensures the continuation of forest management practices as documented in the period 2000-2009, and revise the FRL if applicable. Demonstrate how dynamic age-related forest characteristics have been taken into account and revise the FRL, if applicable. Specifically, clarify why there is a discrepancy in biomass gain between model output and greenhouse gas inventory for the period 2010-2016. Describe how the model used input data and model calibration, thereby minimizing this gap.

#### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- c) Provide data from the reference period to the dataset used for the ex-post adjustment, since this has an impact on the accuracy of the FRL. As France did not use the entire reference period consistently, additional available data from the reference period to the dataset used for the ex-post adjustment should be used.

- e) Provide more detailed documentation of data source(s) used for the ratio between solid and energy use of forest biomass.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period.

#### Technical recommendations on Annex IV, Section B Elements

- b) Ensure consistent modelling of carbon pools, in particular across the time series and between Metropolitan France and Overseas Territories.
- c) Provide complete data on historical and projected harvest levels. Provide more detailed description of sustainable forest management practices used in the determination of the FRL.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection. Given the use of the dynamic area approach, provide a detailed disaggregated calculation of the managed forest land area at annual time steps for the entire time series since, at least, year 2000. Provide more complete information regarding managed and unmanaged forest area to guarantee that the same information is used for the FRL and the national GHG inventory.
- e) iii Provide data on increments, dynamic age-characteristics and rotation length. Provide a more detailed description on the share of even and uneven-aged forests and the related information for the strata.
- e) iv Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

### 5.11 Croatia

#### Technical recommendations on Article 8(5) Principles

No recommendation

#### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Section B (e) i. Estimate the FRL based on carbon pools and greenhouse gases as indicated in Annex IV, Section B (b). Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Compare historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period by using, for information only, the same harvest intensities applied in line with Article 8(4).

#### Technical recommendations on Annex IV, Section B Elements

- b) Include the greenhouse gases consistent with those applied in the latest national GHG inventory. Include the carbon pools required by Regulation (EU) 2018/841 in the FRL and the national GHG inventory.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) ii Provide a calculation of GHG emissions and removals during the reference period using harvest intensities as elaborated for the FRL estimation for a fictive no-war scenario and include this assessment in the NFAP.
- e) iii Provide complete information on age-class distribution including an aggregation for country level. Describe the "normal area" concept and its use.
- e) iv Provide detailed information on the historical and future harvesting rate disaggregated between energy and non-energy uses.

### 5.12 Italy

#### Technical recommendations on Article 8(5) Principles

- 1) Demonstrate how dynamic age-related forest characteristics have been taken into account and revise the FRL, if applicable. Specifically, demonstrate the linkage between biomass density and age-class distribution. Provide additional information on forest management practices, including rotation length and thinning intensity and demonstrate how these have been taken into account.

#### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- f) Provide additional information on existing biodiversity goals and strategies, including on protected areas and endangered endemic species.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Section B (e) i. Estimate the FRL based on carbon pools and greenhouse gases as indicated in Annex IV, Section B (b).

#### Technical recommendations on Annex IV, Section B Elements

- b) Include the carbon pools and greenhouse gases consistent with those applied in the latest national GHG inventory.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) ii Include a description of imports and exports in the HWP pool and apply changes to the FRL, if applicable. Assure consistency for carbon stock change in living biomass derived from table 6 and final FRL estimates. Correct editorial mistakes in table 7, 36 and 37 of the NFAP. Provide national totals and units in tables of NFAP.
- e) iii Provide information on age-class structure and additional information on rotation length.

## 5.13 Cyprus

### Technical recommendations on Article 8(5) Principles

- 1) Demonstrate that the approach used in the determination of the FRL ensures the continuation of forest management practices as documented in the period 2000-2009, and revise the FRL if applicable. Demonstrate how dynamic age-related forest characteristics have been taken into account and revise the FRL, if applicable. Provide information justifying the use of a constant harvest rate for the reference period in the determination of the FRL.

### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- c) Provide transparent information ensuring that emissions and removals resulting from biomass use are properly accounted for, including those related to natural disturbances.
- d) Provide differentiation of the HWP pool at the level of products' group. Provide a comparison of the FRL between assuming instantaneous oxidation and applying the first-order decay function and half-life values.
- e) Provide a ratio between solid and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- f) Provide further explanation on how non-exploitable forests were considered in the determination of the FRL.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Estimate the FRL based on carbon pools and greenhouse gases as indicated in Annex IV, Part B (b). Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period.

### Technical recommendations on Annex IV, Part B Elements

- a) Provide a description of how the criteria of the Regulation were taken into account. Provide information if and how natural disturbances have been taken into account.
- b) Include the carbon pools and greenhouse gases consistent with those applied in the latest national GHG inventory. Include the carbon pools required by Regulation (EU) 2018/841 in the FRL and the national GHG inventory.
- c) Assure that modelling starts the year after describing the state of the forest. Provide a quantitative description of sustainable forest management practices and intensity. Check and further explain the information provided for carbon stock changes for coniferous species, including harvest (pages 18-19 in the NFAP of Cyprus).
- d) Provide information on how harvest rates are expected to develop under different policy scenarios.
- e) i) Provide the area under forest management consistent with Table 4.A ("Forest land remaining Forest land") from the latest national GHG inventory using the year preceding the starting point of the projection.

- e) iii Provide information on increments, rotation lengths and dynamic age-related characteristics.
- e) iv Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

## 5.14 Latvia

### Technical recommendations on Article 8(5) Principles

- 1) Demonstrate how dynamic age-related forest characteristics have been taken into account and revise the FRL, if applicable. Demonstrate that the FRL is based on the continuation of sustainable forest management practices from the reference period specifically for harvest rates. Specifically, exclude policy assumptions from the FRL calculation. Explain the change and indicate drivers for living biomass converting from a sink in the reference period to a source during the compliance period. Indicate if data outside the reference period (2000-2009) were used, and if so, provide a justification.

### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- c) Provide a detailed description of forest management practices as documented in the reference period (2000-2009). Exclude policy assumptions from the FRL calculation and revise the FRL accordingly.
- e) Provide a ratio between solid (HWP) and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Section B (e) i. Use the conversion period for Land converted to forest land (Afforested Land) consistent with the latest national GHG inventory. Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period.

### Technical recommendations on Annex IV, Section B Elements

- a) Ensure consistency of values throughout the NFAP specifically between table 1 and the text, e.g. on page 6.
- b) Noting the inclusion of additional carbon pools in the FRL, include those pools in the next submission of the national GHG inventory to ensure consistency between the FRL and the national GHG inventory.
- c) Provide additional data on harvest assumptions, specifically on harvest intensity and harvest frequency. Demonstrate the exclusive use of data from the reference period for modelling the FRL.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection. Given the use of the dynamic area approach, provide a detailed disaggregated calculation of the managed forest land

area at annual time steps for the entire time series since, at least, year 2000. Specifically, provide information on change in area for each age class using sufficiently disaggregated age-classes, e.g. 10-20 years.

- e) iii Provide detailed information on increments, age structure and harvesting rates for estimating the FRL. Exclude policy assumptions on harvests in the reference period to balance age-structure. Avoid contradictions in the NFAP such as between Figures 4 and 5 regarding reference period and harvesting rates or table 7 and Figure 4 regarding the share of harvest.
- e) iv Provide information about the future harvesting rates disaggregated between energy and non-energy uses. Provide additional information on the assumptions used to allocate round wood to each HWP category.

## 5.15 Lithuania

### Technical recommendations on Article 8(5) Principles

No recommendation

### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- c) Clarify the discrepancies between national GHG inventory data and the projections used to set the FRL or revise the application of the model. Demonstrate that the model's outcomes can capture actual emissions and removals as reported in GHGI in both level and trend.
- e) Provide a ratio between solid and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Estimate the FRL based on carbon pools and greenhouse gases as indicated in Annex IV, Part B (b). Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period.

### Technical recommendations on Annex IV, Section B Elements

- b) Include the greenhouse gases consistent with those applied in the latest national GHG inventory.
- c) Address the inconsistencies in input data used in setting FRL and the national GHG inventory and provide an explanation for the differences observed in data of the NFAP and those reported in the NIR of 2018.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) iii Provide more accurate information on the total increment associated with the projected FRL (both for reference and compliance period) and transparently explain how this increment is incorporated in the applied modelling approach. Provide information on the projected harvests in the compliance period.

- e) iv Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

## 5.16 Luxembourg

### Technical recommendations on Article 8(5) Principles

No recommendation

### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- d) Include the carbon pool of HWP in the FRL, and thereby provide a comparison between assuming instantaneous oxidation and applying the first-order decay function and half-life values in the NFAP.
- e) Provide a ratio between solid and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Estimate the FRL based on carbon pools and greenhouse gases as indicated in Annex IV, Part B (b). Check (and possibly correct) the sign of the FRL value, noting that in accordance with Regulation (EU) 2018/841 Art 5(1), removals (or sink, in CO<sub>2</sub> equivalent) are denoted with a negative sign. Demonstrate the ability of the model used to construct the FRL to reproduce consistently historical data from the national GHG inventory for the reference period.

### Technical recommendations on Annex IV, Section B Elements

- b) Include the greenhouse gases required by Regulation (EU) 2018/841 in the FRL and the national GHG inventory. Noting the inclusion of additional carbon pools in the FRL, include those pools in the next submission of the national GHG inventory to ensure consistency between the FRL and the national GHG inventory. Provide an estimation of HWP pool, instead of the current assumption of zero. Provide further justification on the meaning and implications of "Considered with LUC" for litter and SOC on Table 2.1.
- c) Provide information on the biomass module used for the estimation of FRL, including clear descriptions of forest management practices, and demonstrate consistency with national GHG inventory.
- e) i Provide the area under forest management consistent with Table 4.A ("Forest land remaining Forest land") from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) iv Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

## 5.17 Hungary

### Technical recommendations on Article 8(5) Principles

- 1) Demonstrate how dynamic age-related forest characteristics have been taken into account. Provide information on modelling of growing stock during the reference period.

### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- c) Provide data and information on all HWP uses.
- d) Provide the FRL by assuming instantaneous oxidation of HWP.
- e) Provide a ratio between solid and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Estimate the FRL based on carbon pools and greenhouse gases as indicated in Annex IV, Part B (b). Ensure that the model used to construct the FRL is able to reproduce historical data from the national GHG inventory.

### Technical recommendations on Annex IV, Part B Elements

- b) Include the carbon pools consistent with those applied in the latest national GHG inventory. Noting the inclusion of additional carbon pools in the FRL, include those pools in the next submission of the national GHG inventory to ensure consistency between the FRL and the national GHG inventory.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection. Given the use of the dynamic area approach, provide a detailed disaggregated calculation of the managed forest land area at annual time steps for the entire time series since, at least, year 2000. Check and correct reference in Table 3 (page 21 in the NFAP of Hungary) to Table 6.5.1 in the NIR (2018 submission).
- e) iii Provide additional information on dynamic age-related forest characteristics in the projection period. Provide clarification on the repetition of pattern in annual increment by species in the reference period as reported in Table 8 (page 37 of the NFAP of Hungary). Clarify how forest management practices are distributed by yield class, and with regards to L-FL.
- e) iv Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

## 5.18 Malta

*Note:* Recommendations on Malta’s NFAP can only partly assess the FRL because Malta’s current GHG inventory does not report emissions of removals for any carbon pool. In addition, Malta’s small forest land does not undergo harvest. Therefore sub-paragraph 2 of Article 8(5), criteria (b) – (e) and (g) of Annex IV,

Section A and elements (b), (d), (e) ii and (e) iv of Annex IV, Section B do not apply.

Technical recommendations on Article 8(5) Principles

No recommendation

Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Section B (e) i.

Technical recommendations on Annex IV, Section B Elements

- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection. Assure consistency between forest areas reported in Tables 2 and 15 of the NFAP.

## 5.19 Netherlands

Technical recommendations on Article 8(5) Principles

No recommendation

Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- e) Demonstrate how harvest statistics, information from the forest inventory, the ratio between energy and solid biomass use and HWP projection were considered in elaborating the NFAP.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Section B (e) i.

Technical recommendations on Annex IV, Section B Elements

- c) Provide a justification for allocating 100% of “unknown management objective” to category “multifunctional”
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) iii Provide additional information on age-class structure and rotation length. Correct editorial changes such as in Table 3.2.
- e) iv Provide explicit information on allocation of future harvest to specific HWP categories. Provide information on import and export of HWP.

## 5.20 Austria

### Technical recommendations on Article 8(5) Principles

No recommendation

### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period. Noting the limited information given in the NFAP concerning the interlinked models used to develop the FRL (CALDIS-VB V0.1, YASSO and HWP models), it is recommended that Austria uses consistent models and provides additional information to demonstrate how such models are able to reproduce historical national GHG inventory data for the reference period 2000-2009.

### Technical recommendations on Annex IV, Section B Elements

- b) Assure consistency for the starting point of projections for all carbon pools, including the HWP pool.
- d) Provide a table on harvest intensity, for the reference period and as applied for the projection, disaggregated by forest type, growth regions or equivalent.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) iii Provide additional information on rotation length.
- e) iv Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

## 5.21 Poland

### Technical recommendations on Article 8(5) Principles

- 1) Demonstrate that the approach used in the determination of the FRL ensures the continuation of forest management practices as documented in the period 2000-2009, and revise the FRL if applicable.
- 2) Document the (quantitative) description of sustainable forest management practices for the period 2000-2009, detailing those parameters used as model input data, so as to demonstrate how dynamic age-related forest characteristics have been taken into account.

### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.

- e) Clarify that the (constant) ratio between solid and energy use for forest biomass assumed in the modelling of the FRL is the value presented in row 1 (2000-2009) of that Table 12.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Demonstrate the consistency between the amount of harvest used as input to calculate the FRL and relevant historical data on harvest, including the reference period 2000-2009.

#### Technical recommendations on Annex IV, Section B Elements

- b) Noting the inclusion of additional carbon pools in the FRL, include those pools in the next submission of the national GHG inventory to ensure consistency between the FRL and the national GHG inventory.
- c) Provide information on the age structure module, demonstrating age class transition from 2000 to 2020 and 2025 (e.g. in the structure of Table 15 in the NFAP).
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) ii Clarify that HWP is estimated based on managed forest land only, assuming that the FRL is based on managed forest land only (thereby not including afforested land). Clarify any inconsistency between the estimates of HWP in the reference period as reported in the National Inventory Report 2018, under the Convention and KP, and those used for the FRL in the NFAP.
- e) iii Provide information on increments, dynamic age characteristics and rotation length. Provide information about growth curves used in NFAP based on WISL (i.e. for each strata actually considered in the model) and a reference for the bark fraction value applied for Poland and clarification what the “bark fraction” includes.
- e) iv Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

## 5.22 Portugal

#### Technical recommendations on Article 8(5) Principles

- 1) Demonstrate that the approach used in the determination of the FRL ensures the continuation of forest management practices as documented in the period 2000-2009, and revise the FRL if applicable. Demonstrate how dynamic age-related forest characteristics have been taken into account and revise the FRL, if applicable.
- 2) If no dynamic age characteristics were used, provide evidence that such information has no impact on the FRL and long term carbon sinks will be maintained or enhanced.

#### Technical recommendations on Annex IV, Section A Criteria

- a) Given the absence of age-related characteristics in the FRL modelling, demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- c) Provide data on harvest for solid biofuel production, and clarify how wood removals are derived from the industrial roundwood statistics and thus how all

harvests are included (i.e. wood removals, solid wood and wood for bioenergy) in the estimate of carbon stock change in the FRL.

- e) Provide a ratio between solid and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection. Evaluate whether the HWP pool needs to be recalculated (and subsequently, the FRL).
- f) Confirm the information provided showing that the reference level is consistent with the objective of contributing to the conservation of biodiversity and the sustainable use of natural resources.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Provide (numerical) information for the period 2010-2016 demonstrating that the modelling approach used to construct the FRL is comparable and consistent (i.e., showing justified differences) with the national GHG inventory.

#### Technical recommendations on Annex IV, Section B Elements

- c) Explain how the requirement to consider age-class dynamic is considered in the applied approaches, methods and models, and provide explicit information on forest management practices including references to data sources and background information, used for expert judgements cited in the NFAP.
- d) Provide information on harvesting rates for at least one different policy scenario.
- e) i) Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection. Given the use of the dynamic area approach, provide a detailed disaggregated calculation of the managed forest land area at annual time steps for the entire time series since, at least, year 2000.
- e) ii) Clarify the estimation of HWP, the computation of GHG emissions and removals using the production approach and how double counting of harvest is avoided considering that different sources are used for estimating industrial harvest, salvage logging and information related to burned area and forest conversion.
- e) iii) Provide additional information on dynamic age-characteristics and rotation length.
- e) iv) Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

### 5.23 Slovenia

#### Technical recommendations on Article 8(5) Principles

- 1) Demonstrate that the approach used in the determination of the FRL ensures the continuation of forest management practices as documented in the period 2000-2009, including private forests, and revise the FRL if applicable. Provide further information on whether the correction factor used to simulate harvest intensity is based on the continuation of forest management practices as documented in the reference period, and how this correction factor is incorporated in the determination of the FRL. Indicate if data outside the reference period (2000-2009) were used, and if so, provide a justification.
- 2) Clarify whether the correction factor is introduced to reflect the need not to unduly constrain forest management intensity. Ensure that the increase in harvest volumes

projected in the FRL is in line with Art 8(5), reflecting the evolution of dynamic age-related forest characteristics, and revise the FRL if applicable.

#### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- c) Ensure a robust and credible accounting system based on forest management practices documented in the reference period for all managed forest land and without the use of a correction factor.
- d) Provide a specific value for the HWP pool. Provide a comparison of the FRL between assuming instantaneous oxidation and applying the first-order decay function and half-life values.
- e) Provide a ratio between solid and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Estimate the FRL based on carbon pools and greenhouse gases as indicated in Annex IV, Part B (b). Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period. In particular, provide explanation of the trends and data about harvest levels (Table 8 in the NFAP of Slovenia) and emissions and removals (Figure 7 in the NFAP of Slovenia), and reduce discrepancies between FRL projections and national GHG inventory estimates (Figure 7 in in the NFAP of Slovenia).

#### Technical recommendations on Annex IV, Part B Elements

- a) Provide a description of how the criteria of the Regulation were taken into account
- b) Include the greenhouse gases consistent with those applied in the latest national GHG inventory.
- d) Provide information on harvesting rates for at least one different policy scenario.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.
- e) ii Provide further information on historical and future HWP outflows.
- e) iii Provide information on increments, rotation lengths and dynamic age-related characteristics. Provide further information on the use of forest management strata in the FRL, forest management practices, diameter class distribution, and harvest in privately owned forests. Check for consistency between Table 5 figures in the NFAP of Slovenia and the treatment of protected forests.
- e) iv Provide historical and future harvesting rates disaggregated between energy and non-energy uses.

## 5.24 Slovakia

### Technical recommendations on Article 8(5) Principles

- 1) Provide more detailed information on harvest rates in the compliance period. Describe more thoroughly forest management practices in a disaggregated way and in qualitative terms, describing different forest stands and forest functions.

### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- f) Explain how biodiversity goals and in particular conservation of older forest stands are taken into account in constructing forest reference levels and past management practices. Describe how harvest levels are consistent with EU Nature & Biodiversity policies goals, in particular in National Parks, Nature Reserves, Nature 2000 sites, Sites of Community Interest, Special Protection Areas.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i.

### Technical recommendations on Annex IV, Section B Elements

- b) Include the carbon pools required by Regulation (EU) 2018/841 in the FRL and the national GHG inventory.
- d) Include information on harvesting rates for at least one different policy scenario in the revised NFAP. Translate relevant information of studies in Slovak into English.
- e) i) Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection.

## 5.25 Finland

### Technical recommendations on Article 8(5) Principles

- 1) Demonstrate that the approach used in the determination of the FRL ensures the continuation of forest management practices as documented in the period 2000-2009, and revise the FRL if applicable. Demonstrate how dynamic age-related forest characteristics have been taken into account and revise the FRL, if applicable.
- 2) Provide information on forest dynamics for/by development classes and demonstrate that the increase in harvest volumes projected in the FRL is in line with Art 8(5), reflecting the evolution of dynamic age-related forest characteristics, and revise the FRL, if applicable.

### Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- c) Provide additional information to clarify how future harvests (as presented in Table 12) are related to the existing scenarios presented in Section 2.3.2 of the NFAP.

- e) Provide a ratio between solid (HWP) and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection. Present the ratio together with information in Table 12 of the NFAP.
- f) Provide information on how the projected increase in harvest rates is consistent with the objective of contributing to the conservation of biodiversity. Clarify if the projected increase of harvest rates affects northern Finland more than southern Finland (see Table 9 of the NFAP).
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Demonstrate the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period, through the provision of backcasting information from the modelling framework. Demonstrate that the interest rate used by the model can reproduce the harvest documented in the reference period.

#### Technical recommendations on Annex IV, Section B Elements

- c) Clarify the NIR submission (year) from which data was used for the FRL calculation and the (partial, 2011 to 2016) comparison between the FRL and the national GHG inventory. Provide evidence that the actual management practices of the reference period are equivalent to those described in the Best Practices for Sustainable Forest Management guidelines (e.g. Tapio 2006). Clarify whether earlier versions of the guidelines (e.g. Tapio 2001) and the forest decree 224/1997 are relevant to describe practices in the period 2000-2009. Clarify which forest management practices are used in the model.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection. Provide a definition of forest and information on the total area under forest management to resolve inconsistencies in total areas in Table 3 and Table 5 of the NFAP.
- e) iii Provide information concerning: (Stand, category) development classes for time periods comparable to Table 5 (e.g. NFI9 and NFI11); Information on the standing volume per development class in the compliance period in order to relate the area to the standing volume; Documentation on the way the estimate of the interest rate was derived, including more specific references and demonstrating that it is representative for the entire forest area and the reference period; Additional information on the impact of the interest rate in the model outcomes for harvest volume by period; A clarification on the impact of assuming ‘non-declining’ industrial roundwood removals, in relation to Article 8(5) Paragraph 1 of the Regulation.
- e) iv Provide historical and future harvesting rates disaggregated between energy and non-energy uses. Provide information on harvest volume development through periods up to 2060 to improve the understanding of the long-term development, consistent with Table 14 of the NFAP.

## 5.26 Sweden

### Technical recommendations on Article 8(5) Principles

- 1) Provide transparent documentation of forest management practices in the reference period. Ensure that the approach used in the determination of the FRL reflects the continuation of sustainable forest management practices as documented in the reference period, excluding policy assumptions on harvest rates from the FRL calculation. Provide transparent information on harvest-to-growth ratio from the reference period. In light of 100% harvest rate of net biomass increment applied in the FRL on productive forest land managed for wood supply regardless of age-class distribution, explain how this is applied to modelling of the FRL and revise the FRL accordingly.
- 2) Ensure that harvest volumes projected in the FRL are in line with Art 8(5), reflecting the evolution of dynamic age-related forest characteristics, and revise the FRL accordingly.

### Technical recommendations on Annex IV, Section A Criteria

- c) Justify how the proposed FRL ensures a robust and credible accounting system in light of documented forest management practices during the reference period.
- d) Provide an explanation on the decreasing trend of HWP sink and include the projected shares of different HWP categories while harvests are increasing.
- e) Provide a ratio between solid and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- f) Provide more information on the projected development of total forest area of old forest stands (>80 years). Provide additional information on the impact of projected increased harvest on biodiversity.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Use the conversion period for Land converted to forest land (Afforested Land) consistent with the latest national GHG inventory. Demonstrate the ability of the model used to construct the FRL to reproduce historical data from the national GHG inventory. Demonstrate the consistency between historical data from the national GHG inventory and modelled data for estimating the FRL for the reference period. Specifically, information is required on 1) the validation of simulated increments for all stands and present values of increment instead of total volume, 2) the demonstration of the modelling framework to reproduce historical harvest data, 3) the bias between measurements and model estimates for mineral soils.

### Technical recommendations on Annex IV, Section B Elements

- c) Document sustainable forest management practices in the reference period, including information on harvesting intensities per strata, using consistent sources, definition and units, and apply those to the forest development during the simulation, and subsequently the calculation of the FRL.
- e) i) Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection, and the future development of the managed forest land area, including afforested and deforested land.

- e) iii Provide information on increments, age-related dynamics and rotation length. Provide the projected increment per strata for historic data and the compliance period.

## 5.27 United Kingdom

Technical recommendations on Article 8(5) Principles

No recommendation

Technical recommendations on Annex IV, Section A Criteria

- a) Demonstrate how the goal of achieving a balance between anthropogenic emissions and removals will be achieved in the second half of the century. Provide qualitative and quantitative information until at least 2050 consistent with the long-term strategy required under Regulation (EU) 2018/1999.
- e) Provide a ratio between solid (HWP) and energy use of forest biomass as documented in the period from 2000 to 2009 used for the estimation of the forest reference level and demonstrate it remains constant throughout the projection.
- g) Demonstrate the consistency with the national projections of anthropogenic greenhouse gas emissions reported under Regulation (EU) No 525/2013. Provide explanations for possible differences between national projections and the proposed FRL.
- h) Estimate the FRL based on the area under forest management as indicated in Annex IV, Part B (e) i. Use the conversion period for Land converted to forest land (Afforested Land) consistent with the latest national GHG inventory. Explain the difference of approximately 2 Mt CO<sub>2</sub> between the national GHG inventory and FRL for the reference period (Figure 4.1 in the NFAP). Demonstrate possible impacts of the different age-class structures used in the FRL and national GHG inventory in the reference period and on the trends during the years 2010-2016.

Technical recommendations on Annex IV, Section B Elements

- b) Provide missing information on non-CO<sub>2</sub> emissions from drained organic soils for the FRL, which are reported in GHG inventory.
- c) Provide more detailed information on the calculation of the background level for natural disturbances, consistent with Regulation (EU) 2018/841.
- e) i Provide the area under forest management consistent with Table 4.A (“Forest land remaining Forest land”) from the latest national GHG inventory using the year preceding the starting point of the projection. Given the use of the dynamic area approach, provide a detailed disaggregated calculation of the managed forest land area at annual time steps for the entire time series since, at least, year 2000.
- e) iii Provide additional information on increments.
- e) iv Provide additional information on disaggregation of energy and non-energy uses for historical and future harvesting rates.

## 6. NEXT STEPS

Based on the technical assessments and the technical recommendations, Member States shall communicate their revised proposed forest reference levels to the Commission by 31 December 2019 for the period from 2021 to 2025. The Commission shall publish the proposed forest reference levels communicated to it by Member States.

Based on the proposed forest reference levels submitted by Member States, on the technical assessment and recommendations, and on the revised proposed forest reference

level submitted, the Commission shall adopt by 31 October 2020 a delegated act with a view to laying down the forest reference levels to be applied by the Member States for the period from 2021 to 2025.

If a Member State does not submit its (revised) forest reference level to the Commission by 31 December 2019, the Commission shall adopt a delegated act with a view to laying down the forest reference level to be applied by that Member State for the period from 2021 to 2025, based on any technical assessment carried out.