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Report of the technical assessment of the forest management reference level submission of Australia submitted in 2011

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I. Introduction and summary

A. Overview

1. This report covers the technical assessment (TA) of the submission of Australia on its forest management reference level (FMRL) submitted on 14 March 2011 in accordance with decision 2/CMP.6. The TA took place (as a centralized activity) from 23 to 27 May 2011 in Bonn, Germany, and was coordinated by the UNFCCC secretariat. The TA was conducted by the following team of nominated land use, land-use change and forestry experts from the UNFCCC roster of experts: Mr. Nagmeldin G. Elhassan (Sudan), Mr. Giacomo Grassi (European Union), Ms. Rehab Ahmed Hassan (Sudan), Mr. Vladimir Korotkov (Russian Federation), Mr. Rae-Hyun Kim (Republic of Korea) and Mr. Kevin Black (Ireland). Mr Nagmeldin G. Elhassan and Mr. Giacomo Grassi were the lead reviewers. The TA was coordinated by Ms. María José Sanz-Sánchez (UNFCCC secretariat).

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

B. Proposed reference level

3. Australia has presented a number of FMRL values in its submission to reflect a range of possible outcomes on the force majeure (natural disturbances) provision, as shown in table 1. Contingent on the final form of the force majeure provision, Australia’s estimated FMRL ranges from –0.2 million tonnes of carbon dioxide equivalent (Mt CO₂ eq) to 4.1 Mt CO₂ eq per year. In the absence of a force majeure provision, Australia’s reference level would be 8.5 Mt CO₂ eq per year.

Table 1

Range of forest management reference level values included in Australia’s submission (final values depending on forgone removals)

<i>Forest management with treatment of force majeure</i>	<i>Threshold (% of national emissions)</i>	<i>Reference level (Mt CO₂ eq per year)</i>
Forest management total with force majeure		
Emissions under threshold not accountable	0–1	–0.2–1.0
Emissions under threshold accountable	0–1	–0.2–4.1
Forest management total without force majeure provision	Not applicable	8.5

II. General description of the reference level

A. Overview

4. Australia’s proposed FMRL uses the projected emissions and removals from forest management activities for 2013–2020, estimated using a number of different models. Three

forest management subcategories (multiple use forests, private harvested native forests and pre-1990 plantations), as well as emissions and removals from harvested wood products (HWP), are included in the FMRL.

B. How each element of footnote 1 to paragraph 4 of decision 2/CMP.6 was taken into account in the construction of the reference level

1. Historical data from greenhouse gas inventory submissions

5. Australia states in its submission (chapter 4) that the methods used to calculate the emissions and removals underpinning the calculation of the FMRL are those used to develop the latest national inventory report (2011 NIR) prepared under the Convention and its Kyoto Protocol. During the TA, the expert review team (ERT) noted that the aggregation of forest subcategories differs between the FMRL submission and the NIR, making it difficult to compare the two sets of data. In response to a number of questions from the ERT, Australia provided the information necessary to compare forest subcategories between the FMRL and the NIR. A summary of this comparison is provided below and in the annex. During the TA, Australia also noted that the national inventory methods and data used in the forest land remaining forest land category will be updated to reflect the spatially explicit approach adopted for the purpose of developing the FMRL.

2. Age-class structure

6. The FMRL submission contains information on the following:

(a) The area of pre-1990 plantations (mainly softwood), disaggregated by year of planting (starting in 1940). Most of these pre-1990 plantations were established in the 1960s, and are generally managed on a 30- to 40-year rotation.

(b) The area and growth stage of multiple use forests. The area under each of the age classes was reduced on a pro rata basis from the 1990 harvested native forests estate (14.9 million hectares (ha)) to account for the area of forest that is identified as multiple use forests in 2008 (9.41 million ha). This reduction in area is mainly due to the transfer of forest to land tenures with the primary objective of protection, largely transfer of land to conservation reserves between 1990 and 2008. In response to a question from the ERT on the validity of assuming the age-class structure of harvested native forests as representative of that of multiple use forests, Australia replied that there are no data available to support an alternative assumption. Australia also specified that, while being variable according to forest type and harvest method, the average rotation length for the multiple use forests is of the order of 100 years.

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

7. See paragraph 29 below.

4. Other elements

Forest management activities already undertaken

8. Australia did not elect forest management as an activity in the first commitment period of the Kyoto Protocol. However, sustainable forest management activities already take place in Australia under a range of national and state and territory policies, which are outlined in section 8 of Australia's FMRL submission.

Projected forest management activities under a ‘business as usual’ scenario

9. Sustainable forest management activities already take place in Australia under a range of national and state and territory policies, which are outlined in section 8 of the submission.

C. Pools and gases

10. Above- and below-ground biomass, litter and dead wood are included in all three forest management subcategories. Mineral soil is included only for pre-1990 plantations, under the assumption that soil carbon in the other subcategories is in equilibrium. Australia indicates in its submission that it would seek to utilize the provision for a technical review of the FMRL to incorporate higher-tier modelling of mineral soils on all forest management lands. Organic soil is not occurring. Other greenhouse gas sources included in the FMRL are CO₂, methane and nitrous oxide from biomass burning. HWP are included in the FMRL taking into account products produced since 1990. During the TA, estimates for HWP since 1900 were also provided for information purposes.

11. The inclusion of the above-mentioned pools and gases in the FMRL is consistent with what is included in the 2011 NIR.

D. Approaches, methods and models used

12. The FMRL was constructed considering several different components, and using a combination of different models and methods. Based on the additional information provided by the Party, the content and magnitude of some of these components were clarified during the TA. Overall, the following components were identified, and their quantitative contribution to Australia’s FMRL is included in table 2 of the annex:

(a) Multiple use forests subcategory: emissions and removals estimated using the non-spatially explicit tier 2 capabilities of FullCAM (Full Carbon Accounting Model), as described for the harvested native forests category in Australia’s 2009 NIR;

(b) Private harvested native forests subcategory: a combination of two methods was used. The emissions and removals from private native forest harvesting in Tasmania were estimated using the same model as that used for multiple use forests. The emissions from harvesting in private native forests in New South Wales and Queensland were estimated using the tier 2 comparison model that was also used to verify the harvested native forests model described in Australia’s 2011 NIR;

(c) Pre-1990 plantations subcategory: emissions and removals estimated using the FullCAM model, as described for the same subcategory in Australia’s 2011 NIR;

(d) Fuelwood consumed (extraction of dead organic matter across all forest subcategories): estimated using the fuelwood model described in Australia’s 2011 NIR;

(e) HWP: see paragraphs 27 and 28 below;

(f) Prescribed burning is included in Australia’s FMRL using the same method for estimating prescribed burning emissions as that used for Australia’s 2011 NIR, as described in volume 2, section 7.12. Australia has indicated that it will include an expanded explanation in a future resubmission of the FMRL;

(g) Disturbances in the context of force majeure: a range of possible scenarios was included in Australia’s FMRL (see the table above). The basis of these scenarios is the data from wildfires in multiple use forests between 1990 and 2009. On average, 189,453

hectares per year have been burned by wildfires since 1990, and the corresponding emissions for the average area burned is 8,700 Gg CO₂ eq per year;

(h) Foregone removals from force majeure events: Australia has estimated the expected loss of removals that may occur because of the excision of emissions and removals on land that has been affected by fire under force majeure provisions. That is, where a unit of land has been affected by a force majeure fire, the removals that would have occurred on that unit of land in the absence of fire have been excluded from the FMRL. In response to a question from the ERT, Australia indicated that the foregone removals (3.8 Mt CO₂ eq per year) were estimated by multiplying the average annual expected foregone removals for a hectare of multiple use forests (4.43 t CO₂/ha per year) by the accumulation of the average area burned in multiple use forests over the period 1990–2009 (an additional 189,453 ha for each year of the reporting period).

13. When assessing the above-mentioned components, the ERT noted the following two problems related to the foregone removals:

(a) The relationship between the value of 3.8 Mt CO₂ eq per year and information on net removals per unit area provided during the TA was unclear. In response to a request for clarification from the ERT, Australia stated that the gross removal per unit area (4.43 t CO₂/ha per year for medium and tall dense eucalypt forests) was used to estimate the foregone removals (see the annex, table A-5). The ERT considers that the estimate of the amount of foregone removals during the reporting period will depend on a number of variables that are difficult to forecast at this time. The ERT notes that this issue, if not considered at this stage, could be included in a future technical correction to the FMRL once the exact area burned is identified. In response, Australia indicated that, should the spatial pattern of fires observed during the reporting period imply a different foregone gross removal rate to the one assumed in the FMRL, a technical correction to the FMRL would be implemented once relevant information becomes available;

(b) The assumption of adding the same quantity of foregone removals to all the force majeure scenarios (see the annex, table 2) is a simplification that needs amendment. Different values of foregone removals should be added to different force majeure scenarios, and no foregone removals should be added to the no force majeure scenario. Australia indicated during the TA that it would review the assumption made in the submission and provided preliminary estimates for each scenario to the ERT.

14. With regard to foregone removals, the ERT recommends that the Party either not consider the foregone removals at this stage but include this issue in a future technical correction to the FMRL once the exact area burned is identified, or, alternatively, revise the FMRL values to take into account the issue in paragraph 13(b) above and, as Australia has indicated in paragraph 13(b), provide a future technical correction to the FMRL based on observed data of fires in the reporting period.

E. Description of the construction of the reference levels

1. Area under forest management, and relationship of the forest land remaining forest land category with the forest management activity reported previously under the Convention and the Kyoto Protocol

15. Australia did not elect forest management for the first commitment period of the Kyoto Protocol. Consequently, the lands that will be subject to the forest management activity, if elected, have been identified in the FMRL submission (section 3). In particular, Australia has identified the following forest lands as being subject to the forest management activity:

(a) All commercial plantations not included in reporting under Article 3, paragraph 3, of the Kyoto Protocol (i.e. pre-1990);

(b) All public land available for timber harvesting as at December 2009, specifically multiple use forests as identified by the Montreal Process Implementation Group in 2008.

16. All the other forest lands will be monitored (comprising forest lands that were in formal conservation reserves as at December 2009, privately managed native forests and extensively grazed woodlands). Once an activity is identified (i.e. direct human-induced activities conducted after December 2009), the lands will be transferred to the forest management lands account.

17. The additional information provided by Australia during the TA helped to clarify a number of issues related to both the area under forest management and the emissions and removals considered for its FMRL and their relationship with information included in the NIR for forest land remaining forest land. A summary of this additional information is included in the annex (see table 3 for the area and table 4 for the emissions and removals).

18. The ERT noted that, based on the information provided by the Party, an area of 0.30 million ha is reported as a “statistical discrepancy” (see the annex, table 3). In response to a request for clarification from the ERT, Australia expressed the view that this statistical discrepancy is not relevant to the construction of the FMRL. This is because Australia has used the most recent national data to define the areas subject to forest management and all areas under forest management are allocated to multiple use forest, private harvested native forests or pre-1990 plantations.

19. The ERT notes that Australia adopted a “narrow” approach to define the area under forest management. This area corresponds to about 10 per cent of the total forest area reported in the NIR. While the area of multiple use forests and pre-1990 plantations will remain constant in the reporting period, the total forest management area is expected to increase over time as new areas of private native forests are harvested (see the annex, table 3). In particular, based on the historical rate of harvest in private native forests, Australia assumes that an additional 0.18 million ha of private native forests will be harvested between 2009 and 2020. Australia specified that any deviation from this assumption for private native forests will be reflected in the reporting period, but will not trigger a recalculation of its FMRL. By contrast, the Party indicated that a technical recalculation should result from a planned move to tier 3, approach 3, in the NIR or if improved historical information becomes available or if improved data on the age-class structure of multiple use forests becomes available.

20. The ERT notes that the projected estimates for private harvested native forests show a high implied emission factor (531 t CO₂/ha per year). In response to a question from the ERT, Australia explained that 0.39 million ha of private native forests were already harvested between 1990 and 2009, and that the expected removals from re-growth in these lands in the period 2013–2020 are included in the FMRL. Australia also provided additional information to justify the high implied emission factor (see the annex). This information shows that the majority of private native forest harvesting occurs in high biomass forests; that is, in medium dense and tall dense eucalypt forests in Tasmania.

21. Australia acknowledged that the national inventory methods and data used in the forest land remaining forest land category should be updated to reflect the approach adopted for the purpose of developing the FMRL; that is, that the information in future NIRs will be fully comparable with the forest subcategories adopted in the FMRL submission.

2. Forest characteristics

22. Australia has 106 million ha of forest (see the annex, table 3). Native forests make up 104 million ha, while the remaining approximately two million ha are plantations. Native forests exist within a range of land tenures that have a range of social, economic and ecological values, and include both public and private forests. Public forests may be managed for a variety of purposes, including timber production (i.e. multiple use forests), or may be set aside from intensive management. The area of privately managed native forests is much greater than the area of public forests, and is generally subject to low management intensity. However, some private native forests in higher rainfall regions of Australia are used for timber production (i.e. the private harvested native forests included in the FMRL).

3. Historical and assumed harvesting rates

23. Australia indicated that the future rate of harvest in native forest (i.e. multiple use forests and private native forests) is assumed to be consistent with recent levels given that there were no policies in place as at December 2009 that would change the area of timber production in the future. Australia has used the average harvest area of the period 2002–2009 as the basis for its projection. The period 2002–2009 reflects the period of harvesting following the sharp decline in harvesting rates experienced in 2002 due to increased harvesting restrictions. These data also include the sharp decline in harvesting in 2009 that was a result of short-term economic conditions rather than a result of policy.

24. Based on the additional information provided by Australia during the TA, the ERT has noted that the volume of harvest is predicted to increase in the period 2013–2020, by 7 per cent in multiple use forests and by 4 per cent in private harvested native forests, as compared with the period 2000–2009. In response to a question from the ERT, Australia explained that the increase in harvested volumes over time reflects the dynamics of the forest model used for its national greenhouse gas inventory, and that the observed reduction in the sink of multiple use forests (–15 per cent in 2013–2020 as compared with the period 2000–2009) reflects the increased harvested volumes over the period.

25. Australia indicated that the harvesting rates for pre-1990 plantations are determined by the standard rotation lengths for each species. There is some potential for a small variation around the rotation lengths that reflect economic and other management decisions. However, in general the rotation length will not vary substantially.

26. Based on the additional information provided by Australia during the TA, figure 1 in the annex summarizes the historical and projected harvest volumes in the forest subcategories included in the FMRL.

4. Harvested wood products

27. Australia's FMRL includes an estimate of emissions from HWP produced since 1990. An estimate of emissions with assumptions about emissions from HWP for the period since 1900 (a period for which data are not available) was also constructed and is provided for information purposes as the net difference between the 1900 and 1990 estimate is minimal (see annex section B, table 2).

28. The HWP consumed in domestic markets were estimated using the model described in the 2009 NIR. The HWP consumed in export markets were estimated using the provisions contained in document FCCC/KP/AWG/2010/18/Add.1, chapter II, annex I, paragraphs 27 and 28. The approach used for HWP in Australia's FMRL submission differs from the approach used in the NIR, and the reasons for this difference are explained in the submission (section 4.B).

5. Factoring out

29. The models used to construct the FMRL assume that there is no effect from elevated CO₂. In addition, the use of an FMRL means that removals resulting from elevated CO₂ concentrations above the pre-industrial level and indirect nitrogen deposition will be factored out when subtracting the FMRL from net emissions/removals that occur during the commitment period. The use of a projected reference level implicitly excludes these factors. Similarly, the dynamic effects of differing age-class structures across the forests resulting from past activities and practices and natural disturbances are included in both the construction of the FMRL and the estimation of net emissions during the reporting period.

F. Policies included

30. Australia's FMRL submission describes the domestic framework designed to achieve the conservation and sustainable management of all Australian forests. The main elements of this framework include Australia's 1992 National Forest Policy Statement and the regional forest agreements (RFAs). RFAs are 20-year plans underpinning regional approaches to balancing conservation and production from native forests and cover the majority of production forest regions in Australia. As RFAs approach their 15-year marks between 2012 and 2015, the Australian Government and relevant state governments will be considering the approach to extending the RFAs once they complete their 20-year time frame (2016–2021). As at December 2009, the Government had no plans to make changes to the RFAs. Accordingly, Australia has assumed the continuation of the RFAs in their current form for the 2013–2020 period.

31. The 'business as usual' scenario applied by Australia assumes that policies in place as at December 2009 for native forest management and plantations will remain constant for the 2013–2020 period. This means that Australia assumed that there were no policies in place in December 2009 which would change the rate of timber production in the three subcategories included in the FMRL.

G. Other issues

32. Australia's estimate for its FMRL has been revised from the estimate presented in the previous FMRL submission. The latest (2011) submission explained that a more recent mapping classification of multiple use forests has been utilized, which has identified a transfer of forest out of multiple use forests and into conservation protection over the past decade (by 1.7 million ha). As the forest areas that have been transferred out of the multiple use forest classification will be growing during the second commitment period, this change has significantly reduced the removals estimate for multiple use forests under forest management compared with the previous submission (leading to an increase in the reference level of 7.8 Mt CO₂ eq). Australia specified that this revision does not lead to unbalanced accounting, however, as the sink capacity of these areas will be excluded from both the FMRL estimate and from the net emissions to be estimated in a future reporting period.

III. Conclusions and recommendations

33. Australia has presented a number of FMRL values in its submission to reflect a range of possible outcomes on the force majeure provision. Australia's proposed FMRL uses the projected emissions and removals from forest management activities for 2013–2020, estimated through a number of different models and methods.

34. The ERT has noted that the aggregation of forest subcategories in the FMRL submission is different from the information included in the NIR, making it difficult to compare projected estimates with the historical time series. During the TA, Australia provided useful additional information, which helped to clarify a number of issues related to both the area under forest management and the emissions and removals considered for the FMRL and their relationship with information included in the NIR. A summary of this additional information is included in the annex.

35. Australia acknowledged that the national inventory methods and data used in the forest land remaining forest land category should be updated to reflect the spatially explicit approach adopted for the purpose of developing the FMRL.

36. Based on the information included in the submission or received during the TA, the ERT:

(a) Notes that the estimation of the “foregone removals” added to the FMRL values is based on a number of assumptions difficult to assess at this stage. For this reason, the ERT recommends that the Party either not consider the foregone removals at this stage but include this issue in a future technical correction to the FMRL once the exact area burned is identified, or, alternatively, revise the FMRL values to take into account the issue in paragraph 13(b) above and, as Australia has indicated in paragraph 13(a) above, provide a future technical correction to the FMRL based on observed data of fires in the reporting period;

(b) Recommends that Australia provide additional information to justify the high emissions included in private harvest native forests, including information on the forest types and management involved in the harvest of this subcategory and a quantification of the sink due to the re-growth in the areas of private native forests harvested since 1990. Australia has indicated that it will provide this data when it provides a revised submission.

Annex

Documents and information used during the technical assessment

A. Reference documents

Forest management reference level submission from Australia, 14 March 2011. Available at <http://unfccc.int/files/meetings/ad_hoc_working_groups/kp/application/pdf/awgkp_australia_2011.pdf>.

Montreal Process Implementation Group for Australia. 2008. *Australia's State of the Forests Report*. Canberra: Bureau of Rural Sciences.

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

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

B. Additional information provided by the Party

1. Graphs and table elaborated by the ERT

Tables 2–4 and figure 1 have been elaborated by the expert review team based on the information provided by the Party during the technical assessment.

Table 2

Quantitative contribution of the different components considered in the construction of Australia's forest management reference level (average of projected estimates for 2013–2020)

<i>Component of forest management reference level (FMRL)</i>	<i>Mt CO₂ eq</i>
(A) Subcategory multiple use forests	–9.9
(B) Subcategory private harvest native forests	8.9
(C) Subcategory pre-1990 plantations	0.3
(D) Fuelwood consumed	1.3
(E) Harvested wood products (HWP) (starting 1990) ^a	–4.7
(F) Prescribed burning	0.2
Total with HWP ((A)+(B)+(C)+(D)+(E)+(F))	–4.0
(G) Disturbances (wildfires)	
(G1) Fire emissions (excluding all emissions from events >1%)	1.2
(G2) Fire emissions (excluding all emissions from events >1% above threshold)	4.3
(G3) Total fire emissions	8.7
(H) 'Foregone removals' from force majeure events	3.8
Total FMRL with force majeure:	
- excluding all emissions from events >0% (total with HWP+H)	
- excluding all emissions from events >1% (total with HWP+G1+H)	
- excluding all emissions above threshold from events >1% (total with	–0.2

<i>Component of forest management reference level (FMRL)</i>	<i>Mt CO₂ eq</i>
HWP+(G2)+(H)	1.0
FMRL without force majeure (total with HWP+(G3)+(H))	4.1
	8.5

^a With HWP starting in 1900, the estimate would be –4.6 Mt CO₂ eq.

Table 3

Summary of the area considered under forest management and its relationship with information included in the national inventory report of Australia

	<i>National inventory report, FL–FL</i>	<i>Forest management reference level (FMRL)</i>	
	<i>Area in 2009 (million ha)</i>	<i>Area in 2009 (million ha)</i>	<i>Area in 2020 (million ha)</i>
Harvested native forests	14.90		
-Nature conservation reserve	4.79		
-Multiple use forest	9.41	9.41	9.41
-Private harvested native forests	0.39	0.39	0.57
-Statistical discrepancy ^a	0.30	--	--
Pre-1990 plantations	0.82	0.82	0.82
Other native forest	89.70		
Total	105.40	10.61	10.80

^a “Statistical discrepancy” reflects changes in the definition of forest types between 1997 and 2009 and conversions from multiple use forests to nature conservation reserves prior to 1998.

Table 4

Summary of the emissions and removals considered in the three forest subcategories included in forest management, and relationship with information included in the national inventory report of Australia

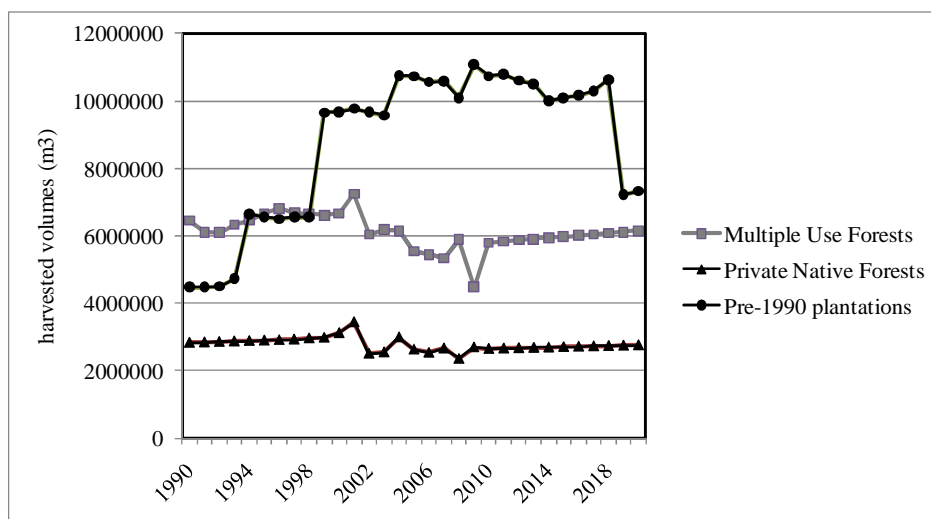
	<i>National inventory report(NIR)</i>		<i>Forest subcategories included in forest management</i>		
	<i>Harvested native forests (total, from NIR)</i>	<i>Harvested native forests not included in forest management (i.e. nature conservation reserves)</i>	<i>Multiple use forest</i>	<i>Private harvested native forests</i>	<i>Pre-1990 plantations</i>
	<i>Mt CO₂ eq</i>				
1990 ^a	–30.0	–19.5	–16.6	6.0	–9.2
1991	–30.9	–21.4	–16.5	7.0	–9.2
1992	–30.3	–22.5	–15.6	7.7	–9.2
1993	–28.7	–23.2	–13.8	8.3	–8.8
1994	–27.6	–23.7	–12.6	8.7	–6.1
1995	–26.4	–24.0	–11.5	9.0	–6.1
1996	–24.9	–24.3	–10.0	9.4	–6.2
1997	–25.0	–24.4	–10.2	9.6	–6.2

1998	-24.6	-24.4	-10.0	9.7	-6.2
1999	-24.2	-24.4	-9.7	9.9	-1.8
2000	-22.2	-24.4	-8.7	10.9	-1.3
2001	-19.3	-24.3	-6.6	11.6	-0.9
2002	-26.9	-24.3	-10.7	8.2	-0.8
2003	-26.6	-24.4	-10.4	8.2	-0.7
2004	-24.9	-24.5	-10.0	9.6	1.0
2005	-29.0	-24.4	-12.8	8.3	1.4
2006	-28.7	-24.5	-13.1	8.9	1.5
2007	-28.2	-24.2	-14.1	10.1	1.9
2008	-28.6	-24.3	-12.4	8.2	1.1
2009	-31.6	-24.3	-16.8	9.5	2.6
2010			-12.3	8.7	2.1
2011			-11.7	8.8	2.2
2012			-11.3	8.8	1.9
2013			-11.0	8.9	1.7
2014			-10.6	8.9	1.0
2015			-10.3	8.9	1.1
2016			-10.0	8.9	1.2
2017			-9.8	8.9	1.3
2018			-9.5	9.0	1.9
2019			-9.2	9.0	-2.9
2020			-8.9	9.0	-3.2

^a The estimates for 1990 may be revised for the next NIR submission.

Figure 1

Historical and projected harvest volumes in the forest subcategories included in the forest management reference level of Australia



Information provided by the Party during the TA¹

The following figures and table were provided by the Party during the technical assessment in order to justify the emissions from private native forests included in the forest management reference level (FMRL).

Figure A-2 Emissions intensity of harvesting in the models used to estimate emissions in Australia's private native forest estate.

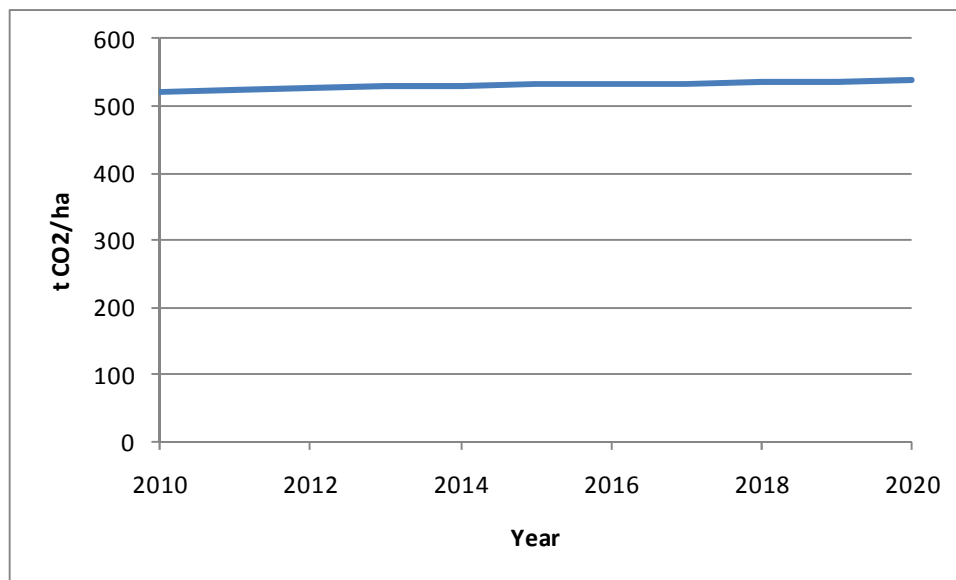


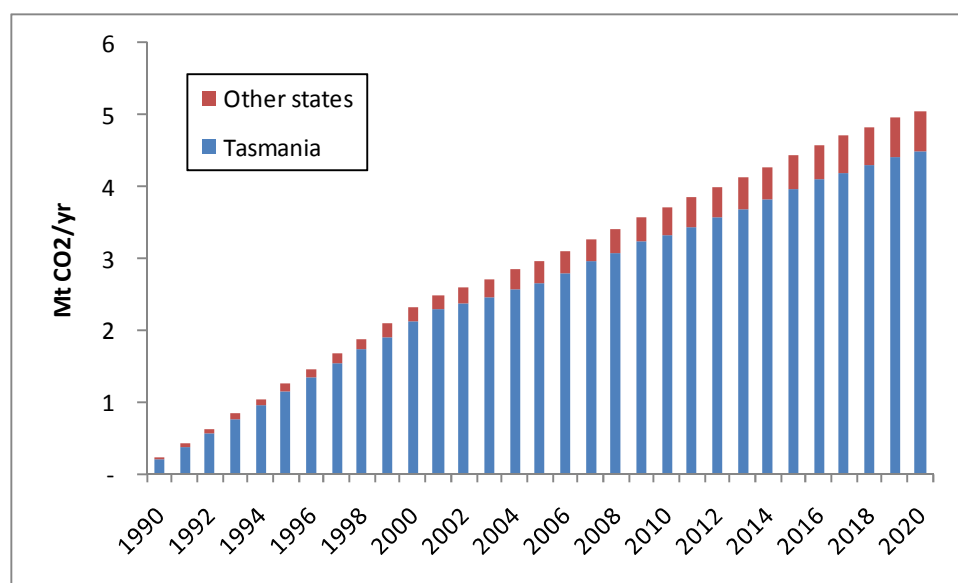
Table A-4 Emissions in year of harvest in model for Tasmanian private native forests

Harvest Plots in Tasmania	CO2 emissions per ha in harvest year
MDEF three aged PH PW TAS.plo	298
MDEF unknown age PH PW TAS.plo	298
MDEF 31-100 PH PW TAS.plo	305
MDEF mature PH PW TAS.plo	343
MDEF senescent PH PW TAS.plo	347
MDEF 31-100 CF NPW.plo	473
MDEF unknown age CF NPW.plo	508
MDEF three aged CF NPW.plo	510
MDEF 31-100 CF PW.plo	518
MDEF three aged CF PW.plo	552
MDEF unknown age CF PW.plo	552
MDEF mature CF NPW.plo	579

¹ Reproduced as received from the Party.

Harvest Plots in Tasmania	CO2 emissions per ha in harvest year
MDEF senescent CF NPW.plo	614
MDEF mature CF PW.plo	632
MDEF senescent CF PW.plo	672
TDEF 31-100 CF NPW.plo	989
TDEF 31-100 CF PW.plo	1,036
TDEF unknown age CF NPW.plo	1,051
TDEF unknown age CF PW.plo	1,123
TDEF mature CF NPW.plo	1,311
TDEF mature CF PW.plo	1,372
TDEF senescent CF NPW.plo	1,457
TDEF senescent CF PW.plo	1,525

Figure A-3 Modelled sink due to the regrowth in the areas of the private native forests harvested since 1990.



Comment by the Party to figure A-2, figure A-3 and table A-4

The implied emissions intensity of harvesting of private native forests is on average 531 t CO₂/ha in the models used to construct Australia's FMRL (figure A-2). This relatively high value can be justified because:

1. Highly productive forests are included in the private forests model (table A-4);
2. The assumed area of regrowth in the private native forest model was small in 1990 and only areas harvested since 1990 contribute regrowth in the private native forest model used.

The majority of private native forest harvesting in Australia occurs in Tasmania. Private native forest harvesting in Tasmania occurs in tall dense eucalypt forests (TDEF) and medium dense eucalypt forests (MDEF) which have a relatively high biomass and growth rate.

The model used to estimate emissions and removals in the private native forest estate in Tasmania to support the development of Australia's FMRL included MDEF and TDEF of various age classes and management regimes (table A-4). The wide range of values encompasses the reported implied factor of 531 t CO₂/ha.

In the private native forest category of Australia's FMRL there is an increasing sink due to the cumulation of areas of private native forests harvested since 1990 (figure A-3).

Table A-5. Methods used to estimate foregone removals for Australia's Forest Management Reference Level scenarios. (*pending decision on foregone removals*)

Scenario	Threshold	Method for calculating foregone removals
FM total with force majeure – Emissions under threshold not accountable	0%	<p>The land area on which foregone removals occur was estimated using the average area burned in multiple use forests between 1990 and 2009 (189, 453 ha).</p> <p>The rate of growth was estimated using the area weighted growth rate for tall and medium dense eucalypt forest (4.43 t CO₂ per ha per year).</p> <p>Multiplication of 4.43 by 189,453 gives 0.84 Mt CO₂ per year which is multiplied by 36 to quantify the removals that would be excluded on the area burnt each year until the end of the commitment period. This gives a total of 30.24 Mt CO₂ over a period of 8 years, or 3.78 Mt CO₂ per year on average.</p>
FM total with force majeure – Emissions under threshold not accountable	1%	<p>The land area on which foregone removals occur was estimated using the average area burned in multiple use forests between 1990 and 2009 for years when the 1% threshold of emissions is reached (158,422 ha).</p> <p>The rate of growth was estimated using the area weighted growth rate for tall and medium dense eucalypt forest (4.43 t CO₂ per ha per year).</p> <p>Multiplication of 4.43 by 158,422 gives 0.70 Mt CO₂ per year which is multiplied by 36 to quantify the removals that would be excluded on the area burnt each year until the end of the commitment period. This gives a total of 25.29 Mt CO₂ over a period of 8 years, or 3.16 Mt CO₂ per year on average.</p>
FM total with force majeure – Emissions under threshold accountable	0%	<p>The land area on which foregone removals occur was estimated using the average area burned in multiple use forests between 1990 and 2009 (189, 453 ha).</p> <p>The rate of growth was estimated using the area weighted growth rate for tall and medium dense eucalypt forest (4.43 t CO₂ per ha per year).</p> <p>This gives 0.84 Mt CO₂ per year which is multiplied by 36 to quantify the removals that would be excluded on the area burnt each year until the end of the commitment period. This gives a total of 30.24 Mt CO₂ over a period of 8 years, or 3.78 Mt CO₂ per</p>

Scenario	Threshold	Method for calculating foregone removals
		year on average.
FM total with force majeure – Emissions under threshold accountable	1%	<p>The land area on which foregone removals occur was estimated using the area subject to force majeure in years where fire emissions were above the 1% threshold. This was calculated by multiplying the area burnt, by the proportion of emissions that were above the 1% threshold.</p> <p>The rate of growth was estimated using the area weighted growth rate for tall and medium dense eucalypt forest (4.43 t CO₂ per ha per year).</p> <p>This gives 0.41 Mt CO₂ per year which is multiplied by 36 to quantify the removals that would be excluded on the area burnt each year until the end of the commitment period. This gives a total of 14.87 Mt CO₂ over a period of 8 years or 1.86 Mt CO₂ per year on average.</p>
FM total without Force majeure provision	NA	No foregone removals have been included in this scenario