From reference levels to results reporting: REDD+ under the United Nations Framework Convention on Climate Change

2020 update

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Acronyms and abbreviations

AD	activity data
AFOLU	agriculture, forestry and other land use
AGB	aboveground biomass
BGB	belowground biomass
BTR	biennial transparency report
BUR	biennial update report
CBIT	Capacity-Building Initiative for Transparency
COP	Conference of the Parties (to the UNFCCC)
EF	emission factor
ER	emission reduction
ETF	Enhanced Transparency Framework (under the Paris Agreement)
FCPF	Forest Carbon Partnership Facility
FOLU	forestry and other land use
FRA	Global Forest Resources Assessment
FREL	forest reference emission level
FRL	forest reference level
GCF	Green Climate Fund
GEF	Global Environment Facility
GFOI	Global Forest Observations Initiative
GHG	greenhouse gas
ICA	international consultation and analysis
INDC	intended nationally determined contribution
IPCC	Intergovernmental Panel on Climate Change
LULUCF	land use, land-use change and forestry
MPGs	modalities, procedures and guidelines
MRV	measurement, reporting and verification
NDC	nationally determined contribution
NFI	national forest inventory
NFMS	national forest monitoring system
PSP	permanent sample plot
RBP	results-based payment
REDD+	Reducing Emissions from Deforestation and Forest Degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
SIS	safeguards information system
SMF	sustainable management of forests
UNFCCC	United Nations Framework Convention on Climate Change

Chemical formulae/units

CO_2	carbon dioxide
CO_2eq	carbon dioxide equivalent
ha	hectare(s)
m	metre(s)
tCO_2eq/yr	tonne(s) of carbon dioxide equivalent per year
USD	United States dollar(s)

Executive summary

This report provides an update on Reducing Emissions from Deforestation and Degradation Plus[1] (REDD+) forest reference (emission) levels (FREL/FRLs) and REDD+ results submitted to the United Nations Framework Convention on Climate Change (UNFCCC), and relevant developments under the Green Climate Fund concerning REDD+ results-based payments. It illustrates the choices countries have made when constructing their FREL/FRLs and areas for improvement identified during technical assessments. Such information can help countries to learn from each other's experiences and thus facilitate South–South knowledge exchange on REDD+.

As of September 2020, the following FREL/FRL milestones had been achieved:

- **Fifty countries** had submitted **60 FREL/FRLs** to the UNFCCC for technical assessment.
- These FREL/FRL submissions collectively cover a **forest area of approximately 1.35 billion ha** (33 percent of global forest area) and the countries that submitted a REDD+ FREL/FRL to the UNFCCC are responsible for around **75 percent of global deforestation**.
- **82 percent** of the FREL/FRLs were **national in scale**, and **80 percent used historical average** emissions/removals to construct their FREL/FRL.
- Deforestation is the most frequently included REDD+ activity in FREL/FRLs and **the scope of activities in FREL/FRLs is expanding** over time
- The reporting of **uncertainties** in FREL/FRL submissions is **increasing over time**.

As of September 2020, the following REDD+ results milestones had been achieved:

- **Thirteen countries had reported REDD+ results** to the UNFCCC through **17 results submissions** (in the REDD+ technical annex of their biennial update reports).
- Results have been **reported for all REDD+ activities,** although no single country covered all REDD+ activities.
- The majority of all reported results came from **reducing emissions from deforestation (98 percent).**
- The combined REDD+ results reported total 9.03 billion tonnes of carbon dioxide equivalent (tCO$_2$eq). Most of these (90.4 percent) are emission reductions reported by Brazil.
- The net annual emission reductions from emitting REDD+ activities reported consist on average of a **34 percent reduction against the FREL,** meaning emissions over the results period are on average 34 percent lower than emissions in the FREL. The

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[1]   The plus stands for the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.

emission reductions per country range from –32 percent (or an increase in emissions against the FREL) to 69 percent reduction against the FREL.

- The net annual removal increase from plus activities reported consist on average of **7 percent increase against the FRL**, meaning removals over the results period are on average 25 percent higher than removals in the FRL. The removal increases per country range from –83 percent (or a drop in removals compared against the historical period) to 85 percent removal increase against the FRL.

The following milestones have been achieved as a result of the UNFCCC technical assessment and technical analysis:

- The UNFCCC had published **45 FREL/FRL technical assessment reports, and 14 technical analysis reports of REDD+ results.**
- For 43 of the 45 finalized technical assessments (96 percent), countries had **submitted a modified FREL/FRL**, and 33 of these 43 modified FREL/FRL submissions **(77 percent) changed the FREL/FRL value** as a result of the technical assessment.

Finally, as of September 2020, the following Green Climate Fund results-based payment milestones had been achieved:

- **Six funding proposals** (Brazil, Chile, Colombia, Ecuador, Indonesia and Paraguay) for REDD+ results-based payments had been **approved by the Green Climate Fund, totalling USD 361 million.**

1. Introduction

1.1 OBJECTIVES AND TARGET AUDIENCE

Building on the considerable amount of work invested in Reducing Emissions from Deforestation and Forest Degradation, and the role of sustainable management of forests, conservation and enhancement of forest carbon stocks (REDD+) over the past decade and beyond, significant progress has been observed in recent years. REDD+ is included in Article 5 of the 2015 Paris Agreement on climate change, and forests and land-use mitigation measures are featured in many nationally determined contributions (NDCs).

The aim of this paper is to inform countries about recent developments in the measurement, reporting and verification (MRV) of REDD+ activities under the United Nations Framework Convention on Climate Change (UNFCCC). It provides an update on submissions on forest reference (emission) levels (FREL/FRLs) and REDD+ results reporting; a summary of experiences with the UNFCCC technical assessment and technical analysis (TA) processes; and progress made on results-based payments (RBPs) through the Green Climate Fund (GCF) pilot programme for REDD+ RBPs, launched in October 2017. Box 1 explains what FREL/FRLs are and what the difference is between a FREL and a FRL.

This report complements and updates *From reference levels to results reporting: REDD+ under the UNFCCC* (FAO, 2017a; 2018a; 2019) and builds on three previous UN-REDD/FAO publications: *Technical considerations for forest reference emission level and/or forest reference level construction for REDD+ under the UNFCCC* (FAO, 2015a)*; Strengthening national forest monitoring systems for REDD+* (FAO, 2018b); *National forest monitoring systems: monitoring and measurement, reporting and verification (M&MRV) in the context of REDD+ activities* (FAO, 2013); and *Emerging approaches to forest reference emission levels and forest reference levels for REDD+* (FAO, 2015b).

1.2 STATUS OF REFERENCE LEVELS AND REDD+ RESULTS SUBMISSIONS

As of September 2020, 50 countries had submitted 60 FREL/FRLs to the UNFCCC, comprising 16 countries in Latin America and the Caribbean, 19 in Africa, and 15 in Asia and the Pacific (Figure 1). For the 60 FREL/FRL submissions, 45 TA reports had been published by September 2020.

Seventeen[2] submissions of REDD+ results were included in the technical annexes of the biennial update reports (BURs) of 13 countries. Of these, technical analyses were completed for 14 submissions by September 2020 as part of the international consultation and analysis (ICA) process (Figure 2).

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[2] Brazil's latest BUR contains a technical annex with REDD+ results for the Amazon (2016–2017) and a technical annex with REDD+ results for the Cerrado (2011–2017), which here are considered as two REDD+ results submissions.

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Box 1
What are forest reference emission levels and/or forest reference levels?

Forest reference (emission) levels are benchmarks for assessing each country's performance in implementing REDD+ (Decision 12/CP.17, p.7). They are expressed in tCO_2eq and should be established transparently, taking into account historical data while they may adjust for national circumstances (Dec4/CP15p7). A FREL/FRL is one of the four elements developing country Parties should develop if they wish to participate in REDD+ (Decision 1/CP.16, p.71), the other elements being a national strategy or action plan, a robust and transparent national forest monitoring system and a safeguards information system. Upon submission to the UNFCCC, a FREL/FRL undergoes a technical assessment (see Appendix I). Modalities for FREL/FRLs are provided in Decision 12/CP.17, II, while guidelines and procedures for the technical assessment of FREL/FRLs is specified in Decision 13/CP.19.

The UNFCCC does not define the **difference between a FREL and a FRL**. In this publication it is assumed that a FREL includes only net emitting activities, while a FRL also or only includes plus activities. As such, a FRL can be expressed in net removals or net emissions.

Latin America
(16 countries)

Africa
(19 countries)

Asia-Pacific
(15 countries)

Map: © FAO, 2020

FREL/FRL submitted
FREL/FRL submitted + results submitted
Other countries
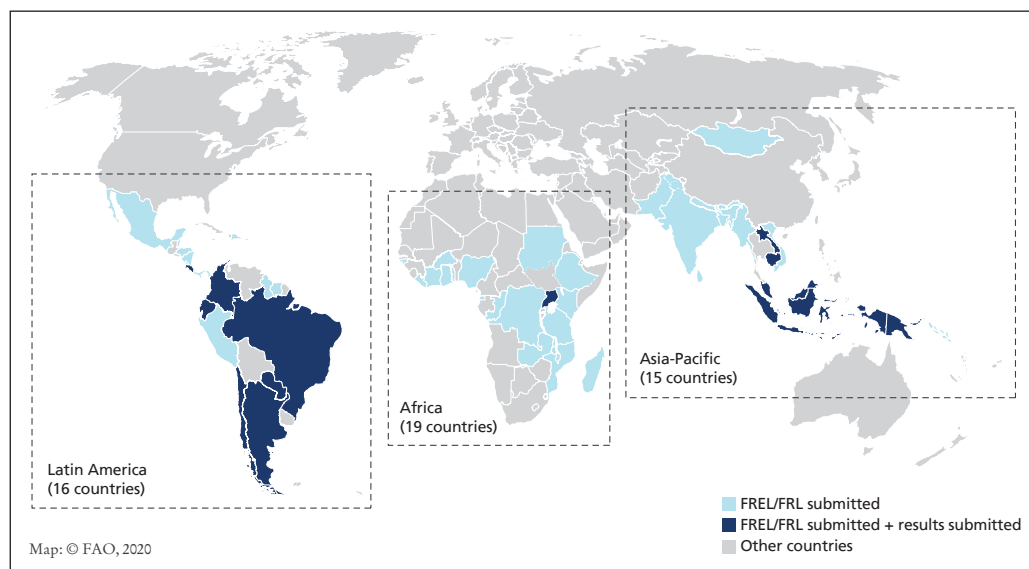
Figure 1. Geographical distribution of countries that have submitted a FREL/FRL (light blue) and those that subsequently submitted REDD+ results (dark blue) to the UNFCCC

FREL/FRL submissions to the UNFCCC

							Belize
							Bhutan
							Burkina Faso
				Brazil			Colombia
				DRC			Dominican Republic
				India			Ecuador
			Brazil	Lao PDR			Equatorial Guinea
		Chile	Cambodia	Madagascar			Honduras
		Congo	Côte d'Ivoire	Malaysia	Argentina		Kenya
		Costa Rica	Ghana	Mongolia	Bangladesh		Liberia
	Colombia	Ethiopia	Honduras	Mozambique	Guinea-Bissau		Malawi
	Ecuador	Indonesia	Madagascar	Myanmar	Malaysia		Mexico
	Guyana	Paraguay	Nepal	Nigeria	Nicaragua		Pakistan
	Malaysia	Peru	PNG	Panama	Nigeria		Sudan
Brazil	Mexico	Viet Nam	Sri Lanka	Suriname	Solomon Islands		Togo
		Zambia	Uganda				
			Tanzania				

Warsaw Framework

2013 — 2014 — 2015 — 2016 — 2017 — 2018 — 2019 — 2020

Brazil		Colombia	Brazil	Chile	Brazil	Uganda
		Malaysia		Colombia	PNG	Lao PDR
		Ecuador		Indonesia	Argentina	Cambodia
				Paraguay	Costa Rica	

UNFCCC REDD+ results:
9.03 billion t CO_2

Figure 2. Overview of FREL/FRL and REDD+ results submissions to the UNFCCC
Notes: COP 19, held in November 2013 in Warsaw, Poland, adopted the seven decisions of the Warsaw Framework for REDD+ (UNFCCC, 2013).
Country names in italic indicate ongoing technical assessment, so the method and scope may change as a result.
Brazil's 2019 BUR includes two REDD+ results technical annexes, one for Amazon and one for Cerrado.
DRC = Democratic Republic of the Congo; Lao PDR = Lao People's Democratic Republic; PNG = Papua New Guinea.

Eight countries have submitted FREL/FRLs more than once (see Section 2.1). Brazil and Colombia submitted more than one technical annex with REDD+ results. Brazil submitted results in its BURs 1, 2 and 3 for three reporting periods for the Amazon region, and results for the Cerrado region in BUR 3. Colombia submitted results for two reporting periods for the Colombian Amazon.

Finally, six funding proposals to the pilot programme for REDD+ RBPs were approved by the GCF Board as of September 2020. The GCF was established in 2010 to support climate change mitigation and adaptation projects, programmes, policies and other activities in developing country Parties (for more information see Chapter 4). The GCF is one of the two operating entities of the financial mechanism to the UNFCCC (the other is the Global Environment Facility).

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1.3 REFERENCE LEVELS AND FOREST AREA (CHANGE) STATISTICS

Non-Annex I developing countries contain 54 percent of global forest area but as much as 95 to 98 percent of deforestation occurs in these countries (Table 1). Countries that submitted a REDD+ FREL/FRL to the UNFCCC (hereafter referred to as REDD+ countries) are responsible for around 80 percent of the deforestation that occurs in non-Annex I countries (or around 75 percent of global deforestation). Collectively, the REDD+ countries are home to a forest area of approximately 1.53 billion ha (38 percent of global forest area or 70 percent of forest area in all non-Annex I countries collectively). Considering that some FREL/FRL submissions are subnational, the forest area covered by these FREL/FRL submissions is approximately 1.35 billion ha (33 percent of global forest area or 62 percent of forest area in all non-Annex I countries collectively).

The countries that submitted REDD+ results to the UNFCCC subsequent to the FREL/FRL submission, collectively account for a forest area of 660 596 million ha considering subnational submissions (which is 16 percent of global forest area or 30 percent of non-Annex I forest area) and 35–50 percent[3] of global deforestation. Brazil accounts for 45–70 percent[4] of loss in the REDD+ results reporting countries.

Table 1. Forest area and deforestation statistics (analysis of data from FAO, 2020)

	Number of countries and territories	Forest area, 2020 ('000 ha)	Deforestation, 2000–2010 ('000 ha/yr)	Deforestation, 2010–2015 ('000 ha/yr)	Deforestation, 2015–2020 ('000 ha/yr)
Global	236	4 058 931	−15 079	−11 812	−10 159
Annex I countries	42	1 857 474	−777	−644	−164
Non-Annex I developing countries	154	2 190 921	−14 295	−11 161	−9 988
… that submitted a FREL/FRL to the UNFCCC	50	1 526 809 (or 1 353 007 considering subnational FREL/FRLs)	−11 572	−8 545	−7 765
… that did not submit a FREL/FRL to the UNFCCC	104	664 113	−2 723	−2 616	−2 223

Note: Annex I countries are Parties listed in Annex I of the Convention, they include industrialized countries and countries with economies in transition (EIT Parties). Non-Annex I countries are Parties to the UNFCCC not listed in Annex I of the Convention. Most non-Annex I countries are low-income.

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[3] There is a range here because the percentage changes with the period considered, for the periods 2010–2015 and 2015–2020 the countries that submitted REDD+ results were responsible for 35 and 33 percent of global forest loss, respectively, while for the period 2000–2010 these countries were responsible for 48 percent of global forest loss as reported in FAO's Global Forest Resources Assessment 2020.

[4] For the periods 2000–2010, 2010–2015 and 2015–2020, Brazil was responsible for respectively 70, 45 and 50 percent of the forest loss in REDD+ countries using national level numbers from FAO (2020).

Table 2. Global reduction in deforestation for Annex I, non-Annex I countries and REDD+ countries

	Number of countries and territories	Reduction deforestation 2010–2015 compared with 2000–2010 (%)	Reduction deforestation 2015–2020 compared with 2000–2010 (%)
Global	236	22%	33%
Annex I countries	42	17%	79%
Non-Annex I developing countries	154	22%	30%
… that submitted a FREL/FRL to the UNFCCC	50	26%	33%
… that did not submit a FREL/FRL to the UNFCCC	104	4%	18%

Looking at how deforestation evolves over time, an overall decreasing trend can be seen. Globally, annual deforestation was reduced, with 22 percent for the period 2010–2015 compared with the preceding decade, and this reduction reached 33 percent for the most recent five-year period (Table 2).

Reduction has been especially significant in Annex I countries, but as very little deforestation is happening their impact on global deforestation is limited. The majority of global reduction in deforestation came from REDD+ countries, responsible for 97 percent of global reduction for 2010–2015 and 88 percent for 2015–2020. This reduction in deforestation is greatly affected by one country, Brazil. Of all REDD+ countries, 52 percent reported a lower deforestation for the period 2015–2020 compared with 2000–2010 versus 27 percent of all non-Annex I countries that did not submit a FREL/FRL. However, when summing all country reported deforestation, the percentage reduction in REDD+ countries (without Brazil) does not exceed the reduction seen in non-Annex I countries that did not submit a FREL/FRL. It may be too soon to assess an impact of REDD+ on global deforestation beyond the impact of Brazil. Only 21 percent of the FREL/FRL submissions have a reference period that ends before or in 2010 (Figure 3). The majority of countries had a reference period ending between 2010 and 2015 (60 percent of submissions), while the remaining 22 percent had an end date after 2015.

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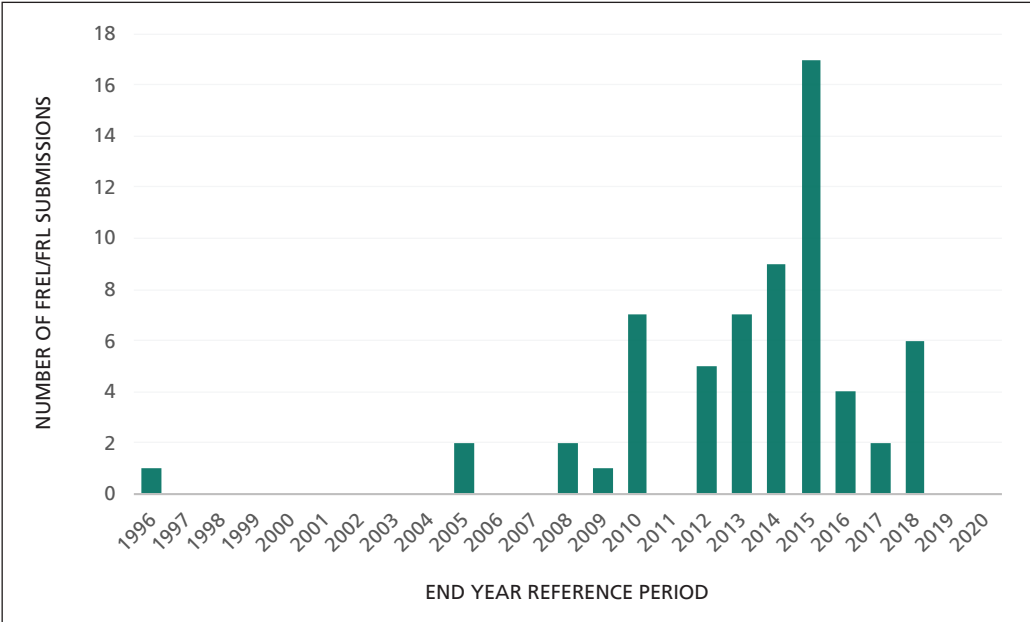
Figure 3. End year of the reference periods in submitted reference levels

2. Summary of submitted reference levels

2.1 WHAT'S NEW FROM REFERENCE LEVEL SUBMISSIONS

In 2020, an additional **15 countries submitted a FREL/FRL** to the UNFCCC. Eleven of these were submitting for the first time (Belize, Bhutan, Burkina Faso, Dominican Republic, Equatorial Guinea, Kenya, Liberia, Malawi, Pakistan, Sudan and Togo), whereas for four countries it was their second submission (Colombia, Ecuador, Honduras and Mexico).

Eight countries (Brazil, Colombia, Ecuador, Honduras, Madagascar, Malaysia, Mexico and Nigeria) have submitted **more than one FREL/FRL** to the UNFCCC, for various reasons: to expand the geographical scope (Brazil added the Cerrado biome, Colombia and Nigeria went from subnational to national coverage); to cover more REDD+ activities (Malaysia added conservation and reduced deforestation, Honduras covered all REDD+ activities in its new submission); and to update the FREL with new, improved data and an updated reference period (Brazil, Ecuador, Madagascar and Mexico; most of the earlier mentioned countries also introduced improvements in their latest submission). Three of the early FREL/FRL submissions included two FREL/FRLs for subsequent periods (Brazil, Costa Rica and Malaysia).

2.2 OBJECTIVES OF REFERENCE LEVEL SUBMISSIONS

FREL/FRL submissions often mention **multiple objectives**. The most frequently mentioned objective is to access results-based finance. However, several countries intend to use their FREL/FRL to evaluate the effectiveness of REDD+ policies and action and several of the more recent submissions made an explicit reference to their nationally determined contribution (NDC). For example, Pakistan mentioned that one of the objectives of the FREL is to "*fulfill a global responsibility to report the national contribution to the mitigation of climate change*" and Bhutan claimed that the FRL serves to "*strengthen Bhutan's position and commitment under its NDC by revalidating the forest cover, instituting a system to quantify and monitor carbon stocks and establishing a benchmark for tracking its performances in terms of forest management.*" Section 5.1 discusses REDD+ reporting and NDCs.

The different objectives may pose a challenge in the FREL/FRL setting, where a FREL/FRL for RBPs may be driven by external donor requirements which may not always correspond to what the country sees as the most appropriate benchmark for assessing its REDD+ performance domestically. Belize's initial FRL submission

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illustrated this by including two benchmarks: a FRL and a "crediting line" (Figure 4). Both cover the same results reporting period. The crediting baseline is explicitly for the purpose of accessing RBPs under the GCF pilot programme and therefore applies a historical average of net emissions as required by this programme. The FRL instead applies a linear extrapolation of net emissions, corresponding to what Belize expected to be a better representation of future emissions but would not be acceptable to the GCF RBP programme.

Papua New Guinea (PNG) also **recalculated its linear extrapolation FRL using a historical average** with a small adjustment as crediting baseline for the purpose of applying to the GCF pilot programme for RBPs. This recalculated crediting baseline was included in an annex to its BUR technical annex. PNG's annex to the BUR technical annex noted the following: "*Submission of PNG's FRL occurred before the launching of the GCF results-based payment (RBP) pilot programme late October 2017 accompanied by the publication of the GCF scorecard (GCF/B.18.23). PNG constructed its FRL in full agreement with the UNFCCC modalities on FREL/FRLs for REDD+ as decided at the UNFCCC Conferences of the Parties, notably the technical assessment report assessed it to*
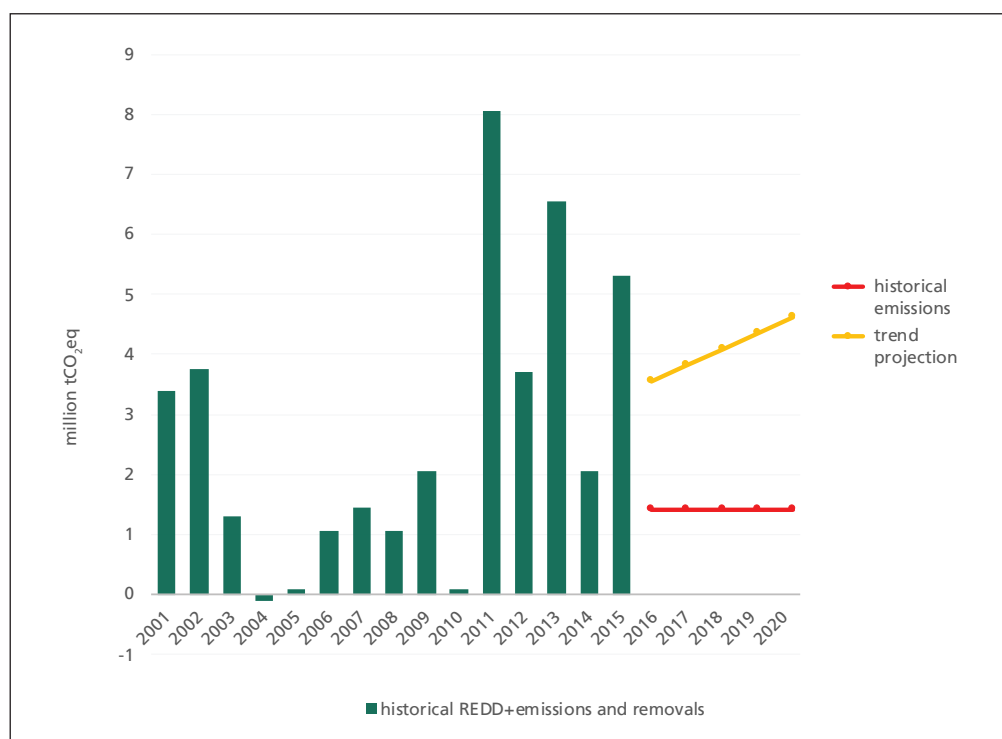
Figure 4. Belize's FRL submission included two FRLs where one is only for the purpose of receiving RBPs from the GCF (modified from Belize's initial FRL submission 2020)

be in overall accordance with the guidelines contained in the annex to Decision 12/CP.17. The GCF Scorecard, however, introduced restrictions on the construction approach for FRELs eligible for RBP beyond the UNFCCC modalities, allowing FRELs to only use historical average of emissions with a limited possible adjustment for high-forest-cover, low-deforestation countries (HFLD). As an HFLD country, PNG has applied a linear regression model based on the emissions in the historical reference period (2001–2013) to estimate business-as-usual emissions during the results reporting period (2014–2018) against which emission reductions will be assessed. Due to the rapidly increasing trend of emissions during the historical reference period, a regression model was considered more appropriate to predict the future emissions than historical average emissions. PNG still believes the linear projection UNFCCC FRL is the best approximation of business as usual, however, to allow participation in the GCF RBP pilot programme, PNG has recalculated its results conform the restrictions provided through the GCF scorecard."

The land use, land-use change and forestry (LULUCF) experts performing Papua New Guinea's technical analysis did not assess the recalculated crediting baseline: "*The LULUCF experts noted that the technical assessment of this new information is beyond the scope of this technical assessment in accordance with decision 14/CP.19, paragraph 11.*"

2.3 IMPACT OF TECHNICAL ASSESSMENT ON REFERENCE LEVEL SUBMISSIONS

By September 2020, 45 technical assessments had been finalized, while 15 were ongoing. For 43 of the 45 finalized technical assessments (96 percent), countries had **submitted a modified FREL/FRL**. Sometimes these modified FREL/FRL submissions only included more and better information (i.e. explaining more clearly how the measurements were made) without changing the FREL/FRL value, but **33 of the 43 modified FREL/FRL submissions (77 percent) changed the FREL/FRL value**. Most of the FREL/FRL value changes were a result of recalculations, a lower number of changed values were due to a change in scope. Of the 33 submissions that modified their FREL/FRL value, 23 (70 percent) resulted in downwards corrections,[5] while 10 (30 percent) were upwards. The changes made to the FREL/FRL values varied greatly between submissions, from 0.2 to 66 percent reduction for the downward corrections, or in the case of Chile a change from net emissions to net removals for the combined FREL and FRL values. On average, the change made to the FREL/FRL values was –25 percent for the countries that corrected downwards, and +17 percent for countries that corrected their FREL/FRL value upwards.

Some countries **changed the scope of their FREL/FRL** during the technical assessment, a few examples of which are listed below:
- add a REDD+ activity (Myanmar added enhancement of forest carbon stocks);
- remove a REDD+ activity (Uganda removed forest degradation, sustainable management of forests and conservation, Nepal removed forest degradation due to grazing);
- add non-CO_2 gases (Madagascar's 2017 submission, Brazil's Cerrado submission and Suriname);

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[5] A downwards correction to the FREL value meaning the emissions were lower after correction, a downwards correction to the FRL value meaning the net removals were higher after correction.

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- add a carbon pool (Madagascar's 2018 submission added the soil carbon pool during the TA);
- remove a carbon pool (Chile, Guyana, Mongolia and Panama removed the soil carbon pool as a result of the TA).

The most common reason for omissions of activities or carbon pools during the technical assessment is related to concerns around the accuracy and reliability of the data.

During the technical assessment, countries are frequently asked whether they have considered the impact of **carbon contents in post-deforestation** land uses in the calculation of a net emission factor (EF). In the case of forest degradation, countries are frequently asked whether they have considered the **post-disturbance regrowth**. In case these are not considered, the technical assessment might include this as an area for improvement to avoid overestimation of emissions from deforestation and forest degradation.

The technical assessment reports often include assessment of uncertainty as an area for improvement and the more recent tend to focus on **more in-depth assessments of uncertainty**, including capturing all sources of error and using higher-tier[6] approaches (e.g. Monte Carlo simulation).

The technical assessment may also comment on the FREL/FRL **construction approach** and **reference period**. For example, as a result of their technical assessments, Malaysia changed its reference period, Ghana changed its initially proposed linear projection FREL to a historical average, and Myanmar substituted a zero FRL for enhancement with average removals over the reference period.

2.4 CHOICES MADE BY COUNTRIES ON REFERENCE LEVEL ELEMENTS

This section briefly summarizes country choices per FREL/FRL element, in some cases illustrated with examples from new FREL/FRL submissions. FAO (2018a) provides a comprehensive overview of UNFCCC guidance on each of the FREL/FRL elements.

Forest definition

Most countries included references to **threshold parameters** (Figure 5) for their REDD+ forest definition. Some countries also included a reference to the predominant use of the land, excluding for example tree crops such as oil palm. Thirteen countries (26 percent) used FAO's three Global Forest Resources Assessment (FRA) thresholds: a canopy cover of 10 percent; a tree height of 5 m; and a minimum area of 0.5 ha. Some countries applied multiple height and canopy cover thresholds with the lower values applicable to dry conditions in the country. Bangladesh applied the FRA thresholds while indicating an exception in tree height for mangroves, as they rarely grow above 2 m in height.

As explained in FAO (2019) some countries diverged from the forest definition they adopted for REDD+ and used an **operational forest definition**, generally because of technical limitations with their MRV. Also, in establishing the minimum area threshold countries sometimes considered the operational aspect, e.g. the 0.81 ha threshold in Figure 5 corresponds to the area of 3 by 3 Landsat pixels (30 m by 30 m).

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[6] For the IPCC, a tier represents a level of methodological complexity.
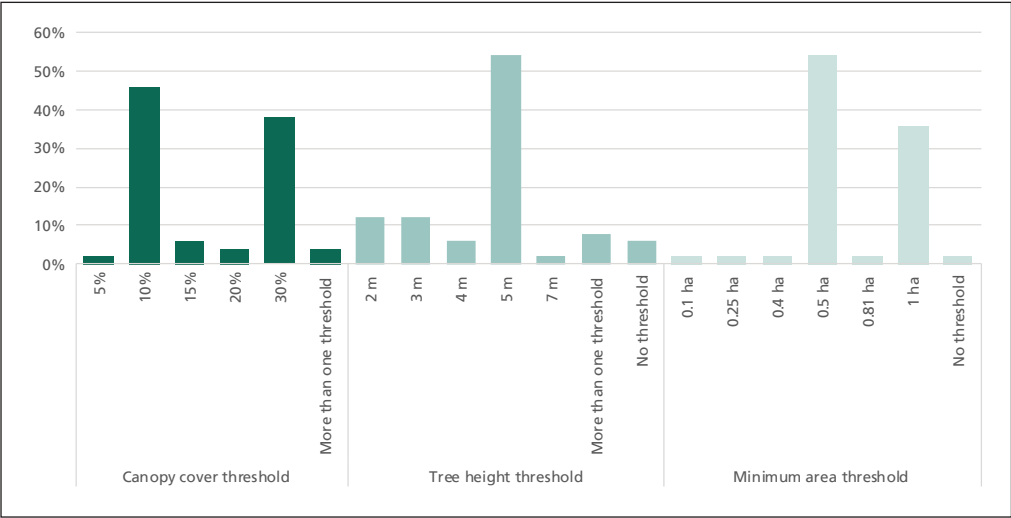
Figure 5. Percentage of countries using threshold values for REDD+ forest definitions

Note: Mexico's 2015 FREL submission had an area threshold of 50 ha; only the 1 ha threshold of Mexico's 2020 FREL submission is displayed in this graph.

Scale

Most FREL/FRL submissions (49 of the 60 submissions, or 82 percent) are **national scale** (Figure 6), which is in line with the UNFCCC requirement that allows subnational FREL/FRLs only as an interim measure (Dec.1/CP16p71b). Two countries (Colombia and Nigeria), first submitted a subnational FREL followed by a national FREL. The remaining countries that submitted a subnational FREL/FRL were four Latin American and two African countries. No Asian country has submitted a subnational FREL/FRL to the UNFCCC.

Argentina, Brazil (all four submissions), Chile, Colombia, Guinea-Bissau, Liberia, Nigeria, Peru, Sudan

all other submissions

■ National ■ Subnational
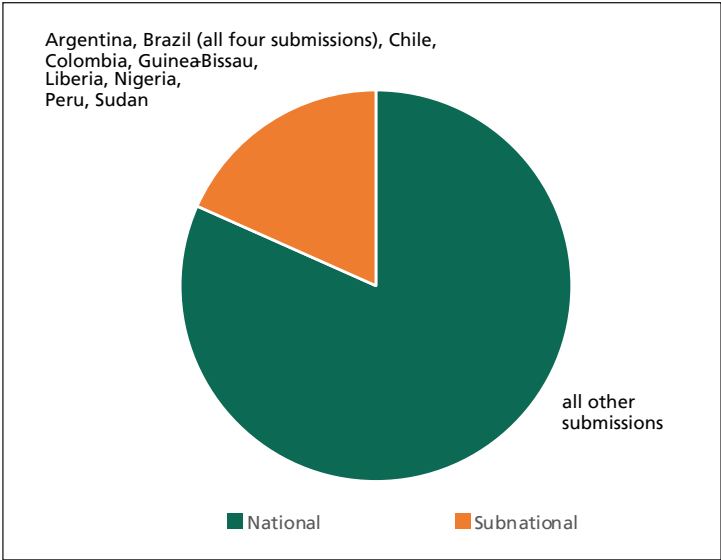
Figure 6. Scale of FREL/ FRL submissions

Note: All other submissions include Colombia and Nigeria, which submitted both a subnational and a national FREL.

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Scope of REDD+ activities

Concerning the scope of REDD+ activities, reducing emissions from deforestation remains the most frequently included REDD+ activity in FREL/FRL submissions, with 97 percent of the submissions including the activity (Table 3). Enhancement of forest carbon stock was included in 43 percent and forest degradation in 42 percent of the FREL/FRL submissions. **Sustainable management of forests (SMF)** was included in 15 percent, and conservation in 12 percent, of the FRL submissions.

Table 3. REDD+ activities included in FREL/FRL submissions

Country	Submission year(s)	Deforestation	Forest degradation	Sustainable management of forests	Conservation	Enhancement (X = non-forest to forest only. XX = includes forest remaining forest)
Argentina	2019	X				
Bangladesh	2019	X	X			XX
Belize	2020	X	X	X	X	XX
Bhutan	*2020*	X		X	X	XX
Brazil	2014, 2017, 2018	X				
Burkina Faso	*2020*	X	X			XX
Cambodia	2017	X	X			XX
Chile	2016	X	X		X	XX
Colombia	2015, *2020*	X				
Congo	2016	X	X			
Costa Rica	2016	X				XX
Côte d'Ivoire	2017	X				X
Dominican Republic	*2020*	X	X			XX
Democratic Republic of the Congo	2018	X				
Ecuador	2015, *2020*	X				
Equatorial Guinea	*2020*	X	X			
Ethiopia	2016	X				X
Ghana	2017	X	X			X
Guinea-Bissau	2019	X				
Guyana	2015	X	X			
Honduras	2017	X				
Honduras	2020	X	X	X	X	X
India	2018			X		
Indonesia	2016	X	X			
Kenya	*2020*	X	X	X		XX
Lao People's Democratic Republic	2018	X	X			XX

Country	Submission year(s)	Deforestation	Forest degradation	Sustainable management of forests	Conservation	Enhancement (X = non-forest to forest only. XX = includes forest remaining forest)
Liberia	2020	X	X			
Madagascar	2017, 2018	X				
Malawi	*2020*	X	X			XX[1]
Malaysia	2015			X		
Malaysia	2018, 2019	X		X	X	
Mexico	2015	X				
Mexico	*2020*	X	X			
Mongolia	2018	X	X			X
Mozambique	2018	X				
Myanmar	2018	X				X
Nepal	2017	X	X			X
Nicaragua	2019	X	X			X
Nigeria	2018, 2019	X				
Pakistan	*2020*	X				
Panama	2018	X	X	X	X	X[2]
Paraguay	2016	X				
Peru	2016	X				
Papua New Guinea	2017	X	X			X
Solomon Islands	2019	X	X			X
Sri Lanka	2017	X				X
Sudan	*2020*	X				X
Suriname	2018	X	X			
Togo	*2020*	X				X
Uganda	2017	X				
United Republic of Tanzania	2017	X				
Viet Nam	2016	X	X			XX
Zambia	2016	X				
Total submissions, including the activity[3]		**58**	**25**	**9**	**7**	**26**

Notes: Country names in italic indicate ongoing technical assessment, so the method and scope may change as a result.

[1] Only enhancement from plantation management.

[2] Removals from forest land remaining forest land are included as sustainable management of forests and conservation.

[3] Total number of submissions 60.

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A look at the number of REDD+ activities included in FREL/FRL submissions over time reveals that the **scope of FREL/FRL submissions is gradually expanding** (Figure 7). The expanding scope of REDD+ activities may be an important indication of methodological improvements to assess REDD+ activities other than deforestation.

Only three countries included all REDD+ activities in their submissions: Belize, Honduras and Panama, but some countries simply have not defined certain activities separately, as explained in the section on enhancement, or certain activities did not occur in the country (e.g. Bhutan explained it had no forest degradation as emissions from forest land remaining forest land were included in net removals from the plus activities). Considering that for some countries REDD+ activities do not cover additional emissions or removals, despite only three countries including all REDD+ activities, 13 countries have not omitted any REDD+ activities.[7]

Some countries have built their reporting on the land-use categories from the IPCC 2006 guidelines for national GHG inventories and defined the REDD+ activities to match these categories and subcategories (land use and land-use conversions), which makes it easier to ensure consistency with the national GHG inventory. Figure 8 translates the REDD+ activities included in the FREL/FRL submissions into IPCC subcategories.
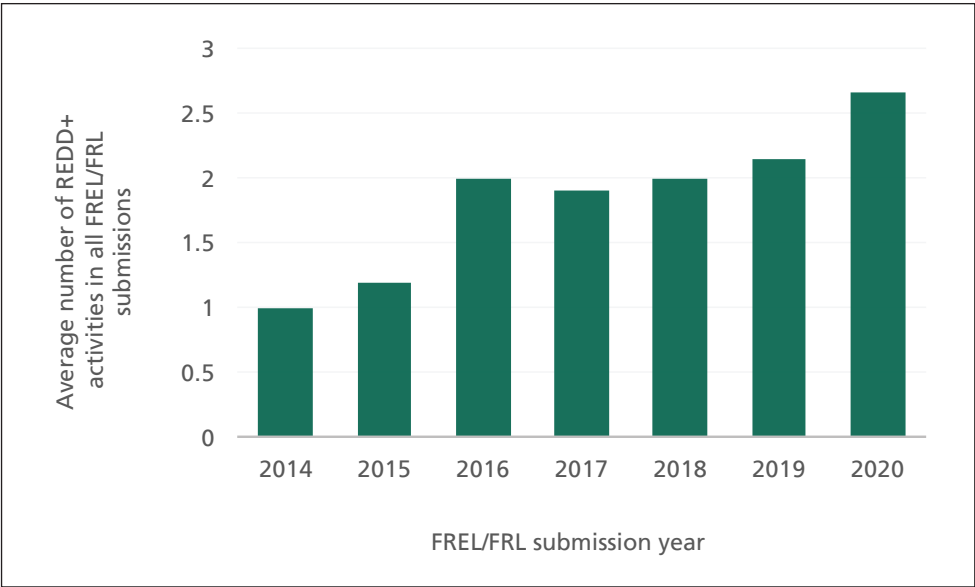
Figure 7. Average number of REDD+ activities included per FREL/FRL submission per year of submission (e.g. the value 1.2 for 2015 is obtained because one of the five submissions that year contained two REDD+ activities, whereas the remaining four contained a single REDD+ activity)

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[7] An additional complexity is that some countries have included an activity in their scope, but not all emissions/removals associated with that activity. This is further discussed under "Reducing emissions from forest degradation" (page 17) and "Conservation, sustainable management of forests and enhancement of forest carbon stocks" (page 20).

REDD+ activities translated to IPCC (sub)category:

Percentage FREL/FRL submissions

0% 20% 40% 60% 80% 100%

Forest land converted to non-forest land

Forest land remaining forest land (net emissions)

Non-forest land converted to forest land

Forest land remaining forest land (net removals)
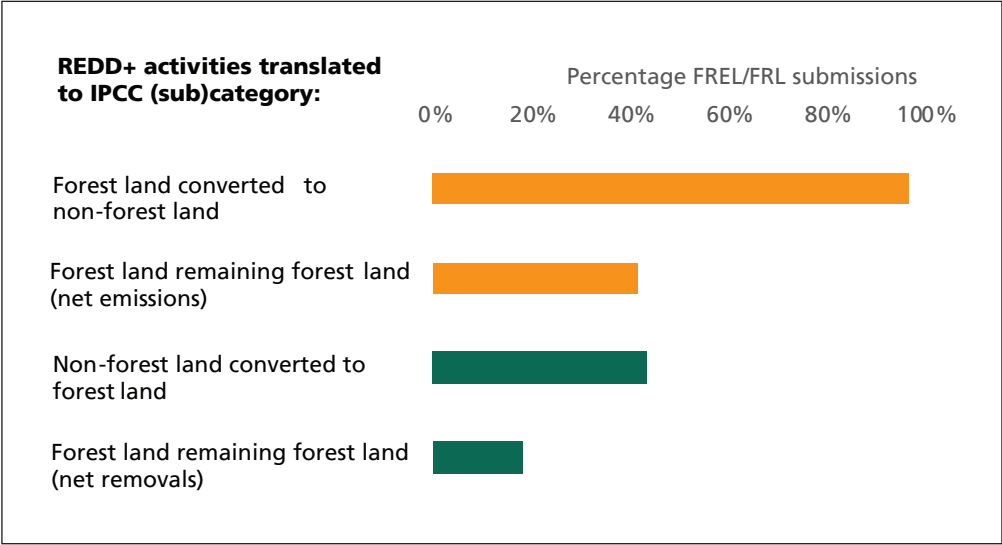
Figure 8. REDD+ activities included in FREL/FRL submissions translated into IPCC land-use subcategories (e.g. 58 out of 60 FREL/FRL submissions, or 97 percent, included deforestation which in all cases was translated into the IPCC subcategory forest land converted to non-forest land)

Figure 8 shows that the flux that is least included in REDD+ reporting is **removals in forest land remaining forest land** which in the FRL submissions are included as either enhancement of forest carbon stocks, sustainable management of forests or conservation of forest carbon stocks. This is further discussed under "Conservation, sustainable management of forests and enhancement of forest carbon stocks" (page 20).

Reducing emissions from deforestation

To assess emissions from deforestation, countries used **three methods for generating activity data (AD)**: (i) areas extracted directly from wall-to-wall change maps (referred to as **pixel counts**); (ii) areas from samples that are stratified using wall-to-wall maps including deforestation in the map (referred to as **stratified area estimate** and described by Olofsson *et al.*, 2014); and (iii) areas extracted from **samples only** with either a systematic or random distribution and sometimes using a map for intensification (e.g. using a forest/non-forest map, but not using a map with deforestation like the stratified area estimate). These methods and their differences are explained in detail in FAO (2018a) and some lessons learned from stratified area estimates are provided in GFOI (2018) and FAO (2019).

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Table 4. Methods used to assess deforestation by country

Method	Number of FREL/FRL submissions	FREL/FRL submission
Pixel counts	28	Argentina, Brazil (2014, 2017, 2018), *Burkina Faso*, Cambodia, Chile, Colombia (2015, 2020), Costa Rica, Ecuador (2015, 2020), Ghana, Guyana, Honduras (2017, 2020), Indonesia, *Kenya*, Lao People's Democratic Republic, Madagascar (2017), Malaysia (2018, 2019),* Mexico (2015), Peru, *Sudan*, *Togo*, United Republic of Tanzania, Viet Nam
Stratified area estimates	20	Bangladesh, *Bhutan*, Congo, Côte d'Ivoire, Democratic Republic of the Congo, *Equatorial Guinea*, Ethiopia, Guinea-Bissau, Liberia, Madagascar (2018), Myanmar, Nepal, Nigeria (2018, 2019), *Pakistan*,** Paraguay, Sri Lanka, Suriname, Uganda, Zambia
Samples only	10	*Belize*, *Dominican Republic*,** *Malawi*, *Mexico* (2020), Mongolia, Mozambique, *Nicaragua*, Panama, Papua New Guinea, Solomon Islands

Notes: The total number of submissions is 58, because two countries did not include deforestation in their FRL. Country names in italic indicate ongoing technical assessments, so the method and scope may change as a result.

*Malaysia used information on (de)gazetted areas in combination with map areas obtained through remote sensing.

**Dominican Republic and Pakistan post-stratify a systematic grid with a change map, and intensify on a single class or a few classes. Therefore, this approach is hybrid between stratified area estimate and samples only.

Table 4 provides a detailed overview of the methods used by country to assess deforestation. It shows that roughly half of the submissions used pixel counts, while the other half used a sample-based method (either stratified by a change map or not). Two countries (Madagascar and Mexico) used pixel counts in their first FREL submission, while their second FREL submission used stratified area estimates. IPCC (2019) and the Global Forest Observations Initiative (GFOI) methods and guidance documentation for forest monitoring (GFOI, 2016) support the use of sample-based methods, as pixel counts do not correct for systematic error nor allow for the calculation of confidence intervals around the area estimate. Especially when change maps are created by comparing two separately created classifications (referred to as post-classification or map-subtraction), these systematic errors can be considerable. This is illustrated by Cambodia's annex to its BUR technical annex submission where the country shows its sample-based calculation estimates an emission reduction of 9.5 million tCO_2eq for 2017–2018 only (and no results for 2015-2016), while its pixel count estimates an emission reduction of 163 million tCO_2eq for 2015–2018, i.e. pixel counts over-estimate the results by a factor of 16.

For deforestation, countries mainly used **inventory data to estimate the associated emission factor (EF)**, either from the NFI, from the ongoing NFI's preliminary values, or from local inventories. Paraguay and Uganda both submitted a FREL with preliminary values from the ongoing NFI. When reporting REDD+ results in their BUR technical annex, both countries calculated their results using the preliminary values to maintain

consistency with the FREL, even if better data were available for both countries at the time of submitting their BUR technical annex. The use of forest inventories and IPCC values to estimate EFs is further discussed under "Forest inventory data and IPCC default values" (page 22).

Reducing emissions from forest degradation

Countries proposed a **variety of methods for generating activity data**. Figure 9 shows some of the most common methods used for assessing forest degradation, revealing that initially countries tended to use timber statistics but there has been a clear trend towards a spatially explicit approach to assess forest degradation. As with the assessment of deforestation, sample-based methods (either samples only or stratified area estimates) are now more frequently used. Samples only is the prevalent methodology used for assessing forest degradation, but in recent years countries have also proposed stratified area estimates.

Figure 9 does not show all methods that countries have applied to assess forest degradation in their FREL submissions. **Other methods** are the use of multiple NFI cycles (Viet Nam), the use of the spatially explicit supply-demand model WISDOM (Drigo, Masera and Trossero, 2002) to assess forest degradation from woodfuel collection
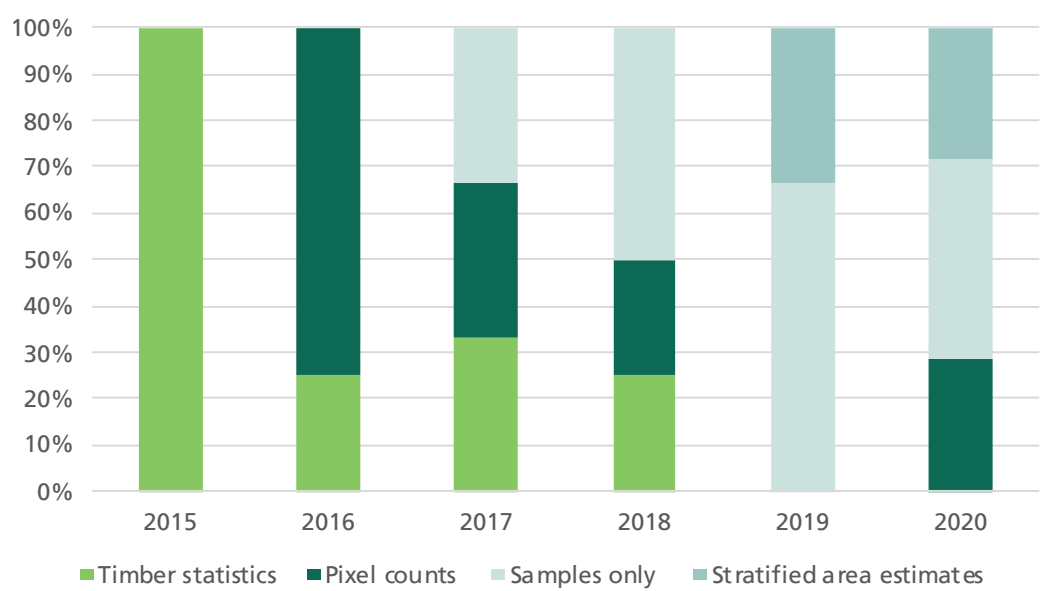
Figure 9. The most common methodologies for assessing forest degradation and how their use has changed over time

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(Ghana, Malawi, Nepal) and the use of MODIS data[8] to assess emissions from forest degradation by fire (Chile, Ghana). In addition, countries have proposed other methods such as stump counts in the NFI (Lao People's Democratic Republic) and counting trucks to estimate emissions from illegal logging (Ghana). The choice of method may depend on the main driver of forest degradation and on data availability. Countries have often included forest degradation associated with a particular driver, therefore not all countries including this REDD+ activity in their submission have assessed the full scale of emissions associated with forest degradation (e.g. Nepal included emissions from timber and woodfuel extraction in its FRL, but emissions from forest degradation caused by grazing are not included).

For the assessment of **EFs associated with forest degradation**, countries that used timber statistics estimates tend to use per cubic metre EFs instead of per hectare EFs, sometimes also considering emissions from collateral damage resulting from timber extraction (e.g. as assessed in Pearson, Brown and Casarim, 2014). Several countries assessing AD through (high-resolution) satellite imagery approximated the associated emissions with the difference in average carbon stock of intact and degraded/disturbed forest. The Dominican Republic created a linear regression model from aboveground biomass (AGB) and canopy cover inventory measurements to predict biomass loss from canopy cover reduction assessed through satellite image interpretation. Equatorial Guinea also used canopy cover reduction assessed through satellite image interpretation to approximate biomass reduction. Cambodia and Viet Nam assessed degradation emissions per hectare as the difference between dense and open forest types. Viet Nam complemented this with data from NFI cycles to assess carbon stock declines in forest remaining in the same class (Box 2) along consecutive inventories.

Box 2
How Viet Nam used multiple NFI cycles in REDD+ reporting

Viet Nam submitted its first FREL/FRL in January 2016, and a modified FREL/FRL in July 2016. Four NFI cycles were implemented continuously during the 15-year reference period of the FREL/FRL (1995–2010). Each cycle's time frame was five years from 1990 to 2010, and the last year of each cycle was considered as its reference year. For example, Cycle IV was implemented from 2006 to 2010 and referred to as the 2010 data.

Cycle IV was the most recent NFI cycle, had good quality control procedures and was reviewed by international organizations. For these reasons and because the other cycles had not yet been reviewed in January 2016, it was the only cycle considered in the initial FREL/FRL submission.

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[8] https://modis.gsfc.nasa.gov/data/dataprod/mod45.php

Box 2 (Cont.)

When using one set of forest inventory data for the whole reference period, a key issue emerges – there are no emission nor removal factors for forest land remaining forest land. Viet Nam disaggregated its data analysis by ecoregion and over three time periods (1995–2000, 2000–2005 and 2005–2010), but to simplify the nationwide carbon stocks for evergreen-rich and deciduous forest are considered for the period 2005–2010. The carbon stocks are expressed in tCO_2/ha so equal the EFs used, as Viet Nam did not consider the carbon contents in post-deforestation land use. With Cycle IV data only (initial submission), the carbon stock of evergreen-rich and deciduous forest was 502 and 114 tCO_2/ha, respectively. The emission and removal factor matrix is displayed in Table 5.

Table 5. Emission factors (positive values)/removal factors (negative values) used in Viet Nam's initial FREL/FRL submission

		2010		
		Evergreen-rich forest (tCO_2/ha)	Deciduous forest (tCO_2/ha)	Non-forest (tCO_2/ha)
2005	Evergreen-rich forest	0	389	502
	Deciduous forest	−389	0	114
	Non-forest	−502	−114	0

As a consequence of using only one NFI cycle, the emission or removal factor for stable evergreen-rich or stable deciduous forest was zero. Viet Nam used increment rates to assess changes but had no data on mortality or other sources of degradation, raising the concern of overestimation of removals in the forest land remaining forest land areas.

During the technical assessment process a series of quality control procedures were applied consistently to all four cycles. The reassessment of data from Cycles III and IV suggested carbon stocks of 535 and 513 tCO_2/ha in 2005 and 2010 respectively for evergreen-rich forest, and 117 and 114 tCO_2/ha for 2005 and 2010 respectively for deciduous forest. The updated emission and removal factor matrix is provided in Table 6.

Table 6. Emission factors (positive values)/removal factors (negative values) used in Viet Nam's modified FREL/FRL submission: the use of multiple NFI cycles provided emission/removal estimates for forest that remain in the same class in the change matrix

		2010 (Cycle IV)		
		Evergreen-rich forest (tCO_2/ha)	Deciduous forest (tCO_2/ha)	Non-forest (tCO_2/ha)
2005 (Cycle III)	Evergreen-rich forest	22	422	535
	Deciduous forest	−396	4	117
	Non-forest	−513	−114	0

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Box 2 (Cont.)

> Thanks to the additional NFI cycles, emission and removal factors could be calculated for forest land remaining forest land (22 and 4 tCO$_2$/ha over five years for evergreen-rich and deciduous forest, respectively).
>
> Additional considerations regarding the use of several NFI cycles in Viet Nam's FREL/FRL:
>
> - As a different number of plots was measured in each NFI cycle, comparing the cycles with aggregated forest types could lead to bias due to several forest types being over-represented in one of the NFI cycles. Producing estimates by forest type avoided this issue.
> - The results were also disaggregated by ecoregion to avoid the discrepancies between the sampling designs misrepresenting the forest conditions from different ecoregions.
> - The methodological choice of comparing average carbon stock at the ecoregion level was due to most plots not being relocated correctly from one NFI cycle to the other. Plot relocation in the field was, and still is, a key issue in many countries. When plots cannot be relocated, forest carbon stock dynamics cannot be calculated at plot level but can be derived from averages of all the plots in similar forest conditions.
> - Unless major changes occurred in forest land remaining forest land, their emission and removal factors can be expected to be small and with large confidence intervals (inherent to measuring small changes in carbon stocks with fluctuating contents due to growth and mortality), which may have consequences on the overall FREL/FRL and its aggregated uncertainty.

Conservation, sustainable management of forests and enhancement of forest carbon stocks

Although all countries may define REDD+ activities (slightly) differently, only the **different definitions of the plus activities** result in similar fluxes being labelled differently by countries. Fluxes here refer to the net emissions or net removals from IPCC land-use subcategories (Figure 8, page 15). The low number of countries reporting on conservation and sustainable management of forests[9] is partially due to the fact that some countries label all forest-related removals as enhancement of forest carbon stock without assessing explicitly which removals are associated with SMF or conservation of forest carbon stocks.

Enhancement of forest carbon stocks can occur when **other land uses are converted to forest land** (forest expansion either through afforestation/reforestation or natural regeneration) **or on forest land remaining forest land**. All submissions reporting the activity enhancement of forest carbon stocks included removals from forest expansion, but only 12 of the 26 submissions reporting enhancement (46 percent) also included enhancement in forest land remaining (Table 3, page 12).

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[9] SMF is considered here as a plus activity, although one country (Kenya) reported net emissions as a result of SMF.

There are several **challenges associated with assessing removal results** from carbon stock enhancement against a FRL, mainly – but not only – related to the delayed removals resulting from growth. These challenges are explained in more detail in Lee, Skutsch and Sandker (2018).

AD to assess forest expansion come either from satellite imagery analysis (samples, maps or a combination) or from official data on planted areas. Most countries only include afforestation/reforestation as forest expansion and do not consider natural regeneration. Some countries (e.g. Myanmar and Sudan) assess deforestation with analysis of satellite imagery while they indicate that for afforestation or reforestation, AD are more accurately estimated with official plantation establishment statistics due to the challenges of assessing afforestation through remote sensing.

For **removal factors associated with forest expansion**, some countries have applied either country-specific increment values from the NFI, in-country studies, or IPCC default growth rates. Several countries have proposed "committed" removals, where all expected future removals are accounted for the year that forest expansion was detected. The use of "committed removals" has been included as an area for technical improvement in technical assessment reports, where the assessment teams note this may overestimate removals in the FRL.

For estimating the enhancement of forest carbon stocks in **forest land remaining forest land**, countries estimated removals by the difference in average carbon stock of forest types (e.g. between open and dense forest), used data on age structure applying growth models, or used data from multiple NFI cycles. Box 2 explains how Viet Nam replaced increment rates applied to the entire forest land remaining forest land area with the difference between average stocks obtained from different NFI cycles.

Removals in forest land remaining forest land is the least-reported forest CO_2 flux (Figure 8, page 15). This may be for several reasons. First, it is **challenging to assess such removals** with accuracy and on a large scale, because slow and gradual changes are difficult to assess through remote sensing. Permanent sample plots (PSPs) may be promising for assessing these gradual changes over time but these are rare in developing countries and the assessment of net growth is complicated through natural dynamics with mortality and growth happening simultaneously (see "Forest inventory data and IPCC default values", page 22). Even if PSPs are available to the country, this still leaves the challenge of extrapolating the information from these point measurements to the large area of forest land remaining forest land. Second, it is difficult to distinguish what share of removals happening in forest land remaining forest land can be considered as human-induced. Developing countries often do not have a clear spatial distinction of managed and unmanaged land. In many countries, removals from forest land remaining forest land may comprise a very large sink. In fact, in the global carbon budget, absorption by land is responsible for the uptake of 27 percent of carbon from the atmosphere annually (Ciais *et al.*, 2013), most of which is removed by growing forests. The majority of removals from growing forests tend to be non-anthropogenic and are expected to cancel out when comparing the results period with the reference period, unless the forests recover more

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during the results period. Such forest recovery may be human-induced if it is a result of protective measures allowing forests to recover. Chile's REDD+ results are largely associated with removals from forest land remaining forest land.

Scope of carbon pools and gases

Concerning the scope of carbon pools, **above- and belowground biomass** remain the most frequently reported carbon pools in REL/FRL submissions.

Deadwood was included mainly by countries that assessed this pool in their national forest inventory (NFI). The Intergovernmental Panel on Climate Change (IPCC) *2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories* (Box 3) provides default values for deadwood, as opposed to the IPCC 2006 guidelines, which indicated that there was too little coherence in the literature to propose a single value per climate type.

Litter was also included mainly by countries that assessed this pool in their NFI (often only measured in a subset of plots). Other countries used IPCC default values. IPCC (2019) provides updated values for litter, where the new default value for "all vegetation" types in the tropics is more than double the old default value of IPCC (2006) for tropical broadleaf deciduous forest.

Soil was included by many countries in the 2020 submissions, where six of the 15 submissions included emissions from soils. Nonetheless, soil remains the least-included pool in FREL/FRL submissions. In submissions prior to 2020, soil was included only five times. Four times countries initially included soil in the scope of their FREL/FRL submission but then removed it during the technical assessment. Estimating emissions from the soil carbon pool is challenging for multiple reasons. First, IPCC suggests the use of a 20-year default transition period, which creates significant lagged emissions that build up over time and are not balanced if countries are only able to start including these from the beginning of the reference period. Second, a Tier 1 assessment of soil emissions requires detailed knowledge of the land use replacing forest after deforestation, including inputs and management regimes of this non-forest land use.

All submissions include CO_2 and 22 percent of the submissions include **non-CO_2** emissions, most from fire but some from drainage of peatland (Malaysia). Submissions that included non-CO_2 emissions are Belize, Bhutan, Brazil (Cerrado), Chile, Costa Rica, Ghana, Madagascar (2017 and 2018 submissions), Malawi, Malaysia (2018 and 2019 submissions) and Panama (Figure 10).

Forest inventory data and IPCC default values

The most common data sources for EFs are forest inventories and IPCC default values. IPCC (2019) provides updated default values for forest specific pools (Box 3).

Most EFs for deforestation are estimated using forest inventory data. Forest inventories can be local or national. An NFI typically has a sampling design representative of the forests in the entire country. Local forest inventories may not always be representative of the entire country and often have a specific objective (e.g. to assess biodiversity or timber extraction potential), which may create a bias if aggregated or generalized to a larger
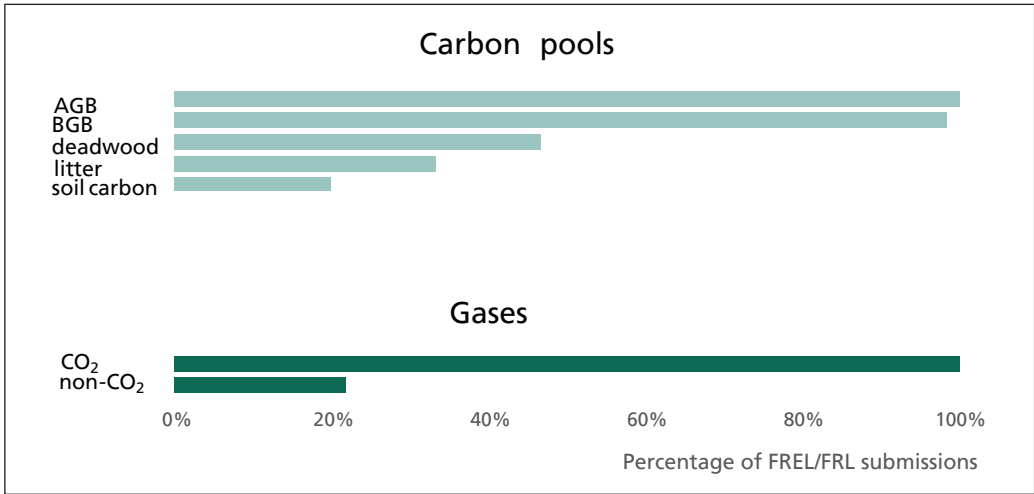
Figure 10. Scope of carbon pools and gases chosen by countries for their FREL/FRL submissions

Box 3
IPCC 2019 refinement and how it influences REDD+ reporting

The *2019 refinement to the 2006 IPCC guidelines for national greenhouse gas inventories* (IPCC, 2019, hereafter referred to as the 2019 IPCC refinement) updates, supplements and/or elaborates the 2006 IPCC guidelines where gaps or out-of-date science have been identified. It will not replace the 2006 IPCC guidelines and should be used in conjunction with them. The 2019 IPCC refinement was adopted and accepted during the 49th Session of the IPCC in May 2019 but has not yet been adopted and recommended by the Conference of the Parties (COP) so its use is not mandatory.

The 2019 IPCC refinement provides an update of the default values for a wide range of forest-specific pools and forest succession stages, stratified by climate and ecological zone. Examples are the ratio of BGB to AGB, AGB in natural forests and forest plantations, AGB net growth in natural forests, as well as in (sub)tropical plantation forests and the reported mean annual increment values for some plantation (both primary and secondary) forest species (IPCC, 2019, Vol. 4, Chap. 4, Tables 4.1–4.12). For the latter, these include default uncertainty AGB values, which will allow countries to report on uncertainty using a Tier 1 method (see also IPCC, 2019, Vol. 1, Chap. 3). The use and selection of AGB and BGB allometric equations has also been elaborated in more detail, and major attention paid to the inclusion and calculation of the soil carbon component and its uncertainty assessment (IPCC, 2019, Vol. 4, Chap. 4, Sections 4.2.3–4.4.3).

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Box 3 (Cont.)

Other changes in the 2019 IPCC refinement in relation to the existing 2006 guidelines for REDD+ are the guidance on AD, including:

- **On map accuracy:** any sampling for reference data should be optimized for estimation of AD, not map accuracies (IPCC, 2019, Vol. 4, Chap. 3, Section 3.5; Annex 3A.2.4).
- **On recalculation techniques:** it is anticipated that this will be particularly important in the agriculture, forestry and other land use (AFOLU) sector (IPCC, 2019, Vol. 1, Chap. 5 – Time series consistency).
- **On time series analysis:** guidance is presented to minimize potential inconsistencies in the time series. Splicing techniques can be applied to combine or join more than one method to form a complete time series, where it is not possible to use the same method or data source in all years. Countries should provide documentation of any splicing techniques used to complete a time series. The documentation should identify the years in which data for the method were not available, the splicing technique used, and any surrogate or overlap data used (IPCC, 2019, Vol. 1 Chap. 5, Section 5.3.3; Vol. , Chap. 3, Section 3.3).

The updated guidelines will support the countries to better implement the calculations for AD and EF and their reported uncertainties in REDD+ reporting.

reporting area. For example, Sri Lanka explained in its modified FREL submission that the available local inventory studies were evaluated by a group of Sri Lankan scientists, who suggested that these studies were biased towards higher carbon stock forests (as these are more attractive from a biodiversity perspective). As such, Sri Lanka decided to use IPCC default values[10] instead.

Forest field inventories can apply permanent, semi-permanent and temporary sample plots for collecting forest and land-related data (Räty and Kangas, 2019). Permanent sample plots are typically remeasured in all consecutive inventory cycles, while temporary plots are discarded after the first measurement. Temporary plots are mainly intended to capture the current state of the forest, whereas PSPs, in addition to the current state, aim to capture the changes (e.g. Tomppo *et al.*, 2010). Repeated NFI cycles using temporary plots may also be intended to capture changes but will do so with less accuracy compared with PSPs.

Of the 50 countries that have submitted one or more FREL/FRL(s), 30 countries (60 percent) had completed at least one NFI cycle and 12 countries (24 percent) were implementing an NFI at the time of the latest FREL/FRL submission (Figure 11). Typically NFIs in the tropics have used temporary plot designs, and PSPs have been primarily applied for research when collecting temporal data about forest dynamics for growth and yield studies. The designs often change with time. Examples of countries

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[10] It could be argued that region-specific IPCC default values may not be less biased than country-specific partial inventories. Statistical sampling scheme frameworks exist to take into consideration various local inventories, from simple averages (e.g. Cambodia) to stratified sampling and ratio estimators to account for various sampling designs, in particular different plot areas (e.g. Bangladesh).
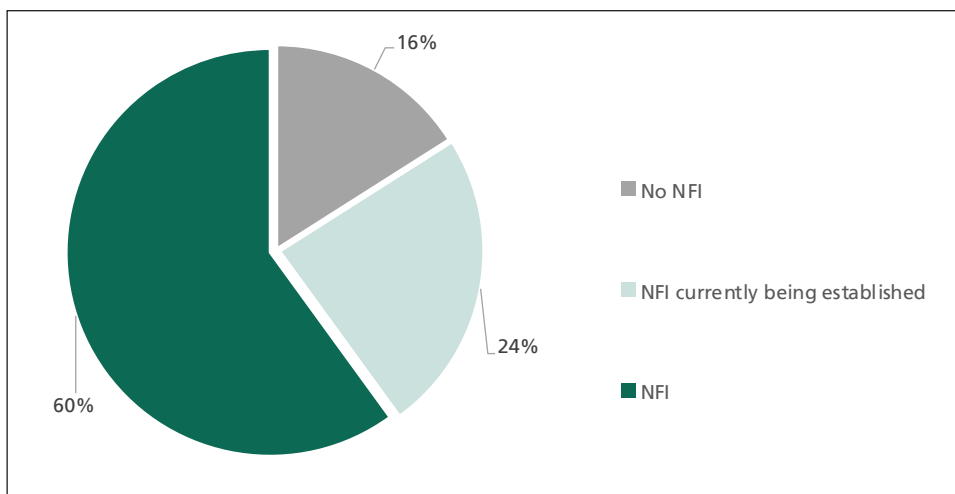
Figure 11. Percentage of countries submitting a FREL/FRL that had undertaken or were establishing an NFI

with PSPs are Uganda (although not part of the NFI, and information from the repeated measurements is not used in the FREL submission) and Malaysia. The challenge in establishing and maintaining PSPs within NFIs is, first, that they are more expensive to establish and measure than temporary sample plots. Second, in order to be efficient they require a stabilized inventory design, and preferably a constant remeasurement interval. One potential solution is testing and further development of spatially balanced sampling methods where different plot types are combined (permanent, semi-permanent and temporary; see e.g. Köhl *et al.*, 2015; Grafström *et al.*, 2017; Räty and Kangas, 2019).

In large-area forest inventories, as in NFIs, the temporal sequence of plot measurements within and between inventory cycles can be complex (e.g. Fischer and Traub, 2019). The measurements within a cycle can take place over several years, so the data may need to be calibrated into the same time point, e.g. by forecasting increments computationally. Similarly, the temporal sequence between inventory cycles is complex for multiple reasons, one being relocating the plot and remeasuring it consistently, another being assessing dynamic changes in growing stock caused by mortality and ingrowth (i.e. new trees exceeding the minimum measuring threshold) occurring simultaneously. Examples of countries with repeated NFI cycles are Mexico, Viet Nam and Zambia. Of these three, due to the additional complexity discussed (pages 18 and 21), only Viet Nam used information from the repeated measurements in its FRL submission. Box 2 presents some of the challenges Viet Nam was faced with when comparing multiple NFI cycles.

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Uncertainty analysis

Uncertainty around the EF is most frequently included in FREL/FRL submissions, with 45 of 60 FREL/FRL submissions (75 percent) including emissions. This is followed by uncertainty around AD reported by 37 of the 60 FREL/FRL submissions (62 percent), while the lowest percentage of reporting is on aggregate uncertainties around emission estimates included in 28 or the 60 FREL/FRLs (47 percent). The average aggregate uncertainty around emission estimates in the 2020 submissions is 32 percent if outliers are excluded (these being Malawi with an aggregate uncertainty of 1 percent and Mexico with an aggregate uncertainty of 250 percent), or 53 percent if all submissions are included.

Figure 12 illustrates that countries are making progress in their uncertainty reporting where uncertainty estimates around AD, EF and aggregate uncertainties around FREL/FRL values are more frequently included in 2020 submissions compared with previous years combined. This illustrates important progress on the transparency of FREL/FRL submissions. It is possible that these percentages will change (increase) in the course of the technical assessment, as happened in 2019 where the aggregate uncertainty reporting increased from 71 to 86 percent because of Argentina, which did not report this in the initial submission but did so in its modified FREL/FRL submission.

Although the UNFCCC decisions note that data have to be accurate and uncertainties should be reduced as far as practicable, they are not very specific on reporting uncertainties in the REDD+ context. Instead, the GCF RBP pilot programme requires information on aggregate uncertainties to be provided. This may be one of the reasons for the recent increase in (aggregate) uncertainty reporting.
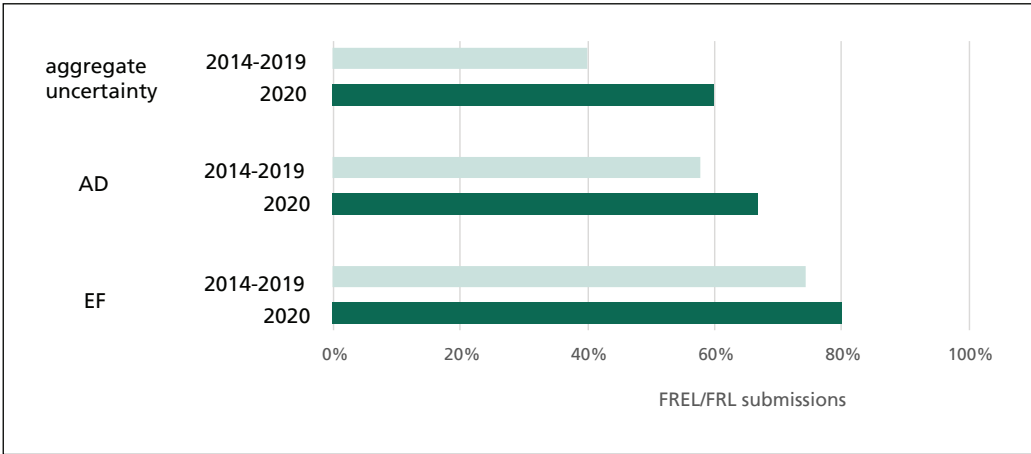
Figure 12. Percentage of FREL/FRL submissions including uncertainty estimates around EF, AD and aggregate uncertainty around emissions/removals for all submissions before 2020 and in 2020

Note that the reporting of aggregate uncertainties is an imperfect indicator of progress because it does not reveal whether all sources of error were included in the calculation. Information on individual error sources would be more useful in the identification of potential areas for improvement (FAO, 2018a).

Furthermore, the aggregate uncertainties in Figure 12 show whether this was reported, but not whether it was reported correctly. Uncertainties are not always correctly calculated in the FREL/FRL submissions (Yanai *et al.*, 2020). For example, despite the fact that pixel counts do not allow for the calculation of a confidence interval around the area estimate, several countries do report this (based on parameters from the map accuracy assessment). The guidelines for the technical assessment (Annex of Decision 13/CP19) note that the assessment team should assess – among many other things – the extent to which the information provided was accurate, but put no further emphasis on uncertainty. Technical assessment reports often include overall assessments of whether the information in the report is transparent and complete, without a structural overall statement on accuracy. This may be part of the reason why erroneous uncertainty calculations are not often commented on in technical assessment reports. Another reason may be the limited capacity of the LULUCF experts to assess whether or not uncertainty was calculated correctly, as these are complicated calculations requiring specific knowledge on this topic.

FAO (2018a) illustrates the multitude of potential sources of error and how uncertainty analyses often do not include all sources of error, and FAO (2019) discusses how an improved assessment of uncertainties is likely to result in a higher aggregate uncertainty because more sources of (systematic) error are captured in the uncertainty assessment.

Construction approaches and adjustments

Countries establishing FREL/FRLs should do so transparently, taking into account historical data, and adjust for national circumstances (Decision 4/CP.15, 2009). Figure 13 shows that a large majority (80 percent) of countries propose a simple historical average to establish their FREL/FRL. Some countries however, notably countries with high forest cover and low historical rates of deforestation, expect future forest emissions to be higher than emissions assessed over the reference period. These countries propose either a linear trend extrapolation or an upward adjustment.

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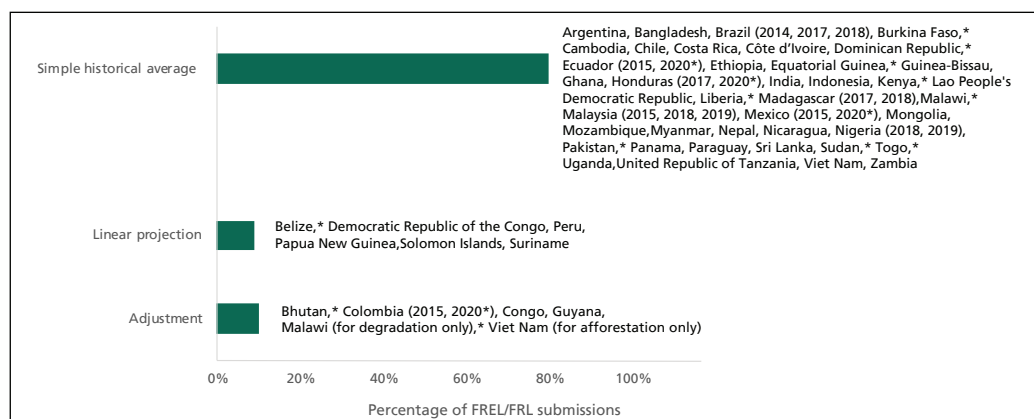
Figure 13. Construction approaches chosen for FREL/FRLs
Note: *Countries with ongoing TAs; construction approach may still change.

2.5 PROPOSED REFERENCE LEVEL VALUES

Technically assessed FREL/FRL values varied greatly. For emissions, they varied between 0.006 million tCO_2eq/yr (Burkina Faso's FRL) and 1 106 million tCO_2eq/yr (Brazil's Amazon-A FREL). For removals, values varied between –0.07 million tCO_2eq/yr (Sri Lanka) and –213 million tCO_2eq/yr (Malaysia). There was variation in the way countries reflected their FREL/FRL values once published on the UNFCCC website at the end of the technical assessment. Three of the early FREL/FRL submissions included two reference levels covering subsequent periods (Brazil, Costa Rica and Malaysia). Of the 45 technically assessed FREL/FRLs, 23 FREL/FRLs (51 percent) included more than one REDD+ activity and 19 FRLs (42 percent) included at least one emitting activity and at least one plus activity. Of the 19 FRLs including both a plus activity and deforestation and/or forest degradation, the majority (12 submissions) published a single net value for emissions and removals (Bangladesh, Cambodia, Costa Rica, Côte d'Ivoire, Ghana, Malaysia 2018 and 2019, Mongolia, Nicaragua, Panama, Papua New Guinea and Solomon Islands).[11] Of these net values some were net emissions while others were net removals. Five submissions published two values: one summing up the emissions from deforestation and/or forest degradation and one summing up the removals from one or more plus activities (Ethiopia, Lao People's Democratic Republic, Myanmar, Sri Lanka, Viet Nam). Two countries (Chile and Nepal) published separate values for each REDD+ activity, resulting respectively in four and three FREL/FRL values.

It is difficult to total all emissions from deforestation and forest degradation included in FREL/FRLs as the FREL/FRLs are valid for different results reporting periods and they are often incomplete in scope and scale. Considering these limitations, the **combined emissions in all FREL/FRLs** (considering the net emitting REDD+ activities only) for 2017 would be **3.9 billion tCO_2eq/yr** (for 49 countries) and the **combined removals in all FRLs** (considering plus activities only) would be **0.4 billion tCO_2eq/yr** (for 29 countries). Considering all countries that included both emissions from deforestation and forest degradation in their FREL, the share of forest degradation in the total historical emissions was 34 percent (see Box 4).

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[11] Both Papua New Guinea and Solomon Islands include deforestation, forest degradation and enhancement but for both countries enhancement was assessed at value zero.

Box 4
Share of historical emissions from forest degradation and deforestation

Forestry and other land use (FOLU), mainly deforestation and forest degradation, is responsible for 11 percent (~5.4 GtCO$_2$eq/yr) of anthropogenic GHG emissions globally (IPCC, 2014). Which share of this 11 percent is due to emissions from deforestation and which to emissions from forest degradation is uncertain, with estimates varying from 25 percent (Pearson *et al.*, 2017) to almost 70 percent of carbon losses (Baccini *et al.*, 2017) resulting from forest degradation. The 25 percent and 70 percent estimates are derived from global databases/ analyses, not country assessments.

Of the 50 countries that submitted a FREL to the UNFCCC, 25 included emissions from both deforestation and forest degradation. Four countries were excluded from the calculation of the share of historical emissions from forest degradation and deforestation, either because they did not separate it out in their submission, or because they explicitly stated that forest degradation is only partially represented in the historical emission estimates in their FRELs. The remaining 21 countries represent a forest area of 276.4 million ha,[1] or 13 percent of the total forest area in all non-Annex I countries.

The 21 countries considered reported combined average annual emissions of 775 million tCO$_2$eq/yr[2] (which would correspond to 14 percent of the FOLU estimate in the IPCC Assessment Report). Of this estimate, 512 million tCO$_2$eq/yr come from deforestation (66 percent) and 264 million tCO$_2$eq/yr from forest degradation (34 percent). The differences per country were quite large, as Figure 14 shows.
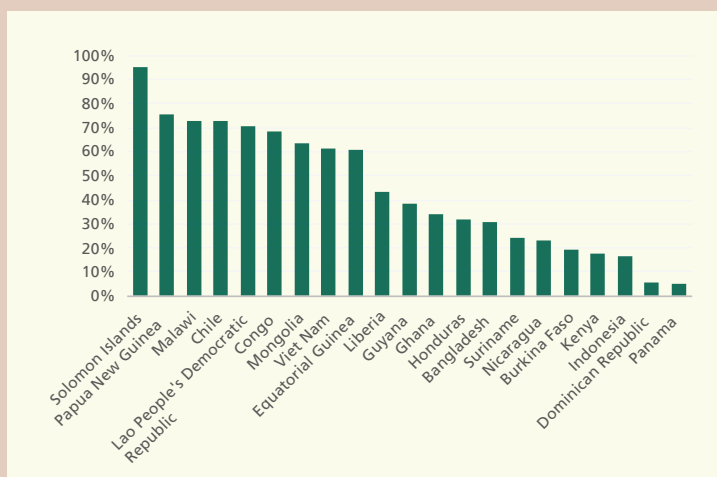
Figure 14. Percentage of historical emissions in the FREL from forest degradation of 21 countries

1 Chile and Liberia have submitted subnational FRELs and thus subnational emission estimates from deforestation and forest degradation.
2 The historical emissions reported by countries in their FRELs correspond to different periods. Indonesian peatland emissions are excluded from this as they are not disaggregated by deforestation and forest degradation.

3. Summary of submitted REDD+ results

3.1 WHAT'S NEW FROM REDD+ RESULTS SUBMISSIONS

As of September 2020, the UNFCCC had received 17 REDD+ results submissions from 13 countries. The results reported a total of 9.03 billion tCO_2 of emission reductions (ERs) achieved between 2006 and 2018. The large majority of these ERs (90 percent) were from one country: Brazil (Table 7). All REDD+ activities have been covered in the reported results (yet no single country covered all activities).

The reported net annual ERs consist of an average 34 percent reduction against FRELs, meaning emissions over the results period are on average 34 percent lower than emissions in the FREL. The average increase of removals reported against FRLs is 7 percent. The percentage reduction compared to the FREL per country ranges from –32 to 69 percent. The range of percentage removal increases compared to the FRL per country is even larger with –83 to 85 percent. The negative values in these ranges mean for the FREL emissions were higher in the results period than during the reference period (Chile) and for the FRL removals were lower in the results period than during the reference period (Cambodia).

Figure 15a (page 34) shows the REDD+ results reported per year by all countries that have to date submitted results for the period 2006–2018, and Figure 15b all countries except Brazil. These numbers will change as new submissions come in. The annual results reported are highest over the period 2009–2017.

As discussed in Section 2.4 (page 10), Cambodia's BUR technical annex reporting pixel counts contains an annex with a more accurate sample-based assessment. The pixel count estimate (consistent with the FRL methodology) assesses an emission reduction of 163 million tCO_2eq for 2015–2018. The sample-based estimate instead assesses an emission increase for 2015–2016 and an emission reduction of 9.5 million tCO_2eq for 2017–2018. The technical assessment report concluded that the FRL submission was transparent, complete and in overall accordance with the guidelines, illustrating how difficult it is for the assessment team to assess the accuracy of the data.

3.2 REDD+ ACTIVITIES INCLUDED FOR RESULTS REPORTING

Results have been reported for all REDD+ activities (Figure 16, page 35), but the majority came from reducing emissions from deforestation (98 percent).

Without considering the results reported by Brazil and Cambodia, the remaining results are still mainly from deforestation (76 percent), followed by sustainable management

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Table 7. Overview of REDD+ results submitted to the UNFCCC

Year	Submission	Results ('000 tCO$_2$)	Percentage of total results	Average annual results ('000 tCO$_2$)	Results period	Length results period (years)	REDD+ activity	ER as percentage of FREL/FRL*
2014	Brazil (Amazon A)	2 971 022	33%	594 204	2006–2010	5	Deforestation	54%
2016	Colombia (Amazon I)	28 984**	0.32%	14 492	2013–2014	2	Deforestation	28%
2016	Ecuador	28 990	0.32%	4 832	2009–2014	6	Deforestation	11%
2016	Malaysia	97 470	1.08%	19 494	2006–2010	5	Sustainable management of forests	11%
2017	Brazil (Amazon B)	3 154 502	35%	630 900	2011–2015	5	Deforestation	69%
2018	Chile	19 362	0.21%	1 614	2014–2016	3	Deforestation; Forest degradation; Enhancement; Conservation	–32% ER and 85% removal increase
2018	Colombia (Amazon II)	31 475	0.35%	15 737	2015–2016	2	Deforestation	30%
2018	Indonesia	244 892	2.71%	16 326	2013–2017	5	Deforestation; Forest degradation	8%
2018	Paraguay	26 793	0.30%	13 397	2016–2017	2	Deforestation	23%
2019	Brazil (Amazon C)	769 001	14%	384 500	2016–2017	2	Deforestation	51%
2019	Brazil (Cerrado)	1 274 723	9%	182 103	2011–2017	7	Deforestation	54%

Year	Submission	Results ('000 tCO$_2$)	Percentage of total results	Average annual results ('000 tCO$_2$)	Results period	Length results period (years)	REDD+ activity	ER as percentage of FREL/FRL*
2019	Papua New Guinea	9 003	0.10%	4 502	2014–2015	2	Deforestation, Forest degradation; Enhancement***	10% ER and 0% removal increase
2019	Argentina	165 173	1.83%	55 058	2014–2016	3	Deforestation	54%
2019	Costa Rica	26 351	0.29%	5 270	2010–2015	5	Deforestation, Enhancement	67% ER and 22% removal increase
2020	Uganda	8 071	0.09%	4 035	2016–2017	2	Deforestation	49%
2020	Lao People's Democratic Republic	14 679	0.16%	3 670	2015–2018	4	Deforestation, Forest degradation; Enhancement	8% ER and 6% removal increase
2020	Cambodia	163 166	1.81%	40,792	2015–2018	4	Deforestation, Forest degradation; Enhancement	56% ER and –83% removal increase****
Total		9 033 657	100%					

Notes:

*For the calculation of ERs against a FREL/FRL, ERs for all emitting activities and removal increases for all plus activities were considered separately, even if the country published a single FRL value.

**The LULUCF experts "are of the view that the changes to the national circumstances justifying the adjustment upwards by 10 percent should not apply to the results reported for 2013–2014" and note that "the results for 2013–2014 should be considered relative to this conclusion". The reason is that the condition identified by Colombia to apply the adjustment was the ratification of the peace process prior to the results period.

***Enhancement is included in the scope of the FRL and the results, but for both the activity has been assessed at zero.

****Cambodia's ER assessment is a pixel count based on map subtraction consistent with the FRL methodology. The BUR TA however includes an annex suggesting the ER using the FRL methodology is over-estimated. The actual emission reduction for 2017–2018 is 9.5 million tCO$_2$eq.

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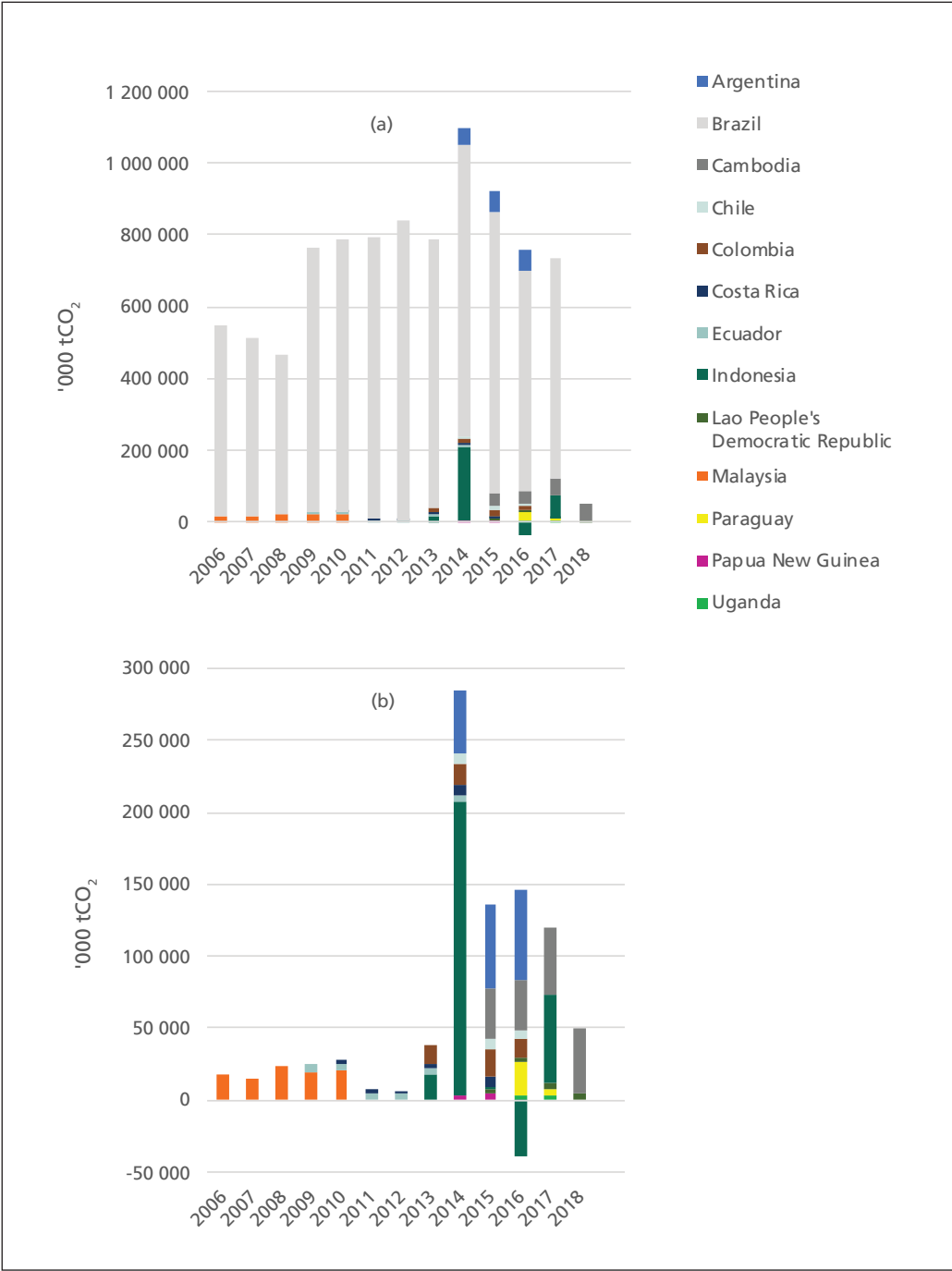
Figure 15. REDD+ results reported (a) for all countries, (b) for all countries except Brazil
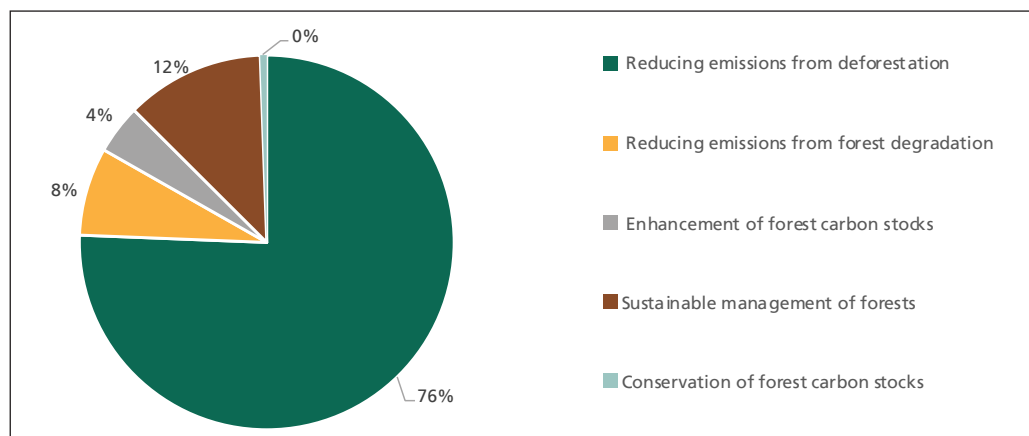
Figure 16. Contribution of REDD+ activities to total cumulative emission reductions (excluding Brazil and Cambodia)

Note: Emissions from peatland (Indonesia) are excluded because they are a mix of deforestation and degradation, but not disaggregated by activity.

of forests (12 percent), forest degradation (8 percent), enhancement (4 percent) and conservation (0.6 percent) of forest carbon stocks. Cambodia's contribution is not considered here since it does not disaggregate the achieved emission reductions by reduced emissions from deforestation and reduced emissions from forest degradation.

The results reported on SMF, enhancement and conservation of forest carbon stocks in Figure 16 are from Chile, Costa Rica, the Lao People's Democratic Republic and Malaysia. These results consist of net removal increases. If Cambodia's REDD+ results for enhancement of forest carbon stocks had been included in Figure 16, the contribution of enhancement of forest carbon stocks would have been reduced to –1 percent instead of 4 percent.

3.3 UNCERTAINTIES AROUND EMISSION REDUCTIONS

Although the IPCC provides clear guidance on propagating errors for emissions calculations, there is no explicit equation for calculating uncertainties around ERs. Seven of the 17 REDD+ results submissions (41 percent) provided aggregate uncertainty estimates around the REDD+ activities assessed over the results reporting period. One additional submission (Paraguay) did not provide aggregate uncertainty in the REDD+ results submission but did provide uncertainty around AD and EF, and its technical analysis report included the propagated aggregate uncertainty estimate. In addition, Cambodia did not provide aggregate uncertainty estimates in its results reported based on pixel counts, but the BUR technical annex included an annex in which new sample-based results are reported, including an estimation of aggregate uncertainty around the sample-based estimate. Similarly, Ecuador included an annex to the BUR technical annex

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with map accuracies and user/producer accuracies around change classes in its map. For the eight countries for which aggregate uncertainties are available, five (Argentina, Chile, Costa Rica, Indonesia and Lao People's Democratic Republic) provided uncertainty details from map accuracy assessments while reporting pixel counts for their AD. The other three provided confidence intervals around stratified area estimates (Paraguay and Uganda), or sample error around a systematic sample (Papua New Guinea) for their AD. All seven propagated the AD error with sampling errors in inventory data used for the EF. To date, no country has provided uncertainties around ERs (the difference between emissions in the results reporting and reference period). As explained in FAO (2019), the expectation is that uncertainty in estimating ERs will usually be much higher than uncertainty in estimating emissions.

Including or improving uncertainty estimates is the area most frequently identified for improvement in technical analysis reports. Yanai *et al.* (2020) discuss common errors in uncertainty calculations and how to correct for them.

4. Green Climate Fund pilot programme for REDD+ results-based payments

4.1 SUMMARY OF THE PILOT PROGRAMME

In October 2017 the Green Climate Fund launched a pilot programme for REDD+ RBPs (GCF Board Decision B.18/07). The pilot programme offers RBPs for REDD+ results achieved over the five-year period 2014–2018. The GCF requires funding to flow through accredited entities that work together with governments to develop proposed investments. Countries that wish to receive REDD+ RBPs would therefore need to engage an accredited entity in order to submit a concept note and a funding proposal to the GCF. Appendix II explains in more detail the requirements for receiving RBPs under the GCF pilot programme (including an overview of the scorecard elements).

As a minimum requirement to participate in this programme, a country needs to have all REDD+ elements (Dec 1/CP16p71) in place. Box 5 gives an overview of progress countries are making on REDD+ elements other than FREL/FRLs.

By September 2020, in total the GCF had granted USD 383 million at USD 5 per tCO$_2$eq to six funding proposals (see Section 3.2). This corresponds to 77 percent of the total portfolio (USD 500 million), which is open for five years (2017–2022). In February 2020, the GCF published a midterm review (GCF, 2020a). This review summarizes views from different stakeholders received during a public call for inputs as follows: "*Some believe that GCF should suspend its consideration of any further REDD-plus results-based payment projects (after the Request for Proposals) until certain issues are resolved. Others are very supportive of GCF continuing REDD-plus results-based payments. Some of those expressing support felt that the programme, with its current procedural and technical elements, is robust enough and therefore ask for REDD-plus results-based payments to be converted into a permanent instrument under GCF. Others proposed that the current pilot programme be extended (and expanded) [and] that a second pilot programme be created.*" As such, the future of REDD+ RBPs under the GCF is not yet entirely clear.

The GCF RBP programme is not the only RBP option for countries. Section 5.3 discusses some other REDD+ RBP opportunities.

Box 5
Progress on REDD+ elements other than FREL/FRLs

In addition to the technically assessed FREL/FRL, the REDD+ results in a technical annex to the BUR[1] and (a description of) the national forest monitoring system (NFMS), in order to be eligible for REDD+ RBPs by the GCF pilot programme, a country should also have in place a national REDD+ strategy or action plan, a safeguards information system (SIS) to inform how the Cancun REDD+ safeguards agreed under the UNFCCC are addressed and respected, and a summary of information on how all the safeguards were addressed and respected during the results period (Table 10 in Appendix II).

The UNFCCC REDD+ web platform should contain the most recent summary of information on safeguards for each country seeking RBPs, and a link to the national REDD+ strategy or action plan, as appropriate.

At least one SIS summary has been submitted by 16 countries, most at national level, although some are at subnational level. These are Argentina, Brazil, Cambodia, Chile, Colombia, Costa Rica, Côte d'Ivoire, Ecuador, Ghana, Indonesia,[2] Malaysia, Mexico, Paraguay, Peru, Viet Nam and Zambia.

While the UNFCCC REDD+ web platform does not collect information about countries' SIS, at least 13 countries are known to have such a system online: Argentina, Brazil, Chile, Ecuador, Ghana, Indonesia, Liberia, Mexico, Pakistan, Paraguay, Philippines, Suriname and Viet Nam.

A link to their national REDD+ strategy or action plan on the information hub has been provided by 14 countries: Argentina, Brazil, Cambodia, Chile, Colombia, Costa Rica, Ecuador, India, Indonesia, Malaysia, Mexico, Mongolia, Papua New Guinea and Paraguay. Many other countries have published their REDD+ strategy or action plan in other locations, for example Uganda's national REDD+ Strategy and Action Plan is published on the Ugandan Ministry of Water and Environment website (Republic of Uganda, 2017), and Equatorial Guinea's REDD+ Strategy is published on the Central African Forest Initiative (CAFI) website (MAGBMA, 2019). Many more countries have completed or are in the process of drafting their national REDD+ strategy or action plan.[3]

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1 REDD+ results need to be submitted to the UNFCCC when submitting a RBP concept note to the GCF. By the time of submitting the complete RBP funding proposal, the technical analysis should be completed and the report made available on the UNFCCC website.

2 The link on the information hub is to the SIS document, not a summary of information. Indonesia's Third National Communication says: "To follow up on this submission, the subsequent sections explain and provide information to address the issues indicated in the submission and serve as a summary of information on how REDD+ safeguards are addressed and respected" (Republic of Indonesia, 2017).

3 Of respondents to a 2019 GCF survey, 26 countries stated that their national REDD+ strategies or action plans were completed. An additional 20 countries responded that their national REDD+ strategies or action plans were in progress (GCF, 2019a).

4.2 OVERVIEW OF APPROVED FUNDING PROPOSALS AND SCORECARD RATINGS

As of September 2020, countries had reported REDD+ results to the UNFCCC totalling 3.36 billion tCO_2eq between 2014 and 2018. By September 2020, the GCF had approved the funding proposals of six countries (Brazil, Chile, Colombia, Ecuador, Indonesia and Paraguay). The total volume of REDD+ results offered to the GCF programme by the six countries is 97 million tCO_2eq emissions reductions (ERs), of which 75 million tCO_2eq (77 percent) qualified for payments. The ERs offered to the GCF corresponded to different shares of the ERs countries reported to the UNFCCC for the years within the RBP programme, these shares ranged from 2 percent (Brazil) to 100 percent (Ecuador) of the ERs submitted. In three funding proposals approved by the GCF Board (Chile, Colombia and Paraguay), a buffer approach was used to manage the risk of reversals, where the countries used the reversal risk assessment tool included in the buffer guidelines of the Forest Carbon Partnership Facility (FCPF) Carbon Fund Methodological Framework to determine the size of the buffer.

The ratings of the countries ranged from 36 to 41 points out of a total of 48 points on the scorecard (Table 8). Chile received the highest score, which is attributed to the fact that the country was rated higher on the inclusion of all significant sources of emissions, carbon pools and non-CO_2 gases. In addition, compared with the other countries Chile used the most recent guidance provided in the 2006 IPCC guidelines as a basis for estimating annual changes in carbon stocks and non-CO_2 emissions based on the extensive use of Tier 2 and Tier 3 methods. The lowest scores by all countries were obtained on the uncertainty element in the scorecard. All countries received an additional 2.5 percent of payments for use of proceeds and non-carbon benefits.

Table 8. Emission reductions offered and RBPs granted under the GCF RBP pilot programme as at September 2020

	ERs offered (million tCO_2eq)	Scorecard score	RBPs granted (USD)
Brazil	25.1	36/48	96 452 228
Chile	14.5	41/48	63 607 552
Colombia	6.9	38/48	28 208 122
Ecuador	4.8	36/48	18 571 766
Indonesia	27.0	36/48	103 781 250
Paraguay	18.9	36/48	50 000 000*
Total	**97.2**		**360 620 918**

Note: * The full volume worth a RBP of USD 72 million has been approved but UNEP's accreditation allows a maximum of USD 50 million per project only. As such, the project is for USD 50 million and Paraguay may choose to present a subsequent proposal for these remaining funds at a later Board meeting.

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4.3 HOW COUNTRIES REINVEST IN THEIR NATIONALLY DETERMINED CONTRIBUTIONS

As established in the terms of reference for the GCF RBP pilot programme, countries receiving REDD+ RBPs must reinvest these payments in activities in line with their current or next nationally determined contributions (NDCs) as established under the Paris Agreement, their REDD+ strategies, or low-carbon development plans. As described in their funding proposals, Brazil, Chile, Colombia, Ecuador, Indonesia and Paraguay will implement actions to reduce emissions and/or increase removals in the forest sector and also address the drivers that affect forest loss in line with their respective NDCs. These six countries will reinvest in two main outcomes: (i) strengthening their institutional and regulatory systems; and (ii) improving land management and planning, which implies a number of activities ranging from sustainable use of the forest to restoration and fire control. Table 9 summarizes the use of proceeds at outcome level by the six countries.

Below is a summary of how the six countries intend to reinvest the REDD+ RBPs in the realization of their NDCs.

Brazil (GCF, 2019b): The RBPs received by Brazil from the GCF will contribute to the implementation of the forest sector actions of the country's NDC. The proceeds will be reinvested in the Floresta+ programme and in the development of a national REDD strategy (ENREDD+). The Floresta+ pilot programme will incentivize conservation in accordance with Brazil's Forest Code and the National Policy for the Recovery of Native Vegetation, known as Proveg. This will contribute to reducing the pressure on native forests, reinforcing ongoing efforts to eliminate illegal deforestation and promoting the restoration and recovery of ecosystems, which are part of ENREDD+ general objectives and are listed as potential activities in the forest sector for the achievement of the NDC and national policies. Part of the RBPs will be directed to support the expansion of the NFMS and MRV to include additional REDD+ activities, carbon pools and gases, considering the mapping products of the Brazilian Biomes Environmental Monitoring Program, for all biomes as appropriate, guided by the Working Group of Technical Experts on REDD+. The aim is to submit a national FREL to the UNFCCC by the end of 2020. A tool will be developed to monitor and measure the impacts of REDD+ policies and investments and inform decision-making regarding the forest component of Brazil's NDC. The safeguards information system for REDD+ (SISREDD+) and its ombudsman will be improved, making the system more complete, transparent and accessible. The capacity of the various stakeholders to participate in CONAREDD+ and its consultative chambers will be enhanced, including revision of the national REDD+ strategy in 2020. A Program for South–South Cooperation on Forests and Climate Change and Forests has been designed by the Ministry of the Environment of Brazil and the Brazilian Cooperation Agency of the Ministry of Foreign Affairs (ABC/MRE).

Table 9. Use of proceeds at outcome level by the six countries that received REDD+ RBPs from the GCF

	Brazil	Chile	Colombia	Ecuador	Indonesia	Paraguay
Indication on how the RBP will be reinvested in the country's NDC	• Forest sector actions contribute to implementation of NDC	• Forest sector actions contribute to implementation of NDC	• Implementation of Colombia's national REDD+ strategy (EICDGB)	• Implementation of the national REDD+ Action Plan	• Support decentralized sustainable forest governance and REDD+ implementation capacity in Indonesia	• National Strategy for Forests and Sustainable Growth (ENBCS) contributes to NDC
Strengthened institutional and regulatory systems	• Projects supporting the improvement and adoption of innovative instruments for public policies related to forest conservation and restoration (e.g. PPCDAm, Planaveg, forest concessions, national forest inventory, SICAR, Sinaflor, etc.) • REDD+ systems and tools improved (SISREDD+, public policy matrix) • ENREDD+ (national REDD+ strategy) revised • Representatives actively engaged in CONAREDD+ and CCT meetings and activities	• Consolidating elements of the Warsaw Framework for REDD+ • Reducing illegality • Improving forest management practices • Enhancing resilience • CONAF (National Forestry Corporation) implements measures of action of the National Strategy for Climate Change and Natural Resources (ENCCRV), aimed at reducing social, environmental and economic vulnerability in communities of six regions, from Maule to Los Lagos	• National and local capacities for monitoring and control strengthened to generate reliable, consistent, timely and quality information on the status, pressure and dynamics of the forests, to support decision-making processes at national, regional and local levels	• Institutional and regulatory systems to improve incentives for low-emission planning and development • Effective implementation • Creating effective coordination mechanisms, policies and institutional management for REDD+ • Operational management of the national REDD+ action plan	• Strengthening REDD+ coordination and implementation and overall REDD+ architecture • Update and further develop the architecture for REDD+ • Strengthen capacity for REDD+ implementation • Communication, knowledge management and adaptive management	• Strengthening capacities of Ministry of Environment (MADES) and Forestry Institute (INFONA) to implement the ENBCS, with high levels of participation of stakeholders and compliance with safeguards • Creating an enabling environment to implement the ENBCS (includes piloting sustainable economic alternatives for local actors, such as farmers and indigenous communities) • Consolidating the NFMS (national forest inventory, terrestrial monitoring satellite systems, and national GHG inventory of the LULUCF/AFOLU sector) • Consolidating a safeguards compliance and a monitoring and reporting compliance system

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	Brazil	Chile	Colombia	Ecuador	Indonesia	Paraguay
Improved management of land and forest	• Support for Foresta+ programme • Increased area of forests supported with incentives for ecosystem services for conservation • Increased area of land supported with incentives for ecosystem services for restoration	• Afforestation and revegetation programme strengthening ecological restoration • Programme of restoration after forest fires • Preventive forestry programme with emphasis on rural/urban interface • Forest management programme • Arrangement and comprehensive management of native forest in created groups that incorporate multiple forestry activities • Strengthening the wood energy programme	• Forest areas sustainably managed and contributing to halt agricultural expansion on forest land • Territorial governance and capacities of indigenous peoples strengthened for forest management and conservation	• Hectares of land or forests under improved and effective management, contributing to CO_2 emission reductions • Transition to sustainable agricultural production systems • Sustainable forest management, conservation and restoration	• Support to decentralized sustainable forest governance • Support the establishment and operation of Forest Management Units (FMUs), as well as SFM investments inside and outside FMUs • Expand and enhance implementation of social forestry	• Strengthening the regulatory framework to facilitate land-use regulation and the control and monitoring of land use in forests and reduce deforestation • Financial incentives (subsidies, tailor-made credits, guarantee funds) to address deforestation drivers • Market for environmental services to encourage forest conservation • Communication campaign to positively affect people's behaviour towards forest conservation and sustainable production

Chile (GCF, 2019c): CONAF will invest the RBPs in the implementation of ten measures established in the National Strategy for Climate Change and Natural Resources (ENCCRV). These measures will impact 25 000 ha of forest area and other lands where sustainable management of forests (SMF), restoration, reforestation and afforestation activities will be implemented. The activities will be implemented in the five administrative regions from Maule to Los Lagos and are expected to lead to the reduction of GHG emissions and increase of removals while respecting environmental and social safeguards and ensuring a gender- and ethnic-sensitive approach. The expected climate benefit of these activities is expected to be around 256 000 tCO_2eq/yr removed from 2020 to 2030. In detail, these emissions reductions and removals will be achieved with the implementation of SMF activities over 17 853 ha, and restoration activities over 7 688 ha during the six years of project implementation. The benefit distribution mechanism will invest 80 percent in activities on the ground and 20 percent in activities to strengthen institutional capacities and project management. The distribution mechanism for activities on the ground will be based on the principles of equity, solidarity and efficiency. This project complements other ongoing initiatives to support the ENCCRV, such as the FCPF Carbon Fund.

Colombia (GCF, 2020b): The proceeds will be invested in supporting specific action lines of Colombia´s National REDD+ Strategy (Estrategia Integral de Control a la Deforestación y Gestión de los Bosques-Bosques Territorios de Vida, EICDGB), consistent with the objectives of the GCF. The National REDD+ Strategy envisions a complete reduction in deforestation by the year 2030, with forest management evolving into a fundamental axis in sustainable integral rural development. Colombia is moving away from a differential, sectorial and territorial approach. The National REDD+ Strategy aims to improve the well-being and livelihoods of local communities and society in general, while promoting the conservation of biodiversity and ecosystem services, including adaptation and mitigation to climate change. Thus, the REDD+ RBP will contribute to the reduction of deforestation in the Colombian Amazon by strengthening local capacities for sustainable forest management and monitoring. It will promote a forest economy that contributes to reducing deforestation by implementing a community-based forestry programme for the Amazon region, strengthening environmental governance of indigenous peoples and creating an enabling environment for community-based forest management , focusing mainly on consolidating the Forest and Carbon Monitoring System (SMByC) and the strengthening of capacities for monitoring and control at national and local levels.

Ecuador (GCF, 2019d): As in the previous GCF project (ProAmazonia) the funds will be reinvested in the national REDD action plan, in particular to strengthen the implementation of REDD+ in indigenous territories, implement land-use plans and management plans at local level, foster public-private partnerships, and provide further support to the Socio-Bosque Program. However, there is no specific mention of the

impact in terms of CO_2 reduction, although the investment will contribute to the NDC target, where the REDD+ action plan will play a key role as a mitigation and adaption action in the AFOLU sector. The RPB complements other ongoing initiatives to help Ecuador implement its REDD+ action plan, through the Global Environment Facility (GEF), REDD Early Movers (REM) and fisheries improvement projects (FIPs).

Indonesia (GCF, 2020c): The Government of Indonesia will invest the REDD+ RBPs in two main activities: (i) continue updating, building and strengthening its REDD+ architecture, as well as further strengthening government capacity to coordinate and implement REDD+ nationally; (ii) further extend and enhance social forestry and Forest Management Units (FMU) operation, including two priority programmes that contribute strongly to the double objective of sustainable forest management and rehabilitation, as well as community empowerment and poverty alleviation.

Paraguay (GCF, 2019e): The use of proceeds will be invested in the implementation of the National Strategy for Forests and Sustainable Growth (ENBCS) and in the establishment and capitalization of the National Climate Change Fund (NCCF). The ENBCS is a long-term government commitment to cope with deforestation. A portion of the proceeds will support several components of the ENBCS. These include securing legal titles for protected areas and completing their zoning plans, the strengthening of ongoing activities to reduce deforestation and support to sustainable production protocols in agroforestry, silvopastoral systems, forest management and biomass where indigenous and small rural farmer communities will have greater access to sustainable economic alternatives. With regard to the NCCF, the proceeds from RBPs will support the establishment of an RBPs window at the NCCF to provide a solid platform for participatory decision making for the investment of resources in the implementation of the REDD+ strategy. Particularly, the RBP proceeds will support the definition the procedures for operation, responsibilities, accountability, structuring and the criteria for allocation of resources, always in line with the principle of transparency, integrity, and gender equality including identification and definition of the type/conditions of grant and financial products that the RBPs window at the NCCF will offer.

5. REDD+ reporting and the Paris Agreement

5.1 REDD+ REPORTING AND NATIONALLY DETERMINED CONTRIBUTIONS

Nationally determined contributions are high-level political commitments made by countries to undertake transformative low-carbon and climate-resilient action and contribute to the global response to climate change. All national efforts communicated through NDCs must represent a progression over time, hence the need to support developing countries in the implementation of the Paris Agreement.

The Paris Agreement recognizes the crucial role of forests in climate change mitigation and adaptation in Article 5. The majority of NDCs reference LULUCF (83 percent of total initial NDCs, FAO, 2016) but only 20 percent of those include quantifiable targets for this sector, less than half of that (about 8 percent of total initial NDCs) in tCO_2eq, making it impossible to estimate its real potential.[12] From the NDCs that included forests as part of their targets, 75 percent are economy-wide NDCs, and only 7 percent are unconditional.[13] The large majority of forest-related NDC targets are conditional upon the provision of international support (IUCN and Climate Focus, 2017).

By 2020, countries were requested to communicate a new NDC to the UNFCCC or update it depending on the time frame (paragraphs 23 and 24 of Decision 1/ CP 21). As of July 2020, only four countries out of 186 had submitted their second NDC to the UNFCCC. Six countries presented updates to their NDCs and three countries made submissions of additional information (UNFCCC, 2020). Creating stronger links with SDGs, as well as alignment with development and sectoral plans and targets (e.g. REDD+), was the second most common category of planned revisions to NDCs, mentioned by 88 countries in their responses to a survey conducted by UNDP in 2019 (UNDP, 2019). Many countries have not yet fully explored the opportunities that REDD+ can bring to NDC development to facilitate both mitigation and adaptation efforts in the forest sector (Box 6).

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[12] Global studies estimate that, if fully implemented, the sector could deliver about 25 percent of planned emission reductions by 2030 (Grassi *et al.*, 2017).

[13] It is important to note that the Paris Agreement and its decisions make no difference between the conditional and unconditional components of the NDCs.

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Box 6
Ecuador's enhanced NDC and the role of REDD+

Ecuador's intended nationally determined contribution (INDC) recognized the impact of forest sector activities and the appropriate management of protected areas on climate change, but it did not include forest-related targets or references to the role of REDD+.

Since 2015, Ecuador has advanced its work in this area, and the country's first NDC, submitted in 2018 (UNFCCC, 2019a) includes a specific target for the LULUCF sector, i.e. the reduction in gross emissions by at least 20 percent (4 percent unconditional and 16 percent conditional to international support) by 2025, compared with FREL 2000–2008.

The LULUCF action plan for the implementation of the NDC is closely aligned with the national REDD+ action plan. Ecuador will reinvest the resources received from the GCF for REDD+ RBPs in the implementation of its national REDD+ action plan.

The country has also indicated that improvements in REDD+ submissions are likely to result in changes in the reference and indicators for the LULUCF component of its NDC. The new FREL for the period 2000–2014 and the use of IPCC 2006 guidelines are the main areas identified by the Government of Ecuador for future NDC enhancement.

REDD+ readiness efforts provide key entry points to integrate and/or enhance mitigation action in the NDCs through the forest sector and to mobilize new and additional sources of finance for implementation.

The development of national REDD+ strategies with consideration of drivers, land tenure and forest governance issues, as well as gender and safeguards, can contribute to the implementation of NDCs. In many developing countries, the timeline for the implementation of national REDD+ strategies/action plans coincides with that of NDCs and often includes specific targets and objectives for the forest sector. In the process of developing their national strategies or action plans, many developing countries have undertaken scoping exercises to identify investments needed for REDD+ implementation. These plans are ready to be financed, providing a good basis for the forest component of the NDCs.

REDD+ readiness efforts also encompass the establishment of NFMSs and systems for the MRV of GHG emissions by sources and removals by carbon sinks, which have yet to be integrated into the NDCs. Related to this is setting up and/or improving systems and processes in the context of the Enhanced Transparency Framework (ETF) under the Paris Agreement. REDD+ countries have developed or substantially improved their own national GHG data for the forest sector. In many developing countries, the national REDD+ data are more sophisticated and include more data points than the LULUCF sector GHG inventory submitted as part of their national communication to the UNFCCC. Mapping complementarities and potential contradictions between the

national data used for their NDC and data for the REDD+ submissions will strengthen the robustness of the NDC.[14]

The methodological details needed to allow for tracking progress of NDC implementation and estimating its full mitigation potential will be provided by countries at the latest by the end of 2024, through their first biennial transparency report (BTR).[15] As part of their BTRs, countries will need to provide specific information on the contribution from the land use and forestry sector to meeting their NDC targets.[16] Countries need to ensure that their BTR and REDD+ submissions are consistent, both in terms of information and timing, considering that BTRs will replace BURs as the means to submit REDD+ technical annexes to the UNFCCC after 2024.

REDD+ FREL/FRL data and information can serve as a good basis for forest sector reporting through the BTRs, but methodological changes are likely to be made considering the different objectives of these submissions and national circumstances. It is important to acknowledge the key differences between REDD+ submissions (e.g. reported by activity) and GHG inventories (e.g. reported by land-use categories), which will be an important basis for NDC accounting for most countries. REDD+ submissions are made in the context of the provision of new and additional finance, including RBPs, and in many cases, based on requirements of specific sources of finance and/or donors. Most developing countries have based their NDC targets on projected emissions while REDD+ FRELs/FRLs often use historical average emissions. REDD+ submissions go through technical assessments under the UNFCCC, where countries receive inputs from LULUCF experts on areas for future technical improvements. This information can contribute to enhanced transparency, completeness, consistency and accuracy of LULUCF sector information for the NDC.

5.2 HOW NATIONAL FOREST MONITORING SYSTEMS CAN BOOST TRANSPARENCY

Forests are key to limiting global warming, so improved information is needed to disclose the potential of forest resources for climate action. Forest monitoring is critical in empowering countries to meet their emission reduction goals, allowing them to align

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[14] For more information on enhancing NDCs climate mitigation and adaptation action in a cost-effective manner and with multiple co-benefits, see: https://www.undp.org/content/undp/en/home/librarypage/climate-and-disaster-resilience-/pathway-for-increasing-nature-based-solutions-in-ndcs.html

[15] Paragraph 64 of Decision 18/CMA.1 requests as part of the first BTR a "description of its NDC under Article 4, against which progress will be tracked". The information provided shall include: targets and description, including target type(s) (e.g. economy-wide absolute emission reduction, emission intensity reduction, emission reduction below a projected baseline), mitigation co-benefits of adaptation actions or economic diversification plans, policies and measures, and others; target year(s) or period(s), and whether they are single-year or multi-year target(s); reference point(s), level(s), baseline(s), base year(s) or starting point(s), and their respective value(s); time frame for implementation; scope and coverage; intention to use cooperative approaches (Article 6 of the Paris Agreement).

[16] Paragraph 77c, of Decision 18/ CMA 1 requests specific information on contributions from the LULUCF sector for each year of the target period or year, if not included in the inventory time series of total net GHG emissions and removals, as applicable.

their forest policies with up-to-date, reliable, transparent and accessible information.

The goal of an NFMS is to generate a reliable data and information base (FAO, 2017b):

- to support the formulation, monitoring and adjustment of (sub)national-level policies related to forests and forested landscapes including, increasingly, development and socio-economic policies;
- to inform citizens and stakeholders about the status characteristics, services and development of national forest;
- to facilitate discussions and the development of agreements at international level and to submit regular reports; and
- to provide baseline data to enable the measurement of progress towards sustainable forest management.

The Enhanced Transparency Framework (ETF) is a key element of the Paris Agreement guided by the modalities, procedures and guidelines (MPGs). Under the ETF, robust **data collection** is the basis for reporting on emissions and removals and tracking progress in meeting NDCs. A fully functioning NFMS will enable countries to not only respond to their own multipurpose national data needs on trees and forests, but also allow them to effectively report on their climate action.

A country's NFMS should provide forest-related data for the national forest inventory (NFI) of anthropogenic emissions by sources and removals by sinks of greenhouse gases, where applicable also for REDD+ estimates (FREL, REDD+ results), and the information required to track progress in implementing and achieving NDCs under Article 4 of the Paris Agreement. Myanmar is a good example of how REDD+-inspired data collection results in increased transparency in NDC reporting (Box 7).

Over the last ten years, progress in MRV of emissions and removals from forests has led to unprecedented transparency in forest data, with a growing number of countries able to meet international reporting requirements. Furthermore, continued capacity development on the NFMS, experience with FREL/FRL, REDD+ results reporting and the associated technical assessments and analysis are providing useful lessons towards the implementation of the ETF (FAO, 2018b).

A sustainable and robust NFMS will be the basis of continued support to the ETF in the coming years. Thus a legal basis, financial commitment, and a permanent institutional framework are vital to ensuring efficient implementation and operation to respond to national and international needs (Cóndor and Felicani, 2020).

5.3 HOW RESULTS-BASED PAYMENTS ARE MADE AGAINST REDD+ RESULTS REPORTED TO THE UNFCCC

Access to RBPs is the most frequently mentioned objective by countries in FREL/FRL and REDD+ results submissions to the UNFCCC. At the time of writing (mid-2020), a growing number of countries had succeeded in accessing RBPs for emission reductions or were very close to doing so.

Chapter 4 describes the REDD+ RBP pilot programme under the GCF, which is part of the financial mechanism of the UNFCCC, but there are other international REDD+

Box 7
Myanmar's commitment to emission reductions: from FRL to updated NDC targets

Myanmar has been a partner country of the UN-REDD programme since 2011. During 2015 and 2016 the Myanmar Forest Department developed two major action plans for upgrading the NFMS and establishing the FRL. During 2017 and 2018, a national scale FRL with a ten-year (2005–2015) historical baseline for two REDD+ activities (reducing deforestation and enhancement of forest carbon stocks through afforestation/ reforestation) was developed and published on the UNFCCC website in early January 2019. The methodology for the FRL follows good practices for sample-based area-change assessment (Olofsson *et al.*, 2014; Mahmood *et al.*, 2019) as well as relevant IPCC guidelines for EF calculations based on district management forest inventories (MONREC, 2018).

The INDC of Myanmar, submitted in 2015 (MOECAF, 2015), is a key government document that formulates strong policy commitments for the (A)FOLU sector but does not quantify emission reduction targets. For the revised and updated NDC of Myanmar in preparation of the country's contribution to COP 26 and the Paris Agreement, the Ministry of Natural Resources and Environmental Conservation (MONREC) has committed to ambitious emission reduction targets to be implemented through REDD+ during the decade 2020–2030. The commitments are divided into conditional and unconditional.
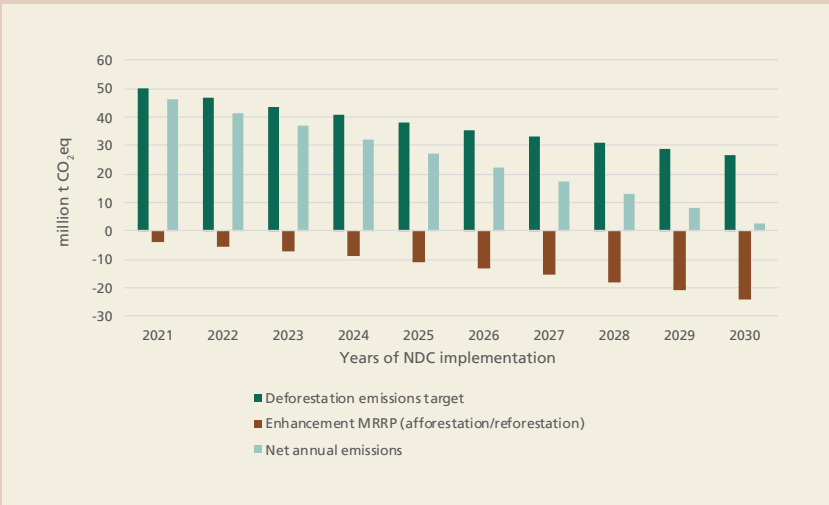

Figure 17. Projection of emissions and emission reductions for Myanmar's revised NDC (A)FOLU sector 2020 – 2030 (conditional)

Note: MRRP = Myanmar Reforestation and Rehabilitation Plan

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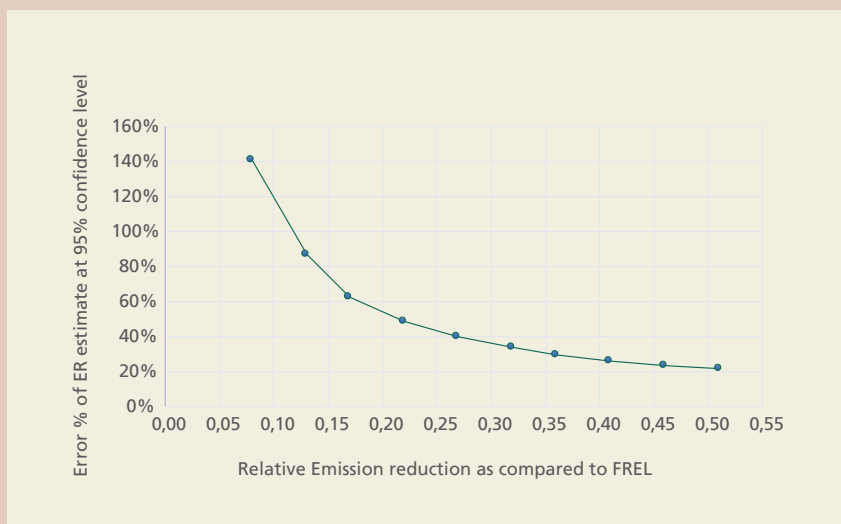
Box 7 (Cont.)

Figure 18. Projection of expected aggregate error over relative emission reductions from (A)FOLU based on Myanmar's FRL for NDC target 50% ER by 2030

- The conditional NDC target for (A)FOLU aims at reducing net accumulated emissions by 50 percent over the decade 2020–2030, while the corresponding unconditional NDC target still aims at a 25 percent reduction (no additional international support beyond what already exists in 2020). The new conditional target was developed in line with the priorities for COP 26 outlined by the UN Secretary-General in early March 2020 and recognition of the need for a greater contribution to limiting global warming to 1.5°C and achieving net zero emissions at latest by 2050.

- In order to achieve the conditional NDC target, the main measures are reducing deforestation by 50 percent by 2030 through coordinated REDD+ actions across relevant public and private institutions and the implementation of the ten-year (2017–2026) Myanmar Reforestation and Rehabilitation Plan (MRRP) (Figure 17) as well as its extension beyond 2026. An essential condition for success in this context will be substantial additional international support for REDD+ implementation from 2021 onwards, including access to RBPs around 2026, when the present MRRP expires and needs to be extended. The amount of accumulated emissions reductions (ERs) by 2025 with the conditional target would be about 27 percent below the baseline (Figure 17) and the expected associated aggregated error of the ERs about 40 percent (Figure 18), i.e. well below the threshold of 50 percent set out by the GCF scorecard for REDD+ results reporting.

> - As Myanmar's NFMS further improves over the coming years, through the establishment of a new permanent NFI and enhanced remote-sensing-based monitoring capabilities of changes on existing forest areas, more activities will be included in REDD+ implementation, especially related to reducing forest degradation and enhancing carbon stocks on existing forest land. In addition, fledgling processes of subnational and jurisdictional approaches will help to better adapt REDD+ implementation to local conditions, including conflict and mixed governance areas and/or specific biomes (e.g. mangroves).

RBP opportunities available to countries from both governments and the private sector. Domestic finance could be an equally promising source of funding, such as through environmental taxes or linkages to domestic emissions trading schemes.

The Paris Agreement refers to mitigation in the forest sector in Article 5 and to several mechanisms for cooperation towards achieving NDCs in Article 6. More certainty on this is expected to emerge from still ongoing UNFCCC negotiations related to the Paris Agreement. In the meantime, countries have made several arrangements for results-based finance.

Such RBPs do not directly or automatically derive from having reported emission reductions to the UNFCCC. Payments have been made under several multilateral and bilateral arrangements, but these involve a process for accessing funding and are at the discretion of the donors involved. The emission reductions as reported to the UNFCCC are not usually translated one-to-one into payments ("We just multiply the UNFCCC tonnes of carbon by a carbon price …"). When emission reductions are a basis for payments, numerous modifications have been applied to countries' UNFCCC approaches for estimating and reporting REDD+ results. Such modifications have included general discounts (GCF, REM), different reference periods (Indonesia–Norway partnership), use of conservative estimates (Amazon Fund), reverting to the historical average emissions for reference-level setting (REM in Colombia), and introducing new indicators (Guyana–Norway partnership) (all discussed below).

The source of REDD+ RBPs that is most directly linked to the UNFCCC is the **Green Climate Fund pilot programme for results-based payments** (discussed in Chapter 4). The GCF pilot programme was launched in 2017. The amount of emission reductions to be compensated is estimated based on the amounts reported to the UNFCCC, multiplied by a factor derived from a scorecard. The scorecard assessment is undertaken by a group of technical experts based on the UNFCCC technical assessment and analysis. The scorecard also introduces additional requirements related to forest monitoring, notably regarding the approach to constructing reference levels and contains "fail" elements, meaning not all UNFCCC reported REDD+ results are eligible. By September 2020, six countries had received RBPs from the GCF.

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One developing country has proposed its own funding mechanism for RBPs and invited donors to contribute. Brazil set up the **Amazon Fund** in 2008, which has received donations from the Governments of Germany and Norway, among others. Brazil's ER estimates are calculated using the country's NFMS for the Amazon but some modifications were made for using conservative EFs, which led to different ER estimates from the values reported to the UNFCCC. In the years before the UNFCCC began conducting technical analysis of REDD+ results, ER estimates were validated by national stakeholders. The ER estimates are considered as a limit for fund-raising – from the Amazon Fund or otherwise. Brazil's reported REDD+ results far exceed the amounts for which payments were received.

Other countries and jurisdictions with REDD+ programmes have entered into partnership arrangements with REDD+ donors. The REDD Early Movers (REM) programme is implemented by the Kreditanstalt für Wiederaufbau (German state-owned development bank), with funding from Germany, the United Kingdom and Norway. It has entered into agreements in several countries, including several Brazilian states, Colombia and Ecuador. Other partnership agreements include those that Norway has entered into with several countries. Payments have been made or are in the process of being made to Guyana and Indonesia.

The **REM** programme has compensated several national or subnational governments for emission reductions. For example, the Government of **Colombia** has sold emission reductions starting from 2016. The ER amounts are based on UNFCCC reporting, but a further verification of results is carried out in addition to the UNFCCC technical assessment. Colombia agreed that the adjustment of the UNFCCC FREL/FRL above the historical average should be disregarded. To address risks, Colombia also agreed to retire (approximately) one additional carbon credit for each carbon credit that payment is made for.

In 2010, **Indonesia** and **Norway** agreed to a partnership for reducing emissions that involved potentially significant RBPs. A bilateral MRV protocol lays out the approach to reference-level setting, which introduces several modifications from Indonesia's UNFCCC approach for setting the FREL/FRL and estimating REDD+ results. For example, these involved recalculating the reference level for a ten-year reference period and excluding emissions from peatlands from the scope. These modifications led to a lower reference level than that reported to the UNFCCC and to a lower ER amount. An additional verification was undertaken and payments are expected for late 2020.

Under the 2009 bilateral **Guyana–Norway Partnership** agreement, Norway has been making RBPs as a reward for keeping the deforestation rate low. The latest iteration of a series of joint concept notes with agreed indicators lays out that payments are made if two conditions are met: (i) emissions are reduced against an agreed reference level that is closely related to the country's "combined incentives"[17] FREL that was later

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[17] Guyana's combined incentives FREL uses the mid-point between Guyana's national and global developing countries' historical average emissions from deforestation and forest degradation as a benchmark. The underlying idea is that, if all countries apply this approach, global emissions would be reduced – while countries with low historical emissions (such as Guyana) could be incentivized for keeping emissions at a low or moderate level.

submitted to the UNFCCC; and (ii) the deforestation rate remains below 0.1 percent per year (and discounts are applied if it exceeds 0.056 percent per year). The indicators are established through dedicated reports that undergo audit.

Beyond such examples of RBP agreements, there are also market-based REDD+ transactions where an emission reduction title is transferred between seller and buyer. There are several schemes and contexts for this. For example, the **FCPF Carbon Fund** has signed payment agreements with several countries for emission reductions to be reported from 2020 onwards. Reference level setting and reporting on emission reductions relies on the Carbon Fund's own methodological and procedural guidance. Although the development of the reference level for the Carbon Fund needs to be informed by the development of a FREL/FRL for the UNFCCC and the intention is to use the NFMS for tracking progress, there are two separate reporting and verification processes to the FCPF and to the UNFCCC.

In all cases of RBPs listed above, the NFMSs that underlie reporting to the UNFCCC were also the basis for measuring ERs for compensation. Forest monitoring tracks the indicators that are used to establish payment amounts – first and foremost the amounts of ERs. However, modifications are common to the reporting choices (reference period, specific EFs, use of reference level construction approach, etc.). Moreover, in all cases, additional evaluations are undertaken before RBPs can be made, such as verification audits, additional reviews or stakeholder validation. The only example included above of a transaction with title transfer (under the FCPF Carbon Fund) involved a different MRV system from those applied for RBPs. Nevertheless, alignment with the UNFCCC submissions is seen as an important objective.

6. Concluding remarks

Encouragingly, developing countries increasingly report REDD+ reference levels to the UNFCCC using ever-improving methods and approaches. By September 2020, 50 countries had submitted 60 FREL/FRLs to the UNFCCC, comprising 16 countries in Latin America and the Caribbean, 19 in Africa, and 15 in Asia and the Pacific. Never before have so many countries reported at this level of transparency on deforestation and forest degradation trends and the associated GHG emissions. The total forest area for which FREL/FRLs have been presented totals 1.35 billion ha, which is 62 percent of the total forest area in all non-Annex I countries.

REDD+ reporting is no longer only part of readiness efforts, but countries increasingly report results for their successful REDD+ implementation. Of countries that submitted a reference level to the UNFCCC, 26 percent have reported REDD+ results against their technically assessed reference level. By September 2020, 13 countries had submitted 17 REDD+ results technical annexes to the UNFCCC, comprising seven countries from Latin America and the Caribbean, five from Asia and the Pacific and one from Africa. The countries that submitted REDD+ results to the UNFCCC collectively account for 35 to 50 percent[18] of global deforestation.

Countries are making important methodological improvements and have come to rely on more advanced approaches. Over time, sample-based methodologies are replacing pixel counts and proxy estimates for assessments of deforestation and forest degradation. Sample-based methodologies generally improve the accuracy of estimates and allow for the calculation of confidence intervals, which are important measures of uncertainty and whose provision enhance the transparency of the data presented. Important progress is being made on aggregate uncertainty reporting, for which the percentage of submissions that included this increased from 27 percent (2014–2017) to 62 percent (2018–2020). This remains an important area for improvement indicated by the technical assessments.

A growing group of countries has implemented stepwise improvements. As many as eight countries have made more than one FREL/FRL submission and had the opportunity to improve on methods and approaches. Over time, countries are expanding the scope and scale of their FREL/FRL submissions, gradually including more REDD+ activities and geographical areas not previously covered and augmenting the completeness of their

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[18] For the periods 2010-2015 and 2015-2020 the countries that submitted REDD+ results were responsible for 35 and 33 percent of global forest loss respectively, while for the period 2000-2010 these countries were responsible for 48 percent of global forest loss, as reported in FAO's Global Forest Resources Assessment 2020.

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submissions, which lowers the risk of displacement of emissions, both geographically
and between REDD+ activities.

Technical assessment and technical analysis continue to provide important feedback
to improve country approaches and methods. For as many as 96 percent of the FREL/
FRL submissions, countries opt to resubmit a modified FREL/FRL document, often
greatly improving transparency. Areas identified for improvement are increasingly acted
upon during the technical assessment, with countries changing their FREL/FRL value
for 77 percent of the technically assessed submissions.

The GCF pilot programme for RBPs is seeing a steady flow of submissions.
Countries are increasingly receiving RBPs through arrangements that invariably use
FREL/FRL submissions to the UNFCCC as a key reference for establishing monitoring
and reporting approaches.

**Evolving REDD+ finance opportunities and the implementation of NDCs may be
important developments for the future of REDD+ reporting under the UNFCCC.** The
landscape of carbon finance remains fluid. Ongoing discussions under the Green Climate
Fund concern the next stage for REDD+ RBPs (beyond the current pilot programme).
Countries also continue to amass experience on how to use NFMSs and UNFCCC
submissions as a basis for bilateral RBP arrangements. Article 6 is still under negotiation
and may in future provide important signals as to how carbon credits could be used to
offset mitigation commitments in the public and private sectors. The improvements in
forest monitoring demonstrated through submissions of FREL/FRLs provide a good
foundation for countries to participate in various future finance opportunities.

Appendix I. UNFCCC guidance and modalities

Forest reference (emission) levels (FREL/FRLs) to the UNFCCC are generally submitted by the beginning of the year to meet the annual deadline set by the UNFCCC. REDD+ results are included in a technical annex to the BUR, which can be submitted at any time, after which the UNFCCC secretariat has a maximum of six months to organize a technical analysis session. The number of sessions depends on the number of submissions received. To date a maximum of three sessions were held during the year for the technical analysis of the BUR and REDD+ results in the technical annex (if submitted).

Countries voluntarily submit FREL/FRLs to the UNFCCC for technical assessment. In doing so, they may apply for RBPs under the financing mechanism of the UNFCCC (through the Green Climate Fund) if they meet the specific GCF RBP pilot programme requirements (Appendix II). Parties to the UNFCCC have agreed on decisions (COP decisions) that provide guidelines and modalities for FREL/FRL construction (Figure 19). The technical assessment will evaluate the extent to which the FREL/FRL submission is in line with the guidelines contained in the relevant COP decisions. Once a technical assessment has been completed, countries can submit REDD+ results in an annex to their BURs for analysis (Figure 19).
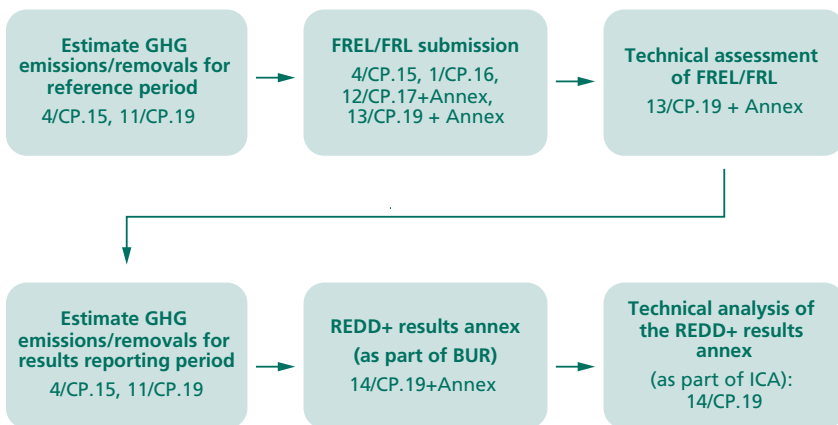

Figure 19. Measurement, reporting and verification for REDD+, and the most relevant decisions of the UNFCCC

Note: Preceding FAO publications (2015a; 2017a; 2018a) provide more detailed explanation of UNFCCC guidance and modalities for FREL/FRL and REDD+ results submissions.

Appendix II. Requirements and scorecard of Green Climate Fund pilot programme for REDD+ results-based payments

Table 10 provides an overview of the UNFCCC-related requirements to participate in the GCF RBP pilot programme.

Table 10. UNFCCC-related requirements to participate in the GCF RBP pilot programme and where/how these should be made available

Requirements related to UNFCCC	What should be available?
National REDD+ strategy or action plan	Link should be provided
Technically assessed FREL/FRL that is used to assess REDD+ results for which RBPs are requested	UNFCCC link to the FREL/FRL and technical assessment report should be provided
National forest monitoring system	UNFCCC link to the BUR with technical annex (including an NFMS description) should be provided
Summary of information on how all Cancun* safeguards have been addressed and respected	UNFCCC link to the summary of information should be provided
Safeguards information system (SIS) to inform how the Cancun safeguards are addressed and respected throughout the implementation of REDD+	Evidence of SIS should be provided
REDD+ results in a technical annex to the BUR, including those results for which payments are being requested. The technical analysis should be completed with the report made available on the UNFCCC website by the time of submitting the complete RBP funding proposal.	UNFCCC link to the BUR should be provided

Note: *As agreed at the 2010 United Nations Climate Change Conference, held in Cancun, Mexico, from 29 November to 10 December 2010.

   Of the above elements, COP decisions do not require the national REDD+ strategy and SIS to be submitted to the UNFCCC, but a link to the national REDD+ strategy needs to be provided.
   Concerning safeguards, there is a difference between an SIS and a summary of information on safeguards. The SIS can be seen as a national instrument to manage

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information, whereas a summary of information[19] is generally a broader document available to an international audience (UNFCCC, 2019b). The first summary of information can be submitted at any time, and thereafter should be consistent with the provisions for submissions of national communications, which are submitted at least once every four years. Summaries of information may also be submitted directly to the UNFCCC REDD+ web platform.

A description of the NFMS needs to be provided in the BUR technical annex with REDD+ results (see UNFCCC Decision 14/CP.19 Annex), however, countries may in addition provide a description of the NFMS as a stand-alone document and publish it on the UNFCCC website (see Cambodia example, UNFCCC, 2015), where they can share any information they feel is relevant.

Following Decision 9/CP.19, a Lima REDD+ information hub has been established on the REDD+ web platform to publish information on the results of REDD+ activities, and corresponding RBPs. The Lima REDD+ hub aims to increase transparency of information on REDD+ results-based actions. Information is only displayed on the hub after all the following elements have been submitted/made available: technically analysed REDD+ results, technically assessed FREL/FRL, summary of information on safeguards, link to the national REDD+ strategy, and information on the NFMS (typically through the BUR TA). Decision 9/CP.19 furthermore states that the information hub should contain the quantity of results for which payments were received, expressed in tCO_2eq/yr, and the entity paying for those results.

Countries wishing to participate in the GCF RBP pilot programme should make sure that they do not fail any elements of the scorecard (GCF, 2017). They may wish to consider the following aspects that may lead to a "fail" if not met:

- FREL/FRL should be equal to or below historical annual average emissions (Section 2a: ii);[20]
- FREL/FRL and/or REDD+ results submitted in or after 2019 should include information on aggregate uncertainties (Section 2a: xv and Section 2b: vii);
- FREL/FRL reference period should be >5 or <20 years (Section 2a: xiii);
- FREL/FRL should not reflect higher emissions/lower removals than a previous FREL/FRL submission covering the same area (Section 2a: xiv);
- significant REDD+ activities should be included (Section 2a: viii);
- information should be guided by and aligned with the IPCC (Section 2a: xi, xii);
- FREL/FRL and/or REDD+ results should be transparent, complete, consistent, accurate and in accordance with the guidelines in Decision 12/CP.17 (Section 2a: iii, iv, v, vi, vii and Section 2b: ii, iii, iv, v);
- REDD+ results reported should be consistent with the FREL/FRL (Section 2b: i);
- ERs offered for RBPs may not have been paid for already (Section 2b: viii);
- ERs offered for RBPs should be included in a registry (Section 2b: ix).

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[19] Guidance on the information that countries may wish to include in a summary of information is provided in UNFCCC Decision 17/CP.21, timing and frequency of the presentation of the summary of information is provided in UNFCCC Decision 12/CP.19.

[20] IPCC guidance (2006) requires delayed emissions for soil organic carbon. It is unclear how such legacy emissions will be considered when resulting in a FREL above historical annual average emissions.

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