

# Analysis of the land use sector in INDCs of relevant Non-Annex I parties

Yvonne Hargita, Sebastian Rüter

Thünen Working Paper 50

Yvonne Hargita  
Thünen-Institut für Internationale Waldwirtschaft und  
Forstökonomie  
Leuschnerstraße 91  
21031 Hamburg  
Telefon: +49 04 73962-164  
Fax: +49 40 73962-399  
E-Mail: yvonne.hargita@thuenen.de

Sebastian Rüter  
Thünen-Institut für Holzwirtschaft  
Leuschnerstraße 91  
21031 Hamburg  
Telefon: +49 40 73962-619  
Fax: +49 40 73962-699  
E-Mail: sebastian.rueter@thuenen.de

Yvonne Hargita, Sebastian Rüter

**Thünen Working Paper 50**

Braunschweig/Germany, October 2015

**Content**

<b>Abbreviations</b>	<b>2</b>
<b>Tables</b>	<b>4</b>
<b>Figures</b>	<b>5</b>
<b>Zusammenfassung</b>	<b>7</b>
<b>Abstract</b>	<b>8</b>
<b>1. Introduction</b>	<b>9</b>
<b>2. Methodology and Data</b>	<b>9</b>
<b>3. Summary of the INDC assessment: results and conclusions</b>	<b>15</b>
<b>References</b>	<b>21</b>
<b>A.1 China – submitted to UNFCCC 2015-06-30</b>	<b>23</b>
<b>A.2 India – submitted to UNFCCC 2015-10-01</b>	<b>29</b>
<b>A.3 Indonesia – submitted to UNFCCC 2015-09-24</b>	<b>32</b>
<b>A.4 Brazil – submitted to UNFCCC 2015-09-28</b>	<b>38</b>
<b>A.5 Mexico – submitted to UNFCCC 2015-03-30</b>	<b>44</b>
<b>A.6 Republic of Korea – submitted to UNFCCC 2015-06-30</b>	<b>50</b>
<b>A.7 Colombia – submitted to UNFCCC 2015-09-07</b>	<b>55</b>
<b>A.8 Ethiopia – submitted to UNFCCC 2015-06-10</b>	<b>59</b>
<b>A.9 Peru – submitted to UNFCCC 2015-09-28</b>	<b>64</b>
<b>A.10 Morocco – submitted to UNFCCC 2015-06-05</b>	<b>67</b>
<b>A.11 DR Congo – submitted to UNFCCC 2015-08-18</b>	<b>72</b>
<b>A.12 Gabon – submitted to UNFCCC 2015-04-01</b>	<b>77</b>

## Abbreviations

a	Year
AFOLU	Agriculture, Forest, Other Land Uses (IPCC 2006 Land use sector)
BAU	Business-as-usual
BUR	Biennial Update Report
BY	Base Year
CAIT	Climate Data Explorer of the World Research Institute
CAT	Climate Action Tracker
CO <sub>2</sub>	Carbon Dioxide
CO <sub>2eq</sub>	Carbon Dioxide Equivalents
DR Congo	Democratic Republic of the Congo
EU FLEGT	European Union Forest Law Enforcement, Governance and Trade
FAO	Food and Agriculture Organization of the United Nations
FAO-Stat	Statistics Division of the FAO
FCPF	Forest Carbon Partnership Facility
FRA	Forest Resource Assessment
GDP	Gross domestic product
Gg	Gigagram
GHG	Greenhouse gas
Gt	Gigatonne (1000 Mt)
ha	Hectare
HFLD	High forest cover, low deforestation rate
INDC	Intended Nationally Determined Contributions
IPCC	Intergovernmental Panel on Climate Change
IPCC 1996	Revised 1996 IPCC Guidelines for National GHG Inventories
IPCC 2000	Good Practice Guidance and Uncertainty Management in National GHG Inventories
IPCC 2006	IPCC Guidelines for National GHG Inventories
kt	Kilotonne (1000 tonnes), 1 kt equals 1 Gg
LU	Land Use
LUCF	Land Use Change and Forestry (IPCC 1996 Land use sector)
LULUCF	Land Use, Land Use-Change and Forestry (IPCC 2003 Land use sector)
m <sup>3</sup>	Cubic meter
Mt	Megatonne (1000 kt)
n.a.	Not applicable
NAMA	National Appropriate Mitigation Action
NC	National Communication
n.d.	Not defined
p.a.	Per annum
PBL	Netherlands Environmental Assessment Agency (Dutch: Planbureau voor de Leefomgeving - abbr. PBL)

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
RL	Reference level
SFM	Sustainable Forest Management
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States of America
USD	US Dollar
w/o	With/without
WRI	World Research Institute

## Tables

TABLE 1: TEMPLATE: OVERVIEW TABLE REGARDING KEY INFORMATION OF EACH INDC. ....	10
TABLE 2: ANALYSED NON-ANNEX I-COUNTRIES (GREY) RANKED ACCORDING TO THEIR SHARE IN GLOBAL FOREST AREA IN 2015.....	14
TABLE 3: OVERVIEW TABLE FOR KEY INFORMATION FROM ASSESSED NON-ANNEX I- INDCs.....	15
TABLE 4: COUNTRY SPECIFIC OVERVIEW SUMMARIZING THE OVERALL ACCOUNTING APPROACH AND INFORMATION PROVIDED FOR THE LU TARGET .....	16
TABLE 5: COMPARISON OF KEY ELEMENTS FROM THE BRAZILIAN INDC WITH THOSE FROM THE US, CANADA AND AUSTRALIA. ....	18
TABLE 6: INDC ANALYSIS REGARDING THE LU SECTOR FOR CHINA – OVERVIEW. ....	23
TABLE 7: CONVERTING THE 2030 TARGET (FOREST STOCK VOLUME) IN CO <sub>2</sub> -EMISSIONS /REMOVALS.....	24
TABLE 8: INDC ANALYSIS REGARDING THE LU SECTOR FOR INDIA – OVERVIEW. ....	29
TABLE 9: SEQUESTRATION BY FORESTS IN MT CO <sub>2</sub> FOR 2005-2035 IN INDIA. ....	31
TABLE 10: INDC ANALYSIS REGARDING THE LU SECTOR FOR INDONESIA – OVERVIEW. ....	32
TABLE 11: INDC ANALYSIS REGARDING THE LU SECTOR FOR BRAZIL – OVERVIEW. ....	38
TABLE 12: BRAZILIAN BIOMES AND THEIR CORRESPONDING AVERAGE EMISSIONS IN GT CO <sub>2</sub> /A. ....	40
TABLE 13: 2005 AS BASE YEAR FOR THE TARGETS 2025 AND 2030 AND ACTUAL EMISSION DEVELOPMENT FOR 2012. THE BRAZILIAN INDC DOES NOT INDICATE THE SHARES OF THE LU SECTOR IN THE TARGET EMISSIONS OF 2025 AND 2030. ....	41
TABLE 14: SHARE OF EMISSIONS FROM DEFORESTATION IN THE AMAZON IN TOTAL EMISSIONS FROM LU FOR THE YEARS 1994, 2000 AND 2010. ....	42
TABLE 15: INDC ANALYSIS REGARDING THE LU SECTOR FOR MEXICO – OVERVIEW. ....	44
TABLE 16: SUMMARY OF INFORMATION PROVIDED UNDER THE MEXICAN REDD+ REFERENCE LEVEL SUBMISSION. ....	46
TABLE 17: INDC ANALYSIS REGARDING THE LU SECTOR FOR KOREA – OVERVIEW. ....	50
TABLE 18: INDC ANALYSIS REGARDING THE LU SECTOR FOR COLOMBIA – OVERVIEW. ....	55
TABLE 19: OVERVIEW OF THE REDD+ FOREST REFERENCE EMISSION LEVEL SUBMISSION FROM COLOMBIA UNDER THE UNFCCC. ....	57
TABLE 20: INDC ANALYSIS REGARDING THE LU SECTOR FOR ETHIOPIA – OVERVIEW. ....	59
TABLE 21: INDC ANALYSIS REGARDING THE LU SECTOR FOR PERU – OVERVIEW. ....	64
TABLE 22: INDC ANALYSIS REGARDING THE LU SECTOR FOR MOROCCO – OVERVIEW. ....	67
TABLE 23: INDC ANALYSIS REGARDING THE LU SECTOR FOR DR CONGO – OVERVIEW. ....	72
TABLE 24: EMISSION REDUCTION POTENTIALS IN MT CO <sub>2</sub> ACCORDING TO FIGURE 32.....	74
TABLE 25: INDC ANALYSIS REGARDING THE LU SECTOR FOR GABON – OVERVIEW. ....	77
TABLE 26: GHG INVENTORY OF GABON, BASED ON THE FIRST AND SECOND NATIONAL COMMUNICATIONS [IN Gg CO <sub>2</sub> ] .....	80

## Figures

FIGURE 1: PERIODICAL REPORTING REQUIREMENTS FOR ANNEX I- AND NON-ANNEX I-PARTIES UNDER THE UNFCCC (AS OF OCTOBER 2015).	13
FIGURE 2: HISTORICAL AND PROJECTED EMISSIONS FOR INDIA IN EMISSION INTENSITY PER GDP (LEFT) AND OVERALL EMISSION DEVELOPMENT (RIGHT).	19
FIGURE 3: EMISSIONS AND REMOVALS IN MT CO <sub>2</sub> FROM CHINESE FORESTS FOR 1994 AND 2005 ACCORDING TO THE FIRST AND SECOND NCS.	26
FIGURE 4: FOREST AREA IN KHA FOR CHINA REPORTED UNDER FAO.	26
FIGURE 5: REMOVALS IN MT CO <sub>2</sub> DUE TO STANDINGS FORESTS AND AFFORESTATION IN CHINA.	27
FIGURE 6: NATIONAL EMISSIONS IN INDONESIA IN MT CO <sub>2eq</sub> FOR 2005 AND FOR 2030 ACCORDING TO THE BAU SCENARIO AND THE UN-/CONDITIONAL PLEDGES.	33
FIGURE 7: SHARE OF DIFFERENT SECTORS IN THE NATIONAL EMISSIONS IN 2000 IN INDONESIA. PEAT FIRE IS CONSIDERED SEPARATELY FROM THE LU SECTOR AS THERE IS NO ROBUST NATIONAL DATA	34
FIGURE 8: INDONESIAN BAU AND TWO DIFFERENT MITIGATION SCENARIOS UP TO THE YEAR 2025, TAKEN FROM THE SECOND NC. IT IS NOT STATED, IF THE (MORE AMBITIOUS) MITIGATION SCENARIO 2 IS REFERRING TO THE -26 % PLEDGE FOR 2020 FROM 2009.	35
FIGURE 9: HISTORIC EMISSION TRENDS 1990-2010 IN INDONESIA FOR DEFORESTATION ONLY AND FOR NET-EMISSIONS FROM FORESTS (INCLUDING DEFORESTATION, DEGRADATION AND REMOVALS).	36
FIGURE 10: BRAZILIAN EMISSION INVENTORY FOR THE LU SECTOR ACCORDING TO THE SECOND NC, DIFFERENTIATED IN BIOMES.	39
FIGURE 11: EMISSIONS FROM DEFORESTATION IN THE AMAZON BIOME AND THE EMISSION REDUCTION IN 2012 RELATIVE TO THE INDC BY 2005.	41
FIGURE 12: BAU-BASELINE, TARGET AND ZERO DEFORESTATION TARGET ACCORDING TO THE MEXICAN INDC.	45
FIGURE 13: LUCF CATEGORY REPORTING FROM THE FIFTH NC (ACCORDING TO IPCC 1996) AND INFORMATION REGARDING THE REDD+ RL (ACCORDING TO IPCC 2000).	47
FIGURE 14: INFORMATION FROM A MEXICAN INDC PRESENTATION.	47
FIGURE 15: KOREAN GHG INVENTORY FOR THE LU SECTOR BASED ON THE LATEST SUBMISSION FOR THE YEARS 1990, 1995, 2000, 2005 AND 2010 IN MT CO <sub>2</sub> . THE CURVE REPRESENTS THE HEIGHT OF EMISSIONS DUE TO DEFORESTATION.	51
FIGURE 16: KOREAN GHG INVENTORY, BAUS AND PLEDGES IN TOTAL EMISSIONS EXCLUDING AND INCLUDING LU.	52
FIGURE 17: SHARE OF THE LU SECTOR IN TOTAL GHG EMISSIONS (EXCL. LU) OVER TIME AND POTENTIAL SHARE IN BAU UP TO 2030.	52
FIGURE 18: POTENTIAL EFFECT OF THE INCLUSION OF THE LU SECTOR ON PLEDGES.	53
FIGURE 19: COLOMBIAN GREENHOUSE GAS INVENTORY FOR THE YEAR 2010.	56
FIGURE 20: BAU- AND MITIGATION SCENARIOS WITH UNCONDITIONAL TARGET FOR 2030 IN COLOMBIA.	56
FIGURE 21: HISTORIC EMISSIONS FROM DEFORESTATION IN THE COLOMBIAN AMAZON AND THE SUBMITTED REFERENCE LEVEL FOR 2013-2017	58
FIGURE 22: SHARE OF DIFFERENT SECTORS IN ACTUAL EMISSIONS IN ETHIOPIA (2010), BAU 2030 AND IN MITIGATION EFFORT TOWARDS 2030 TARGET. THE MOST RELEVANT SECTORS ARE <i>AGRICULTURE</i> AND <i>FORESTRY</i> , WHILE <i>FORESTRY</i> HAS THE HIGHEST MITIGATION POTENTIAL.	60
FIGURE 23: EMISSIONS AND REMOVALS BETWEEN 1990 AND 1995 FOR THE <i>LAND USE-CHANGE AND FORESTRY</i> SECTOR IN MT CO <sub>2</sub> IN ETHIOPIA.	61
FIGURE 24: DEVELOPMENT OF NET-EMISSIONS FROM LAND USE WITHOUT MITIGATION EFFORTS.	62
FIGURE 25: PERU'S GHG FOR 2010 AND 2030 ACCORDING TO THE BAU WITH AND WITHOUT EMISSIONS FROM LU. THE DELTAS ON THE RIGHT SIDE GIVE THE LU EMISSIONS UNDER BAU ACCORDING TO THE COMPARISON.	65
FIGURE 26: COMPARISON OF EMISSION DATA FOR THE YEAR 2010 FROM THE INDC AND THE LATEST EMISSION INVENTORY.	66

FIGURE 27: DISTRIBUTION OF THE MITIGATION EFFORT BY SECTOR BETWEEN 2020 AND 2030, TO ACHIEVE THE CONDITIONAL TARGET OF - 32 % (-54 MT CO <sub>2EQ</sub> ).....	68
FIGURE 28: NET-EMISSIONS IN KT CO <sub>2</sub> FROM THE MOROCCAN LU SECTOR DIVIDED IN SUBCATEGORIES FOR THE YEAR 2000. ....	68
FIGURE 29: EMISSIONS AND REMOVALS IN KT CO <sub>2</sub> FOR THE MOROCCAN LU SECTOR FOR 1994 AND 2000.....	70
FIGURE 30: EMISSIONS IN KT CO <sub>2</sub> FROM 2000 TO 2030 FOR DR CONGO: TOTAL NATIONAL EMISSIONS RESPECTIVELY EMISSIONS FROM LU AND THEIR REDUCTION SHARES. ....	73
FIGURE 31: GROSS-EMISSIONS, REMOVALS AND NET-EMISSIONS IN DR CONGO FOR THE HISTORIC PERIOD 2000-2010 AND PROJECTED GROSS-EMISSIONS FOR THE YEARS 2015/2020/2025/2030. ....	73
FIGURE 32: DR CONGO EMISSION REDUCTION POTENTIALS IN MT CO <sub>2EQ</sub> . GREEN INDICATES THE SHARE OF LU RELATED EMISSION REDUCTION POTENTIALS (24.2 MT CO <sub>2EQ</sub> ).....	74
FIGURE 33: GABONS' EMISSION PROFILES FOR THE YEAR 2000 AND FOR THE YEAR 2025 UNDER BAU ( <i>S. TENDENCIAEL</i> ) AND MITIGATION ( <i>S. MAÎTRISÉ</i> ). THE LU SECTOR IS DISPLAYED AS <i>CHANGEMENT D'AFFECTATION DES TERRES</i> . ....	78
FIGURE 34: GHG INVENTORY FOR THE YEAR 2000 AS PROVIDED IN THE SECOND NC. EMISSIONS ARE POSITIVE, REMOVALS NEGATIVE (GG CO <sub>2EQ</sub> ).....	79
FIGURE 35: EMISSIONS UNDER THE BAU ( <i>DÉVELOPPEMENT TENDENCIAEL</i> , YELLOW) AND THE MITIGATION SCENARIO ( <i>DÉVELOPPEMENT MAÎTRISÉ</i> , GREEN) BETWEEN 2000 AND 2025 FOR GABON.....	81
FIGURE 36: EMISSIONS FROM THE LU SECTOR UNDER THE BAU ( <i>GAINS</i> [i.e. DIFFERENCE], GREEN/WHITE AND THE MITIGATION SCENARIO ( <i>DÉVELOPPEMENT MAÎTRISÉ</i> , GREEN) BETWEEN 2000 AND 2025 FOR GABON. ....	81



## Zusammenfassung

Die internationale Staatengemeinschaft hat im Dezember 2015 in Paris ein globales Klimaabkommen verabschiedet, welches ab 2020 in Kraft treten und alle Mitgliedstaaten zu verbindlichen Emissionsreduktionen verpflichten soll. Im Vorlauf der Verhandlungen wurden von den Staaten nationale Emissionsreduktionsbeiträge für post 2020 eingereicht, die sogenannten *Intended Nationally Determined Contributions* (INDC). Im Sinne des §14 des *Lima Call for Climate Action* sollen die INDCs unter anderem Auskunft darüber geben, ob und auf welche Weise Kohlenstoffeinbindungen im Landnutzungssektor berücksichtigt werden.

Die Verhandlungen unter dem Kyoto Protokoll in der Vergangenheit haben gezeigt, dass der Landnutzungssektor eine besondere Rolle spielt, da die Anrechnungsregeln einen entscheidenden Einfluss auf die Berücksichtigung von Emissionen und Einbindungen haben können. Da sich die Staatengemeinschaft bisher nicht auf verbindliche Anrechnungsregeln unter einem gemeinsamen Klimaabkommen einigen konnte, haben die Länder derzeit alle Freiheiten bei der Ausgestaltung ihrer freiwilligen Reduktionsziele. Insbesondere der potentielle Beitrag des Landnutzungssektors, der je nach natürlichen Voraussetzungen und Nutzung als Treibhausgasquelle oder -senke fungieren kann, stellt eine Unsicherheit hinsichtlich der über alle Staaten akkumulierten Emissionsreduktionsziele dar.

Mit unseren INDC-Analysen relevanter Non-Annex I-Länder für den Landnutzungssektor, haben wir die potentielle Rolle von Wäldern und REDD+ für die jeweiligen nationalen Reduktionsziele kritisch hinterfragt. Es hat sich gezeigt, dass die untersuchten Länder die Freiheiten in der Anrechnung nutzen, und im bestehenden Rahmen unterschiedlichste Ansätze auswählen. Diese Vielfalt geht auf Kosten von Transparenz, Vollständigkeit und Vergleichbarkeit der Emissionsziele und erschwert die Bewertung des Ambitionsniveaus. So bleiben Fragen offen zu Emissionsdaten und zu Annahmen zukünftiger Emissionsentwicklungen. Die Auswertung der INDCs zeigt, dass eine unabhängige Überprüfung der INDC-Datenlage durch UNFCCC-Experten notwendig ist, um die Rolle des Landnutzungssektors für künftige globale Emissionsreduktionsziele in den weiteren Verhandlungen einschätzen zu können. Zum jetzigen Zeitpunkt bleibt die Berücksichtigung des Landnutzungssektors in einem zukünftigen Klimaregime eine Quelle für Unsicherheiten.

**Keywords:** UNFCCC, INDC, Non-Annex I, REDD+, 2020, 2030, Pariser Klimaabkommen, Wald, Landnutzung, Brasilien, Indien, China, Indonesien

## Abstract

The international community has committed itself to adopt a global climate agreement in Paris in 2015, which shall enter into force in 2020 and shall be legally-binding for all. In advance of the negotiations, parties shall submit the so-called *Intended Nationally Determined Contributions* (INDC), providing the voluntary national emission reduction pledges post 2020. For the purposes of § 14 of the *Lima Call for Climate Action* parties may also provide information on whether and in what manner *removals* are taken into account. Removals are synonymous for the land use (LU) sector that can serve as a carbon sink or source, depending on the national preconditions and the sector's management.

Climate negotiations in the past have shown that the accounting rules that result from the special role of the LU sector have a major impact on the accounting of emissions and removals (in the sum: net-removals), and thus on the pledged overall emission reduction targets. Since the international community has yet not been able to agree on binding accounting rules for post-2020, every party can decide on its own, how it considers net-emissions from LU in its INDC. Countries with large forest areas could significantly weaken their overall level of ambition by applying national profitable rules.

With our analysis of the LU sector in relevant Non-Annex I-INDCs, we critically reflect the potential role of forests and the REDD+ mechanism for the national reduction targets. The analysis shows that the assessed parties have taken advantage of the missing common rules and designed their reduction targets in a variety of ways. This variety risks transparency, completeness and comparability of information and complicates the assessment of ambition. The remaining issues that could not be answered with the data provided confirmed the need for independent technical review of emission data and assumptions behind future emission development by UNFCCC experts. These reviews could assure that the quality of pursuing negotiations of reduction targets would not be compromised. At the present state, the inclusion of the LU sector and its impact on future reduction commitments remain a source of uncertainty.

**Keywords:** UNFCCC, INDC, Non-Annex I, REDD+, 2020, 2030, Paris Agreement, forest, land use, Brazil, China, India, Indonesia

## 1. Introduction

In 2012, the parties to the Convention decided ‘(...) *to launch a process to develop a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties* (...)’ (UNFCCC 2012). This process should be completed at the meeting in Paris at the end of 2015 and the new protocol should enter into force in 2020.

Parties could neither agree on binding reduction commitments nor on emission accounting rules. So they agreed on the approach of *Intended Nationally Determined Contribution* (INDC) (UNFCCC, 2014) which refers to initial national mitigation targets that every party can define on its own. Those INDCs ‘(...) *may include, as appropriate, inter alia, quantifiable information on the reference point (including, as appropriate, a base year), time frames and/or periods for implementation, scope and coverage, planning processes, assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals, (...)*’ (UNFCCC, 2015). *Removals* refer to the land use (LU) sector that can serve as carbon sink or source and has a share of approximately 25 % in global net-emissions (IPCC, 2014).

REDD+ is the established mechanism for emissions from forests in Non-Annex I-countries (UNFCCC 2010). REDD+ emission reductions have to be verified against a national reference level and are than financially compensated (UNFCCC 2011). Flexible rules for the establishment of the REDD+ reference level consider the different economical and technical capacities among Non-Annex I-countries. The national implementation status of REDD+ differs considerable depending on the reporting capabilities (Romijn et al, 2012). Still, REDD+ as implemented mechanism for net-emissions from forests can be expected to play an important role for the LU sector in INDCs. But the flexibility within REDD+ additionally to the missing accounting rules for INDCs, enhances the risk of individually developed INDCs which could result in the most profitable accounting approach for each country. Against this background, the LU sector presents a source of uncertainty- not only for national mitigation targets, but due to its high share in global emissions also to the overall global emission reduction that is necessary to keep global warming well below 2°C.

The objective of this work is to provide the interested community in a transparent manner on how Non-Annex I-countries treat the forest sector and REDD+ in their INDCs. We analyze the role of the LU sector in INDCs of forest relevant Non-Annex I parties regarding the importance for their post 2020 pledge, the level of detail of the information given and whether the LU sector target could be assumed as ambitious or provides the potential to considerable weaken the overall national target. We restrict our analysis to climate relevant forest countries (compare Hargita, 2014).

## 2. Methodology and Data

For many Non-Annex I-countries’ emission inventories, the clear distinction of forests within the LU sector is not possible. This is due to the wide use of 1996 Intergovernmental Panel on Climate

Change (IPCC) Guidelines for National Greenhouse Gas Inventories that do not foresee a differentiated reporting of emissions in the LU sector for forests and other LU like more recent IPCC Guidelines do. Similar is the treatment of LU related emissions in the INDCs, where some countries refer to other LU categories than in their emission inventories or to country-defined categories. Due to this heterogeneity in naming LU related emissions in the INDCs, in this text 'LU' is used as synonym for categories from *Land Use Change and Forestry* (LUCF) (IPCC 1996), *Land Use, Land Use-Change and Forestry* (LULUCF) (IPCC 2000), *Agriculture, Forest and Other Land Uses* (AFOLU) (IPCC 2006) or other country-defined categories (e.g. biomes, 'non-categories' like peat fires etc.) until otherwise specified.

### Template for the assessment

The template which is the basis for all conducted assessments is presented in the following. First, key information of each INDC was compiled in an overview table (see Table 1).

**Table 1:** Template: Overview table regarding key information of each INDC.

LU sector considered		Time frame	
All pools included		Accounting method	
Distinct LU sector target		Reference level, LU	

- LU sector considered in the INDC: 'LU sector' summarises all LU categories, by preference as established categories according to the IPCC; possible options: Yes/No.
- All pools included: relevant carbon pools in the LU sector are according to the IPCC: biomass (aboveground and belowground), soil (organic and mineral), litter and dead wood (together: dead organic matter); possible options Yes/No or not defined (n.d.).
- Distinct LU sector target: INDCs include an overall emission reduction target which can vary in the level of detail; due to the special role of the LU sector that can serve as a carbon sink or source, a distinct LU sector target enhances the transparency of the overall reduction target; possible options Yes/No.
- Time frame: countries could decide on a year after 2020 for their reduction target.
- Accounting method: three potential accounting methods exist under UNFCCC (Ellison et al., 2011):
  - (1) Net-net: net-emissions of a target year are compared with those of a base year, e.g. all non-LU sectors' emissions under the first commitment period of the Kyoto Protocol were reduced relative to those of one base year, mostly 1990;
  - (2) Gross-net: for a defined time frame, accumulated net-emissions are accounted for, e.g. under the first commitment period of the Kyoto Protocol, accumulated net-emissions from forest management 2008-2012 were accounted for up to a defined cap;

(3) Reference level (RL): emissions are accounted against a national benchmark, e.g. forest management under the second commitment period of the Kyoto Protocol or REDD+;

(4) Intensity target: this option does not exist under UNFCCC, nevertheless some Non-Annex I-parties decided to account their emission reduction relative to their gross domestic product (GDP).

- Reference level, LU: if parties account their overall emission reductions relative to a reference level, they need to develop reference levels for all sectors covered, also for the LU sector; possible options: Yes - in case an actual LU reference level is provided; not applicable (n.a.) - the accounting option does not need a reference level; n.d. - the accounting option needs a reference level but it is not provided by the party.

In further detail, the following questions are answered for every INDC:

**1. Is the LU sector part of the INDC?**

The country explicitly in- or excludes emissions from LU.

**2. Is a clear differentiation between LU sector target and its share in the overall INDC possible?**

The country provides a distinct target for LU, e.g. X % of the overall target will be fulfilled by a reduction in LU emissions, or the sub target for LU is Y %.

**3. Is the LU sector accounting comprehensible?**

The country provides the reporting and accounting categories for LU which are consistent with historically reported categories, or provides updated categories and emission data (also for historical years). It states the basis for the LU projection (e.g. data basis and assumptions made) and how it is planning to achieve the LU sector target (see next question).

**4. Which measures support the LU sector target?**

The country provides measures for the LU sector, in the best case with corresponding reduction potentials.

**5. How can the LU sector target be seen in the context of past emission trends? How does it compare to existing available data and trends?**

In the case of Non-Annex I countries, most countries do not provide extensive historic emission data comparable to Annex I time series. The reason for this lies in the different treatment of country groups under UNFCCC regarding capacities and responsibilities for both, the reporting and the potential emission reduction commitments (compare **Fehler! erweisquelle konnte nicht gefunden werden.**). Therefore, the comparison of the provided data in the INDC with available LU data can help to assess the ambition of targets (see next question). The informative value of this section has to be treated with caution, as it includes some guesswork due to missing background information.

## 6. How ambitious is the LU sector target?

The thorough assessment of the ambition level of emission reductions in the LU sector should take all relevant national circumstances into account, as there are: state of the forest, economical dependency on forests and its products, overall economic state and development projections, national emission budget and many more. Such an assessment is made by the Climate Action Tracker (CAT) that conducts assessments of climate pledges by countries (CAT 2015). Here, the assessment of ambition is conducted mainly based upon the data available under UNFCCC and in relation to comparable countries.

### Remaining issues

Based on the assessment, the most urgent remaining questions regarding the LU sector in the INDC are formulated.

For the assessment additional data sources were consulted. Whenever possible, data submitted under the UNFCCC was used, as this data is most likely of a comparable quality level and based on comparable calculation methods as the data in the INDC. Figure 1 displays periodical reporting requirements for Annex I- and Non-Annex I-parties under the UNFCCC.

As there are no strict reporting requirements for Non-Annex I-parties like there are for Annex I-parties (e.g. the use of IPCC Guidelines), UNFCCC-emission data for Non-Annex I-countries is often incomplete and/or out-dated. Therefore additional data sources were consulted; under UNFCCC data from *National Appropriate Mitigation Actions* (NAMA) and REDD+ submissions was used. Outside the UNFCCC data from the *Food and Agriculture Organization of the United Nations* (FAO) was used, namely from the *Forest Resource Assessment* (FRA) and from the *Statistics Division* (FAO-Stat). Other sources of information were the Climate Action Tracker (CAT) that conducts assessments of climate pledges by countries (CAT 2015), and the Climate Data Explorer of the World Research Institute (CAIT) which provides national historical emission projections up to 2012 (CAIT 2015).

**Figure 1:** Periodical reporting requirements for Annex I- and Non-Annex I-parties under the UNFCCC (as of October 2015).

	Reporting under the Convention			Kyoto Protocol
Annex I	<b>GHG-Inventory + Report</b> annual IPCC Guidelines 2006 1990-201X Review	<b>National Communication</b> 3-5 years IPCC Guidelines 2006 1990-201X Review	<b>Biennial Report</b> biennial IPCC Guidelines 1990-201X Review	<b>GHG-Inventory + Report</b> annual IPCC Guidelines 2006 2008-201X Review + Compliance
Non-Annex I		<b>National Communication</b> 3-5 years IPCC Guidelines 1996/2003/2006 1990/1994/2000 no Review	<b>Biennial Update Report</b> biennial IPCC Guidelines 1996/2003/2006 year minus max. 4 Consultation + Analysis Process	

Source: Own illustration. The squares display the periodicity for submissions in years, the required IPCC Guidelines, the time frames for emission data and whether the data is reviewed or not.

### *Assessed Non-Annex I-parties*

12 Non-Annex I-parties were selected mainly based on the climate political relevance due to their forests (see Hargita 2014). Table 2 displays the 13 countries that comprise almost 75 % of the global forest area in 2015 (eight are Non-Annex I-countries) and four more assessed Non-Annex I-parties ranked according to their share in global forest area. Besides their share in global forest area (according to FAO FRA, 2015), the table shows whether the LU sector (LU instead of forest sector as it is not possible to extract forest net-emissions from Non-Annex I-countries inventories) is a net-sink or a net-source, the share of LU emissions compared to remaining emissions from other sectors and which forest activity is most relevant for the LU sector in terms of net-emissions.

The shares of net-emissions from forests in Brazil and Indonesia are not only highly relevant for the national emission budgets (154 % respectively 148 %). Due to the high shares in global forest area they also have a major share in global emissions from forests. China is another extreme as it is conducting the world's largest afforestation programme and therefore provides a major sink. But compared to the high national emissions mainly from the Energy sector, the share of the LU sector as national net-sink is relatively low (-6 %).

**Table 2:** Analysed Non-Annex I-countries (grey) ranked according to their share in global forest area in 2015.

Country	Share in global forest area in 2015 (%) <sup>1</sup>	Overall LU: sink/source	LU-share in national emissions (excl. LU emissions) <sup>2</sup>	Most relevant forest activity/subcategory
Russia	20.4	Sink	-24 %	Forest Management
Brazil	12.3	Source	154 %	Deforestation/Degradation
Canada	8.7	Source	6 %	Forest Management
US	7.8	Sink	-15 %	Forest Management
China	5.2	Sink	-6 %	Afforestation/Reforestation
EU	3.9	Sink	-7 %	Forest Management
DR Congo	3.8	Sink	-389 %	Standing forests
Australia	3.1	Source	3 %	Forest Management
Indonesia	2.3	Source	148 %	Deforestation/Degradation
India	1.8	Sink	-15 %	Afforestation/Reforestation
Peru	1.8	Source	54 %	Deforestation
Mexico	1.7	Source	7 %	Deforestation
Colombia	1.5	Source	23 %	Deforestation
...				
Gabon	0.6	Sink	-1 %	Standing forests
Ethiopia	0.3	Sink	-21 %	Afforestation/Reforestation
Republic of Korea	0.2	Sink	-7 %	Forest Management
Morocco	0.1	Source	7 %	Degradation

(Footnotes: <sup>1</sup>Taken from FAO FRA (2015), <sup>2</sup> UNFCCC (2015): 2013 for Annex I, last available reporting year for Non-Annex I.

The table illustrates the heterogeneity within the group of assessed Non-Annex I-countries regarding the role of forests on international (12.3 % to 0.2 % share in global forest area) and national scale (+154 % to -1 % LU share in remaining national emissions) and regarding the relevant forest activities (Deforestation, Afforestation, Forest Management). Compared to the Non-Annex I-group, the group of Annex I-countries with highest shares in global forest area is relatively homogeneous regarding the range of shares of LU in overall emissions (-24 % to +6 %) and the most relevant forest activity (Forest Management).

The chosen Non-Annex I-INDCs provide a cross section of the heterogeneous group of Non-Annex I-countries and consider the most forest relevant countries within this group.



### 3. Summary of the INDC assessment: results and conclusions

In this section the results of the assessments will be summarized, but all INDC assessments are attached in the Annex of this document. Table 3 illustrates the key information of the assessed countries according to Table 1. From 12 assessed INDCs, 11 explicitly include the LU sector. Only the Republic of Korea did not consider the LU sector, but stated that it could do so in the future and will decide later. The statement of deciding later on the inclusion of a whole sector is a noteworthy result of missing accounting rules and 'freedom of choice'. Regarding the inclusion of carbon pools, there is the clear tendency of Non-Annex I-countries not to make any statement regarding the pools. Most likely, all assessed parties are referring at least to the reporting of the pool aboveground biomass in the context of LU; most likely not included by the majority is the mapping and reporting of soil carbon which is most demanding (Romijn et al. 2012).

Five parties give a distinct LU target, some in the target section like China, others in the context of adaptation like Mexico. Thus, the level of detail regarding the LU targets is quite different and sometimes the differentiation between a measure and a target is not that simple, as countries seem to have used different definitions for these two. The seven countries without a distinct LU target include the Republic of Korea which has not yet decided upon the inclusion of the LU sector. Regarding the time frame for the overall emission reduction target, the majority chose 2030 as target year for the post 2020 agreement, only Gabon pledged for a target in 2025.

**Table 3:** Overview table for key information from assessed Non-Annex I- INDCs.

Out of 12 assessed INDCs		
LU sector considered	Yes	11
	No	1
All carbon pools included	all	0
	no specification	12
Distinct LU target	Yes	5
	No	7
Time frame	2025	1
	2030	11
Accounting method	net-net	1
	gross-net	0
	reference level	9
	intensity target	2
Reference level, LU	Yes	2
	n.d.	6
	n.a.	4

Source: Own illustration; information taken from INDCs.

The majority of countries decided for a reference level as accounting method but only two provided a distinct reference level for the LU sector. The country specific overview in Table 4 shows that Brazil is the only Non-Annex I-party that chose a net-net approach. China and India decided for an intensity target which is not an established accounting method under UNFCCC.

**Table 4:** Country specific overview summarizing the overall accounting approach and information provided for the LU target

Countries	Share (%) in global GHG emissions 2012 <sup>3</sup>	INDC BY	Accounting approach	Unconditional INDC target (conditional*)		
				Target relative to BY/ RL	Comment for future LU target	LU target: ambitious
China	22.4	2005	Intensity target	Peaking latest by 2030, -60 to -65 % CO <sub>2</sub> /GDP	Increase in standing volume of forests	Yes
India	6.0	2005	Intensity target	-33 to -35 % CO <sub>2</sub> /GDP by 2030	Forest: projected sink -90 Mt CO <sub>2</sub> /a	See analysis
Indonesia	4.2	2005	RL	-29 % (-40 %*) by 2030	Constant deforestation, increase in sequestration	See analysis
Brazil	3.8	2005	net-net	-43 % by 2030	Zero illegal deforestation in Amazon	See analysis
Mexico	1.6	2013	RL	-25 % (-40 %*) by 2030	Zero net-deforestation	Yes
...						
Republic of Korea	1.3	-	RL	-37 % by 2030	decision on inclusion later	-
Colombia	0.4	-	RL	-20 % (-30 %*) by 2030	Mentions REDD+ Submission	See analysis
Ethiopia	0.3	2010	RL	-64 %* by 2030	74% increase in forest area, 64 % of this area under SFM	Yes*
Peru	0.3	2010	RL	-20 % (-30%*) by 2030	Important role (50 % of emissions)	See analysis
Morocco	0.2	-	RL	-13 % (-32 %*) by 2030	50,000 ha afforestation per year	Yes*

Countries	Share (%) in global GHG emissions 2012 <sup>3</sup>	INDC BY	Accounting approach	Unconditional INDC target (conditional*)		
				Target relative to BY/ RL	Comment for future LU target	LU target: ambitious
DR Congo	0	2000	RL	-17 % by 2030	LU emission reduction -25 %	See analysis
Gabon	0	2000	RL	at least -50 % by 2025	Excluding sink- effect	See analysis

Source: Own illustration; information taken from INDCs, <sup>3</sup>CAIT (2015). A comparable overview for all submitted INDCs can be found at Climate Policy Observer (2015). For the assessment it is assumed that information regarding the LU sector in the INDCs is referring to the unconditional overall target, although it is generally not clearly indicated in the INDCs (exception is Ethiopia with only a conditional target).

Beside information summarizing the overall accounting approaches chosen by the assessed parties, Table 4 displays that some countries chose to pledge an *unconditional* reduction target they would implement through domestic investment and expenses, but also a *conditional*\* target that is subject to the availability of international financing.

Although the **capacities** in LU reporting within the Non-Annex I-group range from low (Africa) to higher (South America, China, India; Hargita 2014), this discrepancy in capabilities does not necessarily show in the quality of the submitted INDCs. Emerging economies like China or India with comparably high capacities remained relatively vague regarding the role of the LU sector in their intensity targets. On the other side, lower developed countries like Gabon or DR Congo provided reference levels for their LU sectors in order to improve the transparency of their overall targets. In Brazil and Indonesia the LU sector is due to high deforestation rates a major source of emissions and therefore has the highest reduction potentials of all assessed countries. Indonesia pledges for a reduction target of -29 % and with international financing -40 %. It is most likely that the financing is needed for emission reduction measures in the LU sector as it is an important source. The Brazilian INDC will be discussed in the following chapter. Mexico is the only assessed party that commits for a zero deforestation target.

### *Implications of the different accounting approaches*

In the following we will discuss the different accounting approaches and their role in, and possible implications for, international negotiations towards post 2020.

Brazil is the only assessed party that chose a **net-net accounting approach**. Table 5 shows some key elements from Brazil and the *Umbrella Group* members US, Canada and Australia (all Annex I). Brazil signalled that it would submit its INDC not until the last *Umbrella Group* member would have submitted its INDC which was Australia in August 2015. The direct comparison shows that Brazil has not only chosen the same accounting approach and the same base year, but that it commits to a reduction target well above those from some of the most important Annex I-countries.

**Table 5:** Comparison of key elements from the Brazilian INDC with those from the US, Canada and Australia.

Comparable INDCs	Share (%) in global GHG emissions 2012 <sup>3</sup>	INDC BY	Accounting approach	Unconditional target relative to BY
US	12.2	2005	net-net	-26 to -28 % by 2025
Brazil	3.8	2005	net-net	-43 % by 2030
Canada	1.8	2005	net-net	-30 % by 2030
Australia	1.1	2005	net-net	-26 to -28 % by 2030

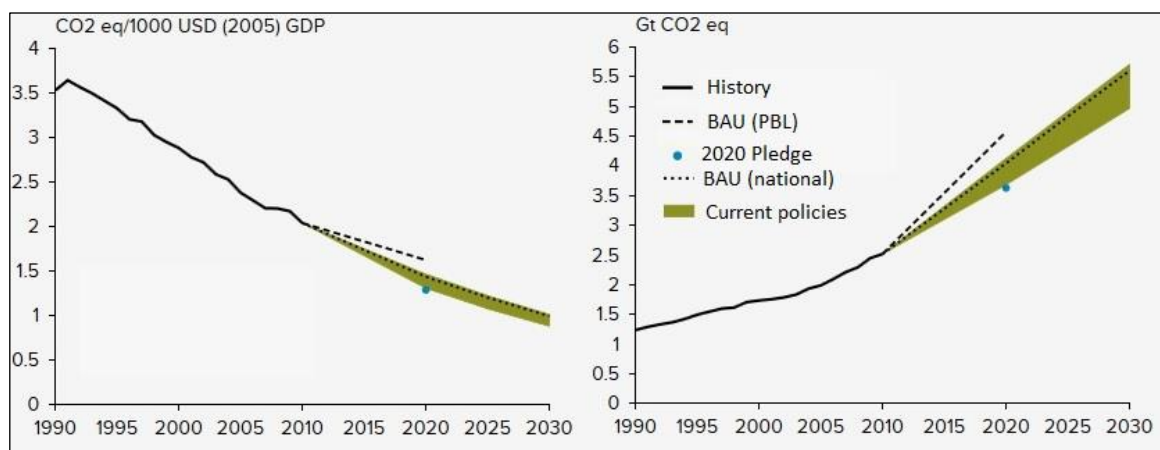
Source: Own illustration, based on US (2015), Brazil (2015), Canada (2015), Australia (2015) and <sup>3</sup>CAIT (2015).

Brazil not only timed its own submission with those of the most developed countries. Based on the same accounting approach and the same base year, Brazil is also providing the highest relative reduction target within this group. As the INDC analysis shows, Brazil has already achieved -41 % of emission reduction compared to 2005 in 2012 (PRODES, 2014) and therefore almost reached its 2030 target of -43 % (under the simplified assumption that emissions from other sectors remain stable). Basis for the Brazilian target is a historic decrease of 70 % in emissions from deforestation in the Amazon biome (Brazil 2014) since 2005. In this context, the Brazilian INDC may not be very ambitious for the forest sector in the years coming, but it is a clear signal to other heavyweights in climate negotiations- Brazil has already done its share in emission reductions up to 2030 and its commitment is higher than those of leading Annex I-parties.

No assessed party has decided for an accounting by the **gross-net accounting approach**. Consequently this accounting approach is not likely to play a role in future accounting.

India and China have committed to **intensity targets**. Intensity targets are defined as policies that specify emission reductions relative to productivity or economic output (Herzog et al., 2006). In India's and China's cases the targets are relative to the respective GDP. From the economic perspective the advantage of intensity targets is that they do not penalize economies for economic growth (Kolstad, 2004). This is an aspect which is highly relevant for emerging economies like China and India that fear the consequence of absolute targets like emission caps. Regarding the goal to keep global emissions within the 2°C corridor of global warming, intensity targets have to be seen more critically. Kolstad (2004) found that *'in order to stabilize greenhouse gas concentration, the rate of decline in intensity must equal the rate of growth of GDP'*. Otherwise they create high uncertainty about the human impact on climate as the emissions are a function of uncertain economic variables. PBL (2015) found in its projections that the 2020 intensity targets from India and China will lead to an overall increase in emissions as shown in Figure 2 for India. The graph displays historical and projected emissions in emission intensity per GDP (left) and overall emission development (right). The curves show historic emissions and different BAU scenarios and the coloured range the development under current policies. The dot indicates the Indian 2020 pledge of minus 22-25 % emission intensity.

**Figure 2:** Historical and projected emissions for India in emission intensity per GDP (left) and overall emission development (right).



Source: Both graphs are taken from PBL (2015).

One can see from Figure 2 that while the emissions per GDP are substantially decreasing under the 2020 pledge, overall emissions are still increasing. The same is valid for the Chinese scenario. But in contrast to India, China announced in its INDC that its emissions will peak around 2030 at the latest, which leads to a reversal in the emission trend. From a negotiating point of view, the introduction of intensity targets into UNFCCC negotiations bears the risk that they *'may open the door for a myriad of other variables to be considered'* which could further slow negotiations down (Dudek and Golub, 2003).

The majority of the assessed Non-Annex I parties has chosen relative emission reduction targets against a **reference level**. Usually, reference levels are based on a business-as-usual scenario and often suggest an ongoing increase in emissions. This leads to relative emission reductions against assumed emissions for a certain future year and can result in additional emissions compared to a historic base year. Regarding the LU sector and especially the REDD+ mechanism, this approach can be evaluated as profitable accounting approach for countries with high historic deforestation rates and assumed ongoing deforestation, when profitable is defined as potential emission reductions with minimal efforts. Therefore the assumptions behind the reference level are critical to evaluate whether the expected future emission is plausible or can result in *'hot air'* (Hargita et al. 2016).

The REDD+ mechanism is explicitly mentioned only in half of the INDCs (Brazil, Colombia, DR Congo, India, Peru) but all assessed countries are engaged in the FCPF and/or UN-REDD program and thus receiving finance to take part in REDD+ (FCPF, 2015; UN-REDD 2015).

Beyond the above discussed topics, the INDC analysis has shown that some basic questions regarding the emission data used for defining targets remain, in some cases even the data presented within the INDC was not consistent. For the assessed parties that was the case for Gabon and Peru, but most likely this is also the case for other countries' INDCs. From nine parties with accounting against a reference level, only two provided reference levels in their INDCs (DR Congo, Gabon). For at least one of these two reference levels, doubts remain whether the reference level is well

established (Gabon). The overall analysis has shown that the data provided in the INDCs is generally insufficient for a thorough analysis of the potential role the LU sector could play under a post 2020 agreement.

## *Conclusions*

Based on the analysis attached in the Annex of this document, we discussed the overall LU-information level of the INDCs in the previous section. The heterogeneity regarding national circumstances, reporting capacities and of course the missing common accounting rules results in a variety of accounting approaches. It seems that the classic Non-Annex I countries refer to accounting against reference levels and with that at least could consider LU in form of the already implemented REDD+ mechanism (although only three of them are explicitly referring to REDD+). Brazil is an exception with a net-net approach. It has already significantly reduced emissions from forests and confidently provides an INDC that can be compared to those of the most developed countries. The remarkable approach of the Republic of Korea to decide on the inclusion of the LU sector later could imply that it will await decisions on accounting of LU emissions first, and only decide in favor of the inclusion if those rules are profitable on the national level. The reduction commitments (intensity target is no accounting approach) of the emerging economies China and India could be interpreted as signals of stepping out of the group of Non-Annex I, while claiming a special status in future negotiations and reduction commitments.

We concluded that different reporting capacities of the parties are not necessarily reflected in the quantity and quality of LU information presented in the INDCs. There is rather the tendency that the more important the LU sector is for the national emission budget, the more likely it is that information regarding its role post 2020 is provided, although in varying quality.

The evaluation whether a target is ambitious or not has proved to be a difficult task within this analysis as information in INDCs are limited. To guarantee the reliability and the quality of present and future emission data and the reference levels, reviews conducted by UNFCCC experts are needed, comparable to those under the Kyoto Protocol (see Figure 1). These reviews can result in the need to recalculate or improve data which in turn can change the absolute amounts of expected emissions and consequently of the reduction potentials. As the LU sector is an important sector in most Non-Annex I-countries, recalculations of its emissions have impacts of overall emission reduction pledges. At the present state, the LU sector remains a source of uncertainty regarding overall emissions.

## References

- AUSTRALIA (2015): Intended Nationally Determined Contribution, 11.08.2015, [http://unfccc.int/focus/indc\\_portal/items/8766.php](http://unfccc.int/focus/indc_portal/items/8766.php).
- BRAZIL (2014): Brazil's submission of a Forest Reference Emission Level (FREL) for reducing emissions from deforestation in the Amazonia biome for REDD+ results-based payments under the UNFCCC, 10.2014.
- CANADA (2015): Intended Nationally Determined Contribution, 15.05.2015, [http://unfccc.int/focus/indc\\_portal/items/8766.php](http://unfccc.int/focus/indc_portal/items/8766.php).
- CAIT (2015): Climate Data Explorer, <http://cait.wri.org/>, 05.10.2015.
- CAT (2015): Climate Action Tracker, <http://www.climateactiontracker.org.>, 05.10.2015.
- CLIMATE POLICY OBSERVER (2015): INDC, <http://climateobserver.org/open-and-shut/indc/>, 13.10.2015.
- DUDEK, D.; GOLUB, A. (2003): Intensity targets: Pathway or roadblock to preventing climate change while enhancing economic growth? In: Climate Policy 2003, S21-S28.
- FAO FRA (2015): Global Forest Resource Assessment Report 2015. Desk Reference. Rome.
- FAO-Stat (2014): Statistics Division, Emissions – Land Use – Forest Land, <http://faostat3.fao.org/home/E>, 19.09.2014.
- FCPF (2015): Forest Carbon Partnership Facility, <http://www.forestcarbonpartnership.org/redd-countries-1>.
- HARGITA, Y. (2014): Assessing the relevance of countries and their capacities for reporting forests under UNFCCC, Thuenen Working Paper 36, DOI: 10.3220/WP\_36\_2014.
- HARGITA Y., GÜNTHER S., KÖTHKE M. (2016): Brazil submitted the first REDD+ reference level to the UNFCCC- Implications regarding climate effectiveness and cost-efficiency. Land Use Pol 55:340-347.
- IPCC (1996): Revised Guidelines for National Greenhouse Gas Inventories, Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories, OECD, Paris 1997.
- IPCC (2000): Good Practice Guidance for Land Use, Land-Use Change and Forestry, Intergovernmental Panel on Climate Change Guidelines for National Greenhouse Gas Inventories, Japan, 2003.
- IPCC (2006): Guidelines for National Greenhouse Gas Inventories, Intergovernmental Panel on Climate Change, Washington D.C., USA, 2009.
- IPCC (2014): Summary for Policymakers. Edenhofer, O.; Pichs-Madruga, R.; Sokona, Y.; Farahani, E. ; Kadner, S.; Seyboth, K.; et al.; Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA (Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change).
- KOLSTAD, C. D. (2004): The simple analytics of greenhouse gas emission intensity reduction targets, Energy Policy 33, 2231–2236.
- PBL (2015): PBL Climate Pledge INDC tool, <http://infographics.pbl.nl/indc/>, 05.10.2015.
- PRODES (2014): Taxas anuais do desmatamento—1988 até 2013. Projeto PRODES, Monitoramento da Floresta Amazônica Brasileira per Satélite, Retrieved November 5, 2014. <http://www.obt.inpe.br/prodes/prodes 1988 2013.htm>.

- ROMIJN, E.; HEROLD, M.; KOOISTRA, L.; MURDIYARSO, D.; VERCHOT, L. (2012): Assessing capacities of non-Annex I countries for national forest monitoring in the context of REDD+. In: *Environmental Science and Policy* 19-20, 2012, pp 33–48.
- UNFCCC (2010): FCCC/CP/2009/11/Add.1, Decision 4/CP.15, United Nations Framework Convention on Climate Change.
- UNFCCC (2012): Decision 1/CP.17. and 2/CP.17. FCCC/CP/2011/9/Add.1., United Nations Framework Convention on Climate Change.
- UNFCCC (2015): Decision 1/CP.20. FCCC/CP/2014/10/Add.1., United Nations Framework Convention on Climate Change.
- UN-REDD (2015): UN-REDD Programme, <http://www.un-redd.org/partner-countries>.
- US (2015): intended Nationally Determined Contribution, 31.03.2015, [http://unfccc.int/focus/indc\\_portal/items/8766.php](http://unfccc.int/focus/indc_portal/items/8766.php).



## Annex

All INDCs are available online: <http://www4.unfccc.int/submissions/indc>

### A.1 China – submitted to UNFCCC 2015-06-30

China is part of the G77+China negotiation block and a heavyweight in climate negotiations. China caused one fifth of the global emission in 2012 (CAIT, 2015) and therefore is one of the most important economies when it comes to impact on future emissions. Regarding its LU, China is conducting an unprecedented afforestation project (China, 2002) and therefore has a high potential for an increasing sink effect due to growing forest stocks.

With the Copenhagen Accord China declared to voluntarily lower its CO<sub>2</sub> emissions per unit GDP by 40-45 % by 2020 compared with the 2005 level. China declared to increase forest coverage by 40 million ha and forest stock by 1.3 billion m<sup>3</sup> compared with 2005 (UNFCCC, 2011). The Climate Action Tracker assessed the 2020 goal as follows *‘The 2020 pledge has large uncertainties associated with its quantification. In general, the resulting emissions level of the intensity pledge depends critically on future GDP growth.’* (CAT, 2015).

For 2030, China pledged for an intensity target again (emission reduction by 60-65 % per GDP) and a peaking in emissions by 2030 at the latest (China, 2015). Thus, China considered in their 2030 pledge that depending on the GDP growth, emissions could further increase and committed to a trend reversal. Regarding the forest sector, China is projecting increasing sequestration in its forest area up to 2030 (increase in forest stock volume by around 4.5 billion m<sup>3</sup> compared to 2005).

**Table 6:** INDC analysis regarding the LU sector for China – overview.

LU sector considered	Y	Time frame	2030
All pools included	n.d.	Accounting method	Intensity
Distinct LU sector target	Y	Reference level, LU	n.a.

China INDC: Summary regarding land Use sector (N – no; Y – yes; N/A – not applicable; n.d. – not defined); Relevant LULUCF aspects requested by the Lima Call for Action, decision 1/CP.20

## 1. Is the LU sector part of the INDC?

Yes (see 2.).

## 2. Is the clear differentiation between LU sector target and its share in the overall INDC possible?

No, a clear differentiation between LU sector target and its share in the overall INDC is not possible. China's overall targets for 2030 are (China, 2015):

- (A) to achieve the peaking of carbon dioxide emissions around 2030 and making best efforts to peak early; and*
- (B) to lower carbon dioxide emissions per unit of GDP by 60 % to 65 % from the 2005 level.*
- (C) to increase the share of non-fossil fuels in primary energy consumption to around 20 %; and*
- (D) to increase the forest stock volume by around 4.5 billion cubic meters on the 2005 level.*

It is likely that the targets (C) and (D) are sub-targets or measures to fulfil targets (A) and (B). Regarding the overall targets it can be concluded that although reduction in the CO<sub>2</sub> intensity per GDP unit relative to 2005 are intended, absolute emissions will increase as the Chinese GDP is expected to grow.

China announced that by 2020 it will increase the forested area by 40 million hectares and the forest stock volume by 1.3 billion m<sup>3</sup> compared to the 2005 levels (UNFCCC, 2011). By 2014 China achieved an increased forested area by 21.6 million hectares and an increase in forest stock volume by 2.188 billion m<sup>3</sup> compared to 2005.

Under the conservative assumption that China afforested mainly light density tree species and that the increase in forest stock volume is evenly distributed between the years up to 2030, annually removals between 2014 and 2030 could be 184 Mt CO<sub>2</sub> (Table 7).

**Table 7:** Converting the 2030 target (forest stock volume) in CO<sub>2</sub>-emissions /removals.

Converting China's planned increase of forest stock to tonnes of Carbon under the conservative assumption that light density tree species are used ( <i>Populus spp.</i> – Poplar/Aspen - .35tC per m <sup>3</sup> )			
Stock increase in billion m <sup>3</sup>	Billion tons (Gt) of carbon removals	Billion tons (Gt) of CO <sub>2</sub> removals (tC*44/12 =tCO <sub>2</sub> )	Annual average removals until 2030
4.5 (since 2005)	1.575	5.775	-0.222 Gt (-222 Mt) annually (2005-2030)
2.3 (since 2014)	0.805	2.95	-0.1845 Gt (-184 Mt) annually (2014-2030)

Source: Calculation based on China (2015) and IPCC (2006).

### 3. Is the LU sector accounting comprehensible?

No, as there is no under UNFCCC acknowledged accounting approach mentioned, the accounting by intensity targets is not comprehensible. China sets all its targets in relation to 2005. If 2005 was the base year and 2020 respectively 2030 the commitment year, net-net accounting could theoretically be the basis for the intensity target.

### 4. Which measures are behind the LU sector target?

In the case of the Chinese INDC, the target is the ‘*increase of forest stock volume*’ respectively the increase in carbon pools. It is remarkable that China does not announce an extra target for the increase in forested area up to 2030 like for the 2020 target. Afforestation seems to play a minor role between 2020 and 2030 compared to the enhancement of carbon stocks on existing forested area. Measures beyond the enhancement of forest stock volume are given on page 10 (China, 2015):

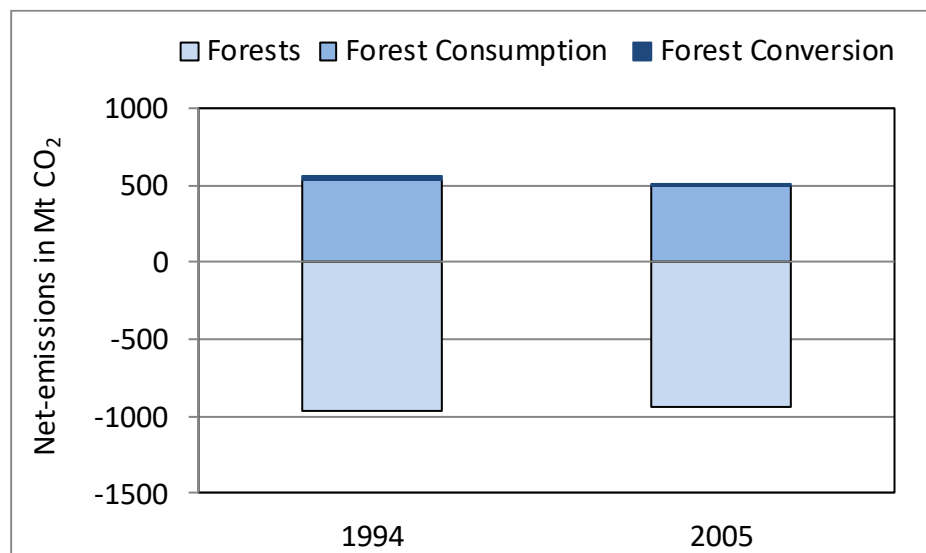
- *To vigorously enhance afforestation, promoting voluntary tree planting by all citizens, continuing the implementation of key ecological programs, including protecting natural forests, restoring forest and grassland from farmland, conducting sandification control for areas in vicinity of Beijing and Tianjin, planting shelter belt, controlling rocky desertification, conserving water and soil, strengthening forest tending and management and increasing the forest carbon sink;*
- *To strengthen forest disaster prevention and forest resource protection and to reduce deforestation-related emissions;*
- *To strengthen the protection and restoration of wetlands and to increase carbon storage capacity of wetlands; and*
- *To continue to restore grassland from grazing land, to promote mechanism of maintaining the balance between grass stock and livestock, to prevent grassland degradation, to restore vegetation of grassland, to enhance grassland disaster prevention and farmland protection and to improve carbon storage of soil.*

No data regarding the expected emission reductions or the removals behind these measures are given in this context.

### 5. How can the LU sector target be seen in the context of past emission trends? How does it compare to existing available data and trends?

Based on the submitted National Communications from 2004 and 2012 under UNFCCC, China reported LU sector data for the years 1994 and 2005 for the categories *Change in forest and other woody biomass stocks* and *Forest conversion* (based on the IPCC Guidelines 1996). China divided the first category in the two subcategories *Forests* and *Forests consumption*. The results are given in Figure 3.

**Figure 3:** Emissions and removals in Mt CO<sub>2</sub> from Chinese forests for 1994 and 2005 according to the first and second NCs.

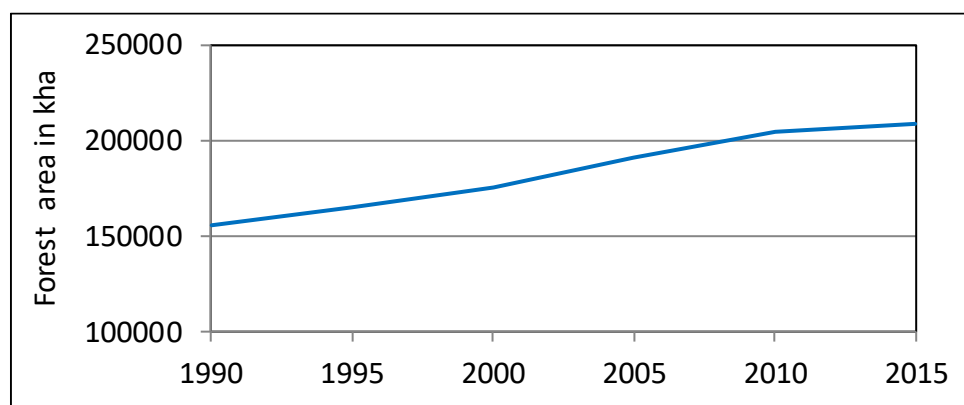


Source: Own illustration based on China (2004) and China (2012).

One can see a minor decrease in removals for 2005 compared to 1994. Based on the scarce data reported under UNFCCC, no trend for net-emissions from forests can be made. Compared to the reported removals for 1994 (-960 Mt CO<sub>2</sub>) and 2005 (-940 Mt CO<sub>2</sub>), the calculated removals of annually 184 Mt CO<sub>2</sub> for 2030 seem relatively low. Compared to the net-emissions for 1994 (-410 Mt CO<sub>2</sub>) and 2005 (-420 Mt CO<sub>2</sub>) the 2030 removals would be 50 % beneath the historic level.

The forest area reported by China under the FAO FRA (2010) for the years 1990, 2000, 2005 and 2010 shows an ongoing increase in the forest area since 1990 (Figure 4).

**Figure 4:** Forest area in kha for China reported under FAO.

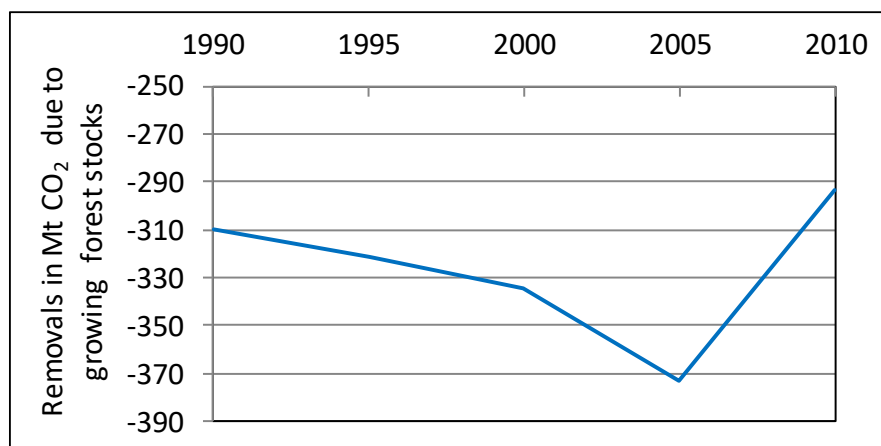


Source: Own illustration based on FAO FRA (2010) and (2015).

Based on the FAO FRA (2010) data for forest area and carbon stock per hectare, the FAO-Stat (2014) calculated net-emissions for almost all countries. For China Figure 5 shows increasing removals until 2005 and a decrease in removals for 2010. As the forested area reported under FAO FRA (2010) is

steadily increasing, the decrease in removals under FAO-Stat (2014) is caused by a decrease in the carbon stored by hectare, the *carbon intensity per area*.

**Figure 5:** Removals in Mt CO<sub>2</sub> due to standings forests and afforestation in China.



Source: Own illustration based on FAO-Stat (2014).

As long as China does not ‘translate’ the targeted increase in forest stock volume in its INDC in forest area and carbon stock per area, no established projections regarding expected removals can be made.

## 6. How ambitious is the LU sector target?

China is conducting the largest ongoing afforestation project in the world (China, 2002). In the consequence, a lot of carbon will be sequestered by existing young forest stands and by afforested areas.

By 2014 the forested area and the forest stock volume are increased by 21.6 million hectares respectively by 2.188 billion cubic meters compared to the 2005 level. To reach the 40 million hectares target for 2020 approximately 18 million more hectares need to be afforested. The 2020 target of an increase in forest stock volume about 1.3 billion cubic meters more than 2005 is already achieved. For the 2030 target 2.3 billion m<sup>3</sup> more are needed. With regard to the overall forest area and forest carbon stock increase, the Chinese target for forests is assessed as ambitious.

## Remaining Issues

- A. What are the assumptions behind the targeted increase in forest volume stock up to 2030?
- B. What are the emission/removal projections for the LU sector for 2030? What are the expected emission reductions in the land uses besides forests? (e.g. wetlands, grassland, revegetation)
- C. What is the expected share of forest-removals in the overall emission-intensity reduction per unit GDP?

## References

- CAIT (2015): Climate Data Explorer by the World Research Institute, <http://cait.wri.org/historical>, 05.10.2015
- CAT (2015): Climate Action Tracker, <http://www.climateactiontracker.org/countries/india>, 05.10.2015
- CHINA (2002): China's Afforestation Reported First in World; <http://www.china.org.cn/english/2002/Jan/25708.htm>; 08.10.2015
- CHINA (2004): First National Communication.
- CHINA (2012): Second National Communication.
- CHINA (2015): Intended Nationally Determined Contribution.
- FAO FRA (2010): Global Forest Resource Assessment Report 2010. FAO Forestry Paper 163. Rome.
- FAO FRA (2015): Global Forest Resource Assessment Report 2015. Desk Reference. Rome.
- IPCC (2006): 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). Published: IGES, Japan.
- UNFCCC (2011): Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, Note by the secretariat, FCCC/AWGLCA/2011/INF.1, 18.03.2011

## A.2 India – submitted to UNFCCC 2015-10-01

India's share in global emissions in 2012 was 5.1 %, ranking fourth behind China (20.2 %), the US (11.9 %) and the EU (8.6 %) and before Russia (4.7 %) (CAIT, 2015). Back in 2009, with the Copenhagen Accord, India committed voluntarily to 20-25 % reduction in emission intensity of GDP compared with 2005 (comparable with the approach chosen by China). This goal covered all sectors but agriculture (UNFCCC, 2011). In the light of increasing overall national emissions (>200 % since 1990, excluding the LU sector) and under the assumption of an annual GDP growth rate of 6.4 %, the Climate Action Tracker rated this commitment expressed as an intensity target as medium, indicating it is *'... at the least ambitious end of what would be a fair contribution. This means it is not consistent with limiting warming to below 2°C unless other countries make much deeper reductions and comparably greater effort'* (CAT, 2015).

On the road to Paris, India intends *'to reduce the emission intensity of its GDP by 33 to 35 % by 2030 from 2005 level'*. Part of this commitment is the LU sector because India plans *'to create an additional [compared to 2005?] carbon sink of 2.5 to 3 billion tonnes of CO<sub>2</sub> equivalent through additional forest and tree cover by 2030'* (India, 2015). The role of the LU sector in India has drastically changed in the last decades. Between 1994 and 2000 it developed from a small source to a large sink (India, 2004; India, 2012). According to national projections, the sink effect will increase from 69 Mt CO<sub>2</sub> removals in 2010 to 90 Mt CO<sub>2</sub> in 2025 (India, 2014). As intensity targets bear the potential to lead to an increase in overall emissions, the actual share of the forest sink in the remaining national emissions is likely to decrease from actual 2.3 %. With respect to the expected future emission heights in India, the overall reduction potential of the LU sector is relatively weak. In absolute terms it's almost half of the Chinese sequestration target.

**Table 8:** INDC analysis regarding the LU sector for India – overview.

LU sector considered	y	Time frame	2030
All pools included	n.d.	Accounting method	Intensity
Distinct LU sector target	n.a.	Reference level, LU	n.a.

India INDC: Summary regarding land Use sector (N – no; Y – yes; N/A – not applicable; n.d. – not defined); Relevant LULUCF aspects requested by the Lima Call for Action, decision 1/CP.20

### 1. Is the LU sector part of the INDC?

Yes. Although India does not give any coverage of territory or sectors for its INDC, except the explicit exclusion of the agriculture sector, it highlights the role of forests in prominent place (see 4.).

### 2. Is the clear differentiation between LU sector target and its share in the overall INDC possible?

No. As India makes clear *'It is clarified that India's INDC do not bind it to any sector specific mitigation obligation or action, including in agriculture sector.'* (India 2015).

### 3. Is the LU sector accounting comprehensible?

No. Based on the overall intensity target of minus 33-35 % in emissions per GDP, and the statement given under 2, the accounting of the LU sector cannot be assessed as comprehensible.

### 4. Which measures are behind the LU sector target?

The main objective for the LU sector is *'to create an additional carbon sink of 2.5 to 3 billion tonnes of CO<sub>2</sub> equivalent through additional forest and tree cover by 2030'*. Under the aspect of 'mitigation strategies', India further clarifies its strategy for 'planned afforestation' (India, 2015):

*'India is one of the few countries where forest and tree cover has increased in recent years transforming country's forests into a net sink owing to national policies aimed at conservation and sustainable management of forests. As per the latest assessment, forests and tree cover has increased from 23.4 % in 2005 to 24 % of the geographical area in 2013. Government of India's long term goal is to bring 33 % of its geographical area under forest cover eventually.'*

1. *With its focus on sustainable forest management, afforestation and regulating diversion of forest land for non-forest purpose, India has been successful in improving carbon stock in its forest by about 5 %, from 6,621.5 million tons in 2005 to 6,941 million tonnes in 2013.*
2. *Initiatives like Green India Mission (GIM) aim to further increase the forest/tree cover to the extent of 5 million hectares (mha) and improve quality of forest/tree cover on another 5 mha of forest/non-forest lands along with providing livelihood support. It is expected to enhance carbon sequestration by about 100 million tonnes CO<sub>2</sub> equivalent annually.*
3. *These efforts have been further augmented by policies like National Agroforestry Policy (NAP), REDD-Plus policy, Joint Forest Management; National Afforestation Programme and proposed devolution of about USD 6 billion under Compensatory Afforestation to states.'*

Beside all efforts already achieved in afforestation it is noticeable that the 'long term goal' of increasing the forest cover to 33 % dates back to the National Forest Policy of India from 1952 (India, 2014). Under UNFCCC, India was actively engaged in REDD+ negotiations and especially in the extension from RED to REDD+, as it has a high interest in the accounting of the REDD+ activities of carbon conservation and enhancement through afforestation and sustainable forest management (Sud et al., Undated).

### 5. How can the LU sector target be seen in the context of past emission trends? How does it compare to existing available data and trends?

India's mitigation strategies are given in the INDC (see 4.), but are not translated into net emissions. The Indian Planning Commission on Low Carbon Strategies presented a projection on sequestration by forests through the *Green India Mission* (India, 2014). The data is given in Table 9.



**Table 9:** Sequestration by forests in Mt CO<sub>2</sub> for 2005-2035 in India.

Year	Sequestration by forests in Mt CO <sub>2</sub>
2005	65
2010	69
2015	73
2020	83
2025	90
2030	90
2035	90

Source: India (2014)

The data shows a constant increase in sequestration until 2025, when obviously the sequestration ceiling is reached with annually 90 Mt CO<sub>2</sub>. From 2025 on, India plans to keep the sequestration stable on this high level. Beside the merely increase in forest and tree cover to 33 %, the *Green India Mission* comprises a shift from quantity to quality as it is enhancing the focus on the improvement of ecosystem services, biodiversity and habitat diversity (India, 2014).

## 6. How ambitious is the LU sector target?

Based on the LU data submitted under UNFCCC, India has achieved a structural transformation in its forests from a source to a sink (India, 2004, India 2012) and plans to stabilize the sequestration of CO<sub>2</sub> on a high level (India, 2014). Beyond this, no assessment of ambition can be made.

## Remaining Issues

As India States *,It is clarified that India's INDC do not bind it to any sector specific mitigation obligation or action, including in agriculture sector'*, no further questions regarding the role of the LU sector remain.

## References

- CAIT (2015): Climate Data Explorer by the World Research Institute, <http://cait.wri.org/historical>, 05.10.2015
- CAT (2015): Climate Action Tracker, <http://www.climateactiontracker.org/countries/india>, 05.10.2015
- INDIA (2004): First National Communication.
- INDIA (2012): Second National Communication.
- INDIA (2014): The Final Report of the Expert Group on Low Carbon Strategies for Inclusive Growth, Planning Commission by the Government of India; April 2014
- INDIA (2015): Intended Nationally Determined Contribution.
- SUD, RIDHIMA; SHARMA, JITENDRA VIR; BANSAL, ARUN KUMAR (undated): International REDD+ architecture and its relevance for India, The Energy and Resources Institute
- UNFCCC (2011): Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, Note by the secretariat, FCCC/AWGLCA/2011/INF.1, 18.03.2011

### A.3 Indonesia – submitted to UNFCCC 2015-09-24

Indonesia is a highly relevant country regarding the emission contribution from LU to anthropogenic climate change (Hargita, 2014). It is number 9 among the countries with the highest shares in global forest area (FAO FRA, 2010) and has the third largest tropical rainforest area in the World (TheREDDdesk, 2015). According to the FAO-Stat (2014), Indonesia has the highest share in global emissions from forests due to emissions mainly from deforestation and degradation, caused by the expansion from palm oil plantations and illegal logging. Indonesia engaged in different bilateral agreements to tackle the most important drivers of LU change. In 2011 it signed a *Memorandum of Understanding* with Norway over USD 1 billion and established a moratorium (valid until 2016) on new permits to clear primary forests and prohibited the conversion of peat lands (WRI, 2013). Also in 2011, Indonesia agreed on a *Voluntary Partnership Agreement* with the EU which entered into force in 2014. Core of the agreement is 'to guarantee that any wood exported from a timber-producing country to the EU comes from legal sources' (EU FLEGT, 2015). Nevertheless, the primary forest cover loss in Indonesia in 2012 was estimated to be 0.84 Mha and therefore almost 55 % higher than the forest cover loss in Brazil in the same year (Margono et al., 2014). So, obviously further efforts in reducing the loss of forest cover and biodiversity and in reducing emissions from LU are needed.

Under the UNFCCC, Indonesia voluntarily pledged to reduce emissions unconditionally by 26 % compared to a BAU by 2020. According to its NAMA, the main reduction potentials were identified for the LU sector which is the most important greenhouse gas source in Indonesia (UNFCCC, 2011). In preparation of Paris 2015, Indonesia commits to the unconditional reduction target of 29 % of the BAU scenario by 2030. Again LULUCF is the most important sector for fulfilling the envisaged emission reduction. Both commitments could be raised to 41 % reduction in 2020, respectively in 2030, if international support is provided.

**Table 10:** INDC analysis regarding the LU sector for Indonesia – overview.

LU sector considered	Y	Time frame	2030
All pools included	n.d.	Accounting method	RL
Distinct LU sector target	N	Reference level, LU	n.d.

Indonesia INDC: Summary regarding Land Use sector (N – no; Y – yes; n.a. – not applicable; n.d. – not defined); Relevant LU aspects requested by the Lima Call for Action, decision 1/CP.20

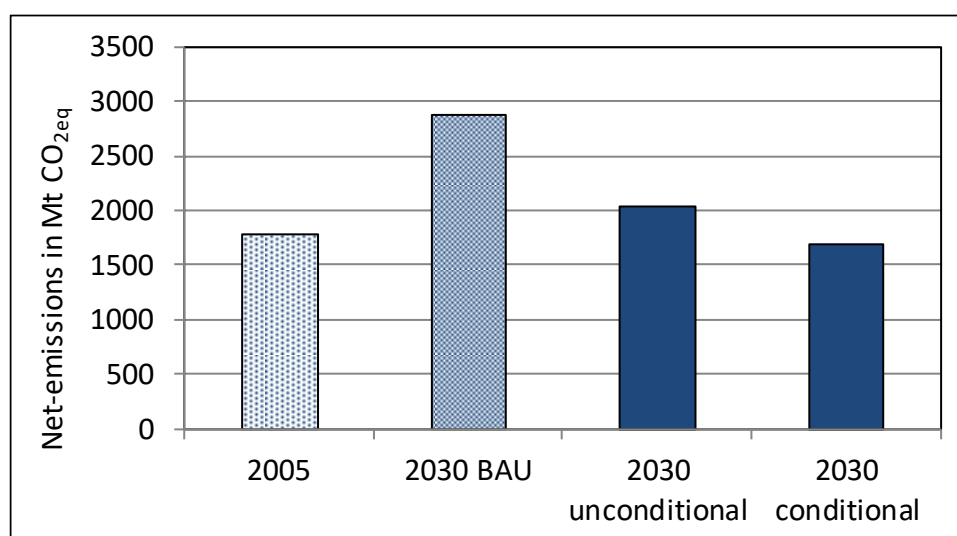
### 1. Is the LU sector part of the INDC?

Yes. The INDC refers to a nationwide coverage and explicitly mentions the sector LULUCF. The LU sector contributes to 63 % of national emissions (Indonesia, 2015) and therefore will play a major role in overall emission reduction of unconditionally 29 % or conditionally 41 %.

### 2. Is the clear differentiation between LU sector target and its share in the overall INDC possible?

No. As in Figure 6 displayed, Indonesia provides emission data for the overall BAU up to 2030 and for the unconditional/conditional reduction pledge, but no further disaggregation. The BAU projection starts in 2010 and is *'based on historical trajectory (2000-2010), projected increases in the energy sector and the absence of mitigation actions'* (Indonesia, 2015). The assumptions made under the BAU regarding the LU sector are not clear.

**Figure 6:** National emissions in Indonesia in Mt CO<sub>2eq</sub> for 2005 and for 2030 according to the BAU scenario and the un-/conditional pledges.



Source: Own illustration, data taken from Indonesia (2015)

### 3. Is the LU sector accounting comprehensible?

No. The accounting will be against a BAU, but no further information is provided (see 2. above). Regarding the data considered for the BAU, Indonesia refers to its Biennial Update Report and the submission of the REDD+ reference level under UNFCCC.

### 4. Which measures are behind the LU sector target?

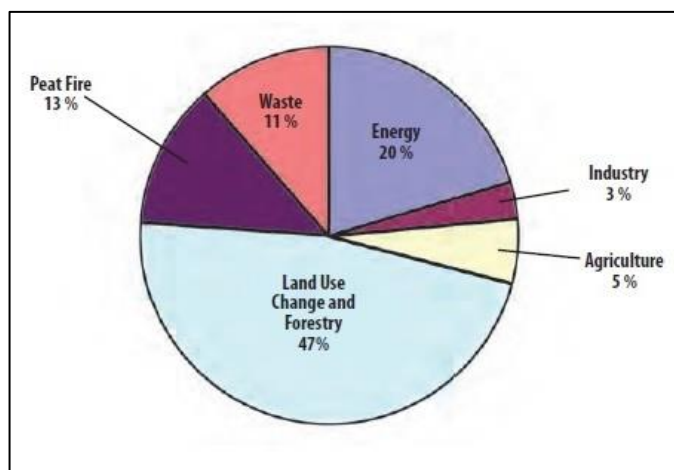
Indonesia provides a number of measures for implementing its commitment up to 2020 (*'effective land use and spatial planning, sustainable forest management which include social forestry program, restoring functions of degraded ecosystems'*) and mentions its moratorium on the clearing

of primary forests and the prohibition of peat land conversion. It states that *‘these ongoing efforts will be strengthened through protection and conservation of its remaining forests by reducing deforestation and forest degradation, restoring ecosystem functions, as well as sustainable forest management ...’* (Indonesia, 2015). As the third National Communication is under preparation and is expected for 2016, and as the Biennial Update Report was prepared along with the INDC it can be assumed that more detailed information regarding national programs in the LU context are provided in these upcoming submissions. An important mechanism for emission reductions will be REDD+.

### 5. How can the LU sector target be seen in the context of past emission trends? How does it compare to existing available data and trends?

As there is no LU sector target in the INDC it cannot be assessed in the context of past emission trends. Some information can be taken from the second National Communication from 2011 and FAO-Stat (2014).

**Figure 7:** Share of different sectors in the national emissions in 2000 in Indonesia. Peat fire is considered separately from the LU sector as there is no robust national data



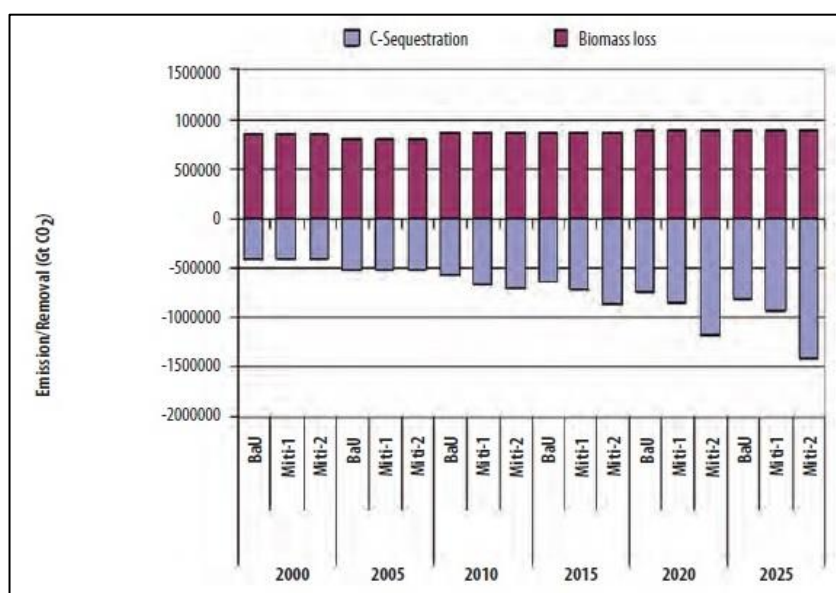
Source: Indonesia (2011).

Figure shows the share of the LU sector in the national emission inventory for the year 2000. Without emissions from peat fire, LU contributes almost 50 % to the overall emissions. After deforestation and degradation, peat fires are one of the most important LU related emission sources. Peat fires are treated cautiously in the Indonesian inventory, as its estimation is accompanied by high uncertainties and depending on the considered data source, the emissions can vary dramatically, ranging from 2.4 to 711 Mt CO<sub>2</sub> in 2000 (Indonesia, 2011). The uncertainty of the inventory for the year 2000 is estimated with 16.3 % without LU, and with 47 % with LU (Indonesia, 2011). In its INDC Indonesia *‘recognizes the need for considering both methods and data sources to ensure the high degree of accuracy’* (Indonesia, 2015).

In its second National Communication Indonesia provides a BAU scenario and two mitigation scenarios for LU up to the year 2025 (see Figure ). It is most likely that the emission data has been

recalculated for the recent submissions (INDC, third National Communication, Biennial Update Report, REDD+) and therefore is not transferable to the INDC scenarios. But it is remarkable that under all three scenarios from 2011, Indonesia assumed a constant deforestation rate up to 2025 (see Figure 8). Only for the sequestration Indonesia assumed different scenarios for the future with increasing sequestration rates.

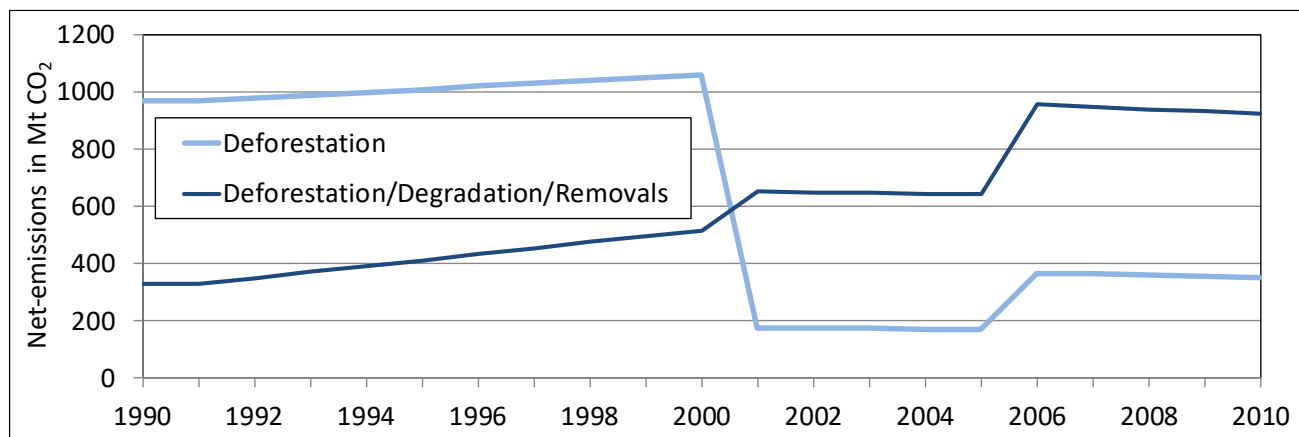
**Figure 8:** Indonesian BAU and two different mitigation scenarios up to the year 2025, taken from the second NC. It is not stated, if the (more ambitious) mitigation scenario 2 is referring to the -26 % pledge for 2020 from 2009.



Source: Indonesia (2011)

The assumption of constant deforestation under all scenarios would not be in line with the zero net-deforestation target Indonesia signed in 2014 (UN, 2014). Contrary to the national inventory data, emission estimates based on reported data under the FAO FRA (2010) assume an overall increase in emissions since 1990 due to the increasing role of forest degradation. Figure shows historic emission trends 1990-2010 for deforestation only and for net-emissions from forests (including deforestation, degradation and removals) (FAO-Stat, 2014). According to the data reported under FAO FRA (2010), deforestation in Indonesia has dramatically decreased since 2000 while emissions from degradation have increased and are overcompensating emission reductions from deforestation.

**Figure 9:** Historic emission trends 1990-2010 in Indonesia for deforestation only and for net-emissions from forests (including deforestation, degradation and removals).



Source: Own illustration. Emission data according to FAO Statistic Division (FAO-Stat 2014). Background data is the data reported under the FAO FRA (2010).

## 6. How ambitious is the LU sector target?

No LU sector target is provided in the INDC. More recent inventory data is going to be provided by Indonesia in the upcoming National Communication and Biennial Update Report. It is expected that these reports give insights in assumptions and projections regarding the future development of net-emissions from the LU sector, as the INDC is referring to these reports.

### Remaining Issues

- A. What are the LU sector targets for 2030 under the conditional and under the unconditional target?
- B. What are the assumed reduction potentials behind the mitigation measures of the LU sector up to 2030?

### References

EU FLEGT (2015): Forest Law Enforcement, Governance and Trade; Country Side Indonesia, available under: <http://www.euflegt.efi.int/indonesia>

FAO FRA (2010): Forest Resources Assessment 2010.

FAO-STAT (2014): STATISTICS DIVISION, EMISSIONS – LAND USE – FOREST LAND, [HTTP://FAOSTAT3.FAO.ORG/HOME/E](http://FAOSTAT3.FAO.ORG/HOME/E), 19.09.2014

HARGITA, Y. (2014): Assessing the relevance of countries and their capacities for reporting forests under UNFCCC, Thünen Working Paper 36, Hamburg. Available under: [http://www.ti.bund.de/media/publikationen/thuenen-workingpaper/ThuenenWorkingPaper\\_36.pdf](http://www.ti.bund.de/media/publikationen/thuenen-workingpaper/ThuenenWorkingPaper_36.pdf)

INDONESIA (2011): Second National Communication.

INDONESIA (2015): Intended Nationally Determined Contribution.

MARGONO, B.A.; POTAPOV, P.V.; TURUBANOVA, S.; STOLLE, F.; HANSEN, M.C. (2014): Primary forest cover loss in Indonesia over 2000-2012, *Nature Climate Change* 4(8): 730-735.

UN (2014): New York Declaration on Forests, Action Statements and Action Plans, Climate Summit 2014, New York/USA, 23.09.2014.

UNFCCC (2011): Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, Note by the secretariat, FCCC/AWGLCA/2011/INF.1, 18.03.2011

WRI (2013): Indonesia Extends its Forest Moratorium: What Comes Next? World Resource Institute, available under: <http://www.wri.org/blog/2013/05/indonesia-extends-its-forest-moratorium-what-comes-next>

## A.4 Brazil – submitted to UNFCCC 2015-09-28

Until 2004, Brazil accounted for 5 % of global emissions alone by deforestation in the Amazon, but since 2005 it achieved a dramatic decrease in the deforestation rate due to several political and public/private initiatives. In 2004, President Lula launched the *Plan for the Prevention and Combating of Deforestation in the Amazon*, in 2006 and 2009 Greenpeace released the publications *Eating up the Amazon* and *Slaughtering the Amazon* that lead to soy respectively beef moratoriums (see Greenpeace, 2006; Greenpeace 2009), and in 2008 Brazil implemented the Amazon Fund (Boucher et al., 2013). Within this most notable bilateral agreement, Norway pledged up to 1 billion US dollar since 2009 via the Amazon Fund as compensation for monitored emission reductions (Amazon Fund, 2014; Boucher et al., 2013).

Under the Copenhagen Accord in 2009, Brazil voluntary committed to reduce emissions by 36.1 % to 38.9 % in 2020 compared to BAU scenario (UNFCCC, 2011). Based on the extremely high historic emissions, a reduction projection with current policies would have led to emission reductions 36 % to 46 % by 2020 compared to a BAU (CAT, 2015).

The Brazilian INDC has been highly expected, especially as it was announced to follow the last INDC submitted by an *Umbrella Group* member. Brazil decided for a net-net approach like the *Umbrella Group* members US, Canada and Australia- even with the same base year 2005. Brazil commits to -37 % emissions in 2025 and -43 % in 2030 relative to 2005. Compared to the before mentioned Annex I countries, Brazil committed by far to the highest relative reduction (see Table 11).

Brazil has already achieved -41 % emission reductions in 2012 compared to 2005. This impressive emission reduction was realized by an unprecedented decrease of 80 % in deforestation in the Brazilian Amazon since 2004 (see above) and is part of the first technically assessed REDD+ reference level under UNFCCC (Brazil, 2014a)- for economic and environmental implications of the Brazilian REDD+ submission see Hargita et al. (2016). The target of -43 % leads to stable emissions on the actual level without relevant additional reductions

**Table 11:** INDC analysis regarding the LU sector for Brazil – overview.

LU sector considered	Y	Time frame	2025/2030
All pools included	n.d.	Accounting method	Net-net
Distinct LU sector target	N	Reference level, LU	n.a.

Brazil INDC: Summary regarding land Use sector (N – no; Y – yes; N/A – not applicable; n.d. – not defined); Relevant LULUCF aspects requested by the Lima Call for Action, decision 1/CP.20



### 1. Is the LU sector part of the INDC?

Yes. The LU sector is part of the INDC which has coverage of '100 % of the territory, economy-wide' (Brazil, 2015).

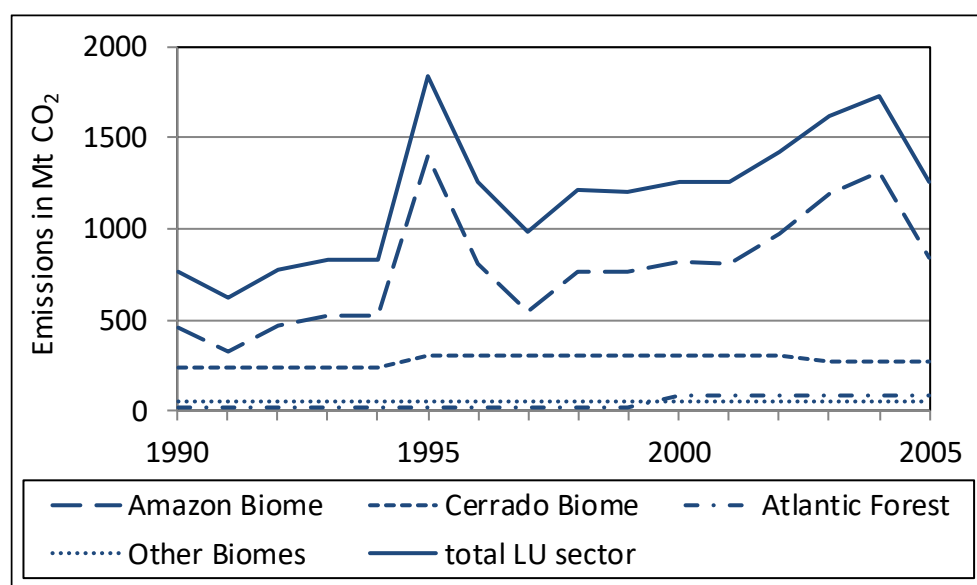
### 2. Is the clear differentiation between LU sector target and its share in the overall INDC possible?

No. The overall target for 2030 is -43 %. Brazil gives no distinct LU sector target.

### 3. Is the LU sector accounting comprehensible?

Brazil seems to have chosen the net-net accounting approach and with that a relative reduction against the self-defined base year 2005. 2005 is the year with the fifth highest emissions from LU, according to the latest available inventory data presented in Figure 10 (Brazil, 2010).

**Figure 10:** Brazilian emission inventory for the LU sector according to the second NC, differentiated in biomes.



Source: Brazil (2010).

Regarding LU categories Brazil did not follow given IPCC categories in the past, but rather developed country specific LU categories based on biomes, namely Amazon, Cerrado, Caatinga, Atlantic Forest, Pantanal and Pampa as presented in Table 12.

Emission reporting (and accounting) on the basis of these biomes does not allow comparison with the known LU categories under LUCF/LULUCF/AFOLU and therefore with inventories from other countries. As Brazil declares that the INDC covers 100 % of the territory, all biomes must be taken into account. At the same time, Brazil is at the moment not able to report on all biomes and all LU related emissions, most prominent on emissions from degradation. That is the justification why the REDD+ RL submission is covering only deforestation in the Amazon (Brazil 2014a).

**Table 12:** Brazilian biomes and their corresponding average emissions in Gt CO<sub>2</sub>/a.

Biomes	average gross CO <sub>2</sub> emission from deforestation Gt/a (1994-2002)	relative importance in %
Amazon	1.021	70
Cerrado	0.287	20
Caatinga	0.042	3
Atlantic Forest	0.087	6
Pantanal	0.016	1
Pampa	0	0
<b>Total</b>	<b>1.456</b>	<b>100</b>

Source: Brazil (2014a)

#### 4. Which measures are behind the LU sector target?

As ‘Additional Information on the INDC for clarification purposes only’ Brazil (2015) lists the following measures:

- *strengthening and enforcing the implementation of the Forest Code, at federal, state and municipal levels;*
- *strengthening policies and measures with a view to achieve, in the Brazilian Amazonia, zero illegal deforestation by 2030 and compensating for greenhouse gas emissions from legal suppression of vegetation by 2030;*
- *restoring and reforesting 12 million hectares of forests by 2030, for multiple purposes;*
- *enhancing sustainable native forest management systems, through georeferencing and tracking systems applicable to native forest management, with a view to curbing illegal and unsustainable practices;*

An important pillar of the Brazilian strategy in keeping the 2°C temperature goal is the ‘sustainable use of bioenergy’, especially of second generation biofuels. Possible implications through bioenergy crops for the LU sector are not given.

#### 5. How can the LU sector target be seen in the context of past emission trends? How does it compare to existing available data and trends?

Table 13 gives an overview over the available information regarding the targeted emission development for 2025 and 2030 relative to the base year 2005. Based on the latest emission data for 2012 one can see that almost no additional emission reduction up to 2030 is needed (-2 %), but a temporary increase in emissions up to 2025 is possible (+4 %) (Brazil, 2014a).

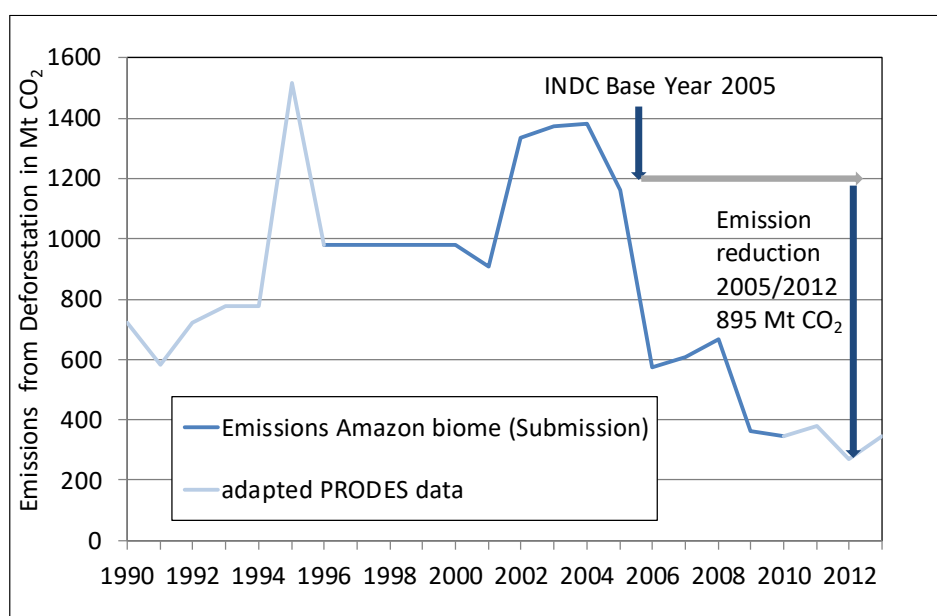
**Table 13:** 2005 as base year for the targets 2025 and 2030 and actual emission development for 2012. The Brazilian INDC does not indicate the shares of the LU sector in the target emissions of 2025 and 2030.

Year	Relative Emission Height in %	Absolute Emission Height in Gt CO <sub>2</sub>	LU Share in Gt CO <sub>2</sub>	LU Share in %
2005	100	2.1	1.3	62
2012	-41	1.24	0.27	22
2025	-37	1.3	?	?
2030	-43	1.2	?	?

Source: Brazil (2010), Brazil (2014b), Brazil (2015)

Figure 11 shows the emission development for deforestation in the Brazilian Amazon as submitted by Brazil to UNFCCC as REDD+ Forest-Reference-Emission-Level, and extended with data from PRODES (before 1996 and after 2010). The graph shows the relevance of the Amazon biome for the overall emission reduction between 2005 and 2012 (-860 Mt CO<sub>2</sub>).

**Figure 11:** Emissions from deforestation in the Amazon biome and the emission reduction in 2012 relative to the INDC BY 2005.



Source: Own illustration (compare Hargita et al. (2015)), data from Brazil (2014a) and PRODES (2014)

Regarding the relevance of the Amazon for the overall emissions from LU, Table 14 shows that the relevance has been highest in 1994 with 95 % and since then is fluctuating on a high level, depending on natural fluctuations and overall emission development in the other reported biomes.

**Table 14:** Share of emissions from deforestation in the Amazon in total emissions from LU for the years 1994, 2000 and 2010.

Year	CO <sub>2</sub> emissions from LU in Gt CO <sub>2</sub>	Emissions from Deforestation in the Amazon in Gt CO <sub>2</sub>	Amazon share in LU in %
1994	0.82	0.78	95
2000	1.4	0.98	70
2010	0.4	0.34	85

Source: Own illustration, data from Brazil (2014a) and Brazil (2014b)

## 6. How ambitious is the LU sector target?

Since the emission reduction projected for 2030 has already been almost achieved (-41 % in 2012 compared to -43 % in 2030), there is no additional ambition in emission reduction for the future compared to 2012. The ambition is rather to keep the actual emissions on a stable level. Beside this, Brazil is the only Non-Annex I country not accounting against a BAU or an intensity target which can result in a further increase in absolute emissions compared to historic levels (compare with China's INDC approach). So, the Brazilian submission is unique among Non-Annex I countries under qualitative and quantitative aspects.

## Remaining Issues

- A. As the INDC is covering 100 % of the territory does that mean that Brazil is considering all biomes as reported under UNFCCC?
- B. Does Brazil plan to include emissions from degradation (from all biomes) in its LU sector reporting and accounting up to 2030?
- C. What is the distinct LU sector target for 2030? Are emissions from deforestation/degradation expected to increase again, e.g. in other biomes?
- D. Implies the -43 % target stable overall emissions or decreasing emissions from LU to neutralize increasing emissions from other sectors?

## References

AMAZON FUND (2014): Amazon Fund - Activity Report 2013.

BOUCHER, D., ROQUEMORE, S., FITZHUGH, E., (2013): Brazil's Success in Reducing Deforestation. Tropical Conservation Science. Special Issue 6, 426-445.

BRAZIL (2010): Second National Communication.

BRAZIL (2014a): Brazil's submission of a Forest Reference Emission Level (FREL) for reducing emissions from deforestation in the Amazonia biome for REDD+ results-based payments under the UNFCCC

BRAZIL (2014b): First Biennial Update Report.

BRAZIL (2015): intended Nationally Determined Contribution, 28.09.2015.

CAT (2015): Climate Action Tracker, <http://www.climateactiontracker.org/countries/Brazil>, 09.10.2015

GREENPEACE (2006): Eating up the Amazon, April 2006, Amsterdam.

GREENPEACE (2009): Slaughtering the Amazon, July 2009; Amsterdam.

HARGITA, Y.; GÜNTHER, S.; KÖTHKE, M. (2016): Brazil submitted the first REDD+ reference level to the UNFCCC— Implications regarding climate effectiveness and cost-efficiency, Land Use Pol 55:340-347, DOI:10.1016/j.landusepol.2015.08.027

PRODES (2014): PRODES, 2014. Taxas anuais do desmatamento—1988 até 2013. Projeto PRODES, Monitoramento da Floresta Amazônica Brasileira per Satélite, Retrieved November 5, 2014. from <http://www.obt.inpe.br/prodes/prodes 1988 2013.htm>.

UNFCCC (2011): Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, Note by the secretariat, FCCC/AWGLCA/2011/INF.1, 18.03.2011

## A.5 Mexico – submitted to UNFCCC 2015-03-30

Mexico is member of the Environmental Integrity Group formed in 2000 and comprising Mexico, Liechtenstein, Monaco, the Republic of Korea and Switzerland. It's the only group consisting of both, Annex I and Non-Annex I-parties. The group has the common goal towards more responsibility for emission reductions in emerging economies. Thus, Mexico became one of the leading Non-Annex I-parties in emission reporting with five National Communications and one of the first countries to submit a REDD+ reference level submission to the UNFCCC. Against this background, the Mexican INDC submission is from special interest.

The LU sector is part of the overall emission reduction under both, the unconditional (-25 %) and the conditional (-40 %) target which are accounted for against a BAU baseline for the year 2030. The BAU baseline starts 2013 and is based on projections regarding economic growth in the absence of climate change policies. While there is a zero deforestation target for 2030 under adaptation, the share of the remaining LU sector in the overall target is not further defined. Information regarding the accounting scope (categories, pools) are missing. Non-official information from a Mexican presentation give deeper insights in the Mexican emission reduction plan towards 2030.

**Table 15:** INDC analysis regarding the LU sector for Mexico – overview.

LU sector considered	Y	Time frame	2030
All pools included	n.d.	Accounting method	RL
Distinct LU sector target	Y	Reference level, LU	n.d.

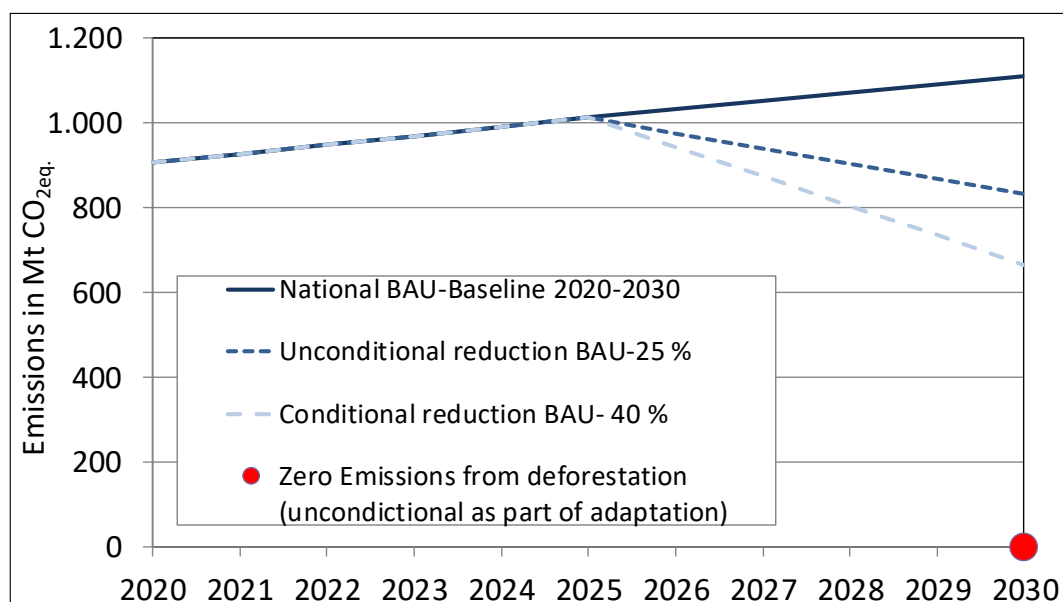
Mexico INDC: Summary regarding LULUCF (N – no; Y – yes; N/A – not applicable; n.d. – not defined); Relevant LULUCF aspects requested by the Lima Call for Action, decision 1/CP.20

### 1. Is the LU sector part of the INDC?

Yes. Mexico mentions under LULUCF the Kyoto Protocol activities (Afforestation/Reforestation, Deforestation, Forest Management, Cropland Management, Grassland Management) *'or equivalent land-based accounting using UNFCCC reporting categories'* and/or *'other categories'*. All targets refer to nation-wide coverage which is important in order to avoid national leakage, e.g. of deforestation activities. Agriculture is considered separately from LULUCF (Mexico 2015a).

### 2. Is the clear differentiation between LU sector target and its share in the overall INDC possible?

No, the differentiation is not possible, at least not on the basis of the official INDC document. The 2030 target of zero deforestation is explicitly mentioned as part of adaptation, although it could also be defined as LU target. In this context, it seems to be part of the unconditional reduction target which is irrespective of further conditions (see Figure 12).

**Figure 12:** BAU-baseline, target and zero deforestation target according to the Mexican INDC.

Source: Own illustration, based on Mexico (2015).

### 3. Is the LU sector accounting comprehensible?

Yes/No. The zero deforestation target for 2030 under adaptation is an absolute target, according to the *New York Declaration on Forests* it refers to zero net deforestation (UN, 2014).

Not comprehensible is the overall target for the LU sector as it is not indicated. The overall reduction is accounted against a baseline so it could be assumed that the LU sector as part of the overall baseline is accounted against a baseline, too. Yet it is not clear from the INDC document. As Mexico mentions the Kyoto Protocol activities '*or equivalent land-based accounting using UNFCCC reporting categories*' it is likely that Mexico will use at least the *IPCC 2003 Good Practice Guidance* as already done for the REDD+ reference level (Mexico, 2014). This would enhance the transparency of emission reporting and allow the extraction of e.g. forest relevant emissions and removals.

### 4. Which measures are behind the LU sector target?

In the context of mitigation, no LU sector relevant measures are mentioned but several national laws and programmes which accompany the planning process. Under the aspect of *Ecosystem-Based Adaptation* Mexico lists in the Annex I of the INDC inter alia:

- i. Reach a rate of 0 % deforestation by the year 2030.
- ii. Reforest high, medium and low watersheds (...)
- iii....
- v. Increase carbon capture and strengthen coastal protection (...).

While measure (i) directly reduces emissions, measures (ii) and (v) enhance the carbon stock and with that the carbon-removals. Beside zero deforestation, no absolute or relative numbers of the different measures are indicated.

For the Agriculture sector Mexico states the adaptation measure:

*vi. Strengthen the diversification of sustainable agriculture by (...) development of agro-ecosystems, through the incorporation of climate criteria in agriculture programmes.*

According to the fifth National Communication and *Mexico's Vision on REDD+: Towards a National Strategy*, REDD+ is one of the two important lines in order to reduce emissions in the LU sector (Mexico 2012, Mexico 2010). Under the second important line, emission reduction potentials are assigned to other forest relevant programmes but only up to 2020 (PRODEFOR: 6.7 MtCO<sub>2</sub>, UMAS: 3.6 MtCO<sub>2</sub>) (Mexico, 2012).

#### 5. How can the LU sector target be seen in the context of past emission trends? How does it compare to existing available data and trends?

As a Non-Annex I-party Mexico has not to report annually on greenhouse gas emissions like Annex I-parties. But with its fifth National Communication in 2012 Mexico offered emission calculations 1990-2010 for the LU categories *CO<sub>2</sub> emissions and removals from soil, Forest and grassland conversion, Changes in forest and other woody biomass stocks and Abandonment of managed land* based on the IPCC 1996.

In December 2014 Mexico was one of the first parties to submit a REDD+ reference level under UNFCCC, with emissions from deforestation based on IPCC 2000. Table 16 gives a summary over the information provided in the REDD+ reference level submission (Mexico 2014). REDD+ is an important part in the Mexican strategy towards emission reductions in the LU sector.

**Table 16:** Summary of information provided under the Mexican REDD+ reference level submission.

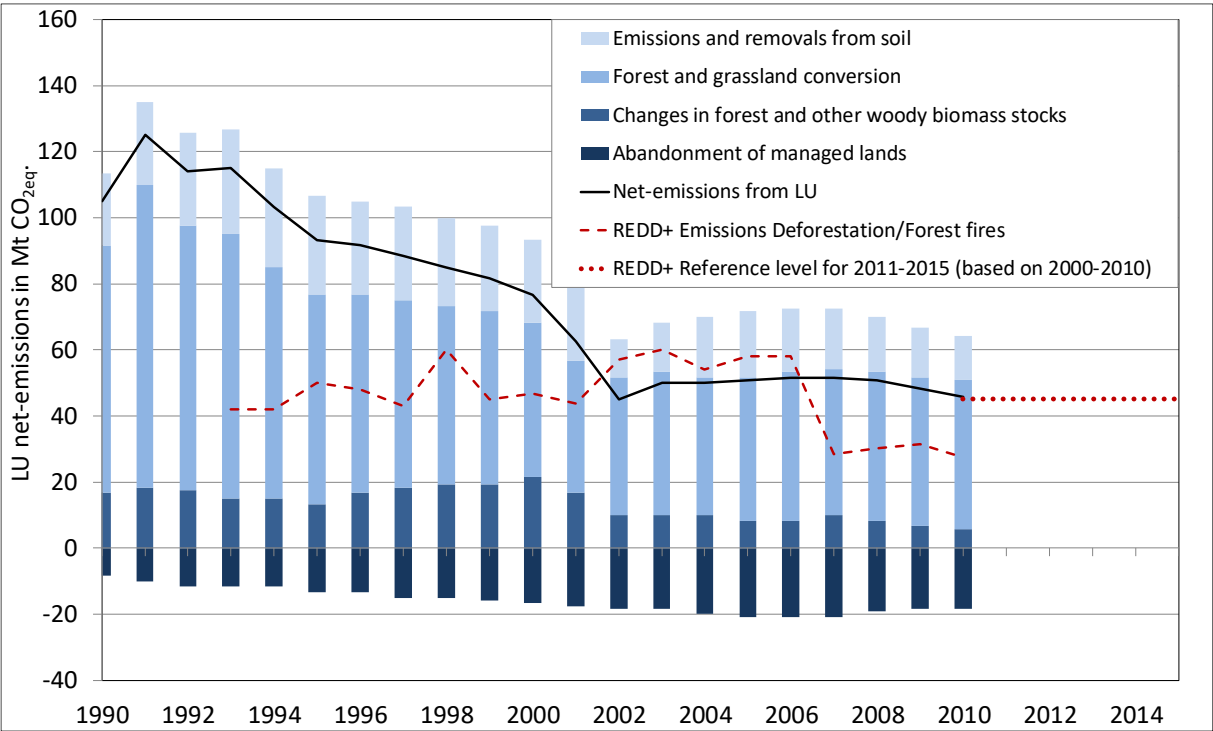
Country	Coverage	REDD+ activities	IPCC Guidelines	Pools	Gases	Reference	Commentary
Mexico	national	gross deforestation	Good Practice Guidance 2000	all but soil	CO <sub>2</sub>	historical average 2000-2010	including forest fires but no degradation

Source: data taken from Mexico (2014).

Note that Mexico reported emissions from deforestation and forest fires under REDD+ according to IPCC 2000 (Mexico 2014) and net-emissions from LUCF in its fifth National Communication according to IPCC 1996 (Mexico 2012). These different calculation guidelines result in not comparable categories/activities (see Figure 13). As forest relevant emissions are not extractable from the National Communication categories, no conclusions regarding the INDC can be drawn from these data.



**Figure 13:** LUCF category reporting from the fifth NC (according to IPCC 1996) and information regarding the REDD+ RL (according to IPCC 2000).



Source: Own illustration, based on information from Mexico (2012) and Mexico (2014).

**Figure 14:** Information from a Mexican INDC presentation.



Source: Mexico (2015b) INDC Presentation by Mexico (not part of the official INDC submission)

Figure 14 shows one slide of a Mexican presentation regarding its INDC. Note that this is not part of the official INDC submission. Considering the information given in **Fehler! Verweisquelle konnte**

**icht gefunden werden.** 14, the unconditional target for the LU sector (*USCUSS*) 2030 over -131 % would result in a net-sink, compared to the assumed BAU scenario of 36 Mt CO<sub>2eq</sub>. Note that compared to 2013 only in the categories ‘*residential and commercial*’ and LU absolute emission reductions occur.

No information exists considering the role of the LU sector in the conditional -40 % target (e.g. same or higher net-sink effect?).

## 6. How ambitious is the LU sector target?

In 2010 Mexico declared in its NAMA ‘*that it aims to reduce emissions by up to 30 % compared with the ‘business as usual’ scenario by 2020 provided the provision of adequate financial and technological support from developed countries as part of a global agreement*’ (UNFCCC, 2011). Mexico did not state any concrete measures in its NAMA. With the conditional INDC-target of -40 % Mexico corrected its NAMA target upwards when it comes to ambition.

In September 2014 Mexico signed the *New York Declaration on Forests* and announced the target of zero *net* deforestation (UN, 2014). This is reflected in the INDC.

Figure 13 indicates that emissions from deforestation and forest fires submitted under REDD+ have a high share in overall LUCF net-emissions, although the different IPCC Guidelines used for the calculation do not allow a concluding comparison. Based on the informal information in **Fehler! erweisquelle konnte nicht gefunden werden.**, the LU sector has a share of 4.6 % in overall emissions in 2013. At the same time, the share in the emission reduction (-47 Mt/-281 Mt) is almost 17 %. The zero deforestation target is an absolute target and can be assessed as ambitious.

## Remaining Issues

- A. Why did Mexico not include disaggregate information regarding the LU baseline and the future scenarios in its INDC (compare Figure 14)?
- B. Could Mexico clarify on the share of LU in the conditional target?

## References

- MEXICO (2010): Vision de Mexico sobre REDD+ hacia una Estrategia Nacional, Comisión Nacional Florestal, Jalisco/México.
- MEXICO (2012): Quinta Comunicación Nacional ante la Convención marco de las Naciones Unidas sobre el Cambio Climatico, México.
- MEXICO (2014): National forest reference emission level proposal México, in: Secretariat of Environment and Natural Resources, N.F.C.M.
- MEXICO (2015a): Intended Nationally Determined Contribution, 28.03.2015.
- MEXICO (2015b): INDC Presentation by Mexico (not part of the official INDC submission).

UN (2014): New York Declaration on Forests Action Statements and Action Plans, Climate Summit 2014, New York/USA, 23.09.2014.

UNFCCC (2011): Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, Note by the secretariat, FCCC/AWGLCA/2011/INF.1, 18.03.2011.

## A.6 Republic of Korea – submitted to UNFCCC 2015-06-30

The Republic of Korea is member of the Environmental Integrity Group formed in 2000 and comprising Mexico, Liechtenstein, Monaco, the Republic of Korea and Switzerland. It's the only group consisting of both, Annex I and Non-Annex I-parties and with the common goal towards more responsibility for emission reductions in emerging economies. Thus, the Republic of Korea became one of the leading Non-Annex I parties in emission reporting with three National Communications and one Biennial Update Report. According to UNDP the Republic of Korea has a Human Development Index comparable to Japan (UNDP, 2013) and according to the World Bank it is a high income country (World Bank, 2014). Thus, it is a country with relatively high reporting capacities. Further, it is the first Non Annex-I-INDC party declaring to decide later on the inclusion of the land sector in its 2030 target. Against this background, the Korean INDC submission is from special interest.

**Table 17:** INDC analysis regarding the LU sector for Korea – overview.

LU sector considered	N	Time frame	2030
All pools included	N	Accounting method	RL
Distinct LU sector target	N	Reference level, LU	n.a.

Republic of Korea INDC: Summary regarding land Use sector (N – no; Y – yes; N/A – not applicable; n.d. – not defined); Relevant LULUCF aspects requested by the Lima Call for Action, decision 1/CP.20

### 1. Is the LU sector part of the INDC?

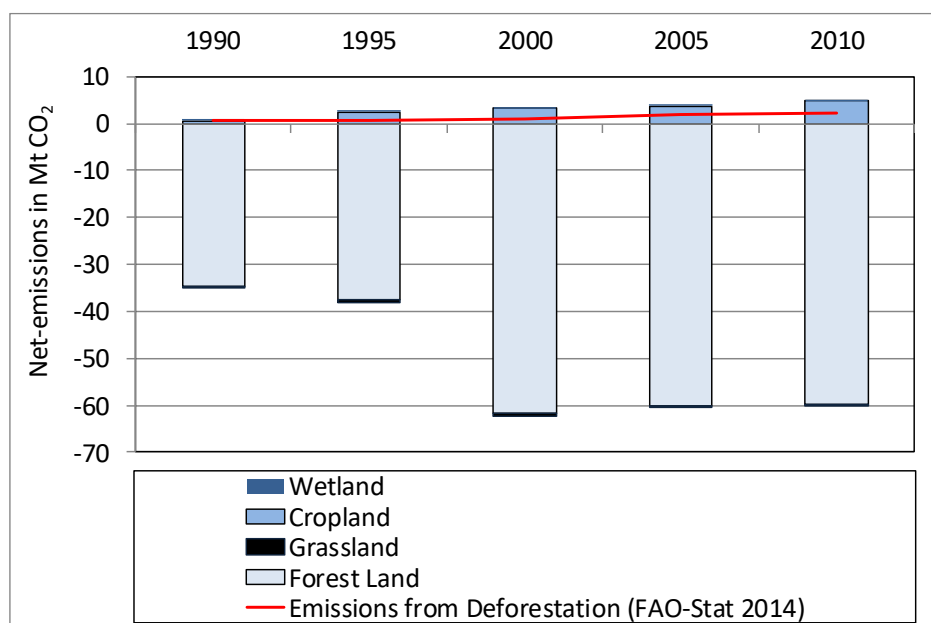
No. The Republic of Korea (2015) declares '*In assessment of mitigation performance, a decision will be made at a later stage on whether to include greenhouse gas emissions and sinks of the land sector as well as the method for doing so.*'

### 2. The LU sector is not part of the present INDC for 2030, but could be included at a later point in time. Possible implications of an inclusion of the LU sector at a later stage are discussed in the following.

#### **Historic net-emissions from LU**

In its Biennial Update Report the Republic of Korea provides GHG estimates for the land uses forestland, cropland, grassland and wetland for the period 1990-2012 (see Figure 15). Emissions from cropland show an increasing trend on a low level (2005-2010: 0.23 Mt CO<sub>2</sub> annually). Emissions from wetland and removals from grassland are not significant. Removals from forest land increased between 1990 and 2000 and are since 2000 on a steady level (-60 Mt CO<sub>2</sub>). If LU changes (e.g. deforestation) are included in the given LU categories it is not mentioned. Therefore it is not clear if the Korean GHG inventory for the LU sector under UNFCCC is comprehensive.

**Figure 15:** Korean GHG inventory for the LU sector based on the latest submission for the years 1990, 1995, 2000, 2005 and 2010 in Mt CO<sub>2</sub>. The curve represents the height of emissions due to deforestation.



Source: Own illustration, based on data from Korea (2014) and FAO-Stat (2014).

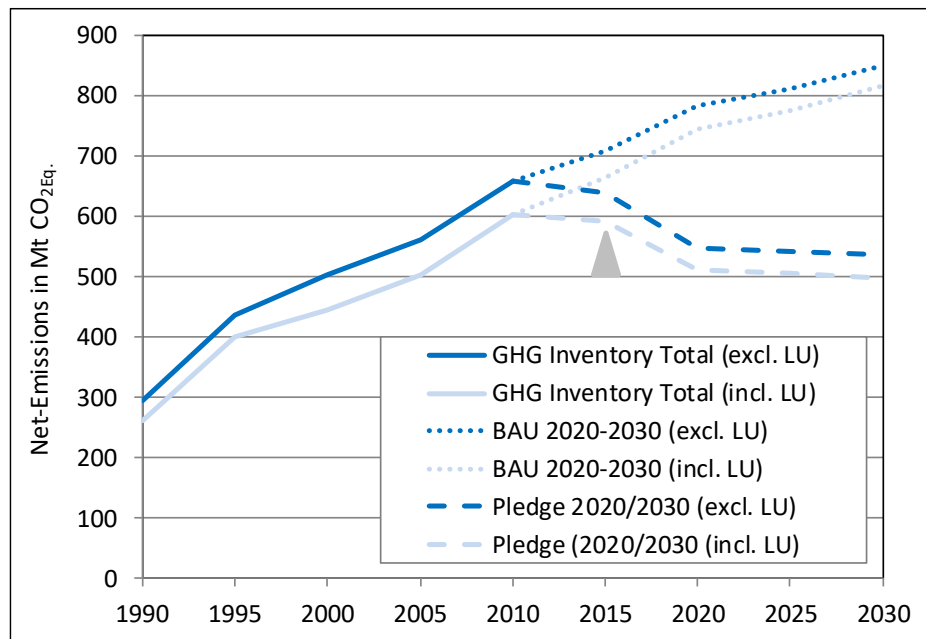
Based on emissions estimates from FAO-Stat (2014) (which are based on FAO FRA, 2010) for deforestation (see **Fehler! Verweisquelle konnte nicht gefunden werden.** 15), it can be concluded that in the Republic of Korea emissions from deforestation would be fully compensated by removals from forests.

### **BAU and Pledges for 2020 and 2030**

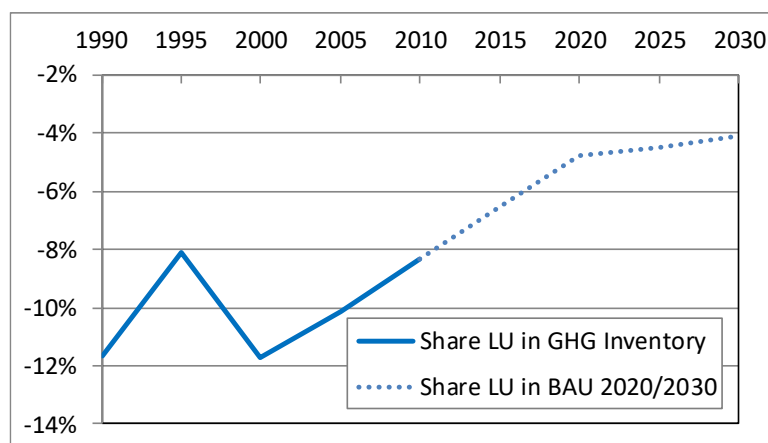
- Pledge for 2020: 30 % below BAU (excl. LU) (Korea, 2012)
- Pledge for 2030; 37 % below BAU (excl. LU) (Korea, 2015)
- Peak in emissions in 2014, decline in 2015 (role of LU not clear) (Korea, 2014)
- Decrease in LU removals by 26 % for 2020 compared to 2005 (Korea, 2012)

The Republic of Korea made its reduction pledges for 2020 and 2030 without the consideration of net-emissions from the LU sector.

Figure 16 shows the historic GHG emissions without LU, the BAU up to the year 2030 and the corresponding pledge (dark lines). In a lighter shade the same curves are displayed but this time including net-emissions from LU (light lines). The grey triangle indicates the expected emission peak in 2014.

**Figure 16:** Korean GHG Inventory, BAUs and pledges in total emissions excluding and including LU.

Source: Own illustration. Data taken from BUR (Korea 2014), under pledges peak in emissions expected for 2014 (grey triangle). BAU 2020/2030 (excl. LU) is given by INDC (Korea 2015). Pledge 2020/2030 (excl. LU) 2020: -30 % (Korea 2012) and 2030 -37 % taken from (Korea 2012, 2015); assumption for pledge 2020/2030 (incl. LU): no changes for LU compared to BAU 2020/2030 (for explanation see below).

**Figure 17:** Share of the LU sector in total GHG emissions (excl. LU) over time and potential share in BAU up to 2030.

Source: Own illustration. Data taken from Korea (2014) and Korea (2015)

All data can be taken from official submissions except for the BAU 2020/2030 including LU. As there are no planned mitigation measures for the LU sector available, this BAU is based on the following

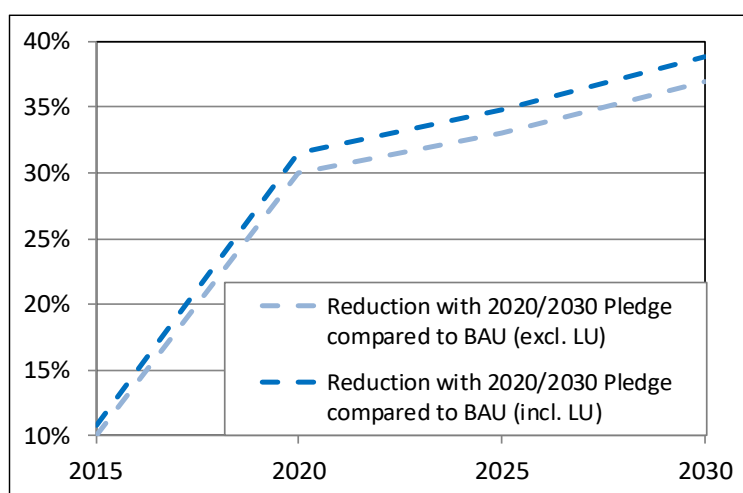
assumptions: decrease in forest land removals by 26 % by 2020 compared to 2005 (Korea, 2012), than remaining on steady level until 2030 (conservative).

The emissions from cropland are expected to increase up to 2030 annually by the same rate as they did 2005-2010 (0.23 Mt CO<sub>2</sub> annually). Therefore the overall sink effect of LU sector will decrease up to 2030 if no additional measures are taken. Same assumptions were included in the pledge 2020/2030 (incl. LU). As expected, the pledge 2020/2030 (incl. LU) is slightly beneath the level of the official pledge due to the overall removals from the LU sector (Figure 16).

Figure 17 shows the share of the LU sector in total emissions. While it is assumed that the annual removals from forest land are steady between 2020 and 2030, the ongoing increase in emissions from cropland reduces the overall sink effect of the LU sector. Therefore the share of LU in total emissions is expected to decrease over time.

Figure 18 displays the potential effect of an inclusion of the LU sector on the 2020 and 2030 pledges. An inclusion of LU in the BAU would lead to only slightly higher reductions than without LU: -32 % in 2020 compared to -30 %, and -39 % in 2030 compared to -37 %.

**Figure 18:** Potential effect of the inclusion of the LU sector on pledges.



Source: Own illustration. Data taken from Korea (2014) and Korea (2015)

## Conclusion

Based on the presented assumptions and estimates, the inclusion of the LU sector at a later point in time does not seem to have the potential to significantly weaken the overall Korean reduction target.

## Remaining Issues

- A. What are the most actual projections for emissions and removals of the LU sector?
- B. If the LU sector is included later in the 2030 target, for consistency's sake, it has to be included in the BAU scenarios for 2020 and 2030 as well.

## References

FAO FRA (2010): Global Forest Resource Assessment Report 2010. FAO Forestry Paper 163. Rome.

FAO-Stat (2014): FAO Statistics Division. Emissions - Land Use. Forest Land. FAO. [http://faostat3.fao.org/browse/G2/\\*/E](http://faostat3.fao.org/browse/G2/*/E)

KOREA (2012): Third National Communication.

KOREA (2014): First Biennial Update Report.

KOREA (2015): Intended Nationally Determined Contribution, 30.06.2015.

WORLD BANK (2014): Country and Lending Groups. World Bank. <http://data.worldbank.org/about/country-and-lending-groups>

UNDP (2014): Human development index. UNDP. <http://hdr.undp.org/en/content/human-development-index-hdi-table>



## A.7 Colombia – submitted to UNFCCC 2015-09-07

Colombia has the 14th highest share in global forest area (1.5 %) with 60.5 million hectares of forest, covering 55 % of the Colombian territory (FAO FRA, 2015). Information regarding the average deforestation rate range between 0.17 and 0.48 % per year for 1990-2010. Colombia is a HFLD-country. In recent decades, Colombia's governments have tended to focus on the FARC-conflict and the need for economic development; environmental protection has been a relatively low priority (TheREDDdesk, 2015). This has begun to change in recent years. Colombia signed up to the 'zero deforestation in the Amazon by 2020' pledge at the Convention on Biodiversity COP 9 in Bonn in 2008 (see CBD, 2011, target 5) and reinforced this engagement by submitting this target as NAMA (UNFCCC, 2011) and signing the *New York Declaration in Forests* in 2014 with the goal 'to end natural forest loss by 2030' (UN, 2014). Colombia began preliminary work on REDD+ in 2009 and submitted a REDD+ reference level under UNFCCC in 2014 (Colombia, 2014).

Colombia commits to an unconditional -20 % target that could be increased up to -30 %, depending on the provision of international support. The LU sector (including agriculture) is the most important sector in the national greenhouse gas inventory. In its INDC Colombia refers to actual data from its third National Communication and its first Biennial Update Report.

**Table 18:** INDC analysis regarding the LU sector for Colombia – overview.

LU sector considered	Y	Time frame	2030
All pools included	n.d.	Accounting method	RL
Distinct LU sector target	N	Reference level, LU	n.d.

Colombia INDC: Summary regarding land Use sector (N – no; Y – yes; N/A – not applicable; n.d. – not defined); Relevant LULUCF aspects requested by the Lima Call for Action, decision 1/CP.20

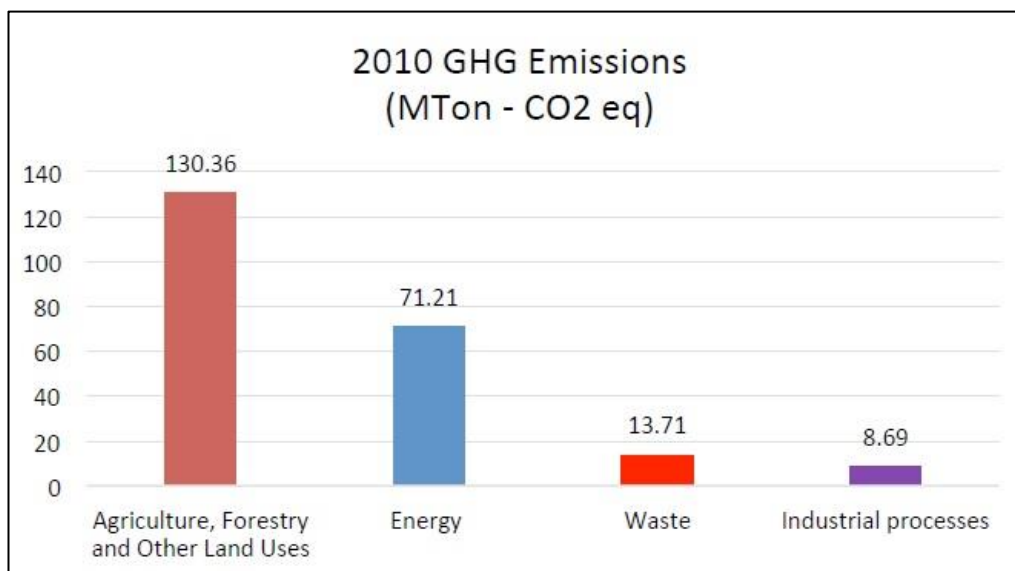
### 1. Is the LU sector part of the INDC?

Yes. The '*economy-wide target*' covers '*100 % of national emissions*', respectively '*all emission sectors acknowledged by the IPCC*'. The LU sector is part of the AFOLU-sector (agriculture, forests, other land use).

### 2. Is the clear differentiation between LU sector target and its share in the overall INDC possible?

No. Based on the submitted INDC a differentiation between the LU sector target and its share in the overall INDC is not possible. The BAU up to 2030 starts with the year 2010. The overall emissions in 2010 amounted to 224 Mt CO<sub>2eq</sub>, with more than half of it coming from the AFOLU sector (see Figure 19).

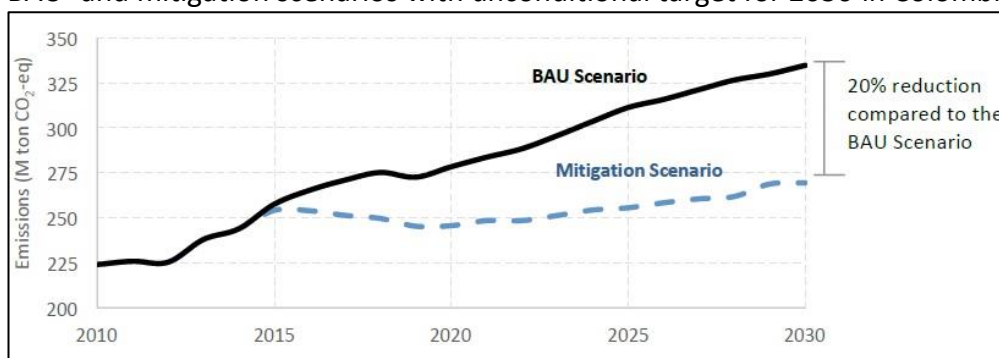
**Figure 19:** Colombian greenhouse gas inventory for the year 2010.



Source: Colombia (2015)

According to the BAU scenario, Colombia expects its emissions to rise to 278 Mt in 2020 and to 335 Mt CO<sub>2eq</sub> in 2030. In 2015 starts the mitigation scenario which leads to at least 20 % less emission in 2030 (equals 268 Mt CO<sub>2</sub>, see Figure 20) compared to the BAU.

**Figure 20:** BAU- and mitigation scenarios with unconditional target for 2030 in Colombia.



Source: Colombia (2015)

Colombia does not state the expected share of the LU sector in the 2030 target, although distinct projections were made for all sectors up to 2030.

### 3. Is the LU sector accounting comprehensible?

The LU reporting is based on IPCC 2006 and excludes removals from natural forests that remain natural forests, but includes net-emissions from forest plantations. Further the INDC states that *'the information on deforestation was projected taking into account the 2013-2017 Forest Reference Emissions Level for the Amazon region presented to the UNFCCC in December 2014'* (Colombia, 2015). Besides this and that the reduction will be *'with respect to BAU'* no further information regarding the accounting is given.

#### 4. Which measures are behind the LU sector target?

In the context of the BAU scenario development, the INDC mentions the REDD+ reference level (see 5.). Under the aspect of adaptation, Colombia further states the following ‘*specific prioritized actions* [regarding the LU sector] *by 2030*’:

- *Delimitation and protection Colombia’s 36 ‘paramo’ areas (high mountain Andean ecosystem) (approximately 3 million hectares).*
- *Increase of more than 2.5 million hectares in coverage of newly protected areas in the National System of Protected Areas –SINAP-, in coordination with local and regional stakeholders.*

No concrete measures with reduction potentials are mentioned.

#### 5. How can the LU sector target be seen in the context of past emission trends? How does it compare to existing available data and trends?

The Colombian INDC does not provide a distinct LU sector target. Therefore the potential role of the REDD+ reference level submission for the overall 2030 target will be discussed. Table 19 summarizes the reference level regarding the coverage (Amazon biome, therefore only subnational), the activities (gross deforestation only, no degradation) and the time period on which the historical average assumed as reference is based (2000-2012). Colombia is a HFLD country and claimed national circumstances (post conflict scenario) to adjust their historic reference 10 % upwards.

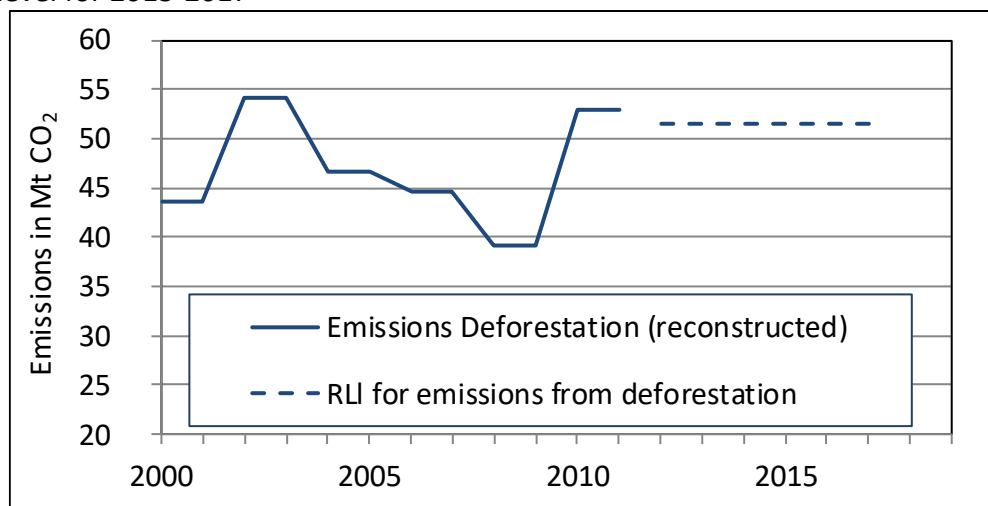
**Table 19:** Overview of the REDD+ forest reference emission level submission from Colombia under the UNFCCC.

Country	Coverage	REDD+ activities	IPCC Guidelines	Pools	Gases	Reference	National Circumstances considered
Colombia	subnational Amazon biome	gross deforestation	Good Practice Guidance 2003	living biomass	CO <sub>2</sub>	historical average 2000-2012	Yes upward adjustment +10 %

Source: Colombia (2014)

21 shows the historical emissions from deforestation in the Colombian Amazon biome and the upwards adjusted reference level for 2013-2017. As Colombia states in its INDC, this reference (51.6 Mt CO<sub>2</sub>, Colombia, 2014) was considered when developing the BAU scenario. This means that Colombia assumes at least stable emissions from deforestation of 67 % of its forested area up to 2020. This assumption would not be in line with the NAMA of reducing deforestation in the Colombian Amazon rainforest by 2020 (UNFCCC, 2011) which this target could be part of the conditional scenario.

**Figure 21:** Historic emissions from deforestation in the Colombian Amazon and the submitted reference level for 2013-2017



Source: Own illustration, data taken from Colombia (2014).

## 6. How ambitious is the LU sector target?

As there is no distinct LU sector target provided, no assessments regarding its ambition level can be made.

## Remaining Issues

- A. What is the distinct sector target for LU?
- B. How are the zero deforestation targets for the Amazon in 2020 and territory-wide in 2030 considered in the un-/conditional emission reduction targets?

## References

- CBD (2011): Strategic plan for biodiversity 2011-2020, UNEP/CBD/COP/10/INF/12/Rev.1, 14.03.2011.
- COLOMBIA (2014): Proposed Forest Reference Emission Level for deforestation in the Colombian Amazon Biome for results-based payments for REDD+ under the UNFCCC, 15.12.2014.
- COLOMBIA (2015): Intended Nationally Determined Contribution, 07.09.2015.
- FAO FRA (2010): Forest Resources Assessment 2010.
- FAO FRA (2015): Global Forest Resource Assessment Report 2015. Desk Reference. Rome, FAO 2015.
- THE REDD DESK (2015): <http://theredddesk.org/countries/colombia/>, 09.09.2015.
- UN (2014): New York Declaration on Forests, Action Statements and Action Plans, Climate Summit 2014, New York/USA, 23.09.2014.
- UNFCCC (2011): Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, Note by the secretariat, FCCC/AWGLCA/2011/INF.1, 18.03.2011.

## A.8 Ethiopia – submitted to UNFCCC 2015-06-10

According to the World Bank, Ethiopia is a low-income country belonging to the G77. Ethiopia is a country with low forest cover (11.4 % forested area in 2015) and low deforestation rate (0.12 % per year) (FAO FRA, 2015). The share of the forestry sector in the GDP decreased between 1990 and 2010 from 7 % to 3.6 %. As 85 % of the population are farmers, the main drivers of deforestation and forest degradation are fuel wood and subsistence agriculture. A potential future thread for emission reduction targets (and food security) could be *land grabbing*.

While agriculture is the major sector in emissions, the land sector has the major share in the mitigation target for 2030 (-64 %). As Ethiopia is conducting the second largest afforestation/reforestation project in the world (CAT, 2015), the targets for 2030 are ambitious.

**Table 20:** INDC analysis regarding the LU sector for Ethiopia – overview.

LU sector considered	Y	Time frame	2030
All pools included	n.d.	Accounting method	RL
Distinct LU sector target	Y	Reference level, LU	n.d.

Ethiopia INDC: Summary regarding land Use sector (N – no; Y – yes; N/A – not applicable; n.d. – not defined); Relevant LULUCF aspects requested by the Lima Call for Action, decision 1/CP.20

### 1. Is the LU sector part of the INDC?

Yes. The INDC states that ‘*The target [64 % from the BAU] has comprehensive coverage (100 %) of the land sector*’. As ‘land sector’ and ‘forestry’ are used synonymously in the INDC it can be assumed that emissions and removals from the Ethiopian inventory subcategories *Changes in Forest and Other Woody Biomass Stocks* and *Forest and Grassland Conversion* are originating from forest related activities/practices.

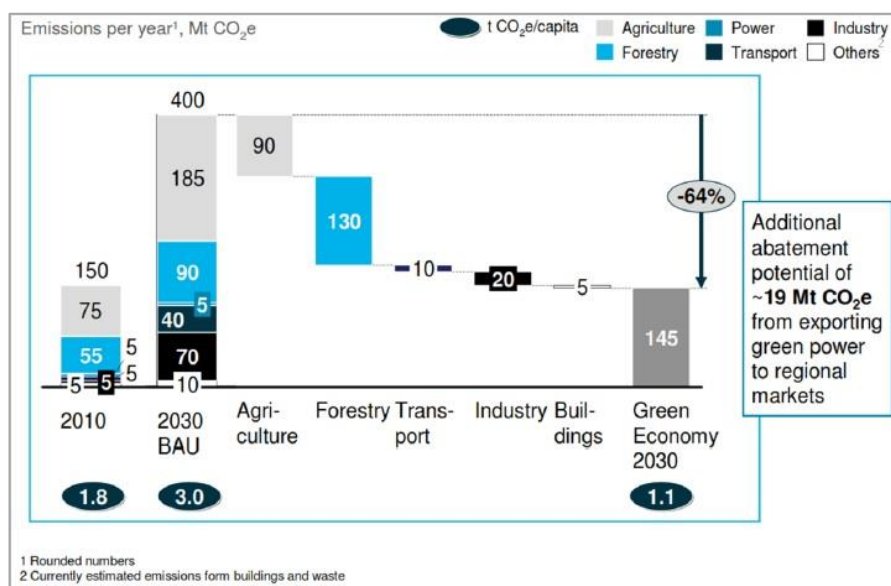
### 2. Is the clear differentiation between LU sector target and its share in the overall INDC possible?

Yes. For the year 2030 Ethiopia indicates a mitigation share of 130 Mt CO<sub>2eq</sub> for ‘forestry’ which equals 50 % of the overall mitigation effort of 255 Mt CO<sub>2eq</sub>. However, the share of the land sector in 2030 under mitigation efforts is not provided (see 3.).

### 3. Is the LU sector accounting comprehensible?

Ethiopia (2015) describes ‘*the development of a BAU scenario up to the year 2030 and the calculation of abatement potentials*’ without providing further details. While the land related mitigation effort comprises 130 Mt CO<sub>2eq</sub> the share in the remaining emissions for 2030 (145 Mt CO<sub>2eq</sub>) is not given (see Figure 22).

**Figure 22:** Share of different sectors in actual emissions in Ethiopia (2010), BAU 2030 and in mitigation effort towards 2030 target. The most relevant sectors are *Agriculture* and *Forestry*, while *Forestry* has the highest mitigation potential.



Source: Ethiopia (2015).

#### 4. Which measures are behind the LU sector target?

As the most important drivers of forest degradation and deforestation are the collection of fuelwood and subsistence agriculture, Ethiopia (2015) states as greatest emission reduction potentials:

- The use of more efficient stoves, amounting to an emission reduction rate of 50 Mt CO<sub>2eq</sub> per year by 2030.
- The increase in ambition by expanding its forest cover, beyond the initial target for the afforestation and reforestation of 7 Million Hectares (70,000 km<sup>2</sup>).

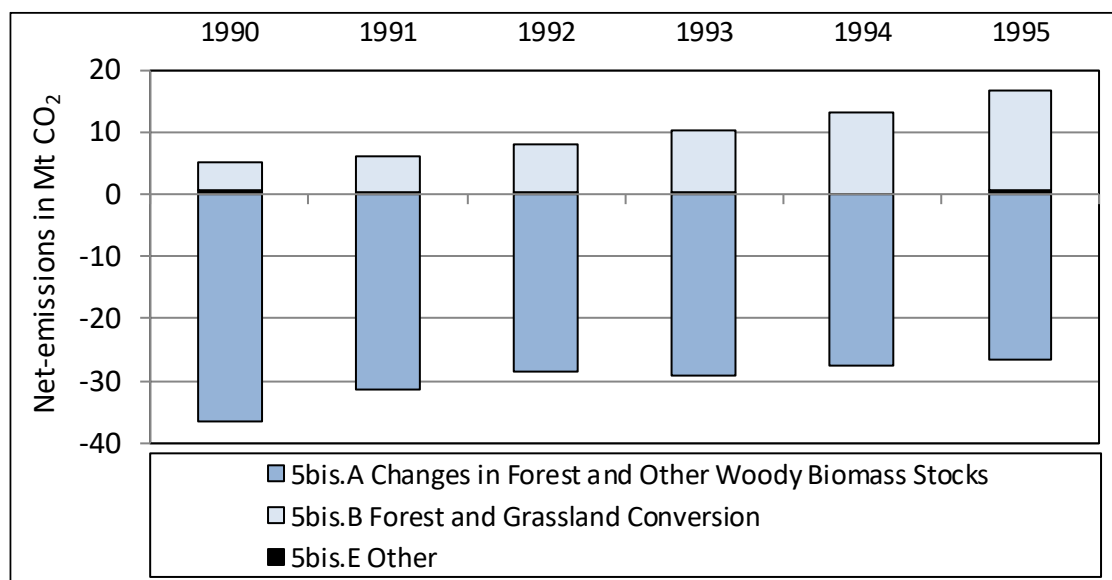
In its NAMA Ethiopia provided the following mitigation measures up to the year 2020 (UNFCCC, 2011):

- Enhanced district-level reforestation actions to increase the vegetation cover of 214,440 km<sup>2</sup> of degraded lands, lands affected by gullies and slopes, including through the management of community areas closed off to grazing;
- A total of 28,736.70 km<sup>2</sup> of natural high forest area sustainably managed in order to reduce GHG emissions from deforestation and forest degradation;
- A total of 4,390.96 km<sup>2</sup> of deciduous forest land sustainably managed in order to reduce GHG emissions from deforestation and forest degradation;
- A total of 60,360 km<sup>2</sup> of national parks sustainably managed in order to reduce GHG emissions from deforestation and forest degradation;

## 5. How can the LU sector target be seen in the context of past emission trends? How does it compare to existing available data and trends?

Under the UNFCCC Ethiopia provides no data more actual than 1995. Figure 23 shows an ongoing decrease in the sink effect of standing forests and an increase in emissions due to forest conversion/deforestation in the first half of the 1990s.

**Figure 23:** Emissions and removals between 1990 and 1995 for the *Land Use-Change and Forestry* sector in Mt CO<sub>2</sub> in Ethiopia.

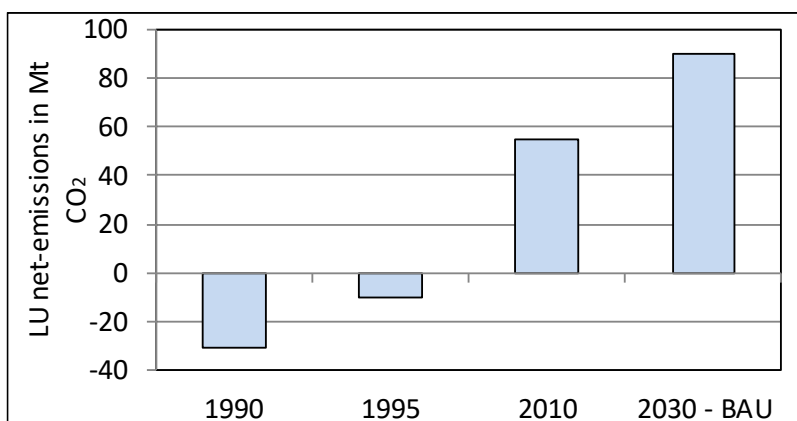


Source: Ethiopia (2001).

According to the data provided in the INDC, the land sector developed from a net-sink to a net-source with net-emissions of 55 Mt CO<sub>2</sub> in 2010 and the potential to further increase net-emissions up to 90 Mt CO<sub>2</sub> in 2030 (see Figure 24). Most likely, the BAU 2030 does not include the measures presented in the NAMA (see 4).

According to FAO-FRA (2015) data, Ethiopia's forested area covered 124,990 km<sup>2</sup> in 2015. With the above presented NAMA (see 4), the forested area would increase by 74 %, from 11.4 % of the national area to 19 %. The remaining NAMA measures regarding sustainable forest management comprise 146,181 km<sup>2</sup> of forested area. Therefore, in 2020 68 % of the aimed for forest area would be sustainably managed.

So, beside the emission reduction rate of 50 Mt CO<sub>2</sub> due to reduced deforestation and degradation, the remaining 80 Mt CO<sub>2</sub> reductions are most likely from an increase in the sink effect due to afforestation/reforestation and sustainable forest management.

**Figure 24:** Development of net-emissions from land use without mitigation efforts.

Source: Ethiopia (2001) and Ethiopia (2015).

Regarding the participation in international market mechanism, Ethiopia states that it *'intends to sell carbon credits during the period to contribute towards achieving its Green Economy Strategy'* (Ethiopia, 2015). Ethiopia could sell carbon credits generated via REDD+. The engagement under the Carbon Fund of the Forest Carbon Partnership Facility could already finance 260 Mt of emission reductions between 2015 and 2035 (FCPF, 2015). To sell carbon credits on international markets, additional reductions or sink-enhancement are needed compared to those accounted for under the mitigation target.

## 6. How ambitious is the LU sector target?

Ethiopia is conducting the second largest afforestation/reforestation programme in the world behind China (CAT, 2015). Besides the high share of forests in the overall mitigation target for 2030, Ethiopia is intending to sell carbon credits, most likely in the REDD+ context. Thus, Ethiopia has ambitious targets for the land sector.

Ethiopia's actual per capita emissions are 1.8 t CO<sub>2</sub> and are going to decrease to 1.1 t CO<sub>2</sub> under the 2030 target. Targeted emissions for 2030 comprise 145 Mt CO<sub>2eq</sub>. It is noteworthy that in other contexts Ethiopia signalled the overall target of *'net zero emissions by 2030'* (FCPF, 2015; UN, 2014).

## Remaining Issues

- A. Ethiopia is mentioning the development of a BAU scenario up to the year 2030 and the calculation of abatement potentials. What are the assumptions behind both scenarios?
- B. What will the share of the land sector be in 2030 under mitigation efforts?
- C. According to the INDC, Ethiopia is intending to sell carbon credits. Are there further information regarding this? How are different emission-reduction-initiatives in the land sector linked (FCPF, REDD+...) and how will double counting be avoided?
- D. When is Ethiopia planning to provide the inventory for 2010 calculated on basis of IPCC 2006 Reporting Guidelines? This could further enhance transparency of the emission data.



## References

- CAT (2015): Climate Action Tracker, Rating of submitted INDCs, <http://climateactiontracker.org/countries/Ethiopia.html>, 03.08.2015
- ETHIOPIA (2001): First National Communication.
- ETHIOPIA (2015): Intended Nationally Determined Contribution, 10.06.2015.
- FCPF (2015): Forest Carbon Partnership Facility, ER-PINS and Early Ideas Presented under the Carbon Fund, Ethiopia, <http://www.forestcarbonpartnership.org/er-pins-and-early-ideas-presented>, 03.08.2015
- FAO FRA (2015): Global Forest Resource Assessment Report 2015. Desk Reference. Rome, FAO 2015.
- UN (2014): New York Declaration on Forests, Action Statements and Action Plans, Climate Summit 2014, New York/USA, 23.09.2014.
- UNFCCC (2011): Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, Note by the secretariat, FCCC/AWGLCA/2011/INF.1, 18.03.2011

## A.9 Peru – submitted to UNFCCC 2015-09-28

Peru belongs to the ten countries with highest shares in global forest area and a national forest cover of 60 % (FAO FRA, 2015). It is considered to be a mega-diverse country with 84 out of the 117 life zones of the world (TheREDDdesk, 2015) and thus is highly vulnerable to climatic changes. In the Copenhagen Accord Peru declared a zero deforestation goal (UNFCCC, 2011; see also UN, 2014). As actual emissions from LU changes make almost half of the national emissions (Peru, 2014), zero deforestation could lead to a considerable shift in sector's shares in the Peruvian emission inventory.

In its INDC Peru declared an unconditional emission reduction of 20 % for 2030 compared to a BAU scenario, additional 10 % reduction is subject to international financing and *'the existence of favourable conditions'* (Peru, 2015). Unfortunately, the emission data for the INDC base year 2010 is not consistent with the emission inventory data for 2010, presented in the actual Biennial Update Report (Peru, 2014). Emissions from LU considered as starting emissions for the 2030 BAU seem to be 100 % higher than the actual LU emissions. In consequence, the projected BAU emissions for 2030 seem to be quite high. In this point, clarification is needed.

**Table 21:** INDC analysis regarding the LU sector for Peru – overview.

LU sector considered	Y	Time frame	2030
All pools included	n.d.	Accounting method	RL
Distinct LU sector target	N	Reference level, LU	n.d.

Peru INDC: Summary regarding land Use sector (N – no; Y – yes; N/A – not applicable; n.d. – not defined); Relevant LULUCF aspects requested by the Lima Call for Action, decision 1/CP.20

### 1. Is the LU sector part of the INDC?

Yes. Peru states that *'the projection considers the total emissions and removals of the LULUCF sector'* (Peru, 2015).

### 2. Is the clear differentiation between LU sector target and its share in the overall INDC possible?

No. The differentiation is not possible as Peru does not indicate a distinct LU sector target. But Peru provides background data regarding the BAU in 2010 and 2030 with and without LU *'for transparency and a better understanding'*. The information is shown in Figure 25 with additional information on the right side, based on the data presented on the left.

**Figure 25:** Peru's GHG for 2010 and 2030 according to the BAU with and without emissions from LU. The deltas on the right side give the LU emissions under BAU according to the comparison.

	Emissions (MtCO <sub>2</sub> eq) including LULUCF	Emissions (MtCO <sub>2</sub> eq) excluding LULUCF	remaining emissions from the LU sector
2010 (base year)	170.6	78.0	Δ 92 Mt CO <sub>2</sub>
2030 (target year)	298.3	139.3	Δ 159 Mt CO <sub>2</sub>

Source: Peru (2015) and additional information.

One can see that under BAU Peru is assuming an increase in emissions from LU up to 2030 (+67 Mt CO<sub>2</sub>), starting on a high LU emission level in 2010 (92 Mt CO<sub>2</sub>).

### 3. Is the LU sector accounting comprehensible?

No (see 2 and 5.).

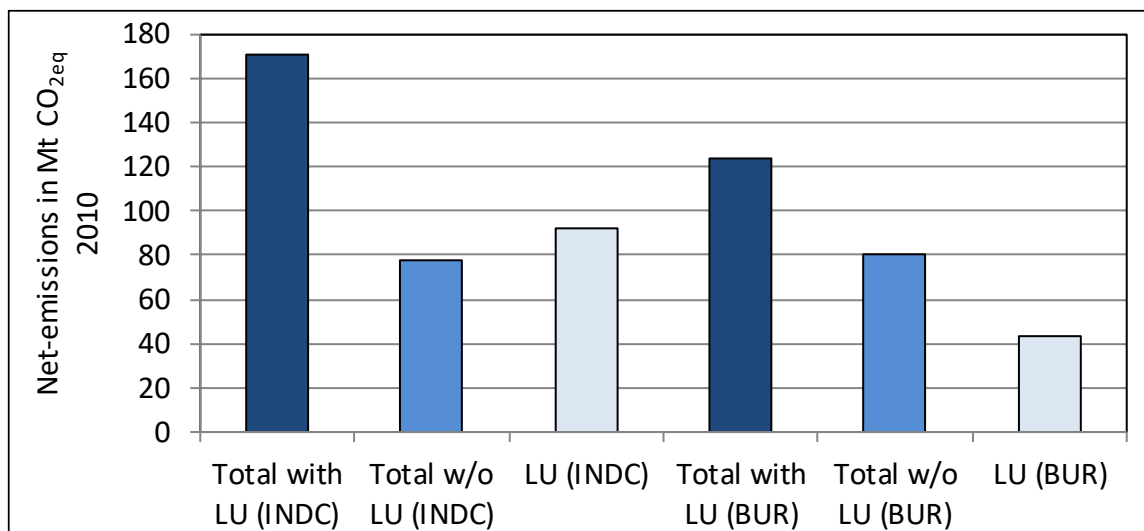
### 4. Which measures are behind the LU sector target?

No measures for the LU sector are described. Under adaptation, Peru gives as intermediate objectives: *'Promote comprehensive land management with a landscape approach, oriented to increase forests resilience to CC [Climate Change], and reduce the vulnerability of local populations.'* (Peru, 2015).

### 5. How can the LU sector target be seen in the context of past emission trends? How does it compare to existing available data and trends?

Figure 26 shows the emission data considered for the BAU scenario with and without LU. A comparison of the 2010 INDC data with actual emission data for 2010 from the official BUR inventory shows a discrepancy of more than 100 % (see Figure 26). This discrepancy is not explained by Peru. It has to be seen critical because the higher overall emission data used for 2010 (+37 % compared with BUR data) is used as basis for the BAU 2030.

**Figure 26:** Comparison of emission data for the year 2010 from the INDC and the latest emission inventory.



Source: Peru (2014) and Peru (2015).

## 6. How ambitious is the LU sector target?

As no LU sector target is provided and the background data seems to be questionable, at least for the BAU 2010, no assessment of ambition can be made.

### Remaining Issues

- A. Why are the LU emissions considered in the BAU base year 2010 twice the emission height as presented in the Biennial Update Report for 2010?
- B. Is the zero deforestation target from the Copenhagen Accord part of the unconditional minus 20 % target or part of the additional conditional minus 10 % target?

### References

- FAO FRA (2015): Global Forest Resource Assessment Report 2015. Desk Reference. Rome, FAO 2015.
- PERU (2014): First Biennial Update Report.
- PERU (2015): Intended Nationally Determined Contribution, 28.09.2015.
- THE REDD DESK (2015): <http://theredddesk.org/countries/peru/>, 06.10.2015.
- UN (2014): New York Declaration on Forests, Action Statements and Action Plans, Climate Summit 2014, New York/USA, 23.09.2014
- UNFCCC (2011): Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, Note by the secretariat, FCCC/AWGLCA/2011/INF.1, 18.03.2011

## A.10 Morocco – submitted to UNFCCC 2015-06-05

According to the World Bank, Morocco is a lower-middle-income country with an annual growth in GDP around 4 % (World Bank, 2014). Morocco's share in global forest area was 0.1 % in 2015 (FAO FRA, 2015), its share in global emissions in 2012 was 0.2 % (CAIT, 2015) and thus, it can only contribute little to climate mitigation.

Morocco was the second African country submitting an INDC. It committed to an unconditional 13 % reduction in GHG emissions by 2030 compared to a BAU scenario. An additional 19 % reduction is achievable under certain conditions (USD 35 billion upon international support) which would bring the reduction to 32 % below BAU by 2030. As Morocco retains the possibility to revise its BAU scenario by 2020, the overall cumulative reduction of 401 Mt CO<sub>2eq</sub> between 2020 and 2030 can be modified.

Under the conditional mitigation target of -54 Mt CO<sub>2eq</sub> in the year 2030, the LU sector could have a share of 5 %. Morocco has not stated with which additional measures it is planning to achieve this goal. More important than the LU sector is the *Agriculture* sector.

**Table 22:** INDC analysis regarding the LU sector for Morocco – overview.

LU sector considered	Y	Time frame	2030
All pools included	n.d.	Accounting method	RL
Distinct LU sector target	N	Reference level, LU	n.d.

Morocco INDC: Summary regarding land Use sector (N – no; Y – yes; N/A – not applicable; n.d. – not defined); Relevant LULUCF aspects requested by the Lima Call for Action, decision 1/CP.20

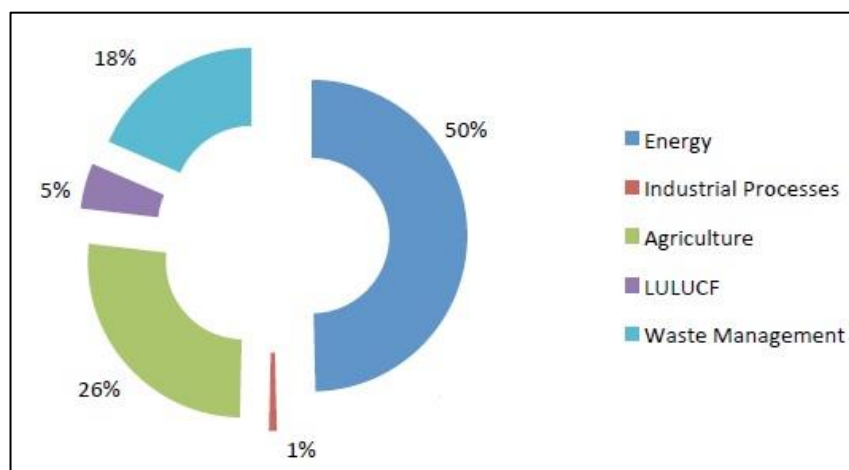
### 1. Is the LU sector part of the INDC?

Yes. The economy-wide target covers the sectors *Energy, Industrial Processes, Agriculture, Waste* and LULUCF (although Morocco is mentioning LULUCF according to IPCC 2000, the actual GHG inventory is calculated for LUCF-categories according to IPCC 1996).

### 2. Is the clear differentiation between LU sector target and its share in the overall INDC possible?

Neither the BAU nor the unconditional and conditional mitigation scenarios up to 2030 are disaggregated on sector level. Nevertheless, for the mitigation effort under the conditional target, Morocco assumes a share of 5 % for LULUCF (see Figure 27). The expected reduction in 2030 under the conditional scenario is indicated with 54 Mt CO<sub>2</sub>. 5 % of 54 Mt CO<sub>2eq</sub> would correspond to 2.7 Mt CO<sub>2eq</sub>.

**Figure 27:** Distribution of the mitigation effort by sector between 2020 and 2030, to achieve the conditional target of -32 % (-54 Mt CO<sub>2eq</sub>).



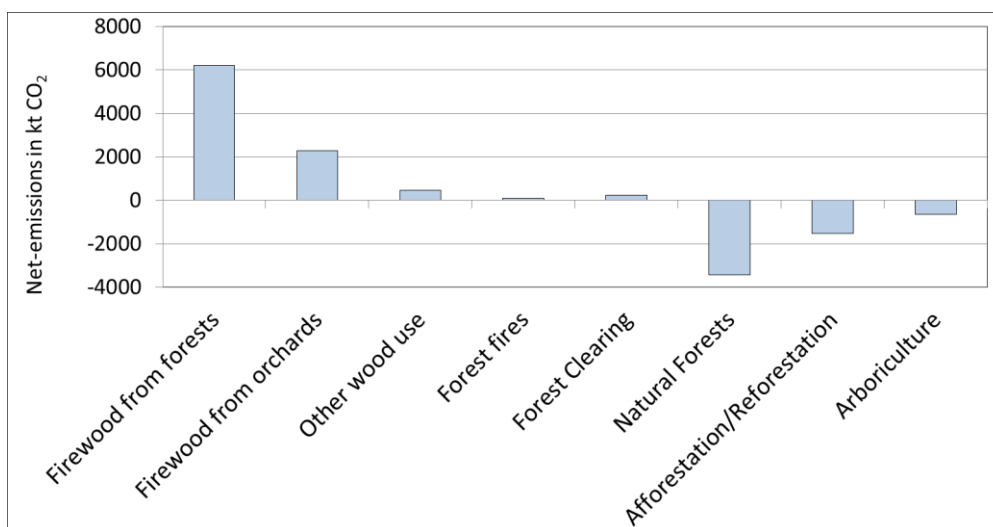
Source: Morocco (2015)

Much more important than the LU sector is the mitigation share of the Agriculture sector with 26 %.

### 3. Is the LU sector accounting comprehensible?

Beyond the overall accounting approach (relative to BAU up to 2030) and the national defined subcategories (same as in the second National Communication, see Figure 28) no further information is given regarding the LU sector in the INDC. Because of the change in the historic emission trend and spare data, no substantiated assumptions can be made (see 5).

**Figure 28:** Net-emissions in kt CO<sub>2</sub> from the Moroccan LU sector divided in subcategories for the year 2000.



Source: Morocco (2010)

#### 4. Which measures are behind the LU sector target?

The *Preservation and Sustainable Forest Management Strategy* (Morocco, 2015) comprises:

- *Develop forestry and surrounding areas.*
- *Finalize land demarcation and registry of forested areas.*
- *Complete the suckering, renewal or afforestation of approximately 50,000 hectares per year, with a primary focus on natural species and support for high quality forest research when rehabilitating territory.*
- *Protect water basins against erosion and siltation of dams.*
- *Rehabilitate ecosystem and protect and promote natural areas as well as endangered species as resources.*

The goal for 2020 is the reconstruction of forests on 200,000 ha.

The mitigation potentials behind these measures are not given in the INDC (see 5). According to the NAMA submitted in 2011 and the *Plan de Reboisement* the target by 2013 was to reach an afforestation/reforestation rate of 50,000 ha/year, leading to a total afforestation/reforestation are of 1 million ha by 2030 (UNFCCC, 2011). As stated in the NAMA the expected mitigation potential from this measure is 209 kt CO<sub>2</sub>/year.

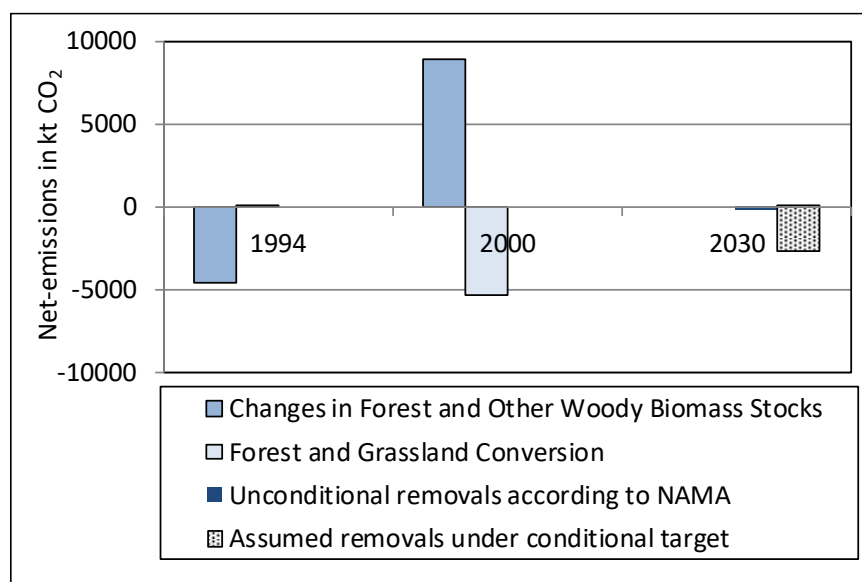
Thus, the predominant mitigation measure of afforestation/reforestation of 50,000 hectares per year in the INDC was already part of the NAMA. It is not clear how the sink gap between 209 kt and 2,700 kt CO<sub>2</sub> (compare with 2.) is supposed to be closed with the presented measures.

#### 5. How can the LU sector target be seen in the context of past emission trends? How does it compare to existing available data and trends?

Based on the first and second National Communications, emission data for two years (1994 and 2000) is available (Morocco, 2001; Morocco, 2010). Based on IPCC 1996 emissions and removals are assigned to *Changes in Forest and Other Woody Biomass Stocks* and *Forest and Grassland Conversion*.

Historic net-emissions from LU changed from a net-sink to a net-source. While *Changes in Forest and Other Woody Biomass Stocks* developed from the dominant sink to the relevant source, *Forest and Grassland Conversion* developed to a sink. In the light of ongoing afforestation and reforestation (UNFCCC, 2011), one would expect an increasing sink effect, assigned to *Changes in Forest and Other Woody Biomass Stocks*. It is possible that the increasing sink-effect was assigned to *Forest and Grassland Conversion*. According to FAO-Stat (2014), Moroccan forest area has only grown by 100,000 ha between 1994 and 2010. To improve transparency of the inventory emission estimates, disaggregated data would be needed, preferably calculated according to IPCC 2006.

**Figure 29:** Emissions and removals in kt CO<sub>2</sub> for the Moroccan LU sector for 1994 and 2000.



Source: Morocco (2010), Morocco (2015), UNFCCC (2011).

The unconditional annual removals for 2030 are taken from the NAMA (UNFCCC, 2011) and only make 10 % of the assumed removals under the conditional target (Morocco, 2015).

## 6. How ambitious is the LU sector target?

As stated under 2 and 4, future share of LU sector emissions under conditional or unconditional target could lie between 5 % (2.7 from 54 Mt CO<sub>2eq</sub> mitigation efforts) and less than 1 % (0.209 from 23 Mt CO<sub>2eq</sub> mitigation efforts). Given the environmental conditions and the ongoing desertification process, the considerable increase in the net-sink-effect under the conditional target can be seen as ambitious, as it obviously involves relevant additional afforestation/reforestation and sustainable forest management measures to those presented in the INDC.

## Remaining Issues

- A. With which additional measures is Morocco planning to close the sink gap between the unconditional and the conditional mitigation target in the LU sector?
- B. When is Morocco planning to improve its inventory reporting in order to increase the transparency of the emission data?
- C. Morocco reserves the right to revise said BAU scenario on the basis of new analysis by 2020. This could have an impact of the absolute emission reduction but not on the relative mitigation target. Is that right? Which changes are expectable?

## References

- CAIT (2015): Climate Data Explorer by the World Research Institute, <http://cait.wri.org/historical>, 05.10.2015
- FAO FRA (2015): Global Forest Resource Assessment Report 2015. Desk Reference. Rome, FAO 2015.



FAO-Stat (2014): FAO Statistics Division. Emissions - Land Use. Forest Land. FAO. [http://faostat3.fao.org/browse/G2/\\*/E](http://faostat3.fao.org/browse/G2/*/E)

MOROCCO (2001): First National Communication.

MOROCCO (2010): Second National Communication.

MOROCCO (2015): Intended Nationally Determined Contribution.

UNFCCC (2011): Compilation of information on nationally appropriate mitigation actions to be implemented by Parties not included in Annex I to the Convention, Note by the secretariat, FCCC/AWGLCA/2011/INF.1, 18.03.2011

WORLD BANK (2014): Country and Lending Groups. World Bank. <http://data.worldbank.org/about/country-and-lending-groups>

## A.11 DR Congo – submitted to UNFCCC 2015-08-18

Based on own translation from the original French Submission

DR Congo had almost no share in global GHG emissions in 2012 (CAIT, 2015) but is a highly relevant forest country, as it has a share of 3.8 % in global forest area (FAO FRA, 2015). DR Congo has the second largest contiguous rainforests after Brazil and *'accounts for more than half of the total remaining rainforests in Central Africa'* (World Bank, 2015). 75 % of the national emissions are caused by LU and Agriculture and therefore, LU and especially forests have high mitigation potentials (DR Congo, 2015). DR Congo is highly engaged in the context of REDD+ and the German International Climate Initiative is financing a number of projects there with the aim to protect rainforests and improve the reporting on forests (ICI, 2015).

**Table 23:** INDC analysis regarding the LU sector for DR Congo – overview.

LU sector considered	Y	Time frame	2030
All pools included	n.d.	Accounting method	RL
Distinct LU sector target	Y	Reference level, LU	Y

DRC INDC: Summary regarding land Use sector (N – no; Y – yes; N/A – not applicable; n.d. – not defined); Relevant LULUCF aspects requested by the Lima Call for Action, decision 1/CP.20

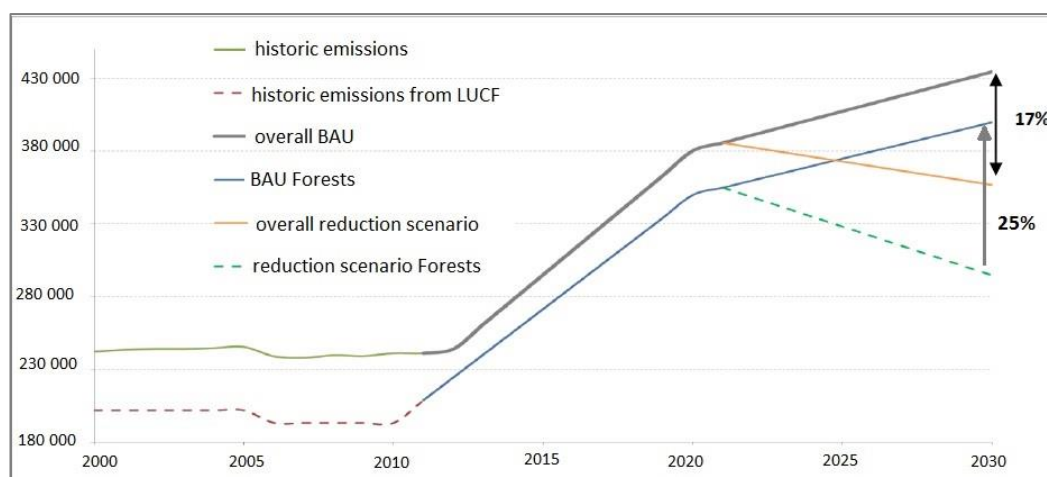
### 1. Is the land use (LU) sector part of the INDC?

Yes. The INDC covers the sectors agriculture, energy and forests. The total emission reduction share for 2030 is 17 % (25 % for LU) compared to a BAU scenario.

### 2. Is the clear differentiation between LU sector target and its share in the overall INDC possible?

Yes. DR Congo displays its BAU scenario, respectively its reference levels, for the years 2010 to 2030 for the national emissions and for emissions from LU (for the assessment of used LU data see 5.). Figure 30 shows the emission trends in Mt CO<sub>2</sub>. According to this data the reduction share of the LU sector is 25 %.

**Figure 30:** Emissions in kt CO<sub>2</sub> from 2000 to 2030 for DR Congo: total national emissions respectively emissions from LU and their reduction shares.

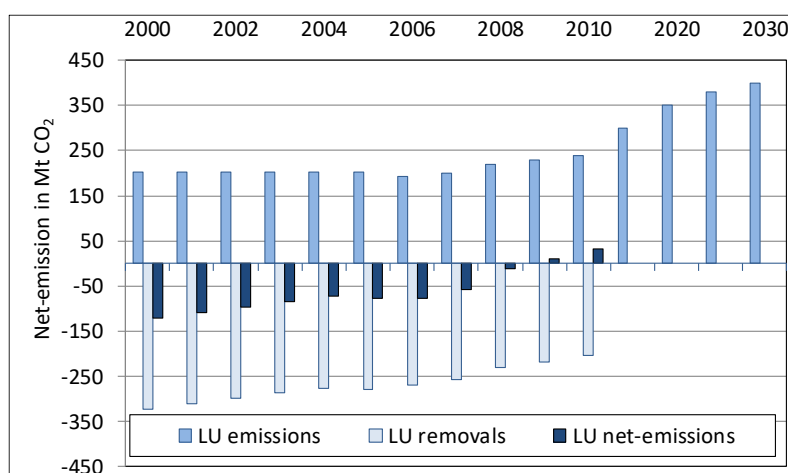


Source: Taken and adapted (25 %) from DR Congo (2015b).

### 3. Is the LU sector accounting comprehensible?

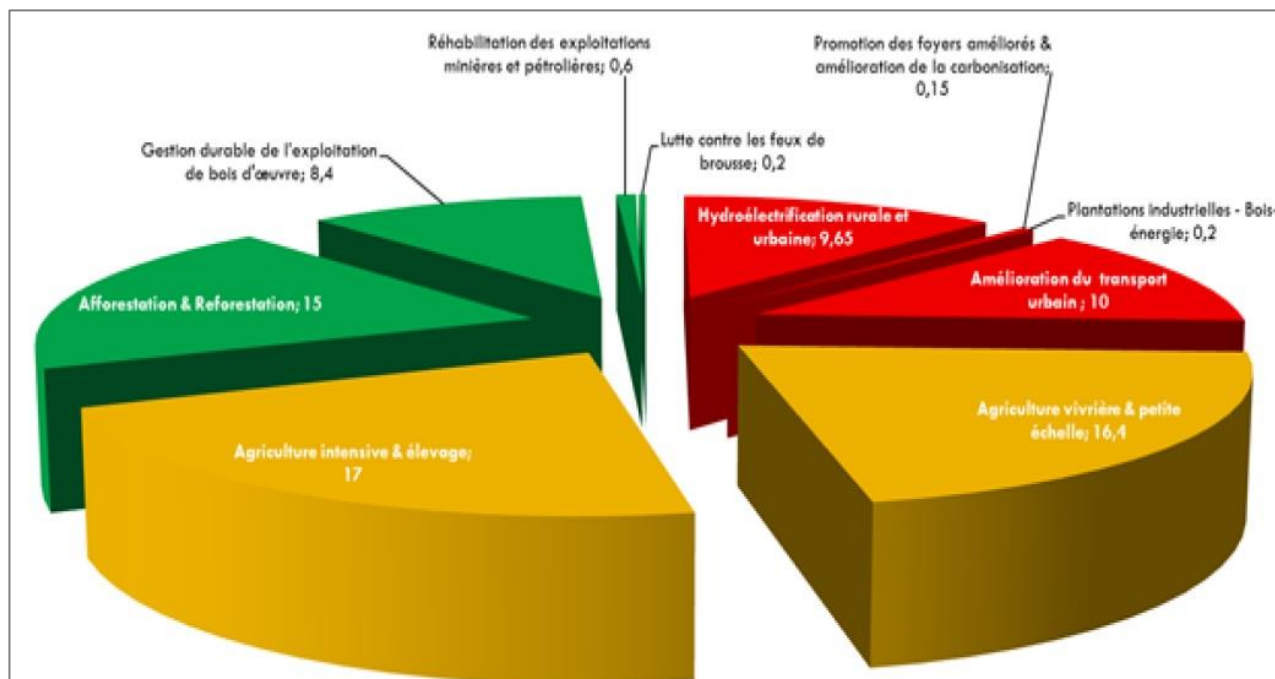
DR Congo does not state which assumptions are behind both scenarios (BAU and reduction). According to the data in Figure DR Congo does not take the removals from LU into account, only emissions. While the LU emission reduction amounts to almost 100 Mt CO<sub>2</sub> compared to the BAU according to Figure 31, DR Congo states in another figure in its INDC that its only 24 Mt CO<sub>2</sub> (compare Figure 32 and Table 22). Therefore, a discrepancy remains.

**Figure 31:** Gross-emissions, removals and net-emissions in DR Congo for the historic period 2000-2010 and projected gross-emissions for the years 2015/2020/2025/2030.



Source: Data taken from DR Congo (2015a) and DR Congo (2015b).

**Figure 32:** DR Congo emission reduction potentials in Mt CO<sub>2eq</sub>. Green indicates the share of LU related emission reduction potentials (24.2 Mt CO<sub>2eq</sub>).



Source: DR Congo (2015b).

**Table 24:** Emission reduction potentials in Mt CO<sub>2</sub> according to Figure 32.

Mitigation Potential	in Mt CO <sub>2</sub>
Afforestation Reforestation	15
Sustainable Forest Management	8.4
Rehabilitation of mining areas	0.6
Wildfires	0.2
Intensified Agriculture	17
Smallscale agriculture	16.4
Transport	10
Energy crops	0.2
Hydroelectrification	9.65
Oven	0.15
<b>Overall</b>	<b>77.6</b>
<b>LU (approximately 1/3)</b>	<b>24.2</b>

Source: Translation from DR Congo (2015b).

#### 4. Which measures are behind the LU sector target?

As measure DR Congo (2015b) states:

- *Planting of 3 Mio ha forest until 2025 which will remove 3 Mio ha CO<sub>2</sub>*

No measures regarding deforestation are made. DR Congo did also not submit any NAMA that could provide further measures.

#### 5. How can the LU sector target be seen in the context of past emission trends? How does it compare to existing available data and trends?

Compared to emissions 2000-2010 (DR Congo, 2015b), the projected increase in gross-emissions as displayed in Figure 31 and Figure 32 seems to be quite high. Therefore it would be interesting which activities cause almost the doubling of gross-emissions. Most likely it could be a projected increase in the deforestation rate (1990-2010: 0.32 %).

#### 6. How ambitious is the LU sector target?

LU is the second most important sector behind agriculture in DR Congo. According to the projected BAU-reference the LU sector also provides a high mitigation potential (25 %). The assumptions behind the BAU-reference are not provided. The projected increase in emissions from LU is considerably high- and so is the assumed mitigation potential. Based on the information available, no assessment regarding the overall ambition of the LU sector target can be made (see remaining issues above).

#### Remaining Issues

- A. Could DR Congo clarify on the assumptions behind the BAU scenario? The projected increase in emissions seems to be quite high.
- B. Is it correct that DR Congo does not include removals from forests in its INDC? If this is correct, why does the INDC mentions only one measure in the context of LU which is sink increasing and not deforestation decreasing?
- C. In Figure 3 of its INDC DR Congo states that the mitigation potential of LU is 24 Mt CO<sub>2</sub>. According to the gap between BAU/reference level and reduction scenario for LU in Figure 2, the mitigation potential seems to be substantially higher, almost 100 Mt CO<sub>2</sub>. Could DR Congo clarify on the discrepancy?

#### References

- CAIT (2015): Climate Data Explorer by the World Research Institute, <http://cait.wri.org/historical>, 05.10.2015.
- DR CONGO (2015A): Troisième Communication Nationale à la Convention sur le Changement Climatique (3. NC), Février 2015.
- DR CONGO (2015B): Soumission de la Contribution nationale prevue determinee au Niveau Nationale au titre de la Convention des Nations Unies sur le Changement Climatiques (INDC).
- FAO FRA (2015): Global Forest Resource Assessment Report 2015. Desk Reference. Rome, FAO 2015.

- ICI (2015): Internationale Climate Initiative, <http://www.international-climate-initiative.com/en/projects/projects/>; 12.10.2015
- WORLD BANK (2015): Forests in the Democratic Republic of Congo, <http://web.worldbank.org/WBSITE/EXTERNAL/EXTSITETOOLS/0,,contentMDK:22322346~pagePK:98400~piPK:98424~theSitePK:95474,00.html> ; 12.10.2015

## A.12 Gabon – submitted to UNFCCC 2015-04-01

Based on own translation from the original French Submission

Gabon is part of G77 and the Coalition for Rainforest Nations. It is located in western Central Africa and borders Cameroon, Equatorial Guinea and Congo. Gabon has a share of 0.6 % in global forest area and high forest coverage of 88 %, with 65 % share in primary forests (FAO FRA, 2015). Emissions and removals from the LU sector dominate the GHG profile of Gabon, as data under UNFCCC for 1994 and 2000 show.

Gabon is the first African country submitting an INDC. Its summary states that emission reductions of at least 50 % can be expected up to 2025. The LU sector is supposed to have the main share in the mitigation. The analysis, however, reveals that neither the share of the LU sector in the reference level from 2010 to 2025 and its underlying assumptions, nor the assumptions and the time series of the mitigation scenario are comprehensible. On this basis, no concluding assessment regarding the level of ambition can be made.

**Table 26:** INDC analysis regarding the LU sector for Gabon – overview.

LU sector considered	Y	Time frame	2025
All pools included	n.d.	Accounting method	RL
Distinct LU sector target	Y	Reference level, LU	Y

Gabon INDC: Summary regarding Land Use sector (N – no; Y – yes; N/A – not applicable; n.d. – not defined); Relevant LULUCF aspects requested by the Lima Call for Action, decision 1/CP.20

The following Figures are taken from the INDC of Gabon. [1 Gg = 1kt = 0,001 Mt]

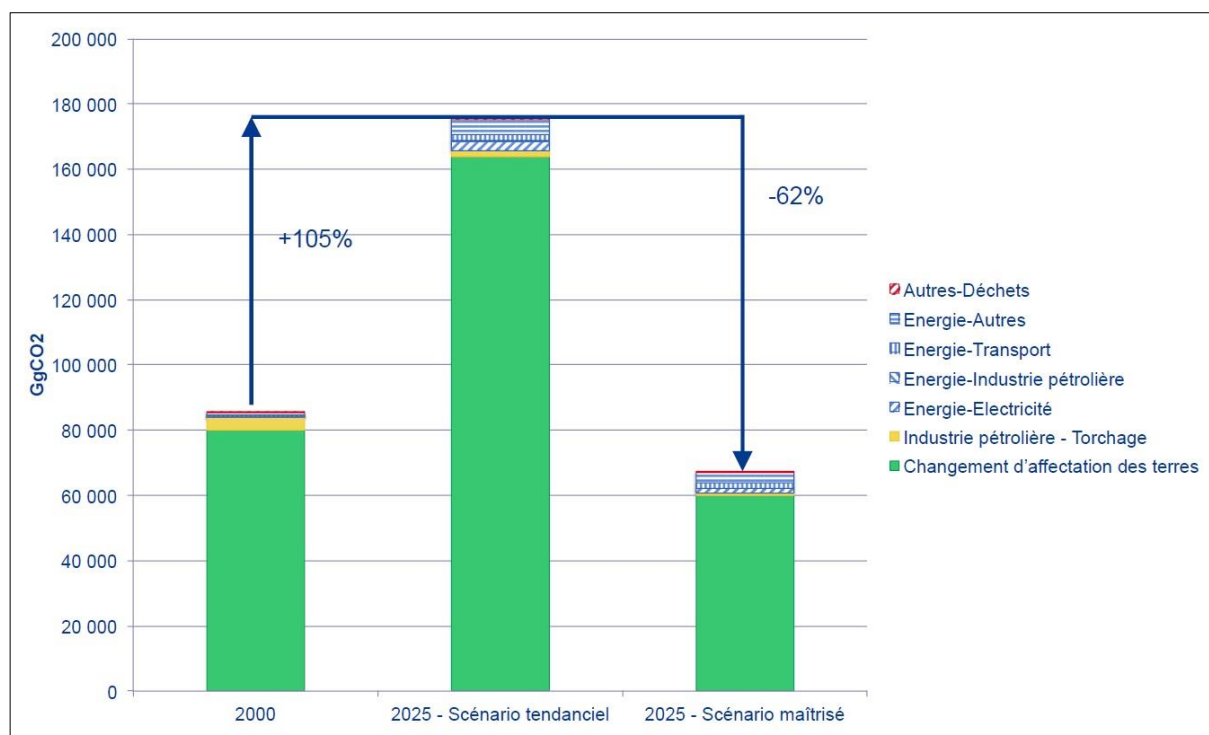
### 1. Is the LU sector part of the INDC?

Yes. The LU sector is part of the overall reference level for 2010-2025, which can be described as BAU scenario (*Développement tendenciel*). The reduction commitment is described as *Developpement maîtrisé*.

### 2. Is the clear differentiation between LU sector target and its share in the overall INDC possible?

Yes/No. For the year 2025, Gabon provides detailed emission profiles for both scenarios (BAU/reference and mitigation), which can be seen in Figure 33 Gabon assumes that emissions from the LU sector would increase almost 100 % compared to the year 2000 without any measures (from 80,000 Gg CO<sub>2</sub> to over 160,000 Gg CO<sub>2</sub>). Under the mitigation scenario it assumes a decrease of 60 % compared to BAU (60,000 Gg CO<sub>2</sub> compared to 160,000 Gg CO<sub>2</sub>) and also a decrease of 25 % compared to 2000 (60,000 Gg CO<sub>2</sub> compared to 80,000 Gg CO<sub>2</sub>).

**Figure 33:** Gabons' emission profiles for the year 2000 and for the year 2025 under BAU (*S. tendenciel*) and Mitigation (*S. maîtrisé*). The LU sector is displayed as *Changement d'affectation des terres*.



Source: Gabon (2015).

However, the value representing the starting year 2000 is not comprehensible. There appears to be a discrepancy with the value included in the GHG inventory for the year 2000, which has been submitted with the second National Communication in 2011 (Gabon, 2011; see Figure 34 below). The assumptions made for the future scenarios cannot be reproduced. (See also 3. and 5.)

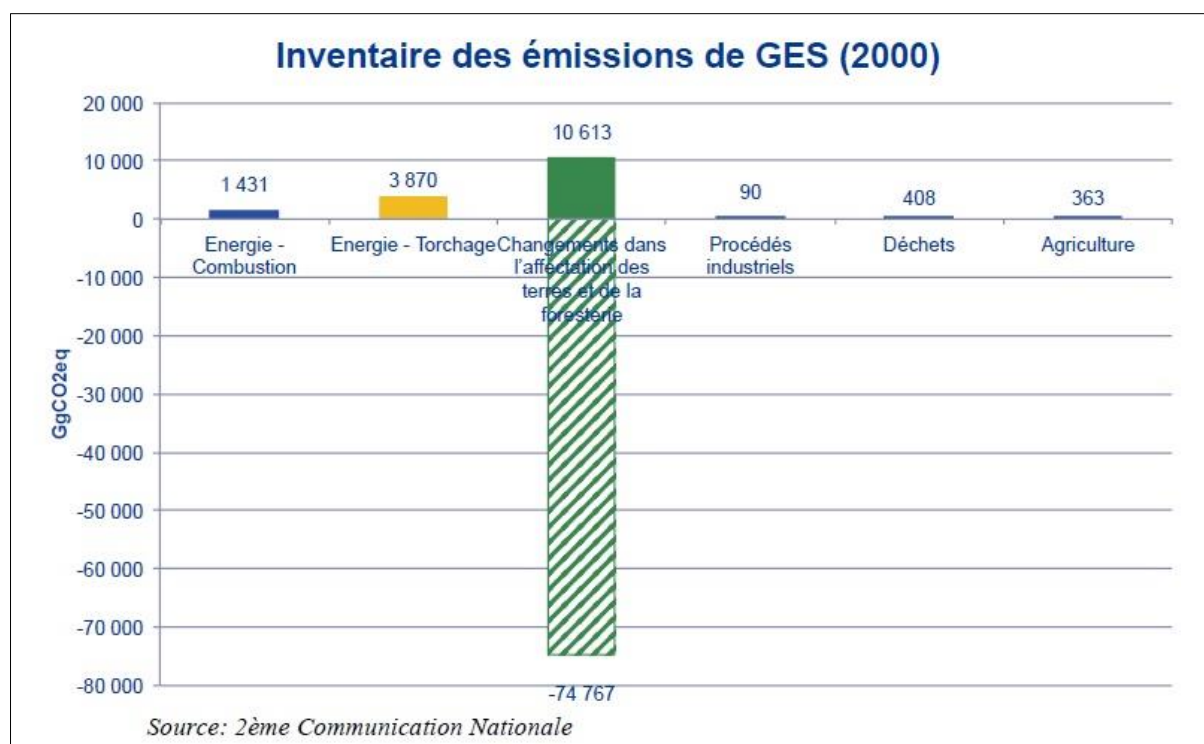
### 3. Is the LU sector accounting comprehensible?

No. Based on the GHG inventory (Gabon, 2011), Gabon provides in its INDC a GHG profile for the overall national emissions and removals (see Figure 34). Removals from the LU sector amount to - 74,767 Gg CO<sub>2eq</sub> and emissions sum up to 10,613 Gg CO<sub>2eq</sub>.

Gabon states that in its reduction commitment it only accounts for emissions '*hors stockage de carbone dans la biomasse forestière*'. It is assumed that Gabon means that removals from the forest sector are not considered, but the use of the word '*stockage*' is misleading, as it means pool instead of sink or removals (French: *cuvette*). Accounting of stored carbon in pools is not allowed under UNFCCC.



**Figure 34:** GHG inventory for the year 2000 as provided in the second NC. Emissions are positive, removals negative (Gg CO<sub>2eq</sub>).



Source: Gabon (2015).

Thus, without the LU sector removals (i.e. -74,767 Gg CO<sub>2eq</sub>) the overall emissions from Gabon sum up to 16,775 Gg CO<sub>2eq</sub>. This results in a gap of approximately 70,000 Gg CO<sub>2eq</sub> as compared to the emission profile for the year 2000 in Figure 34, which is not explained by Gabon. As the two future scenarios are based on this questionable value, it can be concluded that the emission estimates for 2025 are problematic as well. (See 5)

#### 4. Which measures are behind the LU sector target?

The mitigation scenario (*Developpement maîtrisé*) is based on several assumptions. On the one hand, national policies passed after 2000 are listed (Forest-Code, National Parks, Climate-Plan, Land-Allocation-Plan) and on the other hand, Gabon refers to some measures resulting from these policies (changing rotations from 15 years to 25 years, creation of 13 National Parks in 2002, adaptation of land use-plans with the exclusion of intact forests, forests with high conservation values and forests with high carbon contents). Gabon does not explain in detail how these measures impact the assumed emission reduction.

#### 5. How can the LU sector target be seen in the context of past emission trends? How does it compare to existing available data and trends?

Gabon reported GHG inventories for the years 1994 and 2000 to the UNFCCC, based on the IPCC 1996 for the sector LUCF, which are displayed in Table 26. The difference between the two years is

immense, especially for the LU sector, where the net-sink effect decreased within 6 years from -500,875 to -64,155 Gg CO<sub>2</sub>. Beside these numbers, no other net-emission data exist.

**Table 26:** GHG inventory of Gabon, based on the first and second National Communications [in Gg CO<sub>2</sub>]

Category	1994	2000
1 Energy	6,364.54	5,302.38
2 Industrial Processes	65.2	90.10
3 Solvent + Other Product Use	-	-
4 Agriculture	-	360.01
5 Land-use Change and Forestry	-500,875.69	-64,155.50
6 Waste	94.59	407.06
7 Other	-	-
<b>Total</b>	<b>-494,351.36</b>	<b>-57,995.95</b>

Source: Gabon (2004) and Gabon (2011).

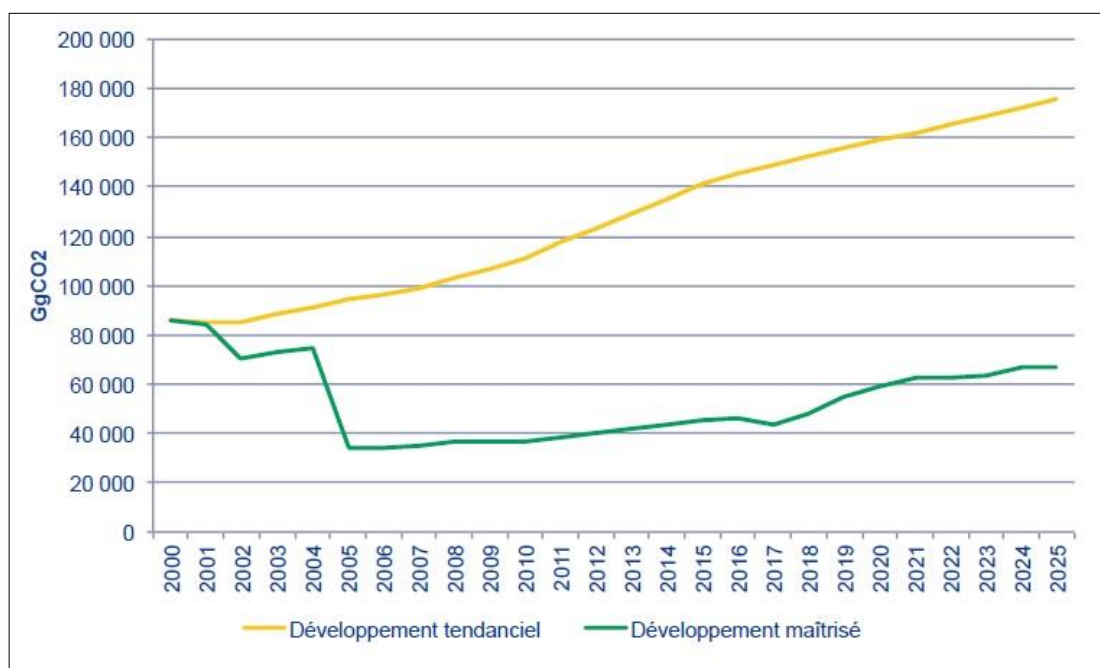
In its INDC, Gabon not only presents GHG emission profiles for the years 2000 and 2025 (see Figure 33), but also a detailed time series for the development of emissions under the BAU and the mitigation scenario for 2000-2025 (Figure 34).

Compared the other sectors presented in the INDC of Gabon (see Section D '*Industrie pétrolière*', Section E '*Energie*', Section F '*Autres émissions de GES*'), which start to differentiate between the mitigation scenarios and BAU in +/- recent years (2010, 2013, 2014), Gabon assumes for the land sector a divergent development for the mitigation and BAU scenarios from the year 2000 onwards (see also Figure 36below).

Both scenarios are based on ex-post assumptions (i.e. impact of national policies passed after 2000 and related measures or the trend of emissions based on population growth (2 % p.a.) and economic development (10 % p.a.)), which obviously appear to be contradictory. This results in a current (i.e. year 2015) difference [called 'gains'] in the emission budget of about 95,000 Gg CO<sub>2</sub> only based on inconsistent assumptions on the historic development from 2000 up to now.

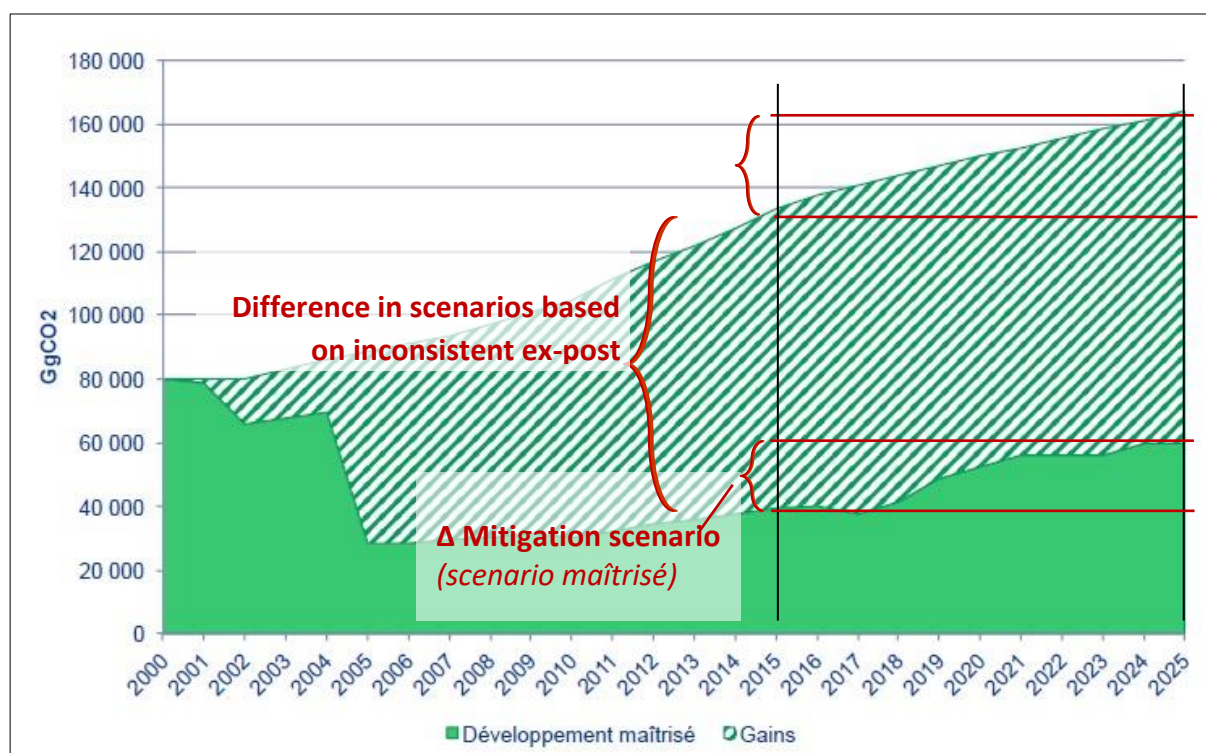
To overcome the challenge of estimating the current emission budget, it could be clarified which assumptions 'override' and which historic development (2000-2015) appears to be most likely.

**Figure 35:** Emissions under the BAU (*Développement tendanciel*, yellow) and the mitigation scenario (*Développement maîtrisé*, green) between 2000 and 2025 for Gabon.



Source: Gabon (2015).

**Figure 36:** Emissions from the LU sector under the BAU (*Gains* [i.e. difference], green/white and the mitigation scenario (*Développement maîtrisé*, green) between 2000 and 2025 for Gabon.



Source: Gabon (2015) with supplement explanations by the authors (red).

## 6. How ambitious is the LU sector target?

Based on the explanations given under 2-5, the main difference between BAU and the mitigation scenario originates from inconsistent assumptions on the historic development. On this basis, hardly any evaluation can be made (see 5 and Figure 36).

Provided the analysis as set out above is correct, an ambitious level could be deduced from the difference of the assumed development between 2015 and 2025 in the BAU scenario (i.e.  $\Delta$  BAU) as compared to the assumed development in the mitigation scenario (i.e.  $\Delta$  Mitigation scenario). This would amount to a difference of round about 10,000 Gg CO<sub>2</sub>.

## Remaining Issues

- A. Why is the emission data for the year 2000 as basis for the scenarios not consistent with the 2000 emission data from the GHG inventory? (see 2. and 3.)
- B. Why are different ex-post assumptions the basis for the LU sector scenarios from 2000-2015? For other sectors the different scenarios start in 2010/2013/2014 from a common emission trend. (see 5.)

## References

- FAO FRA (2015): Global Forest Resource Assessment Report 2015. Desk Reference. Rome, FAO 2015.
- GABON (2004): First National Communication.
- GABON (2011): Second National Communication.
- GABON (2015): Intended Nationally Determined Contribution, 01.04.2015.

**Bibliografische Information:**  
Die Deutsche Nationalbibliothek verzeichnet diese Publikationen in der Deutschen Nationalbibliografie; detaillierte bibliografische Daten sind im Internet unter [www.dnb.de](http://www.dnb.de) abrufbar.

*Bibliographic information:*  
*The Deutsche Nationalbibliothek (German National Library) lists this publication in the German National Bibliographie; detailed bibliographic data is available on the Internet at [www.dnb.de](http://www.dnb.de)*

Bereits in dieser Reihe erschienene Bände finden Sie im Internet unter [www.ti.bund.de](http://www.ti.bund.de)

*Volumes already published in this series are available on the Internet at [www.thuenen.de](http://www.thuenen.de)*

**Zitationsvorschlag – Suggested source citation:**  
Hargita Y, Rüter S (2015) Analysis of the land use sector in INDCs of relevant Non-Annex I parties. Hamburg: Johann Heinrich von Thünen-Institut, 82 p, Thünen Working Paper 50

Die Verantwortung für die Inhalte liegt bei den jeweiligen Verfassern bzw. Verfasserinnen.

*The respective authors are responsible for the content of their publications.*



## Thünen Working Paper 50

Herausgeber/Redaktionsanschrift – *Editor/address*  
Johann Heinrich von Thünen-Institut  
Bundesallee 50  
38116 Braunschweig  
Germany

[thuenen-working-paper@thuenen.de](mailto:thuenen-working-paper@thuenen.de)  
[www.thuenen.de](http://www.thuenen.de)

DOI:10.3220/WP1447228551000  
urn:nbn:de:gbv:253-201511-dn055903-4

