



# AMAZALERT Delivery Report

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## Abbreviations / acronyms

BAF	Biogenic adjustment factor
CDM	Clean Development Mechanism
CEN	Comité Européen de Normalisation (European Committee for Standardization)
CMP	Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol
COP	Conference of Parties under UNFCCC
dLUC	direct land-use change
EU ETS	EU Emissions Trading System
EU RED	EU Renewable Energy Directive (2009/28/EC)
FAO	Food and Agricultural Organization
FCPF	Forest Carbon Partnership Facility
FIP	Forest Investment Program
GEF	Global Environment Facility
GHG	Greenhouse gas
HWP	Harvested wood products
iLUC	indirect land-use change
ISO	International Organization for Standardization
IUCN	International Union for the Conservation of Nature
JI	Joint Implementation
KP	Kyoto Protocol
LCA	Life cycle assessment
LCFS	Low Carbon Fuel Standard (California, U.S.)
MMBtu	million British thermal units
NAMA	National Appropriate Mitigation Action
NGO	Non-governmental organization
NREAP	National Renewable Energy Action Plan
REDD	Reducing emissions from deforestation and forest degradation
RES	Renewable Energy Sources
RFS2	Renewable Fuel Standard 2 (United States)
ROW	REDD Offset Working Group (California, U.S.)
R-PP	Readiness Preparation Proposal under the FCPF
RSB	Roundtable on Sustainable Biofuels
RTRS	Round Table on Responsible Soy
SAN	Sustainable Agriculture Network
TNC	The Nature Conservancy
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US CAA	United States Clean Air Act
USEPA	United States Environmental Protection Agency

# 1 Introduction

## 1.1 Content of first draft

This Deliverable was originally foreseen to be finalised towards the end of the first year. However, as the work on the evaluation of existing scenarios progressed, it became clear that two highly relevant sets of scenarios needed to be considered. Yet, neither of those sets was finalised. As both sets of scenarios were deemed highly relevant to the Brazilian context, the goals of the AMAZALERT project and the scenario development process, we decided to wait until the scenarios were finalised and documented, so the information could be included in this Deliverable. We therefore decided to push back the delivery date of this Deliverable from M12 to M20. At the same time, however, this Deliverable consists of two rather separate parts, a review of scenarios and a review of policies. The policy review did (thus) not depend on the scenarios, and was therefore delivered in time. We decided it would be useful to produce this Deliverable in two phases. The first phase would be a “first draft” containing all information on the policy review, and a limited part on the scenarios. The timing of this draft is such that it can accompany the mid-term review report; substantiate the progress; and provide background information on the policies. The second phase would be the “final version”, which is scheduled to be finalised in M20, i.e. in two months’ time. This version is the first draft of Deliverable 4.1, containing all information on the policies and some initial introduction to the most important scenario sets.

## 1.2 Scenarios

This first draft only contains information on the two sets of scenarios that are believed to be essential for the development of scenarios for the Amazon. Two sets are the new IPCC-guided Shared Socio-economic Pathways (see O’Neill et al., 2012) and the so-called CCST scenarios for Brazil that are being developed at the Brazilian National Institute For Space Research (INPE) – a key partner in AMAZALERT. The final version will review and analyse a broader set of global and regional scenarios and demonstrate why these two are most relevant for AMAZALERT.

## 1.3 Policies

Although developments in the Amazon Basin will be most directly impacted by national and sub-national policies and programs, a limited set of international policies and programs are also likely to influence land use and land cover. In particular, bioenergy programs in, e.g., Europe, the United States, and China and REDD+ initiatives are expected to play a role. Important demand for agricultural products other than for bioenergy and related certification standards can also be expected to be of importance. Examples are the high Chinese demand for soybean imports and standards and certification programs for agricultural and biofuel products. On the Brazilian level, the new Forest Code is of major importance, next to the Action Plan for Prevention and Control of the Legal Amazon

Deforestation and land titling. It is important to highlight that these different policies and programs may affect land use in the Amazon due to direct conversion of forest or other land use transitions that may occur in other parts of Brazil. For example, it is not expected that sugar cane plantations will expand in the Amazon, due to biophysical reasons but also because the land zoning for that product does not allow its plantation in the Amazon and the Pantanal Biome. However, if sugar cane plantations expand in southeastern Brazil, it is likely that cattle ranching will expand even more than it did already towards the Amazon borders. Thus, the connections of different forces and policies driving land use changes in the Amazon must be considered. The list of policies is not meant to be complete but to provide a solid overview of the variety of types of initiatives.

## 1.4 Outline of Deliverable

The Deliverable consists of 4 Sections. Section 2 shortly introduces the two scenarios sets that will be used in AMAZALERT. Section 3 and 4 present an overview of all European, other relevant international policies, as well as regional policies. Section 5 lists the important Brazilian policies. Section 6 concludes.

## 2 Selected scenarios to be used in AMAZALERT

The work started with an evaluation of existing scenarios that could bear relevance for AMAZALERT. It was foreseen that a couple sets would emerge that could be used to kick-start the process of developing scenarios for Brazil and the Legal Amazon. Indeed, two sets of scenarios were identified that were highly relevant to the Brazilian context, the goals of the AMAZALERT project and the scenario process that was being envisioned. Those sets are:

1. **The new IPCC-guided scenarios** that are being developed for the Fifth Assessment Report (AR5). These scenarios consist of a set of four climate change scenarios (Representative Concentration Pathways – RCPs) and a set of 5 socio-economic scenarios (Shared Socio-economic Pathways – SSPs), and will be accompanied by a set of policy scenarios (Shared Policy Assumptions – SPAs). See Figure 1 for details. Deadline of completion of the SSPs, that are particularly relevant for WP4, is submission of a description of the stories to a special issue of Global Environmental Change by March/April 2013.

Crucial aspect: these are scenarios that are very recent, have a specific component to include regional studies, and that are on the same topic as AMAZALERT. The release of the final version of the stories has been delayed, but an earlier draft of the full stories served as starting point for the work in AMAZALERT (see Table 1 for downscaled versions for the Amazon).

2. A set of **scenarios ('visions') for Brazil**, developed by an expert panel, composed of mainly invited researchers from INPE's Earth Science System Center (CCST). This is a set of initially 2 scenarios, which was later expanded to 4. The development of the qualitative stories was finalised in the course of 2012.

Crucial aspect: these are scenarios that are for the same region, and that are partly developed by the same researchers that are included in AMAZALERT.

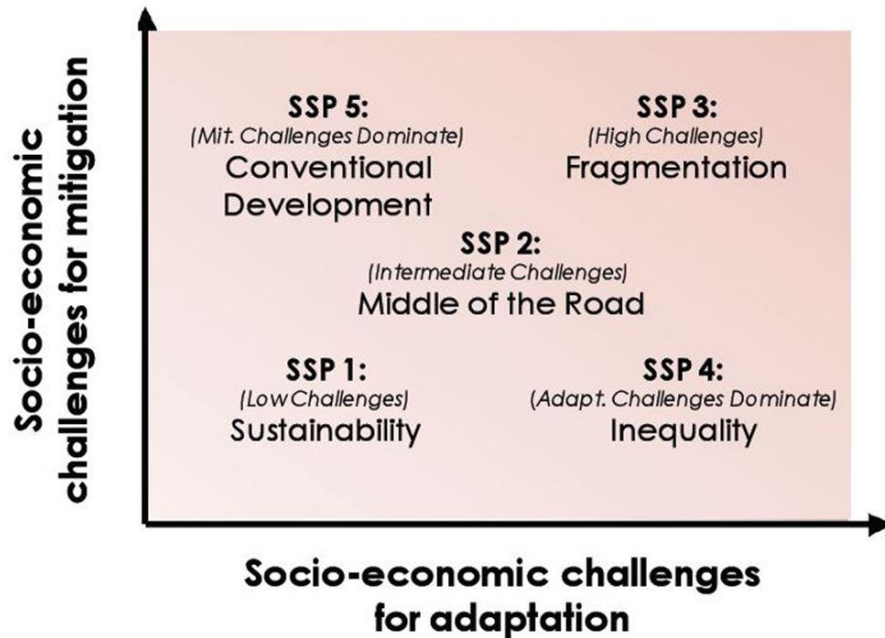


Figure 1. The Shared Socio-economic Pathways (SSPs) of the new IPCC-guided scenario set.

For these and other reasons, it was concluded that both the new global IPCC-guided scenarios and the new Brazilian CCST scenarios would need to be part of the AMAZALERT scenarios. Particularly seeking a 1:1 match with the CCST scenarios (see Figure 1) was regarded to be needed. There is a fairly strong correlation between the CCST scenarios and the SSPs (Vision A = SSP1; Vision B = SSP2/4; Vision D = SSP3; Vision C = SSP5).



Table 1. Downscaled versions of the global SSPs.

Global SSP	Brazilian SSP – summary	Brazilian SSP – plausibility
SSP1: Sustainability	<p>“Brazilian Green”</p> <p>All of Brazil’s efforts to strongly reduce deforestation are successful, improving Brazil’s position on the world market, in turn boosting the economy. There is willingness to embrace and implement all the policy options.</p>	There are issues related to plausibility and credibility of this Utopian scenario. This could serve as the most positive case.
SSP2: Middle of the road	<p>“Muddling through”</p> <p>Most important drivers of deforestation change moderately. This end of the economic recession poses challenges to permanently slow deforestation rates. Large social and institutional problems remain.</p>	This scenario is rather close to the present day situation, and as such plausible.
SSP3: Fragmentation	<p>“Fortress not forest”</p> <p>There are many ways to kick-start a downward spiral of protectionism, deglobalisation, inward-looking and environment-ignoring attitudes. It seems plausible that it starts with trade barriers, collapse of (agricultural) export, unemployment and poverty. This scenario offers many possibilities for tipping points in social and economic systems towards a dark future that cannot be easily escaped from.</p>	Some aspects of the storyline reads very much like the present day reality in parts of Latin America. This can potentially increase credibility of this otherwise very negative scenario.
SSP4: Inequality	<p>“Indifferent dictators”</p> <p>There is strong indifference of the elite towards social, human, and natural capital of the non-connected. The elite have no inherent interest in the environment, instead pursuing global trade opportunities, leading to environmental destruction and lack of social safety nets for the masses.</p>	Contains a mix of the doom of SSP3 with some potential of SSP1, making for a plausible scenario.
SSP5: Conventional Development	<p>“Educated destruction”</p> <p>There is a fundamental tension in many aspects between economic development stimulating the economy by providing cheap energy at the expense of the environment, while on the other hand social change is towards equity, high education, low crime and corruption. Deforestation and degradation continue at current rates but with implementation of relevant policies both can be halted completely due to strong governance.</p>	This is perhaps one of the more difficult scenarios to develop for Brazil. The starting point of low adaptation and high mitigation challenges is highly debated and is not the most plausible of all scenarios.

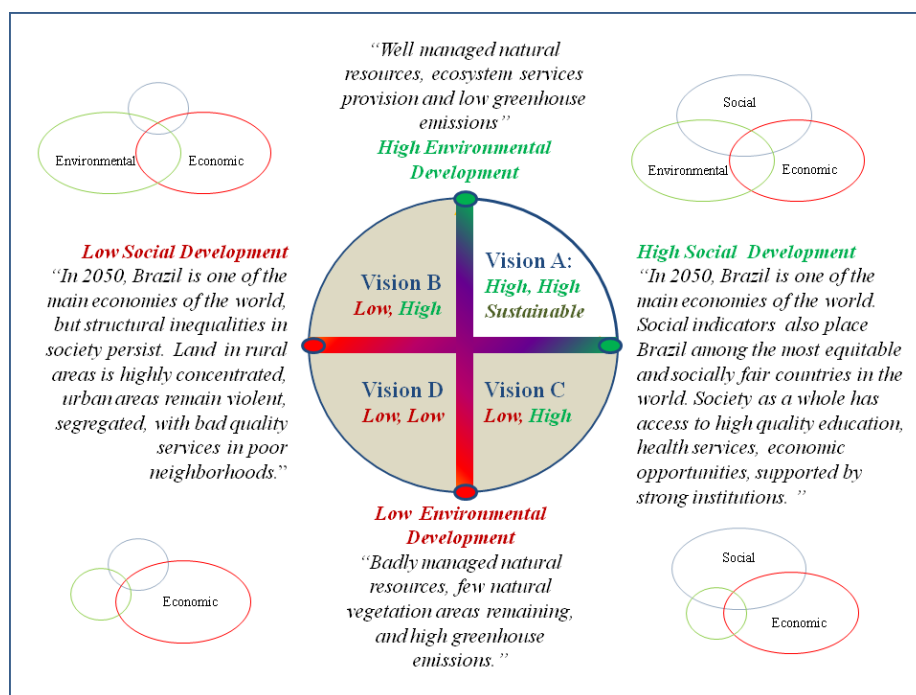


Figure 2. The CCST visions.

### 3 International policies and initiatives

The following section discusses international policies and initiatives potentially affecting land use in the Amazon basin. The effect depends on the policy or initiative itself but can generally be categorized into 1) impacts on the demand for agricultural and forest products from Amazon nations in general and 2) specific management and production standards applying to Amazonia.

#### 3.1 UNFCCC: Decisions taken during COP 17

During the seventeenth session of the Conference of the Parties (COP 17) of the UN Framework Convention on Climate Change (UNFCCC) in 2011<sup>1</sup>, it was agreed to change the accounting rules applying to the land-use sector and to wood converted to products. These new accounting rules would apply during a second commitment period under the Kyoto Protocol (KP) starting 2013. These new rules would primarily apply, at least until 2020, in the EU which forms the majority of nations agreed to targets under a second commitment period. This is why several explanations here refer to the EU context including the EU Emissions Trading System (EU ETS).

<sup>1</sup> More precisely, the decisions presented here were taken at the seventh session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP 7). We refer to COP 17 as this is the better known negotiation track. The conference took place from 28 November to 9 December, 2011 in Durban, South Africa

The new rules potentially alter the incentives EU nations have in regard to use of their forest resources. The key decisions from the perspective of demand for imports are:

- Accounting for emissions due to forest management will be mandatory;
- The delay in emissions that occurs if wood is used for products will be recognized by the introduction of accounting for harvested wood products (HWP) pools;
- Reference levels will be used to estimate emissions from managed forests and HWP.

The new rules are, however, unlikely to increase pressure to import wood from non-EU nations to an important extent for a number of reasons discussed in the following sections.

### 3.1.1 Forest management accounting

There is, in principle, a potential of the forest management accounting system to incentivize wood imports from nations without binding commitments to nations with binding commitments under the Kyoto Protocol. This includes, e.g., imports of wood from the Amazon to the EU. However, the specific rules and country situations as well as experiences from the first commitment period make it unlikely that the mandatory forest management accounting strongly affects wood imports from, e.g., the Amazon region.

From a governmental perspective, the mandatory inclusion of emissions from forest management would, by itself, increase the incentive to import solid biomass in order to avoid negative impacts from domestic harvests on the Kyoto target achievement. In particular, biomass for energy generation is in high demand and biomass imports would avoid disadvantages from domestic harvests accounted under the Kyoto Protocol. Bioenergy does, for instance, contribute to meet the EU Renewable Energy Directive targets (EU RED targets, see section 4.1). In the first commitment period, inclusion of emissions from forest management was not obligatory and not all EU nations opted to include them<sup>2</sup>. As a result, reductions (or reduced increases) in carbon stocks due to harvests from managed forests did not have a negative impact on Kyoto target achievement in these countries. Austria, for example, could have harvested and used, domestically or for export, wood with no negative impact on achievement of its Kyoto target. Within nations including emissions from managed forests in their accounting, use of domestic wood additionally harvested for energy would, other things remaining the same, render it more difficult to meet the national emission target (see Box A).<sup>3</sup> However, corporate entities with emission responsibilities under, in particular, the EU ETS have an advantage from using biomass for energy generation because under Kyoto Protocol accounting, biomass combustion is assumed not to lead to CO<sub>2</sub> emissions.

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<sup>2</sup> EU nations not reporting forest management include Austria, Belgium, Ireland, Luxembourg and the Netherlands. Of these, Austria has the most extensive forests.

<sup>3</sup> It needs to be noted that countries showing a net increase of carbon stocks would always benefit from forest management accounting. Additional harvest may, however, reduce the net carbon stock increase and thus reduce the positive impact of the forest on the overall national target achievement.

### Box A: Impact of bioenergy on target achievement.

Where wood is additionally harvested for energy, reducing forest carbon stocks may make it more difficult to meet national emission targets in the short- to medium term. As shown in the table below, wood results in more combustion emissions per unit of energy produced than fossil fuels.

**Table 1: Carbon emissions per unit of energy**

Electricity production	kgC/MWh	Heat production	kgC/MMBtu
Wood	399	Wood	35
Coal	270	Oil	25-27
Natural gas	102	Natural gas	17

Source: Walker *et al.*, 2010

Thus, for example, if 399kgC is removed from a forest to produce electricity, emissions are reduced by only 102kgC for each MWh produced if the wood replaces natural gas. However, there will be 399kgC less in the forest, 399kgC that otherwise would count as a negative emissions (removals of C from the atmosphere) which would be subtracted from total emissions to the atmosphere. Thus for every MWh the nation is worse off by 297kgC: it has reduced its emissions by 102kgC at the cost of 399kgC negative emissions. Over the long term this disadvantage may be compensated by regrowth, but this will mostly happen in a timeframe far longer than the duration of a commitment period under the Kyoto Protocol. Reduction of this disadvantage may occur due to specific forest growth dynamics or targeted compensation measures such as additional planting which is assumed not to occur in most cases.

Due to the above explained reasons, it would, in principle, be beneficial for governments to import wood for energy. However, in the first commitment period, where nations have elected to account for forest management, the emissions balance of forests was no major incentive to change forest management practices or to import wood. This is partly the case because most nations with binding targets under the Kyoto Protocol have increasing forest carbon stocks. Thus wood imports could potentially allow a further increase in these stocks. However, a lack of imports does not result in an emission being accounted. In addition, carbon stock considerations are not of priority for forest practices and wood harvests because the entities taking forest management decisions (e.g. land owners) in most nations are not themselves responsible for their impact on the national emissions balance. Furthermore, wood supply, including imports, is not fully controlled by governments.

Under the Durban rules, the use of the Reference Level approach to accounting for emissions from managed forests will, depending on the specific case, in principle increase the incentive to import wood. Under the Reference Level approach, emissions are not, as they were previously, calculated as the change in carbon stocks between the beginning and end of the commitment period. Instead they will be calculated as the difference between a forecast level of emissions and the level experienced during the commitment period. Most nations forecast negative emissions (i.e. removals) corresponding to carbon stock increases. Nations will only account for removals from its managed forests if actual removals turn out

to be higher than the forecast. Where removals are lower than the forecast, emissions will be accounted. Thus, under the Reference Level approach, where removals are forecast, i.e. where the forest stocks are forecast to increase, fewer removals will be accounted than under the former system. In addition, emissions may have to be accounted even though, physically, removals take place. Therefore, the new accounting system may provide higher incentives to import wood instead of harvesting domestic wood. One may, however, consider that countries forecasted high harvest levels in order not to end up in a situation where emissions need to be accounted. In addition, for the same reasons as explained above for the first commitment period, the accounting system does not directly impact the entities deciding on wood imports. In order for the accounting system to actually influence wood imports, governments would have to put in place mechanisms that favour wood imports over the use of domestic wood. Currently, it seems unlikely that governments will intervene with the wood market to such an extent.

### **3.1.2 Harvested wood products (HWP) accounting**

The third Durban decision that may influence the use of domestic wood is the inclusion of changes in the harvested wood products (HWP) pool in KP accounting. Just as forest management, HWP falls under the reference level but is reported as a separate carbon pool. Net accounting benefits from an increased HWP pool would thus only occur if the increase exceeds the forecast. Only wood domestically produced and converted to products can be accounted under the HWP pool. This, in principle, favours the use of domestically grown wood for products over imported wood since the latter does not provide corresponding benefits for the national accounting (in fact it provides a benefit for the exporting country). For instance, the use of wood for energy may not result in a similar opportunity to garner negative emissions (see explanations above) as compared to the use of wood for HWPs. Therefore, the new rules would favour the use of domestic wood for products over use for energy. For this to impact the use of wood, however, nations will need to offer programs that encourage use of domestic wood for products in particular as an alternative to use of wood for energy or for exports. While this would be in the national interest for meeting KP targets, currently no private entities receive GHG benefits for substitution of wood for other products similar to those enjoyed by entities producing heat or power under the EU ETS. Such substitution considerations would first of all lead to a shift between wood uses within a country rather than impacting import levels. However, if an incentive to use domestic wood for products was provided, benefiting the national accounting, this may increase the demand for imported biomass for energy. Therefore, the actual impact of the rules decided in Durban on wood imports is difficult to predict.

Because only nationally produced wood can be accounted in the HWP pool, forest management and HWP are interacting directly. The fictitious example below illustrates an accounting situation for both forest management and HWP comparing the former accounting system to the system adopted in Durban.

### Example – forest management and HWP accounting

The impacts of the Durban accounting rules as compared to the former approach using a fictitious national accounting situation can be seen in Table 1. In this table it is assumed that the forest removes 8.1 MtC from the atmosphere over some time period (column a). In that same period, harvests are assumed to range from 7.2 to 11 MtC (column b) and the increase in the HWP pool corresponds to 15% of the harvest (column c).

**Table 2: Forest management and HWP accounting under pre- and post-2012 rules. Reported emissions in million tonnes carbon (MtC)**

	C uptake, managed forests	Wood harvest	Increase of HWP pool	ΔtC stocks in the forest (excl HWP)	ΔtC stocks incl HWP	Forecast (Durban rules)	Reported Emissions	
			(15% of b)	(a-b)	(a-b+c)		Pre-Durban rules = -d	Reference Level (Durban rules) = -(e - f)
Column:	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Case A	8,1	7,2	1,08	0,9	1,98	1,5	-0,9	-0,48
Case B	8,1	8,1	1,215	0	1,215	1,5	0	0,285
Case C	8,1	11	1,65	-2,9	-1,25	1,5	2,9	2,75

Under Durban rules, a forecast of emissions is required (column f). In the example, this forecast includes both the change in the forest as well as in the HWP pool. Column (g) shows reported emissions from managed forest as calculated under pre-2013 rules (first commitment period) for countries having chosen to account for forest management (similar to the carbon stock change in column d expressed as emissions). Column h shows reported emissions as calculated according to the Durban rules – the estimated actual carbon stock change (column e) minus the forecast (column f). As can be seen by comparing columns (e) and (h), a nations' negative emissions will be reduced through the application of a forecast that represents negative emissions (i.e., a carbon stock increase). From a national perspective, a perceived need to incentivize increased carbon stocks in either the forest or the HWP pool may only occur if net emissions are reported (under the Durban rules case B and C). In order to avoid a reporting of emissions due to forest management, wood imports may replace wood from domestic harvests. However, due to reasons explained above, it is unlikely that the new accounting system will importantly impact imports of wood from, e.g., the Amazon to the EU.

### 3.2 Nationally appropriate mitigation actions (NAMAs)

Nationally appropriate mitigation actions (NAMAs) are voluntary actions by development countries and countries in transition to reduce GHG emissions. The concept of NAMAs emerged under the UNFCCC Bali Action Plan in 2007. The Cancun Agreement further specified the concept in terms of, e.g., measurement, reporting and verification (MRV) guidelines and set the basis for the creation of a central NAMA registry. Registration of

NAMAs aims at seeking and matching international financial; technology; and capacity-building support for proposed actions (supported NAMAs) and at recognizing individual actions which may be implemented without international support (unilateral NAMAs). The NAMA registry is not yet operational and a prototype of the registry is foreseen to be deployed in April 2013<sup>4</sup>. Given the vague definition of NAMAs and the wide range of support options, they can be expected to strongly overlap or to be combined with instruments such as credit generation for the carbon markets (credited NAMAs).

Among the Amazon nations, three countries have submitted NAMAs to the UNFCCC: Brazil, Colombia, and Peru. Brazil does not claim the need for international support which indicates that the NAMA concept on its own may not lead to additional actions. Colombia and Peru state the need for international support for specific actions. In Columbia this includes the reduction of Amazon rainforest deforestation to zero by 2020 as well as the stimulation of biofuel production and use. The latter has a goal of a 20 per cent share of national fuel consumption by 2020 without endangering natural forests or food security. Columbia further highlights the importance of carbon markets to support commercial reforestation and REDD, including through the expansion of protected areas. Peru aims to reduce net deforestation of primary or natural forests to zero without indicating a specific timeframe and states the option to make use of the CDM and other market-based mechanisms.

The impact of the NAMA approach will strongly depend on the extent to which it will succeed in mobilizing and channelling additional support as compared to other sources such as on REDD and the carbon markets. In any case, the NAMA registry, including both the actions requiring support as well as information on available support, may help to channel available means more efficiently.

### 3.3 Reducing emissions from deforestation and forest degradation (REDD)

This chapter provides information on the following international initiatives aiming at reducing emissions from deforestation and forest degradation (REDD):

- UNFCCC;
- Multilateral initiatives: UN-REDD programme, Forest Carbon Partnership Facility (FCPF), Forest Investment Program (FIP), and REDD+ partnership;
- Bilateral agreements, and
- The voluntary carbon market.

The UNFCCC process aims at providing a broad international framework for REDD but has, even though importantly influencing other initiatives, not itself resulted in implementation so far. Multilateral initiatives mainly focus on *REDD readiness* and implementation while partly interacting with the UNFCCC process. *REDD readiness* includes in particular the

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<sup>4</sup> Draft decision -/CP.18, Prototype of the registry, Advance unedited version. [https://www.google.com/url?q=http://unfccc.int/files/meetings/doha\\_nov\\_2012/decisions/application/pdf/cmp8\\_prototypereg.pdf&sa=U&ei=lwkiUZWAiKTU0gHi-YHgCQ&ved=0CAcQFjAA&client=internal-uds-cse&usg=AFQjCNFgSEvRBnMaO97fx2sTN\\_keDZHmqQ](https://www.google.com/url?q=http://unfccc.int/files/meetings/doha_nov_2012/decisions/application/pdf/cmp8_prototypereg.pdf&sa=U&ei=lwkiUZWAiKTU0gHi-YHgCQ&ved=0CAcQFjAA&client=internal-uds-cse&usg=AFQjCNFgSEvRBnMaO97fx2sTN_keDZHmqQ)

establishment of a national REDD strategy and institutional strengthening. Bilateral agreements refer to financing, implementation and monitoring agreements between individual governments. However, bilateral initiatives are generally also based on existing national or international frameworks and structures such as the Brazilian Amazon Fund.

The carbon markets seek to generate tradable emission reduction credits by developing projects or programmes under different standards. The carbon markets can be generally divided into the compliance market and the voluntary market. The compliance market includes, as the most prominent example, the flexible mechanisms Joint Implementation (JI) and Clean Development Mechanism (CDM) under the Kyoto Protocol. Carbon market initiatives tend to be more oriented towards local or regional project implementation, while government-driven initiatives have a stronger focus on national and international frameworks.

The sections below describe how the different initiatives have evolved and provide a brief assessment of their relevance and potential impact, in particular on the Amazon.

### **3.3.1 UNFCCC and the compliance mechanisms**

Both project-based flexible mechanisms of the Kyoto Protocol – Joint Implementation (JI) and Clean Development Mechanism (CDM) – do not allow for REDD projects. In Marrakesh, in 2001, negotiations on land use, land use change and forestry (LULUCF) activities under the Kyoto Protocol led to the restriction of LULUCF activities to afforestation and reforestation under the CDM. Under JI, only those project types are allowed that correspond to the national accounting of the host country which allows for REDD activities only indirectly where it can be considered “forest management”, i.e. management of existing forests.

However, UNFCCC acknowledged the importance of REDD for global emission reductions. REDD was introduced as an item into the agenda of the UNFCCC’s Conference of Parties (COP) in Montreal in 2005.<sup>5</sup> The COP in Bali in 2007 further initiated a work program on methodological issues including the assessment of changes in carbon stocks and forest management impacts, the establishment of reference emission levels, and the assessment of the effectiveness of capacity building, of technical assistance and of demonstration activities.

The UNFCCC approach to REDD highlights the importance of national and international frameworks. More specifically, the Cancun Agreements, adopted in 2010, require developing country parties to develop a national action plan or strategy, a national forest reference (emission) level, a national forest monitoring system and a system providing information on how safeguards are addressed. Such safeguards shall assure, among others, that REDD initiatives are country-driven and consistent with national development priorities, respect national sovereignty and indigenous rights and promote sustainable forest management. The safeguards further claim that REDD initiatives shall be in accordance with national and international environmental and human rights frameworks.

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<sup>5</sup> [http://unfccc.int/methods\\_science/redd/items/4615.php](http://unfccc.int/methods_science/redd/items/4615.php) The exact title of the agenda item is “Reducing emissions from deforestation in developing countries and approaches to stimulate action”.



The UNFCCC process acknowledges the need for capacity-building and for financial and technical support to developing countries. However, even though the UNFCCC modalities for REDD are the most advanced international framework for these activities and so far provide the only framework with wide international agreement, no successful financing mechanism has been put in place yet. It is also still open whether the UNFCCC will adopt a market-based or a fund-based approach for financing. While resolving the financing issue under the UNFCCC remains on the agenda, the UNFCCC decisions on REDD provide guidance for international efforts outside of UNFCCC, such as the multilateral initiatives described below.

One example of a compliance mechanism independent from the UNFCCC and the Kyoto Protocol is California's compliance offset program. So far, a Memorandum of Understanding (MoU) with the states of Chiapas (Mexico) and Acre (Brazil) to develop sectoral REDD crediting was established in November 2010 and has resulted in the establishment of a REDD Offset Working Group (ROW).<sup>6</sup> Draft recommendations from the ROW are published and are open for public comments until end of April 2013. Recommendations relate to the REDD+ technical design elements; legal and institutional issues as well as social and environmental safeguards referring to, among others, the safeguards established under the UNFCCC Cancun Agreement. Final recommendations are announced for summer 2013 (<http://stateredd.org/>). However, even though a framework for accepting sector-based offsets from developing countries is established, the cap-and-trade regulation does not yet include any approved programs. Due to technical and legal hindrances it cannot be expected that a Californian REDD mechanism will be in place in the near future<sup>7</sup>. In addition, opposition to the acceptance of REDD under the regulation due to concerns regarding, e.g., the violation of indigenous rights<sup>8</sup> may slow down or halt the process. Sector-based offsets would be limited to 2 to 4 percent of an entity's obligation in the first three compliance periods.<sup>9</sup>

### 3.3.2 Multilateral initiatives

The initiatives listed here are the most important multilateral initiatives in terms of available funding and represent a variety of international and national stakeholders, donors and agencies such as national governments, NGOs, UN organizations, development banks and private businesses. All initiatives cooperate closely and aim at supporting both REDD readiness and implementation activities. They also cooperate with e.g. the Global Environment Facility (GEF), and the UNFCCC and aim at supporting the implementation of UNFCCC decisions.

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<sup>6</sup> <http://stateredd.org/>

<sup>7</sup> See, e.g., the REDD-related extracts of the American Carbon Registry webinar: "Update on Key Elements of California's Compliance Carbon Offset Market" of March 13, 2012. <http://www.redd-monitor.org/wordpress/wp-content/uploads/2012/05/ACR-webinar-March-2012.pdf>

<sup>8</sup> See, e.g. <http://climate-connections.org/2012/10/25/indigenous-leaders-rejecting-california-redd-hold-governor-responsible-for-their-safety/>

<sup>9</sup> Sahota, Rajinder, California Air Resources Board, 2012: California's Compliance Offset Program. Climate Action Reserve webinar, January 20, 2012

### *UN-REDD programme<sup>10</sup>*

While so far no international financing mechanism for REDD under UNFCCC is in place, the UN-REDD programme was launched in 2008 with the aim to assist developing countries prepare and implement national REDD+ strategies. It involves three UN organisations: The Food and Agriculture Organization (FAO) which established the programme, the United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP). The support for national REDD+ strategies includes capacity development for governance structures, stakeholder engagement, and development of monitoring systems and payment and benefit structures. To-date, 14 out of 35 partner countries receive support for national programme activities with a total of US\$59.3 million having been approved. In South America, Bolivia, Paraguay, and Ecuador are among these recipients.

### *Forest Carbon Partnership Facility (FCPF)<sup>11</sup>*

The Forest Carbon Partnership Facility (FCPF) became operational in 2008 and is housed within the World Bank's Carbon Finance Unit. The support to countries is provided through two funds. The Readiness Fund provides technical assistance and support to developing countries in their efforts to develop national strategies and systems for REDD+ including the establishment of reference scenarios and monitoring systems. The Carbon Fund provides countries with performance-based payments for actual emission reducing programs. The FCPF is intended to complement the UNFCCC negotiations by demonstrating how REDD+ can be applied at country level.

Thirty-seven countries, of which 15 are in Latin America and the Caribbean, are part of the FCPF. Those member nations covering part the Amazon Basin are Bolivia, Colombia, Peru, Suriname and Guyana. Of these Amazon nations, Colombia, Peru, and Guyana have so far submitted Readiness Preparation Proposals (R-PPs) with a view to entering into readiness grant agreements.

So far, 16 contributors have pledged about US\$447 million to the FCPF, roughly equally divided between the Readiness Fund and the Carbon Fund.

### *Forest Investment Program (FIP)<sup>12</sup>*

The Forest Investment Program (FIP) is a joint effort of several multilateral development banks: The African Development Bank, the Asian Development Bank, the European Bank for Reconstruction and Development, the Inter-American Development Bank and the World Bank Group. The FIP promotes sustainable forest management by providing financing readiness reforms and public and private investments according to national REDD readiness strategies. The FIP also considers climate resilience, co-benefits such as biodiversity conservation, protection of the rights of indigenous peoples and local communities, and

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<sup>10</sup> Section based on information available on <http://www.un-redd.org/UNREDDProgramme/CountryActions/tabid/584/language/en-US/Default.aspx>  
Access of 24 January 2012

<sup>11</sup> <http://www.forestcarbonpartnership.org>

<sup>12</sup> Section based on information available on <http://www.climateinvestmentfunds.org/cif/node/5>

poverty reduction through rural livelihoods enhancements. The FIP so far disposes of US\$ 578 million provided by Australia, Denmark, Japan, Norway, Spain, UK, and the US.<sup>13</sup> Among the pilot countries, Brazil and Peru represent the Amazon region. While for Brazil an investment plan was endorsed in May 2012, an investment plan preparation grant for Peru was approved in April 2011 including activities such as the identification of financing gaps, an assessment of the drivers of deforestation and forest degradation, an estimation of future land-use, the development of a stakeholder involvement plan, and the development of a monitoring and evaluation framework<sup>14</sup>.

### **REDD+ partnership**

The REDD+ Partnership (“the Partnership”) serves as an interim platform for its partner countries to scale up actions and finance for REDD initiatives in developing countries. As of August 1<sup>st</sup> 2012, the Partnership included 75 partner countries. Among the Amazon-nations, Brazil, Ecuador, Guyana, Peru, and Suriname are members. Given the important overlap between the Partnership members and the nations involved in negotiations under the UNFCCC, important feedbacks between the two processes exist. While the UNFCCC aims at reaching formal international agreements, the Partnership provides room for non-binding exchange and cooperation and for direct facilitation of REDD financing and implementation. In addition to governmental representatives, non-governmental organizations affiliated with a registered UNFCCC-observer organization can be registered as stakeholders to the Partnership. The 2010 work program is still in progress and includes the following topics:

- database of REDD+ financing, actions, and results;
- analysis of financing gaps and overlaps;
- discussion of effectiveness of multilateral REDD+ initiatives;
- share lessons on REDD+ initiatives of the Partnership, share best practices & promote and facilitate cooperation among Partners;
- institutional arrangements.

The work program for 2011-12 aims at the facilitation of readiness activities, demonstration activities, and results based actions, scaling up of finance and actions, and promoting transparency (<http://reddpluspartnership.org>).

### **3.3.3 Bilateral initiatives**

Even though an important amount of REDD funding flows through the different multilateral initiatives, a range of bilateral cooperation exists, with Norwegian and German support to the Brazilian Amazon fund being one prominent example. The table below gives an overview on the nations and amounts involved as well as of the activities that are supported.

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<sup>13</sup> <http://www.climatefinanceoptions.org/cfo/node/49>

<sup>14</sup> Forest investment program summary – Preparation Grant Request for Investment Plan, Peru. [http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Preparation\\_Grant\\_for\\_the\\_Investment\\_Plan\\_FIP\\_Peru\\_Summary.pdf](http://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Preparation_Grant_for_the_Investment_Plan_FIP_Peru_Summary.pdf)

**Table 3: Bilateral financing for REDD initiatives in the Amazon region as reported by funders and recipients**

<b>Recipient, total amount and timeframe of funding</b>	<b>Funder and amount (grants, million [M] US\$)</b>	<b>Activities/Projects, Funds</b>
Bolivia, US\$ 26.5 M 2008-2012	Spain (0.52), Denmark (2), Italy (13), Sweden (11)	social and environmental benefits, REDD+ preparation, reducing wildfires, agriculture, biodiversity, community forestry, climate negotiations, National Forestry Action Plan
Brazil, US\$ 1,050 M max. 2000-2015	Norway (1000 maximum, results based), Japan (26), Germany (7), USA (17)	Amazon Fund, technical assistance, research on carbon dynamics, support for protected areas, biodiversity monitoring , REDD readiness
Colombia, US\$ 3.1 M 2009, 2010	Spain (0.1), USA (3)	Capacity building and local awareness, Conservation Landscape and Community Forest Guard Programs
Ecuador, US\$ 49.6 M 2009-2016	Spain (0.6), Italy (9), USA (3), Germany (37)	Demonstration, capacity building, multiple benefits, conservation, livelihood enhancement, community support, MRV
Guyana, US\$ 71 M 2010-2011	Norway (70), USA (1)	Biodiversity, REDD strategy, capacity building and local awareness, governance, establishment of a framework for result-based financial support, National Forest Inventory
Peru, US\$ 18 N 2009-2013	Switzerland (1), Germany (8), USA (9)	REDD Readiness and implementation, biodiversity, conservation, forest management

Source: <http://reddplusdatabase.org> (accessed June 2012). For Amazon nations not listed no entry was found.

Bilateral initiatives overlap with or complement other governmental cooperation or support. For instance, bilateral support from the US for REDD readiness and monitoring (MRV) in Brazil is linked to the above mentioned MoU between the states of California and Acre.

The entirety of REDD funding for a country is difficult to assess. However, comparison of Table 3 with the values given for the multilateral initiatives as well as a brief comparison of funding types for individual receiving countries (REDD+ Database, <http://reddplusdatabase.org>) reveals that bilateral initiatives contribute substantially to REDD financing and partly by far exceed the contributions by multilateral sources.

### 3.3.4 REDD under the voluntary carbon market

The voluntary carbon market is the major alternative approach to REDD as compared to the above government-driven mechanisms. In 2010, land-based credits supplied almost half of credits transacted in the voluntary market, mostly coming from REDD projects (29% of the market). The importance of REDD in the voluntary market increased dramatically until 2010. Latin America was the source of 81% of all REDD credits and half of all forestry credits transacted in 2010<sup>15</sup>. The volume of credits from REDD projects dropped 59% in 2011 but still yielded the highest value of any project type (US\$ 87 M)<sup>16</sup>. REDD is expected to continue to play an important role in the voluntary market given the high international attention it receives. In particular, the voluntary market is strongly impacted by developments in the compliance markets because it partly builds on the expectation that credits will become eligible under the compliance schemes. As shown above, even though highly uncertain so far, REDD credits may become eligible for compliance at least in the U.S. (California)<sup>17</sup>.

## 3.4 Standards and certification

In the following section, some examples of standards and certification schemes for bioenergy products and for other agricultural products that are expected to be of relevance for the Amazon basin are illustrated. The figure below provides an overview of international and national initiatives applying standards and certification for biofuels. EU and U.S. policies are covered in section 4 on national and regional initiatives. In addition to initiatives on biofuels, this chapter contains examples for standards and certification schemes for agricultural products not explicitly aiming biofuel production.

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<sup>15</sup> Peters-Stanley, M., Katherine Hamilton, Thomas Marcello, and Milo Sjardin, 2011: Back to the Future – State of the Voluntary Carbon Markets 2011. Ecosystem Marketplace & Bloomberg New Energy Finance, June 2, 2011.

The numbers refer to over-the-counter market transactions which, in 2010, covered 97% of global market share.

<sup>16</sup> Peters-Stanley, M., Katherine Hamilton, 2012: Developing dimension: State of the Voluntary Carbon Markets 2012. Ecosystem Marketplace & Bloomberg New Energy Finance, May 31, 2012. Contributors: Thomas Marcello, Raquel Orejas, Anne Thiel, and Daphne Yin

<sup>17</sup> Peters-Stanley, M., Katherine Hamilton, Thomas Marcello, and Milo Sjardin: Back to the Future – State of the Voluntary Carbon Markets 2011. Ecosystem Marketplace & Bloomberg New Energy Finance, June 2, 2011

The numbers refer to over-the-counter market transactions which, in 2010, covered 97% of global market share.

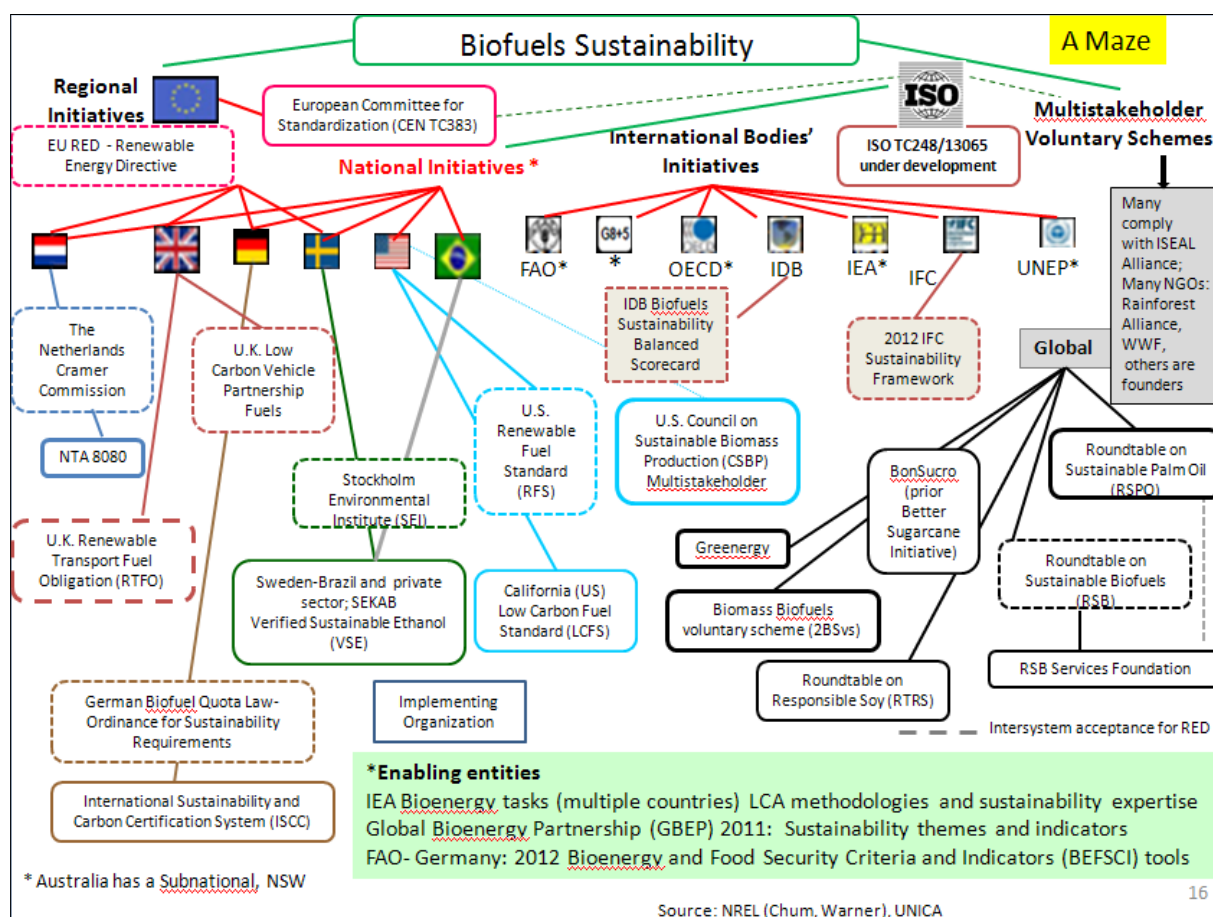


Figure 1: Simplified scheme of current biofuels sustainability activities (Chum, 2012)

### 3.4.1 Standards and certification schemes for bioenergy products

Many international and national organizations work in the field of sustainability of bioenergy products, preparation of standards, and certification of these products. The goal is to secure a sustainable biofuel production which meets criteria such as those defined by the EU renewable energy directive (EU RED). Standards for bioenergy products cover environmental, economic and social aspects. They specify the requirements for operators producing, converting, processing, trading and using biomass/bioenergy products. Standards define the criteria which have to be met by a product, to be assessed by a certification body.

### *International Organization for Standardization and the ISO/TC 248/13065*

The International Organization for Standardization (ISO), with a central secretariat in Geneva, Switzerland (<http://www.iso.org/>), is a network of 164 national standards institutes. ISO is not a certification body and therefore certification is not part of ISO's activities. ISO currently is developing a standard for the production, supply and use of bioenergy (ISO/TC 248/13065). Germany and Brazil initiated the standard in 2009, and the finalization is planned for 2014. This standard will cover all economic operators, all forms of bioenergy (not only biofuels) and globally all countries. The aim is to promote sustainable production and use of bioenergy and to facilitate trade. Four working groups have been established working on issues such as

- terminology, verification, auditing,
- greenhouse gas accounting (methodology),
- environmental, economic and social aspects, and
- indirect effects.

The standard will cover all aspects of sustainability by specifying principles, criteria and indicators, but it will not specify thresholds to be met. This is deemed to the responsibility of national schemes for which the standard may be used. For GHG accounting the standard follows the carbon footprint standard (ISO 14067), which in turn follows the Life cycle assessment (LCA) standards (ISO 14040/14044).

### *European Committee for Standardization and the European Standard CEN/TC 383*

The European Committee for Standardization (Comité Européen de Normalisation, CEN) is a major provider of European Standards and technical specifications thereby aiming at removing trade barriers for European industry and consumers (<http://www.cen.eu/>). Similar to ISO, CEN is not a certification body and therefore certification is not part of CEN's activities. On request of the European Commission, in May 2009, the CEN started working on and is currently finalizing the European Standard CEN/TC 383, called "Sustainably produced biomass for energy applications – principles, criteria, indicators and verifiers for biofuels and bioliquids", which will be available in autumn 2012 (<http://www.cen.eu/cen/Sectors/Sectors/UtilitiesAndEnergy>). It includes the following parts:

- Terminology (prEN 16214-1).
- Conformity assessment including chain of custody and mass balance covering the whole assessment of the sustainability claim of a biofuel supplier (prEN 16214-2).
- Biodiversity and nature protection including prevention of cultivation in nature protection areas, biodiverse grasslands and peatlands (prEN 16214-3).
- Calculation methods of the greenhouse gas (GHG) emission balance using a life cycle analysis (prEN 16214-4).

The scope of this standards is to achieve harmonization concerning, e.g., the distinction of residues from waste which plays an important role for the GHG emission calculations. The European Standard has been developed to assist the EU Member States and economic operators with the implementation of EU biofuel and bioliquids sustainability requirements mandated by the European Directives. It can thus be expected to have a direct impact on imports of biomass feedstock and biofuels from outside the EU.



### *Roundtable of Sustainable Biofuels and the biofuels Standards*

The Roundtable on Sustainable Biofuels (RSB) is an international initiative coordinated by the Energy Center at the École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, which has developed standards and a certification system for sustainable biofuels. The standards cover environmental, social and economic principles and criteria, developed through a multi-stakeholder process (<http://rsb.epfl.ch/>). More than 100 organizations in 30 countries all over the world support RSB (e.g. fuel makers, large and small farmers, oil companies, NGOs, UN agencies, governments and research institutes). In Brazil, the Brazilian Sugarcane Industry Association “UNICA”, the biofuel producer “Petrobras SA” and the NGO “Amigos da Terra – Amazônia Brasileira” and in Peru the Rural Amazonian Promotion and Development Center “CEPODRA” are RSB members.

RSB has developed a global set of standards, which applies to any type of biomass feedstock worldwide. For Europe, these RSB standards have been adapted to be in compliance with the Renewable Energy Directive (EU RED). The RSB standard for EU market access (RSB, 2011a) is one of the first voluntary schemes recognized by the European Commission (see also section 4.1). During the certification process of RSB the whole supply chain, including an on-site audit, is assessed by independent auditors.

RSB also deals with the issue of indirect impacts of biofuels and how to address e.g. indirect land use change and indirect impacts on food security. RSB currently develops a new certification tool for “low indirect impacts biofuels”. Reductions of indirect impacts include (RSB, 2011b):

- Feedstock yield increase;
- Production on degraded/unused land with low carbon stocks and low biodiversity values in countries with an excess or growing amount of unused arable land;
- Efficiency increases of food/feed/fiber/biofuel production through integration of food and fuel production, such as sugarcane-cattle integration;
- Biofuel production from wastes and residues that do not cause unwanted indirect effects, e.g. ethanol from straw.

The certification tool for low indirect impact biofuels was developed by Ecofys and is currently being tested (Ecofys, 2011).

On June 26<sup>th</sup> 2012, RSB announced the recognition of the Rainforest Alliance certified farms (RSB News Release 26 June 2012). The RSB and the Sustainable Agriculture Network (SAN) (for SAN see below) have started to cooperate. Upon completion of this process, Rainforest Alliance certified farms will be able to access biofuel chains by receiving RSB certification through a simplified audit process. In future, the RSB plans to recognize also other credible standards and certification schemes through similar benchmarking processes.



### 3.4.2 Standards and certification schemes for other products

#### *Sustainable Agriculture Network and the Rainforest Alliance Certification*

The Sustainable Agriculture Network (SAN) is a group of independent conservation organizations, which develops social and environmental standards for products grown on certified farms in rainforest areas (<http://sanstandards.org>). Certified farms or group administrators can apply for the SAN-Standard-based Rainforest Alliance Certified Trademark for products grown on their farm (<http://www.rainforest-alliance.org>). Since 1992, more than 600 certificates for more than 60,000 farmers in 25 countries in Africa, Asia, Latin America and USA have been finalized. Certified products include agricultural commodities (e.g. cattle, cocoa, coffee, flowers, fruits, nuts, oil palm, soy, sugar cane, tea...), forestry products and also sustainable tourism (certified hotels). In the Amazon region, there are currently 86 certified producers in Brazil, one in Bolivia, 78 in Columbia and 24 in Peru ([http://sustainablefarmcert.com/?page\\_id=23](http://sustainablefarmcert.com/?page_id=23)).

The SAN “Sustainable Agriculture Standard” (SAN, 2010a) is applicable to more than a hundred crops. The following ten categories are covered by the SAN standards:

1. social and environmental management system;
2. ecosystem conservation;
3. wildlife protection;
4. water conservation;
5. fair trade and good working conditions for workers;
6. occupational health and safety;
7. community relations ;
8. integrated crop management;
9. soil management and conservation;
10. integrated waste management.

These categories must fulfil in 99 binding criteria.

For cattle farming, a “Standard for Sustainable Cattle Production Systems” (SAN, 2010b) has been setup. The first certified cattle ranches are located in Mato Grosso, Brazil.

Since February 2011, a special “Climate Module” is available, which supplements the Sustainable Agriculture Standard by a specific voluntary set of 15 additional climate change adaptation and mitigation criteria (SAN, 2011). One of these voluntary criteria (criteria 1.13) requires a direct Greenhouse Gas emissions inventory of the farm.

#### *Round Table on Responsible Soy Association*

The Round Table on Responsible Soy (RTRS) is an international multi-stakeholder initiative founded in 2006 in Switzerland (<http://www.responsiblesoy.org/index.php>). RTRS aims at reducing social and environmental impacts and maintaining or improving the economic status for the producer due to the cultivation and use of soy. This is to be achieved through the commitment of main stakeholders along the value chain to a global standard developed, implemented and verified by the RTRS. The Executive Secretariat is based in Buenos Aires, Argentina. The RTRS has around 150 members from all over the world, including from:

Germany; Argentina; Belgium; Denmark; Spain; USA, Finland; The Netherlands; France; India; China, Singapore, Norway; Paraguay, Uruguay; United Kingdom; Sweden and Switzerland. Among the Amazonian countries, companies and other organizations from Brazil and Bolivia are members of RTRS. In Brazil, a national technical group including eight member institutions from civil society, industry, and NGOs was established.

The RTRS Principles and Criteria were developed by a multi-stakeholder working group process. Version 1 of the RTRS Standard was approved in June 2010 (RTRS, 2010). The RTRS Standard is applicable at a global level. At present, the most widely involved production regions are South America, India and China. The RTRS Standard is applicable to the production of soy for different products: animal feed, human consumption, and biofuels. The first producers were certified in 2011 in Argentina, Brazil, and Paraguay.

For producers and processors who wish to export soybeans for biofuel production or soybean based biodiesel in an EU country, the “RTRS EU RED Compliance Requirements for Producers” (RTRS, 2011) have been developed. The document sets out all requirements asked by the EU RED and has been recognized as a voluntary scheme by the European Commission in July 2011 (see also section 4.1).

### **Bonsucro**

Bonsucro is a global non-profit company and a registered trade mark of the sugarcane industry in Europe and Australia with the aim to improve the social, environmental and economic sustainability of sugarcane (<http://www.bonsucro.com/about.html>) . Bonsucro has its seat in London, UK. Many of the Brazilian sugar and bioethanol producers and other related companies and organizations are member of this international company. It emerged from the “Better Sugarcane Initiative”. Bonsucro developed a global standard for the agricultural feedstock of sugar cane. The unit of certification is the sugar mill and the linked cane supply area. The Bonsucro standard provides one single certification for both sugar and bioethanol. This allows modern sugar mills to switch between the two products depending on actual prices. Concerning social aspects, Bonsucro follows the ISEAL’s Best Practice Guidance. The ISEAL Alliance is a global association which defines codes of good practices for standard-setting organizations. The Bonsucro Standard includes specific requirements of the EU RED (Bonsucro, 2011) and the European Commission recognized this voluntary scheme in July 2011.

## **4 National and regional policies and initiatives outside of Amazonian nations**

### **4.1 EU renewable energy directive (EU RED)**

In 2009, the European Commission adopted the Directive on the promotion of renewable energy sources (Directive 2009/28/EC, here referred to as the European Renewable Energy Directive, EU RED). The EU RED defines how the EU will develop and promote renewables with the goal of reducing greenhouse gas (GHG) emissions.

The EU RED tries to control GHG emissions from biofuels production in three ways, by:

- Setting a minimum GHG emission reduction target, regardless of where in the world the emissions occur,
- Excluding certain areas for biomass production,
- Providing a bonus if degraded land is used.

Other goals are to reduce the dependence on energy imports and promote energy efficiency. This paper is focused on two issues that may influence exports of biomass or bioenergy from Brazil and potentially other nations with land in the Amazon basin, and therefore may have consequences on land use in the region:

- Mandatory national renewable energy targets,
- Sustainability criteria

#### 4.1.1 Mandatory national renewable energy targets

In the EU RED (article 3) two targets for Renewable Energy Sources (RES) are defined. First, a mandatory Community-wide target, of at least a 20% share of energy from renewables in gross final energy consumption in 2020, has been established. Second, each member state has to ensure a share of 10% renewables in the transport sector. Each member state had to adopt a National Renewable Energy Action Plan (NREAP) by June 2010 (EU RED Article 4). An analysis of all NREAPs shows that bioenergy - solid and gaseous biomass, bioliquids and biofuels - accounts for around 54% of the 2020 renewable energy target (Atanasiu, 2010).

As many of the EU countries do not have sufficient or sufficiently cheap biomass to meet their NREAP, demand on the international market will result. Solid biomass for heat and power production is, to a large extent, currently imported by the Netherlands, UK, and Belgium. Denmark, the UK, Ireland, Greece, the Netherlands and Germany are already significantly dependent on imports of biofuels and will be more so in the future if EU policies and resulting national targets are to be maintained.

Scenarios on future RES deployment in Europe as developed in the RE-Shaping study with the GREEN-X model (Resch *et al.*, 2012), show the following results: The “Strengthened National Policy” (SNP) Scenario, which represents the planned targets for RES in 2020 as indicated in the EU RED, results in a five-fold increase in EU overall annual import of biofuels between 2010 and 2020 (from 35 TWh to 175 TWh). The imports of solid biomass increase in the same period more than five-fold (from about 17 TWh to 91 TWh).

Brazil is one of the countries planning to increase exports to Europe to meet biofuel demand, both for ethanol, and biodiesel. Before 2011, Brazil did not export wood pellets for bioenergy. However, there are plans to increase the area of short-rotation eucalyptus plantations from 2014 onwards to produce 2 million tonnes of wood pellets in the states of Bahia, Rio Grande do Sul and Minas Gerais (Hoefnagels *et al.*, 2011). Part of that production can be expected to be exported to the EU. New plantations may cause either direct or indirect land-use changes. Land-use change is called direct (dLUC) in the case of changes

occurring on-site where the bioenergy feedstock is grown. Indirect land-use change (iLUC) refers to land use changes that occur in other locations as a response to using land for feedstock production that was previously devoted to food, feed or fiber production.

#### 4.1.2 Sustainability criteria for biofuels

The EU RED sustainability criteria for biofuels and bioliquids may also have important implications for land use in the Amazon basin to the extent that biomass is to be exported to the EU. The sustainability criteria include:

- GHG emission savings shall be at least 35% for the initial years in comparison to their fossil fuel alternatives. By January 2017, the GHG emission savings are raised to at least 50%, and by January 2018 to at least 60%. Calculations of GHG emission (CO<sub>2</sub>, N<sub>2</sub>O, CH<sub>4</sub>) savings of biofuels and bioliquids in comparison to their fossil fuel comparators under the EU RED can be classified as a value-chain approach. Carbon stock changes are annualized over a 20-year period, with emissions from dLUC included but so far not those due to iLUC.
- Use of biomass from areas with high biodiversity are prohibited, as well as biomass from primary forests, protected natural areas and ecosystems included in lists of inter-governmental organizations or the International Union for the Conservation of Nature (IUCN).
- Biomass can also not be used from lands, including forest and wetlands, that had high carbon stocks as of 2008 but no longer do, nor from land that was peatland as of 2008 unless no new drainage is involved.

Economic operators must demonstrate that the sustainability criteria have been met by:

- Delivering the relevant data to the national authority where the biofuel is used,
- Operating under a bilateral or multilateral agreement containing provisions on sustainability criteria corresponding to those in the EU RED, or
- Using a voluntary scheme recognized by the EC.

To date, no relevant bilateral or multilateral agreements have been established. However, as of August 2012, the EC had recognized eleven voluntary schemes, at least four of which are linked to planned imports of Brazilian biofuels. Recognized schemes are listed below.

- ISCC Germany (government financed scheme covering all types of biofuels)
- Bonsucro EU (Roundtable initiative for sugarcane based biofuels, see section 3.4.2 above)
- RTRS EU RED (Roundtable initiative for soy based biofuels, see section 3.4.2 above)
- RSB EU RED (Roundtable initiative covering all types of biofuels)
- 2BSvs (French industry scheme covering all types of biofuels)
- RSBA (Industry scheme for covering the supply chain of the Spanish company Abengoa)
- Greenergy (Industry scheme for Greenergy from UK, covering sugar cane ethanol from Brazil)
- ENSUS (a UK's bioethanol producer)
- Red Tractor (a UK's Farm Assurance Combinable Crops & Sugar Beet Scheme)
- SQC (a Scottish Quality Farm Assured Combinable Crops (SQC) scheme)
- Red Cert (a German certification system for biomass resources)

An interesting component of the EU RED is a bonus of 29 g CO<sub>2</sub> eq /MJ biofuel for the use of degraded land. The objective of this bonus is to promote cultivation of crops on degraded land and to reduce iLUC. This is particularly important because emissions from iLUC are not included in the value-chain calculations that determine whether emission reductions have been met. However, it has been shown that the incentive to use degraded land is too low and consequently the EU RED may well cause iLUC (Lange, 2011).

#### **4.1.3 Sustainability Criteria for biomass for heat and power**

Requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling are not covered by the EU RED, but it is specified that the commission has to prepare a report on the issue for the Council and the European Parliament. A first report was produced in 2010 (EC COM 2010 11). The EC recommends in this report that Member States introduce voluntary national sustainability schemes for solid and gaseous biomass used for electricity, heating and cooling, similar to those of biofuels. The Commission is currently assessing the effectiveness of this approach and is planning to publish a report (information as of August 2012).

## **4.2 U.S. programs**

There are two national-level U.S. programs with potential to impact land use in the Amazon Basin due to demand for biofuels or biomass for energy. The two programs are the Renewable Fuel Standard 2 (RFS2) established under the Energy Independence and Security Act of 2007<sup>18</sup> and upcoming regulations on GHG emissions due to use of biomass at stationary sources, resulting from the 2010 Endangerment Finding<sup>19</sup>. Both of these programs are carried out under the U.S. Clean Air Act (US CAA)<sup>20</sup>. In addition to these national programs, the California Low Carbon Fuel Standard (LCFS)<sup>21</sup> may result in demand for sugar-cane ethanol.

#### 4.2.1 U.S. Renewable Fuel Standard 2 (RFS2)

The Energy Independence and Security Act of 2007 (EISA) mandated use of 36 billion<sup>22</sup> gallons of renewable fuels by 2022. The program which specifies how this mandate is to be met is referred to as RFS2. Due both to RFS2 program changes and recent changes in U.S. renewable fuel subsidies and tariffs, RFS2 has significant potential to impact land use in Brazil. In 2011, for example, the number of Brazilian sugar-cane processors that registered to supply ethanol under the RFS2 increased from 55 to 107<sup>23</sup>.

In addition to the RFS2's overall 36 billion gallon mandate, there are also mandates for the amounts of cellulosic, biomass-based diesel, and advanced biofuels to be produced. In this system, both cellulosic and biomass-based diesel can be used to meet the advanced biofuel mandate. For a biofuel to be acceptable for each mandate, its GHG emissions must be less, by specified amounts, than the fossil fuels for which they substitute. In calculating the biofuels' GHG emissions, the emissions resulting from both direct and indirect land use change are included.

The biomass-based diesel and advanced biofuel sub-mandates in particular have significant potential to impact Amazon basin land use. Soy- and palm-oil based diesel can be used to meet the biomass-based diesel mandate. Moreover the quantity of used biodiesel is multiplied by 1.5 for the purposes of meeting the advanced biofuel mandate volume requirement; with the result that biomass-based diesel is of particular interest to U.S. fuel distributors. The advanced biofuel sub-mandate may have even greater impact on land use in Brazil because sugar-cane ethanol qualifies as an advanced biofuel.

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<sup>18</sup> U.S. Federal Register. 2010. Part II. Environmental Protection Agency. 40 CFR Part 80. Regulation of Fuels and Fuel Additives: Changes to Renewable Fuel Standard Program; Final Rule. March 26.

<sup>19</sup> U.S. Federal Register. 2009. Part V. Environmental Protection Agency. 40 CFR Chapter 1. Endangerment and Cause or Contribute Findings for Greenhouse Gases under Section 202(a) of the Clean Air Act; Final Rule. December 15.

<sup>20</sup> U.S. Code. Title 42. Chapter 85. Air Pollution Prevention and Control.

<http://www.gpo.gov/fdsys/pkg/USCODE-2008-title42/pdf/USCODE-2008-title42-chap85.pdf>.

<sup>21</sup> California Environmental Protection Agency. Air Resources Board. Low Carbon Fuel Standard Program. <http://www.arb.ca.gov/fuels/lcfs/lcfs.htm>.

<sup>22</sup> US billion = 10<sup>9</sup>

<sup>23</sup> UNICA. 2011. More than 100 Brazilian sugarcane mills registered under RFS2 can ship ethanol to the US. <http://english.unica.com.br/noticias/show>. 19.10.2011.

Table 4 shows the volumes of each category of fuel as originally established under the Clean Air Act. However, the United States Environmental Protection Agency (USEPA) has the authority to alter the amounts if circumstances warrant. The USEPA has found that the mandated levels for cellulosic biofuels are higher than can realistically be met<sup>24</sup>. Consequently the 2011 and 2012 cellulosic mandates were lowered from one hundred and two hundred and fifty to 6.5 and 10.5 million ethanol equivalent gallons, respectively. The advanced biofuel mandate has, however, remained unchanged and sugar-cane ethanol can be used to meet this mandate. Although biodiesel could also be used to meet the mandate, except when produced from waste greases, oils or fat, it is more expensive than sugar-cane ethanol. As a consequence, in 2012 U.S. demand for sugar-cane ethanol may be close to one billion gallons. Due to the limited prospects for significant production of cellulosic biofuels in the near future, if the advanced biofuel mandate remains unaltered, unless the biodiesel mandate is raised significantly, demand for sugar-cane ethanol could grow rapidly. By 2017, for example, fully eight billion gallons of ethanol would be needed. Demand at even the 1 billion gallon level could significantly impact land use and cover in the Amazon Basin through indirect land use change<sup>25</sup>. Conversion of grazing land to sugar-cane production outside of the Basin would increase pressure for grazing land within it.

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<sup>24</sup> Given the severe drought in the US in 2012, the USEPA is currently reviewing the ethanol mandate

<sup>25</sup> Nagavarapu, S. 2010. Implications of Unleashing Brazilian Ethanol: Trading off renewable fuel for how much forest and savanna land? [http://www.econ.brown.edu/fac/Sriniketh\\_Nagavarapu/brazilian%20ethanol.pdf](http://www.econ.brown.edu/fac/Sriniketh_Nagavarapu/brazilian%20ethanol.pdf).

**Table 4: Volumetric mandates (billion gallons) set under the U.S. Clean Air Act**

Year	Cellulosic	Biomass-based diesel	Total advanced biofuels*	Total renewable
2009		0.5	0.6	11.1
2010	0.1	0.65	0.95	12.95
2011	0.25	0.89	1.35	13.95
2012	0.5	1.0	2.0	15.2
2013	1.0	A	2.75	16.55
2014	1.75	A	3.75	18.15
2015	3.0	A	5.5	20.5
2016	4.25	A	7.25	22.25
2017	5.5	A	9.0	24.0
2018	7.0	A	11.0	26.0
2019	8.5	A	13.0	28.0
2020	10.5	A	15.0	30.0
2021	13.5	A	18.0	33.0
2022	16.0	A	21.0	36.0
2023+	a	A	a	a

a = To be determined through future EPA rule making

\* Total advanced biofuels is the sum of cellulosic, biomass-based diesel and other fuels that qualify as advanced, e.g., sugar cane ethanol.

Other factors that are likely to lead to increased demand for imported ethanol are changes in U.S. subsidies and tariffs. Subsidies bolstering U.S. renewable fuels and tariffs inhibiting imports have either already ended or are likely to end by the end of 2012. The 45 cents per gallon tax credit that U.S. ethanol producers received ended at the end of 2011. As of the beginning of 2012, the 54 cents per gallon import tariff on ethanol ended. As of the end of 2012, the US\$ 1 per gallon credit granted to U.S. biodiesel blenders will expire unless renewed. Under current U.S. conditions renewal is unlikely. All of these changes render Brazilian biofuels more competitive with U.S. ones. The end of ethanol subsidies and tariffs may render sugar-cane based ethanol sufficiently cost-competitive with U.S. corn-based ethanol so that, in addition to being used to meet the advanced biofuel mandate it may also be of interest to distributors for meeting the much larger total renewable fuel mandate.

#### 4.2.2 U.S. Stationary sources, proposed approach

As a result of the Endangerment Finding, GHG emissions from all sources in the United States will be subject to regulation. The CAA, under which the Endangerment Findings will be translated into regulations, addresses mobile sources separately from stationary sources. The regulations that are being drawn up for stationary sources do have potential to impact



imports of biomass for heat and power. This is a result of the way in which GHG emissions at the point of combustion are treated.

The United States will not follow the Kyoto Protocol approach in which carbon dioxide (CO<sub>2</sub>) emissions due to combustion of biomass are not accounted for in the energy sector (combustion factor = 0). In fall 2011, the USEPA published a proposed approach to CO<sub>2</sub> emissions from combustion of biomass at stationary sources<sup>26</sup>. The USEPA approach is similar to that used in the EU Renewable Energy Directive insofar as GHG emissions that occur along the entire biomass production-transportation-storage-processing value chain are used to determine the emissions due to use of a specific batch of biomass for energy (for the EU Renewable Energy Directive see section 4.1). However, the U.S. system differs from the EU RED system in two important ways. First, only emissions due to carbon stock changes are considered. Neither emissions due to use of fertilizer nor emissions due to use of fossil fuels in biomass production or transport are included. Second, the results of the calculation are used to determine a factor, or multiplier, that is applied to the CO<sub>2</sub> emissions. This approach discourages, but does not prohibit, use of biomass by stationary sources where it results in reductions of terrestrial carbon stocks.

The factor calculated is referred to as the biogenic adjustment factor (BAF). This multiplier will usually fall between zero and 1. A factor of, e.g., 0.2 would indicate that uptake of CO<sub>2</sub> from the atmosphere has balanced 80% of the carbon lost to the atmosphere due to lower carbon stocks on the landscape and carbon released during transport, storage and processing. Carbon that leaves the stationary source in the form of products, or sequestered underground, is not considered as having entered the atmosphere for the purposes of calculating the factor. A BAF of 1 would occur, for example, if reductions of carbon stocks in the forest region from which the wood together with carbon losses along the value chain equal the carbon in the stationary source's CO<sub>2</sub> emissions. In this case CO<sub>2</sub> emissions from combustion of biomass would be treated exactly like CO<sub>2</sub> emissions from fossil fuels. Thus the approach will encourage stationary sources to source biomass of types and from situations where carbon losses on the landscape and during transport are low.

The proposed approach distinguishes between three basic types of biomass: forest-derived woody biomass, agricultural biomass and wastes. It is assumed that wastes would degrade and release their carbon to the atmosphere in any event. Therefore the BAF for CO<sub>2</sub> emissions resulting from combustion of wastes is assumed to be 0. Agricultural residues are, however, classified as agricultural biomass, not as waste. Although the proposed approach recognizes the importance of indirect land-use change, it does not as yet provide a methodology for including them in the BAF calculation. It is expected that reductions of carbon stocks will be measured by comparing carbon stocks at the end of the time period to those at its beginning. However, a revised document is expected in which this issue will be clarified. The USEPA has commissioned a Science Advisory Board (SAB) to review the fall 2011 approach and make suggestions for change or improvement. In July 2012, the SAB

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<sup>26</sup> USEPA. 2011. Accounting framework for biogenic CO<sub>2</sub> emissions from stationary sources. Office of Atmospheric Programs. [http://www.epa.gov/climatechange/emissions/biogenic\\_emissions.html](http://www.epa.gov/climatechange/emissions/biogenic_emissions.html).

released a draft report which is to be reviewed and publicly commented. It can be expected that the principal concepts in the September 2011 report will be maintained but it will take several month until a final USEPA report will be released.

#### **4.2.3 California Low Carbon Fuel Standard**

California's Low Carbon Fuel Standard (CA LCFS) requires a 10% reduction in the overall carbon intensity of transportation fuels used in California (CA) by 2020. The CA LCFS will not have a direct impact on production of oil crops in Brazil because the only biodiesel accepted under the program is biodiesel from waste oils and Midwest soybeans. Indirect impacts, however, may occur if the LCFS increases the demand for Midwest soybeans to an extent that additional imports for, e.g., soybeans for fodder would be required. The potential impact of the standard on Brazilian ethanol production and sales cannot be determined at this time because implementation has been halted pending the outcome of a federal law suit. Parties have objected to the LCFS on the grounds that it violates the Commerce Clause of the U.S. Constitution (Article I, Section 8, Clause 3). This clause grants Congress the authority to regulate commerce among the various states. The parties objecting to the CA LCFS contend that CA has usurped the federal power because it will close the CA fuel market to mid-west corn ethanol producers.

The negative impact of the CA LCFS on mid-west corn-ethanol producers results from the high emission values (gCO<sub>2</sub>e/MJ) assigned to mid-west ethanol (Table 5) and the average emission intensities providers of transportation fuels must achieve (Table 6). A comparison of the tables shows that by 2016 only the two least carbon-intensive ethanol production processes in the mid-west would meet the standard.

**Table 5: Emission intensity for mid-west ethanol**

Process	Direct emissions (gCO <sub>2</sub> /MJ)	Land use & other indirect (gCO <sub>2</sub> /MJ)	Total emissions (gCO <sub>2</sub> /MJ)
Dry mill, wet DGS, 80% NG, 20% biomass	56.80	30	86.80
Dry mill, wet DGS, NG	60.10	30	90.10
Dry mill, dry DGS, 80% NG, 20% biomass	63.60	30	93.60
Wet mill, NG	64.52	30	94.52
Dry mill, dry DGS, NG	68.40	30	98.40
Wet mill, 60% NG, 40%	75.10	30	105.10
Wet mill, coal	90.99	30	120.99

**Table 6: Required emission intensity**

Year	gCO <sub>2</sub> e/MJ
2011	95.61
2012	95.37
2013	94.89
2014	94.41
2015	93.45
2016	92.50
2017	91.06
2018	89.62
2019	88.18
2020	86.27

Source for both tables: Final Regulation Order amending section 95486, title 17, California Code of Regulations (CCR).  
[http://www.arb.ca.gov/fuels/lcfs/CleanFinalRegOrder\\_02012011.pdf](http://www.arb.ca.gov/fuels/lcfs/CleanFinalRegOrder_02012011.pdf)

In contrast to mid-west ethanol, Brazilian sugar cane's emission values (Table 7) are considerably lower than the carbon intensities required through 2020. Thus if the CA LCFS were to be implemented with the current values, Brazilian ethanol would offer a significant advantage to fuel distributors.

**Table 7: Carbon intensity for Brazilian sugarcane ethanol**

Process	Direct emissions (gCO <sub>2</sub> /MJ)	Land use & other indirect (gCO <sub>2</sub> /MJ)	Total emissions (gCO <sub>2</sub> /MJ)
Average production, mechanized harvest & co-production of electricity	12.4	46	58.40
Average production, co-production of electricity	20.40	46	66.40
Average production process	27.40	46	73.40

Source: Final Regulation Order amending section 95486, title 17, California Code of Regulations (CCR).  
[http://www.arb.ca.gov/fuels/lcfs/CleanFinalRegOrder\\_02012011.pdf](http://www.arb.ca.gov/fuels/lcfs/CleanFinalRegOrder_02012011.pdf)

For example, in 2012 a fuel provider would receive 36.97 gCO<sub>2</sub>e/MJ credit (the difference between the target carbon intensity and the intensity of the fuel sold, i.e., 95.37-58.40) for Brazilian sugar-cane ethanol but only 8.57 gCO<sub>2</sub>e/MJ (95.37- 86.80) for mid-west corn ethanol, using the lowest values in each case.

One problem that has been pointed out is that, as currently conceived, the LCFS would most likely result in Brazilian sugar-cane ethanol being shipped to CA and U.S. corn ethanol being shipped to Brazil to meet ethanol demand there. Such cross shipment suggests that the CA LCFS would have the perverse result of increasing greenhouse gases (GHGs) outside of CA while attempting to lower them within the state.

### 4.3 Chinese policies and trade

China has a high demand for biofuels and increasingly for soybeans which cannot be met domestically. The following sections give some insight in the role that this demand may play for land use in Amazonia and in particular in Brazil.

#### 4.3.1 Biofuel targets in China

Because of high economic growth, petroleum consumption in China is rapidly increasing. In 2002, the Chinese government started to mandate the use of bioethanol blend gasoline in five cities (Koizumi, 2011). Meanwhile the E10 program (10 percent ethanol blended into fuel) has been expanded to 10 provinces. In 2011, a diesel fuel blend standard requiring 5% Biodiesel (B5) was implemented. Hainan province is the first pilot province to use the B5 (USDA, 2011).

Currently China produces bioethanol mainly from corn, and to a smaller part from wheat and cassava. With 1.68 million tonnes of ethanol in 2010 (USDA, 2011), China is the world's third-largest producer after Brazil and USA. As corn for bioethanol production was competing with corn consumption for feed, food and other uses, the Chinese government started to promote biofuels based on non-food feedstock. The used feedstock for biodiesel production is cooking and vegetal oil. The annual biodiesel production was at 0.118 million tonnes in 2010.

The 2007 renewable energy plan of the Chinese Energy Bureau of the National Development and Reform Commissions (NDRC) includes a target for bioethanol from non-food feedstock of 2 million tonnes in 2010 (not reached) and 10 million tonnes in 2020. Due to rising food prices, however, the government stopped approval of new ethanol plants and there is no longer a specific target for ethanol or biodiesel production in the 11<sup>th</sup> five year plan (2011-2012).

Brazil as the world's largest bioethanol producer is interested in exporting bioethanol also to China as one of the largest potential consumers of biofuels. A cooperation memorandum on energy and mining between China and Brazil was signed in 2009 (Masiero, 2011). The level of bioethanol imports from Brazil to China was up to now insignificant. However, Chinese companies are buying land in Brazil (state of Bahia and Gojas) in order to produce food and/or fuel for the Chinese market. Masiero (2011) states that unofficial statistics indicate 7 million hectares owned by Chinese which would be well above the official estimate for all foreigners but that it is nearly impossible to know the exact share of Chinese or other foreign investments in the Brazilian agriculture sector.

### 4.3.2 The current and future soybean trade between China and Brazil

Due to high Chinese demand and growing Brazilian production levels, soybean trade between the two countries plays an important role. While China cannot meet its soybean demand domestically, projections from the Brazilian Ministry of Agriculture indicate that the total crop area under cultivation in Brazil will increase from around 60 million hectares in 2010 to 69.7 million hectares in 2020. From the increase of 9.7 million hectares, 4 to 5 million hectares are projected to be used for soybean production (Dossa *et al.*, 2010). The US-based Nature Conservancy (TNC, <http://www.nature.org/aboutus/>), prepared the report “An overview of the Brazil - China soybean trade and its strategic implications for conservation” (Brown-Lima *et al.*, 2011). The following text is based on this report.

China is currently the biggest soybean importer with 41.1 million tonnes in 2009, which correspond to 53% of worldwide imports (USDA-FAS, 2010). Since 2009 Brazil is the most important trade partner of China with soy bean trade playing a significant role. China has a growing population but a reduction of croplands because of desertification in northern China, where soybeans have traditionally been grown. At the same time, Brazil is rapidly expanding its agricultural production, in particular production of soybean. This has created a new food trade link between these two countries. In 2009, Brazil exported 15.9 million tonnes of soybeans to China, which corresponds to 56% of its total exports. The Brazil – China soybean trade over the next decade (2010 – 2020) has been projected by TNC in three scenarios: business as usual, business above the projected and business below the projected. Based on this, implications for demand for land in Brazil and especially in Mato Grosso have been estimated. Also strategic implications for conservation in Brazil have been examined. Based on the scenarios, the Brazilian soybean exports to China will rise by between 70% and 90% by 2020. The projections of soybean exports from Brazil to China in 2019/2020 range between 29.9 million tonnes and 35.6 million tonnes.

For the Amazon area, a soy moratorium exists since 2006. Mato Grosso is the major Brazilian state for the production of soybeans and will remain to be it also in the future. Mato Grosso currently has around 22 million hectares of extensively used pasture land. TNC states that the increase of soy demand from China can easily be met through converting pasture in more intensively used cropland in Mato Grosso while protecting areas of intact and highly biodiverse forests and grasslands. In order to achieve this, and to avoid displacement to the Cerrado, TNC suggests measures such as the intensification of production systems on land already cleared, application of land-use monitoring, and a mapping of land available for agricultural expansion at minimal biodiversity cost, rather than redlining high conservation value areas (Brown-Lima *et al.*, 2011). Such measures are stated as particularly relevant because the Chinese market is up to now unconcerned about environmental footprints and certification.

## 5 Brazilian public policies affecting the Amazon

### 5.1 THE BRAZILIAN FOREST CODE: RATIONALE AND CURRENT STATUS

The Brazilian Forest Code (FC) was created almost 50 years ago and it was intended to be a tool for soil/water resources management and for environment protection as well. The law required the maintenance of natural vegetation along the rivers, streams and lakes, on tops of hills and mountains and on steep hillsides. At same time the FC became law, the Government was also promoting several other policies aiming the integration of the Brazilian Amazon territory, like opening roads, attracting farmers to the region and requiring them to make productive use of the land, which is commonly understood that landowners must clear some forests for agriculture purposes or risk losing the land. In the Amazon region the FC required rural properties to maintain 50 percent with the native forest. Because of multiple reasons, the FC has never been enforced but always served as a point of dispute between the agriculture and environmental communities.

The Forest Code includes two types of conservation areas: permanent preservation areas (PPAs) and legal reserve areas (LRAs). PPAs are geographically explicit and aim at protecting water resources, soils, and biodiversity. LRAs are not geographically explicit and aim at biodiversity conservation in more general terms. Since the FC legislation was never enforced, the non-compliance with PPA and LRA requirements occurs in all regions that have significant agricultural land use. The total compliance with the FC, if achieved through the replanting of natural vegetation, would be very costly. It is expected that farmers will have to reforest 24 million hectares, which would be by far, the greatest reforestation program in the world.

In 1996, at the same time that Brazil started positioning itself as a net exporter of agricultural products, the international pressure to protect the Amazon was intense and Government decided to increase to 80 percent the protected area and made it through a "Provisory Measure". Since then, the Congress has never voted this measure mainly due to the implications it would bring to agriculture, one of the most important segment of Brazilian economy. In addition, In 2009 the legislation on environmental crimes turned into criminals the large majority of farmers in Brazil, particularly in the Amazon region. In order to avoid this, the Government postponed the criminal and the penalties for violators of the Forest Code.

In an attempt to minimize the problem, the Congress recently approved many modifications on the Forest Code. Among the proposed changes that worried environmentalists are the exemption of small landowners from requirement to preserve 80% forest and to give an amnesty to landowners who cleared forest before 2008. The proposed changes did not please any side. While environmental supporters (mostly NGO's) are divided, with some considering a huge step back and others considering a pragmatic and constructive step, the productive sector is still afraid of the economic implications on their agricultural activities and claim that it will surely affect a large number of farmers' competitiveness and therefore

it is perceived as a barrier against development of the agricultural sector. The following are some insights on polemic issues of the Forest Code:

### **5.1.1 Amnesty**

There is a discussions on whether the proposed changes of the FC is really an amnesty or just a way to bring into the law the large majority of farmers in the Amazon. The new FC may solve the illegality problem but fails in promoting additional conservation, as environmentalists want. The fear is that agricultural production may grow based on unnecessary conversion of forests to agriculture land.

With the proposed substitutive FC, Brazilian lawmakers are expecting to create conditions for farmers to start following the new regulations. They argue that granting farmers the amnesty will bring them into the law and this measure coincides with protecting the Amazon's future from potential dangers. Amnesty and reforestation are Brazilian lawmaking attempts to provide a positive strides for the Amazon's future.

### **5.1.2 Compensation mechanism**

The compensation mechanism is another lawmakers attempt to make the FC implementation possible without major disturbances on current production areas. It creates the possibility of farmers to compensate deforested areas through the acquisition and conservation of an equivalent preserved land in another place.

Another way proposed for compensation is through payments to the public treasury. This is the most criticized mechanism because it is seen as if the protection of forest may be removed in exchange for money.

Environmentalists usually see compensation mechanisms as room for reducing the protection on the farm and argue that it has proven to be difficult to apply.

Some analysts indicate that, if the proposed reductions in legal requirements for PPAs and LRAs included in the substitutive FC are turned into effect, there will be no need for off-farm compensation.

### **5.1.3 Differential treatment of small vs. large land-owners:**

There are differential treatments between large and small farmers in the current Forest Code. The following are some:

- Small properties are allowed to substitute APPs by sustainable agri-forestry activities that are practiced in small properties.
- It allows compensation for deforestation to be carried out in areas of Legal Reserve by the cultivation of exotic tree species.
- The State environmental Agency is supposed to provide technical support for restoration of Legal Reserve.
- Small farmers can use protected areas under the system of forest management.

- No obligation to recover the legal reserve for small land-owners in properties of up to four “fiscal modules” (up to 400 hectares in the Amazon)

Environmentalists consider the last issue above the most problematic but others argue that this is intended to enable the survival of small farmers. The risk to use the size of properties as reference is that it could allow the extension of the benefit to landowners who do not depend on agriculture for subsistence.

Since the production of a considerable amount of food crops, like rice and beans, are in hands of small farmers, changes in the forest legislation and differential treatment are seen as necessary in order to avoid food shortage in Brazil. In addition, the argument that family farming is a potential incentive for employment reinforces the need for differential treatment.

It is a common sense that by lowering the protection requirements and increasing the compensation possibilities, the substitutive FC may provide a feasible solution for the illegality problem, but it may not be effective in promoting conservation in areas where natural land is presently under highest pressure from agriculture expansion, like is the desire of environmentalists.

#### 5.1.4 Final remarks

Environmentalists and agricultural development experts have different approaches for gaining this political battle. While environmentalists use different media resources to influence public opinion, the “ruralists” rely mostly on their strong lobby inside the Congress.

The Brazilian society’s opinion about the Forest Code is divided. If in one hand everybody is against the destruction of the environment, they also do not want to see Brazilian agriculture losing its competitiveness in the commodity market.

Dealing with the balance between farming land and protecting land has been the most difficult issue of the legislation. Although the need for changes in the Forest Code is immediate, these modifications would require a broader debate on sustainable development especially if one considers agricultural production and the new paradigm for food security in a global level instead of prioritizing specific and immediate interests of any part.

On May 25, 2012, the Brazilian President Dilma Rousseff made 12 vetoes and 32 other alterations to the substitutive Forest Code and included a requirement for large landowners to reforest land they had illegally cleared, with less stringent requirements on smaller farms. The partial veto gave to the Government some time for manoeuvring the current dispute between environmentalists that were appealing for a total veto and the agribusiness sector, hoping to keep the current text and immediately have the FC going into law. As it was expected, nobody on either side of the issue is completely satisfied with this partial veto.

The forest code will continue to require that growers maintain forest coverage equating to 80 per cent of the farm's land in the Amazon region and put the onus on larger-scale farmers to replace a larger portion of their forest, while it is less restrictive to small properties.



## 5.2 CREDIT AND SUBSIDIES PROGRAM

### 5.2.1 MMA (Ministry of the Environment)

**FNMA<sup>27</sup> – The National Fund for the Environment** is a 22 years old program, considered the first one created in Latin America. It works as a financial agent, through the implementation of the Environmental National Policy – PNMA. It has supported 1.400 socio-environmental projects investing US\$ 115 million in sustainable use of natural resources initiatives.

**PNMA II- Environmental National Program – Phase II.** Focused on institutional building to strengthen management capacity of environmental agencies at national, state and county levels. The first PNMA was operational from 1991 to 1998 with the main objective of creating conservation and protection units. After 1993, another program, the PED – Decentralised Execution Program, provided the concept of capillarity all over the country.

The PNMA II was divided into Phases I and II, managed at the three governmental levels (National, State and County) for promotion and implementation of sustainable practices at governmental levels, particularly the ones that impact the environment. In other words, the program aims at contributing to integrated sustainable management in the country, effectively improving the environmental quality and generating socioeconomic benefits.

The PNMA II, Phase I started in July 2000 and ended in July 2006, with a budget of US\$ 18, 4 million. The Phase II is co-financed by the World Bank with an approved budget of US\$ 24,3 million and a Brazilian contribution of US\$7,29 million.

### 5.2.2 AMAZON FUND (FUNDO AMAZÔNIA)

The Amazon Fund raises funds from donations and non-reimbursable investments in the prevention and monitoring of forest clearing activities and promoting the conservation and sustainable use of the Amazon biome. The Fund supports projects in the following areas - public forest management and protected areas; control, monitoring and enforcing of environmental laws; sustainable forest management; economic activities developed from the sustainable use of forests; ecologic and economic zoning; land titling; conservation and sustainable use of biodiversity and recuperation of degraded areas. The Fund is managed by BNDES - Banco Nacional de Desenvolvimento Econômico e Social, which is also responsible for fund raising, financing and monitoring of projects.

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<sup>27</sup> [www.mma.gov.br/fundo-nacional-do-meio-ambiente](http://www.mma.gov.br/fundo-nacional-do-meio-ambiente).

### 5.2.3 GREEN AID (BOLSA VERDE)<sup>28</sup>

Bolsa Verde is a Program for environmental conservation designed for extremely poor families living in areas considered as priorities for environmental conservation. The goal is to increase their income and promote their sustainable activities. In Conservation Units allowing forest use, the communities are stimulated to replace some of their activities, such as hunting, fishing and illegal clearing.

### 5.2.4 ARPA<sup>29</sup> – Amazonian Protected Areas

ARPA is a program funded by GEF - Global Environment Facility, through an institutional arrangement with the World Bank, KFW (German Government), the WWF network (through BNDES/Amazon Fund). ARPA started in 2002 and is considered one of the biggest conservation programs for tropical forest in the world. It aims to expand and strengthen the System of Conservation Units, which maintains 60 million hectares and promotes the sustainable development in the region allocating funds for the management of these areas in a short and long run.

### 5.2.5 CLIMATE FUND (FUNDO CLIMA) – National Fund for Climate Change

The main objective of the National Fund for Climate Change is to support projects and programs in line with a development model envisioning low emission of gases that are responsible for the greenhouse effect, aiming at environmental, social and economic sustainability, with the improvement of life conditions of populations, poverty reduction and social inclusion, respecting the ecological-economic zoning (see chapter 5.5). It also searches for synergy with governmental programs and policies focusing on large investment programs; avoiding overlapping and duplication of financing and providing efficiency on the use of funds; promoting technological innovation, especially on the implementation of low carbon technologies. The non-reimbursable funds are managed by the Ministry of Environment and the reimbursable funds are managed by the BNDES. The fund sources of Fundo Clima follow the “Lei Orçamentária Anual da União” (Annual Budget Law); funds from oil production; donations from national and international organizations, public and private.

### 5.2.6 National Program of Solid Residues - PNRS (Programa Nacional de Resíduo Sólidos).

Considering that Amazonian cities are surrounded by forests and rivers, there is a demand for technology for handling the garbage produced by these cities in order to avoid contamination of underground water. Besides, it is a requirement to comply with the current policy for dealing with sewage in the cities of Amazonia. This program implementation is based on a public and private partnership at county level.

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<sup>28</sup> [www.mma.gov.br](http://www.mma.gov.br) - Ministério do Meio Ambiente.

<sup>29</sup> [www.programaarpa.org.br](http://www.programaarpa.org.br)

### 5.2.7 Ministry of Agriculture (MAPA)

**ABC Plan (PLANO ABC)**<sup>30</sup> – It is a Plan for mitigation and adaptation to the climate change for the establishment of an agriculture based on low carbon emissions. The main objective is to organize and plan actions that are related to adopt sustainable agricultural production technologies in a ten year framework, from 2010 to 2020, with an estimated budget of around US\$ 100 billion. The funds are released through rural credits, to finance activities of seven programs (see [www.agricultura.gov.br](http://www.agricultura.gov.br)).

Funds come from several sources, including BNDES, Banco do Brasil and Banco da Amazonia. At MAPA's site ([www.agricultura.gov.br/desenvolvimento-sustentavel](http://www.agricultura.gov.br/desenvolvimento-sustentavel)), it is stated that Plano ABC "should be seen as a tool that integrates all governmental (federal, state and county) actions aiming to reduce the emission of greenhouse effect gases (GEE) from the productive sector and society as a whole.

The engaged governmental organizations working under the coordination of MAPA and MDA are: Secretaries of Agriculture, Secretaries of Environment, Embrapa, other research organizations and banks, and representatives of the civil society (productive sector, workers, college students, cooperatives, etc.).

Seven implementation programs are planned:

Program 1: Recuperation of degraded pasture – 15 million of hectares are planned to be recuperated towards lower losses in productivity and better capacity to support higher production levels and the required quality animals require. This will minimize the impact caused by degradation, like the greenhouse effect.

Program 2: Integration of Crop-Animal husbandry-Forestry i.e., production systems that contribute to the recuperation of degraded areas, including a forest component, promoting the generation of jobs and income, and stimulating the adoption of good agricultural practices to add value to environmental services. The objective of this program is to implement the system on 2.76 million hectares.

Program 3: Non-tillage practices in systems associated with conservation agriculture that contributes to soil and water conservation, increases the efficiency of soil fertilization through the increase of organic matter in soil, lowers the energy and agrochemicals needed for production, mitigates the emission of greenhouse gases and promotes the resilience of soils. It also increases the financial benefits to farmers. The goal is to increase about 8 million hectares with this practice.

Program 4: Biological fixation of Nitrogen to reduce the emission of greenhouse gases and to increase carbon sequestration by maintaining the organic matter in the soil, improving soil fertility and the cost/benefit ratio. The objective is to expand the adoption of this system in 5.5 million hectares of cultivated land with less use of Nitrogen fertilizers.

Program 5: Commercial planted forests. The objective of this program is to promote actions of reforestation in 3 million hectares of rural properties as a rentable activity. Besides

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<sup>30</sup> [www.Agricultura.gov.br/desenvolvimento-sustentavel/](http://www.Agricultura.gov.br/desenvolvimento-sustentavel/)

capturing CO<sub>2</sub> from the atmosphere, it will increase the offer of wood for the productive sector and create new sources of income.

Program 6: Treating animal sewage. Create incentives for the correct treatment of animal sewage and comply with the environmental regulations in rural properties. The objective is to increase the use of technologies in around 4,4 million of cubic meters. The correct treatment of animal sewage contributes to lower the emission of methane, promoting sustainable practices with the reduction of energy costs, chemical inputs and lowering the environmental risks.

Program 7: Adaptation to climate changes. This program's objective is to promote diversified systems and the sustainable use of biodiversity and water resources. During the transition process, the support of methodologies for the organization of production, income generation and genetic resources use, water resources adaptation of productive systems, identification of vulnerabilities and modelling.

### 5.2.8 Ministry of Agrarian Development (MDA)

**PRONAF<sup>31</sup>**, the **Program for the Strengthening of Family Agriculture** was created to finance Family Agriculture activities that require labour of rural farmers and family. This kind of financing is for small producers that work in their land as owners, settlers, etc. It is an obligation to use the land in a sustainable way.

Pronaf attends six funding lines:

Pronaf 1 – Agroindustry – financial support, investment and infrastructure for processing and commercialization of agricultural production, forest products and craft products besides agrotourism.

Pronaf 2 – Woman – Financial support for agricultural activities developed by women.

Pronaf 3 – Agroecology – Financial support and investment in agroecologic and organic systems, including the costs related to the establishment, utilization and maintenance of the business.

Pronaf 4 - Eco – Financial support and investment for the establishment and use of renewable energy, environmental technologies, water saving, planted forest, and adoption of conservation practices for soil correction and fertility.

Pronaf 5 – More food – Financial support to promote increase in production and productivity with reduction in production costs that increase family income.

Pronaf 6 – Debts Composition – Credit lines for the composition of debts from financing of Pronaf with funds from BNDES.

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<sup>31</sup> [www.mda.gov.br](http://www.mda.gov.br)

### 5.2.9 Ministry of Fishery and Aquaculture (MPA)

The **Project Amazonia Aquiculture and Fishery** – promotes the creation of fish production using native species in a sustainable way. The MPA does research for stimulating the development of fishing sector and search the strengthening of teaching, research and extension related with fishery.

## 5.3 SOY MORATORIUM

The fast growth in Brazil's soybean production areas during the last decade and its expansion into the country's Center-West region raised the possibility that soybean production was associated to the increase of deforestation in the Amazon Biome. Anticipating the possibility that trade barriers could be built against Brazilian exports, ABIOVE (Brazilian Vegetable Oil Industry Association) and ANEC (Brazilian Grain Exporters Association) decided not to purchase this grain originated from areas of the Amazon Biome deforested after July 2006. This initiative is called Soy Moratorium. They pledge not to trade soy produced in deforested areas of the Amazon Biome after that date. By doing that, the moratorium seek to conciliate environmental preservation with the region's economic development, taking into consideration the responsible and sustainable use of Brazil's natural resources. The Soy Moratorium was renewed for the 4th time on July 2010, always maintaining ABIOVE's and ANEC's member companies' commitment not to acquire soybeans from any deforested area, from July 2006 on.

For the Monitoring of the Soy Moratorium, the Soybean Working Group (GTS) was created. The GTS group is composed of the following members: ABIOVE's and ANEC's member companies, Ministry of the Environment (MMA), Banco do Brasil and Civil Society Organizations (Conservation International, Greenpeace, IPAM, TNC and WWF-Brazil) – in partnership with INPE, National Institute For Space Research, that developed a special tool to detect the presence of agricultural crops in deforested areas through a satellite image classification system. The Data Base of institutions such as FUNAI, IBAMA, IBGE, IMAZON and INPE is also used to obtain secure information about the relationship between soybean production and deforestation in of the Amazon Biome.

## 5.4 POLICY FOR LAND TITLING

### 5.4.1 Ministry of Agrarian Development (MDA) - Special Secretary for Land Titling in the Amazon

**The Legal Land Program.** In 2009, the MDA, together with State and County governments, initiated a new phase in the process of conservation and implementation of sustainable production models for the Amazon. The main objective of the program is to promote legal land use by legitimating previous occupations, particularly for small land holders of local communities that make possible for them to have access to credit and other benefits and, at

the same time, commitment to follow public policies for the preservation of the Amazon biome.

#### 5.4.2 Ministry of Social Development (MDS)

##### **INCRA – National Institute for Colonization and Agrarian Reform**

The **II National Plan of Agrarian Reform** was presented in 2003 and is based on the fact that sustainable practices in rural areas depend on a better agrarian structure. Therefore, the II Plan involves the implementation of new settlement projects based on sustainable development views.

- National Database of rural properties-CNIR. It is associating the use of satellite monitoring tools that includes georeferenced data for all rural properties in Brazil.
- Improvement of settlements created lately based on available data for improving the National System of Settlement information for Agrarian Reform – SIPRA.
- Land Credit - this program integrates the II PNRA as a tool for complementing the appropriation of land.
- Promotion of Gender in Agrarian Reform. A money contribution to rural woman.
- Land title to minorities. Besides the recognition of these groups, the program creates incentives for small holders to stay in their lands.
- Resettlement of non-Indians present in Indian land. It is based in two main actions: Indian land demarcation and the resettlement.
- Forest products exploitation and forest settlement – The so called Extractive Reserves are areas formally recognized by the MMA where communities living in the forest are considered rural workers that make their living from the forest resources.
- Population affected by the construction of Dams. The program includes the implementation of a policy of resettlement of rural populations.
- Riverside populations. The II Plan includes public policies that recognizes the needs of these populations.

The II Plan objectives are:

1. 400,000 new families settled.
2. 500,000 families with land title.
3. 130,000 families receiving land credit.
4. Restore production capacity and economic viability of existent settlements.
5. Create 2,075,000 new jobs in the settlements.
6. Implement the georeferenced database and regularization of 2.2 million rural properties.
7. Recognition, demarcation and land title to quilombola communities.
8. Assure the resettlement of rural farmers currently occupying indian land.
9. Promote gender issues.
10. Assure technical assistance and rural extension, capacity building, credit and market access to settlements.
11. Assure the right to education, culture and social security in settlements.

#### 5.5 LAND ZONING

### 5.5.1 Ministry of Agriculture (MAPA)

**ZAE – Agroecologic Zoning** – it is a tool of agricultural policy for the spatial organization of several production activities, including the linkage with rural credit.

**ZARC – Agricultural climatic risk management.** It is a tool of agricultural policy to support the sector regarding climatic changes for minimizing risks. Presently there are 40 crops covered: 15 annual and 24 perennial.

### 5.5.2 Ministry of Environment (MMA)

**ZEE – Ecologic-Economic Zoning** – Coordinated by the MMA, countrywide. It is fundamental for the rational use of land for reducing the predatory actions in land use.

**ETNOZONING** – It is a tool for the National Policy for territorial and environmental management of Indian lands (PNGATI).

## 5.6 FOOD PURCHASE PROGRAM

### MDS – Ministry of Agrarian Development

It is an action from the Federal Government for strengthening Family Agriculture and promoting the reduction of hunger and poverty<sup>32</sup>. The government purchases part of the agricultural production and donates it to a network of social assistance institutions, food banks, community kitchens, etc. Another part of food is purchased by other institutions involved with family agriculture. In average, around 150 thousand<sup>33</sup> small farmers per year benefit from this program and more than 3 million tons of food were made available.

## 5.7 PAYMENT FOR ENVIRONMENTAL SERVICES

In 2008, a Decree created the National Policy of Environmental Services (PNSA). The law defines the following services:

- Services for provisioning- they are related to environmental products with economic value and sustainably exploited within the ecosystems.
- Services for the maintenance of ecosystems. The guarantee of resources to next generations.
- Cultural services. Services associated with human values, derived from the preservation or conservation of natural resources.

he FGV (Fundação Getúlio Vargas)<sup>34</sup> did a survey and ended up with a list of environmental services programs, such as:

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<sup>32</sup> Information from the website [www.mda.gov.br](http://www.mda.gov.br), accessed on 18 February 2013.

<sup>33</sup> Facts retrieved from [www.mda.gov.br](http://www.mda.gov.br), accessed on 18 February 2013.

<sup>34</sup> [www.ces.fgvsp.br/arquivos/104/PSA\\_Versao\\_WEB\\_29jun2012.pdf](http://www.ces.fgvsp.br/arquivos/104/PSA_Versao_WEB_29jun2012.pdf): *Marco regulatório sobre pagamento de serviços ambientais*. Org: Santos, Priscila; Brito Brenda; Maschietto, Fernanda; Osório, Guarany; Monzoni, Mario. FGV e IMAZON. 2012.

- Programa de Recuperação e Cobertura Vegetal – Projeto de Lei 3.134/2008.
- Fundo Clima – Fundo Nacional sobre Mudança do Clima. Lei 12.114/2009
- Programa de Apoio à Conservação Ambiental – Programa Bolsa Verde. Programa de Apoio à Conservação Ambiental e o Programa de Fomento às Atividades Produtivas Rurais. Lei 12.512/2011
- Sistema Nacional de REDD+ . Projeto de Lei do Senado 212/2011.

### 5.7.1 State of ACRE

- Certification Program – Programa Estadual de Certificação de Unidades Produtivas Familiares do Estado do Acre. Lei 2.025/2008.
- Sistema de Incentivo a Serviços Ambientais do Acre – Lei 2.308/2010.

### 5.7.2 State of AMAZONAS

- Sistema Estadual de Unidades de Conservação do Amazonas – Lei Complementar 53/2007.
- Política Estadual sobre Mudanças Climáticas, Conservação Ambiental e Desenvolvimento Sustentável do Amazonas.
- Bolsa Floresta do Governo do Estado do Amazonas – Decreto 26.958/2007.

## 5.8 INFRASTRUCTURE FOR TRANSPORTATION AND ENERGY

### 5.8.1 Transportation

- BR 163 - Also known as Cuiabá-Santarém, is being paved and will become an alternative route for agricultural products to reach the international market.
- BR 319 – Federal road linking Manaus (AM) to Porto Velho (RO): 880,4 km crossing the state of Amazonas and 859,5 km in the state of Rondônia. Controversies about its viability have been frequent.
- Railroad Norte e Sul- public-private partnership.
- Hidroroads – The Rivers form a network of thousands of kilometers of extension. Some river corridors may become important ways for transportation in the future.

### 5.8.2 Energy

- Gas-duct Coari-Manaus: investment of 2.3 billion dollars.
- Thermo-electric and natural gas from Amazonas Distribuidora de Energia S/A.
- Program Light for Everyone. Until 2015, thousands of houses, many in rural areas will receive electric energy.

## 5.9 CLIMATE CHANGE PLANS, INCLUDING REDD+ IN EACH AMAZONIAN STATE



**Amazonas:** The State created a management unit for climatic changes within the Secretaria de Meio Ambiente e Desenvolvimento Sustentável with the mission of implementing Climate Changes Legislation. The related policies are developed by the “Centro Estadual de Mudanças Climáticas – CECLIMA”.

**Acre:** The Secretaria de Meio Ambiente created the Programa de Controle da Poluição Veicular (PCPV), public policy for monitoring the quality of air and a program for vehicle pollution. They also developed the “Plano de Prevenção e Controle de Desmatamento do Estado do Acre (PPCD)”.

**Pará:** The State created in 2007 the network for preventing extreme impacts caused by climate and hydrological changes.

**Rondônia:** The State implemented a tool for agricultural public policies, controlled for risk management. It is called “Zoneamento Agrícola de Risco Climático (ZARC)”<sup>35</sup>

**Tocantins:** The “Secretaria do Meio Ambiente e do Desenvolvimento Sustentável – SEMADES” created the “Diretoria Geral de Fundos Ambientais e Captação de Recursos (DGFACR)” to promote the development of a sustainable economy.

**Amapá:** The “Secretaria do Meio Ambiente” through its Instituto do Meio Ambiente e Ordenamento Territorial do Estado do Amapá (IMAP), does land use planning.

## 5.10 Program for the Acceleration of Development PAC

The Program for the Acceleration of Development (Programa de Aceleração do Crescimento) objectives are planning and executing large construction projects for social infrastructure, urban, logistics and energy in the country.

The project funds infrastructure in the North region, such as those listed below:

- Railways – Ferrovia Norte- Sul - Palma (TO)/ Anápolis (GO) portion.
- Hydroelectric and thermo-electric sources. It is planned the production of 1.600 megawatts (MW) for the following states: Mato Grosso (UHE São Manoel and UHE Sinop); Maranhão/Piauí (UHE Ribeiro Gonçalves, UHE Cachoeira, UHE Castelhana and UHE Estreito Parnaíba) and Amapá (UHE Cachoeira Caldeirão).
- Interlink for transmission of energy to link isolated systems in the National System: Belo Monte, Tapajós and Teles Pires.
- Interlink Luiz Gonzaga – Garanhuns – Pau Ferro, interlink Manaus - Boa Vista; Interlink Porto Velho – Jauru; interlink Norte – Nordeste; Interlink Tapajós – SE; Interlink Teles Pires – SE.
- Until the World Cup in 2014, PAC also anticipates infrastructure investments for other transportation equipment, such as roadway terminals, airports, and ports.

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<sup>35</sup> Informações no site do Governo de Rondonia.

### **5.11 Action Plan for Prevention and Control of the Legal Amazon Deforestation (PPCDAM)**

PPCDAm (Action Plan for Prevention and Control of the Legal Amazon Deforestation) is an attempt of Brazil to reduce deforestation of the Brazilian Amazon Forest. It is an effort towards monitoring changes in the forest cover that is carried out by the Brazilian National Institute of Space Research (INPE) and it has been acknowledged and recognized worldwide. Implemented in 2004, it significantly contributed to the decrease of deforestation rates, discouraging illegal deforestation in Amazon Forest. Through PPCDAM, the Brazilian Government allocated funds under its Pluriannual Plan (PPA).

## 6 Conclusions

### 6.1 Overview of main policies

This document first describes the international and non-Amazonian national policies and initiatives that may impact land use in the Amazon in three ways. First, they influence the demand for agricultural and forest products and thus potentially affect production levels and priorities among different products in the Amazon region. Second, they define standards applicable to production practices and, third, provide support for national activities. Further, Brazilian policies and initiatives are described, providing the more specific frameworks and partly financing for national action.

International initiatives for greenhouse gas emission reduction and deforestation prevention are diverse and a large number of initiatives are overlapping and interacting. Among the international institutions, the UNFCCC creates frameworks and methodological approaches for the achievement of emission reductions from both industrial processes and land use, including reducing emissions from deforestation and forest degradation (REDD). As for emission reduction commitments under the UNFCCC, the impact of the Kyoto accounting-rules in the land-use sector possibly affects the demand for biomass imports but its actual impact is rather indirect and difficult to assess. The major direct impact of the Kyoto Protocol on biomass demand stems from the demand for biofuels and different biofuel feedstocks used for achieving emission reduction targets. Regarding REDD, the UNFCCC process has not yet materialized into a financing scheme. However, its contribution in terms of, e.g., methodological approaches, is of high importance for other initiatives. Many REDD initiatives have emerged, partly directly funding specific initiatives in the Amazon.

Both EU and U.S. policies have the potential to importantly affect land use and land-use change in the Amazon. In particular, biofuel or other renewable energy targets create a high demand for biomass including from Latin American countries, potentially affecting land use in the Amazon Basin. While efforts are made to correctly account for the emissions resulting from biofuels and bioenergy production and use, EU and U.S. rules, in most cases, do not account for all relevant emission sources. Even if all related emissions are accounted for, besides possibly decreasing demand, the specific impact on land use and land use change in the producing country can be steered only to a limited extent. Except for some cases, such as the exclusion of specific lands for the production of feedstock under the EU Renewable Energy Directive (RED), demand-side provisions require emission thresholds along the value chain rather than specific management practices or even large-scale land use planning. In addition, not all importers have provisions in place and demand-side provisions by far do not apply to all agricultural and forest products with the important soybean demand by China being one example. This underpins the importance of standards and agreements like, for instance, certification systems or the round tables aiming at reducing negative impacts from the production of specific products.

In Brazil, farmers are adopting new, more sustainable agricultural practices, like non-tillage agriculture and complying with agricultural zoning requirements. These and other technologies are leading to agricultural intensification in already available crop lands and reaching higher yields. This is, perhaps, the plausible way to increase food production to meet global demands, without incorporating new land for this purpose. This is probably one of the reasons that deforestation rates in the Brazilian Amazon has declined since 2004. With a new Forest Code, there is a hope that farmers will be able to work without the current fears and uncertainties but its implementation depends on a massive effort to have georeferenced property boundaries for such a large territory and monitoring systems to follow land use and land cover at the rural landscape and the property scales. Brazilian farmers are adopting new, more sustainable agricultural practices, like non-tillage agriculture and complying with agricultural zoning requirements. These and other technologies are leading to agricultural intensification in already available crop lands and reaching higher yields. This is, perhaps, the plausible way to increase food production to meet global demands, without incorporating new land for this purpose. This is probably one of the reasons that deforestation rates in the Brazilian Amazon has declined since 2004. With a new Forest Code, there is a hope that farmers will be able to work without the current fears and uncertainties but its implementation depends on a massive effort to have georeferenced property boundaries for such a large territory and monitoring systems to follow land use and land cover at the rural landscape and the property scales.

Overall, international and national demand-side initiatives create important frameworks and standards for reducing negative environmental and socio-economic impacts from, e.g., the production of agricultural and forest products. In addition, international and bilateral initiatives provide support for specific national actions such as REDD with the Brazilian Amazon Fund being a prominent example. The soy moratorium illustrates the interaction of international demand-side concerns and national action. The complexity of the international framework is not less on national level – a high number of partly overlapping initiatives and involved institutions impact land use and land cover, including deforestation in Brazil. Diverse interests and the difficulty to harmonize, e.g., economic development with environmental protection render the definition of national strategies complex and lengthy with the Forest Code being an important example.

## 6.2 Towards a selection of relevant policies to be included in AMAZALERT

At the time of writing, the final selection of policies that will be included in the further development of the set of Amazonian scenarios has not been made, but Table 3 lists a number of policies that are likely to be taken into account.

Table 3. Candidate policies to be take into consideration, with main reason for selection.

Candidate policy / policy aspects	Reason for selection
Roads and infrastructure	Quantifiable
Enforcement of Forest Code	Essential policy and quantifiable
Protected areas	Essential spatial policy and quantifiable
Soy moratorium	Direct influence on deforestation
REDD+ (Brazil and international)	Important for AMAZALERT objectives
Land titling	Instrumental in the long run
PPCDAM	Most direct and arguably most influential
Energy, biofuels and renewables	Link with EU policy
Certification and standards	Important for specific products

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