Inspectie Ontwikkelingssamenwerking en Beleidsevaluatie (IOB)

Evaluation of the Dutch foreign policy with respect to Latin America

Thematic study Sustainable Development

Case Study: Sustainable bioethanol from Brazil

June 2013

Authors:
P. de Koning
M. Moreira

Table of Contents

Glossary

CAP	Common Agriculture Policy
CNG	Compressed Natural Gas
CSO	Civil society Organisation
EC	European Commission
Embrapa	Empresa Brasileira de Pesquisa Agropecuária
EU27	European Union, 27 member countries
FFV	Flex Fuel Vehicles
FQD	Fuel Quality Directive
FSC	Forest Stewardship Council
GBEP	Global Bio-Energy Partnership
GHG	Green House Gas
ICONE	Institute for International Trade Negotiations, Brazil
JRC	Joint Research Centre of the European Commision
LAC	Latin America and the Caribbean
LPG	Liquid Propane Gas
LNV	Ministerie van Landbouw, Natuur en Voedselkwaliteit (Dutch Ministry of Agriculture, Nature and Food Quality)
MoU	Memorandum of Understanding
NGO	Non-Governmental Organisation
RED	Renewable Energy Directive
RSPO	Round Table for Sustainable Palm Oil
RTRS	Round Table on Responsible Soy
UNICA	Brazilian federation of sugarcane producers
USA	United States of America
VROM	Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer (Ministry of Housing, Spatial Planning and the Environment)
WTO	World Trade Organisation

List of people interviewed

The persons interviewed were not always directly responsible for biofuel issues but also related to general sustainable development issues.

Argentina	Jeroen Douglas	Solidaridad ,Regional Director Latin America
Argentina	Joris Jurriens	Royal Netherlands Embassy, Former First Embassy Secretary embassy Brazil
Argentina	Bart Vrolijk	Royal Netherlands Embassy, Former Agriculture Attaché embassy Brazil
Brazil	Daniel Furlan Amaral	ABIOVE, economics manager
Brazil	Luiz Fernando do Amaral	UNICA, sustainability manager
Brazil	Fabio Beltrame	Control Union
Brazil	Jorgen Leeuwestein	Royal Netherlands Embassy, also former consultant formulating CDM projects in Brazil
Brazil	Casio Franco Moreira	WWF Brazil, Programme manager agriculture
Brazil	Marcelo Moreira	ICONE
Brazil	Kees Rade	Royal Netherlands Embassy, Ambassador in Brazil
Brazil	Manoel Regis Lima Verde Leal	CTBE
Brazil	Pieter Sijbrandy	Solidaridad Brazil
Brazil	Arnaldo Cesar da Silva Walter	CTBE
Brazil	Fabio Trigueirinho	ABIOVE, general secretary
Brazil	Eduardo Viola	University of Brasilia
Brazil	Patricia de Vries-van Loon	Royal Netherlands Embassy, Agriculture Attaché
Brazil	Sander Werrie	Royal Netherlands Embassy, foreign secretary
Brazil	Mark Wolthuis	Argos Ltd., Director Brazil
Netherlands	Kitty van der Heijden	Ministry of foreign Affaires, Ambassador for Sustainable Development, Director DME
Netherlands	Ralph Brieskhorn	Ministry of Infrastructure and Environment, senior policy maker
Netherlands	Hans de Waal	Ministry of Infrastructure and Environment, senior policy maker
Netherlands	Sven Sielhorst	Solidaridad Netherlands, project coordinator
Netherlands	Fons Gribling	Ministry of Foreign Affairs, senior policy maker

Executive summary

I. Drivers of biofuel policy developments

In 2001, the European Commission (EC) expected CO_2 missions from transport to rise by 50% between 1990 and 2010 (to around 1,113 million tonnes). The main sector responsible was road transport with 84% of transport related emissions (EC/COM(2001)/370). The European energy and transport projections till 2030 (EU, 2003) showed EU countries would miss their climate-related Green House Gas (GHG) targets and their ambition to reduce fossil fuel dependency if no action was taken. On the short term blending of conventional fuels with biodiesel, bio-ethanol and biogas is the most attractive economic option as conventional engines could use these blends (pros and cons will be discussed later) without expensive adjustments of the vehicles or investments in new infrastructure. At the same time, the reduced CAP (Common Agriculture Policy) subsidy and increasing competition from outside the EU posed problems for its sugar and maize producers.

II Developments and Outcomes

Enabling policies and legislation affecting bio-ethanol production and trade

The Netherlands
The Netherlands was the first European country with a Biomass Action Plan (end 2004), later to be followed by a European Biomass Action Plan (COM/628/2005). In the Netherlands the share of renewables (i.e. biofuels) in the transport sector was only 0.02% in 2005. In 2006 the Netherlands adopted the Transport Biofuels Act (of 14 Nov 2006), which set biofuel targets for transport at: 5.75% share by 2010, and 10% share by 2020. These targets were set before a discussion or research of potential negative effects (even when this was already put forward by CSOs). This suggests climate change and environmental concerns were not the main reason to adopt this legislation. However, in 2006, the Dutch government installed the Commission "Sustainable Production of Biomass" chaired by Ms. J. Cramer, which developed a framework and criteria to assess sustainability of biomass production (final report in 2007). Dutch policy makers soon acknowledged sustainability criteria were needed and lobbied for their inclusion in the EU RED.

Between 2004 and 2008, The Netherlands developed its own biofuel and renewable energy-related policies and standards (2007 policy 'Schoon en Zuinig', NTA 8080) with the understanding that it would have to be adapted or replaced by the new Renewable Energy Directive. The latest Dutch legislation implements the RED target of 10% renewable energy in transport in 2020 (road vehicles and mobile machines) and places targets for the coming years: 4.25% in 2011, 4.5% in 2012, 5.0 % in 2013 and 5.5% in 2014 (set lower because of sustainability concerns).

European Union
The main policy outcomes between 2004-2011 in the EU were the Renewable Energy Directive and Fuel Quality Directive. In April 2009, the EU members adopted the *Renewable Energy Directive* (RED, 2009/28) and *Fuel Quality Directive* (FQD, 2009/30). The RED defined mandatory targets of a 20% share of energy from renewable sources by 2020 and a 10% share of renewable energy specifically for the transport sector. The RED also includes sustainability criteria.

Brazil
Prior to 2004, Brazil already had some significant policies and laws in place to guide production and expansion of sugarcane, which include the Forest Code, environmental laws, and the labour law. Legal compliance is the main issue for the sector in Brazil. Major policy changes between 2004-2011 include the reform of the Forest Code and the zoning of sugarcane:

The Forest Code sets limitations on the amount of forest that can be cleared within any plot of land. Enforcement of the Forest Code improved considerably the last decade, partly as a result of improvements in the ability to monitor forest cover through remote sensing. Most farmers do not comply with this forest law because historically they have cleared forests without formal permission. This might be the reason why in 2011, a reform of the forest code was proposed.

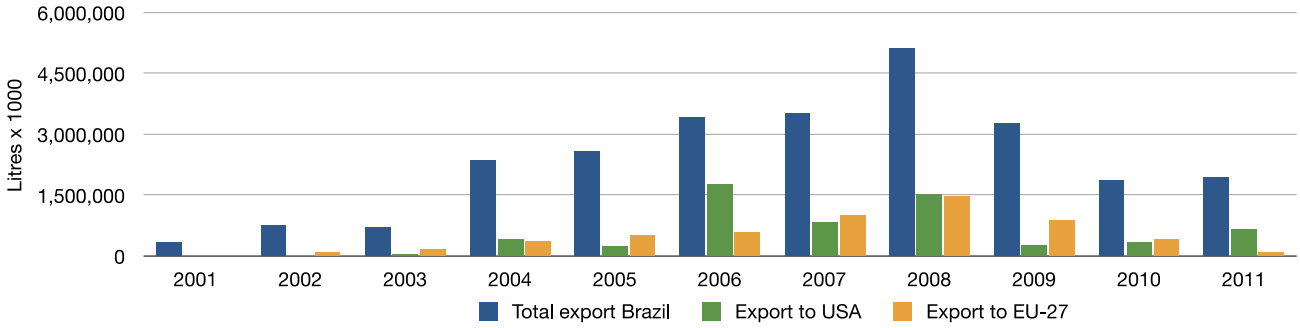
Opponents of the Brazilian Forest Code (i.e. mainly large farmers and ranchers) see the law as hindering agricultural growth and international competitiveness and successfully presented the reform as a nationalist response to an unfair international pressure for conservation in Brazil. In April 2012, the lower house of Brazil's National Congress passed a motion regarding reform of the Forest Code. According to environmentalists the main problem is the proposed amnesty for illegal deforestation conducted before July 2008. On 28 May 2012, president Dilma Rousseff vetoed some parts of the Bill and provided some alterations, including the amnesty. A Mixed Parliamentary Committee examined the legislation and provided new alterations. The Parliament approved the report of this committee without reservations.

A major policy outcome between 2004-2011 is the Sugarcane Agro-ecological Zoning, (Decree Nº 6961/2009), which coordinates sugarcane expansion in Brazil. Importantly, the Zoning excludes: (1) areas with high slopes (above 12%), assuming it as a limiter for mechanical harvesting/non burning; (2) areas of native vegetation; (3) the Amazon and Pantanal biomes; (4) areas of environmental protection; indigenous areas, areas annually covered by water, rocky areas; urban and areas and mines. According to UNICA (Brazilian sugarcane federation) the agro-ecological zoning is not hindering the sugarcane sector as it is in line with existing market dynamics.

Sustainable production and trade of bio-ethanol

The demand for bio-ethanol increased tremendously by the mandatory targets set for biofuels in many countries and the introduction of Flex-Fuel Vehicles (FFV) in 2003 (cars that can run on 100% petrol up till E85: 85% bio-ethanol blend). Ethanol production within the EU was low at the turn of the century but suddenly jumped with the increasing demand for ethanol as transport fuel. Total ethanol production in the EU27 increased from 528 million litres in 2004 to 3,7 billion litres in 2009 and 5.5 billion in 2011 (10-fold increase). The projected installed capacity of 6 billion litres is not sufficient to reach the goal of the set blending targets for which app. 13 billion litres is needed in 2020. Additional import is needed.

Figure: Export of ethanol by Brazil 2001-2011 and to EU27 and USA (data from Alieweb, MDIC)



Brazil's main trading partners for bio-ethanol are the USA, the EU and Japan. Almost 90% of the Brazilian ethanol went through the harbour of Rotterdam in the Netherlands. In 2008, Brazil produced 24.5 billion litres, exported 5.1 billion litres (21%) of which 1.5 billion litres (29%) was exported to the EU. For the EU, Brazil was then the main trading partner with a market share of 76.9%. Not only did the total volume of EU imports grew over the years but also Brazil's market share. This means Brazil was the main third party supplier profiting from the biofuels market development in the EU. However, import from Brazil dropped in the years thereafter. The harbour of Rotterdam reported (2012) that biofuels transhipment decreased with 6% between 2010-2011. Import of ethanol from Brazil decreased to 100,000 tonnes (9% of total import), down from the peak of 800,000 tonnes in 2008.

Sustainable bio-ethanol in Europe

The area of land use for crops and pastures in the EU more or less stabilised although annual variations occur due to crop rotation. The overall number of hectares of the main ethanol crop

wheat remained the same, while the number of ha for sugar beet goes down. These feedstocks did thus not replace other crops during the last decade as a result of rising demand for bio-ethanol. In the coming years there is also no expansion foreseen (JRC, 2010). There is also no suggestion of indirect land use changes within Europe, e.g. wheat replacing cattle or another crop that expand somewhere else. Within Europe 3% (9 million tonnes) of all grains produced in Europe are used for the production of bio-ethanol. The majority (60%) is used as animal fodder (so indirectly for food). Food versus Fuel is not an issue.

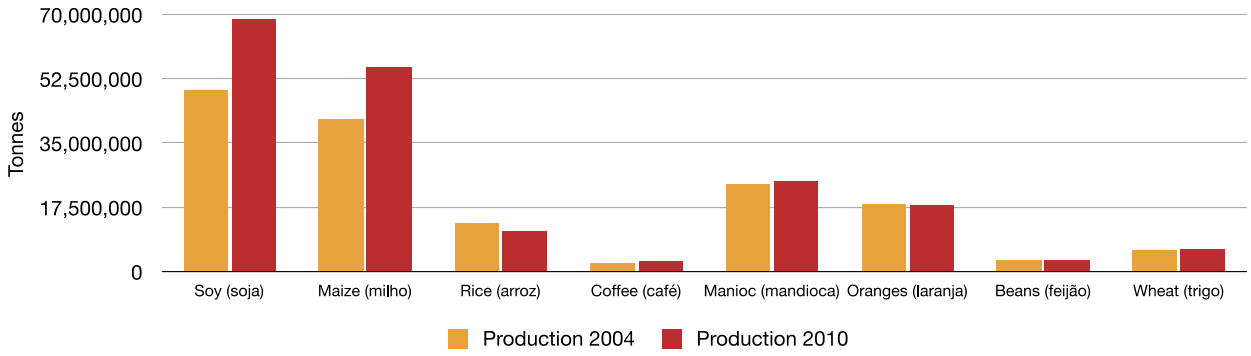
Land use changes and GHG-balance in Brazil
In 2004, there was 5.6 million hectares planted with sugarcane, which grew to 9.2 million ha in 2010 (164% increase). In Brazil, Sao Paulo is by far the main producing state with the largest surface area planted (2.95 million ha in 2010 with 72% increase since 2004), followed by Minais Gerais (746,500 ha), and Parana (625,900 ha). The largest increase in area planted and production is found in Mato Grosso do Sul (205% increase to 399,000 ha), Goais (228% to 579,000 ha), and Minais Gerais (123% to 74,500 ha). Although in the Northern states (which includes Amazon states) the production also increased this is relatively small (see below).

The burning of sugarcane before harvest not only leads to smoke hazards for workers and local people but also to massive CO_2 emissions. The last decade the harvest became more mechanised, which makes burning unnecessary. It significantly improves the GHG-balance of sugarcane. The sugarcane crop and production technology has advanced over the years and the residue of the sugarcane (bagasse) is used for energy generation in ethanol factories. On February 2010, the EPA decided sugarcane ethanol was an advanced biofuel, capable of reducing GHG by at least 50% compared to petrol. Overall, experts agree that ethanol production from sugarcane on farmland has a positive GHG balance. However, recent research suggests the effect of nitrous oxide from nitrate fertiliser used in the production of biofuels is underestimated. This would alter the GHG life cycle assessment of many biofuels and turn them negative. Sugarcane has a significant margin but a new complete GHG life cycle assessment of sugarcane is needed.

Socio-economic issues in Brazil
Large-scale sugarcane production and expansion can have a variety of effects on local livelihoods – both positive and negative. On the positive side production may provide significant employment opportunities in rural areas, in both the production and processing sectors, and thereby potentially drive up rural incomes and improve access to health and education. De Castro (2007) found that the sector generates a large number of jobs and has many indirect employment effects. The sugarcane sector provided 700,000 direct and 3.5 million indirect jobs in 2004. However, the number of jobs generated per hectare of land may be low when compared to small-scale farming. But than also the level of income may be very low. Working conditions in the traditional sugarcane cutting are bad and wages insecure (because paid by amount harvested). But the sector is mechanising fast and mechanisation makes burning of sugarcane before harvesting unnecessary and thereby improves working conditions and reduces GHG emissions. On non-mechanised farms, working conditions remain an issue. Many sugarcane producers do not fully comply with the labour law.

Food versus Fuel in Brazil
On a national level, total production of food crops in Brazil went up between 2004-2011 (see figure). In the case of beans (+6%), coffee (+18%), and wheat (+6%) overall production increased while the area planted decreased. The main decrease in production is rice (-15%) both in area planted as well as in yield. The principal producing state is Rio Grande do Sul (1,1 million ha planted, 6.9 million tonnes) followed by Santa Catarina. The state of Maranhão has a high surface area planted (481,544 ha) but low yields. These are not the major sugar cane areas. The state of Mato Grosso had 235,287 ha planted with rice in 2010. Interestingly, the production of soy (+39%) and maize (+33%) increased strongly because they are used in an intercropping system. This also shows how difficult it is to attribute the effect of expansion of one crop to the decrease of another crop. In conclusion, sugarcane expansion had no effect on food security in Brazil.

Figure: Production of main food in Brazil crop in 2004 and 2010 (data from IBGE Brazil).



Biodiversity
The biodiversity in large-scale monoculture plantations is very low but the overall preserved surface area in Brazil is high. The expansion of sugarcane over natural vegetation is very small. The Forest Code also requires a certain percentage preserved within the production area and watershed.

Sugarcane in the Amazon states and Indirect Land Use Changes (ILUC)
In relation to direct and indirect land use changes, European attention mainly focuses on the Amazon rainforest (and not on the Cerrado where most sugarcane expands). It is the world's largest rainforest and its destruction would lead to major biodiversity loss, climatic changes, and loss of stored carbon. In Europe concern grew that increasing demand for biofuels (from sugarcane and soy), would lead to destruction of primary forests. Another concern voiced by NGOs is that sugarcane, by replacing pastures in the Cerrado, indirectly pushes cattle ranching further into the Amazon. The linkages and actual effects of this Indirect Land Use Change (ILUC) is researched and debated by Brazilian and international experts. With ILUC it becomes very difficult to distinguish between the various drivers for expansion of cattle ranching, which also include demand for beef, export prices, etc. Using the Brazilian Land Use Model (BLUM) developed by ICONE, it can be derived that conversion of native vegetation by sugar cane was 8% of the total sugarcane expansion area, and almost all conversion was indirect (7.6%). The conversion of native vegetation was highest in the Northeast Cerrado biome (almost 50%). There is an indirect effect but the 181,000 ha of native vegetation indirectly converted is very small.

In Brazil, the figures of deforestation during the last decade show that overall deforestation went down and deforestation in the Cerrado surpassed the Amazon. Since 2005 deforestation in the Amazon has been declining to a record low of 6,418 km² /year in 2011 (measured since 1988). This was during the same period as sugarcane for ethanol expanded in Brazil. In 2010, the area planted in the Amazon states is 3.2% of total area planted with sugarcane in Brazil and there are 26 ethanol factories (3 more planned but outside the Amazon biome). Overall, the total surface area for sugarcane (297,368 in 2010) is so small (0.7%) in the Legal Amazon region in comparison to the total surface area used for cattle ranching in the Amazon (44.7 million ha in 2008, INPE) that it hardly can be considered the main driver of expansion by cattle ranching. There is thus no relation between land use changes for sugarcane and deforestation in the Amazon. The main causes for deforestation in the Amazon today are still cattle ranching (85% of the land in use), infrastructure development (roads), colonisation and related agriculture, commercial agriculture and logging. In conclusion, if one would like to keep the Amazon forest standing the expansion of cattle ranching and beef consumption should be addressed, not sugarcane.

III Effectiveness of modalities and pathways

Effect of biofuel policy development
The Brazilian government accepts to expand the area planted to 30 million hectares (534% increase from the 5.6 million ha in 2004). This expansion is rooted in the policy decisions and

mandatory blending of various countries including Brazil and the EU (RED). Therefore major determinants for the ethanol trade are: (1) policy decision-making with respect to mandatory blending in the importing nations (i.e. creating a market), (2) import tariffs, and (3) quality standards (especially the specification of the ethanol quality standard is important as it is a national matter and not harmonised within the EU. This acts as a trade barrier).

The Netherlands had a pro-active role in European biofuel policy development. Dutch foreign policy positions on biofuels followed and are based on the European political discussions on biofuels and agriculture. Between 2004-2009, the general Dutch political position was that biofuels were an economic opportunity and they supported the development of the RED. This general political position was in line with other major countries such as France, Germany and Spain. In the beginning also many (incl. Dutch) civil society organisations (CSOs) supported an increased use of biofuels instead of fossil fuels in order to reduce climate change gas-emissions. Mid-2000, CSOs and researchers expressed their concern of triggering an undesired, large-scale conversion of natural and farm lands. Sharing this concern the Dutch government wanted conditions to ensure sustainable production and use. The leading Dutch Ministry for Environment (now I&M) started organising meetings on sustainability criteria and framework with like-minded countries, like United Kingdom and Germany, and also invited the EC, to discuss sustainability in relation to biofuels. Without the support of major countries like Germany and UK, the Netherlands would not have succeeded to include sustainability criteria.

Without the RED sustainability criteria the Brazilian Agro-ecological zoning would probably not have been developed because prior to the RED the Brazilian government did not consider indirect land use changes an issue nor was it concerned by sugarcane expansion (although Brazil will formally deny such a link). If sugarcane producers comply with the already existing Brazilian forest, environment and labour laws they would cover all sustainability concerns mentioned in the RED sustainability criteria. However, the 2012 reform of the Forest Code could mean less compliance with the RED criteria. Some additional careful spatial planning by the Brazilian government is needed – that goes partially beyond the capacity of the sector – to guide the compensation schemes of the Forestry Code within the same watershed, to divert expansion from natural areas and to address ILUC. Although not a law, this is the purpose of the Agro-ecological zoning. In that sense, the Brazilian government responds well to the concerns raised in the sustainability criteria. The EU legislation (directives and criteria) have been very effective.

International pathways and modalities

Brazil is convinced that bio-ethanol from sugarcane is a superior renewable energy alternative, especially for developing countries, and has economic, social and environmental benefits. Recognising the energy security concerns of countries (incl. EU), Brazil's main diplomatic effort in the last decade was focused on making bio-ethanol a global commodity, produced by many different countries. The Government of Brazil was actively involved in the consultation process of the EU-RED, whereby it disputed any provisions it regarded as technical barriers to free trade and highlighted the social sustainability of bio-ethanol.

For the Netherlands the EU is an international pathway to have an influence on international and global developments. The development of the EU policies on biofuels forms an interesting case for the effectiveness of international policy development and diplomacy. Between 2004-2011, the Dutch government played an important role in the development of the sustainability criteria and their acceptance under the EU Renewable Energy Directive. Bringing together like-minded donors and the EC proved to be very instrumental and effective in the development of the RED criteria. This also influenced the development of the criteria developed by the Global Bio-Energy Partnership (with a pro-active Brazil). The Dutch Cramer criteria would not have had such an impact as the EU RED criteria now have. The Dutch market is too small to play a key role in corporate and country production decisions. The carrot of the common EU market can do this (the effect of the EU blending targets is described in par. II). As a channel to have influence the EU is for the Dutch government only effective when it can ensure support from the major EU economies.

Bilateral pathways and modalities

The Netherlands decided to officially close its development co-operation programme with Brazil at the end of 2005. The modalities of the embassy are currently economic diplomacy including foreign affairs and the agriculture attaché, and the MoU Biofuels. In general, the embassy is capable to maintain good economic relations with Brazil and understands some of Brazil's sensitivities regarding biofuels and the Amazon. The embassy has not formulated policy goals / targets for sustainable ethanol trade.

Prior to the closure of the bilateral development co-operation programme, the Netherlands supported various interesting projects but none related to ethanol production and trade. The supported projects (together with other donors) helped to build environmental awareness and capacity within Brazil at CSOs and Ministries, for example by the reasonable influential programme PPG7 ('Programa Piloto para Proteção das florestas tropicais do Brasil'). This and earlier programmes led to an active civil society and capable Ministries and is likely one of the reasons Brazil has good environment, forest and labour legislation.

The last couple of years, the main economic diplomacy efforts are expressed through maintaining relations, organising high-level visits and trade missions, organising seminars, present Dutch expertise, and organise or participate in meetings on specific subjects. In combination with the interesting market opportunities of Brazil, the economic diplomacy led to more visits and trade missions, more Dutch and Brazilian companies establishing themselves in each country and more trade. However, for ethanol this has not been the case as price determines trade and after 2008 export to Europe was minimal. The MoU Biofuels provides the embassy with an opportunity to foster linkages between Brazil and the Netherlands In practice Brazil had more contact with officials in The Hague although this was also limited. Under the MoU only several meetings were organised which did enhance mutual understanding between participants, which is a limited effect for a bilateral MoU. The trade missions were more effective to foster linkages and contacts.

CSOs and Multi-stakeholder initiatives

Over the last decades Dutch civil society organisations have been very active in Brazil and in multi-stakeholder partnership initiatives. In the absence of legislation and enforcement, multi-stakeholder initiatives between CSOs and companies are very effective in raising awareness on environment and setting the bar for sustainability. A certification standard has become the instrument to promote progress towards sustainability in market chains and sustainability / fair trade / organic labels have become very visible in European consumer markets. Together with public opinion it also raised awareness within companies and stimulated development of corporate social responsibility. However, sustainable ethanol is not visible at the pump in Europe.

As a result of the UNICA-Solidaridad co-operation, the Bonsucro standard has established itself as an important sustainability standard. Until 2012, 23 sugarcane mills within Brazil became Bonsucro certified, mainly from the State of Sao Paulo. These mills encompass 2% of global production and 5% of the Brazilian production. Ethanol transported to the EU complies with the RED. That said certification remains a niche market for most commodities unless, like for biofuels, the EU defines legislation and sustainability standards. Also, because there is no premium, UNICA thinks that most small Brazilian mills that produce for the local market will not join. Macro-economic developments and corporate decisions are also still driven by economic and commercial concerns and not by sustainability. On such developments certification has no effect, only EU legislation has. But these initiatives do influence long-term developments. For the Dutch government, these initiatives are good instruments to stimulate awareness, CSR and sustainable development in countries with which they have a commodity trade relation.

Companies and corporate social responsibility

On the sustainability of a commodity, the producers and processers i.e. companies are in the drivers seat. In the end they determine whether or not the production and trade of sugarcane

ethanol is sustainable or not. The other actors can only decide upon the conditions (government by legislation) or facilitate compliance with standards (CSOs by public opinion of stimulating application of certification standards). On the long term awareness-raising also affects companies as it affects employees and society. Corporate social responsibility is growing fast in European multi-national companies and they bring CSR-priorities to other countries as well. Formal CSR policies in Brazilian companies are still limited. Because Brazil is a very open trade economy, producers are very aware of what happens in consumer markets like Europe and sensitive about their image. This is fertile ground for CSR and certification and as the Brazilian urban society becomes richer and more aware, and Brazilian companies more international they will probably show the same development as Europe. Joint ventures between Brazilian and European companies also show a tendency to integrate sustainability / CSR from the start. The coming years full legal compliance is the main issue for sugarcane producers.

IV Conclusions

(1) What were the main policy developments that influenced bio-ethanol production and trade?

The EU biofuel policies (RED and FQD), mandatory blending targets have created the biofuel market and triggered the biofuel boom as shown by the fast increase in use, production and investments in ethanol production capacity after 2004, both in the EU as well as in Brazil.

At the moment, production decisions in Brazil (sugar or ethanol) by mills are solely based on what happens in Brazil. The EU27 policies are considered – according to UNICA - too unreliable for investors to base a multi-million euro investment decision on. At the moment the EU27 – and thus also the Netherlands - is irrelevant with regard to bio-ethanol production decisions in Brazil.

(2) How has sustainability of bio-ethanol production been addressed in policies and agreements by NL, EU and Brazil? What is/was the influence of the Netherlands?

Brazil had already some significant policies and laws in place to guide production and expansion of sugarcane, which in include the Forest Code, environmental laws and the labour law. Later it developed the Agro-ecological Zoning of sugarcane. There was no direct influence by the Netherlands or the EU. Historically, the development cooperation donor countries have played a role in developing environmental awareness and a vocal Brazilian civil society, and through capacity building of lead Ministries. This has led indirectly to sound environmental, forest and labour laws and thus an enabling policy environment.

The government of the Netherlands (also influenced by NGOs) has played an influential role (together with Germany and the UK) in the development of the EU sustainability criteria for biofuels, which influenced developments in Brazil (certification and zoning).

(3) What is the policy coherence between economic policy objectives and sustainability objectives, especially environmental, social and climate change criteria?

The coherence between economic policy objectives and sustainability objectives, is for bio-ethanol quite strong due to the legal status of the RED sustainability criteria which forces the sector into a sustainable direction. Social criteria are however not included. Here the Global Bio-energy Partnership (GBEP) has more influence. Led by the concerns of the EU countries – incl. the Netherlands - GBEP also developed sustainability criteria incl. social concerns. More importantly, the labour laws of Brazil are good, and when sugarcane producers mechanise their farms (thereby removing the main bad working conditions) and comply with the law (most yet do not) also the main social concerns are addressed.

Trade missions and diplomatic contacts help to foster co-operation between the Netherlands and Brazil. Sustainability of commodities could be better integrated and more actively discussed in trade missions that do not directly relate to commodities, but trigger more production and export, to ensure more coherence.

(4) To what extent and how does the imported bio-ethanol from Brazil comply with the Dutch and EU sustainability criteria?

Bio-ethanol from Brazil that complies with the BonSucro standard (or other RED acceptable standards) complies with the Dutch and EU sustainability criteria. Today, 23 mills are certified which is sufficient to cover ethanol demand from the EU in the coming years.

(5) How sustainable is bio-ethanol from sugarcane in Brazil and how can sustainability issues be best addressed? What is/was the influence of the Netherlands?

Sugarcane is the most energy-efficient biofuel crop with a positive GHG-balance and better than petrol (on for example GHG emissions, local air pollution).[1] Working conditions are bad with manual cane cutting but improving with mechanisation. Direct conversion of primary rainforest for sugarcane does not occur or is very limited. There is no relation between land use changes for sugarcane and deforestation in the Amazon. Food security and indirect land use changes by sugarcane are not (very) relevant issues in the context of Brazil. If one wants to decrease deforestation in the Amazon, attention should focus on cattle ranching and beef consumption (85% of the converted forests in the Amazon are pastures).

The best way to address sustainability issues is by defining appropriate legislation. The Brazilian laws and the EU RED - and especially the sustainability criteria - have fostered sustainable production. Second best instrument is certification. Related multi-stakeholder initiatives help producers to become legal compliant and in the end certified. Besides being a strong supporter of the RED sustainability criteria, the Netherlands has supported such initiatives (current project with Solidaridad and UNICA, RTRS, Bonsucro) and thus influenced developments. Such multi-stakeholder partnerships are now common between Dutch CSOs and companies and help to improve mirror partnerships in Brazil and can increase corporate social responsible in the sugarcane sector, either directly or indirectly. To increase impact, multi-stakeholder initiatives i.e. co-operation between NGOs and companies should include more often other European partners especially French, German and UK companies and CSOs (because these are important and influential markets) to increase influence and impact.

(6) What is the effect on sustainability of overall sugarcane production and what is the overall effect of bio-ethanol from different sources on agriculture expansion?

Sustainable bio-ethanol from sugarcane is still a niche of the ethanol market and this will remain so in the near future as Brazilian domestic demand is more important for Brazilian producers than the European market. The Bonsucro standard applies to both ethanol and sugar and thus affects overall production of sugarcane. The European concerns with sustainability do not affect the majority of producers in Brazil whom produce for the domestic market. It does affect those who want to export and European-based multi-national companies and both want to become Bonsucro certified. In general, they want to comply with European standards and increasingly have corporate social responsibility (incl. sustainability of production) integrated in their operations.

The general impression regarding the impact of expansion of crops for ethanol production - and its overall sustainability - is that this is small in comparison to expansion for cattle ranching or in EU and USA the use of the food crops wheat and maize for animal fodder. Both suggest more attention should be provided to the use of land and food crops for meat. The growing demand for beef has more impact on the Brazilian Amazon rainforest than the growing demand for ethanol.

[1] In comparison with petrol, studies tend to look at the basic GHG life cycle savings but overlook the increasing use of tar sands, charcoal and oil from the Arctic to meet global demand for petrol.

1 Introduction

1.1 Background

In 2012, the Inspection and Evaluation Department of the Dutch Ministry of Foreign Affairs started the evaluation of Dutch policy in Latin America between 2004 and 2011. This evaluation contains policy studies on (1) economic co-operation, (2) sustainable development, (3) economic diplomacy, and (4) human rights. The current report is part of the policy evaluation on sustainable development.

Early 2004, the biofuel boom - which includes production of biodiesel and bioethanol - was triggered by various policy decisions. In Latin America, the main producing country of biofuels is Brazil, which uses bio-ethanol from sugarcane. Therefore it was decided to focus a case study on the sustainable production and trade of bio-ethanol from Brazil.

This report assesses the role and efforts of the Dutch government to stimulate sustainable sugarcane production in Brazil and trade of bio-ethanol between Brazil and the EU / The Netherlands. The report also partially looks forward at the potentials of economic diplomacy and instruments to enhance sustainability of trade with Brazil and provides some recommendations.

1.2 The case study and methodology

The general framework for the evaluation is presented in annex 1. The evaluation study included a desk study of available literature, a country mission, and interviews with people that have been working on, or related to, biofuel policy development and implementation between 2004 and 2011.

This study has been conducted in 2012 by Mr. Peter de Koning of Mekon Ecology in Leiden, the Netherlands together with Mr. Marcelo Moreira of ICONE Institute (Instituto de Estudos do Comércio e Negociações Internacionais) in Sao Paulo, Brazil. ICONE interviewed various persons in Brazil. In October 2012, Brazil was also visited by the Dutch consultant and various organisations and people were interviewed.

The main research questions for this case study are (see also the framework):
A: Enabling Politics and Policies:
(1) What were the main policy developments that influenced bio-ethanol production and trade?
(2) How has sustainability of bio-ethanol production been addressed in policies and agreements by NL, EU and Brazil? What is/was the influence of the Netherlands?
(3) What is the policy coherence between economic policy objectives and sustainability objectives, especially environmental, social and climate change criteria?
B: Sustainable Production and Trade:
(4) To what extent and how does the imported bio-ethanol from Brazil comply with the Dutch and EU sustainability criteria?
(5) How sustainable is bio-ethanol from sugarcane in Brazil and how can sustainability issues be best addressed? What is/was the influence of the Netherlands?
(6) What is the effect on sustainability of overall sugarcane production and what is the overall effect of bio-ethanol from different sources on agriculture expansion?

1.3 Reader

This report uses the terms 'biofuels' and 'bio-ethanol or ethanol' often but they are not interchangeable. 'Biofuels' refers to both biodiesel and bio-ethanol and is often used in documents in relation to problems on a global level. There is however such a big difference between the feedstock and associated dynamics and issues of biodiesel in comparison to bio-ethanol that this often confuses policy debates. It does not to do justice to the pros and cons of bio-ethanol from sugarcane. This report therefore makes a clear distinction between the terms.

This report follows the logic of the evaluation framework.

2 Status bioethanol production and trade

2.1 Bio-ethanol and its uses

During the last decade concern grew that the rise in demand for crude oil would lead to high prices, shortages, and an un-desired dependency on crude oil from instable countries or regions. The fast rise in the price of fossil fuel in 2006 and 2007 also make alternatives for the transport sector – bio-ethanol blends, electric vehicles, hydrogen vehicles - commercially more attractive. Although the global economy slowed after 2008 and also the price of crude oil went down, many experts think that when the global economy starts growing again, soon new high prices will be reached and shortages may occur. Secondly, biofuels are a renewable energy source and promoted as such. Many governments promote the use of bio-ethanol through policies, regulations and subsidies because they assumed it would not only decrease dependency on fossil fuels but it also would raise farmer's incomes and have a positive balance in green house gas emissions.

Bio-ethanol[2] (or commonly known as alcohol) is produced from different cellulosic biomass[3] materials. The main feedstock for bio-ethanol in the EU-27 is wheat and sugar beet, in Brazil it is sugarcane and in the USA it is maize. On average, for each 1,000 litres of ethanol you need 2,300 kg of maize, 2,800 kg of wheat, 10,000 kg of sugar beet or 13,000 kg of sugar cane. This suggests maize is more efficient than sugar cane. However, it also depends on how much you can produce on one hectare. Sugarcane produces between 40-75 tonnes/ha/yr whereas maize only produces 5 tonnes/ha/yr. Per hectare, sugarcane produces most ethanol compared to sugar beet, maize and wheat (in declining order).

A distinction is also made between first-generation and second-generation ethanol. First-generation ethanol is produced by conventional fermentation technology for sugar or starch from crops - maize, sugarcane, sugar beet - by using micro-organisms and enzymes (e.g. just as wine is made from grapes). Second-generation, or lingo-cellulose, bio-ethanol is made from any lingo-cellulosic material (woody crops, biomass residues and waste), which require additional technology. The advantage of second-generation biofuel is that it uses the non-food parts of current crops and residues of trees such as stems, leaves and husks and other waste material. However, if high prices would also lead to dedicated, even monoculture, production of woody crops the pressure on land is the same as for first-generation crops.

Bio-ethanol is used mainly as transport fuel, or as chemical component in production processes. Ethanol or derivatives are used as raw material, e.g.: Ethanol-95% -besides being the biofuel - for foods, pharmaceuticals, and detergents; Ethyl alcohol for spirits, cosmetics, print colours and varnish; Acetaldhyde as binding agent for paints and dyes; Acetic acid for plastic or bleaching agent.

The focus of this case study is on bio-ethanol-95% for its use as biofuel, and on the agricultural production of its raw materials in Brazil and the European Union. Bio-ethanol is one of the alternatives for petrol in the transport sector. Brazil has been using ethanol as transport fuel for decades and has shown it is a feasible and economic attractive option. Ethanol can be blended with petrol to form an E-10 blend (10% ethanol, 90% petrol) but it can also be used in higher concentrations with an appropriate engine such as flex fuel engines (E-85) and pure ethanol engines (E-100).

---

[2] There are two kinds of ethanol: fermentation-(or bio-)ethanol produced from biomass feedstock (mainly used as fuel); and synthetic ethanol produced from ethylene, a petroleum by-product (mainly used in industrial applications). Bio-ethanol is by far the most common type.

[3] Plants absorb solar energy through the process of photosynthesis and store it in the form or organic matter called 'biomass'. In order to this, the plants take up carbon (CO_2) from the surrounding atmosphere. Biomass therefore is a store for both energy and carbon. Biofuels produced from plants are regarded a renewable energy source. Although crude oil also originates from organic matter, this was fossilized and stored deep in the earth and thereby taken out of the CO2 balance of the atmosphere. Burning fossil fuels therefore adds CO2 to the atmosphere.

One of the problems of pure ethanol is that it absorbs moisture from the atmosphere and thereby become less pure. Bio-ethanol can also be transformed to ETBE (Ethyl tert-Butyl Ether), which is commonly used as additive in the production of petrol from crude oil (to get the right octane number). Unlike ethanol, ETBE does not induce evaporation of petrol, which is one of the causes of smog, and does not absorb moisture. Countries like France and Italy often still use especially ETBE to blend with petrol.

2.2 European Union context and energy forecasts in 2003

In 2000, the price of crude oil reached a new high, slowly declined again to reach a new peak in 2008 just before the economic crises started. In 2002, the European Union (EU) adopted the sixth Community Environment Action Programme (Decision no 1600/2002/EC) and set levels of air quality. This meant reduced emissions of harmful air pollutants. Also, in relation to the Climate Change Convention (UNFCCC) and the Kyoto Protocol, the EU pledged to reduce its Greenhouse Gas emissions by 2008-2012 compared to the Kyoto baseline of 1990[4].

In 2001, the European Commission (EC) expected CO_2 missions from transport to rise by 50% between 1990 and 2010 (to around 1,113 million tonnes). The main sector responsible was road transport with 84% of transport related emissions (EC/COM(2001)/370). In 2003, the European Union published its energy and transport projections till 2030 (EU, 2003). The report showed that with the growing global population and world GDP, demand for oil, gas (global demand would double) and solid fuels (90% increase) would increase significantly but prices would remain fairly stable. Based upon the 2003' existing markets trends and policies, the report projected a decline in the global share of renewable energy sources although hydropower production would rise two-thirds and production from other renewables (e.g. wind) would double. The use of biomass and biofuels would decline. As a result of these developments global CO_2-emissions would increase substantially (in the report's baseline case) by 87% between 2000 and 2030. Compared with the Kyoto-protocol baseline year 1990, global emissions would rise by 41% in 2010 and double by 2030!

The 2003 forecast was that primary energy demand in the EU would grow with 18% (although GDP would double and energy intensity –energy demand/GDP – would improve considerably). Domestic fossil fuel production would peak in 2005 and net imports would grow by two-thirds. EU energy import dependency would reach 68% in 2030 compared to just under 50% in 2000 (dependency on imported oil would rise from 75% in 2000 to 90% in 2030). By 2030, the EU25 CO_2-emissions would exceed the 1990 baseline by 14%.

The EU countries would miss their GHG targets and ambition to reduce fossil fuel dependency by miles if no action was taken. Additional policy measures were needed if the EU wanted to: (1) reduce its dependency and ensure security of energy supply; and (2) reach their Kyoto-commitments to reduce greenhouse gas emission. In 2008, the EU reviewed its political energy security agenda (EC COM 2008/0781) and re-enforced its "20-20-20" targets: reducing its GHG emissions by 20%, increasing the share of renewables in the share of energy consumption to 20% compared to 8.5% in 2008, and improving energy efficiency by 20%, all to be reached in 2020. For bioethanol the focus is on the transport sector.

2.3 Biofuel consumption in the EU and The Netherlands

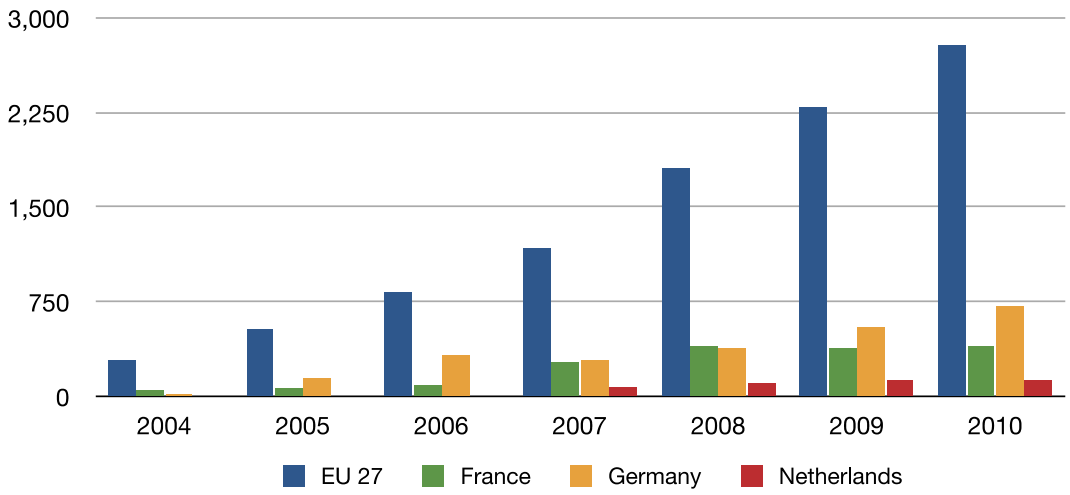
The share of energy from renewable sources grew slowly during the '90s, mainly based on an increased installed capacity for renewable electricity (e.g. hydropower) and heat generation. Growth was the result of feed-in tariffs (e.g. Germany), grants, tax credits and quota systems. Because bio-diesel and bio-ethanol are almost solely used for blending with fossil fuels the focus is on use in the transport sector. In contrast of the rest of the world, the EU27 consumes more

[4] The 1997' Kyoto Protocol requires the 15 countries that were EU member at the time to reduce their collective emissions in the 2008-2012 period to 8% below 1990 levels. In 2007, the EU made a unilateral commitment that they would reduce its emissions to at least 20% of 1990 levels by 2020.

biodiesel (around 77%), followed by bio-gasoline[5] (19%). Early 2000 the share of biofuels in the transport sector was just above zero EU-wide. Only after 2004, when the EU adopted policies and regulations that promoted the use of biofuels in the transport sector (see chapter 3) did the use of biofuels start growing. In conclusion, the EU biofuels market depends on the blending mandates.

The share of renewables in the transport sector steadily increased EU27-wide to 4.7% in 2010 with France (6.1%) and Germany (5.7%) leading. The Netherlands ranks low with a share of 3% in 2010[6]. In 2008, the share of renewables in transport dropped – e.g. in Germany - at the same time as the price of crude oil decreased and the price of vegetable oils increased. Biodiesel became more expensive in comparison to diesel. Bio-ethanol is more strongly correlated to the price of sugar and because the price of sugar increased less than petrol prices, blending with bio-ethanol became more attractive. Eurostat figures show that overall consumption of biofuels (bio-ethanol, biodiesel and derivatives) increased from 2 million toe (tonnes of oil-equivalent) in 2004 to 13 million toe in 2010 (6.7x increase). In 2010, the use of bio-gasoline (official term used by the EC but means ethanol and derivatives) in road transport rose to 2.8 million toe from 291,000 toe in 2004 (almost 10-fold increase!). The GBC Global Biofuels Outlook 2010-2020 projects that total EU demand for bio-ethanol will be 13 billion litres by 2020. Ethanol imports are projected to grow by 7% per year on average.

Figure 1: Bio-gasoline use in road transport in EU-27 and selected countries (1000 toe).



Based on data from Eurostat. Figures used in the Netherlands deviate from these figures.

2.4 Production of bio-ethanol in EU27

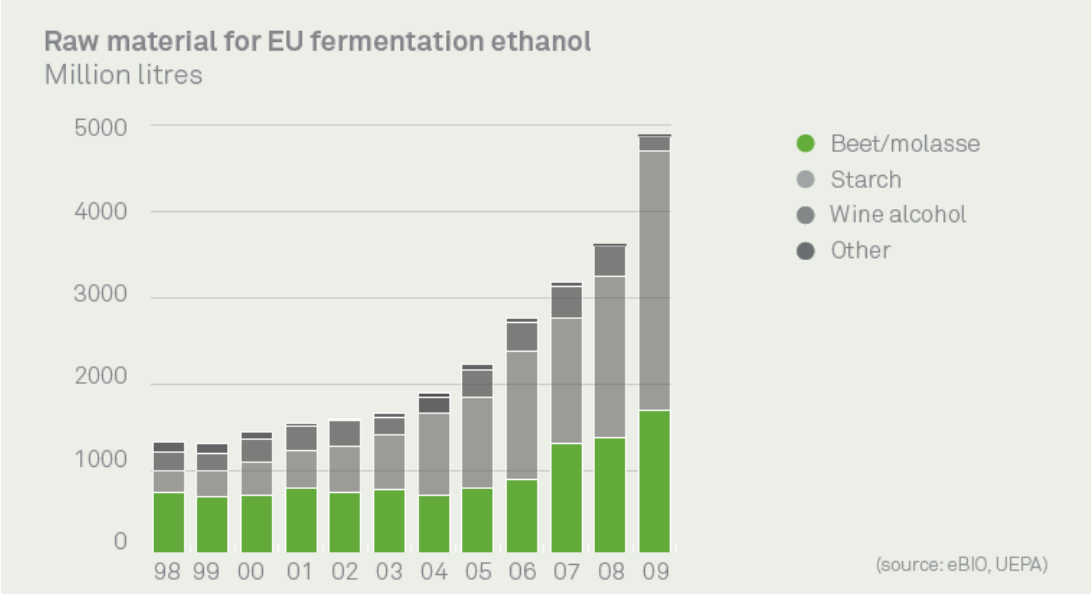
Ethanol is produced from various agricultural crops (see figure below for EU feedstock). Therefore, production and demand are influenced by various policies for the agriculture and transport sector and thus also by world prices (especially for sugar). The main feedstock for bio-ethanol in the EU-27 is wheat and sugar beet. The EU is the largest sugar beet producer in the world with an annual production of 17 million metric tonnes.

Under the EU Everything-but-Arms (EBA) trade deal with least developed countries, sugar (from sugarcane) from these countries gained access to the European market. Most sugar imports are still controlled by Tariff-Rate-Quotas, which set the amount of sugar that can enter the EU from abroad. As a result major producing countries (Australia, Brazil) face high import duties: €339 per ton on raw cane sugar and €419 per ton on white sugar. As part of the agricultural reform

[5] The sum of bioethanol, biomethanol, bio-ETBE and bio-MTBE7.
[6] Within The Netherlands other figures are also used. See: http://www.compendiumvoordeleefomgeving.nl/indicatoren/nl0535-Biobrandstoffen.html?i=9-53

described in par. 3.2, the EU decided to reduce the guaranteed price of sugar by 36% (from €631.9 per ton to €404.4 per ton) as of 21 February 2006, over a period of 4 years (which was also a response to WTO ruling on objections made by Australia, Thailand and Brazil on protection measures and sugar dumping). At the moment, Brazil is allowed to export 334,054 tonnes of sugar to the EU at a preferential rate of €98 per ton and an open-to-all quota of 500,000 tonnes at the same rate for 2010/2011. In addition, a temporary duty-free quota of 400,000 tonnes annually is open for industrial sugar imports. On the medium-term, the main factor influencing EU production is the quantity imported from the duty-free EBA countries.

Figure 2: Raw materials for bio-ethanol used in the European Union.



Source: ePure

Within the European Union the main feedstock for bio-ethanol production is starch from **wheat** (and rye). The total surface area for agriculture within the EU-27 is 160 million hectares. The surface area planted and harvested with wheat seemed to have stabilised between 25-26 million hectares (see figure below) and total wheat production is also more or less stable around 137 million metric tonnes but shows some peaks (2004, 2008) and declines.

Figure 3: EU-27 wheat area harvested by year (ha x1000).

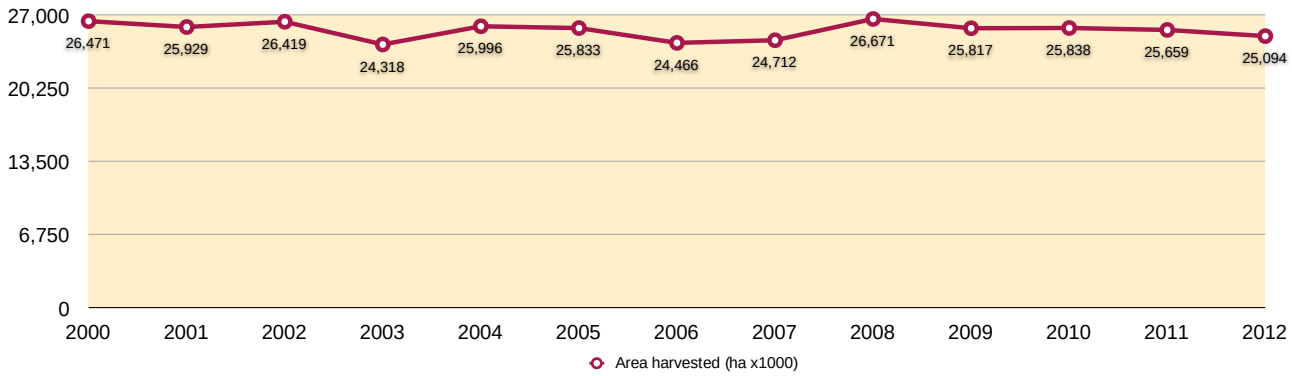
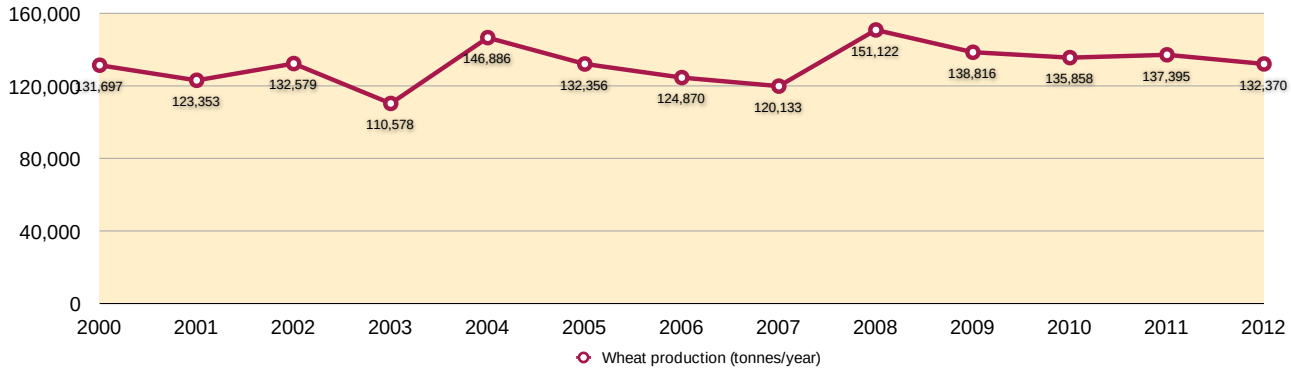


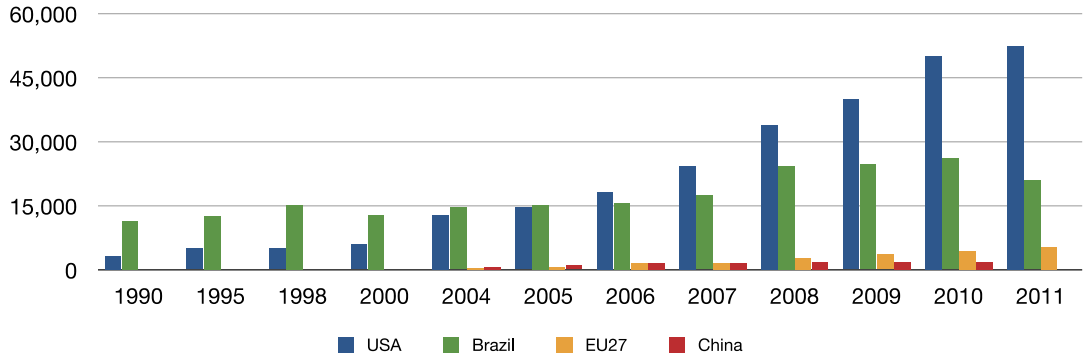
Figure 4: EU-27 wheat production by year (Mtonnes x1000).



Based upon data from Index mundi website.

Ethanol production within EU was low at the turn of the century (zero litres in Germany in 2003) but suddenly jumped with the increasing demand for ethanol as transport fuel (see tables in annex 3). Total ethanol production in the EU 27 jumped from 528 million litres in 2004 to 3,7 billion litres in 2009 and 5.5 billion in 2011 (10-fold increase). The top producing countries are France, Germany and Spain. The installed production capacity reached 6 billion litres in 2009 and another 2 billion litres capacity is under construction. Major increases can be seen in various European countries. This has everything to do with the increasing demand for ethanol by the mandatory blending targets set by the EU.

Figure 5: Ethanol production in the EU-27 and main producing countries.



The production figures are as much as possible derived from the country of origin. However, annual production figures vary considerably between sources and publications. Sources used are (1) UNICA Brasil, (2) World Global Outlook, (3) USA RFA, (4) Eurostat. Blank cells means that no reliable figures could be found (before 2000 this could mean there was no significant production).

The projected installed capacity of 6 billion litres is not sufficient to reach the goal of the set blending targets for which app. 13 billion litres is needed in 2020. Low blends like E10 European-wide will already absorb all Europe's production and import is needed if other blends are to be used (for example E85). Additional import is needed.

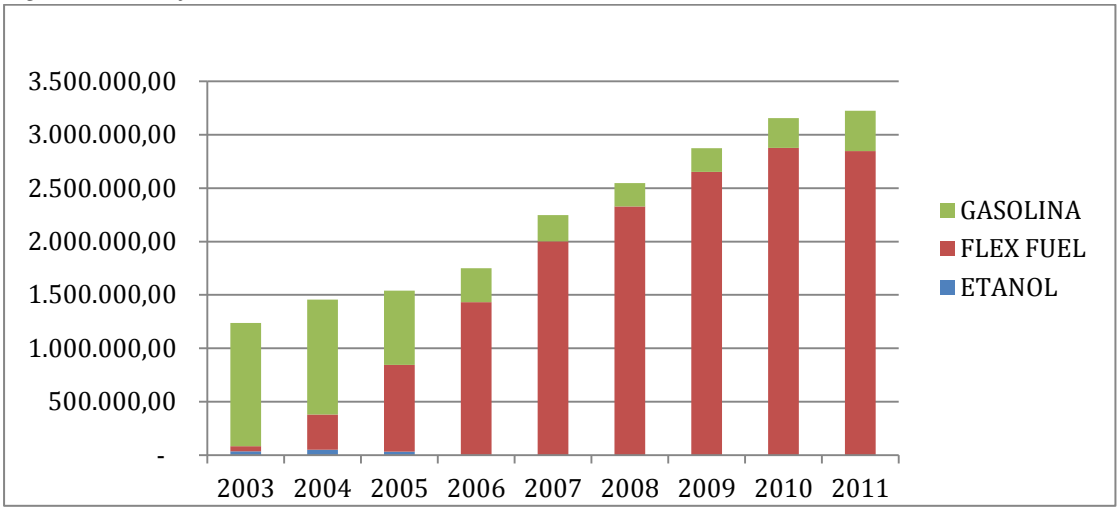
2.5 Consumption in Brazil

The whole world is looking at Brazil to supply the increasing demand for bio-ethanol. However, Brazil is also growing economically and needs more bio-ethanol for its own domestic market. Overall, demand in Latin America will grow because many countries will have blending targets and the sale of flex-fuel vehicles is still increasing (especially Brazil, but sale is also stimulated with lower tariffs on FFVs in Paraguay, Jamaica and probably Colombia in 2012).

Unlike most countries in the world, Brazil offers two different fuels with completely different production structures: ethanol and petrol. Until 2003, arbitrage opportunities for consumers were relatively restricted, since his choice has been defined at the time of the purchasing of the new car (either petrol or E100). With some limited modifications on the car engine, cars companies started to sell Flex Fuel Vehicles (FFV) that could run on any blend, from pure petrol to 100% Ethanol. The opportunity to choose which fuel to choose at the pump station was a public success and in 2009 more than 80% of all new vehicles sold in the market were FFV. The substitution of petrol cars by FFV was therefore a major driver to boost ethanol demand, as long as the ethanol prices at the pump were lower than 70% of the price of petrol[7].

At the same time, there was a general perspective that ethanol, a renewable liquid fuel, could also gain significant share of the international market by its potential to mitigate GHG emissions and enhance energy security.

Figure 6: Sale of Flex Fuel Vehicles in Brazil 2003-2011.



Within Brazil, the period 2004-2011 can be clearly divided in two different phases: expansion and consolidation. The first phase, is characterized by bright future prospects, significant sector expansion and increasing debt; whereas the second phase can be as time of revision of expectations, bad financing conditions of particular mills and sector consolidation with new (corporate) players.

In general, the future of sugarcane and its mills is still quite bright, as domestic and international demand for sugarcane will continue to grow. One should bear in mind that sugarcane can also be used to produce sugar, energy (see box below), and bioplastics.

Box 1: Electricity from bagasse in Brazil.

The sugarcane mills use sugarcane residue (bagasse) to produce steam and electricity for their production process and as such need no additional energy input. This makes sugar and ethanol production very efficient. The mills increasingly produce a surplus of energy through this co-generation that can be sold to the national grid (2% in 2005, 75% comes from hydropower). Electricity could become the third standard product after sugar and ethanol of the sugarcane industry. Co-generation projects require substantial initial investment and have relatively long payback periods. Therefore investors need to feel confident about the stability of the business environment, especially with regard to pricing of electricity. Financial support can come from for example CDM or commercial banks like the Rabobank (Rabobank, 2007). However, this co-generation development can become unappealing when second-generation technology becomes

[7] In high ethanol blends, the energy content of ethanol is approximately 70% of the gasoline.

available to turn bagasse into ethanol. The Rabobank concludes that even with a large expansion of sugarcane production, co-generation will probably not be in position to make a major contribution to the nation's electricity supply. Nevertheless, the timing of bagasse-based electricity in the dry season – when production from hydropower is lower – can give it a strategic significance. Also the relative short term of co-generation project implementation and the proximity to the main consumers in the South is an advantage.

3 Netherlands and EU policy developments 2004-2011

To assess the role of the Netherlands in supporting sustainable ethanol, the activities by the embassy – in the absence of own clear policy goals – will be assessed together with the effectiveness of implementation of policies in relation to ethanol by the European Union and the Netherlands. These policies are described in this chapter.

In paragraph 2.2 the forecasts of 2003 were described to which the European politicians and policy makers responded. The increasing demand for biofuels in the European Union was triggered by policy decisions and mandatory targets (see use of biofuel before 2004 in par. 2.3). Therefore, first these policy decisions are described. The direct result of a new policy is actually a decision on making certain inputs available (i.e. establish a financial instrument, or tax reduction) and/or change norms and standards. Through these mechanisms, outcomes are realised such as, in the case of bio-ethanol, changes in production, trade and consumption. These outcomes however cannot always be directly linked to a specific activity as there will be many other activities and developments influencing these outcomes. Brazilian policy developments (chapter 4) are of course both the result of an autonomous development (domestic demand, policy priorities, knowledge, insight, concerns, interests) as well as influenced by international developments and actions, and to some extent by actions by the Dutch embassy. This interaction is described in chapter 5.

3.1 Policy developments in the Netherlands

In the Netherlands, the biofuels debate followed and interacted with the European debate with the same drivers: agricultural opportunities, security of energy, and GHG emissions targets. The Netherlands was the first European country with a Biomass Action Plan (end 2004), later to be followed by a European Biomass Action Plan (COM/628/2005). However, the Netherlands is actually slow in adopting the use of renewables. In the Netherlands the share of renewables (i.e. biofuels) in the transport sector was only 0.02% in 2005. The voluntary blending target for 2006 was set at 2%. To stimulate blending of biofuels the government decided that between ethanol was free of duties in the year 2006. As of 2007, suppliers had to market at least 2% of biofuels (this does not necessarily mean every litre had to have a 2% blending).

In 2003, Rabobank International produced a report, which assessed the potential for ethanol production in the Netherlands. They assessed that because of the decline in cattle and pigs in the Netherlands there would be less demand for fodder. A new potential outlet would be bio-ethanol. In theory the industry could be produce between 1-1.5 million hectolitres. The voluntary blending target of 2% for 2005 would mean a demand for 1.7 million hectolitres and thus create an attractive market. Most publications in 2003-2005 described an economically attractive emerging market with positive effects on GHG emissions. Soon after, non-governmental organisations and researchers started questioning the positive assumptions. Many critics pointed at the fact that monoculture plantations for soy, palm oil and sugarcane were the most likely to respond to this increased demand. Based upon the historic developments of these plantations, concerns were expressed for triggering agricultural expansion in pristine natural areas, increasing deforestation, more land right conflicts, etc. New was the concern that the demand for biodiesel and bio-ethanol would lead to rises in food prices and problems for poor people in developing countries. Many publications followed such as from the World Rainforest Movement 'Oil palm, From Cosmetics to Biodiesel: Colonisation lives on" (2006) and Oxfam's "Biofueling Poverty" (2007). The 2007 publication by Greenpeace on oil palm showed that plantations established on former peatlands led to huge GHG emissions. This showed that biodiesel from oil palm on peatlands could not have a positive effect on climate change. Later publications discussed doubts concerning the overall positive effects of biofuels on GHG emissions such as OECD's 'Biofuels: is the cure worse than the disease?' (2007). In the Netherlands some researchers strongly oppose biofuels (e.g. P. Bindraban

from Wageningen University), others also point at positive effects (e.g. A. De Faaij from Utrecht University).

From the start, biofuels was a difficult issue for the Dutch Ministries as it touched upon various mandates: agriculture, trade, energy, economic affairs, and development co-operation. Some turf battles between the Ministries responsible for Agriculture (LNV), Environment (VROM), and Development Cooperation (BuZa/DGIS) proved unavoidable. But sufficient systems and inter-Ministerial working groups were in place to reach an agreed Dutch position in EU negotiations even though the ministries did not always agree on the details. The lack of coordination was evaluated and discussed in a report by Mr. Enthoven (2009). Based upon his analysis a new Department on Biofuels at the Ministry for Environment (VROM) was created, which became responsible for domestic coordination and RED implementation (in a letter signed by the three Ministers).

In 2006 the Netherlands adopted the Transport Biofuels Act (of 14 Nov 2006), which set biofuel targets for transport at: 5.75% share by 2010, and 10% share by 2020. These targets were set before a discussion or research of potential negative effects (even when this was already put forward by CSOs). This suggests climate change and environmental concerns were not the main reason to adopt this legislation. However, in 2006, the Dutch government installed the Commission "Sustainable Production of Biomass" chaired by Ms. J. Cramer (later she became Minister of Environment). The Commission started a multi-stakeholder dialogue with selected organisations (government, private sector, NGOs) on the sustainability of biomass. They developed a framework and criteria to assess sustainability of biomass production (final report in 2007). The criteria included GHG-emissions, food security concerns, local welfare and well-being, and biodiversity. Dutch policy makers soon acknowledged sustainability criteria were needed and lobbied for their inclusion in the EU RED.

Between 2004 and 2008, the Netherlands developed its own policies and standards (2007 policy 'Schoon en Zuinig', NTA 8080), with the understanding that it would have to be adapted or replaced by the new Renewable Energy Directive. The Netherlands launched a biobased economy initiative in 2007. Later the biobased economy was mainly linked to the top sector chemical industry and re-defined in a Business plan Biobased Economy 2.0. In 2008, The Council of Ministers decided on a government-wide approach to support sustainable development (KaDo). The approach focused on six themes defined as crucial, which included sustainable energy and biofuels. Targets included:

- 30% reduction of GHG emissions by 2020 (baseline 1990);
- Speed up energy savings from 1% to 2% per year;
- Share of sustainable energy from 2% to 20% in 2020;
- Increase availability of sustainable energy in developing countries.
- Increase sustainability of biofuel production and a stronger international cooperation.

In follow-up of the Cramer Commission, the Dutch government established a new Commission on Sustainable Biomass on 29 June 2009 led by Ms.Corbey to advice the Dutch government on sustainability of production and use of biomass. The Commission was set-up to channel all criticism on the sector Ministries and to allow interest groups to discuss among each other, in the best tradition of the Dutch 'Polder' system. The Commission produced various reports including an advice to the Dutch government on how to deal with Indirect Land Use Changes (ILUC) in the development of the Renewable Energy Directive (RED). Many government officials from the different sector Ministries (environment, agriculture, economic affairs, foreign affairs) were involved in the Dutch and RED-related debates and in establishing the formal position of the Dutch government. This not only included ILUC but also technical standards an definitions (e.g. the definition of 'trees' and 'forests': if oil palm was considered a tree, an oil palm plantations could be considered a forest and thus palm oil planted after 2008 could be used for biodiesel and count towards the biofuels target. In the end oil palm was not considered a tree).

In anticipation of RED, the Netherlands already decided on mandatory blending targets (3.75% in 2009). In 2009, the Netherlands decided to reduce the duty on sustainably produced bioethanol E-85 with 27%. The programme 'Fuel stations for alternative fuels' (Tankstations Alternatieve Brandstoffen) provided subsidies to establish ethanol-filling points at fuel stations.

In May 2011, the EU RED and Fuel Quality Directive (FQD) came into force in the Netherlands. The Dutch legislation implements the RED target of 10% renewable energy in transport in 2020 (road vehicles and mobile machines) and places targets for the coming years: 4.25% in 2011, 4.5% in 2012, 5.0 % in 2013 and 5.5% in 2014 (amended because of sustainability concerns). In achieving the obligatory targets mentioned above, both the petrol and diesel markets must include a minimum percentage of 3.5% biofuels. In order to be eligible for counting towards the renewable energy obligation in transport, the biofuel must meet the European sustainability criteria (to be verified by an independent expert).

From 2014, the companies that are required to report under the FQD (also includes suppliers of fuel to inland navigation and suppliers of LPG and CNG) have to meet greenhouse gas intensity reduction targets: 2% in 2014, 4% in 2017 and 6% in 2020. Biofuels that are used to achieve the reduction target shall, as in the annual obligation for renewable energy in transport, meet the European sustainability requirements. The total amount of electricity supplied to road vehicles (including the non-renewable part) counts 2.5 times towards the reduction target.

3.2 The Netherlands bilateral support to environment in Brazil

In the period covered by this evaluation (2004-2011), the embassy of the Netherlands presented several annual plans and a multi-annual strategic plan (2008). The next multi-annual plan will be submitted in 2012 (MIB 2012-2015). The main task of the embassy was and is to maintain the good diplomatic relations with Brazil. Economic diplomacy (incl. agriculture) and development co-operation were important modalities. At the beginning of this century, the Netherlands decided to focus its bilateral co-operation on the poorest countries and MDGs. Brazil was not considered in this group because of its higher GDP and good prospects for future economic growth. Therefore Netherlands decided to officially close its development co-operation programme with Brazil at the end of 2005. The 2004 annual plan presented the exit strategy of development co-operation for the years until 2006. The various annual plans do not define concrete, quantitative bilateral goals or targets. They did define several qualitative policy objectives and underlying programmes had their own objectives. In 2004, overall ODA support was US$ 16.3 mln and in 2005 this was US$15.44, which dropped to US$ 1.95 mln in 2006.

Until 2006, the Dutch embassy in Brazil always had attention for environment, energy, climate change and water as shown by the support provided to environmental issues. The Amazon rainforest always received special attention because of its international importance, and media and political attention in the Netherlands (through bilateral funds as well as through central RTR[8] funds). The main bilateral environment-related support between 2004-2006 went to the multi-donor programme PPG7 ('Programa Piloto para Proteção das florestas tropicais do Brasil'). This programme supported research and pilot projects to protect and sustainably use tropical rainforest (especially the Amazon). The Netherlands contributed US$5.25 mln to the PPG7' Rain Forest Trust Fund and US$ 2.87 mln for sustainable business management, forest management and coordination. The PPG7 programme continued till 2009 after it was closed. Bilateral support was also provided to the Brazilian NGO Instituto Internacional de Educação do Brasil (IEB, US$4 mln) for grass-root capacity building and the NGO Amigos da Terra Amazônia Brasileira (Friends of the Earth; US$ 2.5 mln) for promotion of sustainable business in the Amazon. Support was also given to three budget lines (US$3.1 mln) of the governmental Fundo Nacional de Meio-Ambiente (FNMA, national environment fund). In addition, the embassy had a Small Grants Fund (annual volume of €100,000) to finance small-scale activities in the environment sector. For example, in 2005 a study on biodiversity was supported focusing on three main transport corridors and as an

[8] RTR = Regeringsstandpunt Tropisch Regenwoud. A former Dutch support programme for tropical rainforests.

input to the spatial planning and zoning along these transport routes. These activities led to very visible publications and discussions, most notably around the paving of highway BR-163 that cuts through the Amazon. The PPG7 programme helped to build knowledge, capacity and influence of the federal Ministries of Environment and the Ministry of Science and Technology. Related to climate change the embassy focused on facilitating CDM (Clean Development Mechanism), and assisted in the MoU CDM between Brazil and the Netherlands (signed in 2004, although not a prerequisite for project implementation it helps to facilitate country relations). The Netherlands was the third country in CDM projects in Brazil (6%). The 22 projects in Brazil financed or co-financed by the Netherlands represent CER (Certified Emission Reduction) credits of in total 10.4 million tonnes. CDM-project are for example related to landfills, hydroelectric dams and.co-generation with biomass The main objective of the CDM projects was to generate CERs, not foster sustainable development. They did provide the CERs intended.

After closure of the bilateral support also the attention for environment and the contacts with The Hague' DGIS/DME significantly decreased. Trade and environment were combined in the First Embassy Secretary when the staff position for development cooperation stopped whereby economic concerns dominate environmental concerns. Annual Plan 2007 included for the first time a focus on sustainability of commodities timber, soy and biofuels (e.g. organising a round table discussion with companies and NGOs, facilitating research projects) and in 2009 cacao was added. Today, the embassy has very little budget to actually support (new) initiatives (after development cooperation stopped). The embassy successfully facilitated attention access to financial instruments such as the former Programme Cooperation Emerging Markets (PSOM, signed in 2007 for North-east Brazil).

The last couple of years, the main economic diplomacy efforts are expressed through maintaining relations, organising high-level visits and trade missions, organising seminars, present Dutch expertise, and organise or participate in meetings on specific subjects. The economic diplomacy and trade relations focused early 2004 on agribusiness, transport & logistics and water management and continues to do so. Also environment and energy are considered interesting sectors. Agribusiness entails market access and phyto-sanitary measures, technology and sustainability of commodities. In 2007, the embassy formally visited the state of Mato Grosso in follow up of a Brazilian trade mission to the Netherlands and discussed to enhance their insight in the production, transport and trade of soy and biofuels. Whereas sustainability in 2004 was more a concern to take into account it has now become institutionalised and is an integral part of the trade agenda and also linked to CSR. The signing of the five MoU in 2008 (a.o. MoU Biofuels, discussed later) is regarded by the embassy as a positive step in the increasing economic co-operation between Brazil and the Netherlands. In 2010, during the mission of vd Hoeven, a discussion on sustainability of bioenergy was part of the agenda (also in relation to the MoU Biofuels).

As a result of the above developments, 'environment' developed the last decade from environmental protection and nature conservation to sustainable management of natural resources and biotrade, to, after 2006, integration of 'sustainability issues' in production and trade of several major commodities. Today trade dominates the agenda and sustainability is a major point of attention of the Agriculture Attaché of the embassy (Min. of Agriculture) while Foreign Affairs focuses on general diplomatic and economic issues. The contacts with Brazilian ministries, institutes and organisations working on environment significantly decreased. In the coming years attention to environment will come mainly from the Agriculture Attaché and to some extent from local foreign affairs staff to issues related to biobased economy, water & environmental technology and renewable energy (as opportunities for Dutch companies). Also Corporate Social Responsibility (CSR) in relation to exchanges and partnerships with companies receives more attention.

In conclusion, the embassy has not formulated policy goals / targets for sustainable ethanol trade.

3.3 EU Agricultural policy reform

Because ethanol within EU is produced from wheat and sugar beet EU agriculture policy developments are important. The EU Common Agriculture Policies (CAP) and national policies determine agricultural production within the European Union. The CAP is a system of European Agricultural subsidies and programmes and the goal was to produce enough food for Europe. The main tools were guaranteed prices, intervention purchases, high import tariffs, and export subsidies. The EU policy can be considered a success because it led to a tremendous increase in production. It also led to huge vested interests of farmers and producing countries. In many instances, production subsidies made over half of farmers incomes. The WTO Doha Agenda negotiations for example were stalled due to the developed countries refusal to remove agricultural subsidies, a.o. in fear of European farmers' prospects. Early 2000, the EU produced sufficient food for its population and agriculture became less important for GDP as the manufacturing and services industry grew. The CAP also mandates the EU to purchase millions of tonnes of surplus output every year at a stated guaranteed market price. The CAP was such a success that this became a burden to the EU budget and CAP formed more than half of the EU budget at the turn of the century (Sotte, 2011). The political focus shifted towards quality instead of quantity. This led to a significant reform of the CAP in 2003 to be implemented between 2004-2012. Since 2003, the CAP moves away from subsidising production towards subsidising land stewardship. The latest review by the European Commission of the CAP in order to try to make it more efficient led to several proposals. Amongst others the EC wants to end the last remaining quota regime for sugar by 2015. Following the 2003 reform, EU sugar exports dropped from 7.5 million tonnes in 2005/2006 to 815,000 tonnes in 2010/2011, and the EU became a net importer. The European sugar beet, maize and wheat farmers faced strong competition and were loosing market share.

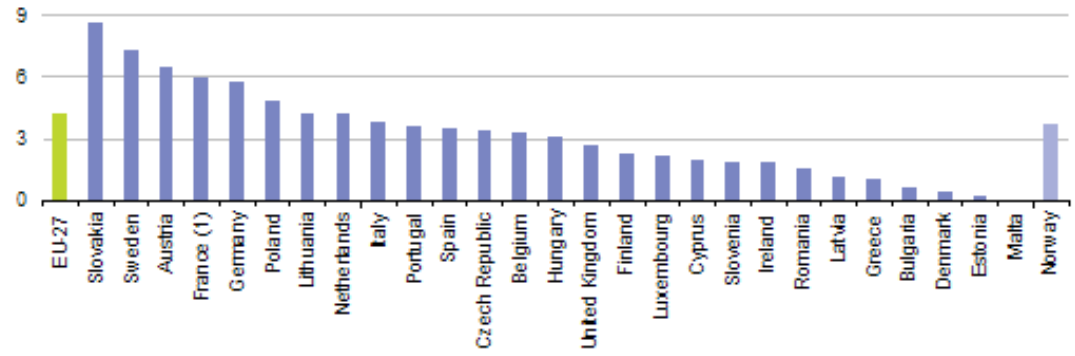
3.4 EU Transport sector policy reform

Within Europe, the transport sector is responsible for 20% of all GHG-emissions and second largest after the energy sector. Emissions have increased with 36% since 1990, while GHG emissions in other sectors decreased with 15% between 1990 and 2007.[9] The transport sector depended for 98% on fossil fuels. To lower emissions the EU set increasingly high emission standards for cars and defined rolling resistance limits, tyre-labelling requirements and mandatory tyre pressure monitors on new vehicles. Another policy option was to promote the use of alternative energy sources for the transport sector such as blending of conventional fuels with biodiesel, bio-ethanol, or biogas, hybrid & electric engines and hydrogen engines. At the start of the biofuels debate at the beginning of this decade, it was assumed that the CO_2 or GHG life-cycle balance of biofuel from agricultural crops would be neutral (during its growth the plant converts CO_2 into biomass, which is again released when the crop/biofuel is burned).

On the short term blending of conventional fuels with biodiesel, bio-ethanol and biogas is the most attractive economic option as conventional engines could use these blends (pros and cons will be discussed later) without expensive adjustments of the vehicles or investments in new infrastructure. Given the described context and assumptions, the EU developed the Directive 2003/30 on the promotion of the use of biofuels and other renewable fuels for transport, which set non-mandatory targets to use 2% of biofuels in transport by 2005 and 5.75% by 2010. In some countries developments went fast such as in Germany and Sweden. Already in 2006, bio-ethanol became the most important non-fossil fuel in Sweden whereby all petrol contained 5% bio-ethanol and the use of E-85 (for which specific engines were needed) was promoted. However, as can be seen in the figure below many EU countries did not meet these targets in 2009, some would not even reach 2%.

[9] http://ec.europa.eu/clima/policies/transport/index_en.htm

Figure 7: Share of renewables in fuel consumption in EU27 countries by 2009.



(1) Excluding French overseas departments and territories.
Source: Eurostat (online data code: tsdcc340)

At the same time, the reduced CAP subsidy and increasing competition from outside the EU posed problems for sugar and maize producers in the European Union. The production of ethanol from sugar beet and maize was seen as a great opportunity for European farmers (also by the Netherlands). Various interviewed persons indicated that the EU's mandatory targets set in the new Renewable Energy Directive (RED), which created a market for biofuels, are set as much for industrial and political reasons, as for environmental concerns. Farmers' organisations (sugar farmers in France, rapeseed farmers in Germany: both hard hit by the agricultural reform) as well as German car industry lobbied for the inclusion of the 10% biofuels target for the transport sector as compensation for the agricultural reforms and the imposition of greener and higher CO_2 standards.[10] Forecasts show that as a result of the ethanol market, sugar beet production will likely remain strong in competitive regions in France, Germany, the UK and Poland (EC, 2007) but overall the area devoted for sugar beet production is expected to decrease from 2.2 to 1.7 million hectares. The medium-term projections show an increasing demand for cereals (i.e. maize) thanks to the emerging bioethanol demand (EC, 2007), and after 2010 of a recovering and growing world market (the competitiveness of the EU also depends on the strengthening of the US dollar).

In the beginning many (incl. Dutch) civil society organisations (CSOs) supported an increased use of biofuels instead of fossil fuels in order to reduce climate change gas-emissions. Mid-2000, many environmental CSOs and researchers expressed their concern of triggering an undesired, large scale conversion of biodiverse and farm lands (through direct or indirect land use changes) and an ensuing negative CO_2 and/or GHG balance as well as impacts on local food security (DPRN, 2010). In the Netherlands the 2006 discussion on sustainability (see next par.) led to the formulation of an assessment framework and criteria in 2007. European CSOs lobbied their government, Ministries, European parliamentarians and the EC to include social and environmental criteria in the new RED, although many NGOs preferred that this new directive would not be adopted at all as it included mandatory targets for biofuels (while they do favour mandatory targets for the use of renewables to produce electricity).

The European Council of March 2007 agreed on setting new mandatory targets for the share of renewable energy. The EU member countries added some preconditions, such as sufficient availability of sustainable biofuels and whether a sufficient amount of second generation of biofuels would be available, to avoid that the Commission could legally enforce the targets. The Council also asked for the development of sustainability criteria and an assessment of the social and environmental consequences of the production and consumption of biofuels.

Between 2004-2009, the general Dutch political position was that biofuels were an economic opportunity. This general political position was in line with other major countries such as France, Germany and Spain. The Dutch government wanted conditions to ensure sustainable production

[10] http://www.euractiv.com/climate-environment/eu-report-questions-conventional-news-512076

and use. Countries like Spain and Italy were not in favour of introducing conditions and standards to be imposed on their private sector. The leading Dutch Ministry for Environment (now I&M) started organising meetings on sustainability criteria and framework with like-minded countries like United Kingdom and Germany and also invited the EC to discuss sustainability in relation to biofuels. More countries joined the discussion. The Dutch view was shared by Germany and the UK, but opposed by countries such as Brazil, Indonesia and USA who did want any conditions that could hinder their export. Without the support of major countries like Germany and UK, the Netherlands would not have succeeded to include sustainability criteria.

On 28 April 2009, the EU members adopted the *Renewable Energy Directive* (RED, 2009/28), which defined mandatory targets of a 20% share of energy from renewable sources by 2020 and a 10% share of renewable energy specifically for the transport sector (please note this does not mean it has to be achieved by using only biofuels). On 17 October 2012 the EC published a proposal to limit the use of food-based biofuels to 5% instead of 10% (EC COM 2012/595).

The RED also includes *sustainability criteria*, which were lobbied for by the Netherlands (and others. See above). This meant for example that the CO_2 emissions throughout the production chain of biofuels had to be at least 35% lower than comparable fossil fuels (the 'carbon saving threshold'). The 35% threshold was not chosen arbitrarily, but was lobbied for by German rapeseed farmers as they comply to this threshold and negotiated by German government representatives. In 2018 this had to become 65% lower. The European federation of European Ethanol Producers (ePure) lobbied for a distinction between bio-ethanol and biodiesel in which they did not succeed. The sustainability criteria will be discussed in more detail later in this report. Given all controversies and uncertainties, the European Commission will review the sustainability of its targets in 2014 (but because of public pressure and new insights already proposed amendments in 2012 as described above). To avoid a conflict with WTO, a very important aspect of the criteria is that irrespective of whether raw materials are from within or outside the European Union, energy from biofuels has to fulfil the sustainability criteria if they are to count towards the target (of course biofuels may also be used on a purely commercial basis).

The *Fuel Quality Directive* (FQD, 2009/30) was also adopted on 28 April 2009 (which revised the existing Directive 98/70/EC), which provided quality specifications of petrol, diesel and gas-oil and introduced a monitoring mechanism. It specified that suppliers had to gradually reduce by 2020 life cycle GHG emissions with 10% per unit of energy from fuel and energy supplied: at least 6% by 2020 compared to 2010 by using biofuels or reduced flaring; 2% reduction through carbon capture, storage and electric vehicles; and 2% through buying CDM credits. Also here standards were defined in such a way that European companies could comply.

From its various budgets the EC also supports various projects to promote and pilot the use of bioethanol. Examples are the project 'EU Transport GHG: Routes to 2050?', and 'BEST'. Bioethanol for Sustainable Transport is a joint effort by various cities and regions to promote cars and buses running on bioethanol and establishing fuel stations. The co-ordinating city is Stockholm but it includes cities from the EU member states (like Rotterdam), China and Brazil (Sao Paulo).

An important, unsolved environmental issue is Indirect Land Use Change (ILUC) as a result of expanding biofuel demand and production. The EC postponed a decision on ILUC and had to report by the end of 2010 on whether ILUC is a threat. Various reports (see next chapters) showed that the GHG balance of biodiesel produced from palm oil, soy or rapeseed was negative and biodiesel producers started lobbying to protect their investments (investments triggered by the RED's mandatory targets). The EC looked for a political compromise whereby the current carbon-saving threshold would be raised that all biofuels must meet to count towards the EU' target. This would penalise al types of biofuels equally, including for example ethanol from sugarcane. Critics say this approach ignores a growing consensus that various biofuel crops have different ILUC impacts. However, integrating ILUC is opposed by the agri-industry (both within Europe as elsewhere). Others in favour of ILUC (and the sustainability criteria in general) see this as evidence

that policy makers are actually not promoting biofuels for environmental or climate change reasons, but rather see it as a new way to support farmers and to diversify energy supply.

Box 2: Some country positions regarding the EC' developments on ILUC.

In the development process of the RED and its sustainability criteria one of the most controversial issues was Indirect Land Use Changes (ILUC). A formal consultation period was conducted. Below some of the country responses are presented

Brazil opposes the introduction of ILUC because a solid scientific basis and useful models are absent. Brazil also argues that their "available data from remote sensing about areas of sugarcane production indicate that the direct effect is in areas of agriculture and degraded pasture, and no indirect effect that contributes to the deforestation of the Amazon is taking place …Hence, according to satellite data available, deforestation in the Amazon does not occur as a result of ILUC in Brazil". Brazil prefers ILUC is addressed through the international UNFCCC-framework.

France argues that there is on the short term a lack of scientific knowledge and models to measure ILUC or calculations is (too) complex. France comments on the various options to mitigate concerns, for example to introduce additional sustainability requirements for biofuels from crops/areas whose production is liable to lead to a high level od damaging land use change. The 'do nothing' option is not considered acceptable as there are legitimate concerns regarding negative effects on the environment (incl. GHG emissions) and social-economic effects. France does not oppose an indirect land use change factor (option G) for certain production crops such as oil palm, sugarcane and soy.

Germany considers it crucial that the issue of ILUC is addressed in the RED and FQD. On the short term Germany considers options E (extending bonuses) and option G (an ILUC factor) as most feasible whereby overall due consideration should be given to biodiversity and social effects.

Indonesia prefers the 'do nothing' option because the existing RED should be implemented first and would enable Indonesia to gain experience and find support data.

Italy opposes the introduction of an ILUC factor (option G) and prefers an international agreement on protecting carbon-rich habitats (B), could accept doing nothing (C) or the use of bonuses (E).

The Netherlands reiterates that biofuel production can lead to unwanted ILUC. Doing nothing is not an option for the Netherlands and they prefer the introduction of an ILUC factor (option G). Other international efforts (CBD, FCCC) are regarded as complementary.

United Kingdom acknowledges ILUC can pose a problem and the RED is a legally binding European framework that can mitigate the risk. The UK argues that a composite approach is needed for this complex problem (combine an ILUC factor -G- with the use of bonuses –E-). Do nothing is not a feasible option for the UK.

Source: Letters submitted by the countries during the consultation process.

4 Modalities and pathways 2004-2011

4.1 Policies, policy assessments and sustainability criteria

Enabling policies and legislation affecting sustainable bio-ethanol
The EU policies RED and FQD described in the previous chapter are the most important modality related to biofuel production and trade: the biofuel boom is driven by policies and related mandatory blending targets. In this paragraph, additional attention is provided to policy instruments that have been used to help to make these policies (more) sustainable.

Policy impact assessments
For each major policy document the EC also assesses the economic and environmental impacts. The 2005, impact assessment of the Biomass Action Plan (SEC 1573) described the benefits of using renewable energy (incl. biofuels) on diversification of the energy mix, rural job creation and reduction in GHG-emissions. But it would cost additional €2.1 billion up to €16.6 billion per year, especially for 'biofuels' in transport. The Assessment only looked at GHG-emissions and not at other environmental or biodiversity impacts. Also the social impacts are limited to employment and monetary costs for society. Direct CO_2 emissions from biofuel combustion were not considered relevant due to the virtually closed carbon cycle of biomass growth and combustion. The GHG-balance assessment was based on third party literature and stated the GHG-balance is positive ("Imported bioethanol reduce GHG emissions by 90% as compared to petrol", p.32). The third party literature such as VIEWLS, 2005 does however not take into account the CO_2 stored in the soil or the use of fertiliser for crop production in a GHG-balance. Limitations of these GHG assessments is not discussed. The Assessment does for example also not discuss under what circumstances the literature from Imperial College cites a -11% balance for bioethanol from sugar crops (not specified) and thus whether mitigating actions or conditions are needed.

EU RED sustainability criteria
History shows that the massive agricultural expansion of monoculture plantations had negative effects on people and the environment. Large investment in biofuel production and related agricultural expansion can lead to the same conflicts as conventional agricultural expansion. In order for biofuels to become environmentally sustainable and socially acceptable, former practices have to change. Concerns voiced by NGOs and scientists and efforts by the Netherlands, Germany and UK led to the integration of sustainability criteria in the Renewable Energy Directive (RED). For the first time sustainability concerns were legally coupled to commodities. Before, such criteria were part of voluntary initiatives such as the Forest Stewardship Council. Fair Trade Labelling Organisation, Round Table for Responsible Soy, Round Table for Sustainable Palm Oil and BonSucro (formerly Better Sugarcane Initiative). There were two important reasons to include sustainability criteria. First, to ensure that no high biodiversity areas would be turned into agricultural lands and secondly, that the use of biofuels would lead to a tangible positive contribution to GHG emission reduction. The RED criteria are (Article 17):

- GHG emission saving from the use of biofuels and bio-liquids shall be at least 35%;
- From 1 January 2017, GHG emission savings shall be at least 50%;
- From 1 January 2018, GHG emission savings shall be at least 60% for biofuels and bio-liquids produced in installations in which production started on or after 1 Jan 2017;
- Biofuels and bio-liquids shall not be produced from land with high biodiversity value, namely land that the following statuses in or after January 2008: primary forest and other wooded land of native species; nature, species or ecosystem protected areas; highly biodiverse grasslands; land with high carbon stock such as wetlands, continuously forested areas and land with canopy cover of between 10%-30% and trees higher than five metres; peatlands;
- Agricultural raw materials from within the Community shall comply with requirements and standards on environment and agriculture ('cross compliance').

Important aspects of the RED are that it does not distinguish between biodiesel and bio-ethanol, or between raw materials from inside or outside the European Union. It also now accepts voluntary schemes[11] as part of the implementation framework. This had not the preference of the Netherlands, which rather wanted one European CEN-standard for all member countries. The EC and various influential member countries were against this.

The sustainability criteria of the EU and standards set by other countries[12] had a major influence on biofuel developments worldwide. Any country and producer that wanted to produce for the European market had to comply and adopt a voluntary scheme. Producing countries had to make clear that production areas were eligible and thus the need for spatial planning and zoning increased. Of course, those who didn't or did not want to comply could always sell to other countries (or in the case of Brazil, domestic consumption is already more important). Below, some of the main European sustainability concerns are discussed in more detail. Whether these concerns occur in the Brazilian context is discussed in the next chapters:

Land use change
With a growing world population there is already an increasing need for land to produce food crops, and cattle. The blending targets mean that more sugarcane, sugar beet, maize or switch grass has to be produced to meet the demand for bio-ethanol. This means agricultural expansion. This can either be by diverting existing agricultural lands and cattle ranches or converting natural areas. This competition for land can lead to direct and indirect land use changes. Searchinger (2009) is one of main critics pointing out that land use changes results in changes in the above-ground vegetation and carbon balance in the soil. Conversion of forests[13] and grasslands, clearing of vegetation, ploughing etc. may lead to a negative GHG-balance, either directly or indirectly. The United Nations Environment Programme (UNEP, 2009) estimates that it requires between 118 and 508 million hectares of cropland if first generation biofuels are used to meet 10% of the global transport fuel demand by 2030. These biofuels would substitute 0.17 to 0.76 billion tonnes of fossil CO_2. If these biofuels were to be produced on converted natural areas, the associated extra land use change would lead to an additional 0.75 to 1.83 billion tonnes of CO_2. Only when the world population would consume far less sugar, eat less maize and meat (maize is used as fodder) there could be surplus cropland and expansion be unnecessary. This seems very unlikely. The payback time for the 'carbon-debt' can become very long (or not at all) and the shortest payback time would be 17 years for sugarcane in the driest parts of the Brazilian Cerrado. Land use change and ILUC are part of the RED criteria although ILUC has not been solved yet. ILUC is a complex issue and can only be solved by proper spatial planning and enforcement in the producing country.

Worldwide there is also already much degraded land, left barren after the land became useless. A commercial investor is not likely to use these degraded lands as this would require high investments or mean less productivity (any crop needs water and nutrients to grow to produce sufficient quantities to be commercially attractive)[14]. In order for this to occur governments would have to subsidise such investments. Other lands are considered marginal or idle, but are often used by local communities (e.g. livestock farming, shifting rice cultivation, fire wood and fruits). Producing on these lands requires the consent of these local communities. The last decades a lack of local consultation and agreement led to many land conflicts.

---

[11] Recognised voluntary schemes:
http://ec.europa.eu/energy/renewables/biofuels/sustainability_schemes_en.htm
[12] Also the USA Environmental Protection Agency set standards. Japan is developing a standard.
[13] The bigger the vegetation the more biomass is stored. An additional complicating factor is that carbon storage balance is different between ecosystems. Most biomass in the Amazon is stored above-ground and the soil is very poor. In woodland savannah areas much carbon in stored in the soil and in grassland savannah areas much biomass is stored in animals. Scientific literature points out that conversion of any natural area for biofuel production will always lead to a negative GHG-balance and the payback time for the 'carbon debt' is very long. Most suitable are already degraded areas but here the costs to achieve commercial production are higher.
[14] So far no proof could be found by the author of a large-scale investor that invested in degraded land to grow biofuel crops. In Brazil, sugar cane also expands on former pastures that are not very productive.

Food versus Fuel
Biofuels increase the demand for food products, vegetable oils or cropland and thereby increase the crop prices, especially in times of shortages (like the 2012 drought in the USA is causing). This effect is somewhat offset by a reduced demand for these foods. In 2007, food riots took place in cities in Mexico, Bangladesh, Haiti, Egypt and Senegal. In Mexico, the finger was pointed at the shortages of maize in the country as a result of the use of maize for ethanol production in the USA. Whatever the cause, higher food prices do affect urban poor. On the other hand, higher food prices mean that farmers can earn more money. Also for the European farmers the blending target is a positive development. In 2007, the UN rapporteur on the Right to Food, Mr. Ziegler called for a 5-year moratorium on biofuels because of soaring food prices. He especially blamed corn ethanol but also stated that in Brazil sugarcane takes up land that can be used by food-producing small farmers. Whether the 'Food versus Fuel' is an issue in Brazil is described later. Other experts argued that many other factors influenced the food prices, and showed interrelations with the price of crude oil (which led to a high price increase for fertiliser), structural changes in global food reserves driven by increased consumption, and a sudden large influx of investment by hedge funds and investment funds, and last but not least, crop failures by droughts that has and will affect production on a large scale in for example Brazil, China, India, Russia and the USA. It should be noted that food security is not part of the EU RED criteria and can therefore not be solved in relation to this framework. It is however part of the GBEP-framework (defined as 'price and supply of a national food basket').

GDP Developing countries and poverty reduction
The demand for biofuels is a new market for producers. This demand is mostly met by large-scale monoculture producers that need employees. The EC for example calculated that the blending targets create more rural employment in the EU. In developing countries investments in agricultural production is welcome and are often done by companies, which establish large monoculture plantations. Brazil is no longer a developing country and considers ethanol from sugar cane an attractive option for developing countries. It therefore actively promotes sugar cane in sub-Saharan Africa and builds local capacity. Even before the growing demand for agrofuels, the expansion of sugarcane, soy and oil palm led to higher economic revenues for the producing countries. Small family farms are included through outgrower schemes. Developing countries promote foreign direct investment as in improves agricultural infrastructure, boosts GDP growth and makes the country less dependent on expensive fossil fuel imports. But this expansion can also lead to problems. The plantations could replace rural farmers of which the majority will not find employment in the new plantation and will migrate to poor neighbourhoods in cities. In many countries with large scale plantations there are also land conflicts with local people.

4.2 International diplomacy

Brazil is convinced that bio-ethanol from sugarcane[15] is a superior renewable energy alternative, especially for developing countries, and has economic, social and environmental benefits. Recognising the energy security concerns of countries (incl. EU), Brazil's main diplomatic effort in the last decade was focused on making bio-ethanol a global commodity, produced by many different countries[16]. Brazil diplomatic actions aimed on getting recognition of the benefits of bio-ethanol and assurance of conditions of a free international market. Brazil has not yet joined the

[15] The last decade, Brazil lobbied strongly at the WTO against the export subsidies provided by the EU to sugar producers. The WTO ruled in their favour and Brazil (together with Australia and Thailand) reached an agreement with the EC in 2006.[15] However, in 2010, the three major sugar producers and exporters - Australia, Brazil and Thailand - have again voiced serious concerns over the recent decision of the European Union to authorize the export of an additional 500,000 tonnes of out-of-quota sugar (reaching 2 million tonnes in total in 2009/2010).

[16] For example, the 2009 Structured Programme in Support of Other Developing Countries in the Area of Renewable Energies (Pro-Renova). The programme promotes south-south co-operation and includes sending Brazilian specialists to African countries (so far16 countries have hosted seminars).

International Renewable Energy Agency (IRENA), allegedly because IRENA focuses too much on wind and solar energy and neglects biofuels and hydro-electricity (both very important for Brazil). Brazil is also not a member of the International Energy Agency (IEA).

To promote their case at the EC, the Brazilian federation UNICA opened an office in Brussels to participate in discussions and inform the EC. They closed their office in 2012 as the EU RED was concluded and further lobbying was less important. Brazilian producers are now also more interested in supplying their domestic market, the USA and Japan. Interviews suggest that the EU market is perceived as cumbersome and the import tariff makes ethanol export unattractive.

The Government of Brazil was actively involved in the consultation process of the EU-RED (see chapter 3), whereby it disputed any provisions it regarded as technical barriers to free trade and highlighted the social sustainability of bio-ethanol. In an interview with the magazine Valor in 2008 president Lula states on 'sustainability criteria' (meaning the EU criteria) for ethanol: *"Promoting sustainable development is in the interest of Brazilians themselves. But we need to discuss the criteria and not just accept them passively. This will allow us to participate more effectively in international talks on environmental requirements, avoiding them being imposed on us unilaterally. Otherwise we run the risk of environmental and social certificates becoming transformed into disguised protectionism imposed by the developed countries".*

This statement carefully states Brazil's point of view. Brazil has also become very active on sustainability issues of biofuels in international fora and other debates. International diplomatic interaction between Brazil, the EU and the Netherlands took mainly place at known international fora such as the CBD, FCCC and especially at the newly established Global Bioenergy Partnership:

Global BioEnergy Partnership (GBEP)

In 2006, Brazil and Italy took the initiative for a *Global BioEnergy Partnership (GBEP)*, which was created in 2007 by the G8 plus Brazil, China, India, Mexico and South Africa. The partnership is open to all countries on a volunteer and non-binding basis. Soon the Netherlands and the EU joined as well.

Because of the European developments the discussion soon focused on sustainability indicators, which can help in the formulation of public policies for sustainable biofuels. Discussions were difficult at first. However, biofuels became a theme at the Conference of Parties of the Biodiversity Convention (CBD) in Bonn in 2008 (COP9). Brazil opposed strongly to discussing biofuels within the framework of the CBD just as the USA does not want to discuss biofuels at the Climate Change Convention (which it has not ratified). GBEP provided a good alternative. Both Brazil as well as the Netherlands participates actively in GBEP. The EU and Netherlands pushed for an international agreed sustainability framework (for which GBEP turned out to be a good international platform). At the end of 2011, GBEP agreed on a framework, which now has to be implemented (GBEP, 2011). Although implementation is voluntary and will differ per country, in any event, there is a common understanding on what sustainability entails.

4.3 Bilateral diplomacy (trade missions, MoU Biofuels)

The growing economic importance of Brazil is not only shown by abolishing development cooperation funds by the Netherlands but also by growing foreign direct investments and by the increasing number of trade missions and diplomatic visits. The last ten years Brazil became very popular. For example, French President Sarkozy frequently visited Brazil and Brazilian President Lula visited EU countries and the EC with the aim to boost trade and investment. The main topic of all these visits is how to enhance economic ties between the countries, especially related to agribusiness, commodity trade, and transport and logistics (including port development, oil and gas).

Some important bilateral visits and trade mission from the Netherlands to Brazil were:

March 2003:	Visit by the Her Majesty the Queen of the Netherlands to Brazil
June 2004:	Visit by Ms. Van Ardenne, Minister of Development Cooperation for UNCTAD XI
Nov 2005:	Visit Ms. vd Hoeven (replacing other Minister) to enhance economic and political ties. She was accompanied by 42 companies.
May 2006:	Visit by Mr. Veerman (Minister of Agriculture, Nature and Food Quality)
Jan 2007:	Visit by Mr. Bot (Minister of Foreign Affairs)
April 2008:	Visit President Lula to the Netherlands to enhance trade.
April 2008:	Visit Mr. Heemskerk (State-Secretary for Foreign Trade) and Mr. Opstelten (major of the city of Rotterdam) to Brazil. Seeking increasing cooperation and trade.
March 2009:	Visit Prime Minister Balkenende and Mr. Eurlings (Minister for Transport, Public Works and Water Management) to Brazil, Spoke about biofuels.
Sept 2010:	Visit Ms. vd Hoeven (Minister for Economic Affairs) accompanied by 20 companies.
Year 2011:	The year to celebrate 100 years of trade relations between Brazil and Netherlands.
Nov 2011:	Visit Mr. Bleker (State Secretary of Agriculture and Trade)
April 2012:	Visit Ms. Schultz van Haegen (Minister of Infrastructure and Environment) accompanied by 35 companies.
May 2012:	Visit by Mr. Rosenthal (Minister of Foreign Affairs).
Nov 2012:	Trade mission including a visit in November by the Prince of Orange and Princess Maxima accompanied by the State Secretary of Economic Affairs, Agriculture and Innovation. Around 150 companies are expected to join totalling 205 persons.

Dutch CSOs always try to bring sustainability on the agenda but they do / cannot participate in trade missions. During the Ministerial visits sustainability issues are always included in the briefings of the Ministers (referred to as 'sustainability' in general), which does not mean it is also discussed. The good economic ties led to a visit in 2008 by President Lula to the Netherlands. During his visit various MoU were signed including one on biofuels (see below) and one Transport and Logistics (see case study diplomacy, which looks at harbours and the role of the Port of Rotterdam). President Lula also signed a MoU on Biofuels with the EC. The year after, Prime Minister Balkenende spoke specifically about biofuels. In his speech[17] he recognised Brazil as a biofuel superpower, the harbour of Rotterdam as the main transport hub for biofuels, and lamented Europe transport was still mainly carbon-based. He also stated his concerns such as expansion in the Amazon and the need to avoid negative effects on people and nature. Brazil responded by informing Dutch diplomats about these sustainability issues in meetings under the MoU Biofuels. In 2010, Minister vd Hoeven visited Brazil to enhance the economic ties between the countries. The main themes were energy and biofuels. She was accompanied by 20 companies and visited for example the Oil & Gas Fair in Rio de Janeiro. She also met with UNICA in Sao Paulo to discuss the production of bio-ethanol and visited the Cosan-Shell joint venture Raizen ethanol factory in Piracicaba (State of Sao Paulo).

In addition, Brazilian officials –ranging from the President to federal government officials to state governors - visit the Netherlands to establish closer connections and facilitate foreign investment in Brazil. They meet with Dutch government and the private sector. Not only President Lula visited the Netherlands in 2008. Also the governor of Mato Grosso do Sul did so and in 2011, the governor of Bahia visited the Netherlands. Earlier (2007) the Ministers responsible for harbors and agriculture together with the governor of Mato Grosso officially visited the Netherlands. They

[17] http://agrosoftbrazil.com/agropage/168.htm

discussed harbor development and logistics with the Dutch government and private sector. Regular visits have also been conducted under the MoU Biofuels (see next).

In trade missions, environment is in general not a major topic in comparison to trade and investment (for example promoting the use of Rotterdam as entry point to Europe for commodity trade). However, corporate social responsibility is an important issue for most Dutch multinational companies, less so for middle-sized and small companies that also participate in trade missions. Increasingly, CSR is extended to ensure sustainability of resources and the organisation's operations. This has an effect on the trade missions where related subjects are discussed and affects Brazilian counterparts and joint ventures (e.g. Shell-Cosan).

MoU Biofuels Brazil – The Netherlands

Both the Netherlands as well as Brazil were very interested to increase sustainable biofuel production and trade and signed a bilateral MoU to co-operate further. The formal objective of the MoU is "to promote a mutually beneficial partnership between the signatories in the field of bioenergy, including biofuels' and identified areas of co-operation (no goals). Sustainability was not specified and no specific targets were set. Through an accepted motion from Mr. van der Ham, member of parliament, which questioned the sustainability of first-generation biofuels, the government was requested not to accept sustainability standards which were less than the one used in the Netherlands at that time (the 'Cramer criteria'). During this period also an intense debate developed in Europe about 'Food versus Fuel' and 'indirect destruction of the Amazon' whereby organisations accused the USA and EU governments to promote biofuels at the cost of the hungry poor. In 2009, the Prime Minister Balkenende, in light of these concerns, did not want to promise to increase ethanol import from Brazil.

The Brazilians regard the MoU Biofuels as an important framework for bilateral discussions between high-level government staff. The Dutch seem to underestimate this importance of the MoU. They for example did not send a Minister to the high-level International Conference on Biofuels organised by Brazil six months after signing the MoU, which would have emphasized its importance. On the other hand organisations and parliamentarians in the Netherlands sometimes over-estimate the influence the Netherlands has in Brazil. With regard to ethanol production, the domestic situation is far more important and with regard to trade the USA is more important.

The MoU led to four workshops (both in Brazil as well as in the Netherlands) to exchange information and discuss developments in general. It led to an enhanced understanding on both sides but not to concrete activities, results or changes. The MoU and discussions have not yet led to increasing ethanol trade.

On 25 June 2012, the State Secretary of Infrastructure and Environment, Mr. Atsma and Mr. Figueiredo Machado, (Ambassador at Rio+20, Director-General at the Ministry of External Relations) renewed the MoU Biofuels between Brazil and the Netherlands. The next two years this has to result in a closer cooperation on biofuels that meet the sustainability criteria and exchange of knowledge on new technology.

General observations

The above-mentioned diplomacy-related modalities - international fora, trade missions and meetings, bilateral MoU - and related activities have no clear targets to measure progress or effectiveness. Findings and conclusions can thus only be qualitative. It is difficult to quantify the effect of trade missions. The overview above shows that the number of companies participating in the trade missions increased over the years (42 in 2004, 150 in 2012). Today, around 250 Dutch companies are active and investing in Brazil. The Netherlands is one of the main trading partners of Brazil (and entry point to EU) and one of the main investors. In turn, Brazilian companies now also have based themselves in the Netherlands (e.g. Braskem, Petrobras and agro-companies such as Cutrale, Copersuca, AMaggi and BrasilFoods). These developments reflect the in general good economic relations between the Netherlands and Brazil.

Based upon documents and interviews, the government of the Netherlands seems to have an ambivalent stance regarding 'biofuels'. On the one hand it promotes Rotterdam as the transport hub for biofuels or related raw materials. On the other hand it voices concerns on the impact of increased production. These discussions are not linked, not even in discussions on the biobased economy in the Netherlands. The Dutch government also is unable to - or doesn't want to - distinguish between 'biofuels' and bio-ethanol (('biofuels' includes biodiesel-related problems) and between bio-ethanol from sugarcane (replacing sugar as a product), or bio-ethanol from corn or maize (food crops). This confuses the debate on sustainability of ethanol from sugarcane. In general, the Netherlands prefers second-generation biofuels over first generation biofuels. Brazil points to the fact that sugarcane is a very efficient crop for ethanol production. Second-generation technology that makes use of bagasse and sugarcane leaves and stems possible would make this even more attractive, energy efficient and sustainable. But is also very possible that Brazilian mills rather use the bagasse for electricity instead of producing ethanol. The Netherlands – government, NGOs, media - fail to recognise these distinctions.

4.4 CSOs and multi-stakeholder initiatives (incl. Dutch support)

Although many Dutch non-governmental organisations have scaled down their support over the years, they (e.g. WWF-NL, Solidaridad. Hivos, BothEnds, IUCN-NL.) remain interested in Brazilian developments or in touch with their Brazilian partners. Some of them still support Brazilian counterparts focusing on Brazilian environmental and social issues, and on Dutch/international interesting issues such as the commodity trade and the Amazon rain forest.

In the absence of regulation and enforcement, the last decade the main modality to use is certification initiatives. It has become the instrument to promote progress towards sustainability in market chains. However, the trigger is often a negative public opinion as a result of negative press (e.g. the Greenpeace publication which led to the soy moratorium in the Amazon). To avoid this kind of bad press companies have become more aware of sustainability. In addition, European companies now also realise that their foreign resources can become scarce. Sustainability criteria and certification is often the result of NGO-private sector initiatives such as round tables. These initiatives have often been supported by funding to the participating NGOs from amongst other the Netherlands and the EC. Dutch NGOs are often found at the forefront of international multi-stakeholder initiatives such as Bonsucro, RTRS and RSPO.

Certification itself is an independent seal that shows that a product, system or service complies with a certain standard. Because of the increased consumer awareness, NGO-pressure, and genuine concerns by the private sector themselves, certification has become an important tool for companies to show their performance. Often the starting point is compliance with national laws followed by increased Corporate Social Responsibility and enhanced management and performance. Actual certification is often the last step in an improvement process and only taken when there is a tangible market benefit (image, premium) that outweighs the costs.

The ***ISCC (International Sustainability and Carbon Certification)*** exists since 2010 and focuses on fulfilling EU-RED criteria. It does not focus on bio-ethanol. The largest producer of plastics from bio-ethanol worldwide, Brasken from Brazil, has certified its plant in 2011.

The **Bonsucro / *Better Sugarcane Initiative (BSI)*** originated in the EU (with Dutch involvement). BSI focuses on sugarcane as it is produced in 103 countries worldwide and accounts for 60-70% of global sugar production. It has thus no relation with ethanol from maize in the USA. BSI is a collaboration of sugar producers, retailers, investors, traders, producers and NGOs who are committed to sustainable sugar by establishing principles and criteria that are applied in the sugar growing regions of the world through regionally specific strategies and tools. BSI aims to reduce the social and environmental impact of sugarcane production in measurable ways that will also enable sugar production in a manner that contributes to social and economic benefits for sugar farmers and all others concerned with the sugar supply chain. The goal is, through the encouragement of better management practices to reduce farm and other sugar processing impacts. In 2010, the initiative evolved into BonSucro organisation and standard. The members of

this new organisation come from 19 countries. Dutch members include the companies Argos NSG Ltd., CSM Ltd., Rabobank Ltd., Suiker Unie Ltd. and the NGO Solidaridad. Members from Brazil includes 17 large companies including Agrovale, Brasken, Bunge, Copersugar, and Raizen (Cosan-Shell joint venture). A Petrobras branch is actually listed under the Netherlands. The federation UNICA was member of the board for 4 years.

Between July 2011 and September 2012, already 21 sugar cane mills within Brazil became Bonsucro certified, mainly from the State of Sao Paulo. These are mainly the larger companies that also export, such as Raizen. According to UNICA, the fast application showed that they already had established a sound management system and standards (there are only 2 other mills in the world with a certification). These mills encompass 2% of global production and 5% of the Brazilian production. Although this sounds low it is also already 20% of the projected EU consumption (after 1 year). Because there is no premium, UNICA thinks that most small Brazilian mills that produce for the local market will not join.

Greenergy

The Greenenergy Brazilian bio-ethanol verification programme is an industry scheme covering sugarcane ethanol from Brazil. It originates from the United Kingdom' RTFO (Renewable Transport Fuel Obligation). Companies were obliged to report the performance of biofuel feedstocks against the RTFO meta-standard (environment, health, safety). Greenenergy used this meta-standard to develop its own criteria. According to Greenenergy, 91% of the sugarcane mills that exported bio-ethanol to the UK complied with their standard.

Regarding bio-ethanol the leading initiative is BonSucro as certifies both sugar as well as ethanol from sugar cane. Increasingly, companies such as Coca Cola and Kraft and other multinationals also want to source their sugar from sustainable producers.

Round Table for Sustainable Biofuels

The RSB was established in 2006 and is an international initiative coordinated by the Energy Center at EPFL in Lausanne, Switzerland. The aim is to ensure the sustainability of biofuel production and processing. The RSB has developed criteria and tools and a third-party certification system. RSB certification has now been recognised by the EU under the RED. Members can be found in 30 different countries. Members from Brazil are UNICA, Petrobras and Amigos da Terra. From the Netherlands members include DSM, SkyNRG, SAFUG (Sustainable Aviation Fuel Users Group)[18], Wetlands International and the Dutch Ministry of Infrastructure and Environment.

Other CSO-led multi-stakeholder initiatives supported by the Netherlands

Besides providing general funding to various Dutch NGOs between 2004-2011 (under the development co-operation co-financing scheme), which was partially used by the NGOs to initiate and participate in certification / multi-stakeholder initiatives also some direct support was provided to projects. Bilateral support to Brazil was phased out as of 2006. Through the Dutch government' financial instruments Sustainable Biomass Fund (SBF) and Sustainable Biomass Import (DBI) some multi-stakeholder initiatives on sugarcane were supported (see table below).

Table 1: Sugar cane related initiatives supported by the Netherlands in Brazil.

Country	Scheme	Partners	Project	Crop
Brazil	SBF	Solidaridad, Argos NSG Ltd, WWF, Utz Certified	Real benefit sharing: improving sustainability of cane ethanol through mainstream marketing	Sugarcane
Brazil, Indonesia, Mozambique, South Africa	SBF	WWF, RSB, Univ. Sao Paolo, IESR, WWF Moz., Biogreen, Ecofys, WUR, certification body,WWF	CIIB: certification system addressing indirect impacts of biofuels	Sugarcane

[18] The group was formed in 2008 and includes major airlines and aviation companies including Brazilian companies AviancaTaca, GOL, TAM, Embraer, and Dutch KLM, and TUI Int.

Brazil	DBI	Indonesia Biopower International Ltd	Combining two biomass flows and optimizing logistics for export purposes	Sugarcane bagasse and cashew

SBF = Sustainable Biomass Fund
SBI = Sustainable Biomass Import

All of these initiatives aim to support the development of sustainable sugarcane and ensure a positive GHG-balance. None of these initiatives influence climate change policies but rather focus on implementation of techniques, innovation and increasing efficiency.

'Real Benefit Sharing' project / Projeto Renovação
The important Brazilian sugarcane federation UNICA participates in this project in relation to its main sustainability issue: labour conditions and training of sugarcane cutters.[19] The project contains several elements including (1) retraining of sugarcane cutters; (2) better management practices for farmers; (3) research on more efficient production in North-east Brazil; (4) support for suppliers that want to get the Bonsucro certification. In the State of Sao Paulo there are an estimated 90,000 sugarcane cutters and due mechanisation many are either no longer needed and/or unqualified for the new jobs. The project helped to set-up a re-training programme including a pre-training on literacy. At this moment 70 mills are participating. This part of the project can be considered strategic and successful as it is supported by the labour union and now copied by the State of Sao Paulo. Interestingly, there might be a shortage of employees soon as other sectors of the economy are also booming. Re-training has suddenly become a strategic activity for the sugarcane sector. The better management practices for farmers should lead to higher productivity, overall legal compliance and potential certification. An interesting development in this respect is that Triple-A-brand companies like Coca Cola and Kraft also want their sugar to be certified. According to Solidaridad, participating producers increasingly see the benefit of certification not only for their image but also for their performance and productivity. Corporate producers are thereby the front-runners as they have a longer time horizon and vision. Family producers are more driven by the market and their financial position.

Box 3: The Sao Paulo' Agroenvironmental Protocol

The Agroenvironmental Protocol was signed in July 2007 by the governor of the state of São Paulo, the Secretary of Environment and Agricultrue, the president of UNICA (major mill association in Brazil) and Organização de Plantadores de Cana da Região Centro-Sul do Brasil (ORPLANA). The protocol has different objectives such as:

- The anticipation of end of the pre-harvesting burning techniques of sugarcane field. According to the protocol sugarcane pre-burning will be phased out in 2014 in mechanized areas and 2017 in higher slope areas. As mentioned in section (chapter 2), the state of São Paulo law the phase out was 2021 and 2031, respectively (so faster!).
- Protection and recovery of riverside areas (APP)
- Adoption of techniques to avoid soil erosion
- Adopt measure to reduce air pollution

The protocol, which is based on voluntary participation, already had more than 171 mill' signatures in 2010, as well as rebounding effects in other states of the Center-South of Brazil. (Ministério Meio Ambiente[20]). The mechanization of sugarcane harvesting, seen as on of the major objectives of the protocol has already reached more than 70% of all sugarcane field in the Center South (CTC 2012). The mechanization process has several different relationships with others sustainability indicators. It reduces GHG emissions by reducing the biomass burning, and helps enhance soil cover, leading to higher carbon stocks in soil. It also increases the recovery of leaves and stalks to the industrial plants, where it can be transformed into electricity (current technology) or second generation biofuels (incoming technology). It also has social impacts by substituting manual

[19] http://unica.com.br/Renovacao/
[20] http://www.ambiente.sp.gov.br/etanolverde/protocoloAgroambiental.php

harvesting (with bad work conditions). Different experiments, however show that mechanical harvesting enhances significantly soil compaction, compromising sugarcane growth in the field. It is also enhances the harvesting losses (sugarcane brought to the mill /sugarcane in field) due to difficulties on adjustments of harvesting machines to irregular fields (CTC, 2012).

CIIB - certification system addressing indirect impacts of biofuels
The project included various partners including some from Brazil. The project developed a methodology for Low Indirect Impact Biofuels (LIIB). The project ran from January 2011 till July 2012 and culminated in the publication of the report "Low Indirect Impact Biofuel (LIIB) methodology version 0" (July 2012) by WWF International, Ecofys and EPFL (host of the RSB secretariat. The impact of this recent report cannot be assessed yet but is an interesting contribution to the challenge of dealing with ILUC.

Biopower International Ltd.
The project by the Dutch company Biopower (www.biopower.nl) is piloting to make pellets from bagasse and cashew waste to be exported. The project planning has faced some delays and is still running. Results are not yet published.

General observations
The above-mentioned government multi-stakeholder activities have no clear targets to measure progress or effectiveness. Findings and conclusions can thus only be qualitative.

In the absence of legislation, certification initiatives – Bonsucro as well as others like FSC, RTRS, RSPO - seem successful in stimulating sustainability in commodity value chains. As a result of the continuous efforts by non-governmental organisations the last decades and general awareness also corporate social responsibility is gaining ground. Multi-stakeholder initiatives are a good way to bring companies, NGOs and government entities together. For the Dutch government this is an interesting modality to stimulate progress on its sustainability objectives without the need to define legislation (which it can only do in the Netherlands anyway).

The mentioned projects cannot be assessed against their formulated goals as they are not finalised yet. The discussed 'Real Benefit Sharing' project seems quite successful and the LIIB report is interesting.

5 Enabling politics, policies and structures in Brazil

5.1 Policy developments in Brazil

Sustainability of ethanol production is directly related to its use as biofuel and renewable power generation (energy sector) and the expansion of biofuels (agriculture). Therefore, their sector plans are important as well.

Market demand policies/developments

The most important policies directly affecting the ethanol market are related to taxes (Federal and by State) and the federal blending mandate. Since hydrous ethanol demand is mainly driven by commercial comparison of ethanol and petrol prices, all policies that influence ethanol (and petrol) costs are therefore also relevant. The most important taxes on ethanol are ICMS (Imposto de Circulação de Mercadorias e Servicos: State Sales Tax) ranging from 12 to 25% of final ethanol price, depending on the state and IPI (Imposto sobre Produtos Industrializados: Federal Excise Tax). The CIDE (Contribuição de Intervenção no Domínio Econômico: royalty payments, technology transfers and compensation of technology supply), also collected by the federal government, has also been used as an incentive for the consumption of ethanol. However, the CIDE is now zero for petrol, which changed that incentive from favouring ethanol to petrol. The government also stimulated the sale of Flex-Fuel Vehicles (FFV). This incentive has also been cited as an important instrument to promote the use of ethanol. However, in the end the consumer decides at the pump between pure petrol or ethanol, so sales of FFV can only enhance the potential consumption of ethanol.

Climate Change and Energy policies in Brazil

Although Brazil has no obligatory mandates to reduce emissions, the country made a Voluntary Commitment (at Copenhagen in 2011) on reducing GHG emissions between 36,1% and 38,9% in 2020. This commitment is supported by the National Policy on Climate Change (law no 12.187, December, 29, 2009) and the National Implementation Plan. The total 38,9% reduction are expected to be realised by: 24% from deforestation (20,9% in Amazon and 3,9% in the Cerrado); 6,1% from agriculture; 7,7% from energy (including biofuels); and 0,4% from others. The action plan includes the promotion of the use of bio-ethanol (share of reduced emissions is 2.2% or 60 metric tonnes CO2 by 2020).

The National Plan for Energy defines the actions related to energy sector. In Brazil, the National Council of Energy Policy set the policies and guidelines for the energy sector. The Ministry of Mines and Energy (MME), is responsible for the energy planning policy implementation (EPE, 2011), and elaboration of the Decennial Plan of Energy (PDE)[21]. The PDE presents the 10-year vision on energy supply and demand, serving as a reference for investments in the energy market. The PDE is not binding but rather serves more as a mix of forecast and ambition. It does not have adequate instruments to make these long-term projections reality by enforcing or stimulating implementation. In the ethanol case, the forecast for 2020 was 63 billion litres for national consumption, 6.8 for exports and additional 3.5 for industrial use making a total of 73 billion. The actual PDE, that presents projections for 2021, reduced total demand to 68; most of the reduction comes from projected exports.

The executive power must also establish Sector Plans (Planos Setoriais de Mitigação e de Adaptação às Mudanças Climáticas) in different sectors to reach in conjunction the objectives of the National Plan on Climate Change. The sector plans also include the plans to control deforestation in different biomes (PPCDAM for the Amazon; PPCERRADO for the Cerrado; and PPCaatinga for the Caatinga biome), for the agriculture (Plano ABC). These are important sector plans in the light of the discussion of indirect land use changes and deforestation triggered by expansion of sugar cane.

[21] Available at. http://www.epe.gov.br/PDEE/Forms/EPEEstudo.aspx

Labour law

The Brazilian legal labour legislation is rather strict. The regulatory laws for the labour market in Brazil are: (i) The Federal Constitution; (ii) Consolidation of Labour Laws (CLT), (iii) Rural Workers' Law (5889/73; and Law No. 10.192/2001 that establishes the wage policy. In addition, there are annual negotiations between parties (held in compliance with the abovementioned laws to reach Collective Agreements. According to the benchmark developed by ICONE, the Regulating Norm 31 (NR-31) of the Ministry of Labour and Employment establishes the precepts that must be followed by agriculture firms for worker health and safety, which includes training, provision of personal protection equipment, housing, clean water, handling hazardous substances, etc. Overall, compliance with the law is a major issue and – like environmental laws – enforcement is increasing.

Brazilian environmental legislation

The environmental legislation is spread over several specific laws. The table below presents the main environmental legislation in Brazil.

Law	Objective	P.S.
No. 4,771, September 15th, 1965	Forest Code	Permanent preservation areas
No. 997, May 31st, 1976	Environmental Polution Control	Environmental Permission
Portaria do Ministério do Interior No. 323, November 29th, 1981	It probibits release of vinhoto in the water	
No. 6,938, August 31st, 1981	Environmental National Policy	Mechanisms and instruments (environmental zoning, Environmental Impact Assessment)
CONAMA deliberation No. 001/7986	General Guidelines for the Evaluation of Environmental Impact	For 'industrial complex and units and agro-industrial'
No. 6,171, July 04th, 1988	The use, conservation and preservation of agricultural soil	
No. 11,241, September 19th, 2002	Gradual elimination of burning the straw of sugarcane	Elimination of the use of fire as a unstraw method and facilitator of cutting the sugarcane
No. 12183/05	Use of water charge	
No. 50,889, June 16th, 2006	Legal Reserve of landed property in the State of São Paulo	Obligation of reserving an area equivalent to 20% of each rural property
SMA deliberation 42, October 14th, 2006	Environmental prior license to distilleries of alcohol, sugar plants and units of production of spirits	It defines criteria and procedures
Deliberation No. 382, December 26th, 2006	It sets the maximum emission of air pollutants to sources	Annex III: Emission limits for air pollutants from processes of heat generation from the external combustion of sugarcane's mulch
Agricultural and Environmental Protocol of sugar/ethanol industry	Prominence to anticipate the legal period to the end of the harvest of sugarcane with the previous use of fire in the areas cultivated by plants	Government of the State of São Paulo and ÚNICA
Elimination intentions of burning sugarcane in the ethanol/sugar sector of Minas Gerais protocol	Removal of burnt by 2014	SIAMIG/SINDAÇÚCAR-MG and Government of the State of Minas Gerais

Source: Amaral et al (2008).

If a producer wants to start a new agribusiness project, the investor must go through three licensing procedures:

1. Licença Previa (LP) – Preauthorization – approves the site and plan and establishes basic requirements conditions.
2. Licença de Instalaçao (LI) – Facility License – authorizes the facility and includes environmental control measures.
3. Licença de Operaçao (LO) – Operating License – authorizes operations after complying with requirements established in the previous licenses and subject to periodic renewal.

The producer has to have an Environmental Impact Assessment (EIA) conducted and publish an EIA-Report (EIA/Rima). The EIA process includes an obligatory public hearing to present the project and the Environmental Compensation, such as the planting of native species or the formation of a permanent natural reserve within the production area or within the same watershed (BNDES, 2008).

Brazilian Forest code

The **Forest Code** (1965 with later amendments) sets limitations on the amount of forest that can be cleared within any plot of land. Each biome has a different percentage of area that has to remain forested (ranging from 20% to 80% in the Amazon biome). In addition, Areas of Permanent Preservation (APP) are designated in vulnerable areas, such as along rivers, hilltops, and steep slopes. Enforcement of the Forest Code improved considerably the last decade, partly as a result of improvements in the ability to monitor forest cover through remote sensing. Most farmers do not comply with this forest law because historically they have cleared forests without formal permission (although in the '80s and early '90s sometimes with informal government consent). This might be the reason why in 2011, a reform of the forest code was proposed.

Opponents of the Brazilian Forest Code (i.e. mainly large farmers and ranchers) see the law as hindering agricultural growth and international competitiveness and successfully presented the reform as a nationalist response to an unfair international pressure for conservation in Brazil. In April 2012, the lower house of Brazil's National Congress passed a motion regarding reform of the Forest Code. According to environmentalists the main problem is the proposed amnesty for illegal deforestation conducted before July 2008. Also the APP requirements were reduced along rivers from 30 to 15 meters and to allow these areas to count as part of the Legal Reserves, which is not the case at the moment (Metzger et al. 2010). This would have a serious impact on environmental connectivity and water catchment (Michalski et al. 2010). This reform discussion was particularly painful because Brazil was the host of the Rio +20 World Summit on Sustainable Development in June 2012.

On 28 May 2012, president Dilma Rousseff vetoed some parts of the Bill and provided some alterations. Although Rousseff denied environmentalists' push for a full veto, she removed many of the bill's contentious provisions, including the amnesty. She also issued an executive order to fill in the gaps created by her veto. Rousseff and her ministers defended their decision as a realistic compromise that promotes agriculture but also protects the environment. The revised code still requires that land-owners maintain a proportion of their land as forest, ranging from 20% for those in coastal regions to 80% in the Amazon. Rousseff restored obligations for landowners to restore forests that were cut down illegally, although she created exemptions that could relieve numerous small properties of this obligation. Whereas the old forest code required landowners to maintain corridors of riverbank forest 30–500 meters wide, depending on the size of the waterway, the revised law and presidential order reduce those requirements to just 5–100 meters. They also eliminate protections for steep slopes and allow landowners to meet some of their obligations to restore forest with permanent plantations of exotic trees, such as eucalyptus and oil palm. Brazil's Congress has until September to overturn Rousseff's vetoes with a majority of both houses, and the president's executive order will expire in late July unless approved by Congress.

A Mixed Parliamentary Committee examined the legislation and provided alterations. The Parliament approved the report of this committee without reservations. In the newly approved text, the area of vegetation to be restored along riverbanks, other bodies of water and APP areas will be reduced even further for large rural properties than originally foreseen. In big properties, or in the case of wide rivers, the minimum requirement for the protected vegetation strips has been reduced from 30 to 20 meters. Another concession is that replanting and recuperation of vegetation can now be done using commercial fruit trees in both APP areas and in Legal Reserve areas of natural vegetation. President Dilma's expressed dissatisfaction with the political agreement that altered the text.

CSOs are dissatisfied with the reform. They are concerned because the reform lowers the level of forest protection in Brazilian law; second, since it exempts many producers from their historic obligation to recover deforested areas with natural forest trees, the new version of the Code could operate as an incentive to illegal deforestation in the future and; third, it showed how politically powerful the conservative agricultural sector is.

6 Outcomes 2004-2011

6.1 Enabling policies and politics

6.1.1 European Union and the Netherlands

The demand for bio-ethanol increased tremendously by the mandatory targets set for biofuels in many countries and the introduction of Flex-Fuel Vehicles (FFV) in 2003 (cars that can run on 100% petrol up till E85: 85% bio-ethanol blend). The enabling policies for biofuels are the EU Renewable Energy Directive (RED), its sustainability criteria and the Fuel Quality Directive (FQD) and the related Dutch policies and legislation. Together they created a market for biofuels. The EU decision to use biofuels in the transport and to set mandatory blending targets meant for the Netherlands that by 2010 around 900 million litres was needed (with the 5.75% target, later to be reduced to 4% by a decision by the Dutch government). Although The Netherlands has sugar beet farmers and bio-ethanol plants, it cannot produce enough bio-ethanol. To meet this demand, the Netherlands has to import bio-ethanol and biodiesel, either from European producing countries such as France or from third countries such as Brazil. Economically probably more important for the Netherlands is that it wants to play a significant role in supplying the European market with bio-ethanol from third parties through its harbours (Rotterdam harbour wants to be one of the main transport hubs of the world).

Demand in the EU27 grows stronger than local production so import is needed. Also demand will continue to increase strongly in countries such as Brazil, Japan and especially the USA[22]. Estimates on global production and demand in 2020 seem highly unreliable because:

- Many countries want to reduce their overall use of energy;
- Cars and industrial production become more efficient, and at the same time fossil fuels are replaced by biofuels, hybrid/electric engines etc.;
- Ethanol is produced from first-generation crops as sugar cane, sugar beet, and maize which are annual crops meaning that producers can quickly respond to (slowing) demand;
- As of 2015, second-generation technology will become widely available and production will increase rapidly worldwide.

It is safely to assume that ethanol will represent the majority of global biofuels demand in 2020. Opposition[23] will grow to producing biodiesel from edible oils (also used by the food industry) and rising prices will make biodiesel production less attractive. Whether ethanol demand will exceed supply is uncertain. Even when second generation technology becomes available in 2015, production from first generation ethanol will remain high and larger than second-generation production.

6.1.2 Brazil

There are various policies and laws that affect the sustainability of production in Brazil. These are described in the previous chapter. Sustainable production of sugarcane and sustainable ethanol is not formally defined in Brazilian legislation, and the Brazilian government does not have a unified policy for sustainable sugarcane production and sustainable ethanol. On the contrary, there are several policies that address and help to guide the sustainability of sugarcane and ethanol in different policy levels. From a Brazilian sugar cane producer perspective, social issues i.e. labour legislation and related issues, are the most important sustainability issue.

[22] The USA is the world's biggest fossil fuel consumer and wants to replace 20% of its petrol with ethanol. Already in 2012, the USA consumed 511-530 billions litres of petrol a year, of which 95% is blended with ethanol (predominantly at E10 level). The coming years this will increase to E15, which would mean an annual demand of around 76 billion litres of ethanol.

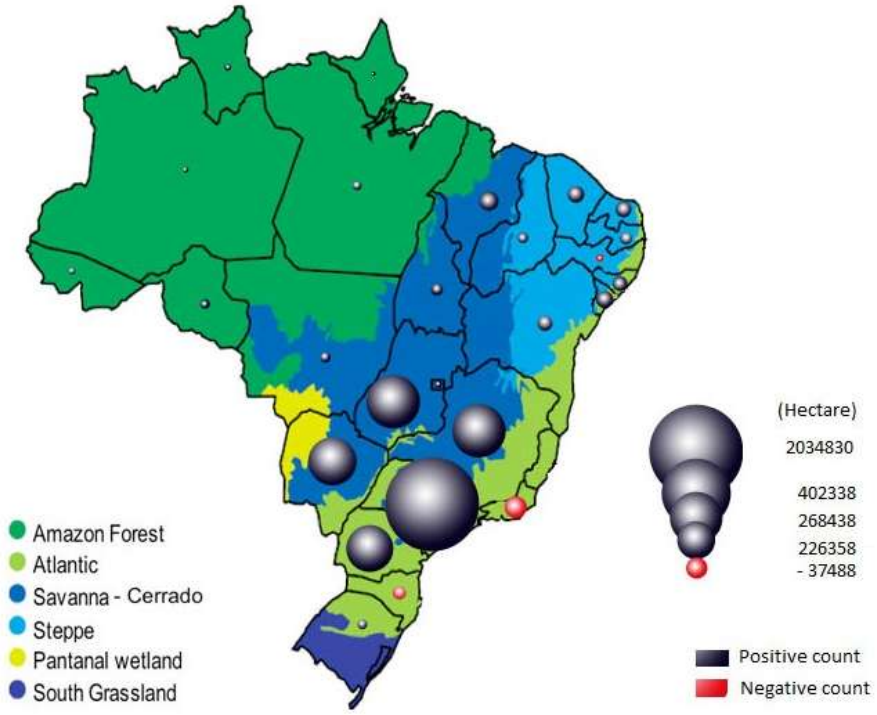
[23] The world's largest biodiesel market is Europe and opposition to the use of edible oils such as palm oil and rapeseed by NGOs and food industry is strong and growing (GHG emissions, biodiversity, food security). For example, the CEOs of Unilever and Nestle expressed their opposition in newspapers.

A major policy development in Brazil is the reform of the Forest Code. But as it does not relate to Dutch or EU biofuel development but it is a domestic affair, it cannot be regarded an outcome. Therefore, the reform is described in the previous chapter.

A major policy outcome between 2004-2011 is the Sugarcane Agro-ecological Zoning, (Decree Nº 6961/2009), developed by the Ministry of Agriculture in partnership with Ministry of Environment, which serves in Brazil as a major reference to coordinate and promote sugarcane expansion in Brazil. The Zoning indicates the most favourable places for sugarcane expansion considering soil and climate risk, potential for sustainable production, social impacts and environmental legislation. Importantly, the Zoning excludes: (1) areas with high slopes (above 12%), assuming it as a limiter for mechanical harvesting/non burning; (2) areas of native vegetation; (3) the Amazon and Pantanal biomes; (4) areas of environmental protection; indigenous areas, areas annually covered by water, rocky areas; urban and areas and mines. Lands already under sugarcane cultivation in the 2007/08 crop season were also excluded from the study. The final products are zoning plans per State and are maps and tables (by municipality) classifying potential areas for sugarcane expansion, as high average and low potential, and also classifying the actual land use (mix of agriculture and pastureland; agriculture and pastureland) of those expansion areas.[24] The GIS based study identified a total of 64.7 million hectares for sugarcane expansion, where 19.3, 41.2 and 4.3 million ha were classified as high, average and low potential for sugarcane cultivation. From the total suitable expansion area, 37.2 ha were classified as pastureland.

The zoning does not include legislation to enforce a specific pattern of sugarcane expansion, but it serves as a reference for land use planning and energy policies. The major impacts of the Zoning comes through specific actions such as establishment of regulatory framework, public and private control mechanism, better financing conditions (particularly trough BNDES loans).[25] Areas outside of the zoning don't receive public support or credit

Figure 8: Location and relative size of sugar cane producing areas in Brazil.



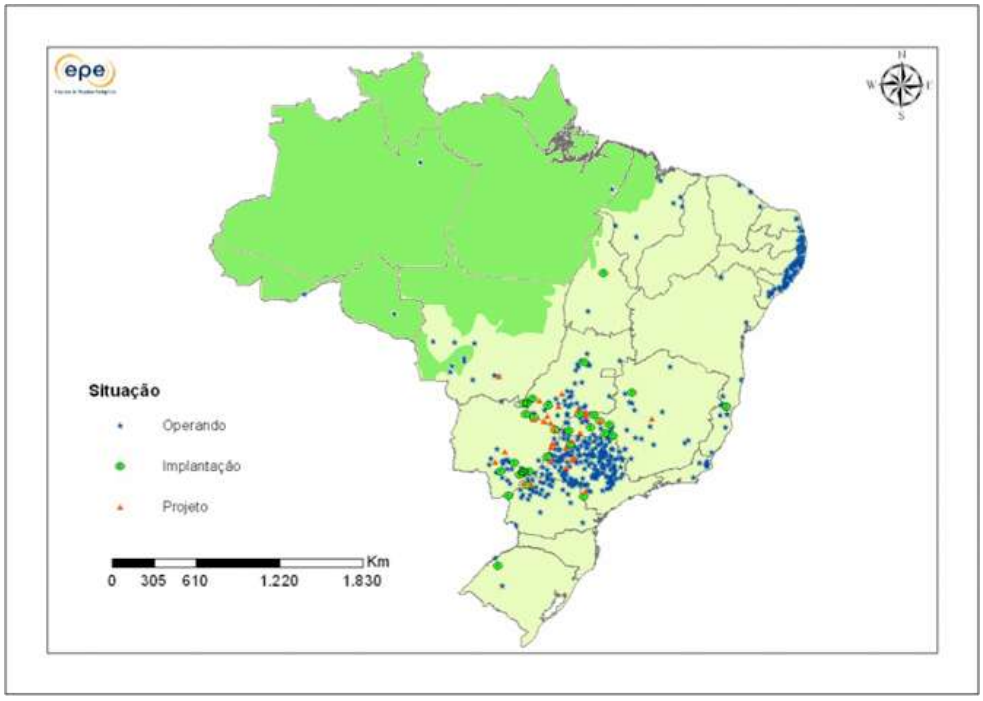
Made by authors based upon IBGE data.

[24] The "actual" land use is based on the survey made by the ministry of environment in 2002 (probio).
[25] EMBRAPA. Zoneamento Agroecológico da Cana-de Açúcar. Expandir a produção, preservar a vida, garantir o futuro, ISSN 1517-2627 2009.

According to UNICA the agro-ecological zoning is not hindering the sugarcane sector as it is in line with existing market dynamics. The exclusion of the Amazon and Pantanal for expansion is not a problem. Although the zoning has not been in place for a too long and thus effectiveness is difficult to asses, the existing market dynamics can be described (see table in annex 4). The market dynamics confirm UNICA's statement. Sao Paulo is by far the main producing state with the largest surface area planted (2.95 million ha in 2010 with 72% increase since 2004), followed by Minais Gerais (746,500 ha), Parana (625,900 ha). The largest increase in area planted and production is found in Mato Grosso do Sul (205% increase to 399,000 ha), Goais (228% to 579,000 ha), and Minais Gerais (123% to 74,500 ha). Although in the Northern states (which includes Amazon states) the production also increased this is relatively small (see next paragraph). The location and relative size of sugar producing areas are pictured in the figure above.

The sugarcane production areas are closely connected to the ethanol/sugar cane mills (which require significant investments). Normally sugarcane production is located within a radius of 50 km around a mill. This explains the expansion of sugarcane in the states that already have significant sugarcane areas. There are very few mills located within the Amazon biome.

Figure 9: Location of existing and planned ethanol mills in Brazil.



Source: EPE with information from MAPA, UNICA, UDOP

6.2 Sustainable production and trade

6.2.1 Bio-ethanol trade

The main determinant for the ethanol market is policy decision-making with respect to mandatory blending or tariffs. Bioethanol is imported to the EU mainly from Brazil and USA (the mandatory blending can also have unwanted consequences. See box below). There are 3 main components that determine the cost of imported ethanol for transport use: custom classification and its tariff; specification of ethanol quality; and taxes. The main driver for consumers to use ethanol in comparison to petrol is price. European producers cannot compete on price with Brazilian sugarcane ethanol. There is thus an inclination to establish an import barrier by establishing duties, and set high denaturation demands and other standards. Especially the specification of the ethanol quality standard is important as it is a national matter and not harmonised within the EU.

Even the definition of E85 varies. The quality standard defines to what extent E85 has to be denatured. Because ethanol absorbs moisture from the atmosphere, even if Brazil denatures ethanol 100% it will be not be the same when it arrives in Europe. This often forms a trade barrier[26] for Brazil and even between EU member countries, as an E85 blended in one country is not allowed in another country because of different fuel-specifications. More importantly Brazil faces tax barriers to enter the EU: the import tax for non-denatured ethanol is €0.192 per litre and for denatured ethanol this is €0.102 per litre. Brazil mainly exports non-denatured ethanol and the majority of EU member-states only allows for this type to be blended.

Box 4: Consequences of tax credits and mandatory blending in the USA.

The difficulties and consequences of promoting the production and use of biofuels is illustrated by the United States. The USA supports bioethanol production by providing tax credits and creating a market (10% mandatory blending target). US government pays 45 cents for every gallon ethanol blended with petrol. The higher the blend, the higher the tax credit. The loophole in the system is that it can be applied to biofuel produced in another country and blended in the USA to receive the tax credit. A 'splash' of fossil fuel is sufficient. Subsequently, the blend can be exported – the 'dash' - to the EU and receive the fuel credit there. Later, Congress passed a bill that eliminates the possibility of foreign producers to use the 'splash' loophole.

Increasingly, American producers used the ethanol tax credit as an export subsidy instead of contributing to America's energy diversification strategy. This makes the tax credit debatable. The 2012 drought in the Midwest caused a new twist in the biofuel debate. The drought wiped out the corn crop. However, the biofuel blending of 10% is mandatory and forces producers to produce ethanol. The estimate is that the USA will need 13bn gallons of ethanol. If the domestic production is insufficient (normally 40% is used for ethanol, 40% as animal feed and 20% by consumers: already debated as Food vs Fuel), either feedstock or ethanol will have to be imported which would drive food prices worldwide upward. Farmers, food and beef companies, and even the FAO have asked President Obama to suspend the mandatory blending.

Sources: various websites including Financial Times.

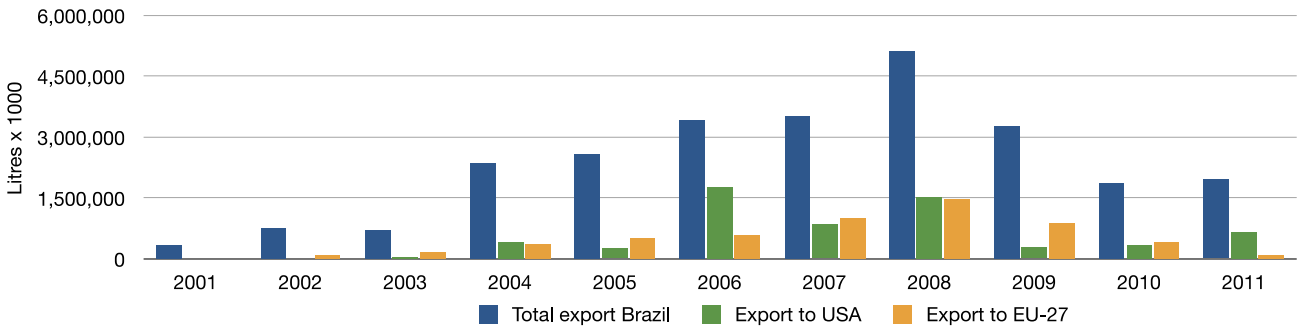
In theory, the market would grow to using E85 blends. To make E85 a success it has to be competitive on price at the pump. This will require additional actions (tax exemptions, duties on petrol, blending with cheap imports) because European producers will not be able to produce at that price level. Cheap imports could be a solution for consumers but not for farmers. However, the EU's Custom Code Committee approved on 12 October 2011, a draft regulation to raise import taxes (with 30%) for high ethanol blends to €102/m^3. On third of member states voted in favour of the regulation, one third opposed and remainder abstained. Those in favour argue that the regulation fixed a loophole, whereby companies import ethanol-petrol blends (especially E90 imported as a chemical) and avoid the higher duties of unblended ethanol (imported as a biofuel). This makes it also impossible to find reliable figures on the total amount of ethanol imported from Brazil and USA that is used as biofuel (the classification 'chemical' is also used for other goods). Some figures can be found on the import of denatured bioethanol.

Mr. R. Vierhout of the European Ethanol Biofuel association (ePure) noted in his 2009 presentation at the ethanol summit in Brazil a gap of 600 million litres between trade statistics (figures from EU COMEXT and Brazilian SECEX), whereby Brazilian export figures are higher than the European import figures. EPure corrected the import figures of the EU from Brazil, which are presented in the table above. Of course, Brazil produces more bio-ethanol and has more trade partners than just the EU. Brazil's main trading partners for bio-ethanol are the USA, the EU (with the Netherlands as main entry point), and Japan. In 2008, Brazil produced 24.5 billion litres, exported 5.1 billion litres (21%) of which 1.5 billion litres (29%) was exported to the EU (or 38% if the corrected figure of 1.9 billion litres is used). For the EU, Brazil was then the main trading

[26] Because it may classify E85 as drinking alcohol with a minimum tax of €500/hl.

partner with a market share of 76.9%. In 2008, the EU27 produced 2.86 billions litres (see table in par. 3.3). Not only did the total volume of EU imports grew over the years but also Brazil's market share. This means Brazil was the main third party supplier profiting from the biofuels market development in the EU. From the table above it can be derived that in 2008, from all ethanol imported in the EU from Brazil almost 90% went through the Netherlands. However, import from Brazil dropped in the years thereafter. The harbour of Rotterdam reported in 2012 that biofuels transhipment decreased with 6% between 2010-2011.[27] Import of ethanol from Brazil decreased to 100,000 tonnes (9% of total import), down from the peak of 800,000 tonnes in 2008.

Figure 10:Total export of ethanol by Brazil 2001-2011 and to EU-27 and USA.



Based on data from Alieweb (MDIC).

Table 2: Import EU-27 and export Brazil of bio-ethanol, all uses (millions litres).

Year	Export Brazil all countries[1]	Imports EU all countries[2]	Import EU from Brazil[1]	Import EU from Brazil corrected[3]	EU-imports Brazilian share[3] (%)	Export by EU[2]	Import NL from Brazil[6]
2000	227		37				
2002	604		76	198	38.6%		
2004	2,321		380	586	64.8%		
2005	2,592		542	787	68.9%		
2006	3,429	973	585	866	67.5%	66	344
2007	3,532	1,670	997	1,360	73.3%	70	801
2008	5,122	2,390	1,485	1,930	76.9%	58	1,331
2009	3,308	1,900	0	?	?	73	675
2010	1,903	1,440	0	?	?	92	
2011	1,511	1,500	0	?	?	100	

Based upon various sources including (1) SECEX Brazil, (2) EU27 Annual Biofuels Report, USDA Agricultural Service, (3) ePure, (6) UNICA Brazil, If the cells are blank this means no reliable figures could be found.

According to UNICA the main reasons were the high prices of sugar vis-à-vis a low(er) price for ethanol and increased demand within Brazil. To make it even more complex, Brazil also fixed the price of petrol at the pump, which affects the competitiveness of ethanol at the pump. In general, import and export are affected by overall production (especially in Brazil and the USA), subsidies, blending targets, and import tariff decisions by the USA and EU. For example, the USA is now both exporting its own subsidized corn ethanol to Brazil as well as importing Brazilian sugar cane ethanol (for which the import tariff was reduced).

At the moment, production decisions in Brazil (sugar or ethanol) by mills are solely based on what happens in Brazil. The EU27 policies are considered – according to UNICA - too unreliable for investors to base a multi-million euro investment decision on. Maybe only after the 2014 evaluation of the RED they might find the EU more reliable. At the moment the EU27 – and thus also the Netherlands - is irrelevant with regard to bio-ethanol production decisions in Brazil.

[27] http://www.portofrotterdam.com/nl/actueel/pers-en-nieuwsberichten/Pages/daling-overslag-biobrandstoffen.aspx

6.2.2 Land use changes and social issues within the EU

The environmental factors directly associated with agricultural production in general are pollution by using pesticides, soil erosion and acidification by the excessive use of fertiliser. This is not typical for crops used for biofuels. Therefore, this paragraph focuses more on those environmental issues that are more closely associated with the increasing demand for biofuels.

Land use changes

The area of land use for crops and pastures in the EU more or less stabilised although annual variations occur due to crop rotation. The annual land-cover change is low with 1.3 (mainly urbanisation, intensification and afforestation)[28]. The wilderness areas within Europe are either protected or unsuitable for agriculture and cattle ranching. Further agricultural expansion in these wilderness areas is very unlikely. The last decades some agricultural land has been taken out of production. This fallow land slowly turned into natural vegetation and had positive effect on biodiversity. There is a link between the increased demand for biodiesel and the planting of rapeseed on these fallow lands (5.6% less in 2020), especially in Germany (JRC, 2010). This is however not the case for ethanol:

The overall number of hectares of the main ethanol crop wheat remained the same, while the number of ha for sugar beet goes down (see par 2.2). These feed-stocks did thus not replace other crops during the last decade as a result of rising demand for bio-ethanol. In the coming years there is also no expansion foreseen (JRC, 2010). There is also no suggestion of indirect land use changes within Europe, e.g. wheat replacing cattle or another crop that expand somewhere else. If replacement would occur, the expectation is that more produce would be imported from outside the EU (e.g. Ukraine). Because no natural vegetation i.e. forests have been cleared to planting wheat, sugar beet or maize the environment or biodiversity within the EU is not negatively affected.

Another important issue is the overall balance of greenhouse gases of an 'ethanol' crop in comparison to petrol. In general, feedstock not including land cover changes is positive for sugar beet and wheat (IFEU, 2008; IFPRI, 2010). However, land conversion has a major impact on this GHG-balance (Searchinger, 2009), whereby the type of land that is being converted plays an important role. Lands with high carbon stocks (mature forests, peatlands) turn any GHG-balance negative. As mentioned above LUC and ILUC are not major issues within EU for wheat and sugar beet and thus the GHG-balance remains positive.

Social issues

JRC (2010) cites the ESIM-model, which forecasts that the production of wheat (+3%) and maize (+7%) will go up. EU prices for the feedstcoks wheat, sugar and maize will rise by 8%, 21% and 22% by 2020. Organisations like ePure question this rise, as the use of these feedstocks is much smaller for ethanol than for fodder. According to them, a rise in meat consumption and the price of meat will have a higher impact. Also, the by-product of ethanol products from cereals, dried distiller grain, can be used as fodder and thereby suppresses the price of fodder (EU, 2007). Last but not least, it is also important to what extent the EU allows the import of ethanol. Because annual crops are the feedstock for ethanol the market can respond quickly to new developments (thereby being very different compared to biodiesel from oil palm trees). Both within the EU as well as in Brazil the ethanol market is considered very volatile and due to its market and trade dynamics and complexity it is difficult to provide reliable forecasts. Overall, one can assume that bio-ethanol is a new market and substitutes the deteriorating sugar market for EU producers. Farmers' income would be influenced positively and consolidate overall employment in the sector (see also the more or less stable wheat production figures).

In the Netherlands, the Ministry responsible for environment (now I&M) supports the biofuels blending targets on the condition that the sustainability criteria are met. They also point out that it provides a unique opportunity to enhance sustainable production and hope the sustainability

[28] EEA 2010 'Land use: SOER 2010 thematic assessment'.

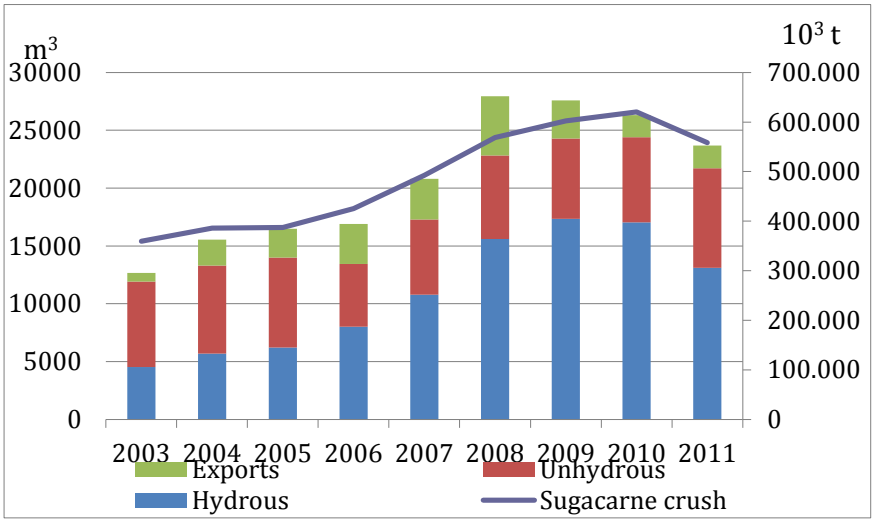
criteria have a positive effect on the wider agricultural sector. In the EU27 the system for compliance has been established and is implemented.

6.2.3 Production of bio-ethanol in Brazil

Brazil already started already in 1975 with producing ethanol for vehicles (ProAlcohol program), to reduce its dependency on expensive import of petrol. More recently, countries like China, India, Thailand and Mozambique plan for large-scale production of ethanol. Global Production reached 74 billion litres in 2009.The top producing countries are the USA (54%), Brazil (34%) and EU27. In the USA mainly maize is used whereas Brazil uses sugar cane and European countries wheat, sugar beet and maize. Brazil ethanol exports reached a historic record in 2006, when MTBE was banned as in the USA (first in California, and then in several other states), by its cancerous effects when it accumulate on groundwater.

In 2004, 10 new mills were established in Brazil, which jumped to 25 in 2007. The vision of a bright future led to huge investments in additional production capacity. In 2008, the sector observed an extraordinary rate of 30 new mills in a single year. In the period 2004-2010 the national development bank BNDES saw the sector as a national strategy and was present in almost all investments, resulting in a total disbursement of 27,7 billion Reais, at a much more attractive cost of capital than the ones practiced in the market (BNDES, 2010). Most of this vision changed in mid-late 2008. After three years of low international sugar prices (due especially to sugar oversupply in India), biofuels were under attack in the international sustainability debate, and average debt of sugarcane mills were then about 43 billion R$, almost 8 times higher than in 2005 (about 5.8 billion)[29]. Under these conditions, the financial crisis hit hard and initiated a new phase for the sugarcane sector. It became clear that the expectations of the international market from 2008 onwards would not become a reality, at least in the short-midterm. Most of the ethanol had to be absorbed by the domestic market, which led to decreased prices. One of the first responses was the withdrawal of investments in industrial capacity, especially after 2008, with only 4 new mills been constructed in 2011. On the agricultural side the impact of low financing resources was mainly felt in the reduction of renewal of sugarcane fields, lower investment in expansion areas and lower use of inputs. Together with bad weather conditions the lack of investments, led to significant decrease of average yields (from 82,8 t/ha in 2008/09 to around 72 t/ha in 2011/12). Overall, as we can see on the graph below, ethanol production reached a peak in 2008, following a downward trend since then.

Figure 11: Brazilian sugar cane crush and ethanol production 2003-2011.



Source: UNICA and EPE.[30]

[29] Estimate from Itaú-BBA.
[30] http://www.unicadata.com.br; https://ben.epe.gov.br/BENSeriesCompletas.aspx

The low ethanol prices and lack of short time financing, and huge debt initiated a phase of opportunities for equity movements, with an important concentration of the sector and entrance of new big corporate players, for example the Cosan-Shell joint venture Raizen. The market is consolidating and the sugarcane sector is for 70% in the hands of 340 large producers.

Preliminary data indicates that ethanol production in 2012/13 will be higher than 2011/12, but several uncertainties remain regarding the expansion of ethanol sector. Long-term forecasts vary significantly. Official figures from Ministry of Mines and Energy projects total production of 73 billion litters in 2020, with 7.8 billion litters for export (EPE, 2011). ICONE´s Outlook projects total ethanol production of 56 billion litters, with 10.3 billion litters for exports in 2022 (ICONE 2012). The projections are relatively similar on technology assumptions, but differ on their views of the international market. Actually, the new projections of the Ministry of Mines and Energy (that is under public consultation) reduced total ethanol production, with an even worse scenario for ethanol exports (EPE, 2012).

Domestic producers have great doubt on the weight that the ethanol strategy is seen by the federal government when compared to recent oil discoveries know as 'pre-salt deposits'. Federal government has been pushing Petrobrás to keep gasoline wholesale prices down regardless the international trends in oil prices. To mitigate Petrobrás losses, it is also giving tax reductions to gasoline (and not to ethanol), making hydrous ethanol less competitive. At the same time, the ethanol production is no longer regulated by the Ministry of Agriculture, but by the Ministry of Mines and Energy, through ANP.

6.2.4 Socio-economic issues in Brazil

The federation UNICA represents around 150 mills which entails 60% of sugar and ethanol producing mills (including 10% from the North-east). The federation is the first association of producers that reports on sustainability issues under the Global Reporting Initiative. In order to be able to this it receives information from approximately 75 mills (or 50% of its members). The organisation and its members are also actively involved in the national commitment on improving labour conditions. According to UNICA compliance with all labour regulations and social sustainability are the main sustainability issues.

Large-scale sugar cane production can have a variety of effects on local livelihoods – both positive and negative. On the positive side production may provide significant employment opportunities in rural areas, in both the production and processing sectors, and thereby potentially drive up rural incomes and improve access to health and education. Some research has been carried out into the employment effects of ethanol production from sugarcane in Brazil. De Castro (2007) found that the sector generates a large number of jobs and has many indirect employment effects. The Brazilian sugarcane sector provided 700,000 direct and 3.5 million indirect jobs in 2004. However, the number of jobs generated per hectare of land may be low when compared to small-scale farming. But than also the level of income may be very low.

Just prior to the harvest many sugarcane fields are set on fire to burn the leaves and scare/destroy snakes. The sugarcane is cut by hand and burning enables the workers to see snakes and avoids cuts from the leaves on hands and arms. It also decreases the risks for accidental cuts from the machete used. But the burning also leads to smoke hazards and excessive heat in the field in combination with the already warm climate. The sector is characterised by poor working conditions, especially in relation to the burning of sugarcane and manual cutting work. The FoodFirst Information and Action Network (FIAN, 2008) reports not only on poor working conditions on Brazilian plantations (e.g. exposure to pesticides and excess heat and sun) but also on cases of slavery and child labour. Smeets et al. (2006) found that wages in sugarcane and ethanol production in Brazil are generally well above the minimum wage. However, cutters are not paid monthly wages but per amount of cane harvested. Overall, the sugar cane producers regard compliance with the labour laws as their main sustainability issue and it is a major obstacle for any

certification.

The current trend towards mechanical harvesting of sugarcane will solve the bad working conditions but will also result in a net loss of jobs. UNICA works on improving the situation and re-training of sugar cane cutters (see the project mentioned under chapter 'Modalities), which is now also adopted by the state of Sao Paulo. UNICA is also part of the National Commitment on Improving Labour Conditions (includes federal government, labour unions and sugar cane sector), which goes beyond the current legislation. At the moment, 140 mills comply with this commitment.

Food security: Food versus Fuel?

In 2012, the Center for Strategic Studies and Management (CGEE) and the Brazilian Ethanol Science and Technology National Laboratory (CTBE) published reports on all relevant aspects of the sustainability of sugarcane bioenergy. It includes figures on how much and which agricultural uses and native vegetation was replaced by sugar cane between 2005 and 2008. Sugar cane substituted mainly pastures, soybean, and maize (but also oranges in Sao Paulo state).

On a national level, total production of food crops in Brazil went up between 2004-2011 (see figures below. In the case of beans (+6%), coffee (+18%), and wheat (+6%) overall production increased while the area planted decreased. The main decrease in production is rice (15%) both in area planted as well as in yield. The principal producing state is Rio Grande do Sul (1,1 million ha planted, 6.9 million tonnes) followed by Santa Catarina. The state of Maranhão has a high surface area planted (481,544 ha) but low yields. The state of Mato Grosso had 235,287 ha planted with rice in 2010. These are not the major sugar cane areas. Interestingly, the production of soy (+39%) and maize (+33%) increased strongly because they are used in an intercropping system. This also shows how difficult it is to attribute the effect of expansion of one crop to the decrease of another crop. In conclusion, sugarcane expansion had no effect on food security in Brazil.

Figure 12: Area planted in Brazil with main food crop in 2004 and 2010.

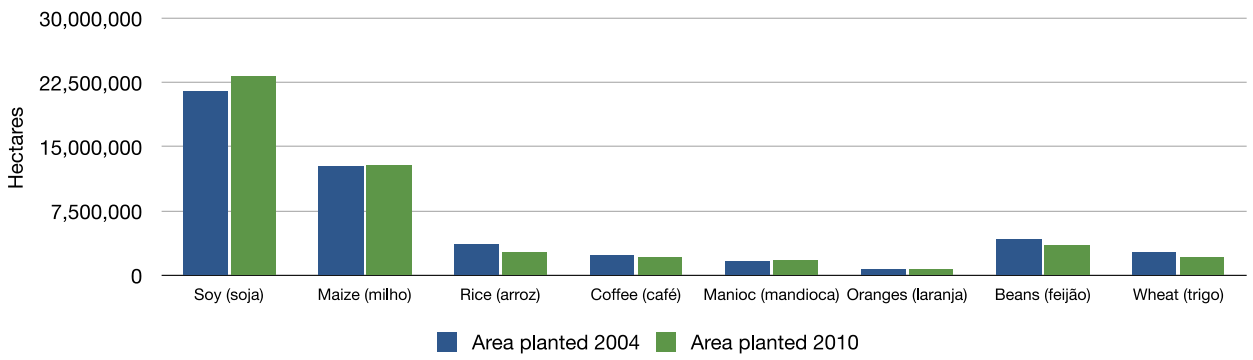
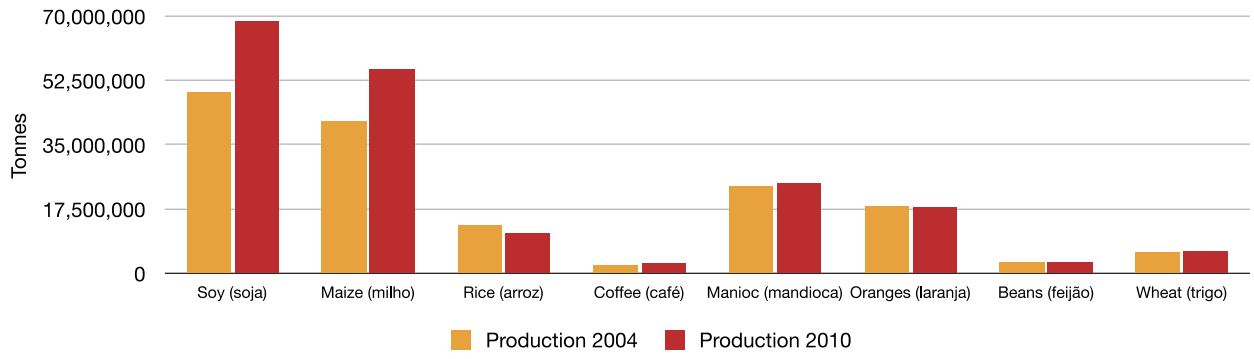


Figure 13: Production of main food in Brazil crop in 2004 and 2010.



Based on data from IBGE Brazil.

6.2.5 Green-House Gasses emissions and land use changes in Brazil

The burning of sugarcane before harvest not only leads to smoke hazards for workers and local people but also to massive CO2 emissions. The last decade the harvest became more mechanised, which makes burning unnecessary. It significantly improves the GHG-balance of sugar cane. The sugarcane crop and production technology has advanced over the years and the residue of the sugar cane (bagasse) is used for energy generation in ethanol factories. The direct emission of GHG due to the production of sugarcane's ethanol on established sugarcane plantations has been calculated in different studies. Whereas the RED estimate direct ethanol emission at 24g CO2/Mj, several other studies shows lower emissions, depending on the hypothesis regarding technology, credits for sales of electricity surplus from the mill to the grid, as well as system boundaries .The OECD (2008) estimates life cycle emissions of GHG on average at 85% less than petrol.

Land use change also plays an important role in the GHG-balance (Searchinger, 2009). Land use changes results in changes in the above-ground vegetation and carbon balance in the soil. This became an important aspect of the RED sustainability criteria. Conversion of natural forests and grasslands, clearing of vegetation, ploughing etc. may lead to a negative GHG-balance, either directly or indirectly. In 2004, there was 5.6 million hectares planted with sugarcane, which grew to 9.2 million ha in 2010 (see table below). This means an additional 4.9 million hectares was planted with sugar cane. Brazil plans to expand the area planted to 30 million hectares. Overall, cattle ranches occupy around 76% of all agricultural land in Brazil. Expansion of sugar cane plantations is most likely to occur in the Cerrado and replace cattle ranches.

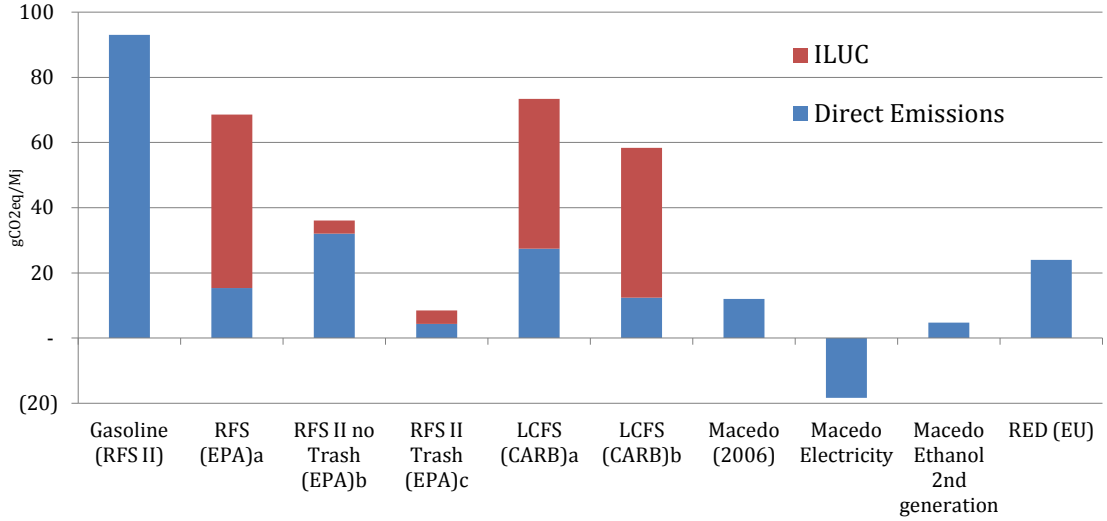
Table 3: Land use in Brazil (hectares)

Land use	Hectares 1990 / 1995	2004	2006	2008	2010
Pastures	177,700,472	n.f.	172,333,073	n.f.	190,000,000[1]
Crop lands					65,371,447
Soy	11,487,300	21,601,340	22,082,666	21,063,721	22,339,094
Sugarcane	4,272,600	5,633,700	5,815,151	8,210,877	9,164,756
Corn	11,394,300	12,864,838	12,997,372	14,747,249	12,987,578
Coffee	2,908,960	2,389,598	2,331,560	2,250,491	2,160,605
Beans	4,680,090	4,325,777	4,243,474	3,967,518	3,655,538

Based on data from IBGE Brazil.
(1) Rough estimate from literature and interviews. This figure refers to the total surface area of pastures but not all land is actually used for grazing of cattle. Land was also cleared to obtain land titles and never taken into production or are degraded pastures and no longer productive.

The USA' Environmental Protection Agency (EPA) studied the life cycle emissions including direct and indirect land use change over a 30-year horizon (under the RFS, Renewable Fuel Standard, see also figure). On February 2010, the EPA decided sugar cane ethanol was an advanced biofuel, capable of reducing GHG by at least 50% compared to petrol. Overall, experts agree that ethanol production from sugarcane on farmland has a positive GHG balance.

Figure 14: Assessment of GHG emissions from sugarcane ethanol in the USA Renewable Fuel Standard (RFS).



a: Preliminary rule RFS2; b: final rule RFS2, no trash for energy and marginal electricity credit; c: final rule RFS2, trash for energy and marginal electricity credit; d: no electricity credit; e: average electricity credit and mechanically harvested. From EPA; CARB; European Commission. Source: Macedo and Seabra (2009).

However, the effect of using nitrate fertiliser, which emits nitrous oxide is underestimated. The global warming potential of nitrous oxide (N2O) has 296 times more impact than CO2 (over a 100-yr period). Nitrous oxide also causes ozone depletion. Cruzen (2008) showed in a calculation that the IPCC' 1% emission factor for the release of N2O from the soil to the atmosphere may be too low. They say the emission factor will be around 3-5%. That means that (excessive) use of nitrate fertiliser will lead also lead to much more N2O in the atmosphere than previously calculated. This would mean the GHG-balance of various crops for biodiesel and ethanol could be negative.

6.2.6 Sugarcane in Amazon states and ILUC

In relation to direct and indirect land use changes, European attention mainly focuses on the Amazon rainforest. It is the world's largest rainforest and its destruction would lead to major biodiversity loss, climatic changes, and loss of stored carbon. Official figures are published by IBGE on the different Amazon states that constitute the Legal Amazon region. It should be noted that not all land involved lies within the Amazon biome and is covered with Amazon rainforest. Also, in some states like Acre and Para part of the rainforest has already been cleared for timber, pastures, agriculture and infrastructure and sugarcane is directed to these lands.

Table 4: Sugarcane in the Legal Amazon Region

Amazonian States	Area planted 2004 (ha)	Area planted 2010 (ha)	Production 2004 (tonnes)	Production 2010 (tonnes)	Ethanol factory
Acre (AC)	648	2,769	22,977	107,251	1
Amazonas (AM)	4,029	5,407	235,431	341,186	1
Amapá (AP)	96	130	2,201	4,146	0
Maranhão (MA)	26,791	50,477	1,652,422	3,176,531	6
Mato Grosso (MG)	206,829	212,498	14,290,810	14,564,724	14
Para (PA)	7,266	10,897	504,225	650,900	1
Rondônia (RO)	415	3,824	29,651	151,000	1
Roraima (RR)	548	563	1,256	1,455	0
Tocantins (TO)	3,081	10,803	160,096	715,317	2
Total	*249,703*	*297,368*	*16,899,069*	*19,712,510*	*26*

Data from IBGE Brazil, UDOP Brasil.

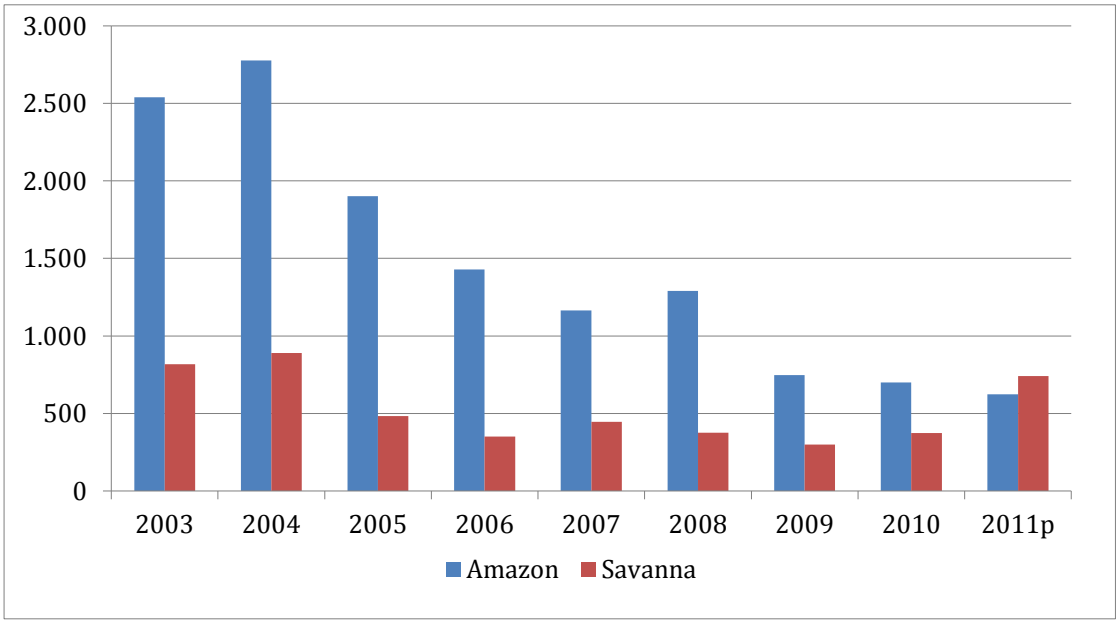
The surface area is small in comparison to the hectares planted in the main producing states (Sao Paulo, Minais Gerais, Parana, Goais, Alagoas, Mato Grosso do Sul and Pernambuco). The area planted with sugarcane in the Amazon states went up with 47,600 ha or 19% between 2004-2011.

In 2004, sugarcane production in the Amazon states was 16.9 million tonnes, which was 4.3% of the total Brazilian production of 396 million tonnes. Production in the Amazon states reached 19.7 million tonnes in 2010, which was 2.7% of the total Brazilian production of app. 717 million tonnes. These figures suggest that although sugar cane expanded and production went up in the Amazon states, expansion and production in the states outside the Amazon increased much more. In 2010, the area planted in the Amazon states is 3.2% of total area planted with sugarcane in Brazil (9.2m ha) and there are 26 ethanol factories (3 more planned but outside the Amazon biome). Fourteen ethanol factories are in the State of Mato Grosso and 6 in Maranhão, which both lie (partially) outside the Amazon biome. Ethanol production in the other states is focused at local use mainly.

In Europe concern grew that increasing demand for biofuels (from sugarcane and soy), would replace pastures with biofuel crops in the Cerrado and subsequently move cattle farmers on natural areas in the Cerrado or the Amazon biome. The linkages and actual effects of this Indirect Land Use Change (ILUC) is researched and debated by Brazilian and International experts[31]. The Brazilian institute CONAB (National Food Supply Company of the Ministry of Agriculture) reported in 2007 that sugar cane expansion occurred mainly by replacing 423,120 ha of extensive livestock pastures and replaced 215,056 ha of corn, soybeans, coffee and oranges. The area planted with grain is around 47 million ha so sugar cane replaced only 0.5%. According to CONAB there is no proof that demand for ethanol pressures grain production, availability or prices.

The figures of deforestation (see below) during the last decade show that overall deforestation went down and deforestation in the Cerrado surpassed the Amazon.

Figure 15: Deforestation in the Amazon and Cerrado between 2003 and 2011.



Source: INPE and Lapig

Impact of direct land use changes

The highest deforestation level in the Amazon was recorded in 1995 with 29,059 km²/yr, followed by 2004 (27,772 km²/yr). Since 2005 deforestation has been declining to a record low of 6,418 km² /year in 2011 (measured since 1988). Reasons cited for this decline are low commodity prices and more effective law enforcement of illegal deforestation. This was during the same period as sugarcane for ethanol expanded in Brazil. There is thus no relation between direct land use changes for sugarcane in the Amazon and deforestation levels. The main causes for deforestation in the Amazon today are still cattle ranching (85% of the land in use), infrastructure development

[31] http://environmentalresearchweb.org/cws/article/news/46082

(roads), colonisation and related agriculture, commercial agriculture (mainly soy) and logging. Barone et al (2010) researched the land use interactions in some places in the Legal Amazon Region. They showed that cattle pastures expanded in Pará, Mato Grosso, Tocantins, Maranhão, Rondônia and now also entered Amazonas state. In Roraima state (the most Northern state of the Amazon), soy replaced cattle. This also occurred in Para and Mato Grosso. Therefore, direct deforestation between 2004-2011 as a result of sugarcane expansion in the Amazon has not occurred.

According to the Brazilian government planting of sugarcane in the Amazon makes no sense. However, the Brazilian NGO Reporter Brazil stated in 2008 that sugar cane plantations did increase in the state of Acre with the support and approval of the Brazilian government (this includes an ethanol factory owned by Alcool Verde SA and planning to grow sugar cane on 39,000 ha of already cleared land. The mandatory EIA was not conducted)[32]. In 2011, the research institute Embrapa published the zoning for sugar cane in the state of Acre. Sugar cane could expand on 195,159 ha of pasture land and land with secondary vegetation in Southern Acre.

The governor of Tocantins also wants to expand sugarcane in his state and Tocantins according to him has the capacity to install 24 ethanol factories. Also here Embrapa researched the suitability of sugarcane and established a zoning (Embrapa 2009). Sugarcane could expand throughout the state along some roads and rivers (also outside the Amazon biome. No total figure provided). In 2011, there was one operational ethanol factory owned by Bunge (capacity 2.4 million tonnes). According to the local newspaper Conexão Tocantins, citing CONAB, the harvest of 2010/2011 showed an expansion of 14,400 ha. The yield is expected to produce app. 124 million litres of ethanol. The planted area increased 18.5% in 2012 from 27,000 ha to 32,000 ha. The most reliable figures are those of IBGE, which states 10,803 ha was planted with sugar cane in 2010. Whether the area planted indeed jumped to 32,000 ha after 2010 cannot yet be confirmed as IBGE did not publish the latest figures yet.

Because not all land in the states belonging to the Legal Amazon Region is covered with rainforest it is not clear to what extent sugarcane ambitions will threaten the rainforest. Secondly, with the agro-ecological zoning for sugar zone the government de-stimulates production in the Amazon biome. The Zoning exercise conducted by Embrapa in for example Acre and Tocantins direct sugar cane to land previously in use for cattle pasture or with secondary vegetation. So the direct conversion of rainforest will probably be very limited.

Impact of Indirect land use changes (ILUC)

Another concern voiced by NGOs is that sugar cane, by replacing pastures, pushes cattle ranching further into the Amazon. Here it becomes very difficult to distinguish between the various drivers for expansion of cattle ranching, which also includes demand for beef, export prices, etc. Sugarcane does expand over pastures in the Cerrado and in theory cattle ranchers could move further into the Amazon biome. Research by Nassar et al (2010) showed that the Brazilian beef production increased 5.3% per year from 1996 to 2008. More than that, in this period there was also a sharp increase in cattle per hectare, by 5.5% per year. In the light of the ILUC discussion, an analysis conducted by Nassar et al. (2010) on the regional re-allocation effect of beef production over natural vegetation showed that only 6.7% of total pasture area decrease in the South, Southeast, Centre-West and Northeast Cerrado was reallocated over natural vegetation in the Amazon biome. This correlation might be attributed to the expansion of a crop like sugarcane but this also shows that the majority of pasture increase in the Amazon cannot be attributed to crop expansion in other parts of Brazil.

In addition, the total surface area for sugarcane is so small (0.7%) in comparison to the total surface area used for cattle ranching in the Amazon biome (44.7 million ha in 2008, INPE) that it hardly can be considered the main driver.

[32] See: http://www.reporterbrasil.org.br/agrocombustiveis/clipping.php?id=25

Using the Brazilian Land Use Model (BLUM) developed by ICONE, the consequence of sugarcane expansion for indirect land use changes were calculated. The model divides the country in six biomes (incl. the Amazon). The results were published in 2012 by CGEE (see table below). From the table it can be derived that conversion of native vegetation by sugar cane was 8% of the total sugarcane expansion area, and almost all conversion was indirect (7.6%). The conversion of native vegetation was highest in the Northeast Cerrado biome (almost 50%). There is an indirect effect but the 181,000 ha of native vegetation indirectly converted is very small in comparison to total surface area in agricultural use (see tables 3 and 4).

Table 5: Sugar cane net expansion (ha) and associated conversion of native vegetation in Brazilian Land Use Model (BLUM) regions between 2005-2008.

Biome region	Sugar cane area net growth	Sugar cane native vegetation conversion		Share of conversion of native vegetation due to expansion		
		Direct	Indirect	Direct	Indirect	Total
South	195,444	0	2,565	0%	1.31%	1.31%
Southeast	1,701,105	5,091	125,637	0.30%	7.39%	7.86%
Centre West Cerrado	334,134	2,203	32,715	0.66%	9.79%	10.45%
Northern Amazon	14,737	0	2,988	0%	20.28%	20.28%
Northeast Coast	110,339	0	0	0%	0%	0%
Northeast Cerrado	39,768	2,437	17,338	6.13%	43.60%	49.72%
Brazil	2,395,726	9,731	181,243	0.41%	7.57%	7.97%

Source: ICONE, Published in CGEE 2012 (p. 208).

In conclusion, if one would like to keep the Amazon forest standing the expansion of cattle ranching and beef consumption should be addressed, not sugarcane.

7 Analysis of effectiveness of modalities and pathways

7.1 Effectiveness of policies and legislation

In general, policy (incl. mandatory blending) was the main driver, not commercial competiveness although sugarcane ethanol can be competitive with petrol. The main driver for consumers to use ethanol in comparison to petrol is price. European producers cannot compete on price with Brazilian sugarcane ethanol. Therefore major determinants for the ethanol trade are: (1) policy decision-making with respect to mandatory blending in the importing nations (i.e. creating a market), (2) import tariffs, and (3) quality standards (especially the specification of the ethanol quality standard is important as it is a national matter and not harmonised within the EU. This acts as a trade barrier).

The Netherlands had a pro-active role in European biofuel policy development. Dutch foreign policy positions on biofuels followed and are based on the European political discussions on biofuels and agriculture. Between 2004-2009, the general Dutch political position was that biofuels were an opportunity. This general political position was in line with other major countries such as France, Germany and Spain. Like Germany and the UK, the Netherlands however wanted conditions to ensure sustainable production and use. Countries like Spain and Italy were not in favour of introducing conditions and standards to be imposed on their private sector. The Netherlands was an early adapter with the development of sustainability (Cramer) criteria in 2006/2007. The leading Dutch Ministry for Environment (now I&M) started organising meetings on sustainability criteria and framework with like-minded countries like UK (also an early adapter) and Germany and also invited the EC to discuss sustainability in relation to biofuels. More countries joined the discussion. The Dutch view was shared by Germany and the UK, but opposed by countries Spain, Italy, Brazil, Indonesia and USA who did want any conditions that could hinder their export. Without the support of major countries like Germany and UK, the Netherlands would not have succeeded to convince the EC and EU to include sustainability criteria in the RED.

Being a major bio-ethanol producer, Brazil became pro-active as well by taking the lead in the Global Bio-Energy Partnership (2007). GBEP provides a good alternative to avoid biofuel discussions at other international fora (like CBD and UNFCCC) where it has less influence. Both Brazil as well as the Netherlands participates actively in GBEP. The EU and Netherlands pushed for an international agreed sustainability framework (for which GBEP turned out to be a good international platform). At the end of 2011, GBEP agreed on a framework, which now has to be implemented (GBEP, 2011). Although implementation is voluntary and will differ per country, in any event, there is a common understanding on what sustainability entails.

In 2012, IOCNE conducted a benchmark of three certification schemes for sustainable ethanol (Bonsucro, RSB and ISCC) approved for the EU-RED against the Brazilian law and regulations (focusing in the Federal Government legislation). According to the benchmark, almost all sustainability criteria listed in the RED are already taken into consideration by at least one of the Brazilian laws studied (ICONE, 2012). Brazilian law even includes important labour legislation, which addresses the main social issues (not part of the RED criteria). The sustainability schemes use different names and words for their criteria but Brazil's legislation presents concepts that can be considered similar in purpose. For example, RSB requires a buffer zone within the production site, Brazil does not have a specific legislation about buffer zone, nevertheless, some requirements in the Brazilian Forest Code can be considered similar to it, such as Permanent Protected Areas with riparian natural vegetation, The purpose of a buffer zone, i.e. protecting a natural site to be preserved from harmful effects of agricultural use, remains the same. The mandatory Legal Reserve requires a percentage of the farm, which needs to be preserved with natural vegetation, either within the production area or compensated within the same watershed. These legal reserves are in purpose meant to preserve biodiversity and the functioning of the ecosystem. If the areas are carefully selected and integrated into an overall spatial planning for nature and ecosystem preservation they can serve this purpose (and also act as buffer zones). It is difficult to assess what

is insufficiently sustainable about this requirement. The real problem is then compliance with this Forest Code and until today many producers do not comply with this law.

The main difference is that the Brazilian Forest Code (Law Nº 4.771/1965) allows the legal conversion of new areas. A permit is required but it can entail land clearing and deforestation of natural areas. The EU RED 28/2009 states no conversion of land with high biodiversity value, or land with high biodiverse grasslands, or land with high carbon stock in order to implement feedstock production. This part of the Brazilian law is therefore not in line with the RED. Recognizing this aspect the Brazilian government introduced the sugar cane Agro-ecological Zoning (no law!), which direct sugar cane expansion to former pastures and areas with secondary vegetation. Although not a law, the sugar cane sector is willing to oblige because it also is in accordance to their sector dynamics and market interests. In reality sugarcane expansion over natural vegetation has been very small for the last years (Nassar et al, 2008) because producers prefer to expand around their existing areas like Sao Paulo state. Here neighbouring areas are mainly pastures and soy areas. However, the 2012 reform of the Forest Code could mean less compliance with the RED criteria.

In conclusion, without the RED sustainability criteria the Agro-ecological zoning would probably not have been developed because prior to the RED the Brazilian government did not consider indirect land use changes an issue nor was it concerned by sugarcane expansion (although Brazil will formally deny such a link). If sugar cane producers comply with the already existing Brazilian forest, environmental and labour laws they would cover all sustainability concerns mentioned in the RED sustainability criteria. But some additional careful spatial planning by the Brazilian government is needed – that goes partially beyond the capacity of the sector – to guide the compensation schemes of the Forestry Code within the same watershed, to divert expansion from natural areas and to address ILUC (the purpose of the Agro-ecological zoning). In that sense, the Brazilian government responds well to the concerns raised in the sustainability criteria.

The sustainability criteria for biofuels set by the European Union has thus positively influenced developments in Brazil. This development is not only positive for meeting the criteria of the EU but also for the overall GHG-balance of sugarcane production in Brazil and its image of renewable energy source.

The sustainability criteria of the RED focus at the main environmental concerns but do not address socio-economic concerns. They also apply only to crops used for the production of biofuels and not if the crop is used for other purposes. Brazil's forest, environmental and labour laws address most sustainability concerns of biofuels. The Netherlands nor the EU had any direct influence on these laws although historic support to Brazilian NGOs and bilateral support by the Dutch embassy (e.g. PPG7) may have helped to create general awareness and (spatial planning) capacity, and helped to develop these laws many years ago.

The main specification on sustainability of bio-ethanol production in the various agreements and policy decisions between NL and Brazil is the MoU Biofuels. It has not influenced Brazilian policies or politics. The MoU Biofuels between Brazil and the Netherlands has led to better mutual understanding. A more pro-active role of the Dutch government in the MoU by co-operating more with companies and NGOs could yield more visible results. For example, by creating a link with existing financial instruments for multi-stakeholder initiatives.

7.2 Effect on sustainable production and trade

The effect of policy modalities on outcomes can only be described in qualitative terms as there are no quantified production targets, only renewable energy and blending targets (annex 2). Even though the mandatory blending targets for 2007, 2008 and 2009 (and probably 2010) were reached by the Netherlands this does not mean that ethanol was used. In fact, the Netherlands only uses very little ethanol and thus achieving these blending targets did not have an influence on sustainable ethanol production in Brazil. The EU RED did have an impact:

The main feedstock for ethanol in the EU-27 is wheat (which is mainly used as fodder). The total surface area for agriculture within the EU-27 is 160 million hectares. The surface area planted with wheat seemed to have stabilised between 25-26 million hectares. The surface area of sugar beet actually goes down (because of foreign competition). Ethanol production within the EU-27 is increasing, but there is insufficient ethanol production capacity to meet demand. Ethanol will need to be imported.

The import tariff set by the EU for ethanol from Brazil is a trade barrier that does not help in reaching the EU blending targets or the European consumers nor does it support sustainable production in Brazil (because it limits export and Europe is a major driver for integrating sustainability concerns). Official figures from Ministry of Mines and Energy projects total production of 73 billion litters in 2020, with 7.8 billion litters for export (EPE, 2011). ICONE´s Outlook projects total ethanol production of 56 billion litters, with 10.3 billion litters for exports in 2022 (ICONE 2012). The expected increased demand led to huge investments in production capacity in Brazil. In 2008, the sector established 30 new mills in a single year. Thereafter, investments collapsed. Together with bad weather conditions the lack of investments, led to significant decrease of average yields. Since 2008, ethanol production is decreasing and no ethanol was exported to the EU.

Main sustainability issues:

- Expansion: In 2004, there was 5.6 million hectares planted with sugarcane, which grew to 9.2 million ha in 2010 (164% increase). Expansion mainly occurred around established mills and sugarcane is mainly found in the states of Sao Paulo (2.95 million ha in 2010 with 72% increase since 2004), Minais Gerais (746,500 ha) and Parana (625,900 ha). The largest increase in area planted is found in Mato Grosso do Sul (205% increase to 399,000 ha), Goais (228% to 579,000 ha), and Minais Gerais (123% to 74,500 ha). The Brazilian government accepts to expand the area planted to 30 million hectares (534% increase from 2004). This expansion is rooted in the policy decisions and mandatory blending of various countries including Brazil and the EU.
- Working conditions: Working conditions in the traditional sugarcane cutting are bad and wages insecure (because paid by amount harvested). But the sector is mechanising fast and mechanisation makes burning of sugarcane before harvesting unnecessary and thereby improves working conditions and reduces GHG emissions. On non-mechanised farms, working conditions remain an issue. Many sugarcane producers do not fully comply with the labour law.
- Biodiversity: The biodiversity in large-scale monoculture plantations is very low but the overall preserved surface area in Brazil is high. The expansion of sugarcane over natural vegetation is very small. The Forest Code also requires a certain percentage preserved within the production area.
- Amazon rainforest: In 2004, sugar cane production in the Legal Amazon Region was 4.3% of the total Brazilian production and 2.7% in 2010. Although sugarcane expanded and production went up in the Amazon states, expansion and production in the states outside the Amazon increased much more. The overall land in use for sugarcane in the Legal Amazon Region (not the same as the Amazon biome) is 297,000 ha in 2010. The area planted in the Amazon states is 3.2% of total area planted with sugar cane in Brazil (9.2m ha) and there are 26 ethanol factories (3 more planned but outside the Amazon biome). Further expansion by the sugar cane sector will be small. This total surface area for sugarcane is so small (0.7%) in comparison to the total surface area used for cattle ranching in the Amazon biome (44.7 million ha in 2008, INPE) that it hardly can be considered the main driver for the expansion of cattle ranching.
- LUC and ILUC: Market dynamics show that sugarcane expansion mainly occurs over former pastures and soy areas. Conversion of native vegetation by sugar cane was 8% of the total sugarcane expansion area, and almost all conversion was indirect (7.6%). The conversion of native vegetation was highest in the Northeast Cerrado biome (almost 50%). Indirect Land Use Change of native vegetation caused by sugarcane between 2005-2008 is estimated at

181,000 ha. This is very small in comparison to total surface area in agricultural use. The overall surface area of pastures is roughly estimated at 190 million hectares. Brazil argues that sugar cane expansion can occur on former pastures and is offset by an increasing intensification in cattle ranching.

- GHG balance: Overall, experts agree that ethanol production from sugarcane on existing farmland has a positive GHG balance. On February 2010, the EPA decided sugar cane ethanol was an advanced biofuel, capable of reducing GHG by at least 50% compared to petrol. However, recent research suggests the effect of nitrous oxide from nitrate fertiliser used in the production of biofuels is underestimated. This would alter the GHG life cycle assessment of many biofuels and turn them negative. Sugarcane has a significant margin but a new complete GHG life cycle assessment of sugarcane is needed.
- Food versus Fuel Brazil: On a national level, total production of food crops in Brazil went up between 2004-2011 at the same time as sugarcane expanded. In the case of beans (+6%), coffee (+18%), and wheat (+6%) overall production increased while the area planted decreased. The main decrease in production is rice (-15%) both in area planted as well as in yield. The principal producing state is Rio Grande do Sul (1,1 million ha planted, 6.9 million tonnes) followed by Santa Catarina. The state of Maranhão has a high surface area planted (481,544 ha) but low yields. The state of Mato Grosso had 235,287 ha planted with rice in 2010. These are however not the major sugarcane states and there seems no correlation. Interestingly, the production of soy (+39%) and maize (+33%) increased strongly because they are used in an intercropping system. This also shows how difficult it is to attribute the effect of expansion of one crop to the decrease of another crop. In conclusion, sugarcane expansion had no effect on national food security in Brazil.
- Food versus Fuel Europe: Within the context of the 'Food versus Fuel" debate, Europe and the USA are doing worse than Brazil because they use food grains (corn, wheat) as the main feedstock while Brazil uses sugarcane (i.e. sugar).[33] Even so, within Europe 3% (9 million tonnes) of all grains produced in Europe are used for the production of bio-ethanol. The majority (60%) is used as animal fodder (so indirectly for food). Also here the relation with 'Food versus Fuel' seems incorrect. There seems however some merit in the "Food versus Fuel' debate about the impact of ethanol production in the USA from maize (although even there the majority is used for animal fodder. But the mandatory blending poses problems in times of shortages) and especially for biodiesel produced from vegetable oils.

Dutch non-governmental organisations have been very active the last decade in promoting multi-stakeholder sustainability initiatives like RTRS and RSPO (so this can be indirectly attributed to Dutch government financial support). They are also very active in the Better Sugar Cane Initiative, which developed into BonSucro. A French organisation took the lead in the Round Table for Responsible Biofuels. The Dutch government either financially supported these initiatives and/or politically endorsed them and thus influenced developments indirectly.

The BonSucro standard evolves fast with the support of UNICA (now 23 mills certified) and the Netherlands has some influence by supporting a project related to labour and environmental issues, which co-operates with UNICA and Solidaridad. Also influential is the adoption of BonSucro by the large ethanol company Raizen (a Shell-Cosan joint-venture), which indirectly stimulates further development and adoption of CSR by Brazilian companies.

7.3 Effectiveness of pathways and modalities

7.3.1 International pathways and modalities

The development of the EU policies on biofuels forms an interesting case for the effectiveness of international policy development and diplomacy. Other commodities are mainly produced and

[33] Although sugar is used as foodstuff is can hardly be considered an essential ingredient for a basic food basket. Especially not by rich countries where government try to reduce the consumption of sugar because people get obese or have dental problems.

traded because of clear commercial reasons and have developed over decades. The EU demand for biofuel was triggered within a few years by the (decision) to develop a EU Directive. Suddenly there was a EU market. From the biofuel case it is also clear that a EU decision has enormous impacts when the EU is a big potential market (which it often is). The sustainability criteria really triggered a worldwide debate and awareness on the pros and cons of such criteria and the relation between biofuels, climate change and the environment. Such an open discussion has for example yet to be conducted on cattle ranching, fodder production and meat consumption.

For the Netherlands the European Union is an international pathway to have an influence on international and global developments. Between 2004-2011, the Dutch government played an important role in the development of the sustainability criteria and their acceptance under the EU Renewable Energy Directive. Bringing together like-minded donors and the EC proved to be very instrumental and effective in the development of the RED criteria (and later GBEP, which was not led by NL). The Dutch Cramer criteria would not have had such an impact as the RED criteria now have. The Dutch market is too small to play a key role in corporate and country production decisions. The carrot of the common EU market can do this. As a channel to have influence the EU is for the Dutch government only effective when it can ensure support from the major EU economies.

7.3.2 Bilateral pathways and modalities

The Netherlands decided to officially close its development co-operation programme with Brazil at the end of 2005. The embassy has also not formulated policy goals / targets for sustainable ethanol trade. The modalities of the embassy are currently economic diplomacy including foreign affairs and the agriculture attaché, and the MoU Biofuels. In general, the embassy is capable to maintain good economic relations with Brazil and understands some of Brazil's sensitivities regarding biofuels and the Amazon.

Prior to the closure of the bilateral development co-operation programme, the Netherlands supported various interesting projects but none related to ethanol production and trade. The supported projects helped to build environmental awareness and capacity within Brazil at CSOs and Ministries (together with other donors). A reasonable influential programme was the multi-donor programme PPG7 ('Programa Piloto para Proteção das florestas tropicais do Brasil'). This programme supported research and pilot projects to protect and sustainably use tropical rainforest (especially the Amazon) and created various capacities at Ministries and CSOs. This and earlier programmes is likely one of the reasons Brazil has good environment, forest and labour legislation.

The last couple of years, the main economic diplomacy efforts are expressed through maintaining relations, organising high-level visits and trade missions, organising seminars, present Dutch expertise, and organise or participate in meetings on specific subjects. In combination with the interesting market opportunities of Brazil, the economic diplomacy led to more visits and trade missions, more Dutch and Brazilian companies establishing themselves in each country and more trade. However, for ethanol this has not been the case as price determines trade and after 2008 export to Europe was minimal. Once trade picks up again, ethanol is likely to be transported through Rotterdam again (before 2009, 90% of the ethanol imported from Brazil went through Rotterdam). This can be attributed to the strategic position of Rotterdam as entry point to Europe as the Netherlands being a good trading partner. Maintaining good bilateral diplomatic relations can influence the latter. Diplomacy also helps to some extent in facilitating contacts between the harbour authorities of Rotterdam and Brazilian counterparts through organising visits and maintaining contacts.

The MoU Biofuels provides the embassy with an opportunity to foster linkages between Brazil and the Netherlands In practice, Brazil had more contact with officials in The Hague although this was also limited. The text of the MoU seems more ambitious but is not specific on how it wants to operationalize these ambitions. The MoU is used by Brazil as a framework under which discussions can be facilitated, less so by the Netherlands. This is probably due to the difference in culture and point of view between the civil servants of Brazil and Netherland towards an MoU. Under the MoU

only several meetings were organised which did enhance mutual understanding between participants, which is a limited effect for a bilateral MoU. The trade missions were more effective to foster linkages and contacts.

7.3.3 Civil Society Organisations and multi-stakeholder initiatives

Over the last decades Dutch civil society organisations have been very active in Brazil and in multi-stakeholder partnership initiatives. Multi-stakeholder initiatives between CSOs and companies are very effective in raising awareness on environment and setting the bar for sustainability, in the absence of regulation and enforcement. A certification standard has become the instrument to promote progress towards sustainability in market chains and sustainability / fair trade / organic labels have become very visible in European consumer markets. Together with public opinion it also raised awareness within companies and stimulated development of corporate social responsibility. However, sustainable ethanol is not visible at the pump in Europe.

As a result of the UNICA-Solidaridad co-operation Bonsucro has established itself as an important sustainability standard. Until 2012, 23 sugar cane mills within Brazil became Bonsucro certified, mainly from the State of Sao Paulo. These mills encompass 2% of global production and 5% of the Brazilian production.

That said certification remains a niche market for most commodities unless, like for biofuels, the EU defines sustainability standards. Also, because there is no premium, UNICA thinks that most small Brazilian mills that produce for the local market will not join. Macro-economic developments and corporate decisions are also still driven by economic and commercial concerns and not by sustainability. On these developments a partnership has no effect, only EU legislation has.

For the Dutch government, these initiatives are good instruments to stimulate sustainable development in countries with which they have a commodity trade relation. Especially when development cooperation can no longer be used to support awareness, capacity building and policy development (i.e. creating an enabling policy environment).

7.3.4 Companies and corporate social responsibility

Because the subject of this study is the sustainability of a commodity, the producers and processers i.e. companies are in the drivers seat. In the end they determine whether or not the production and trade of sugar cane ethanol is sustainable or not. The other actors can only decided upon the conditions (government by legislation) or facilitate compliance with standards (CSOs by public opinion of stimulating application of certification standards). On the long term also awareness-raising affects companies as it affects employees and society.

Corporate social responsibility is growing fast in European multi-national companies and they bring CSR-priorities to other countries as well. Formal CSR policies in Brazilian companies are still limited but there are some good examples . As in many other countries, the Brazilian society is quite aware of climate and environment but as consumers they decide differently. One could even argue that Brazil is already doing better than Europe as its energy matrix is cleaner than Europe's. The decision to buy ethanol at the pump by a consumer is however a financial decision and not an environmental one.

Because Brazil is a very open trade economy, producers are very aware of what happens in consumer markets like Europe and sensitive about their image. This is fertile ground for CSR and certification and as the Brazilian urban society becomes richer and Brazilian companies more international they will probably show the same development as Europe. Joint ventures between Brazilian and European companies also show a tendency to integrate sustainability / CSR from the start. The coming years full legal compliance is the main issue for sugarcane producers.

8 Conclusions

The following conclusions are arranged as response to the main research questions presented in chapter 1.

8.1 Enabling politics and policies

(2) What were the main policy developments that influenced bio-ethanol production and trade?

The EU biofuel policies (RED and FQD), mandatory blending targets have created the biofuel market and triggered the biofuel boom as shown by the fast increase in use, production and investments in ethanol production capacity after 2004, both in the EU as well as in Brazil. Sugarcane in Brazil started expanding fast after 2004 due to increased demand and mandatory blending targets.

Because of the insecure biofuel situation in the EU and increased domestic demand, export to EU is low. At the moment, production decisions in Brazil (sugar or ethanol) by mills are solely based on what happens in Brazil. The EU27 policies are considered – according to UNICA - too unreliable for investors to base a multi-million euro investment decision on. At the moment the EU27 – and thus also the Netherlands - is irrelevant with regard to bio-ethanol production decisions in Brazil.

(2) How has sustainability of bio-ethanol production been addressed in policies and agreements by NL, EU and Brazil? What is/was the influence of the Netherlands?

The (discussion) about the RED sustainability criteria triggered the development of many policy initiatives to enhance sustainability of production. Brazil had already some significant policies and laws in place to guide production and expansion of sugarcane, which in include the Forest Code, environmental laws, the labour law and the newly developed Agroecological Zoning of sugarcane. Legal compliance is the main issue for the sector in Brazil.

Historically, the EU development cooperation donor countries have played a role in developing environmental awareness and a vocal Brazilian society with non-governmental organisations, and through capacity building of lead Ministries (e.g. PPG7, also supported by the Netherlands). This has led indirectly to sound environmental, forest and labour laws and thus an enabling policy environment. Development cooperation no longer plays a rolee as Brazil is now a middle-income country with a booming economy.

Today, national policies and legislation in the Netherlands has no effect on commodity production in Brazil. Only when it is a EU wide decision, like the Renewable Energy Directive, it has a major influence on developments elsewhere. Even then, the EU at large has to be a major trading partner to have an influence. Because no ethanol was imported from Brazil the last couple of years, sugarcane and ethanol producers will more focused on Brazilian domestic policies. But in general, because of the close (economic and cultural) ties between Brazil and Europe, there remains a mutual influence on sustainability of commodity trade.

The government of the Netherlands (also influenced by CSOs) has played an influential role (together with Germany and the UK) in the development of the EU sustainability criteria for biofuels because (1) they already had develop criteria which influenced the development of the EU criteria (2) they organised meetings with like-minded EU nations on inclusion of sustainability criteria. The Netherlands needs the EU as a channel to have this influence but also needs the support of major economies such as Germany, UK and/or France to achieve anything.

(3) What is the policy coherence between economic policy objectives and sustainability objectives, especially environmental, social and climate change criteria?

The coherence between economic policy objectives and sustainability objectives, is for bio-ethanol quite strong due to the legal status of the RED sustainability criteria which forces the sector into a sustainable direction. Social criteria are however not included. Here GBEP has more influence. More importantly, the labour laws of Brazil are good and when sugarcane producers mechanise their farms (thereby removing the main bad working conditions) and comply with the law (most yet do not) also the social concerns are addressed.

Trade missions and diplomatic contacts help to foster co-operation between the Netherlands and Brazil. Sustainability of commodities could be better integrated and more actively discussed in trade missions that do not directly relate to commodities, but trigger more production and export, to ensure more coherence.

8.2 Sustainable production and trade

The 2011 IFPRI study (partially also this study) show that the context and effects of bio-ethanol and bio-diesel production varies considerably due to the feedstock used. Referring to 'biofuels' when discussing 'bio-ethanol' does not do justice to the underlying complexity and the positive aspects of bio-ethanol from sugarcane. In discussions facts used are often out-dated or taken out of the Brazilian context, which does not do justice to the realities of the sector (although problems do exist). This creates a lot of irritation in Brazil who are proud of this renewable energy sector and its achievements. There is also misunderstanding in the Netherlands. The Netherlands –government, NGOs and companies - could do more to actively help Brazil and the sugarcane sector to explain the Brazilian sugarcane sector – and the progress it makes - in European debates and media and describe the sector as it really is (pros and cons).

(4) To what extent and how does the imported bio-ethanol from Brazil comply with the Dutch and EU sustainability criteria?

After 2008 there was no significant trade of bio-ethanol between Brazil and EU. Price dominates trade decisions. The ethanol market is very dynamic and Europe is at the moment not a preferred export destination. Bio-ethanol from Brazil that complies with the BonSucro standard (or other RED acceptable standards) complies with the Dutch and EU sustainability criteria. Today, 23 mills are certified which is sufficient to cover ethanol demand from the EU in the coming years. However, in Brazil, certified ethanol is as yet a niche in the market and the majority of the sugar cane market is as yet still occupied with basic compliance with the Brazilian legislation on labour and the Forest Code.

In the increasingly competitive global export market with USA, Japan and China (not taking into account Brazils domestic market which is most important) and reducing role of the Netherlands and Europe, the overall 'willingness-to-trade' by Brazil and Brazilian companies becomes more important. The Netherlands can build and enhance the good trading relations with Brazil and the co-operation between Brazilian and Dutch companies. That said, price will determine trade of bio-ethanol. Although the ethanol sector would love to receive a premium for their certified ethanol this seems very unlikely to happen. Good, long-term market relations and a preferential treatment for certified ethanol producers seem more feasible.

(5) How sustainable is bio-ethanol from sugarcane in Brazil and how can sustainability issues be best addressed? What is/was the influence of the Netherlands?

- GHG balance: Sugarcane is the most energy-efficient biofuel crop with a positive GHG-balance and much better than petrol (on for example GHG emissions, local air pollution).[34]

[34] In comparisons with petrol, studies tend to look at the basic GHG life cycle savings but overlook the increasing use of tar sands, charcoal and oil from the Arctic to meet global demand for petrol.

- Working conditions: Mechanisation of sugarcane makes burning of sugarcane before harvesting unnecessary and thereby improves working conditions and reduces GHG emissions. On non-mechanised farms, working conditions remain an issue. Many sugarcane producers do not fully comply with the labour law.
- Food versus Fuel: There is no proof that Brazilian ethanol in any way relates to global or domestic hunger or price hikes. Between 2004-2011, overall food production in Brazil increased and there was no shortage of food in Brazil at the same time as sugarcane expanded (see par. 7.2). Prices of several food products went up but here is no correlation with ethanol production. The 'food versus fuel' issue is irrelevant in Brazil on a national level.
- Land Use Changes: The RED date for area under production is 1 January 2008. The land area used for sugarcane production in 2008 was 8.2 million hectares and reached 9.2 million ha in 2010. Within Brazil this occurred mainly over pastures and soy in the already major production states in Southern Brazil. Conversion of native vegetation by sugarcane was 8% of the total sugar cane expansion area, and almost all conversion was indirect (7.6%). The conversion of native vegetation was highest in the Northeast Cerrado biome. There is sugarcane in the Legal Amazon Region, also in areas where historically forests could be found (Amazon biome). Direct conversion of primary rainforest for sugarcane does not occur or is very limited. There is no relation between land use changes for sugarcane and deforestation in the Amazon.
- Indirect Land Use Changes: Indirect Land Use Change of native vegetation caused by sugarcane between 2005-2008 is estimated at 181,000 ha. This surface area is small in comparison to total surface area of sugarcane expansion (2.6 million ha between 2004-2008) or surface area for pastures (190 mln in 2010) and soy (22.3 mln in 2010). If one wants to decrease deforestation in the Amazon attention should focus on cattle ranching and beef consumption (85% of the converted forests in the Amazon are pastures).

The best way to address sustainability issues is by defining appropriate legislations because in the end there is a general willingness by producers to comply with the law, especially when enforcement increases. The Brazilian laws and the EU RED - and especially the sustainability criteria - have fostered sustainable production. Second best instrument seems to be certification. Related multi-stakeholder initiatives help producers to become legal compliant and in the end certified. Besides being a strong supporter of the RED sustainability criteria, the Netherlands has supported such initiatives (current project with Solidaridad and UNICA, RTRS, Bonsucro) and thus influenced developments. Such multi-stakeholder partnerships are now common between Dutch NGOs and companies and help to improve mirror partnerships in Brazil and can increase corporate social responsible in the sugarcane sector, either directly or indirectly. Given the Dutch role in commodity trade and gateway to Europe as well as by its culture and experience in multi-stakeholder co-operation, supporting multi-stakeholder partnerships and facilitating Corporate Social Responsibility are an attractive niche for Dutch foreign policy to support the sustainability agenda. This will also facilitate the strategic agenda of long-term sourcing by multi-nationals and will also benefit the Brazilian sugarcane sector (or other commodity producers).

To increase impact, multi-stakeholder initiatives i.e. co-operation between NGOs and companies should include more often other European partners especially French, German and UK companies and NGOs (because these are important and influential markets) to increase influence and impact.

(6) What is the effect on sustainability of overall sugar cane production and what is the overall effect of bio-ethanol from different sources on agriculture expansion?

Sustainable bio-ethanol from sugarcane is still a niche of the ethanol market and this will remain so in the near future as Brazilian domestic demand is more important for Brazilian producers than the European market. The Bonsucro standard applies to both ethanol and sugar and thus affects overall production of sugar cane. The European concerns with sustainability do not affect the majority of producers in Brazil whom produce for the domestic market. It does affect those who want to export and European-based multi-national companies and both want to become Bonsucro

certified. In general, they want to comply with European standards and increasingly have corporate social responsibility (incl. sustainability of production) integrated in their operations.

National mandatory blending targets of biofuels have created the market for biofuels and triggered increased production and expansion. Even if the indirect linkages are unclear and cannot be proven, the increased worldwide demand for food, fodder, fiber and fuel will lead to conversion of natural areas. Whether the contribution for biofuel production will be significant is a question. Within the biofuel debate, ethanol from sugarcane is very different from biodiesel from palm oil or ethanol from maize (food vs fuel issue). It is also much more efficient regarding the GHG-balance. Recent discussions suggest the sustainability of ethanol from maize is doubtful. The production of ethanol within Europe from starch (wheat) and sugar beet complies with the EU sustainability criteria and uses only a small portion of total wheat production (60% is used for fodder versus 3% for ethanol).

The general impression regarding the impact of expansion of crops for ethanol production - and its overall sustainability - is that this is small in comparison to expansion for cattle ranching or the use of the food crop (wheat, maize) for animal fodder. Both suggest more attention should be provided to the use of land and food crops for meat. The growing demand for beef has more impact on the Brazilian Amazon rainforest than the growing demand for ethanol.

LITERATURE

Amaral, Webber; Marinho, João; Tarasantchi, Rudy; Beber, Augusto; Giuliani, Eduardo (2008), 'Environmental sustainability of sugarcane in Brazil'. In Sugarcane ethanol, contributions to climate change mitigation and the environment. Wageningen Academic Publishers, 2008.

ATLASS Consortium (2011), "Assessing the Land Use Change consequences of European Biofuel Policies". Report prepared by D. Laborde IFPRI.

BEST (2009), 'Incentives to promote Bioethanol in Europe and abroad'. Bioethanol for Sustainable Transport deliverable 5.14.

BNDES (2008), 'O Perfil do Apoio de BNDES ao setor Sucroalcooleiro'.

BNDES, CGEE (2008), 'Sugarcane based Bioethanol' In Energy for Sustainable Development. 2008. Available at http://www.bioetanoldecana.org/

BNDES (2010), 'Determinantes do baixo aproveitamento do potencial eletrico do setor sucroenergetico: uma pesquisa de campo'. BNDES Setorial 33, p421-476, 2010.

CBS (2012), "Renewable Energy in the Netherlands 2010". Centraal Bureau voor de Statistiek, The Netherlands.

Cardoso Lisboa C., Butterbach-Bahl K., Mauder M. Kiese R. (2011), 'Bioethanol production from sugarcane and emissions of greenhouse gases – knowns and unknowns'. In Global Change Biology Bioenergy 2011.

Cotula L., Dyer N., Vermeulen s. (2008), 'Fuelling exclusion? The biofuels boom and poor people's access to land.' IIED and FAO. On IIED website.

CGEE (2012), 'Sustainability if sugarcane bioenergy'. Centro de Gestao e Estudos Estrategicos. ISBN 978-85-60755-47-9.

CTC (2012), 'Os Desafios da Mecanização. II Simpósio Paulista de Mecanização em Cana-de-açúcar –SPMEC 2011'. UNESP – Jaboticabal. 22 de fevereiro de 2011. Centro de Tecnologia Canavieira- CTC.

Crutzen et al. (2008), 'N2O release from agro-biofuel production negates global warming reduction by replacing fossil fuels'. Atmos. Chem. Phys. 8, 389-395, 2008.

De Castro J.F.M. (2007), 'Biofuels: An overview'. Report prepared for Dutch Ministry of Foreign Affairs.

DPRN (2010), 'Burning Questions: certainties and uncertainties concerning biofuels'. Publication by the Dutch Development Policy Review Network.

Ecofys (2003), 'Biofuels in the Dutch market: A fact-finding study'. Part of the GAVE project.

EC (2001), "European Transport Policy". COM/0370/EC.

EC (2001), " White Paper: European Transport Policy for 2010: Time to Decide". EC COM (2001)/370

EC (2001), "On the promotion of electricity produced from renewable energy sources in the internal electricity market". Directive 2001/77/EC.

EC (2003), "European Energy and Transport: Trends to 2030". Office for Official Publication of the European Community, ISBN 92-894-4444-4

EC (2003), "On the promotion of the use of biofuels or other renewable fuels for transport". Directive 2003/30/EC

EC (2003), "Restructuring the Community framework for the taxation of energy products and electricity". Directive 2003/96/EC.

EC (2005), "Biomass Action Plan". COM/628/EC.

EC (2007), 'Renewable Energy Roadmap: Renewable energies in the 21st century, building a more sustainable future'. EC COM 2006/848.

EC (2007), "Impact Assessment of the Renewable Energy Roadmap". AGRI G-2/WM D(2007).

EC (2007), 'The Impact of a minimum 10% obligation for biofuel use in the EU-27 in 2020 on agricultural markets'. AGRI G-2/WM D(2007).

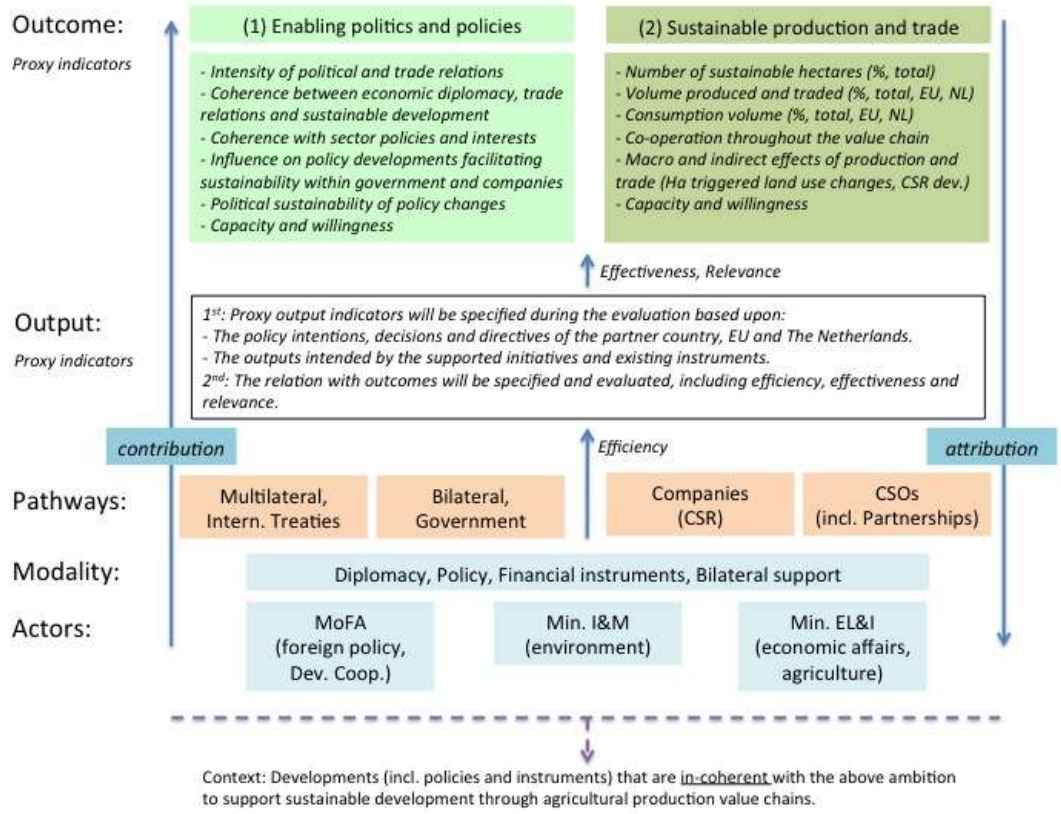
EC (2007) "Prospects for Agricultural Markets and Income in the European Union 2007 – 2014.

EC (2008), ' Second Strategic Energy Review: An EU Energy Security and Solidarity Action Plan. EC COM 2008/781.

EC (2008), 'Bioethanol production and use: Creating markets for Renewable Energy Technologies'. EU RES technology marketing campaign.

EC (2009), “Renewable Energy Directive”. Directive 2009/28/EC.
EC (2009), “Fuel Quality Directive”. Directive 2009/30/EC.
EC (2012), Proposal for a Directive of the European Parliament and of the Council amending Directive98/70/EC and Directive 2009/28/EC.
Ecofys, WWF International, and EPFL July 2012) “Low Indirect Impact Biofuel (LIIB) methodology version 0”.
EPE (2011), ‘Plano decenal de energia’, http://www.epe.gov.br/PDEE/Forms/EPEEstudo.aspx
EU (2011), ‘ Country file Brazil. Market Observatory for Energy.
Eurostat (2010), ‘Renewable Energy Statistics’.
Embrapa (2011), ‘Zoneamento Agroclimático para Cultivo de Cana-de-açúcar em três Municípios da regional do Baixo Acre, Estado do Acre, Brasil’. Documentos 124, ISSN 0104-9046.
Enthoven (2009), ‘Oranje licht of groene golf: Advies ovder beleidscoordinatie biomassa’.
Fargione J., Hill J., Tilman D., Polasky S., and Hawthorne P. (2008), ‘Land clearing and the biofuel carbon debt’. Science 319(5867): 1235-1238.
ICONE (2012), ‘Outlook Brazil 2022. Available at http://www.fiesp.com.br/outlookbrasil/
ICONE (2012), ‘Benchmark of cane-derived renewable jet fuel against major sustainability standards’. Available at: http://www.iconebrasil.org.br/arquivos/noticia/2593.pdf
IFEU (2008), ‘Bioenergy from grain and sugar beet: energy and greenhouse gas balances’.
FBOMS (2006), ‘Agribusiness and biofuels: an explosive mixture’. A publication of the Energy Working Group of the Brazilian Forum of NGOs and social Movements for the Environment and Development (FBOMS).
FIAN (2008), ‘Agrofuels in Brazil’. Report on the fact-finding mission. FoodFirst Information and Action Network.
GBEP (2011), ‘ The Global Bioenergy Partnership: Sustainability Indicators for Bioenergy’. Produced by FAO, 2011.
Grona Bilister (2006), ‘Ethanol production from sugar cane in Brazil’.
GMF (2007), “EU and US Policies on Biofuels: Potential Impact on Developing Countries”. The German Marshall Fund of the United States.
JRC (2010), ‘Impacts of the EU biofuel target on agricultural markets and land use: a comparative modelling assessment’. EU Joint Research Centre. EUR 24449 EN-2010.
Knittel C, Smith A., (2012), “Ethanol Production and Gasoline Price: A spurious correlation”.
Nasser, A. M. Rudoff, Bernardo. Antoniazzy, Laura; Aguiar, Daniel; Bacchi, Miriam; Adami, Mardos (2008). P’rospects of sugarcane expansion in Brazil: impacts on direct and indirect land use change’. In Sugarcane ethanol, contributions to climate change mitigation and the environment. Zuurbier, Peter (org). Wageningen Academic Publishers, 2008.
Nassar , A.M. et al. (2010), ‘European Commission Public Consultation on Indirect Land Use Change: Responses to the Consultation Document’. ICONE Working Paper, Available at: http://www.iconebrasil.org.br/pt/?actA=8&areaID=7&secaoID=20&artigoID=2134
Macedo, Isaias; Seabra, Joaquim (2009), ‘Mitigation of GHG emissions using sugarcane bioethanol’. In Sugarcane ethanol, contributions to climate change mitigation and the environment. Zuurbier, Peter (org). Wageningen Academic Publishers, 2008.
OECD (2008), ‘Economic assessment of Biofuel support policies’. Available at OECD website.
Rabobank, HPA (2004) “Factbook Biobrandstoffen”.
Rabobank (2007), ‘Power struggle: The future contribution of the cane sector to Brazil’s electricity supply’.
RFA (2012), “2010 Ethanol Industry Outlook: Accelerating Industry and Innovation”,
Searchinger (2009), “The impact of biofuels on Greenhouse Gases: How land use change alters the equation”. The Germann Marshall Fund of the United States, Economic Policy Program.
Sotte F. (2011) “The CAP and the EU budget: Do the ex-ante data tell the truth?”. Paper presented for the 122nd EAAE Seminar on “Evidence-based agricultural and rural policy making: methodological and empirical challenges of policy evaluation”, Ancona, 17-18 February 2011.
Texeira-Assis W, Zucarelli M.C., Ortiz L., (2007) ‘Depolluting Doubts: the territorial impacts of expansion of energy monocultures in Brazil’.
VIEWLS (2005), “Environmental and Economic Performance of Biofuels”. The VIEWLs project is co-ordinated by the Dutch AgentschapNL.

ANNEX 1:
EVALUATION FRAMEWORK



Definitions used

The definitions to be used are based upon the definitions used by OECD/DAC and are in line with the guidelines of IOB:

Output = The products, capital goods, knowledge and services, which result from a development intervention. Outputs are with the "sphere of control" of the implementer.

Outcome =A result of the organisation's activities (outputs) that represents a potential contribution to the achievement of changes (e.g. in policies and practices). Outcomes are within the "sphere of influence" of the implementer.

Efficiency = Doelmatigheid = from input to outputs: measure of how economically resources and the way they are applied are converted to direct results (p.17, IOB Evaluation Guidelines)

Effectiveness = Efficacy = Doeltreffendheid = from outputs to outcomes: relates to the extent to which the direct results of the intervention contribute to the sustainable achievement of policy objectives (p.18, IOB Evaluation Guidelines).

ANNEX 2:
EUROPEAN POLICY DEVELOPMENT MATRIX 2004-2011

Sustainable Bio-ethanol			
Year, Sector policy, instrument or channel	**Policy initiatives, objectives and targets (qualitative and quantitative)**	**Realised (qualitative and quantitative)**	**source**
European Union			
2003 EC Directive 30	Promotion of the use of biofuels and other renewable fuels for transport. Non mandatory targets: - 2% biofuels in transport 2005. - 5.65% in 2010.	Not reached in most EU countries and Directive was replaced by mandatory targets.	2003/30/EC: 8 May 2003
2005 Biomass Action Plan	Promotion of the use of biomass in the economy (as part of becoming a sustainable / green economy).	Ambitions partially realised through directives.	2005/628/EC 7 Dec 2005
2005 Impact Assessment Biomass Action Plan	Assessment of the using more biomass in the economy.		SEC(2005)/1573 7 Dec 2005
2006 A EU Strategy for Biofuels	Describes the long-term vision and implications of biofuels.	Became operational through the EU RED.	COM 2006/34 8 Febr 2006
2007 EU Renewable Energy Roadmap	Describes a long-term vision and discusses renewable energy sources for the EU.	The 12% share of renewables in gross inland energy consumption in 2010 will not be met (later the economic crises after 2008 helped).	COM 2006/848 10 Jan 2007
2007 Impact Assessment of the EU Renewable Energy Roadmap	The impact of a minimum 10% obligation for biofuel use in the EU-27 in 2020 on agricultural markets.		AGRI G-2/WM D 30 April 2007

2007 EU Decision on Kyoto Protocol	The EU committed itself to 30% reduction in GHG-emissions in the global context by 2020 and a 20% reduction unilaterally.	The EU reports it is on track in reaching the Kyoto goal of 8% reduction 1990 level between 2008-2012	EU website on Climate Action
2008 Second Strategic Energy Review – Securing our Energy Future.	Reviewing and setting the political agenda to achieve the EUs energy objectives.	Adopts a package of proposals to make energy savings in key areas.	COM 2008/0781 13 Nov 2008
2009 EC Directive 28 'Renewable Energy Directive or RED'	Promotion of the use of energy from renewable sources. Targets: - 20% share renewables overall by 2020. - 10% share biofuels in transport by 2020. - Sustainability criteria set if biofuels are to count towards GHG obligation.	Figures by Eurostat suggest that the 2020 targets can be reached as the share of renewables reached 10% in 2007 and the biofuels share for transport reached 4.7% in 2010. Concern is expressed that there are major differences between countries and some (including The Netherlands) lack behind.	2009/28/EC: 23 April 2009
2009 EC Directive 30 'Fuel Quality Directive'	Specifications of petrol, diesel and gas-oil and introducing monitoring mechanism of GHG emissions. Suppliers should gradually reduce by 2020 life cycle GHG emissions with 10% per unit of energy from fuel and energy supplied: at least 6% by 2020 compared to 2010 by using biofuels or reduced flaring; 2% reduction through carbon capture, storage and electric vehicles; and 2% through CDM credits.		2009/30/EC: 23 April 2009
The Netherlands			
2006 Start Commission Cramer	The Commission started a multi-stakeholder dialogue with selected organisations (government, private sector, NGOs) about sustainability of biomass.	Final report on Sustainability criteria for biomass in 2007. These criteria have influenced and have been integrated into the sustainability criteria of RED.	2007 report
2006 Transport Biofuels Act of 14 Nov 2006	Biofuel targets for transport set: - 5.75% share by 2010 - 10% share by 2020	According to the Dutch PBL the mandatory blending targets for 2007, 2008, 2009 were reached and they assumed 2010 would be reached as well.	"Besluit Biobrandstoffen wegverkeer 2007"
2007 Policy 'Schoon en Zuinig'	Defines the ambition to reduce GHG emissions: - Reduce emissions (especially CO2) in 2020 by 30% in comparison to 19990 - Raise energy efficiency with 1-2% per year - Intensify sustainable energy use from 2% to 20% of the total energy use by 2020	The targets are ambitious and will likely not be met with the policies defined by the new government who no longer supports this agenda.	Latest: part of the top sector 'chemie' and defined in Businessplan Biobased Economy 2.0

2007 Initiative Biobased Economy	Based on above 2007 policy the initiative was taken to start discussing the Dutch biobased economy, which included several support programs.	BBE has no own targets but supports targets set by different related policies.	
2008 Decision Council of Ministers on KaDO	KaDO = Kabinetsbrede Aanpak Duurzame Ontwikkeling (government-wide approach to sustainable development). Focus on six crucial themes including sustainable energy and biofuels. Targets include: - 30% reduction of GHG emissions by 2020 (baseline 1990); - Speed up energy savings from 1% to 2% per year; - Share of sustainable energy from 2% to 20% in 2020; - Increase availability of sustainable energy in developing countries. - Increase sustainability of biofuel production and a stronger international cooperation.	Dutch climate diplomacy to reach a new global agreement (failed). Increase use of sustainable energy in the Netherlands (too slow). An additional 500m euros was invested in sustainable energy in developing countries (on track). Also pilot projects were started in producing countries. The EU RED including its sustainability criteria was accepted.	
Decision Council of Ministers 10 Oct 2008	Biofuel targets are amended and set at: - 4% share biofuels in 2010 - 4.25% share in 2011 - 4.5% share in 2012	The Dutch CBS suggests that the share of renewables in 2010 and 2011 are higher. The figures of Eurostat state that the share of biofuels is 3% in 2010.	CBS 2012, Eurostat
2009 Start Commission Sustainability Biomass	In follow-up of the Cramer Commission a new commission was formed led by Ms. Corbey to advice the Dutch government on sustainability of production and use of biomass. Various reports.	In 2010 the commission advices to slow down the biomass targets in response to the risks associated with production and to invest more in quality and sustainability.	
4 May 2010 Government decision on ILUC	In response to an advice of the Commission Corbey, the Ministers of Environment and agriculture sent a letter to parliament. The targets are set at: - 4% in 2010; 4.5% in 2012; 5% in 2013; and 5.5% in 2014. - The final target still stands at 10% in 2020.	Share of renewable energy in 2010 was 3.7 percent which is more than in 2008 but actually dropped from 4.1% in 2009! Consumption of biofuels in road transport decreased.	CBS 2012

ANNEX 3:
PERSPECTIVES ON SUSTAINABILITY ISSUES by Brazil and Europe
Bases upon the interviews and literature, the perspective by Europeans and Brazilians on the main sustainability issues differs, which often leads to misunderstanding in discussions:

Issue	Brazilian perspective (government, producers)	European perspective (government and NGOs)
Social-economic		
Labour conditions (and legislation)	Government: important issue. Producers: National Commitment to Improve Labour Conditions. The sector works to improve working conditions by mechanisation and re-training. 140 mills certified.	Government: not a policy issue but relevant. NGOs: concerned about working conditions and slave labour.
Employment and wages	Government: issue. Producers: competition from other sectors is increasing and more has to be done to keep people. Sugar cane has the 2nd highest wages after soy bean.	Government: not a policy issue. NGOs: want better wages. NGOs are concerned about less employment as result of mechanisation (which contradicts the issue above)
'Food versus Fuel'	Gov. Prod.: Not relevant. Food production increased while sugar cane also expanded. There is no shortage.	Gov. & NGOs: very important. Policy debates often mention this issue related to 'biofuels' and include Brazil.
Environment and Climate		
Air pollution	Gov. & Prod.: Important issue especially for a city like Sao Paulo. Ethanol is cleaner than fossil fuel. Also burning of sugar cane is now phased out fast.	Government: not an issue in policy or debates. GHG-balance is. NGOs: Burning is a social issue rather than GHG-savings.
GHG-savings (direct)	Gov. & Prod.: Bio-ethanol is a renewable energy source and a positive balance is part of the sector and makes it competitive with the image of gasoline. 23 mills BonSucro certified.	Gov.: Ethanol from sugar cane has a positive GHG-balance. But debate is confused with other 'biofuels'. Ethanol from sugar cane has the highest savings.
Expansion in general	Important for the producers, economic growth, employment and energy security.	Gov. : Not a policy issue. NGOs: often questioned and opposed by NGOs who do not like large monoculture plantations.
Effect direct expansion (GHG balance and biodiversity)	Not relevant for GHG balance or biodiversity. The Zoning excludes important areas and directs expansion to cattle pastures (not natural grasslands) or areas with secondary vegetation (already cleared years ago).	Gov & NGOs: Important issues because it could mean conversion of biodiverse grasslands or savannah. This is not defined for the Brazilian context outside already protected areas.
Amazon rainforest	Not relevant. Deforestation has gone down while the sector expanded. Sugar cane in the Amazon is very low.	Gov & NGOs: Important issue because of ILUC. Brazilian reduced rate of deforestation and other facts are not used.

By authors based upon interviews and literature.