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WP1 Agrofuel Crops

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Jennifer Franco, Lucia Goldfarb, Maria Luisa Mendonça, David Fig, Mireille Hoenicke (TNI), Amsterdam NL, jfranco@tni.org
and **Les Levidow,** Open University (UK)

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Summary

This study originated in early 2007, when governments were increasingly promoting biofuels as a more secure and 'greener' renewable source to replace fossil fuels. These claims underwent increasing challenge; many reports were documenting harm to food security, rural livelihoods and environments in the global South. Criticism was directed at the threat from 'agrofuel because of the intensive, industrial way it is produced, generally as monocultures, often covering thousands of hectares, most often in the global South' (Econexus et al., 2007). So our report generally uses the term 'agrofuels' rather than biofuels, except when referring to official language such as 'biofuels policy', sustainable biofuels', etc.

The controversy has attracted activist-researchers from many backgrounds – land rights, environmental justice, human rights, food sovereignty, etc. Their perspectives have been brought together within TNI's research network. Its study has several aims:

- To identify the socio-political forces promoting agrofuels.
- To identify EU policy assumptions regarding societal benefits of biofuels.
- To compare those assumptions with practical experiences and effects, especially through three case studies – Germany, Brazil and Mozambique.
- To identify different accounts of sustainable agriculture in the controversy.

EU biofuels policy has been driven by a partnership between government and agri-energy business extending the agri-industrial model from commodity crops to energy. Similar alliances in the global South have been promoting agri-industrial agrofuel development there. EU policy creates an agrofuels market and thus commercial incentives for agri-industrial agrofuels development, both in the EU and in the global South. Key actors have frictional encounters, which create intentional or inadvertent resistances to the agrofuels project.

European Union (EU) policy promotes agrofuels in several ways. By 2020, 20% of all energy used in the EU and 10% of each Member State's transport fuel must come from renewable sources – in practice, expected to come mainly from agrofuels. Fulfilment of such an ambitious target will depend on large-scale agri-industrial crops for agrofuels in the global South as well as in Europe, thus making the policy highly contentious. An earlier policy promoting biofuels was renamed 'renewable energy' in the 2009 Directive, mainly in order to deflect controversy.

<u>EU policy assumptions</u>

EU biofuels policy rests upon arguments about societal benefits of three main kinds – environmental protection, especially GHG savings; energy security through import substitution; and rural development. Each argument in turn involves several assumptions, e.g. about what these putative benefits mean and how they can be fulfilled. Our results question the EU's optimistic assumptions, as follows:

Environmental protection: Pursuing the most ambitious targets among EU member states, Germany had expanded its rapeseed production to the maximum by 2007 and subsequently became more dependent upon biodiesel imports, thus generating GHG emissions elsewhere. Further expansion will plausibly stimulate indirect changes in land use, e.g. palm oil plantations displacing forests in Southeast Asia. In Brazil bioethanol from energy-rich sugarcane has great potential for GHG savings, relative to other agrofuel crops. But savings are undermined by sugarcane plantations destroying carbon sinks in the Cerrado savannah and Amazon rainforest, as well as by wider environmental harm from agri-industrial development. GHG emissions also result from soya plantations displacing cattle ranches which in turn clear more rainforest frontiers. Yet these indirect emissions are not counted by Brazil, much less by countries importing agrofuels, and would require many years to repay the carbon debt. In Mozambique, GHG savings from bioethanol are somewhat undermined by agri-industrial practices, e.g. land clearances and the extra infrastructure needed for *de novo* installations distant from metropolitan centres.

Energy security: As transport fuel usage within Europe increases for the foreseeable future, agrofuels supplement fossil fuels, thus limiting the benefits for energy security as well as for GHG savings. As highlighted by the case of Germany, further efforts towards the 10% target would require even more imports. At most this diversifies the import sources for transport fuel, rather than gaining energy independence. In Mozambique agrofuels can play only a small role in import substitution and thus energy security; most agrofuel production is aimed at exports, like its current electricity production.

Rural development: Agrofuels have been promoted as an opportunity for rural development in the global South, especially by including small-scale producers. But their role has remained marginal in Brazil, where agro-business interests have prevailed. The Brazilian government regards millions of hectares as 'marginal' or 'degraded', providing a basis for sugarcane plantations to expand there without harming the environment or food production. In practice, however, agrofuel producers seek and gain access to quality land, water sources and infrastructure. Such plantation developments devastate natural resources and local agriculture, as well as forest reserves in some places. These also destroy employment and degrade labour conditions, even through quasi-slave labour; mechanization reduces employment without improving its conditions. In Mozambique plans for agrofuel plantations have created conflicts with local residents over scarce water supplies, which crucially affect arable land. These results challenge optimistic assumptions about the great availability of 'marginal' or 'idle' land (EuropeAid, 2009: 4).

Underlying the land-use issues are divergent accounts of sustainability, each with different concepts of nature in the agricultural context. Agrofuel promoters see society-nature relations as reduced to competitive advantage in global markets, especially through agri-industrial monocultures. This agenda gives priority to market-oriented economic knowledge and high-tech corporate knowledge for more efficient production methods. By contrast, agrofuel opponents see nature as a commons to be protected and shared; they propose alternatives based on knowledges and needs of small-scale producers.

Assumptions about un/sustainability

Amidst controversy over harmful effects of agrofuel production, EU policy explains current sustainability problems along two lines:

- inadequate management – a problem to be addressed through better management mechanisms or '(self-) governance', e.g., voluntary compliance with sustainability criteria or standards; and
- inefficient use of resources – a problem to be addressed through eco-efficient technological innovation

Contrary to the above assumption about management measures, agrofuel promotion has created pressure to relax environmental and social protection in the global South. Already Brazil has softened its law on environmental crimes to accommodate agri-industrial sugarcane plantations. The European Commission has cited EC development policy as a means to address sustainability problems, but the relevant bodies have scant power or resources to limit harm in the global South.

Regarding the assumption about technological solutions, these will supposedly come from more efficient feedstocks, especially from novel future biofuels. They have various generic names – advanced, 2nd generation or next-generation. For example, it is assumed: 'The higher the productivity of a feedstock, the less it will compete for land with food, until second generation biofuels are commercially available', seen as the ultimate solution (CEC, 2008a).

Agrofuel innovations are designed to increase productive efficiency in several ways, mainly as a means to enhance commercial viability and economic competitiveness. As an overall strategy for government-industry partnerships, R&D horizontally integrates agriculture with energy and other industrial sectors. Eco-efficient innovations are also expected to overcome sustainability problems – e.g. competition for land use (between food versus fuel), indirect global changes in land use, doubtful savings in greenhouse gas (GHG) emissions, etc.

Contrary to the above diagnoses and assumptions, sustainability problems have causes in political-economic drivers – e.g. for extending monocultures to more land, for subordinating land use to global markets, for gaining a competitive advantage in global value chains. If technically successful, more efficient methods per se would not counteract those drivers of harm in the global South. Indeed, greater efficiency arguably provides greater commercial incentives for extending agri-industrial systems to more land, especially to supply expanding global markets for fuel and feed. A 'smart-green' techno-fix provides a false solution. It is aimed at the wrong problems – e.g. how to sustain Europe's growing consumption of transport fuel, and how to maximise value-added from global commodities.

In sum: Various drivers, practices and effects contradict EC policy assumptions about biofuels. Such contradictions may intensify with the future rise of agrofuels and so warrant systematic attention. Critical research can help to hold biofuel policies accountable for harms that result, and at the same time can question the fundamental development models served by corporate-led agrofuels.

1. Original Plan for the WP1

The following describes the original workplan for WP1 on Agrofuels as revised in February 2008.

Objective

The project aims to use case studies to compare assumptions about the sustainability of agrofuel with social experiences and geopolitical realities.

Research questions

The original project proposed the following general research questions:

1 Who are the key actors in the promotion of agrofuels? What overall arguments are used?

2 What shapes policies promoting agrofuels in North and South (e.g. through pilot projects, certification schemes, policy targets for transport fuel replacement)? What (implicit and explicit) assumptions are involved?

3 How do these various arguments and assumptions understand the sustainability of agrofuels, in terms of social, economic and environmental effects – both in North and South? How is 'the environment' understood by various stakeholders?

4 How do these policies work out in practices of agrofuel production and use? How do these practices compare with policy assumptions?

Methods

1 Literature review would survey the various ways in which sustainability is understood and used with respect to agrofuels, including assumptions regarding agrofuels, their production and consumption, focusing on specific examples and practical concerns.

2 Desk study and document analysis of current policies on agrofuels, aiming to identify key policy assumptions.

3 Commissioning of field work and papers to local teams.

4 Engagement and collaboration with relevant experts and organizations through informal meetings and an international CSO workshop.

Research tasks

1 State of the art: agrofuels and sustainability.

2 Current policies and their assumptions.

3 Case studies: Germany, Brazil and South Africa (which was changed to Mozambique).

4 Workshop.

5 Deliverables of the project.

- Framework paper on state of the art and policy assumptions
- Website updated every 3 months
- Progress Reports (3)
- CSO Workshop Report
- Final report
- Website section

2. Research Activities

There are three main components in this research – namely, the framework paper, the country case studies and the CSO workshop. By February 2009 a complete draft of the framework paper had been completed after several months of intensive and extensive literature review. The draft framework paper then informed the preparation of the country case studies – namely, Brazil, Mozambique and Germany. When the first-draft studies of the country cases were completed, a global CSO workshop was organized in Maputo, Mozambique in August/September 2009 to discuss the framework paper and the country case studies.

Originally, the research plan chose a few key countries that were important players in their own right and also relevant for EU policy. We planned to study how similar policy assumptions play out in different national contexts and practices, and thus test these assumptions empirically. This would involve working with civil society organisations accessible through TNI's global network of contacts. This original idea was somewhat re-formulated after the WP1 research team meeting in June 2008 and the virtual communications that followed. There we discussed how three cases with clear inter-connections (Brazil, Mozambique and Germany) would offer an insight into the South-North-South dynamic at play, i.e. how national and regional processes become global in the specifically globalised dynamic of agrofuel chains. The questions of sustainability of production and second-generation agrofuels have created room for controversy in campaigns for and against agrofuels expansion and have thus become distinct fields of struggle in South-North-South dynamics.

The three national cases are linked through the international trade dimension, and through bilateral trade and development agreements with the European Union. For example, Brazilian government and industry are campaigning to expand agrofuels not only domestically, but also through the promotion of projects in developing countries (central American and southern African), some of which are funded from European aid budgets including Germany's GTZ. Another example of the inter-connection are bilateral agreements between Brazil and European states regarding exports to Europe of Brazilian agrofuels or promotion of production in, for example, Mozambique, which benefits from tariff-free exports to Europe. At the same time, the case study approach would allow research into the evolution, application and effect of assumptions in three very different countries: one developed, relatively equitable and wealthy; one developing, largely industrialised, officially middle income but really hugely unequal; and one under-developed, and predominantly agrarian, rural and very poor. For the purposes of comparison and conclusions, each case study would address the same as appropriate in each case.

Our research activities overall have had the following elements: (i) reviewing the larger context within which the current controversy over agrofuels has arisen; (ii) looking at the political forces and agendas that have turned biofuels into a high priority for EU policy; (iii) analysing pro-biofuels arguments and assumptions; (iv) comparing those assumptions with policies, practices and effects in three different countries – Germany, Brazil and Mozambique; (v) summarising how our findings challenge policy assumptions and hold wider implications for agrofuels critics; and (vi) holding a workshop for civil society organisations and social movements, especially those in Africa.

During the first year of the project, there were intensive and extensive preparatory activities, exchanges and networking among the research participants from TNI, EU, Germany, Brazil and Mozambique. Although the work plan outlined three phases of the project (Framework paper, Case studies, CSO workshop). The individuals within TNI who were originally consulted about this project were from the Environmental Justice programme of TNI; later the leadership was passed to others within TNI who had been working on rural social justice issues particularly in relation to land and with rural social movement organisations involved in struggles for rural democratisation. The passage of the project from the one group to the other necessarily involved a new process of internalising the project, while enriching it as well, since the individuals now involved bring with them a distinct set of activist and networking engagements and experiences. All of us also had extensive research experience, although not necessarily on agrofuels specifically (although some do, particularly our Brazilian and German colleagues). Transitioning from one team to another had thus involved a lot of adjustments and entailed a learning curve on the issue of agrofuels and on the related European policy environment and process.

The agrofuels controversy has attracted activist-researchers from many backgrounds – land rights, environmental justice, human rights, food sovereignty, etc. Their perspectives have been brought together in this study – firstly within TNI's own network, and later through the Maputo workshop. It is

important to keep in mind the multi-level, multi-polar design of the study. It was a complex system made up of several poles of gravity around which wider participation revolved: the first pole was the framework paper; the second, third and fourth poles were the country case studies (Germany, Brazil, and Mozambique, respectively); a fifth pole was generated by the project's CSO workshop.

Finally, although not formally part of the study by design, a sixth pole emerged around an unexpected opportunity to take part in an academic workshop on agrofuels. In the case studies on Mozambique and Brazil, the researchers have worked closely with or even within CSOs there. The TNI team has also been exchanging perspectives with academic researchers – initially from Wageningen University (at a special meeting in September 2008), and later from researchers worldwide at a conference (St Mary's University, Halifax, Oct 2009). The outcome of the participation in this last conference will be the forthcoming collective article which the research team will be authoring in the *Journal of Peasant Studies* in 2010.

Finally, TNI co-organised a four-and-a-half day international workshop in Maputo, Mozambique with the them "Global Agrofuels: Sustaining What Development?"[1]. The workshop drew some 50 participants from fourteen countries and several different local civil society organisations and transnational networks who have been involved in various ways in taking up the issue of global agrofuels. The most immediate objective of the workshop was to present the initial findings of the TNI-led study about European Union biofuels policy, its assumptions and social and environmental impacts, or Work Package 1 of the CREPE project. Beyond this most immediate objective, the workshop gained a much broader significance in relation to the anticipated substantive concerns and analysis of the groups that were invited to participate. In addition, once the workshop started, it also took on a new dynamic as well, as the actual participants became more directly involved in shaping the workshop methodology and flow. This involvement served to sharpen the quality of the discussions, while also strengthening a process of mutual learning and co-production of knowledge. The workshop attempted to foster active participation and exchanges, particularly among and between grassroots activists from two broad areas – the environmental justice movement and the agrarian justice movement. The workshop gave space especially to those from social movements to learn, share and articulate their own points of view on the issue. The workshop also sought to deepen links between activists and researchers, including those from social movements. It aimed to analyse trade and investment links among countries, as a basis for joint research and advocacy across countries.

Ultimately the workshop drew about 50 participants from the following: 14 different countries (Canada, UK, Netherlands, Belgium, Germany, Brazil, South Africa, Malawi, Zimbabwe, Zambia, Ghana, Kenya, Uganda, and Mozambique): several different local organisations and transnational networks (including, for example, TNI, Econexus, CETRI, Foodfirst Information and Action Network, CPT, MST, SERC, Rede Social-Brazil, UNAC, Justica Ambiental-Mozambique, Biowatch-South Africa, People's Dialogue- Latin America and Africa, Right to Food Network Africa, African Biodiversity Network, La Via Campesina among others); a few academic institutions (Open University and Saint Mary's University), and a variety of social justice activist orientations (e.g., environmental justice, agrarian justice and peasants rights, human rights, right to food and food sovereignty).

The framework paper and overall report underwent several stages. The first-draft framework paper was completed in February 2009. It was then passed around the members of the TNI research team, especially the researchers for the 3 country case studies, for comments and suggestions as well as to help plan those studies. After considerable progress in those studies, they were incorporated into the paper in late 2009. Likewise the study of EC development policies. In parallel the draft paper for the *Journal of Peasant Studies* drew on all those components and was circulated for comment to staff in DG Development of the European Commission. Our draft Table 2 of EC policy assumptions was more widely circulated for comment to European Commission staff. Many helpful suggestions were incorporated into both the *JPS* paper (Franco et al., 2010) and the report in early 2010. Later the report added sections on the EU-Brazil-Mozambique biofuels pact and ILUC expert reports.

[1] The workshop program can be found in: http://globalagrofuels.wordpress.com/programme/, Power point presentations and papers can be found in: http://globalagrofuels.wordpress.com/presentations-and-papers/ .

3. Results so far

3.1 Key actors and agendas

3.1.1 Policy context

'Biofuels' once meant energy production from bio-waste, as in proposals from some environmental campaigners, but the term has acquired a different meaning through links with agro-industrial systems. Critics emphasise the threat from 'agrofuel because of the intensive, industrial way it is produced, generally as monocultures, often covering thousands of hectares, most often in the global South' (Econexus et al., 2007: 6). This report focuses on agrofuels but refers to 'biofuels' in relation to promotional activities – for the sake of terminological accuracy. More recently the overall policy has been called 'renewable energy', though this mainly means 'biofuels' in the case of transport fuels. The wider context for this policy change is a multiple crisis over oil supply and usage, though the crisis per se does not explain the specific EC policy framework.

Intensifying extraction and use of fossil fuels since the Industrial Revolution, and especially in recent decades, has left humanity with three major problems of global proportion; these are well known and so only briefly reviewed here. First is the problem of diminishing supply due to peak oil. Industry scientists have said that the point of peak oil is likely to come sooner rather than later, and that the oil industry has already discovered most of what exists (Campbell & Laherrere, 1998: 81).

The implications are clear. On the one hand, new technologies to find and extract whatever oil deposits remain will never be enough to offset the fact of peak oil. On the other hand, if we continue to consume fossil fuel at current volumes and rates, we can expect the world's finite fossil fuel deposits to be depleted sooner rather than later. Second is the problem of climate change and the imperative to reduce carbon and other greenhouse gas (GHG) emissions. Increasing levels of CO2 are directly linked to the burning of fossil fuels on the one hand, and land use change (e.g., the cutting down and clearing of forests) on the other (IPCC, 2001). Here the implication is that to reduce anthropogenic CO2 emissions, humanity must reduce fossil fuel use and reduce (if not reverse) deforestation. Third is the problem of a huge, still growing global transport sector almost completely dependent on fossil fuel (Rajagopal and Zilberman, 2007: 7). This sector moves people and goods often across vast distances, implicating much of what people across the globe do and consume in daily life, and it is central in the European biofuels debate.

> Energy accounts for 80% of all greenhouse gas (GHG) emission in the EU; it is at the root of climate change and most air pollution. The EU is committed to addressing this - by reducing EU and worldwide greenhouse gas emissions at a global level to a level that would limit the global temperature increase to 2°C compared to pre-industrial levels. However, current energy and transport policies would mean EU CO2 emissions would increase by around 5% by 2030 and global emissions would rise by 55%. The present energy policies within the EU are not sustainable (CEC, 2007a: 3).

Although widely acknowledged, those sustainability problems have become an argument for prioritising agrofuels made from agricultural raw materials. Official EU documents have aggressively promoted biofuels for sustaining further growth of the transport sector. Less attention has been given to other options, such as making vehicles more fuel-efficient or slowing the growth of the transportation sector in general. To better understand how and why requires a closer look at the main actors and logics that have been driving EU biofuels policymaking. In the EU context, government and corporate business actors in particular are playing important complementary roles in promoting biofuels in policymaking.

3.1.2 EU biofuels policymaking

In the EU context, governments have been adopting and/or expanding mandatory targets for biofuels in transport fuel, as well as enabling corporate business actors to shape policy. In 2005 the Commission's Directorate-General for Research (DG Research) created the Biofuels Research Advisory Council (Biofrac), effectively a pro-biofuels lobby, to inform EU policy on biofuels. Biofrac proposed increasing the use of biofuels in transport to 25 percent by 2030. As main arguments, biofuels use 'sustainable and innovative technologies', with the extra advantage of creating 'opportunities for biomass providers, biofuel producers and the automotive industry' (Biofrac, 2006, 3).

This short-term body was succeeded by a longer-term one: the European Biofuel Technology Platform (EBFTP). Various business interests have sought to ensure policy outcomes favourable to large-scale agrofuels production for the European transport sector (CEO 2008). Table 1 shows the steering committee of the European Biofuels Technology Platform (or EBFTP). It includes fifteen members from the oil, auto, biotech, biofuels and forest products industries (see Appendix 1). Also represented is COPA-COGECA, based on the more affluent, industrialised, commercial-oriented organisation farmers. It is affiliated to the International Federation of Agricultural Producers (IFAP) – a rival of La Via Campesina, a leading critic of corporate-driven agrofuels (Borras and Franco 2009a). More recently the Steering Committee added an environmental consultancy whose website promotes renewable bio-energy, especially R&D investment into algae and marine plants (Bellona 2010).

In addition EU member states have been promoting agrofuels through interventions in the global South, e.g. by providing technical assistance, brokering energy supply deals, facilitating corporate land acquisitions and promoting market-oriented land policies. Bilateral and multilateral development institutions – the World Bank, FAO, GTZ, USAID, and AusAid – are paving the way by promoting formalization, privatization, and liberalization of land property systems (Borras and Franco 2010), as well as by financing agrofuels development. As Northern governments attempt to re-mould the South to suit big business needs, Southern governments anticipate increased agrofuel demand from the North; they have been adopting pro-biofuel policies and brokering biofuel-related agreements involving North-South *and* South-South linkages, e.g., Brazil-Mozambique agreements (Dauvergne and Neville 2009). They too are linking with big business to promote biofuels. For example, a Brazilian state-industry coalition has been promoting conditions for Brazilian ethanol to gain an international market (Biofuel Digest 2008).

EU targets were opposed initially by radical environmental groups, backed up by some researchers and academics. Questioning the environmental benefits of biofuels, they have highlighted how GHG emissions can have uncertain or even negative balances – due to rainforest destruction, unsustainable agricultural practices and indirect effects of land use change. In early 2008, based on information from networks in the South, larger Northern-based environmental organizations began abandoning support for the targets. Civil society groups and transnational networks converged to challenge key policy assumptions.[1] According to critics, EU promotional policies did not guarantee GHG savings and may even generate increases (Searchinger 2008); may compete with food production (FAO 2008; Oxfam International 2008; and Eide 2008); cause human rights violations (FIAN International 2008, 2009; Mendonça 2006; ICHRP 2008); and would spur further industrialization of agriculture to serve needs of the North, to the detriment of the rural poor in the South. This coalition called for a moratorium on incentives and targeting, rallying opponents of agrofuels globally.[2] Together these criticisms led biofuel promoters to alter their arguments, e.g. by emphasising management and mitigation measures.

3.1.3 EU-Brazil-Mozambique deal

Agrofuels as a globalisation process was highlighted by a novel deal signed in July 2010. Under the Partnership for the Sustainable Development of Bioenergy, Brazil together with the EU will help Mozambique to develop 'sustainable biofuels'. Many more African countries are expected to enter such a triangular arrangement. Unlike Brazilian bioethanol, which is subject to high import tariffs at EU borders, African-produced biofuel would be subject to minimal tariffs (Reuters, 2010).

As the general framework for Brazil-EU cooperation in energy, the partners made ambitious claims for societal benefits:

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[1] The controversy heightened when basic food commodity prices rose to unprecedented levels, sparking riots in several countries. UN Special Rapporteur on the Right to Food, Jean Ziegler, attacked agrofuels as a 'crime against humanity'. Analysts from a wide spectrum, including the World Bank (Mitchell 2008), pointed to biofuel expansion as a factor driving up food prices. As one article put it, 'Filling the 25-gallon tank of an SUV with pure ethanol requires over 450 pounds of corn – which contains enough calories to feed one person for a year. By putting pressure on global supplies of edible crops, the surge in ethanol production will translate into higher prices for both processed and staple foods around the world. Agrofuels have tied oil and food prices together in ways that could profoundly upset the relationships between food producers, consumers, and nations in the years ahead, with potentially devastating implications for both global poverty and food security' (Runge and Senauer 2007).

[2] See http://www.econexus.info/biofuels.html

> Leaders reaffirmed the political commitment by Brazil and the EU to promote the use of renewable energies, including the production and use of sustainable biofuels. In this context, they highlighted the importance of keeping responsible and non-discriminatory policies on sustainable bio-energy. They pledged to continue to work closely with interested countries on the promotion of sustainable production of biofuels, bioelectricity and other forms of renewable energy at the international level…..
> The announcement of the launching of a cooperation focusing on the sustainable development of bio-energy in interested African countries, as an important part of the overall triangular cooperation between Brazil, the EU and developing countries and as a first step towards broader action on energy. The development of feasibility studies on the potential for the sustainable production and use of bio-energy, taking into account social, environmental and economic consequences will make an important contribution to tackling climate change, fighting poverty, and promoting access to modern forms of energy, such as for transport, cooking fuels and electricity for rural and urban areas. In this context, they welcomed the Partnership for the Sustainable Development of Bioenergy agreed with Mozambique (Brazil-EU summit, 2010).

The Brazilian Sugarcane Industry Association (UNICA) welcomed the Mozambique deal, especially for helping to make ethanol a globally tradeable commodity:

> Mozambique exhibits a great deal of potential for agricultural expansion, particularly when it comes to tropical crops, including sugarcane. The country's geographic location gives it a clear advantage as a privileged route to ship biofuels to Asia and Europe, with three suitable ports along the coast. This is an additional comparative advantage that increases its potential as an ethanol exporter (UNICA, 2010).

This deal provoked criticisms from NGOs. According to Friends of the Earth Europe (FoEE), promoters' claims for social and environmental benefits do not stand up to scrutiny. Agrofuel projects in Mozambique have gone ahead without consulting local people and have diverted resources from food production (FoEE, 2010). 'In a country that suffers persistent hunger, using millions of hectares of agricultural land to grow crops to power European cars is immoral and perverse', said Adrian Bebb of FoEE.

3.2 Analytical framework

This section summarises the analytical framework used for the study of arguments and assumptions of EU biofuel policies and for their comparison them with the outcomes of the case studies.

'Biofuel' once referred to energy produced from bio(degradable)-*waste*, as in alternative energy proposals from some environmental groups (e.g., Alliance 90/The Greens 2006). But the term has acquired new meanings through links with agro-industrial systems and global trade. 'Biofuel' now refers to liquid fuel that is derived from plant material, even if it could be used instead for food.

Many critics of pro-biofuel policies reject the term, saying that the prefix 'bio' masks harmful social and environmental effects. Using 'agrofuel' instead, they stress the *threat* it poses 'because of the intensive, industrial way it is produced, generally as monocultures, often covering thousands of hectares, most often in the global South' (Econexus, et al. 2007: 6). For them, biofuels development implies changes in land use and/or land property relations, in ways undermining ecosystems and/or poor people's access. Although this paper concerns 'agrofuel', it often uses the term 'biofuel' with reference to the EU policy context.

The previous section sketched how government-business alliances have midwifed the current wave of agrofuel-related interactions through promotional policymaking in the global North and South. So analytical tools are needed to understand agrofuels as global dynamics. According to Arthur Mol, 'we can witness the emergence of a global integrated biofuel network (GIBN), characterised by less concentration of objects, actors and relations in specific locations/regions,' and instead greater transboundary flows. His concept stresses how the GIBN creates new spaces marked by: (i) the growing power of multinational corporations; (ii) decreasing control by nation states, along with more global roles and dependences; and (iii) the marginalization of local concerns. The GIBN 'also enhances the global sourcing for scarce (non-fossil fuel) energy resources. But all this is no evolutionary, deterministic development', further argues Mol (2007: 303, 306-7). Indeed, the global dynamics create new conflicts – not only with people who are adversely affected, but also among biofuel promoters.

Drawing on analytical insights from James Scott (1998: 4-5), biofuel policymaking can be understood as an 'administrative ordering of nature and society', dependent on coercive 'attempts at legibility and simplification'. In the context of intensifying fossil fuel use and related consequences, biofuel policymaking aims to sustain a broad pattern of producing, distributing and consuming transport fuels. As with many state schemes, however, the attempt carries seeds of possible failure. Much local practical knowledge (*'metis'*) is rendered 'illegible' – meaning knowledge 'that could not be assimilated into an administrative grid without being transformed or reduced to a convenient, if partly

fictional, shorthand'. In this way, administrative knowledge can be rendered legible and thus manageable (Scott 1998: 311 and 24).

Such administrative ordering has encountered many obstacles and conflicts. For instance, as will be seen in our country case studies, the interests of big agrofuel business actors and small automobile owners can conflict (Germany). Or contradictions may emerge between national biofuel policymaking and previous national land policy (Brazil and Mozambique). Or, opposition alliances can arise to resist agro-industrial agrofuel development. Each example suggests knowledge that was unanticipated, ignored or kept illegible by policymakers.

As these examples suggest, the GIBN is a dynamic process involving pro-biofuel actors *trying* to shape policy and transact business across numerous borders (e.g., sub-national, national and international) and many differences (e.g., agendas, aspirations, cultures, structures, social histories, practices, knowledge and measures). Those efforts generate conflicts, bringing unexpected turns and effects. These can be conceptualised as 'frictional encounters' – 'the awkward, unequal, unstable, and creative qualities of interconnection across difference', according to anthropologist Anna Tsing (2005). Her research on one particular 'zone of awkward engagement' – the rainforests of Indonesia – focused on how chains of legal and illegal entrepreneurs took over the land from previous claimants in the 1980s onwards, thus creating global commodities for distant markets. But as capitalist interests reshaped the Indonesian landscape, the encounter also produced surprising effects in terms of 'new arrangements of culture and power' (ibid. 5), which she traced to the frictional nature of the encounters and interactions.

A 'friction' perspective is useful for several reasons. It can illuminate actors and interactions that alter original plans, even slightly or temporarily. It can illuminate unintended or unexpected gaps in global agrofuel networking, e.g. on state policy or international trade matters. Such gaps may be perceived differently by different actors -- e.g., seen as threats by promoters of corporate-led agrofuels, but seized as opportunities by opponents. Attention to friction can enable researchers to 'avoid the idea that new forms of empire spring fully formed and armed from the heads of Euro-American fathers' (Tsing 2005: 5); the concept can help instead to pose questions about whether, how and to what degree agro-industrial biofuel agendas translate into outcomes. It thus helps to frame the global integrated biofuels network (GIBN) as an ongoing, fragile project.

3.3 EU biofuels policy: arguments, assumptions and narratives

3.3.1 Pro-biofuel arguments

Since the 1990s EU biofuels policy has featured three main arguments. According to many policy documents, biofuels offer more secure energy supplies for Europe, GHG savings, and economic development in the rural places where they are produced (CEC 1997, 2001; EC 2003; Biofrac 2006). The meaning and relative weight of these arguments has changed over time, mainly in response to wider policy agendas and public dissent. From an early concern with energy security, commitments to the Kyoto Protocol became increasingly important (CEC 1997, 2000).

Biomass originally was meant to come from European 'indigenous' sources, especially to reduce dependence on imports and so enhance security for Europe (e.g. CEC 1997: 4, CEC 2000, CEC 2006b). But prospective sources were later broadened to developing countries: 'The Community's external energy policy should ensure the common voice of the EU in support of intensifying its relationship with its energy partners, with a view to further diversifying sources and routes…' (CEC 2008a: 4). More generally, raw materials should be obtained from 'resource-rich' tropical countries (e.g. CEC 2008b).

That shift responded to industry projections that half the EU biofuel supply could come from imports by 2030 (Biofrac 2006: 16). A parallel narrative promised that biofuels would offer opportunities for 'economic development' or 'rural development' in the global South (e.g. CEC 2006b, 4; EuropeAid 2009; Kojima and Johnson 2006; Dufey 2006), despite early evidence of destructive effects.

Indeed, the Commission's proposal for ambitious EU-wide targets provoked much dissent among staff in several Directorates-General, as well as contrary evidence of many kinds, e.g. questioning the cost-benefit advantages for GHG reductions (Szekeres, 2006). Nevertheless the proposal was pushed ahead. This has been analysed as 'policy-based evidence gathering', i.e. a process whereby evidence is collated to support a previously determined policy (Sharman, 2009: 47). Its proponents cast biofuels as

a ‘win-win’ opportunity to demonstrate Europe’s commitment to addressing both climate change and future oil shortages, while developing rural economies, including in the global South.

Together these arguments justified the December 2008 ‘EU Energy Package’, which was soon legislated as the Renewable Energy Directive (RED), with the following features. *First*, by 2020, 20 percent of all energy used in the EU must come from ‘renewable sources’ (including biomass, bioliquids and biogas), with different targets for individual Member States. With an ‘indicative trajectory’, Member States must show increasing use of ‘renewable energy’ over every two-year period. *Second*, by 2020, Member States must ensure that 10 percent of their total road transport fuel comes from renewable energy – broadly defined to include biofuels, biogas, as well as hydrogen and electricity from renewable sources; there is also an interim target of 5.75 percent by 2010.

Third, sustainability criteria will apply to biofuels and biogas for transport and to liquid biofuels for heat and power. These criteria are purely environmental, stressing the percentage of GHG savings that must be achieved, as well as protection of ‘highly biodiverse’, ‘primary forest’ and ‘continuously forested’ areas – the latter defined by statistical criteria. Compliance will be assessed on the basis of company information, or through voluntary certification schemes or bilateral and multilateral agreements (EC 2009).

A Parliamentary committee had earlier proposed to add social aspects to sustainability criteria, e.g. land rights of local communities and fair remuneration of workers. But these were ultimately excluded from the mandatory criteria, partly on grounds that they would contravene WTO rules on trade barriers (EP Envi, 2008a; CEO-GRR-Econexus 2008). However, ‘These directives do not include mandatory social criteria (labour conditions, land tenure, etc.), nor food security criteria, because of the difficulty to verify the link between individual biofuel consignments and the respect of these particular criteria’, according to a Commission document (EuropeAid 2009: 2). Any such issues were relegated to voluntary schemes or bilateral agreements (EC, 2009).

For certifying compliance with sustainability criteria, originally the Commission had proposed that member states establish their own schemes (CEC 2008a). In a report for the Commission, however, the Biomass Technology Group argued that certification systems could be left to market forces through voluntary ‘private certification’ schemes (BTG 2008). These options were left open in the final directive.

The December 2008 Energy Package sent positive signals for biofuels investment, both inside and outside the EU. The EU incentives spurred national policies promoting biofuels, as well as actual land allocations and land-use conversions especially in the global South. Even beforehand, EU pro-biofuels signals had begun triggering wider harmful effects, according to substantial anecdotal evidence and research (EP Envi 2008b, 19). Such warnings led to a high-profile international campaign for a moratorium on biofuels promotion, especially the EU targets.

Although the targets went ahead in the 2009 Directive, the opposition campaign stimulated changes in sustainability criteria and in pro-biofuels narratives, which were elaborated as potential means to make biofuels promotion more acceptable to a sceptical public. Requirements for GHG savings became more stringent than envisaged a few years earlier – in response to industry lobbies as well as public controversy. At the same time, such narrow criteria facilitate a lucrative market for biofuels whose production can ignore indirect changes in land use (ILUC) and wider socio-economic harm (see later).

3.3.2 Pro-biofuel assumptions

In generic terms, to assume something is to accept it without evidence for the purpose of argument or action. Policy assumptions take the form of narratives that portray a better future – in this case, by imagining how environmental, social or economic problems can be solved. Such stories make a potential future more thinkable and concrete, justifying measures that promise to realise it.

In such ways, societal problems or threats are always framed by storylines which selectively problematise aspects of physical and social reality. Such narrative devices include images, causal models and metaphors. These devices define problems and structure reality so that some futures seem plausible, while others are foreclosed (according to Hajer 1995; also Hajer and Versteeg 2005).

Narrative devices are informed by cognitive and normative frames. These

> refer to coherent systems of normative and cognitive elements which define, in a given field, ‘world views’, mechanisms of identity formation, principles of action, as well as methodological prescriptions and practices for actors subscribing to the same frame. Generally speaking these frames constitute conceptual instruments, available for the analysis of changes in public policy and for the explanation of

developments between public and private actors which come into play in a given field (Surel 2000, 496).

Such frames set up 'a causal explanation of the ongoing processes', as a basis for action (ibid: 501). This frame analysis goes beyond rationalist or instrumentalist models of policymaking (ibid: 506).

Within an overall narrative, assumptions can have several types: (i) predictive; (ii) normative; (iii) causal; and (iv) regulatory. Predictive assumptions involve promises or expectations about a policy's effects. Normative assumptions set criteria for what counts as good or bad effects, relative to analogous effects elsewhere. Causal assumptions identify causes of potential harms or benefits. Regulatory assumptions concern procedures or criteria that can ensure beneficial effects, while avoiding harmful ones (see Table 1).

Table 1: Generic types of assumptions

Type	Policy assumptions (generic)	Comparing them with practices
Predictive	Promises or expectations about effects.	Empirically test predictions about effects.
Normative	What counts as good or bad effects, relative to analogous effects elsewhere.	Identify norms in policy assumptions. Identify practical accounts of sustainability.
Causal	Causes of potential harm or benefits.	Analyse policy assumptions about the character of the causes of harmful or beneficial effects. Identify various drivers and contexts of agrofuel production.
Regulatory	Regulatory procedures and criteria as means to ensure beneficial effects, while avoiding harmful effects.	Analyse proposals for regulatory measures – how they encompass some issues, while ignoring others. Analyse regulatory authority and capacity to avoid harmful effects.

As three main arguments in EU policymaking, biofuels can contribute to (i) GHG savings, (ii) energy security, and (iii) rural development. These arguments structure our analysis of policy assumptions. Each claim for benefits can be disaggregated into the four types of assumptions outlined above. Table 2 summarises the main assumptions, by quoting or paraphrasing numerous policy documents.

Table 2: EU Policy Assumptions Disaggregated

Argument	Environmental protection, especially GHG Savings	**Energy Security**	**Rural Development**
Predictive assumptions	Biofuels produced either in the North or the South can contribute GHG savings by replacing fossil fuel in an expanding transport sector, although the amount of savings will vary according to certain factors that are identifiable and therefore manageable.	Biofuels will enhance energy security by diversifying sources beyond oil in an era when its supply becomes scarcer, more expensive and politically unstable.	Biofuels will spur rural development by invigorating livelihoods, creating new jobs and diversifying incomes in both global North and global South, including many countries where rural poverty is most concentrated and entrenched.
Normative assumptions	What constitutes adequate GHG savings, as contributions to statutory EC targets? The Renewable Energy Directive (RED): requires 35% savings by 2020, rising to 50% from 2017 for existing production, and 60% for new installations from 2017; assigns some emissions to co-products (usable as feed or electricity source), rather than to the fuel, which thereby could have lower or no emissions; and awards a GHG savings bonus for biomass from a 'recovery programme aimed at improving severely degraded or heavily contaminated land', thus providing extra means for any consignment to reach the required % savings (EC, 2009). Beyond GHG savings, the RED also specifies measurable criteria for forests which must not be the source of biofuels eligible for the EC targets (EC, 2009). RED omitted indirect land use change (ILUC) as a contributor to GHG emissions and possible negative balances, partly on grounds that ILUC criteria could be added later with an appropriate method. By December 2010 the Commission must submit a report.	What constitutes energy security and for what purposes? The EU must: (i) secure a large volume and stable supply of liquid fuel for the European market, and thus (ii) fuel the transport sector upon which the European economy and its competitiveness depends. The importance and the vulnerability of the transport sector require that action is taken rapidly to reduce its malign contribution to sustainability and the insecurity of Europe's energy supply (DG Tren, 2009a). Biofuels are the only practical means to reduce EU dependence on oil use in transport (CEC, 2007b). Biofuels are an ideal source for gaining energy security (defined in the above way). Compared to fossil fuels, biofuels are renewable and can be grown virtually anywhere and anytime.	What constitutes rural development? Rural development is measurable in exclusively economic terms, primarily in terms of income. Rural citizens can and will be incorporated into biofuel development processes as labourers in large-scale mono-crop biofuel production processes. Rural development also depends on including smallholders, e.g. through contract-growing schemes (EuropeAid, 2009). Through biofuels development, new markets offer increased productivity, more profitable and diversified agricultural sectors, value-adding industries in rural areas, more rural employment and less migration to urban centres. Redistribution of the expected increased wealth will depend on the economic and social models in each country (CEC, 2008c). What constitutes un/acceptable or un/desirable impacts of agrofuels promotion on rural societies? Removing the best land from food production. Competition between food and fuel uses of land. Reducing employment [understood as the formal economy].

Causal assumptions	For any particular fuel consignment, GHG savings depend on the crop, cultivation method; land type, etc. Avoiding initial need for such knowledge, however, member states can use default values – average GHG emissions for a crop – but later must justify this basis for specific land areas (EC, 2009). Through biofuels feedstock cultivation, degraded or semi-arid land could be put back under vegetation cover by planting adapted species (CEC, 2008c). Relative to the first generation, second-generation biofuels can (i) better save GHG emissions by more efficiently converting plant material to energy and (ii) better avoid competition with food by using non-food crops and/or being grown on 'degraded' or 'marginal' land, otherwise not used.	The European market for biofuels needs to be created because biofuels cannot (yet) compete with fossil fuels for transport. Securing a large volume and stable supply of agrofuel requires sourcing raw materials beyond the EU, which has inadequate suitable land available (CEC, 2008a). Many tropical countries in the global South are 'resource-rich' (CEC, 2008b). 'There is sufficient land available to satisfy demand for food, feed and fuel to 2020', i.e. the global South has sufficient land to supply its own food needs and much of the EU's energy needs (EuropeAid 2009 citing RFA, 2008). Degraded land can be reclaimed and improved through crop cultivation for biofuels (EC, 2009)..	Contributing to rural development (defined as above) depends on directing FDI, ODA, as well as government-sponsored, market-oriented interventions to the target countries, to help establish large-scale industrial biofuel production units and tie them into global biofuels markets. Effective and balanced partnership between smallholders and agro-industrial companies should provide a solution to the cash problem (EuropeAid, 2009). Bioenergy development should be encouraged for crops and lands which compete the least with food and other uses, either directly (they are not staple foods) or indirectly: they have higher yields, hence use less land (EuropeAid, 2009). Thus competition for land use can be avoided by novel technologies which increase productive efficiency.
Regulatory assumptions	Whatever environmental risks biofuels may pose for fragile, biodiverse ecosystems, such risks can be managed through (voluntary) adherence to some identifiable, measurable and enforceable standard set of sustainability criteria. Companies involved in biofuel production will voluntarily adhere to such criteria. Private certification schemes can be accepted for compliance with the EC targets.	A large European market for 'sustainable' biofuels can be created through incentives, targets, and subsidies. Large volumes and stable supply, sourced from outside the EU, can be secured: (i) through joint ventures and foreign direct investment (FDI), (ii) by overseas 'development assistance' (ODA) by market-oriented national biofuel and land policies in developing countries, and (iii) through 'free trade' and 'economic partnership' agreements with 'resource-rich' countries through their national governments.	Various harms could result but can be prevented through appropriate policies of the EU and/or producer countries. Any undesirable effects can be mitigated or prevented by applying labour, human rights and environmental standards, along with community consultation procedures (EuropeAid, 2009). EU development policy will aim to help suitable developing countries capture the benefits offered by biofuels, while addressing these concerns [about harm] in an appropriate way (CEC, 2006b). Biofuels projects shall be designed and operated under appropriate, comprehensive, transparent, consultative, and participatory processes that involve all relevant stakeholders, especially those at local level (EuropeAid, 2009).

3.3.3 EU policy vision for 'sustainable biofuels': tensions made evident

With the issuance of the final directive, debates over sustainability criteria, what they mean, and whether and how they can be implemented have flared. A Parliamentary committee had proposed to add social aspects, e.g. land rights of local communities, and fair remuneration of workers. But these criteria were excluded from the legislation, partly on grounds that they would contravene WTO rules on trade barriers.[3] Additionally, the directives did not include mandatory social criteria (labour conditions, land tenure, etc.) or food security criteria 'because of the difficulty to verify the link between individual biofuel consignments and the respect of these particular criteria' (EuropeAid, 2009). Regarding how to certify sustainability, originally the Commission had proposed that member states establish their own schemes: 'It is appropriate to leave verification to Member States, whilst encouraging multinational certification schemes' (CEC, 2008a). But in a report prepared specially for the Commission, the Biomass Technology Group argued that certification systems could be left to market forces through voluntary 'private certification' schemes (BTG, 2008). These options were left open in the final Directive, as above.

Introducing narratives related to the notion of ´sustainability´ in the policy and what this really means is related to the various ways societies define and propose to achieve sustainability with a given economic activity revealing divergent perspectives on sustainable development, and therefore, about the relationship between nature, society and the environment. Table 3 shows how sustainability is framed in various EU documents, while Table 4 offers a typology of contending framings in the biofuels debate.

Table 3: Sustainability framings in EU documents

EU document	Framing of Sustainability
Biofrac (2006) Biofuels in the European Union. A vision for 2030 and beyond. Final report of Biofrac.	¨Biofuel production in Europe is significantly limited in volume and is not fully sustainable due to limited availability of raw materials that compete with food and other uses and have high costs. ¨ ¨Technology development will play a key role towards the successful implementation of sustainable and competitive biofuels in the EU¨ 'In order to develop the European biofuels to its full potential, a number of non-technological deployment measures have to be addressed also under coordinated and target-oriented efforts: A coherent, long term and harmonised political and open market framework to secure confidence of investors in capital-intensive innovative technologies. Joint public/private financing for R&D and Demonstration of new biofuel production routes and end-use applications. Additional public funding for higher risk large-scale demonstration facilities. A simple, coherent and global certification system to assure environmental sustainability of biofuel production chains. Social awareness needs to be increased and social acceptance gained by open communication of benefits as well as potential drawbacks of biofuels. Both competitive and sustainable biofuels are possible.'
EBFTP (2008) Strategic Agenda and Strategy Development Document	¨To achieve sustainability, policy should facilitate the trade of biofuels among Member States, including flexibility instruments (e.g. biofuel credits). As availability of feedstocks will become a challenge, import and export of biofuels to and from the EU should be made easier in order to balance excess or lack of production capacity within the EU. Unnecessary new measures should be avoided and existing ones kept simple and harmonious. In general actions taken should open both domestic and foreign markets.¨
European Commission	'Sustainability criteria and standards would need to comply with WTO provisions, be

[3] ¨The World Trade Organisation (WTO) is regularly cited by governments and interest groups to block attempts to develop mandatory certification systems. It only allows voluntary systems under conditions of free competition and also only if no measures are taken to inhibit trade in non-certified goods. Furthermore it seems clear that while some environmental issues may be acceptable, social issues, labour standards and even human rights are inadmissible under WTO rules. (….) The BTG report (…) notes that if only the EU has standards, exporters will simply shift to markets that do not certify. It also admits (crucially) that certification cannot help to avoid indirect adverse effects, but proposes bilateral agreements as a solution to this problem¨ (CEO-GRR-Econexus: 2008).

(CEC, 2006) An EU Strategy for Biofuels, SEC (2006) 142.	effective and not over-bureaucratic.' Social considerations within trade agreements and sustainability criteria were proposed by the EP but were not in original proposal of EU and were excluded from the final directive.
European Parliament (2008) Sustainable Biofuel Production in Tropical and Subtropical Countries, Workshop proceedings (DG Envi, 2008).	'Sustainability is a question of finding the right policy incentives.' Main policy dilemmas related to sustainability: - Sustainability may conflict with competitiveness. - Stringent EU criteria for sustainability of biofuel production may not prevent third countries from exporting unsustainable biofuels into the EU. - Focus on biofuels and biomass exports from the South could substantially undermine their local use in heat and electricity applications, which are needed in Southern (specially African) countries, much more than fuel for transport.

Table 4: Sustainability Frameworks

	Agrarian & Environmental justice activists	**Government Agencies in the North**	**Multinational companies; some elites and governments in the South**
Sustainable Development Framing	Community/agrarian & environmental justice	Environmental Management/ Ecological modernization	Neo-liberal eco-efficiency
Problem Definition	Climate change: harmonious balance to be maintained, historical claim for renewables	Need to reconcile economic growth and market competitiveness with environmental protection.	Need resource efficiency to prevent depletion of environmental capital. Trade in environmental goods (green commodities) as a potential market to expand.
Concept of nature	Commons to be protected and shared; small scale farming is central	Existence of a human habitat, ecological support system, assets providing services (livelihoods approach)	Nature as capital to be invested and privatised
What is to be sustained?	Communities, beneficiaries of commons	Optimum rational resource usage	Competitiveness, efficiency, productivity, profitability
Economic aims	Livelihoods, food and energy security/ sovereignty	Economic growth through socio-technical organisations and increased carrying capacity	Competitiveness in global market for green commodities
Solution	Solidarity, democratic political processes, sovereignty	Rules and standards to be negotiated	Eco-efficiency
Expertise	Local resources and knowledge	Identification and control of negative impacts	Research and development of clean products

Environmental sustainability vs. efficiency:

Tension arises in EU documents between measures for improving efficient renewable technology and resource use, and, those that promote diversification of energy sources.[4] Diversifying energy supply and blending/replacing transport fuel with agrofuels may address sustainability narrowly in terms of energy security. But it does not address sustainability and sustainable development in terms of curbing GHG emissions through more efficient renewable resource production and distribution or use. Instead, the argument implicitly expresses an environmental management approach, or more precisely, market-oriented environmentalism. Either rests on faith in regulation and techno-fixes; it is assumed that environmental contexts and impacts can be fully known prior to intervention, and that problems can be managed or avoided through technological innovations and good management techniques.

Green-washing 2nd generation:

Many of the companies most involved in promoting biofuels in EU policymaking elaborate this approach on their websites. Many have embraced 'next-generation' biofuels and are investing in research, on grounds that they do not compete with food crops and offer carbon-savings: 'In the future, biofuels must perform better, in terms of overall environmental sustainability, than the fossil fuels they replace and new biomass-conversion pathways have to be developed in order to reach the large volumes required to meet ambitious EC targets', according to the Biofuels Platform (EBFTP 2008: iii).

To stimulate such innovation, they also embrace sustainability criteria. The latter are considered means for harm prevention or damage control, implying that the harmful social or environmental effects of biofuels are mere contingencies or deviations that can be avoided through corrective measures. While recognising potential harm to food security and rural people's livelihoods, such a framing of harmful effects makes 'win-win' scenarios plausible (von Braun & Pachauri 2006; Clancy 2008). Such a solution rests on the optimistic idea that global markets and environmental protection can be reconciled; but this is evidently easier to imagine than to realise.

Land availability assumed?

Moving ahead with ambitious targets implicitly assumes that enough suitable land can be made available. Biofuel promoters envision a future powered by sustainable and benign biofuels – e.g., biofuels that do not compete with food production, undermine biodiversity, or convert 'high-carbon-stock land'. For this vision, EU policymakers have been able to draw upon expert opinions that biofuels could be grown on so-called 'marginal' or 'degraded' land in the global South.

The 'marginal land' concept was given many beneficent meanings in EC policy narratives. When food prices rose in 2007, this was widely seen as a societal problem – but offered an opportunity for European farmers to profit from marginal land: 'Moreover, with high market prices for food and feed crops, the interest of European farmers in producing first-generation biofuels is now certainly highest in the case of marginal land not suitable for food and feed crops', according to the Agriculture Commissioner (Fischer Boel, 2008). Likewise this became an opportunity for farmers in developing countries: 'High agricultural prices provide incentives for public and private investments and programmes to improve productivity, reinforce infrastructure, spread production to marginal land and enhance the efficiency of agricultural markets' (CEC, 2008d). Moreover, 'marginal land' would allow novel biofuels to avoid the damage caused by current ones, according to the Trade Commissioner:

> We have all seen the maps showing the vast tracts of land that would be required to replace petrol to any significant degree. That is why research and development into second generation biofuels that are cleaner, more versatile, and can be used on more marginal land is so important (Mandelson, 2007).

Similar meanings were incorporated into expert reports. According to the UK's Gallagher Review, further pressures on agricultural land should be avoided by several policy measures: 'This includes use of appropriately defined idle agricultural land, marginal lands, wastes and residues and intensification of current production' (RFA, 2008: 12). A Commission agency cautiously cited this report as evidence of land availability: 'The Gallagher Review has estimated however there is sufficient land available to satisfy demand for food, feed and fuel to 2020, but this needs to be confirmed in a local and regional context before global supply of bioenergy increases significantly' (EuropeAid, 2009: 4). In its report on the draft RED, a European Parliament committee declared that 'Idle, marginal and degraded lands must be defined in this Directive', especially to ensure that such land 'does not have

[4] Differences among EU institutions and between Member States, as well as pressures from the industry and producer countries have been at the root of this.

conservation value or high carbon stock value or is otherwise used in the production of food' (EP ITRE 2008: 14)

From a practical standpoint, the profound complexity of land can perhaps be summarised in the following questions: Who has what rights to use which land for how long and for what purposes? And who gets to decide these contentious matters? Yet official EU biofuels policy disregards all this. Absent in the EU documents is any mention of important issues in the context of land struggles or land policymaking: namely, who has which rights and who gets to decide. Exclusion of such difficult political questions – such as how to regard pre-existing land-based social relations and pre-existing property relations – is illustrates 'state simplification'. Policy assumptions about rural development which take a narrow economic conception of land – e.g., ignoring the social-political relations and cultural meanings that inhabit land in the real world.

To justify its ambitious targets, EU policy need not overtly presume vast land areas 'available' for biofuels in the global South, especially given uncertainty and disagreement over how much imports will be needed. As a concept, 'degraded/marginal' land can play more subtle roles. It can be a means to normalise past degradation, such that agro-industrial monocultures become an improvement; or, to devalue and/or conceal land uses 'marginal' to global markets. The concept can provide policymakers a narrative device for imagining a benign role for biofuel production in the global South, as if experts can operationalise it by choosing the right regulatory-governance measures, whether to protect the best agricultural land for local food uses or to protect the most biodiverse or most 'high carbon stocked' land for environmental purposes. 'Expert knowledge' is most likely considered best suited to define or confirm which lands could be considered 'degraded' or 'marginal'. In the end, the concept of 'degraded/marginal' land is an ambiguous normative measure for investigating, classifying and colonising land in the global South. There is the highly dubious matter of who will get to wield this tool, and thus decide the fate of specific lands – and therefore the fate of people -- in practice.

Another contentious issue related to sustainability is direct and/or indirect changes in land use. Biofuel production displaces food crops to other places, where a once-off destruction of forest or peatland releases enormous GHG; this carbon debt undermines the GHG savings from biofuels. Such change due to agrofuels has a high potential to reduce or even eliminate GHG savings (Searchinger, 2008). Depending on various assumptions, decades or even centuries may be needed to repay the carbon debt. Meanwhile the debt is ignored by 'carbon laundering' which accounts only for direct changes in land use (Birdlife International, 2010).

3.3.4 Expert studies: optimistic assumptions under challenge

As mandated by the 2009 RED, by the end of 2010 the Commission must report on indirect land-use changes (ILUC) – measurement methods, potential harm of various kinds and prospects to avoid them. So Commission Services arranged expert studies, whose publication was delayed by disagreements over their methods and assumptions. Optimistic assumptions have undergone much criticism, thus providing extra grounds to question the EU targets.

IFPRI study for DG Trade

According to a study for DG Trade, EU targets would not seriously undermine GHG savings because conventional (or first-generation) biofuel crops need to provide only 5.6% of transport fuel. This figure was equated with the EU target for 10% of transport fuel to come from renewable energy by 2020, on the assumption that nearly half the quota would come from other renewable sources, especially 2nd-generation biofuel crops and electric cars (IFPRI, 2010: 45). The study assumed that the EU target would generate large markets for those alternatives before 2020. This prediction contradicts the more modest expectations of the European Commission regarding novel biofuels, likewise the modest expectations of the motor vehicle industry for electric cars (Harrison, 2010). It also contradicts policy assumptions that 'renewable' transport fuel would mean mainly biofuels, according to interviews for an academic study (Sharman, 2009).

The 5.6% figure corresponds roughly to a DG Tren report dated October 2009. This offered three different scenarios – from relatively pessimistic to optimistic scenarios – for various sources of renewable energy in transport fuel by 2020. Regarding sources other than first-generation biofuels, the intermediate scenario makes an explicitly 'optimistic assumption for electric road transport, intermediate assumption for second-generation biofuel', the latter using mainly straw. This scenario anticipates 0.9 Mtoe 'electricity from renewable sources in road transport', i.e. electric cars, which enjoys a 2.5x multiplier in the RED for calculating the contribution, resulting in 2.2 Mtoe; plus several types of second-generation biofuels, which have a 2x multiplier. Thanks to those significant

contributions, only 5.9% of transport fuel would need to come from crops (DG Tren, 2009b: 33). This means only 5.1% from first-generation crops because the second-generation component is double-counted in the RED.

Another sensitive issue is the relative proportion of biodiesel and bioethanol (i.e. petrol) in EU transport fuel by 2020. This matters because biodiesel generally has greater ILUC effects than bioethanol. According to the IFPRI report, energy-rich Brazilian sugarcane as feedstock for bioethanol compensates for GHG emissions from indirect changes in land use there – more so than Asian palm oil as feedstock for biodiesel compensates for such changes there, e.g. destruction of peatland and forests.

Given the worse role of biodiesel feedstocks, the report made the optimistic assumption that only 55% of total biofuels in EU transport would come from biodiesel: 'Furthermore, the model uses a target ratio for 2020 of 55% ethanol and 45% biodiesel, based on DG AGRI projections' (IFPRI, 2010: 45), citing a Commission report (DG Agri, 2007). Yet the latter predicted the opposite proportion – 55% biodiesel. Moreover, according to other reports, biodiesel already comprised 75% and would rise to 80% by 2020. When challenged at a Commission meeting, an IFPRI author acknowledged that the proportion would indeed be closer to 80/20 (Harrison, 2010).

Within the assumption that the 10% renewables target would need only 5.6% first-generation biofuels, the study warned that any greater usage could significantly undermine GHG savings via ILUC:

> The main lesson learned is that ILUC does indeed have an important effect on the environmental sustainability of biofuels. However, the size of the additional EU 2020 mandate, under current assumptions regarding the future evolution of renewable energy use in road transport, is sufficiently small (5.6% of road transport fuels in 2020) and does not threaten the environmental viability of biofuels. If the underlying assumptions should change however, either because the mandated quantities turn out to be higher and/or because the model assumptions and parameters need to be revised, there is a real risk that ILUC could undermine the environmental viability of biofuels (IFPRI, 2010: 67).

Indeed, with more plausible assumptions about conventional biofuels needed to fulfil the EU targets, they would trigger large-scale indirect changes in land use (ILUC), according to an NGO bulletin:

> Two studies seen by T&E show that an additional 5.2 million hectares of land would be needed. The head of the Commission's agriculture directorate Jean-Luc Demarty had reportedly written a note to a colleague in the Energy Directorate saying: 'An unguided use of ILUC would kill biofuels in the EU' (T&E, 2010: 1).

This note highlights the inherent conflict between ILUC and sustainability claims.

IPTS study for DG Agri

Meanwhile a study by the Commission's IPTS, funded by DG Agri, likewise warned about potential harm from ILUC: 'Particularly when virgin land such as rainforest or peat land is converted to agricultural use, many decades may be needed before the initial induced carbon losses are compensated by the savings due to greater biofuel use' (IPTS, 2010: 12). But the report did not attempt to model such effects, even excluding land-use changes in palm oil production.

The report assumed that the EU's renewable energy quota would come entirely from biofuels -- unlike the IFPRI study. More specifically,

> The energy share of biofuels is assumed to reach 8.5% in 2020, of which 7% consists of first generation and 1.5% second generation biofuels. Consistent with the Renewable Energy Directive, the energy provided by the latter is considered doubled for the purpose of meeting the 10% target (IPTS, 2010: 30).

The study used three different modelling methods, which yielded somewhat contradictory results across the methods. Regardless of those differences, a consistent outcome was the EU's need to import bioethanol in order to fulfil the 10% target. Given the need for such imports, it is not easy to gauge 'to what extent the EU's energy independence is improved by its biofuel policies', according to the report.

The IPTS study also warned about potential effects on global prices for biofuel feedstocks.

> Regarding the farm income support objective, a new and strongly growing non-food demand for agricultural output will undoubtedly boost farm prices and hence farmers' incomes. However, the desired effect may come at a potentially high cost: a human cost, paid by the world's poorest consumers who may face higher food prices or food shortages, and an environmental cost, particularly in terms of the destruction of rainforest and wilderness, as higher crop prices encourage the expansion of agricultural area worldwide (ibid: 107).

The models showed greater disruption to global prices for biodiesel feedstocks (e.g. oilseeds) because the EU's demand would be a high proportion of the global market – relative to a lower proportion of the market for bioethanol feedstocks, e.g. maize. According to the report:

> There is minor disruption to world market prices of ethanol feedstocks, but world market prices for biodiesel feedstocks are more sensitive to the EU's biofuel policies. This is because ethanol production is a relatively small component of total demand for the agricultural commodities that also serve as ethanol feedstocks, whereas demand for oilseeds and vegetable oils for biodiesel is a much larger component of total world demand for biodiesel feedstocks. This suggests that any direct pressure on global food markets due to EU biofuel policies will concern vegetable oils rather than grains or sugar (ibid: xiii).[5]

As mentioned above, the report assumed that 1.5% transport fuel would come from second-generation biofuels, i.e. using non-food plant material. Moreover, 'the model does not allow them to compete with agricultural crops for food' (ibid: 109) – apparently on grounds that the same biomass could not be used for food. Thus the models made assumptions about land use and markets strictly separating food uses from non-food uses, e.g. not shifting from food uses to industrial ones or to crops more lucrative for those purposes.

Implications

In those ways, expert reports gave some reassurance about the EU's 2020 target for biofuels in transport fuel. The reports accommodated earlier warnings about EU imports potentially causing harm in the global South (e.g. Econexus et al., 2007; T&E, 2009), while downplaying such harm through optimistic assumptions about markets, novel biofuels and therefore land use. For the IFPRI study, such assumptions came from DG Tren, via the relevant staff in DG Trade as intermediaries, rather than from the expert authors. 'Key assumptions were discussed with DG Trade at the beginning of the study. It is normal for a report to depend on DG Tren for relevant knowledge' (interview, DG Tren, 13.04.10).

The various assumptions and methods were compared in another expert study. This emphasised numerous sources of indirect emissions from biofuel production: 'Indirect Land use change emissions are only part of indirect emissions' (JRC, 2010).

By making assumptions explicit, the reports revealed weaknesses of beneficent claims for the EU targets. Optimistic assumptions provoked disagreements in finalising the reports and then overt conflict after publication (Harrison 2010). Given that controversy, journalists speculated about the Commission softening its targets for biofuels (Harrison and Dunmore, 2010).

From the Commission's standpoint, the policy question is: whether to encourage and/or discourage some categories of biofuel, and what criteria would be appropriate for doing so (DG Energy, 2010). Any such criteria would discriminate among biofuels and/or their geographical sources, so a justification would need to withstand scrutiny of global trade rules.

3.3.5 EC development policy as an alibi

Given concerns about biofuel production harming rural populations, the European Commission suggests mitigation measures: 'EU development policy will aim to help suitable developing countries capture the benefits offered by biofuels, while addressing these concerns in an appropriate way' (CEC 2006b: 7; cf. EuropeAid 2009). For such policy, responsibility lies with its Directorate-General for Development, as well as its External Cooperation Programme.

The latter hosts a task force which has analysed conflicts over land use and land tenure in its many forms. According to its report, pre-dating the biofuel controversy:

> Land constitutes an asset and a source of wealth for families and individuals as well as for communities, with strong links to cultural and spiritual values. Ownership and control over land confer very significant political power, particularly where land is becoming scarcer and hence more valuable. Land issues and conflicts are deeply embedded in the long-term social, economic and political history of a country and must be understood in that context…. the rights of farmers to the land they cultivate often remain legally insecure and people may be excluded by government from access to natural resources upon which their livelihoods depend (EU Task Force 2004: 2-3).

Later DG Development launched a consultation exercise on food security in developing countries, especially on the problem that large-scale land acquisitions undermine local food availability. The consultation document asked how to support efforts to meet 'food production challenges', e.g. through regional integration or rights-based approaches. It noted a policy gap regarding biofuels:

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[5] Emphasising this contrast, the 2009 IPTS draft predicted minimal effect on food prices: 'Since the main competition for agricultural crops used for ethanol comes from food demand,… EU biofuel policies in 2020 will not cause significant distortions to global food markets' (p.110). But this reassurance was deleted from the final version.

> Beyond the issues mentioned above, current European strategies on agriculture and food security do not systematically address other issues that only recently gained prominence such as: a) the impact on agricultural production and food availability of biofuels production and large scale land acquisitions…. (CEC 2009: 5).

There are tensions between such concerns and biofuels policymaking. These tensions were indicated by research interviews with staff members at DG Development (in October-November 2009). For example, one staff member felt that mandatory labour standards could deter biofuel developments which create employment. By contrast, another criticised policy language about biofuel development creating 'employment' – an inappropriate term for the informal economic relations which characterise livelihoods in rural societies. Through negotiation, they could gain from biofuels, but they could instead lose livelihoods. These reservations remained self-consciously distant from any practical influence: 'If I make this argument, then who will listen to me?' In fact DG Development has no staff member dealing specifically with labour or employment issues.

Some staff members acknowledged that agricultural producer companies often choose better-quality land – linked with infrastructure, for using the crop as either food or biofuels – not 'marginal' land. As they recognise, biofuels exemplify a wider problem: that investments in large-scale cultivation often threaten customary land rights and livelihoods. DG Development supports international initiatives to address this problem (e.g. ILC 2007; UNCTAD 2009). Staff recognised, however, that outcomes depend upon host countries taking land rights seriously; if the Commission disapproves of a government on such grounds, then it can find alternative donors or investors.

Staff views matter little anyway, since DG Development has gained no significant role in shaping European Commission policy on renewable energy. Nor does it have the financial resources or political power to shape biofuel developments in the global South, e.g. towards ensuring community consultation. Given its marginal role, official documents referring public concerns about biofuels to 'EU development policy' serves as an alibi for – or narrative diversion from – biofuel projects being subordinated to global commodities markets.

3.4 Three case studies: comparing assumptions and effects

Table 2 above analyses EU policy assumptions, as a basis to compare them with drivers, practices and effects. These are next analysed in separate case studies, as specific contexts for constructing agrofuel markets. Each case study briefly mentions the respective national policies as relevant to practices and effects there. But our three cases were selected mainly for comparison with EU policy assumptions, as the main focus of our study.

3.4.1 Germany[6]

In 2006 Germany's Environment Minister announced a new energy strategy, emphasising quotas for a biofuel component in fuel mixtures. The GHG-reduction target of 20% by 2020, as set by the EU Renewable Energy Directive, posed a difficulty for industry because transport emissions were rising by 1.4% per year and were foreseen to continue. Biofuels offered automobile manufacturers a simple solution, soon formalised as 'The Biofuels Roadmap'.

Among EU member states, Germany has undertaken the most ambitious commitments and efforts for transport fuel to come from renewable energy, but fulfilment is limited by land availability and engine design. The country increased its production capacity from 1m to 5m tonnes agrofuels between 2004-08. The share of biofuels in consumption for transport increased as well – from 3.6% in 2005, to 6.3% in 2006 and 7.3% in 2007 – again, mostly biodiesel. So in Germany the EU target of 5.75% in 2010 was already surpassed several years beforehand; no other EU member state had reached 5% by then (Eurostat 2009). Germany was also the only member state to reach its 2010 national targets for biofuels and biomass use, according to the EU's progress report (Agra-Europe 2009).

To meet its own targets for domestic production, however, Germany has imported much additional feedstock. As another limitation on agrofuel use, many motor vehicles cannot use high agrofuel mixtures. Under political pressure, the government limited the quota to 5.25% content in fuel mixtures for 2009, rising to 6.25% for 2010-2014, rather than maintain its original plan for the 6.25% quota by 2009.

[6] This section is based on research carried out for the study by Mireille Hoenicke.

Further advances towards higher targets will depend upon significantly more imported oilseeds, whose production conditions may generate more GHGs than domestic oilseeds. These constraints undermine optimistic assumptions about significant GHG reductions from agrofuel use. Likewise assumptions about energy security from biofuels, which can contribute little to energy self-sufficiency, though they can diversify the supply of a small proportion, increasingly through imports. Hopes to achieve higher quotas in mixtures by 2020, as well as greater GHG savings, depend on optimistic assumptions about 2nd-generation biofuels more efficiently converting non-food feedstock into liquid fuel.

- Environmental protection versus agro-intensification

The Agriculture Minister Ilse Aigner emphasises the need to avoid previous harm from oilseed production and trade: 'In the past, the production of plant oil was often associated with ecological devastation.' It is assumed that any environmental harm from producing biofuels can be reduced through appropriate rules: 'Only if sustainability criteria are effective is it assured that the biomass used as biofuel will be produced sustainably' (BMU, 2008a: 21; translated by the author).

Along lines similar to the EC Renewable Energy Directive, Germany's 2009 Biomass Sustainability Ordinance (BSO) set environmental criteria – protection of 'high conservation areas', sustainable cultivation of land according to good professional practice, and GHG savings of at least 35% at first, rising to 50% in 2017 (BMU, 2009a: 13). However, the increased cultivation of energy crops, especially rapeseed and maize, already shows negative environmental impacts in Germany. Biofuel targets led to more intensive cultivation methods, with a greater use of pesticides and fertilizers, thus undermining the potential reduction in GHG emissions.

The cultivation of energy crops on set-aside land also increased; in 2007 almost 50% of set-aside land was cultivated. Between 2003-2008 more ploughing reduced permanent grassland by 3.4% – also caused by cultivating more maize and rapeseed (NABU, 2009; DBFZ, 2009). Grassland is a carbon sink, fixing 60g carbon/m^2/year, but ploughing releases about twice as much (DBFZ, 2009).

Official sustainability criteria include all direct effects, but not indirect ones. According to an expert report in 2007, 'the biofuel system encompasses the production of the biomass, all conversion processes, waste treatment, any transportation of goods and the use of the biofuels', i.e. including emissions from fertilizers and direct land use change (IFEU, 2007). Even when biofuels are produced from domestic rapeseed, other domestic uses may substitute cheaper imports, e.g. Asian palm oil (JRC, 2008). This chain involves indirect GHG emissions, which are not included in the 2009 German Biomass Sustainability Ordinance (BSO). These limitations in Germany raise doubts that similar emissions can be avoided or included on a global level, even with a certification scheme. Several studies show numerous uncertainties associated with calculating GHG savings, especially from indirect changes in land use (e.g. Searchinger et al., 2008: 3).

As will be required by 2017, greater GHG savings (50%) depend on 2nd-generation biofuels more efficiently converting biomass into liquid fuel, especially from non-food parts of crops. Biofuel proponents also claim that future novel fuels will avoid conflicts with food security, as grounds to delay an increase in the mandatory quota: 'Competition with food will be avoided with the delay of the mixing quota, because it will provide time to gain biomass from other resources.'

However, the investment costs for 2nd generation biofuels are 10-fold higher than for current biofuels (VDB, 2008). And 2nd generation biofuels won't be available in relevant amounts until at least 2020; even then, they will only have a share of 2-3% of total fossil fuel supply, according to one projection (BMU, 2008b). So 1st-generation biofuels, based on starch and sugar crops, will prevail for at least the next decade.

As part of 'The Biofuels Roadmap', Daimler and Volkswagen have bought major holdings in the biofuel company Choren, which opened the first demonstration plant to convert biomass into synthetic diesel fuel (Daimler, 2007). There are technical limits in simply adding biodiesel to fossil fuels. So far, only a 7% biodiesel share is allowed, according to the German Emission Control Act. And there are technical problems in adding a bioethanol share of up to 10%. By contrast, synthetic diesel can be used more flexibly in diesel engines without modification and so suits the car industry. Biofuel investment also helps the industry to appear more environmental friendly.

Biofuels promotion started from the argument about saving GHG emissions, but soon this rationale was called into question by CSOs and academic institutions. According to several expert reports, biomass conversion into combined heat and power offers significantly higher energy potential than into liquid fuels. The German Advisory Council on the Environment has advocated only a moderate expansion in biofuel use in transportation, especially because biofuels do not sufficiently exploit the

potential to mitigate climate change (SRU, 2007). In 2008 renewable energies – in the electricity, heat and fuel sectors – facilitated CO_2 reductions totalling around 112m tonnes in Germany. Biofuels contributed to CO_2 reductions of only 12 million tonnes, i.e. only 10%, while almost 50% came from biomass used as electricity (BMU, 2009b). This gap suggests that environmental benefits are less important than other aims driving the priority for liquid fuels.

- Energy security: limits of self-sufficiency

As a key argument for biofuels, their domestic production is expected to improve Germany's energy security. This argument became more prominent in 2007-08, when energy prices rose and assumptions about GHG savings from biofuels came under attack. The minimal savings are excused by the argument that they are the only alternative energy source in transportation. In replacing or supplementing fossil fuels, obstacles arise from engine design and land availability.

Another constraint on replacing fossil fuels is the quota for biofuel mixtures. Originally the government sought to increase the target to 6.25% in 2009. But in October 2008 an announcement kept the quota at 5.25%, rising to 6.25% in 2010-14. This delay accommodated pressure from the German automobile association, on grounds that many motor vehicles were technically unable to use higher fuel blends. Germany's 2009 National Biomass Action Plan mandates a 10% bioethanol quota (BMU, 2009a: 13), but at least 3m cars are not technically adapted to use this mixture, according to the German Automobile Club (ADAC).

Regarding land availability, the German Advisory Council on the Environment (SRU) warned in 2007,

> Merely producing enough biomass for all petrol and diesel placed on the market to contain at least 6.75% biofuel by 2010 and even higher percentages in the future.… would use up the entire potential available land (SRU, 2007: 102).

So these ambitious targets promote biomass imports. As its report also warned:

> Further expansion targets of the kind planned by the EU for the motor fuel sector (10 % admixture by 2020) will further increase this pressure to import, even given increased yields in crop production or more efficient technologies. Thus the ambitious bioenergy expansion targets will boost imports of biomass and bioenergy sources without taking any account of possible adverse consequences of such imports (SRU, 2007: 41).

In 2007 Germany's rapeseed cultivation reached 1.53m hectares, with 0.7-0.9m already used for biodiesel production (UFOP, 2008). Experts estimate a possible increase in rapeseed production up to 1.8m hectares, but only by increasing the use of permanent grassland, which otherwise acts as a carbon sink (see previous section). Germany has already reached the maximum permitted 5% use of grassland, according to the CAP cross-compliance rules. By 2007 fully 70% of total rapeseed production in Germany was used for biodiesel production. But that amount is not sufficient to satisfy the increased demand. Any increase of the current level of the defined quota would require even more imports of oilseeds.

The larger potential to substitute for fossil fuels is much disputed. By 2007 biofuels contributed to only 7.3% of total transport fuel, yet more than 10% of arable land in Germany was already used for cultivating crops for energy, and a great proportion of energy biomass was already imported. Even by increasing production of biofuels, their overall contribution will not significantly increase – unless the fuel mix is increased. Alternatively, biomass could be used more for heat and electricity, which has more efficient conversion than to liquid fuels.

As the German government acknowledges, biomass imports will gain importance 'for competitive purposes' because domestic sources are more expensive (BMU, 2009a). Already in 2006 Germany imported 60% of its biomass used for energy, mainly rapeseed from Eastern Europe (FIAN Germany, 2008).

In 2007 less than half of consumed biofuel came from domestic energy crops. Of the rest, 1.4m tonnes rapeseed oil, 0.9m tonnes palm and 0.3m tonnes soy oil were imported (DBFZ, 2009: 78ff). According to a scenario calculated by the DBFZ, the domestic production of biodiesel will decrease further from 75% in 2007, and less rapeseed will be grown (only 0.83m ha). In order to fulfil the mixture quota, all additional biodiesel will come from imports of palm and soy oil. If biomass-to-liquid (BtL) technology and biomethane do not provide significant contributions, then Germany will need even more imports (DBFZ, 2009: 86ff).

Moreover the global bioenergy potential has finite limits. According to an expert report, 'In the long run, up to 10% of the global energy requirement could be met from bioenergy' (WBGU, 2009: 1). So biofuels will contribute little to energy self-sufficiency, though they can diversify the supply.

- Rural development: small-scale farmers at issue

As a basis for promoting renewable energy, German development agencies have assumed that biofuels will assist rural development. The Gesellschaft für Technische Zusammenarbeit (GTZ – Society for Technical Cooperation) emphasises the role of private-sector actors:

'For rural populations, the most important opportunities to generate value added lie in high-value agricultural and natural products and labour-intensive transformation and processing... In value chain promotion, GTZ gives preference to private-sector solutions' (GTZ, 2009).

Development cooperation funds energy projects in more than fifty countries. The total budget was 1.6bn Euros by 2008 and was expected to reach 2.5bn Euros in the subsequent five years (BMZ, 2007). In Germany the assumption that the production of biofuels will spur rural development, especially in the global South, led to a public debate about development policy, poverty reduction and hunger.

At the start of the agrofuel boom, the GTZ took the lead in promoting biofuels in developing countries. In Tanzania for example GTZ recommended the establishment of a National Biofuel Task Force to provide advice and recommendations for biofuel production there (GTZ, 2005). But substantial fertile land was sold to mainly foreign investors for agrofuel production, replacing local food production and displacing thousands of small-scale farmers from their lands (ABN, 2007).

Early on Brazil was seen as a potential exporter of biofuels, especially to Europe. Between 2005-07 the GTZ and the DED Brazil (Deutscher Entwicklungsdienst – German Development Service) participated in a Public Private Partnership (PPP) project together with Brasil Ecodiesel, the Ministry for Agrarian Development (MDA) and the national farmers union CONTAG. They promoted biodiesel production from the castor plant in the Northeast of the country. In 2008 the GTZ and Petrobras, a Brazilian oil company, signed an agreement on a PPP project. Both projects are designed to strengthen the small-scale farmer structures needed for the (Programma Nacional de Producão e Uso de Biodiesel (PNPB), as a means to reduce poverty there. However, so far there is little integration of small-scale farmers in biodiesel production, which mainly uses soy. Only 24% of the total production comes from small-scale farming. In 2006 the biodiesel produced by Brasil Ecodiesel consisted of 97% soy, 2% castor and 0.7% cottonseed oil (FIAN, 2008).

In Mozambique GTZ is implementing ProBEC (Program for Basic Energy and Conservation), a program promoting biomass energy in the Southern Africa Development Community (SADC). According to ProBEC, 'Mozambique is internationally recognised as a country with massive biomass potential owing to its favourable geographic location and climatic conditions, which has led to a host of biofuels projects' (ProBEC, 2009).

In Mozambique GTZ also evaluated methods for conserving areas of High Conservation Value, as well as smallholder compliance with such measures. According to two resulting reports:

> Proforest, in collaboration with GTZ, conducted two field studies over the summer of 2008 to investigate how biofuel feedstock plantations can be planned and managed to comply with biodiversity and High Conservation Value requirements contained in RSPO and other sustainability standards…. Both case studies define an assessment landscape and examine HCVs at the landscape level. In addition, the Mozambique case study presents methodologies for using landscape level HCV data in plantation or project-level planning (Proforest, 2009: 4).
>
> The High Conservation Value concept is important, as it is linked to one of the most debated issues in biomass production for energy purposes; namely the competing interests in land usage for fuel, food and biodiversity…. The evaluation clearly shows that the site includes substantial non-HCV areas, where some expansion is possible while maintaining HCVs. The non-HCV areas are both woodlands as well as areas which are close to human settlements. It also points out a major challenge: Converting the non-HCV woodlands would lead to high carbon emissions. Converting the non wood sites might affect the population. A further detailed study and consultation with the local population is therefore necessary (GTZ, 2009a: i-ii).

For those various development aims, a test case has been a biodiesel production project involving Brasil Ecodiesel in Piauí, town of Canto do Buriti. According to Margit Gropper, GTZ Brazil, the project enhanced the organisation of small-scale farmers. This claim is contradicted by a FIAN Fact-Finding Mission, which found 'food vulnerability as a result of low income of the families living in the settlement, insecurity regarding land tenure, intimidation against free organisation, dependence of settled farmers on the company, which generates debt and hampers the development of family producers' (FIAN International, 2008).

3.4.2 Brazil[7]

Brazil is a major producer, consumer and exporter of sugarcane ethanol. Brazil's bioethanol programme, which originated in a 1980s policy to substitute for fossil fuels, has been greatly extended to gain income from export of fuel and related technology. Brazil has promoted agrofuels by expanding agro-industrial monocropping. It also encourages other countries in the global South to adopt this production model, especially through technology transfer agreements. Its foreign policy seeks to extend access to agrofuel markets, especially in the European Union, Japan, and the United States (e.g. CEO, 2008). Brazil's bioethanol exports face high tariffs in the USA and EU, so this barrier becomes another incentive to establish production in third countries, e.g. in Africa or Asia, whose exports can avoid such tariffs. Brazilian exports also use US Free Trade Agreements with Central America to get its agrofuels into US markets. Partly for those reasons, Brazil and the EU have agreed to start studies on how best to develop bioethanol, biodiesel and bioelectricity projects in Mozambique, which has become a leading African biofuels producer in recent years (Reuters, 2010).

Along with the Brazilian sugar cane industry association UNICA, the Brazilian government has been lobbying the EU to drop tariff barriers, to raise the GHG savings requirement in the EC Renewable Energy Directive to 45% and at least 60% from 2015, and to make sugarcane ethanol the main component in meeting the target. These efforts included a tour of Europe in late 2008 by Brazilian industry officials and government diplomats to promote Brazilian ethanol and advance bilateral relations with European states. Brazil and the EU have been in conflict over tariffs imposed on bioethanol exports to the EU. This problem has been partially solved through bilateral agreements with some individual EU member states. For example, the Germany-Brazil partnership agreement signed in May 2008 'establishes sustainability criteria for biofuels, and provides more than $140 million in financing for a renewable energy R&D partnership between the two countries, as well as rainforest preservation efforts in the Amazon'. Brazil has signed bilateral co-operation agreements on biofuels development with several countries – e.g. Sweden, Netherlands, Germany, Denmark, UK, France, and Italy (Biofuels Digest, 2008).

Government policy promotes land concentration and agro-industrial plantations to supply agrofuels for global markets. Investors prefer the best lands, with plentiful water and developed infrastructure; they rarely use "marginal" or "degraded" lands (Mendonça, 2008). Sugarcane and soya plantations generate GHG emissions in several ways – by clearing previous forests or savannah, by applying agrichemical treatments and by displacing cattle ranching into new forest clearances. Such plantations also cause wider environmental harm, especially by destroying soil fertility and polluting water sources, thus also undermining other livelihoods. Exploitative labour conditions harm workers' health and often subjects them to slave labour.

This agro-industrial expansion undermines earlier agendas for land reform, while also depriving peasants of land by various means, especially environmental pollution and violence. In these ways, agrofuels destroy and degrade employment. Agrofuels expansion aggravates societal conflict over the rural environment, which concentrates natural resources — such as water, land, minerals, and biodiversity. Multilateral financial agencies, large national and transnational firms, and governments dispute geopolitical control of regions rich in strategic resources.

- Environmental protection versus resource destruction

Brazil's agrofuel production increases GHG emissions in both direct and indirect ways. Monocropping directly aggravates this problem, especially by extending the agricultural borders of the Amazon and the Cerrado, an enormous savannah area.

In 2008 President Lula claimed that the Amazon has no production of sugarcane, yet this too is contradicted by expert reports. Such production increased from 17.6 million tons to 19.3 million tons between 2007-08, according to the National Supply Company (CONAB), an organ linked to the Ministry of Agriculture. In Tocantins, there was a 13% increase (from 4.5 thousand to 5.1 thousand hectares), followed by Mato Grosso with a 10% increase, and the state of Amazonas with 8% (from 4.8 thousand to 5.2 thousand hectares). In Pará, sugarcane plantations occupy around 10.5 thousand hectares. Pará is a principal area of expansion for ethanol production, according to research from the University of São Paulo.

This expansion has generated worldwide concern and criticism. 'The carbon from forest destruction will not be recuperated by planting sugarcane. For this reason the world is very worried about the transformation of Brazil into a major exporter of biofuels', according to researcher Écio Rodrigues at

[7] This section is based on research carried on for this study by Maria Luisa Mendonça.

the Federal University of Acre (Calixto, 2008). Facing such criticism, the Brazilian government decided to create a zoning system to limit the expansion of sugarcane plantations. However, the government did not explain what will happen to current plantations in the Amazon, Pantanal and Cerrado.

In recent years the Brazilian government has targeted the Cerrado as a priority area for expanding sugarcane. This region has a favorable topography; it is level, with good-quality soil and has potential water supply. Spanning two million square kilometers, the Cerrado is known as the 'father of water', supplying the principal water basins of the country. The region is as important for rich biodiversity as the Amazon; it shelters nearly 160,000 species of plants and animals, many of which are endangered. Studies indicate that each year nearly 22,000 square kilometers of savannah are cleared. More than half of the region has already been devastated; at this rate, its total destruction will be complete by the year 2030. Yet this problem has gained little visibility.

The sugarcane industry has expanded rapidly and generated great environmental damage. In the 2007 harvest, sugarcane production occupied 5.8 million hectares of the Cerrado, according to the Brazilian Institute of Geography and Statistics (Fernandes, 2008). To begin planting sugarcane, it is necessary to clear the native vegetation, and thus all of the trees are uprooted. In 2008, an agreement between the Ministry of the Environment and the Ministry of Agriculture resulted in softening the Law of Environmental Crimes. A Presidential decree subsequently allowed the construction of sugarcane factories in the Pantanal. New sugarcane factories are being built in conservation areas, close to natural springs, according to data from the National Institute for Space Research (INPE), from the Brazilian Institute of Geografy and Statistics (IBGE) and the Ministry of the Environment (MMA).

Sugarcane expansion destroys environments on which livelihoods depend. According to the Society, Population and Nature Institute (ISPN):

> Deforestation done for sugarcane production directly harms rural populations who survive off the biodiversity of the Cerrado. The other terminal consequence is that small food farmers leave their lands, having been lured into temporary employment in the sugarcane fields. This will reduce food production in the area, thus worsening the migration to urban slums (Conexão Tocantins, 2007).

Indirect changes in land use happen when farmers worldwide 'respond to higher prices and convert forests and fields into new plantations, to substitute plantations of grain which were used for biofuels', thus releasing stored carbon (Searchinger et al., 2008; also 2009). For example, since 2007 U.S. farmers have increased their maize production for agrofuels while decreasing acres planted in soybeans, which shifted elsewhere and had higher prices. In Brazil, new soybean farms use land that was previously cleared by cattle ranching, which in turn moves to frontiers in the Amazon forest. These outcomes undermine claims that Brazil's biofuels save GHG emissions.

- Agro-industrial development destroying and degrading employment

Monocropping of sugarcane began in Brazil during the period of Portuguese colonization. Historically, this sector has exploited large areas of land, natural resources and slave labor. The activity grew further during the international financial crisis of the 1970s, which caused a sharp rise in the price of oil. In response, Brazil's ethanol sector started with a governmental programme called Proálcool during 1972-95. In the name of 'modernization', the government provided support for increasing the area of sugarcane plantations, and structuring the sugar-alcohol (ethanol) complex, with large subsidies and other incentives. The Sugar and Alcohol Institute was responsible for all commercialization and export of the product – by subsidizing undertakings, providing incentives for industrial and land centralization, supplying fertile land, means of transport, energy, and infrastructure.

Despite claims that the agro-industrial complex provides 'development' and 'efficiency', it creates serious socio-economic inequalities, especially environmental degradation, concentration of income, and unemployment in rural areas. This 'conservative modernization of Brazilian agriculture will be counter-productive, and even harmful, insofar as it is only limited to improving mechanical equipment and tools, as usually happens, while keeping intact the anachronistic structure of property ownership', warned Alberto Passos Guimarães at an early stage (1978: 22).

For a long time agrarian reform, i.e. changing the structure of possession and use of land, has been promoted for several objectives. Agrarian reform would create low-cost employment, better educational opportunities, assuring the right to citizenship, reducing rural exodus and containing ecological devastation, among others, according to José Gomes da Silva (Stédile, ed., 1994: 184). Such 'integral agrarian reform' could realise a new development model.

However, this model has been undermined by propaganda about urban centers as the chief generators of income and economic opportunities, even as a basis to welcome a rural exodus (Andrade, 2005: 62). At the same time, a greater concentration of land ownership has been facilitated by state support for agro-industrial development: 'Its authority is manifested through the protection granted by government entities to large-scale farming – sugarcane, coffee, cacao, etc – and the complete disregard of subsistence holdings' (ibid: 64).

During 1995-2002 the Cardoso administration replaced agrarian reform policy with a project called 'The New Rural World', centred on three principles: (1) settling landless families under a compensatory social policy; (2) decentralizing agrarian reform projects, by passing responsibilities inherent to the federal government to states and municipalities; (3) replacement of the constitutional instrument on expropriation by a 'land market' policy, which means negotiated purchase and sale of land. This concept of 'development' was encouraged by the World Bank by creating three programs: the Land Title, the Land Fund, and the Land-Based Poverty Alleviation Project. Although this ideology espouses a minimum State, the World Bank demands a contribution of public funds to its projects, which commits the state's budget for privatization of land. In accordance with this policy, small farmers must seek 'efficiency' by means of integration with the agro-industrial complex (Martins, 2004).

According to Bruno Ribeiro, a lawyer of the Pastoral Land Commission,

> The sugarcane complex is presented as a totally integrated production due to its historic expansion and constitution, under the aegis of the State. Land ownership had a central role in this process and linked to that were the official policies on access to credit and the benefits of State subsidies. Its business is not sugar or ethanol, but rather the appropriation of resources by means of programs, incentives, and opportunities offered by the government.

The Lula government's economic policy continues an agricultural model based on monocropping for export. The government promotes the sugar-ethanol sector by opening new lines of credit, principally from BNDES (National Economic and Social Development Bank). Recently, there was an increase in the participation of foreign corporations in this sector, which benefit from public resources.

Some consequences are: degradation of the environment, concentration of income, and rural unemployment. The 2006 Agrarian Census, by the Brazilian Geography and Statistics Institute (IBGE), reveals that properties of less than 10 hectares occupy less than 2.7% of the rural area, while properties larger than 1000 hectares represent 43% of the total.

Of the total jobs created in the Brazilian countryside, 87.3% are in the small production units, 10.2% in mid-sized units, and only 2.5% on the large ones. This study demonstrates that the Small and medium-size rural properties are responsible for the greater portion of food production for local markets, according to an academic study (Oliveira, 2007). Although aware of these data, government policy favours subsidized credit and rollover debt for large corporations and landholdings. The Brazilian agro-industrial complex also uses other privileges – *grilagem* (illegal land grabbing), slave labour, and violation of environmental and labor laws.

In many regions, the increase in ethanol production has caused the expulsion of small farmers from their lands. It has also generated a dependency on the 'sugarcane economy', providing only insecure jobs in the sugar fields. Large landowners' monopoly on land blocks other economic sectors from developing, while creating unemployment, stimulating migration and degrading workers' conditions. Concentration of land ownership leaves the rural work force 'no alternative other than working for large exploitative enterprises' (Prado Jr., 2007: 58).

Despite propaganda about its efficiency, the bioenergy industry is based on exploiting cheap labor and even slave labor. Workers are remunerated according to the quantity of sugarcane cut – not by the hours worked. In the state of São Paulo, the largest producer in the country, the goal of each worker is to cut between 10 and 15 tons of sugarcane per day (Moraes Silva, 2007).

The expansion of the industry, as well as the new investments in technology, has not brought better conditions to workers. Mechanized cutting became the standard for measuring the amount of sugarcane which must be cut; this increased from 5-6 tons per day for each worker in the 1980s, to 9-10 tons per day in the 1990s. Today the mills demand 10-15 tons per day, principally in regions where the mechanized rates are the standard for productivity. Genetically modified sugarcane, which is lighter and has a higher quantity of sucrose, has resulted in higher profits for landowners and more exploitation of workers. 'Previously 100m² of sugarcane weighed 10 tons. Now, it's necessary to cut 300m² of sugarcane to add up to 10 tons', according to research from the Ministry of Labor and Employment (MTE).

This exploitation has caused serious health problems and even deaths. According to the Migrants' Pastoral Service (Serviço Pastoral dos Migrantes, SPM), 21 deaths were registered due to exhaustion from cutting sugarcane in the state of São Paulo between 2005-07. 'Ethanol in Brazil is bathed in blood, sweat, and death', says researcher Maria Cristina Gonzaga of Fundacentro, an institute within the Ministry of Labor (Noticias Terra, 2007). Officially called *trabalho escravo,* slave labor is common in the sector. According to Labour Ministry data, almost 6000 slave workers were rescued per year by the teams of the Mobile Inspection Group. Half of those workers were found at sugarcane plantations (MTE 2010).

According to the Brazilian government, sugarcane plantations are expanded on land that is 'degraded', so there is no harm to the environment or to food production. Some official data are given to support an image that Brazil has millions of hectares of land that are simply "abandoned" or "marginal". Yet it would not make sense for companies and public banks to invest heavily without access good quality land, water and infrastructure. In practice ethanol corporations seek and gain such access, thus devastating natural resources and local agriculture, as well as forest reserves in some places.

In promoting biofuels, the government emphasises opportunities for small farmers to gain extra income. The 2005 Biodiesel Program included the creation of the Social Fuel Seal (*Selo Combustível Social* – decree nº 5.297), which prioritizes the cultivation of castor bean plants (*mamona*) and palm trees (*dendê*). Companies establishing partnerships with small producers of these plants receive the "Social Fuel Seal", making them eligible for benefits and funding from BNDES (Brazilian Bank of Economic and Social Development), in addition to tax exemptions. In the North and Northeast of the country, companies are exempted from the payment of PIS (Private Company Employee Fund) and Cofins (Social Security Financing Contribution) taxes.

There are serious doubts regarding the real advantages for family farmers. The program foresees that they would produce 560,000 tons of castor beans and 680,000 of sunflower seeds for the biodiesel plants of the Northeast. But castor beans production reached only one-sixth the target – 93,700 tons and sunflower 106,100 tons in 2007 (CONAB, 2007).

In fact, soy continues to provide most biodiesel, comprising 80% of the production, while 15% is derived from animal fat and just 3% from other sources. In this context, family farmers have a minimal role in biodiesel production. Big companies still emphasise the advantages of the soy industry, which is based on large-scale infrastructure and land holdings.

3.4.3 Mozambique[8]

For its biofuel policy, the Mozambique government has stated its official aims – to enhance energy security, reduce GHGs and promote sustainable socio-economic development.

> The fundamental considerations motivating the Government, in developing policy, are (1) the promotion of agro-energy resources for energy security and sustainable socio-economic development, at the same time contributing to the reduction of greenhouse gas emissions through the selection and adoption of more adequate technologies and production methods in agriculture and industry; and (2) the necessity to confront the instability, opacity and volatility of fuel prices in the international market, to reduce the country's dependence on imported fossil fuels and to reduce the amount of imports in the national economy. (Mozambique, Boletim da República, 2009).

The government also seeks to avoid competition between food and fuel, especially from maize, which is the most important staple food in southern Africa. For biofuels feedstock, government policy instead favours four other crops – namely, sugar and sweet sorghum (for ethanol) and jatropha curcis and coconut (for biodiesel). In order to achieve all those aims, key activities are 'Knowing the challenges linked to correct land use, avoiding community conflicts, and environmental negative impacts', according to the Agriculture Ministry (Mataveia, 2009).

Biofuels promotion exemplifies a general policy shift towards economic development. During the period when Mozambique was deferring to Structural Adjustment Policies, its political elite had a predatory, often corrupt relation to state funds. The 2004 election marked a shift towards a 'developmental state', but economic development remains dependent on a political elite and foreign investors; the state gives little support to local small enterprises (Hanlon 2009). According to a consultancy report for Germany's GTZ,

> sustainable land management in Mozambique… will require the proper implementation of existing legal requirements, for example, the involvement of local people in land zoning agreements, and the adequate

[8] This section is based on research carried on for this study by David Fig, with extra material and advice from Joseph Hanlon.

sharing of benefits from land management through benefit sharing agreements which reflect the local peoples' legal and customary rights (Proforest/GTZ 2009: 15).

However, small-scale producers have been marginalised in practice; agro-business interests have prevailed instead.

In 2007 Mozambique and Brazil agreed to share resources in biofuel production, with the goal of replicating Brazil's purportedly sustainable model of biofuel production in Mozambique. The agreement would help generate income and employment for the Mozambican population, 'who have all the necessary conditions to help supply the growing global demand for bioenergy'. Mozambique President Armando Guebuza said that biofuel production will not be permitted to displace farmers from their land, but instead should be located in 'areas where they can help increase the income of Mozambicans, and that can industrialise our country' (Biopact, 2007). This agreement was supplemented by a triangular deal with the EU in July 2010 (Reuters, 2010; see section 3.1.3 above).

Despite the government's stated aims, its policy has not avoided conflicts over food production and land use; nor has it much prospect to enhance energy security or access for most people. Rural livelihoods generally have not been advanced or protected by biofuel developments in Mozambique. Large land tracts have been allocated for agrofuels, but few jobs have been created or sustained. Meanwhile optimal arable land and other public resources have been diverted from food production.

Although the government may want to alleviate energy poverty amongst Mozambique's rural and urban poor, there are no clear plans to ensure that agrofuels will do so. Future biofuels production is planned mainly for export, like Mozambique's current electricity production (which reaches less than 5% of the population, mainly in rural areas). These commercial priorities prevail. As an alternative pathway, substantial biomass could be readily used to supply local needs for electricity (Hankins, 2009).

According to Diamantino Nhampossa, general secretary of the União Nacional do Camponeses (UNAC), the National Union of Peasants, 'We are not necessarily opposed to agrofuels in Mozambique, but we do not yet see much benefit for the peasantry and rural workers played by agrofuels in the overcoming of energy poverty' (interview, Maputo, 19.03.09).

Biofuels promotion exemplifies a general effort to promote economic development, as a shift from earlier collusion with individual financial gain. Mozambique's 1997 land law that protects customary rights of the rural poor, so some foreign donors pressurized the government to change the law in order to facilitate privatization. But the country's rulers have accommodated popular opposition to such a change.

Jatropha has been promoted as a biofuel source that could be grown by small-scale farmers without competing for food resources. According to an NGO report, however, 'the dominant arguments used to promote jatropha – as a food security-safe biofuel crop, a source of additional farm income for rural farmers, and a potential driver of rural development – are misinformed at best and dangerous at worst (FoEI, 2010; see also Ribeiro and Matavel, 2009).

- Environmental protection

GHG savings from agrofuels have little empirical evidence. Such calculations depend partly on models, which evaluate an average tonne of feedstock for each crop (Econergy, 2008: Chapter 4), not specific to any context or productivity levels. For the four crops favoured by the Mozambique government, models suggest that they all offer significant reductions in GHG emissions (Econergy, 2008: 178-82). But this potential is readily undermined by the specific context.

Biofuels have been often celebrated as carbon neutral, on grounds that they add no GHGs to the atmosphere. This assumes that burning agrofuels simply returns to the atmosphere the carbon dioxide that the plants remove while growing in the field. This assumption ignores several ways that the process generates GHG emissions.

For example, Mozambique plans agrofuel production in selected rural enclaves. These are (or will be) established *de novo*, with considerable installation of infrastructure, including capital equipment for manufacturing agrofuels. In such remote locations, transport distances are great, resulting in increased usage of fossil fuel.

More generally, GHG emissions may be increased by the following steps in the process:

- land clearance, which may mean removing afforested areas, thus releasing GHGs;

- machinery importation, operation and maintenance in order to cultivate, harvest and process the feedstock;
- transport of equipment, workers, and supplies to the production site, as well as transport of the finished product to the marketplace. ;
- water supply installation at the production site, e.g. pumps or other irrigation control, thus emitting GHGs;
- agrochemical inputs (such as pesticides and organo-phosphate fertilisers), whose production uses GHGs;
- burning sugarcane fields prior to harvest, likewise increasing GHG emissions, air pollution and health risks.

In the case of jatropha cultivation, GHG emissions crucially depend on changes in land use and thus in carbon stock. Cultivation of jatropha on land with no prior vegetation gives a positive GHG balance from land use change. By contrast, cultivation on land with medium-level vegetation gives a negative GHG balance. Therefore biodiesel made from jatropha may have a worse GHG balance than diesel fuel made from hydrocarbons (Reinhardt, 2008: 63).

Moreover, Mozambique plans to produce agrofuels mainly for export, especially to Europe. So most GHG savings will be claimed at the export destination. Mozambique will gain little GHG savings in using agrofuels, yet will incur high emissions in producing them, thus resulting in a negative balance for the country. This perpetuates a wider North-South pattern of outsourcing pollution to the global South.

Biofuel companies in Mozambique try to demonstrate that their activities are environmentally benign, and therefore subscribe to sustainability criteria being applied to their operations. Formal adherence to these standards may impose extra costs that small independent producers cannot afford. Standards are set for generic purposes, usually appropriate for commercial high-input agriculture. Such standards may ignore the distinct needs and practices of peasant farmers, who would not be able to sustain the extra costs of adhering to stringent standards or of certification regimes.

One investor, Sun Oil, is majority owned by Trading Emissions plc, whose 'main investment objective is to make capital profits from purchasing emissions assets at appropriate prices'. It had counted on extra income from registering its jatropha project under the Clean Development Mechanism of the Kyoto Protocol, but such income has not materialised. It had also counted on high oil prices, which fell sharply and are unlikely to reach the same levels.

- Energy security for whom?

When considering energy security, a key issue is to identify who benefits from being energy secure, and who is relegated to energy insecurity or poverty. According to an official in the Agriculture Ministry, 'In Africa there is abundance of energy resources. However, most of these resources are currently either under exploited or exported without benefiting the vast majority of Africa's citizens' (Mataveia, 2009).

Mozambique's population is approx. 80% rural. Most rely on biomass (such as charcoal) to provide household energy supplies. Electricity seldom reaches beyond rural towns; even there it comes mainly from private diesel generators, not from a public service. Thus the rural population is still relegated to energy poverty. This severely inhibits peasant farm mechanisation, rural production (including agro-industry), and marketing of produce. Time spent collecting and transforming fuel wood (especially by women and children) is lost for other forms of gaining a livelihood or education.

Mozambique has significant energy assets. These include hydro-electric resources such as Cahora Bassa on the Zambezi. Due to the configuration of power lines established in the colonial period, however, this source is mostly exported to South Africa, which in turn exports electricity from other local sources to supply the southern parts of Mozambique.

Two-thirds of the country's electricity supply is devoted to a single plant, Mozal, an aluminium smelter near the capital, Maputo. Mozambique has no bauxite, so the smelter uses imported raw materials. It benefits from cheap bulk electricity rates and lax pollution standards that fall below those of the EU. The plant operator is exempt from paying for any externalities.

Mozambique also possesses petroleum, not yet fully commercialized, as well as and natural gas. The latter is exported by pipeline to Sasol, a large South African chemical company which uses the gas as feedstock to manufacture synthetic petroleum. So fossil fuels hardly benefit rural populations. Mozambique has a low-level industrialisation and a limited electricity grid, so the country uses little

electricity. Nor does it use much hydrocarbons – 570m litres in 2006, 66% of which was diesel (Econergy International, 2008: ES-1).

Like the country's current energy production, agrofuels are aimed largely at export to EU countries and South Africa. There are plans to use some local production for blending ethanol (as E10, i.e. 10%) and biodiesel (D5) into imported hydrocarbons, eventually doubling to E20 and D10, respectively. However, this means that 80-90% of hydrocarbons will still need to be imported. So agrofuels will play a very small role in import substitution, providing at most only 38m litres of ethanol and 40m litres of biodiesel annually.

- Rural development:

Since 1997 Mozambique has had a land law protecting peasants' customary land rights from various pressures threatening those rights. This law resulted from an extensive public investigation, consultation and deliberation process. Foreign donors have pressurized Mozambique to change its land law in order to facilitate privatization, but its rulers have accommodated popular opposition:

> But the land law debate showed the complex mix of history and attitudes within the party even with key party members. Land privatisation was opposed by peasants in meetings who feared it would lead to landlessness, and some in the Frelimo leadership knew this had happened in Brazil. So even as key families were acquiring land to sell after privatisation, a consensus grew within the party to oppose the donors and keep land owned by the state (Hanlon, 2009: 5)

This resistance indicates a popular will which readily resists land appropriation of land, still owned and regulated by the state. Agrofuels exemplify these conflicts.

Rural livelihoods generally have not been advanced or protected by agrofuel developments in Mozambique. Large land tracts have been allocated for agrofuels, but few jobs have been created or sustained. Government and industry claims that biofuel production will create thousands of jobs have not been realised. Established operations have been unable to sustain their workforce in full employment or to pay their wages. Investment has been adversely affected by the global economic crisis.

Mozambique government policy seeks to ensure that biofuel feedstock crops will be grown on 'marginal' land in order not to compete with food crops. The Mozambican state has been mapping land use in order to clarify what lands are marginal. According to the Energy Minister, speaking in August 2006, Mozambique had 36m hectares of arable land, of which only 9% was in use. There is an additional 41.2m hectares of marginal land: 3.3m hectares have irrigation potential, but only 1.6m hectares are currently being irrigated (Namburete, 2006).

Contrary to such a figure, much of the arable land is already settled and under traditional management. Before the state allocates land to agro-energy companies, the local authorities have the legal right to object. But often more powerful forces (presidency, cabinet, provincial governors) seem to override them. Judges are being trained more vigorously to understand the laws on energy, environment, land and labour conditions, according to Country Technical Adviser of the Food and Agriculture Organisation (interview, Chris Tanner, Matola, 20.07.09).

Despite all these efforts and presidential declarations, agrofuel crops face conflict with food crops. No crop can easily survive on marginal lands, nor can it be commercially profitable there. As crops such as jatropha fail in semi-arid southern Mozambique, there is the realisation that they need fertile, well-watered land for cultivation to be commercially successful.

Companies have made bids for extensive tracts of land in selected areas. This extends a pattern of land alienation by outsiders for extracting natural resources, dating back to the fifteenth century. In the nineteenth century, a substantial part of the Zambezia province was alienated to the sovereign control of private, usually British companies for e extracting cotton, timber, etc. The companies had complete control over their territory, even producing their own coinage and postage stamps. Colonial forms of coercive labour were extremely harsh.

Although the 1974 Revolution ended colonial rule, the CIA and South Africa mounted a counter-insurgency which eventually subjected Mozambique to neocolonial policies, starting with the IMF-World Bank's Structural Adjustment Policies. Since the 1990s the Mozambican economy has been further liberalized, opened up more to foreign investors, including in agriculture. Although the state formally owns and allocates the land, there is significant pressure from investors to grant exclusive use for a long-term contract. In some cases, money may be passed on to appropriate officials and politicians to secure land access.

Much good arable land is not used to cultivate food crops, in some cases due to weak incentives from uncertain markets and/or low prices. Marketing Boards once guaranteed minimum prices for some food crops, thus providing market stability and financial incentives. But such intervention has been prohibited by Structural Adjustment Policies (SAPs), thus indirectly keeping much land 'idle'. Likewise these policies have prohibited the state from providing agricultural extension services.

At the same time, Mozambique is permitted to impose tariff barriers on the sugar imports, thus protecting the domestic market. Such tariffs help provide a base for foreign companies to establish plantations which also produce sugar for export. Likewise sugar cane for agrofuels provides a means to bypass SAPs and potentially to add value through domestic processing.[9]

Some land earmarked for biofuel plantations was originally held by Portuguese settlers who abandoned the country after independence. Under Frelimo rule, all land became state land. Some former pre-independence plantations and failed state farms have been allocated to agrofuels because such areas were not traditionally used as common land. Regardless of its previous status, all land use change has to be approved by the traditional leadership of local communities. In the following case, there has been ambiguity related to land allocation for agrofuels.

- Sugar cane: Procana's demise

Land conflicts over agrofuels are illustrated by the case of the British-based biofuel company, Procana, which sought control over 30,000 hectares in order to produce sugar cane for ethanol. In 2007 Procana aimed to set up a sugar plantation near Massingir in Gaza province, with expectations of creating 7000 jobs. Claiming government permission, it began to plant the crop.

However, Procana's activities soon jeopardised farmers who had been resettled to farm on adjacent land (Welz, 2009; also Ribeiro and Matavel, 2009: 10). These families had once inhabited part of an old hunting area in Gaza province, Coutada 16, which was later declared to be the Limpopo National Park. The park's creation was part of a plan to establish Mozambique's contribution to a trans-frontier park, shared by South Africa, Zimbabwe and Mozambique. Behind the plan lay a dilemma that has arisen from the excessive elephant population in South Africa's Kruger National Park. As a possible solution to the problem, it was believed that the trans-frontier park would provide a greater range for Kruger's elephants.

But the Mozambican park had not been cleared of human inhabitants. Villages inside the park boundary underwent harassment from the elephant population, which raided their crops and sometimes even trampled their children. The park authorities, pressurised by the villagers to do something about their elephant nuisance, eventually gained German development money to relocate villagers out of the park. Apparently some of this resettlement land had also been promised to Procana.

Procana approached the traditional leadership in the area for permission to encroach on community land. Local people were asked by Procana to shift their cattle to pastures further afield, distant from water sources. A conflict was escalating. Some villagers accepted the Procana request, but others attempted to resist, feeling that they had not understood the full extent of the company's request. Procana needed riparian, well-watered land in order to ensure monocrop production under consistent conditions for its entire planting. Only later did most of the people removed from the park understand this second assault on their land and livelihoods. Procana was under extra pressure, and thus in conflict with peasants, because water supplies were unreliable due to technical difficulties in the district's Massingir Dam.

During the last half of 2008, Procana's major investor, the Central African Mining and Exploration Company (CAMEC), withdrew its funds from the company. Procana managed to limp along for some months, but ultimately was unable to attract new finance to continue its plans for ethanol. By the end of 2009 CAMEC withdrew its investment from the Massingir area (All Africa, 2009). The land grab threat then subsided.

Other companies set up agrofuel projects but also ran into financial difficulties. In order to produce bioethanol, a British company called Principle Energy had access to 20,000 ha in the Dombe area of Manica province, reportedly on superior soils. It was expected to employ 2650 workers. But it ceased paying its employees, according to a researcher from environmental NGO Justiça Ambiental (interview, Nilza Matavel, 15.07.09). The original plan had involved the company in plans for an investment of US$280 million (*Biofuels Digest,* 2007).

[9] Information for these two paragraphs was provided by Joseph Hanlon.

- Jatropha: conflict with food production

South Africa regards jatropha as an alien invasive species and thus rules it out as a feedstock. By contrast, Mozambique has encouraged its adoption for biodiesel production, on the assumption that it will not conflict with food needs. Energy companies have been establishing jatropha plantations there. One company announced its jatropha plantation in Manica province as follows:

> With the help of local and national government representatives, the company acquired the 5000 hectare site in 2006 from a US tobacco firm. So where once was cultivated a drug is now cultivated a new renewable source of energy (Sun Biofuels, 2009).

According to an NGO study in Mozambique, jatropha cultivation has depended on irrigation and chemical inputs. It also attracted pests, which then spread to nearby food crops. In some places it replaced food crops which were otherwise cultivated by subsistence farmers. Given limited resources available to them, 'These limitations force subsistence farmers to replace one crop with another, rather than add acreage, which in the case of Jatropha would generate competition between a cash crop and food crops.' In sum,

> The report concludes that the dominant arguments about Jatropha as a food-security safe biofuel crop, a source of additional farm income for rural farmers, and a potential driver of rural development were misinformed at best and dangerous at worst. While further independent research will give more detail, this investigation seriously challenges Jatropha as providing for sustainable fuel and development in Mozambique (Ribeiro and Matavel, 2009: 41, 8)

Beyond companies, popular enthusiasm for jatropha was stimulated by President Guebuza's visit to Brazil in September 2007. Guebuza was impressed by President Lula's advocacy of biofuels. On national radio Guebuza urged peasants everywhere to cultivate jatropha, implying that it could be grown on marginal land. He urged cultivation in every district of the country. The first lady even helped to distribute seeds to villagers. However, jatropha cultivation proved to be a nightmare for villagers in semi-arid areas, in the absence of sufficient rains and markets.

In one such village in the Moamba district of Maputo province, Goane 1, community leaders were former independence fighters and Frelimo party stalwarts. They heeded the president's call and accepted seed from the first lady. They cleared their land of all other crops, despite some villagers' doubts about putting too much faith in an unknown crop.

In ensuing months, the rains failed, no extension support came from appropriate district officials, no credit was made available for purchasing the necessary inputs or equipment, and no consistent programmatic follow-up support came from the president or national government. The ruling Frelimo party, with representatives based in the village, had likewise provided no support measures.

The village leadership was horrified by the utter failure of the crop, their inability to access water from nearby sources, and villagers' loss of confidence in them. Villagers have learned some hard lessons about whom to trust and not to trust. As a result of this difficult, divisive experience, they have looked for support to the União Nacional do Camponeses (UNAC), the independent peasants' union (interview, Goane 1 leadership, 01.09.09).

In other villages where jatropha did produce seeds, peasants faced other obstacles. They lacked knowledge about appropriate storage, familiarity with the pests that the crop attracted, oil-processing facilities and access to markets. So cultivation was abandoned (Ribeiro and Matavel, 2009: 26-29).

As a lesson being learned, at least by peasants, introduction of new crops like jatropha needs to safeguard provision for food alternatives. Some villages have requested government funds to restore or initiate cultivation of food crops. Government promises of easy harvests in semi-arid conditions need back-up with plans for water provision, credit, supply of seed and equipment, extension services and marketing facilities

3.5 CSO workshop

Firs of all the CSO workshop confirmed that EU policy – along with corporate-led agrofuels promotion, investment and trade – are extending their impacts in many places. For this reason the question of what development is being supported and sustained by agrofuels today becomes even more relevant. This also means that it is also more important than ever to continue interrogating biofuels policies, not just in the EU, but also in the countries where agrofuels expansion is happening and will continue to happen in the years to come. The workshop also confirmed that one of the goals of activist research ought to be to provide relevant information about and analysis of policies, issues, situations or settings that are deemed unjust and harmful. Such analysis can contribute to strategic public action

by identifying useful "pressure points" and/or possible "ways forward". The workshop identified some of the big challenges posed by the corporate agrofuels model.

The workshop confirmed that the key actors behind EU biofuels policymaking and global agrofuels promotion come from both the European government field and the corporate business field. Moreover, governments and companies in the global South are increasingly also very important in promoting agrofuels at home or abroad, and securing or satisfying its political and institutional requirements in their own countries as well. The promotional role being played governments and companies of the global South includes. For example, they provide institutional mechanisms to circumvent existing land laws or facilitate "window-dressing" type public consultation procedures. They make it very difficult for ordinary citizens to access the key information – details like what the policies are, which lands are being allocated and under what terms, etc. Such information is needed for them to engage in informed judgements and decision-making.

The workshop participants were also able to take a field trip to a nearby rural area where national government representatives had encouraged the peasant farmers to plant jatropha and promised support. But they failed to do so, instead leaving the farmers to fend for themselves. As this experience showed, jatropha is not nearly as drought resistant as it is portrayed to be. And there is a great temptation among farmers to plant it in prime agricultural areas in order to increase the chances for a successful crop and harvest.

Second, policy drivers have had a shift in emphasis. Concern about climate change and its link to rising GHG emissions was an early argument for turning to agrofuels, and this remains a central criterion for identifying 'sustainable' biofuels in recent EU legislation. But "energy security" was also a central argument and has become more salient in official EU policy documents. "Energy security" is meant to support a huge and growing, fossil-fuel dependent transport sector. At the same time, the rural development argument too has "travelled" from Europe to the global South. It has been further elaborated via the clever concept that vast quantities of land are "available", "empty" or "idle" or "marginal". This image exploits both the political weakness of those who occupy such places and the unwitting ignorance of those who do not.

Third, the various assumptions underlying agrofuels promotion today, while they may vary to some extent from country to country, taken together they nonetheless reflect the fact that the contemporary agrofuels push is serving a broader development model. At the same time, they remind us of what has been (and is being) promised in terms of a whole range of benefits, supposedly to be gained through benefits-enhancing, harm-reducing agrofuels "management" mechanisms. Systematically drawing these assumptions out and broadcasting them widely is important, as a basis to monitor whether and how these "promises" are fulfilled in reality, with a view towards someday holding the promise-makers accountable when things go wrong. More generally, counter-hegemonic discourses, i.e. questioning the fundamental notion of development for which corporate-led agrofuels are made to serve, will have to address the key assumptions of their promoters.

Finally, and more generally, the workshop showed that the radical critique of the corporate-led agrofuels and its underlying industrial agro-export model remains critical and urgent. But exploring community-based alternative possibilities for poor people (usually biodiesel) is also an imperative. In effect, the struggle today in relation to agrofuels actually has two fronts. In sum, two overall observations can be made about what the workshop accomplished.

For more detailed information about the workshop, see Franco (2009) and
http://globalagrofuels.wordpress.com/

Overall the study has generated new knowledge in bringing together different perspectives (local, national, regional) into an overall integrated, international picture of global agrofuels, while testing the assumptions underpinning EU biofuels policy. Part of the new knowledge in this respect also involved introducing some useful analytical tools in the framework paper. The CSO workshop in particular played a key role in facilitating a very special, single episode of mutual learning in the context of drawing out this larger international picture of global agrofuels. Bringing together diverse participants helped to make this event so special, as a pivotal moment in the study as a mutual learning activity.

3.6 Conclusion

In the three case studies, each in its own way, governments attempt to expand, supply and/or diversify global markets, as a key reference point for domestic economic development. Agrofuels promotion has drivers that converge and interact across our three case studies.

As the European vanguard of agrofuels promotion, Germany has a close overlap with EU policy aims and becomes a test case for their feasibility. Brazil has its own policy drivers: starting from import substitution, those aims were extended to global export, along with efforts towards trade agreements to facilitate exports, especially to the European market. Brazil also seeks investment sites in Africa, partly as a base for avoiding export tariffs in the USA and EU. Mozambique remains dependent on other countries for development aid and industrial investment; it has undergone some influence from Brazil and the EU, especially Germany via cooperation agreements.

Their practices facilitate a convergence of North-South elite alliances promoting biofuels for 'rural development', i.e. incorporating land and labour into agro-industrial systems which supply global markets. In each case, agrofuel development involves setting standards for biofuels mixtures, mandating GHG savings, classifying land as benignly available (e.g. degraded, marginal, etc.). Various policy arguments operate as narratives, imagining beneficent biofuels in the common societal good, thus justifying measures that promote market expansion.

In Germany, agro-intensification methods conflict with environmental protection measures and domestic land availability, thus limiting biofuel production; engine designs are not fully adapted to use agrofuels, thus limiting biofuel mixtures. An ethanol export strategy encounters high tariffs in the global North, thus generating other global strategies to bypass the obstacle. In Mozambique, peasants have criticised the loss of good-quality land for biofuels. And a major bioethanol venture has collapsed in a global context of lower fuel prices.

Pro-biofuel policy assumptions have some similarities between the EU and the three countries under study. Many experiences contradict optimistic assumptions – about environmental protection, energy security and rural development – as earlier sketched in Table 2.

Environmental Protection

GHG savings remain an official rationale of EU policy, as well as a basic criterion for evaluating whether a biofuel source qualifies for the targets. Claims about environmental benefits are espoused by governments in our three case studies, but these optimistic assumptions are contradicted by national biofuel practices. More GHGs could be saved from converting biomass into heat and power rather than into liquid fuel, so GHG savings are not plausibly the main rationale for the latter priority. Biofuels seems not to be the most efficient use of biomass in terms of diversifying energy matrixes.

Germany's agrofuel usage reduces GHG emissions, but some potential savings have been lost by more intensive agricultural practices, e.g. agrichemicals being sprayed and permanent grassland being cleared for cultivation. As Germany attempts to increase its agrofuel use, the country will become more dependent upon imports and thus will stimulate indirect changes in land use – generating GHG emissions elsewhere but not officially counted.

In Brazil bioethanol from sugarcane has great potential for GHG savings, relative to other agrofuel crops. But savings are undermined by sugarcane plantations destroying carbon sinks in the Cerrado savannah and Amazon rainforest, as well as by wider environmental harm. GHG emissions also result from soya plantations displacing cattle ranches which in turn clear more rainforest frontiers; yet these emissions are not counted by Brazil, much less by countries importing soya for agrofuels. Moreover, Brazilian environmental law has been softened to facilitate sugarcane plantations, thus contradicting assumptions about self-governance protecting environments.

Likewise in Mozambique, GHG savings from bioethanol are somewhat undermined by agro-industrial practices, e.g. land clearances and the extra infrastructure needed for *de novo* installations distant from metropolitan centres. For jatropha, cultivation on land with prior medium-level vegetation gives a negative GHG balance. Mozambique plans to produce agrofuels mainly for export, so most GHG savings will be claimed at the export destination.

Energy Security

Energy security has been a key aim and assumption in EU policy; likewise in our three case studies. In the EU agrofuels serve a huge, growing transport sector which will remain dependent mainly on fossil fuels. As our case studies show, agrofuels feed industrial expansion by supplementing fossil fuels, thus effectively limiting the benefits for energy security as well as for GHG savings. In Germany, agrofuels contributed to 7.3% of total transport fuel by 2007. Yet more than 10% of arable land there was already used for cultivating crops for energy, and fully 70% of total rapeseed production there was used for biodiesel production. That amount was not sufficient to satisfy the increased demand. A great proportion was already imported, especially from Eastern Europe; any increase in agrofuel usage would require even more imports of oilseeds. So agrofuels will contribute little to energy self-

sufficiency, though they can diversify the supply beyond fossil fuels. As another constraint on replacing fossil fuels, the government adopted lower biofuel quotas in fuel mixtures than originally planned for 2009, under pressure from the German automobile association, on grounds that many motor vehicles were technically unable to use higher fuel blends. Brazil's bioethanol programme originated in a 1980s policy to substitute for fossil fuels and thus enhance energy security. Although domestic production has been considerable, energy usage in domestic industry and transport has likewise expanded, being fed increasingly by agrofuels. And the aims have expanded to maximise export income, thus driving environmental and social harm. Mozambique aims its agrofuel production mainly for export to gain income, like the main role of its electricity production. It also plans low fuel mixtures within the domestic market, but 80-90% of hydrocarbons will still need to be imported. So agrofuels can play only a small role in import substitution and thus energy security.

Rural development

Rural development, as a promised benefit of agrofuels, involves optimistic assumptions about land use and employment. EU policy presumes that biofuel development can be directed away from the best agricultural land, thus avoiding conflict with local food production, and thereby reconciling rural development with energy export to the EU. The concept of 'degraded/marginal' land exploits the political weakness of those who may occupy and use such land. Germany's GTZ promotes biofuels in the global South as an opportunity for rural development, giving special emphasis to inclusion of small-scale producers. But in practice, the latter's role has remained marginal in Tanzania and Brazil, for example; agro-business interests have prevailed instead.

Meanwhile, the Brazilian government regards millions of hectares as 'marginal' or 'degraded', providing a basis for sugarcane plantations to expand there without being perceived as harming the environment or food production. In practice, however, agrofuel producers seek and gain access to quality land, water sources and infrastructure. Such plantation developments devastate natural resources and local agriculture, as well as forest reserves in some places. These also destroy employment and degrade labour conditions, even through de facto slave labour; mechanization reduces employment without improving its conditions.

Finally Mozambique too makes claims about much land being available for biofuels cultivation and even carries out surveys of 'marginal' land. Yet land conflicts have already arisen with local residents over plans for biofuel plantations. Large land tracts have been allocated for agrofuels, especially sugar cane, but operations have been unable to sustain their workforce in full employment or to pay their wages. Jatropha supposedly avoids competition with food production, but some developments have displaced local food crops and attracted pests.

Frictions and contradictions

EU policy creates a agrofuels market and thus commercial incentives for agro-industrial biofuels development, both in the EU and in the global South. EU biofuels policy has been driven by a partnership between government and an agro-energy business extending industrial model from commodity crops to energy. Similar alliances in the global South are increasingly important in promoting agro-industrial biofuel development at home or abroad.

An emerging global agrofuel market is illustrated by interactions and inter-dependencies among Germany, Brazil and Mozambique. In these cases, the agrofuel project encounters various frictions, inadvertent or intentional resistances to be overcome. EU pro-biofuels policy rests upon arguments about societal benefits of three main kinds – environmental protection, especially GHG savings; energy security through import substitution; and rural development, especially in the global South. Each argument in turn involves several assumptions, e.g. about what these putative benefits mean and how they can be fulfilled. With some variations, similar arguments arise for biofuel promotion in our three case studies.

These have provided evidence for testing and questioning the assumptions. In major respects, they are contradicted by practices, experiences and effects, often with societal conflicts impeding the official policy aims. More than simply inconsistencies, here contradictions mean societal frictions and practical dilemmas, for example:

- Treating land as 'marginal' can justify its agro-industrial appropriation for biofuels but may provoke protest from local people being dispossessed.
- Agro-industrial plantations create 'employment' but degrade its conditions and readily undermine other livelihoods in the informal economy.

- Promoting such industrial development creates conflicts with environmental protection law, which undergoes pressure to be softened.

For that reason, such contradictions may intensify with the future rise of agrofuels and so warrant systematic attention through critical research. Drawing on such research, advocacy groups may more readily overcome their different approaches, hold policies accountable for the resultant harm, find intervention points for changing policy frameworks, and propose alternative development pathways.

4. Relevance to Overall Project

We can reflect on the relevance of our project in the larger scheme of things, addressing the overall project aims (From Part B of the Technical Annex).

4.1 Capabilities and cooperative research

There were several poles around which participation revolved: the first pole was the framework paper; the second, third and fourth poles were the country case studies (Germany, Brazil, and Mozambique, respectively); a fifth pole was generated by the project's CSO workshop; and, finally, although not formally part of the study by design, a sixth pole emerged around an unexpected opportunity to take part in an academic workshop on biofuels. In the case studies on Mozambique and Brazil, the researchers have worked closely with or even within CSOs there. The TNI team has also been exchanging perspectives with academic researchers – initially from Wageningen University (at a special meeting in September 2008), and later from researchers worldwide at a conference (St Mary's University, Halifax, Oct 2009).

The strengthening of capacity to participate in research on this particular topic, as well as the implementation of cooperative research methods, have been cross-cutting relations at different levels in this project:

Research team: Cooperative research processes have been central in various ways through the polycentric way in which the study is organised. We have evolved a 6-person research team dispersed across different global regions, with different roles and responsibilities vis-à-vis the study. We also bring different types of scholar-activist backgrounds, expertise and current political engagements. Several members have a common history in land-use issues through the Foodfirst Information & Action Network (FIAN), including co-authorship of its publications.

For example, our researcher in Brazil is deeply embedded within that section of the broad CSO field that opposes corporate agro-industrial biofuel monocultures. Her history within this broad CSO movement has two solid "legs" – her work in exposing the deplorable working and living conditions of sugar workers (along with the negative environmental impacts of agrofuel expansion in the Cerrado region) on the one hand, and her work on land issues and in promoting real agrarian reform. This has had two substantive implications: (i) her methods of research work within this network has allowed for a more direct consideration of the particular experiences and perceptions of Brazilian sugarcane workers, as they have been transmitted to her via field interviews and participant observation in the field, and as were presented directly by a sugar workers' representative (at the Maputo workshop); (ii) her reputation and quality of political work on the issue has enabled the study to reach out to other key actors within the Brazilian CSO field – landless workers' movement, church-based rural organisers, progressive social academics – and to engage with them (also via the Maputo workshop). Her particular approach has shown a meaningful way out for sugar workers through land reform. For the agrofuels issue, this re-framing transcends a political-ideological gap between organised workers and organised peasants in Brazil.

By contrast, our South African researcher for the Mozambique study was not so deeply embedded in the networks there beforehand. He initially benefited from the pre-existing relationship between another WP1 team member (based at TNI) and the Mozambican national peasants union, the Uniao Nacional de Camponeses (UNAC). Later, once in-country, his work methods served to deepen the relationship between the study and the peasant union. As a particularly notable transaction, he gained crucial documents about the government's biofuels policy and then gave them to the peasant union, which previously been denied access on their own. According to the organisation's staff members, getting their hands on these documents was very important to them, and they credit the WP1 local researcher. The fieldwork in this case is still underway.

The research for the Germany study was mainly based on documentary sources, not needing close relationships with CSOs there. The researcher already had familiarity with land-use issues through involvement in the FIAN network.

Its been a very positive process so far. Cooperation within the core team has been excellent, and the cooperative research relationship between team members and other participants has reportedly been very positive as well, characterised by respect, generosity and mutual learning. As a kind of general reflection, the experience can be summed up so far as – a really incredible amount of reflection and work is required to work collectively, interactively and cooperatively, but the rewards and benefits of working this way are well worth it; shifting the work focus from solely output oriented, to more process oriented reaps mutual learning benefits all along the way, pushing the total learning far beyond the sum of the parts.

Maputo CSOs workshop: We can hypothesize that the good quality of the cooperative research relationship between the team's researcher and key local actors in the CSO field was a factor in persuading key CSO actors to join the Maputo workshop. And if these groups had not been willing to join the workshop, the latter would not have been so successful.

The workshop was an important moment in the cooperative research process, helping to generate new knowledge and mutual learning. In broad strokes, the workshop facilitated direct mutual learning especially

between groups within Brazil and between groups within Mozambique,

between groups from the different African countries present, as well as

between all the participants from roughly 15 or so different countries globally.

Likewise, the workshop arguably facilitated a broadening of the analysis beyond simply agrofuels, to the much wider and complex context of an energy-food-land matrix. Moreover, some collective movement toward a shared vision of the future regarding "energy-food-land sovereignty". As another result, an ad hoc sub-group drafted a collective statement describing "key characteristics of an alternative energy model"; their draft was discussed in a plenary session.

The workshop brought the WP1 project to a new level by going beyond the specific aims of the study and by bringing the project to a place of wider social-political relevance. A specific objective was to present the study "findings" so far. In our context that meant a focus on EU biofuels policy, its underlying assumptions and understandings of the environment and sustainability – as a frame for discussing findings to date from the three country case studies. Workshop participants of course had a deeper interest and concern in many issues beyond TNI's focus on EU policy; and much of the discussion reflected this. The success of the workshop resulted from the relevance of its larger theme, "Global Agrofuels: Sustaining What Development", combined with a whole complex web of previously cultivated social-political relationships and contingent encounters. Whether (or how) this new level of relevance will have a positive impact on policymaking – especially European policymaking – is a still a big question and remains to be seen.

Knowledge generation: Stepping back, we can also add two more points about the workshop's success, as part of a complex process in mutual learning and knowledge generation.

First: In the final evaluation, each participant was given space to give reflections about the workshop. Everyone mentioned that they had found it be a very educational series of discussions over the 4.5 days. We can take this seriously because after just the first two days, we received much informal feedback about participants feeling frustrated about the lack of enough time/space in the schedule to discuss more deeply the many issues arising. This shows that participants were not hesitant to share their criticisms, though unwilling at that point to do so more formally. In response, we quickly pulled together a small group (including a few selected participants) to revise the remainder of the workshop programme. Once we revised the programme to allow for more space for everyone to share experiences, ideas and reflections, the discussion indeed become much richer and the change in format was clearly appreciated.

Second, since the workshop took place, we have heard of a few instances where participants have used some aspect of the workshop in their activities back home. For example, a participant from the South African organisation "Women on Farms" did a "re-echo" of the workshop with her organisation, while our Brazilian researcher used her presentation in another workshop in Paraguay.

Third, we learned only afterward (through informal discussion) that our Mozambican co-hosts for the workshop – the national peasant union UNAC – had not been entirely in agreement on hosting the

activity beforehand. In particular, the peasant leaders had been sceptical and reluctant, while the staff had been more willing and open. It was only later (we were was told) -- during the workshop itself -- that the peasant leaders began to change their mind and find value in participating in it. This revaluation was linked partly to new knowledge gained, and also partly to new contacts gained and other relationship benefits through networking.

OU roles: Finally, with regard to cooperation within the CREPE consortium, over the past seven months (April to October 2009), one of the CREPE co-coordinators (Les Levidow) has continued to be directly involved in the WP1 study. During the second phase, his involvement continued with the planning for the Maputo workshop and then through to the workshop itself, and has gone even further since the Maputo workshop, mainly in relation to another workshop (St Mary's University, Halifax, October 2009).

Les' contributions to the team's cyber-discussions during both the workshop planning (conceptualisation and framing, workshop programme building) and the workshop itself were substantive, relevant and useful. They helped to strengthen our study of the agrofuels issue (or at least helping us to think through) on several key dimensions – the larger EU policymaking context, the role and nature of corporate led technological "innovation", contending views of the environment and sustainability – as well as continuing to help us sharpen our analysis of (and how we analyse) EU biofuels policy assumptions.

He is also contributing to the study itself by conducting interviews with key informants within the most relevant EU policymaking sections in Brussels. Meanwhile he has been soliciting our input in formulating interview questions and sharing the interview results via electronic recordings.

Summing up, one can see several broadly distinct types of participants who became involved in the study in different ways and at particular points in time. These broadly distinct types of participants were: CSO-based activist researchers; Academe-based scholar-activists; Academe-based scholars; CSO-based activists; NGO-based development workers. Another way to describe who became involved in the study is in terms of their geographic location: participants were based in an array of global regions and 14 countries – North America (Canada), South America (Brazil), Western Europe (UK, Netherlands, Germany, Belgium), Western Africa (Ghana), Eastern Africa (Kenya, Uganda) and Southern Africa (Mozambique, South Africa, Malawi, Zambia). Yet another way to describe who became involved is in terms of overall issue orientation: the study drew involvement from people working from a variety of broadly distinct scholarly and activist perspectives – on the activist side (i) agrarian justice; (ii) environmental justice; (iii) human rights; (iv) international development work; and on the scholarly side (i) international development studies; (ii) political economy; (iii) sociology or anthropology; (iv) political ecology; (v) environmental science. All those who have become involved can be said to be highly critical of and concerned about corporate-led and corporate-driven agrofuels particularly in terms of their environmental and social impacts, especially in the global South. Many of those can be said to be additionally concerned with and interested in exploring alternative energy options (in context of development), particularly for rural poor communities in the global South whose lands, livelihoods, and land and labour rights are undermined by or under threat from corporate-led agrofuels expansion, and whose access to national energy grids is extremely limited or nonexistent, and who are most affected by basic food price increases. Please see the CSO workshop draft proceedings for more on participants' aims, interests, concerns, and expertise on the issue of agrofuels.

4.2 Agro-environmental sustainability issues

In the global controversy over biofuels, there are conflicting accounts of sustainability, each with different concepts of nature in the agricultural context. For example, biofuels promoters see society-nature relations as reduced to market-relations. 'Renewable raw materials' become biomass to be mined, decomposed and recomposed in new combinations, e.g. through the integrated diversified biorefinery. By contrast, civil society opponents see nature as a commons to be protected and shared. In industry and government, biofuels promoters seek to sustain economic growth and competitiveness.

These feature normative assumptions about societal benefits and harms. For biofuels sustainability issues, different accounts come from industry lobbyists, from the EU, and from oppositional CSOs. In the dominant account, current sustainability problems are explained along two lines:

- inefficient use of resources – a problem to be addressed through technological innovation; and

- inadequate management – a problem to be addressed through "better" management mechanisms or "(self-governance", e.g., voluntary compliance with criteria or standards, consultation mechanisms, etc

Both aspects are being studied by the research team.

In market terms, there is a potential trade-off or conflict between ensuring energy security and guaranteeing food security. Claims for vast 'idle/marginal' land throughout the developing world, just waiting for 'development', serves to make that trade-off seem less relevant or difficult at the global level. Assumptions about land availability help to legitimise a push for energy security through agrofuels.

One set of issues and perspectives that workshop participants brought to the research had to do with alternatives, and particularly the issue of what an alternative energy model might look like. This came out strongly in the CSO workshop, and was nested in a larger critique of global agrofuels dominated by corporate interests. Here, the decision to hold the workshop in Mozambique was especially crucial and strategic. While all of the participants in the workshop brought this kind of critical perspective into the discussions, it was the situation in Mozambique confronting Mozambican peasants that really brought the need to explore alternatives to the forefront. This was because of the widespread poverty combined with the utter lack of access to electricity that most peasant communities suffer in that at country, which ironically, also exports energy on a large scale. This was an extra perspective on the global agrofuels issue that the study as originally framed did not take up. While there was little space for going deeply into the question of alternatives, it raised the question of under what conditions agrofuels might be a useful and beneficial and sustainable thing, and in the workshop we took steps to try to outline some of those conditions in a very preliminary way. As a result, there was a convergence on a larger framework on agrofuels as a two-front battle: first, participants confirmed the need to continue exposing and opposing the dangers and problems with corporate led agrofuels; second, we opened up the discussion toward exploration of agrofuels in the context of an alternative energy model grounded in local needs (versus external corporate defined needs and global export markets).

4.3 Priority Setting

Regarding the aim on priority-setting, namely "to relate research more closely to societal needs, as a means to inform policy debate and research priorities for Europe as a 'Knowledge-Based Society'", the European agrofuels policymaking process gives priority to global market-oriented economic knowledge and high-tech corporate knowledge. Amidst a controversy over harmful effects of biofuel production, solutions will supposedly come from novel future biofuels, which have various generic names – advanced, 2nd generation or next-generation. These have become a high priority for government R&D funds, with expectations for eco-efficiency which will enhance economic competitiveness as well as reduce, avoid or manage any harm.

While not ignored, local alternative knowledge about social harms and wider societal needs are marginalised. Alternative knowledge streams tend to be considered most clearly and systematically at the level of "window-dressing". Meanwhile the corporate-led agrofuels model is promoted so that it will gain public acceptance.

Our study compares EU policy assumptions with experiences in the case study countries and the CSO workshop, as a basis to challenge the assumptions and suggest alternative priorities. However, actually setting priorities is a distinct political process that requires strategic public action, which in turn, is complicated by the global nature of the agrofuels promotion to date. The knowledge that is needed to challenge European agrofuels policy is not necessarily the same knowledge that is needed to challenge national agrofuels policies (or policymaking processes) in the global South.

4.4 Solutions

Agrofuels policy involves various accounts of the problem to be addressed – e.g. gaining energy security (esp. for road transport), increasing the efficiency of renewable energy, reducing GHG emissions, promoting economic competitiveness, and rural development, etc. There are tensions among these aims and thus conflicts over whether or how biofuels can provide a solution. An emphasis on reducing GHG emissions would favour different solutions, e.g. by using biomass more directly for energy rather than for liquid fuel, and developing alternatives to agro-industrial land use.

One of the problems that has been identified over and over again especially by the Mozambicans was the lack of information and transparency of their governments in promoting biofuels, which is needed in order for local communities and individual peasant families to be able to make informed decisions

about how to respond to encouragement to plant jatropha for instance. In this sense, testing accountability mechanisms and holding governments and companies accountable on the basis of international human rights and other kinds of social and environmental standards commitments and guidelines, could be very useful and relevant in the context of the review of EU biofuel policy every two years starting in 2012.

An, often implicit, assumption underlying the entire mainstream discussion on agrofuels is that it is neither possible nor desirable to fundamentally re-evaluate our present ways of life and to consider ways to reduce humanity's dependence on transportation as we currently know it. One reason may be that such a rethinking would require major changes, not only in current conventional patterns of consumption, but also in prevailing production and distribution of goods and services as well, both within the North and within the South, as well as across the North-South divide. For many, the changes required to address the problem appear to remain literally unthinkable. For others, however, very profound changes increasingly appear to be necessary (or unavoidable) if humanity is to survive.

As already mentioned part of the issues that workshop participants brought to the research had to do with how an alternative energy model might look like, and it seems that the starting point should be questioning assumptions about patters of energy consumption and addressing inequitable distribution of energy within and among countries. In practical terms this would imply the need to switch from fossil fuels based energy to renewable energy sources in balance with nature and social justice, while developing and enhancing means of local energy production for local consumption based on local resources. The aggressive expansion of agrofuels, which is mainly driven by large companies and often based on very little information or proof that the technologies actually work, while 2nd generation agrofuels as a false solution to the problems of the first and in fact a means of a renewed centralized and privatized form of energy production and distribution. Therefore alternatives must build on local existing capacities, knowledge, assets, land, water, seeds and real democratization of decision making processes.

Appendix 1: EBFTP Steering Committee

Member	Position	Organisation	Sector
Veronique Hervouet	Chair	Total SA	oil
Markku Karlsson	Vice-Chair	UPM-Kymmene	forest products
Anders Roj	Vice-Chair	Volvo Technology	auto
Rene van Ree	Vice-Chair	Wageningen University	academia
Ricardo Arjona Antolin	Member	Abengoa Bioenergy	biofuels
Olivier Appert	Member	IFP	biotech
Phil Bowen	Member	Cardiff University	academia
Dirk Carrez	Member	Europabio	biotech
Sandrine Dixson-Declève	Member	University of Cambridge	academia
Christian Dumas	Member	Airbus	aerospace
Henrik Erametsä	Member	Neste Oil	oil
Raffaello Garofalo	Member	European Biodiesel Board	biofuels
Frederic Hauge	Member	Bellona	environmental
Martha Heitzman	Member	Air Liquide	biotech
Dietrich Klein	Member	COPA-COGECA	farmers
Andrzej Kulczycki	Member	Institute for Fuels & Renewable Energy	biofuels
Charles Nielsen	Member	DONG Energy	oil
Eduardo Romero Palazón	Member	Centro de Tecnolgía Repsol	oil
Ulrich Schurr	Member	Julich Research Center	biotech
Steen Skjold-Jorgensen	Member	Novozymes North America Inc.	biotech
Wolfgang Steiger	Member	Volkswagen AG Wolfsburg	auto
Frank Seyfried	Member	Volkswagen	auto
Gianpetro Venturi	Member	Universita di Bologna	academia

Source: EBFTP (2010)

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