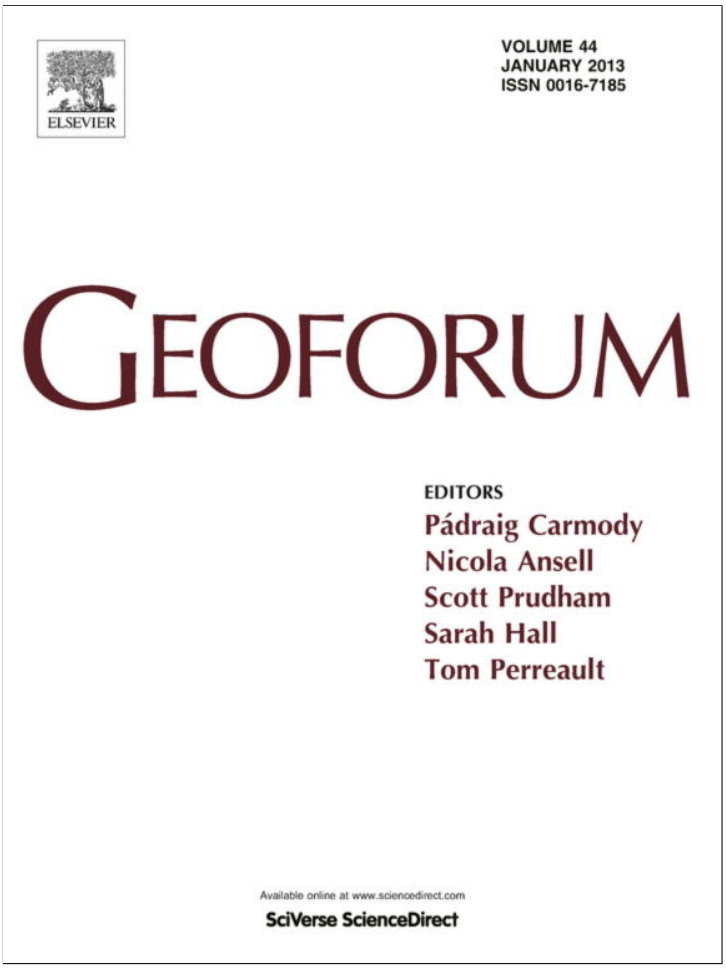

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EU criteria for sustainable biofuels: Accounting for carbon, depoliticising plunder

Les Levidow

DPP, Open University, Milton Keynes MK7 6AA, UK

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ABSTRACT

The EU aspires to global leadership in developing 'sustainable biofuels' which can substitute for fossil fuels and thus reduce GHG emissions, while also enhancing energy security and rural development. Yet EU biofuel targets provide extra incentives for dispossessing rural communities in the global South, especially through land grabs and agro-industrial production methods. Since 2007 North–South NGO networks have denounced 'agrofuels' for such harm, thus provoking a high-profile controversy. Despite those criticisms, the 2009 Renewable Energy Directive (RED) set a mandatory target for European transport fuel to contain 10% renewable energy – in practical terms, meaning mainly biofuels by the 2020 deadline. In managing the consequent tensions, the EU system has elaborated a prior vision of a feasible, desirable future through sustainable biofuels. This combines several elements: mandatory targets incentivising investment in biofuels, R&D funds stimulating future novel biofuels, techniques commoditising natural resources in the name of protecting them, sustainability criteria homogenising the environment, and rural development models dependent on agro-industrial methods; those elements have become linked through circular reasoning. The EU's political accountability is reduced to carbon accounting; in turn it is channelled into expert debates over modelling methods and uncertainties. Arguments about indirect land-use change (ILUC) became an implicit proxy for wider conflicts over the EU's 10% target. Through the ILUC debate, biofuel critics have been drawn into expert procedures which obscure people's experiences of harm in the global South. By these methods, the EU system can pursue global leadership for 'sustainable biofuels', while depoliticising its global plunder of resources.

1. Introduction

The European Union promotes biofuels through mandatory targets. Under the 2009 EC Renewable Energy Directive (RED), 10% of all transport fuel must come from renewable sources by 2020. In practical terms the main source will be biofuels, which lack sufficient domestic sources to fulfil the target. So the EU has been outsourcing its biofuel production, especially to the global South.

The putative benefits of biofuel expansion became controversial. The EU target was officially aimed at reducing greenhouse gas (GHG) emissions from transport fuel. As additional benefits, biofuels were meant to enhance EU energy security and rural development wherever biofuels are produced. Even prior to the Directive, such claims were questioned; the EU target was widely blamed for stimulating land grabs, raising food prices and degrading natural resources. As a main defence, biofuel proponents have envisaged that any significant harm can be avoided through EU sustainability criteria and eventually through future novel biofuels, sometimes known as second-generation or advanced biofuels.

This paper will discuss the following questions:

- What forces and aims have shaped the EU biofuel target?
- How did the target provoke controversy over supposed benefits for GHG savings and rural development?
- How have sustainability criteria selectively accounted for potential harm?
- How has EU biofuel policy reconciled its conflicting aims?
- How has the EU maintained its 10% target despite strong, widespread criticism?

To explore the above questions, the paper links several analytical concepts, as outlined in the next section.

1.1. Research methods

The research focus was EU biofuel policy – its assumptions and tensions – as promoted or criticised by various stakeholders. To identify those aspects, initial analysis drew on documents from several bodies: European Commission, industry lobbies (e.g. Biofrac, EBTP), scientist networks (e.g. BioMat Net), expert agencies (e.g. JRC, IFPRI), development NGOs (e.g. Econexus, Oxfam, ABN, FIAN, Nyari/RAINS) and environmental NGOs (BirdLife, T&E, FoEE, IEEP).

E-mail address: L.Levidow@open.ac.uk

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Document analysis provided a basis for interview questions about the wider rationale for promoting or opposing specific policy measures – e.g. the EU's 10% target and specific criteria for carbon accounting. Interviews were carried out with nine individuals who have an organisational responsibility for biofuel sustainability issues; seven were in five different units of the European Commission (for Energy, Research, Climate Action, EuropeAid within DG Development, and JRC) and two from environmental NGOs (FoEE, T&E). Interviews informed the selection and interpretation of documentary material cited here. An earlier draft paper was circulated to several NGO staff members; some provided comments via email or discussions.

2. Analytical perspectives: accounting for carbon, imagining societal futures

To explore the above questions, the paper links several analytical concepts: dispossessing rural communities; accounting for natural resources as a means to commoditise and legitimise their usage; and imaginaries of societal progress through technoscientific innovation. Hence the literature survey that follows.

2.1. Dispossessing rural communities

When rural communities lose access to their means of subsistence through land grabs, e.g. enforced by contractual arrangements and/or by violence, this extends a long-term commoditisation of natural resources. The entire history of capital accumulation has depended on a dispossession process, subordinating labour and natural resources to capital. In his concept of primitive accumulation, Marx referred to 'the historical process of divorcing the producer from the means of production'. Entire populations were 'forcibly torn from their means of subsistence', thus expropriating agricultural producers from the soil (Marx, 1976: 875–876).

That concept has been extended to 'accumulation by dispossession' – an ongoing process privatising commons or common resources by various means (Himley, 2008: 443). This trans-historical concept draws present-day analogies with early capitalism: 'All the features which Marx mentions have remained powerfully present within capitalism's historical geography up until now' (Harvey, 2003: 145).

Extending the historical dispossession process, agro-industrial systems have appropriated good fertile land, e.g. through monocropping and chemical-intensive methods. In addition to degrading vast land tracts, such systems have pushed small-scale farmers into more marginal land, forest and/or cities. Partly through new technology, corporate power has become more concentrated and production has shifted towards global markets. This agenda promotes 'secure land tenure', i.e. property rights which undermine collective, informal access to land and water (Borras and Franco, 2010, 2012). In such ways, multinational corporations have appropriated 'a multitude of new spaces that could not previously be colonised either because the technology or the legal rights were not available' (Paul and Steinbrecher, 2003: 228–229).

Such appropriations have been called 'land grabs' – an ambiguous concept as regards what aspects are historically new or illegitimate. Some 'land grabs' are illegal but are later legalised through formal changes in land tenure. According to an NGO coalition, land grabs are acquisitions or concessions which violate specific normative criteria – e.g. respect for human rights; free, prior and informed consent of affected land-users; consideration of social, economic and environmental impacts; and transparent contracts (ILC, 2011). In their view, such violations have recently gained a faster pace and extent, dispossessing especially those communities who have no clear tenure over land (Anseeuw et al., 2012).

Although capital accumulation has been dispossessing rural communities for three centuries, recent land grabs have a novel combination of drivers, namely: greater control over land and other associated resources such as water in order to derive economic benefit; large-scale land acquisitions and/or capital investment; and capital accumulation strategies responding to a convergence of multiple crises – food, energy, climate and financial (Borras et al., 2012: 850–851). Unlike traditional rain-fed agriculture adapting to seasonal rainfall, the recent shift to high-value crops via irrigation systems has stimulated water grabs; this shift enhances some livelihoods while undermining others (Woodhouse, 2012: 783–784). Land grabs have targeted fertile land with high-productivity potential (De Schutter, 2011). Land grabs often depend on violence, either threatened or actual:

> Enclosure, territorialization, and legalization processes, as well as force and violence (or the threat of them), all serve to control land... [violence] frequently shapes access to and exclusion from land (Peluso and Lund, 2011: 668, 675).

More generally, capital accumulation has depended upon 'the endless commodification of human and extra-human nature' (Moore, 2010: 391). Industrialisation is popularly associated with technological innovation, as if this were the crucial driver.

> And yet every epoch-making innovation has also marked an audacious revolution in the organization of global space, and not merely in the technics of production.... This dialectic of productivity and plunder works so long as there are spaces that new technical regimes can plunder – cheap energy, fertile soil, rich mineral veins (Moore, 2010: 405).

Thus the profitability of technological innovation depends on reorganising global space for plunder, thus accessing cheap natural resources and labour.

2.2. Accounting for carbon, making resources legible

Commoditisation of resources has been naturalised as obvious, even linked with environmental protection. Theorised as 'neoliberalising the environment', this process can pre-empt or marginalise dissent. Environmentalism has been recast and incorporated into market models of societal progress. Such incorporation 'has done far more to smooth the "roll-out" of neoliberalisations than attempts to dismiss or reject environmental concerns outright' (McCarthy and Prudham, 2004: 279).

Neoliberalisation takes many forms – privatisation, marketisation, deregulation, reregulation, etc. As an environmental problem, for example, GHG emissions are turned into a carbon-pricing system for a global market in carbon credits, so that major polluters can pay for the right to pollute the climate or even gain subsidy to do so. By supposedly protecting the environment, this process can incorporate critics: 'it involves the privatisation and marketisation of ever more aspects of biophysical reality, with the state and civil society groups facilitating this and/or regulating only its worst consequences' (Castree, 2008: 142–143).

Ecological fixes are devised in the name of remaking nature in order to conserve and/or expand natural resources. There arises an apparent paradox: 'nature's neoliberalisation is about conservation and its two antitheses of destroying existing and creating new biophysical resources' (Castree, 2008: 150). Indeed, similar biophysical resources can be both conserved and destroyed by processes of accounting for them.

Moreover, accounting measures have long defined and even shaped resources. In the 19th century Germany developed a

'scientific forestry' programme for greater productivity and conservation, linked by calculation methods. This programme exemplifies a modernist state seeking to make its society and territory administratively legible. New methods arranged populations and acreage into single countable items in order to map the wealth of the subjects, their land and their yields according to a precise, consistent metric (Scott, 1998: 2). More generally, nature is made into a 'resource' through political constructs, which may be unstable and heterogeneous, e.g. because of competing interests. Resources become such 'only through the triumph of one imaginary over others' (Bridge, 2009: 1221).

Accounting methods have framed natural resources as qualitatively homogeneous, quantitatively comparable and thus administratively calculable: 'The second half of the 20th century saw the rise of physical measures to account for the human uses of nature in terms of resource extraction and waste production' (Höhler and Ziegler, 2010: 418). Accounting metrics define diverse resources as equivalent, while also dislocating them from any specific context (Bridge, 2001; Fairhead et al., 2012: 245). Such simplifications have been extended from resource assets to environmental burdens. These can be reduced to single numbers via accounting methods, e.g. an ecological footprint.

By extension, a 'carbon footprint' reduces various environmental impacts to a single unit: 'A form of elemental reductionism, carbon provides an ordering logic and mode of accounting through which space and social practice are being rewritten' (Bridge, 2011: 821). Carbon–offset markets abstract from various greenhouse gases to calculate 'carbon-dioxide equivalent', which becomes a new fetish. Activities with different effects on climate history are more readily conflated in a seemingly apolitical, self-evident way (Lohmann, 2011: 104–105).

Biomass availability, conversion and efficiency likewise have been administratively reduced to carbon accounting. These elements lie at the nexus of the Low-Carbon Economy, a policy concept fetishising carbon cycles as the prime indicator of sustainability. As biofuels became a contentious project, especially regarding claims for environmental benefits, controversy was soon channelled into purely physical debates. Carbon accounting has been meant to distinguish between un/sustainable bioenergy production, to ensure that it mitigates climate change: this 'requires accounting for the flows of energy and matter' throughout the supply chain (van der Horst and Evans, 2010: 177, 180).

Long before biofuels, 'climate change' was highlighted as an imperative for 'climate protection' measures. Environmental activists proposed greatly reducing economic growth and gaining independence from fossil fuels. In dominant policy frameworks, however, growth has been discursively reconciled with climate protection, in turn equated with more efficient production methods:

> The global governmentality of climate protection is built on four discursive pillars – *globalism*, *scientism*, an ethics of *growth* and *efficiency* – that... make it possible to integrate climate protection into the global hegemonic order without changing the basic social structures of the world economy (Methmann, 2010: 348).

This discursive reconciliation takes the form of future societal visions, which can be analysed as imaginaries, explained next.

2.3. Imagining societal futures

Potential futures contend for influence through discursive representations of problems and solutions. Within a specific set of practices, discourse is a pattern of concepts which give meaning to physical and social reality (Hajer, 1995: 44). Discourse is a strategic use of language, often conflating descriptive with normative aspects, thus justifying specific actions and futures.

More profound than discourses, 'imaginaries' are feasible, desirable futures – 'representations of how things might or could or should be' (Fairclough, 2010: 266). 'Imaginaries produced in discourse are an integral part of strategies' (Fairclough, 2010: 480). In EU policy frameworks, prevalent imaginaries foresee technoscientific development as central to societal progress, thus depoliticising policy choices and responsibility for them. Europe is cast as a potential loser or winner in a global race to commercialise technoscience:

> Science and technology in this imaginary are staged unambiguously as the solution to a range of social ills, including the problematic identity of Europe itself. To the extent that S&T are recognised to generate problems, these are cast solely in the form of mistaken technological choices (Felt et al., 2007: 80).

Imaginaries have many aspects and forms, e.g. socio-technical and/or economic, as briefly outlined next.

Socio-technical imaginaries are 'collectively imagined forms of social life and social order reflected in the design and fulfilment of nation-specific scientific and/or technological projects' (Jasanoff and Kim, 2009: 122). Such imaginaries 'inform and shape trajectories of research and innovation'. Less instrumental than a policy agenda, an imaginary is 'an important cultural resource that enables new forms of life by projecting positive goals and seeking to attain them' (Jasanoff and Kim, 2009: 122). This strategic role is central: '[sociotechnical] imaginaries are instrumental and futuristic: they project visions of what is good, desirable, and worth attaining for a political community; they articulate feasible futures' (Jasanoff and Kim, 2009: 123).

An economic imaginary envisages an 'economic community' of common interests. As a prominent example, the Knowledge-Based Economy (KBE) has been promoted as both an imperative and opportunity for prosperity. The KBE has been shaped by a neoliberal agenda, prioritising knowledge that can be privatised. Through the KBE policy framework, the state

> ...is promoting the commodification of knowledge through its formal transformation from a collective resource (intellectual commons) into intellectual property (for example, in the form of patent, copyright and licences) as a basis for generating profits of enterprise and rents for individual economic entities as well as for its own fisco-financial benefit... (Jessop, 2005: 159).

The above analytical concepts have helped to illuminate the Knowledge-Based Bio-Economy (KBBE), which extends the KBE concept to biological resources. As an EU imaginary, the KBBE diagnoses sustainability problems as inefficient resource-usage, to be overcome through a techno-knowledge fix, thus combining socio-technical and economic imaginaries. In its future vision, second-generation biofuels will be produced alongside more valuable products, both replacing fossil fuels (Levidow et al., 2012a). The KBBE shapes policy agendas for the neoliberalization of both nature and knowledge, especially through R&D agendas prioritising intellectual property (Birch et al., 2010).

By linking the above analytical concepts, let us examine how the EU biofuel policy framework arises from conflicting aims, generates tensions and attempts to manage them.

The rest has the following structure:

Section 2: how conflicting political-economic interests and aims have shaped the EU policy framework for biofuels.
Section 3: how critics generated a controversy over EU targets as a threat to GHG savings, environments and livelihoods in the global South.

Section 4: how EU's mandatory targets included sustainability criteria somewhat accommodating criticisms – but provisionally excluding indirect land use change (ILUC).
Section 5: how the ILUC issue became an implicit proxy for conflicts over the EU's 10% target.
Section 6: how the target was reinforced by the imperative to maintain an 'investment climate' for future biofuels.
Section 7: in conclusion, how the EU biofuel controversy was channelled into carbon-accounting methods, thus depoliticising the EU's global plunder.

3. Promoting EU biofuel targets for global leadership

Since the 1990s EU biofuels policy has envisaged several benefits – energy security, environmental protection, technology export and rural development – together symbolising the EU's claims for global leadership. Through these visions of societal progress, EU policy has justified indicative targets for biofuels by the years 2010 and 2020 (EC, 2003). These targets intersected with wider EU policy agendas – e.g., greater access to natural resources, trade liberalisation and technoscientific development – as shown in this section.

Biofuels contribute to a 'renewable energy' sector, which has been expected to provide expert knowledge, technology and thus export opportunities for EU industries as 'world leaders' (CEC, 1997: 4). According to many policy documents, biofuels offer more secure energy supplies for Europe, GHG savings to address climate change, and economic development in the rural places where they are produced (CEC, 1997, 2000, 2001; EC, 2003; Biofrac, 2006). The relative emphasis of these arguments has varied across EU institutions and member states, with shifts over time (Franco et al., 2010).

Also shifting have been assumptions about biofuel sources and thus the EU's relations with the global South. Biomass originally was meant to come from European sources, especially to reduce dependence on oil imports and so enhance fuel security for Europe (e.g. CEC, 1997: 4; 2000, 2006b). But potential sources were later broadened to developing countries, for several reasons – to ensure an adequate supply for higher EU targets, to obtain environmentally sustainable supplies (Barroso, 2007), and to avoid conflicts over WTO rules on trade discrimination (e.g. CEC, 2008b). That geo-strategic shift also responded to industry projections that by 2030 one-quarter of road transport fuel could come from biofuels, half from imports (Biofrac, 2006: 16).

A key aim was always a more secure supply of transport fuel. Its consumption has been expected to grow, to become more dependent on imports of fossil fuel and thus to become less secure: 'there is a particular need for greenhouse gas savings in transport because its annual emissions are expected to grow by 77 million tonnes between 2005 and 2020 – three times as much as any other sector'. Consequently, 'the only practical means' to gain energy security is biofuels, along with efficiency measures in transport, argued the European Commission (CEC, 2007a). This imperative was reiterated by DG Tren (later DG Ener), the *chef de file* for energy policy:

> The sector is forecast to grow more rapidly than any other up to 2020 and beyond. And the sector is crucial to the functioning of the whole economy. 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).

Although acknowledging the 'malign contribution' of transport, EU policy language naturalizes its rise as an objective force. This problem-definition takes for granted the internal market project and EU subsidy for transport infrastructure, which together have driven much of the greater demand for transport fuel (Bowers, 1993; Fairlie, 1993). Since the 1990s multinational companies have together lobbied for faster, more extensive and more efficient transport links. As the explicit rationale, such links are needed 'to better enable European companies to respond to the rapid and time-sensitive delivery of goods caused by globalisation and growth in world trade' (Business Europe, 2009). In practice, extra transport links have been intensifying such forces within the EU's internal market, thus subjecting local producers to greater competition. Given those strong drivers for greater transport, efficiency measures have merely slowed down the increase in GHG emissions (EcoLogic, 2011: 31).

Towards enhancing the EU's energy security, biofuels from agricultural commodities offer buyers more flexible supply chains and thus greater overall control, as emphasised by EU biofuel policy: 'Biofuels add to energy security by increasing the diversity of fuel types and of regions of origin of fuels. It is not obvious how to place a monetary value on this benefit' (CEC, 2007b: 10, 12; also Barroso, 2007). With biofuels,

> You don't put yourself in hock to monopolies within countries to the same degree if you import something that's made from agricultural commodities... It is more a buyer's market; you are able to choose the cheapest source, to work with partners to develop relationships and reliability, and to know that you have a fall-back if things go wrong (interview, DG Tren, later DG Ener, 08.07.09).

Flexible sourcing complements the EU's *Global Europe* strategy, seeking better access to the world's natural resources (CEC, 2006c). As the perceived threat, 'resource-rich countries' unfairly deprive Europe: they impose protectionist measures and/or grant unfair access to emerging industrial countries such as China or Brazil. Consequently, European industry faces a competitive disadvantage, whose remedy is 'targeted measures to secure and improve the access to raw materials for EU industry' (CEC, 2008a), especially through trade liberalisation.

Greater European access to natural resources has been imagined as globally beneficent through a technological vision of a Knowledge-Based Bio-Based Economy (KBBE). In the KBBE imaginary, environmental sustainability means an eco-efficient productivity through resources which are renewable, reproducible and therefore sustainable. Renewable raw materials will provide 'biomass' for flexible conversion into non-food products, especially energy and other industrial products (DG Research, 2005).

Bioeconomy visions have been elaborated by European Technology Platforms, representing major multinational companies in the agri-food-forestry-biofuel sectors. Market-industrial metaphors are projected onto natural resources; for example, agriculture will be 'oil wells of the 21st century', according to a trans-Atlantic R&D network (BioMat Net, 2006). By analogy to crude oil, 'biocrude' components of plant cells will be 'cracked' into their components, thus naturalising a specific construct of natural resources as industrial raw materials (Levidow et al., 2012a). Such visions inform R&D agendas, promoting a further neoliberalisation of nature and of relevant knowledge, especially through intellectual property (Birch et al., 2010). As this illustrates, resources become such through a specific imaginary (Bridge, 2009: 1221).

For strategic advice on biofuels, the European Commission established the Biofuels Research Advisory Council (Biofrac), which represented industrial interests promoting higher biofuel targets and R&D budgets. In its future vision: 'By 2030 the European Union covers as much as one fourth of its road transport fuel needs by clean and CO_2-efficient biofuels'. Such eco-efficiency and therefore sustainability would result from more efficiently converting cheap non-food bio-waste into various products, including second-generation biofuels: 'Integrated biorefineries co-producing

chemicals, biofuels and other forms of energy will be in full operation' (Biofrac, 2006: 16).

That vision was incorporated into Commission policy. According to a report, *An EU Strategy for Biofuels*, the EU faces an opportunity for global leadership through technoscientific advance:

> The options, which will be developed, need to be sustainable in economic, environmental and social terms, and bring the European industry to a leading position. . .. By actively embracing the global trend towards biofuels and by ensuring their sustainable production, the EU can exploit and export its experience and knowledge, while engaging in research to ensure that we remain in the vanguard of technical developments (CEC, 2006a: 5, 6).

The EU's global leadership, e.g. in setting global standards for biofuels, links commercial and environmental meanings of sustainability (CEC, 2007c). A dual sustainability facilitates a competitive advantage for innovating and exporting novel technology: 'In parallel, long-term market-based policy mechanisms could help achieve economies of scale and stimulate investment in "second generation" technologies which could be more cost effective' (CEC, 2006b). They are expected to 'boost innovation and maintain Europe's competitive position in the renewable energy sector' (CEC, 2007b).

In this imaginary, GHG savings will be linked with European economic benefits, especially through future biofuels. According to the Commission's *chef de file*:

> In general for our renewable energy policy we have three objectives – greenhouse gas savings, security of supply and economic spin-offs. Compared to other renewables, biofuels are a relatively employment-intensive source of renewable energy. When you source biofuels domestically, you get a relatively large number of jobs and GDP benefits (interview, DG Tren, 08.07.09).

In promoting biofuels as an opportunity for global leadership, then, EU policy links economic and socio-technical imaginaries in a feasible, desirable future vision.

4. Questioning biofuel sustainability

By 2007 world-wide biofuel expansion was provoking controversy, thus undermining claims for societal benefits. In January 2007 several Latin American organisations published an Open Letter to the EU institutions and citizens, saying that 'We Want Food Sovereignty Not Biofuels'. They opposed biofuel expansion as a threat to their environments and livelihoods (WRM, 2007). Their Open Letter was soon followed by a similar declaration from over 200 NGOs opposing EU incentives for agrofuels (Econexus, 2007). Signatories did not include large Europe-wide environmental NGOs such as Greenpeace and Friends of the Earth Europe; in parallel they denounced the EU's palm oil imports from southeast Asian plantations, especially for destroying rainforests and wildlife habitats.

As regards the EU's biofuel expansion, several NGOs attacked agro-industrial methods as a threat to natural resources and community access. Their joint report replaced the ambiguous term 'biofuel' with 'agrofuel' – which poses a threat '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). EU targets were already stimulating land grabs displacing traditional usages, in anticipation of larger biofuel markets (Econexus et al., 2007: 24).

Harm from 'agrofuels' was documented in numerous NGO reports, informed especially by North–South activist networks focusing on rural development issues (ABN, 2007; Econexus et al., 2007; Eide, 2008; Nyari, 2008; Oxfam International, 2008; WRM, 2007). Some European critics attacked policy agendas which increase demand for transport fuel, perpetuate dependence on oil and seek a deceptive remedy through biofuels (e.g. ASEED, 2008; see Fig. 1).

Biofuels were blamed for various harms which include: greater demand for food crops causing higher food prices, land-use competition with food, deforestation, more chemical-intensive cultivation methods and resource degradation, especially through land grabs (FIAN, 2008; ICHRP, 2008). In Brazilian sugarcane production for bioethanol, workers have been trapped in quasi-slave labour conditions, officially known as *trabalho escravo*. Many have been rescued by a government agency (Mendonça, 2006, 2010; MTE, 2010).

The above criticisms were later substantiated by numerous academic and expert studies (e.g. Action Aid, 2012; Borras et al., 2010; CETRI, 2010; Lehtonen, 2011; Matondi et al., 2011; Schulze, 2012). In particular, land grabs are driven especially by 'demand for biofuel feedstocks as a reflection of policies and mandates in key consuming countries', according to a World Bank report (Deininger and Byerlee, 2010: 11). The report promoted greater 'investment' in agriculture, especially on public lands, while also acknowledging that new uses often dispossess previous users, e.g. through government corruption (Deininger and Byerlee, 2010: 44).

Biofuel expansion has political-economic drivers which contradict claims for wider societal benefits. Through an increasingly 'global integrated biofuel network', transboundary flows of biomass and biofuels subordinate land use to global market forces, thus intensifying resource conflicts (Mol, 2007). After all, 'policies that are designed for the purpose of security of energy supply cannot realistically be expected to yield high social or environmental benefits, and certainly not abroad' (van der Horst and Vermeylen, 2011: 2442). By stimulating changes in land use, moreover, biofuel production does not guarantee GHG savings and may even increase GHG emissions (Searchinger et al., 2008).

Beyond direct changes in land use, indirect changes result from crop substitution through global trade. As a high-profile example, US government subsidy for bioethanol led many farmers to switch crops to maize from soya, in turning stimulating greater soya cultivation in Brazil and rainforest destruction there (Laurance, 2007). As the EU's leading biofuel user, Germany has imported Europe-wide sources of oilseed rape, whose former uses are continued by importing more palm oil from Indonesia, where new plantations often destroy forests (FoEE, 2010; IFPRI, 2010). In such ways, biofuel production displaces crop-production to other places, where an initial destruction of forest or peatland generates enormous GHG emissions. This once-off 'carbon debt' counteracts GHG savings from biofuels replacing fossil fuels (Fargione et al., 2008; Searchinger, 2008).

Biofuels have also faced criticism for unsustainably using natural resources. Biomass conversion into combined heat and power offers greater efficiency and GHG savings than biofuels, according to many expert reports (e.g. SRU, 2007). Indeed, 'there are better ways to achieve greenhouse gas savings and security of supply enhancements than to produce biofuels. And there are better uses for biomass in many cases', according to an EC expert report (JRC, 2008: 22).

Given all those contentious issues, the 2007–2008 global biofuel controversy had high political stakes for the EU because the European Commission was proposing that earlier indicative targets should be made mandatory for all member states (CEC, 2008b). Fulfilling the targets would increase the EU's global demands on land. EU-wide controversy arose about how the necessary biomass could be produced consistently with environmental sustainability and rural development (Franco et al., 2010; Levidow and Paul, 2010; Sharman and Holmes, 2010).

Fig. 1. At the 2008 conference of the European Biofuels Technology Platform (EBTP), the protest slogan says, 'Agrofuel – no cure for oil addiction and climate change'.

Yet the biofuel controversy was depoliticised through an EU future vision for technoscientific innovation enhancing sustainability. As already envisaged by industry (Biofrac, 2006), such novel fuels from non-edible biomass would avoid the 'food vs fuel' conflict. This vision has linked EU policy on R&D priorities and biofuel targets. According to a research network funded by the European Commission:

> At a time when the expansion of first-generation biofuels derived from food crops is causing concern and in some sectors of the public active opposition related to questions of sustainability and competition with food, more emphasis has to be placed on second-generation biofuels (Coombs, 2007: 17).

Enacting such imaginaries, the EU's Framework Programme 7 allocated substantial funds to future biofuels and biorefineries (Levidow et al., 2012b). Although the Programme also funded R&D for hydrogen fuel cells and electric vehicles, its priorities favoured second-generation biofuels. As one rationale: 'To supply 10% of transport fuel by 2020 from renewable energy, this realistically means liquid fuel' (interview, DG RTD-K, 10.11.10).

Such R&D priorities have been formulated and driven by industry lobbies. As a successor to Biofrac (2006), the European Biofuels Technology Platform represents the energy, motorcar, chemical, biotech and other industrial sectors (EBTP, 2008). It has sought a horizontal integration across those sectors through a biorefinery that can convert diverse feedstocks into higher added-value products as well as energy (EBTP, 2008: SRA-23).

Future novel biofuels are variously described as second-generation, next-generation, advanced, etc. They would use non-food parts of plants, or non-food plants such as grasses, or even algae, as means to avoid extra pressure on fertile arable land. Such innovations are also expected to use 'marginal land' for growing novel non-food crops and to turn 'bio-waste' into energy (e.g. EBTP, 2008: SRA-24). Such resources are seen as 'under-utilised' or 'under-valued', i.e. as resources otherwise contributing little to global markets, even if important for local livelihoods (cited in Franco et al., 2010; Econexus et al., 2009: 6).

As an imaginary of cornucopian resources, 'marginal land' complements the Global Europe strategy for accessing more resources of the global South (CEC, 2006c). According to the EU Trade Commissioner, who was also promoting trade liberalisation:

> 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).

The European Commission's unit which assists developing countries, EuropeAid, has foreseen similar remedies: sustainable biofuels need better technology and management of natural resources. In the future, 'The use of technology must improve production efficiency and social and environmental performance in all stages of the biofuel value chain'. Moreover, biofuels can avoid competition with food production by using 'marginal land' (EuropeAid, 2009). Thus policy documents imagine that 'marginal land' is abundantly available for biofuel crops – i.e. that this novel use would make cultivation economically viable but without undermining other resource uses.

Such imaginaries have provided an extra rationale for EU biofuel targets. These become essential incentives for investment bringing future novel biofuels, in turn solving the problems created by the first generation. Technological and managerial solutions assume (or imply) that inefficient resource usage causes the sustainability problems of current biofuels. This assumption is contradicted by the history of technoscientific development, especially in agriculture, where new production techniques have stimulated greater plunder of resources. Similar incentives may arise from novel techniques which more efficiently convert biomass into diverse valuable products (Levidow and Paul, 2011; Smith, 2010: 120).

5. Mandating 'sustainable biofuels', accounting for carbon

The 2007 controversy disrupted the discursive equivalence between 'renewable' and sustainable' energy. The EU already had indicative targets for 'biofuels or other renewable fuels for transport' (EC, 2003). To justify mandatory targets, the European Commission sought a more authoritative account of 'sustainable biofuels' that would be eligible for the targets. (For a chronology, see Euractiv, 2008.) The biofuel controversy was displaced and translated into sustainability criteria selectively accounting for carbon, in turn justifying mandatory EU targets, as shown in this section.

In January 2008 the Commission published its proposal for a Climate and Energy Package, including a draft Directive promoting 'the use of energy from renewable sources'. This mandated targets for transport fuel to include 'renewable energy', thus downplaying biofuels per se. That target provoked much dissent, even among EU institutions, especially from DG Environment and the Joint Research Centre:

> We raised criticisms but were ignored. This is not 'robust science policymaking' that considers all the evidence. Instead the policy is driven by sound-bite science to support a particular viewpoint... In the renewable energy sector, the policy picks winners – a specific industry for biofuels (interview, JRC, 11.03.10).

This process has been critically analysed as 'policy-based evidence gathering', i.e. a process whereby evidence is selected to support a previously determined policy (Sharman and Holmes, 2010).

To address sustainability aspects of the mandatory target, second-generation biofuels were originally proposed as a precondition, but they were demoted to a rationale for investment incentives. At its March 2007 meeting the EU Council supported mandatory biofuel targets reaching 10% in 2020 – subject to production being sustainable and second-generation biofuels becoming commercially available. However, the Commission's legislative proposal rejected such a condition as undermining industry investment:

> The main purpose of binding targets is to provide certainty for investors. Deferring a decision about whether a target is binding until a future event takes place is thus not appropriate (CEC, 2008b: 17).

Conflicting interests and aims sought to shape the legislative mandate for renewable energy in transport fuel. EU agricultural interests generally supported high targets, alongside sustainability criteria that would effectively limit imports from the global South. Business interests jointly sought 'a high and mandatory biofuels target, providing them with the long-term visibility necessary for their investments', according to an academic study (Dontenville, 2009: 39, 54).

NGOs criticised the Commission's proposal for inadequate sustainability criteria – thus endangering environments and livelihoods in the global South – but did so from diverse standpoints. Some environmental NGOs opposed the 10% target unless linked to stronger sustainability criteria (Dontenville, 2009: 39). Most large environmental NGOs opposed the 10% target altogether; they called on the EU 'to withdraw proposals to massively expand the use of biofuels' (FoEE et al., 2008; also CEO et al., 2008).

Parliament rapporteurs for the draft Directive proposed to raise the general requirement for GHG savings, e.g. in order to restrict biomass sources and to compensate for ILUC effects (Corbey, 2007; Turmes, 2008). For several years Green MEPs had been advocating biofuels from biowaste materials; now some criticised the expansion of 'agrofuels', i.e. feedstock from food crops (Lipietz, 2008). Nevertheless Green MEPs generally supported a 10% target with proposals for broad sustainability criteria.

Those contradictory pressures shaped a political compromise – the 2009 Renewable Energy Directive (RED), whose mandatory targets aimed to incentivise investment in low-carbon and biomass conversion technologies. The preamble emphasised 'opportunities for establishing economic growth through innovation and a sustainable competitive energy policy'. In particular, 'mandatory targets should provide the business community with the long-term stability it needs to make rational, sustainable investments in the renewable energy sector' (EC, 2009: 16, 17; cf. CEC, 2008b).

Under the RED, 20% of all energy must come from renewable sources by the year 2020; also 10% of all road and rail transport fuel must come from renewable energy by then. Sustainability criteria define which biofuels qualify for the targets: greenhouse gas (GHG) savings must exceed 35%; this requirement rises to 60% for new biofuel installations in 2017. Relevant to such calculations, the RED double-counts GHG savings for several categories: wastes and residues, assuming that they have no other use; 'advanced biofuels' from non-edible material; and co-products which could be used for other energy sources or animal feed. For the latter bonus, economic operators use the 'energy allocation' method, whose calculation 'ends at the factory door'; beneficiaries need not demonstrate that co-products substitute for feed in practice (interview, DG Ener, 08.07.09). At the same time, the bonus system makes a beneficent assumption that co-products do substitute for production elsewhere and thus further save GHG emissions (EC, 2009: 25; also CEC, 2010: 13). Together those criteria were meant to stimulate biofuels generating more co-products and novel biofuels more efficiently converting non-edible material.

The RED specifies adverse changes in land use which would exclude biofuels from eligibility for the target. Environmental criteria disqualify any sources from 'highly biodiverse', 'primary forest' and 'continuously forested' areas; the latter were defined by statistical criteria. Producers should avoid 'the conversion of high-carbon-stock land that would prove to be ineligible for producing raw materials for biofuels and bioliquids' (EC, 2009: 24). Compliance would be assessed on the basis of company information, or through voluntary certification schemes or bilateral and multilateral agreements.

Also contentious was social sustainability. Parliament had proposed that sustainability criteria should include social aspects, e.g. land rights of local communities and fair remuneration of workers (Turmes, 2008). Such issues were discussed at a Parliamentary hearing (EP Envi, 2008a). But social issues were ultimately excluded: '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).

As a related difficulty for social criteria, global trade rules prohibit 'discrimination' against products from specific countries. Mandatory certification for social and environmental standards could face a challenge from producer countries and an adverse ruling 'by a WTO dispute panel on the grounds of having a disproportionate impact on trade' from specific exporters, according to a report from the OECD (2007: 41). However, 'WTO rules are being used as an excuse for weak certification proposals', according to a biofuel critic (cited in EP Envi, 2008b: 19). Indeed, anticipation of a trade dispute conveniently reinforced deeper drivers, e.g. administrative procedures for quantifying GHG savings. The RED relegated social issues to voluntary schemes or bilateral agreements, along with a requirement for bi-annual reporting by the Commission (EC, 2009: 24).

Within biofuel policy, the Commission has imagined rural development along lines benefiting rural populations. Namely, new biofuel 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 (CEC, 2008c). Rural populations can be incorporated into biofuel development processes as labourers in large-scale monocrop biofuel production processes; in parallel, smallholders can engage in contract-growing schemes, according to the Commission's agency for developing countries (EuropeAid, 2009).

The policy framework sees rural development primarily as higher individual incomes from waged labour or contract farming. This focus obscures market-competitive forces which degrade

labour conditions and natural resources crucial for local livelihoods. Those conflicts generate tensions within the European Commission as well as in the global South. According to interviews with staff members in DG Development, mandatory labour standards could deter biofuel investment which otherwise would create employment; or instead such developments could undermine natural resources necessary for local livelihoods. In the latter regard, agricultural producer companies generally seek better-quality land, especially linked with infrastructure, rather than use 'marginal' land (interviews, EuropeAid, 22.10.09 and 10.11.09, cited in Franco et al., 2010: 676).

Indeed, the term 'marginal land' conceals crucial uses of land and water by rural populations, by analogy to carbon markets concealing plunder of natural resources (Econexus et al., 2009). As a high-profile example, jatropha was originally celebrated as a 'miracle crop' for producing biofuel on 'marginal land', e.g. in arid areas. Yet in Mozambique jatropha has needed substantial water and even agrochemicals for commercially viable production (Ribeiro and Matavel, 2009). Nevertheless EU biofuel policy has presupposed a socially beneficent agro-industrial development using mainly 'marginal land'.

6. Disputing ILUC carbon accounts: a proxy-game reversal

Throughout the 2008–2009 legislative process of the draft Renewable Energy Directive (RED), ILUC effects remained controversial: 'Indirect land use change could potentially release enough greenhouse gas to negate the savings from conventional EU biofuels', according to the Commission's own expert body (JRC, 2008: 10). To address ILUC effects, there were proposals to include an extra calculation penalising all or some biofuels, thus effectively disqualifying some from the mandatory market for 'sustainable biofuels'. If all biofuels were equally penalised, however, 'then the higher threshold would exclude all European biofuels; only Brazilian ethanol would be eligible for the EU target' (interview, DG Agri, 08.07.09).

As a politically awkward issue, ILUC effects were deferred. Under the RED, by December 2010 the Commission had to report on ways to calculate ILUC and to minimise its impact (EC, 2009: 40; see next section for outcome). Further debate over ILUC became an implicit proxy for wider conflict over the EU's 10% target – in ways which depoliticised the issues and reinforced the target, as this section shows.

Within the Commission, DG Trade invited the International Food Policy and Research Institute (IFPRI) to carry out an ILUC study, especially on potential effects of the EU target and specific feedstocks. It concluded that the 10% target need not undermine GHG savings because conventional (or first-generation) biofuel crops need to provide only 5.6% of transport fuel from renewable energy. The report incorporated optimistic assumptions from the Commission's *chef do file*, DG Tren, via the relevant staff in DG Trade as intermediary (interview, DG Tren, 13.04.10). In particular, the 5.6% figure was drawn from an optimistic prediction that only 5.9% of transport fuel would need to come from food crops (DG Tren, 2009b: 33), thus minimising ILUC effects.

This prediction assumed that nearly half the 10% target would come from other renewable sources, especially 2nd-generation biofuel crops and electric cars powered by renewable electricity (IFPRI, 2010: 45). This prediction was more optimistic than the modest expectations of the motor vehicle industry for electric cars (Harrison, 2010). It also contradicted policymakers' assumptions that 'renewable' transport fuel would mean mainly biofuels by 2020 (cited in Sharman, 2009; cf. Bowyer, 2010).

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

> 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: 71).

Even with less optimistic assumptions, the 10% target would still result in GHG savings, according to the study. This conclusion vindicated the target, according to DG Tren (interview, 29.07.10)

The IFPRI study accommodated earlier warnings about ILUC undermining a reduction in GHG emissions (e.g. Econexus et al., 2007; T&E, 2009). By making assumptions explicit, the study revealed weaknesses of beneficent claims for the EU targets to reduce GHG emissions. Its optimistic assumptions provoked disagreements in finalising the report and again afterwards in publicly interpreting the results, especially in stakeholder meetings held by the Commission (Harrison, 2010).

Having opposed the 10% target, large Europe-wide environmental NGOs now saw an opportunity to weaken it through statutory procedures on the ILUC issue. They converged around demands for extra regulatory action on ILUC, seen as 'the only game in town'. According to this strategy, the most harmful biofuels would not be eligible for the target if they must fully account for ILUC. Such NGOs saw better carbon-accounting as a politically realistic way to ensure the environmental sustainability of EU biofuel usage and/or to undermine the 10% target as unsustainable.

Environmental NGOs warned that biofuel expansion would trigger great ILUC effects, framed by ominous metaphors such as a carbon debt and time-bomb. Criticising the IFPRI study, they counterposed pessimistic assumptions about the EU's future dependence on conventional biofuels (e.g. T&E, 2010a: 1). Such critics warned that many decades or even centuries may be needed to repay the 'carbon debt', which would be much greater according to less optimistic assumptions. This debt is ignored by 'carbon laundering' under statutory criteria which account only for direct changes in land use (T&E, 2010b). A similar warning deployed financial metaphors:

> The EU is taking out a sub-prime carbon mortgage that it may never be able to pay back. Biomass policy needs to be fixed before this regulatory failure leads to an ecological crisis that no bail out will ever fix (BirdLife International, 2010).

When National Renewable Energy Action Plans were submitted to the European Commission, the aggregate plans contradicted the Commission's optimistic assumptions; some member states expected nearly the entire 10% to come from from edible biomass, i.e. from conventional biofuels. Citing the new evidence, the Institute for European Environmental Policy (IEEP) issued a report warning that the EU's 10% target would generate much greater GHG emissions than indicated in the IFPRI report. In particular, conventional biofuels would contribute up to 92% of total biofuel use, representing 8.8% of the total energy in transport by 2020 – by contrast to only 5.6% in the IFPRI report (Bowyer, 2010).

Moreover, '72% of this demand is anticipated to be met through the use of biodiesel', by contrast to only the 55% presumed by the IFPRI report. As many experts acknowledged, biodiesel indirectly increases demand for Asian palm oil, in turn destroying peatland and forests, thus generating greater ILUC effects than bioethanol does report (Bowyer, 2010: 2). As the Commission's study had warned, such destruction undermines GHG savings:

> carbon losses from drained peat forest, which is used for palm oil production in South East Asia, are so high that if even 2.4% of the EU's biodiesel needs are met directly or indirectly by

palm oil grown in peat land, all GHG savings from EU biodiesel would be cancelled out (IFPRI, 2010: 26).

Consequently, a high proportion of biodiesel would undermine the environmental rationale for the EU's 10% target. According to the IEEP report, total GHG emissions will be '80.5–166.5% worse than would be delivered from continued reliance on fossil fuels in the transport sector', especially as the EU increases its biodiesel usage. 'The current evidence clearly points to ILUC emissions undermining the arguments for the use of conventional biofuels as an environmentally sustainable, renewable technology'. As a way forward, the report advocated greater consensus on assumptions in modelling ILUC effects, despite the uncertainties (Bowyer, 2010: 21). Campaign NGOs saw the report's expert status as a means for such criticisms to gain greater authority and be taken seriously in the ILUC debate (interviews with NGOs, 10.05.11 and 17.05.11).

Citing the IEEP report, nine NGOs jointly questioned the EU's 10% target in a campaign brochure, *Driving to Destruction:* 'The sustainability of national and European biofuel targets must be reviewed to reflect the reality of biofuel expansion on total emissions, biodiversity and communities' (BirdLife International et al., 2010: 4; see sponsors' list in reference). Together they demanded broader sustainability criteria, especially by counting indirect land-use change (ILUC).

But such demands faced several obstacles. First, campaigning NGOs had difficulty to convey the ILUC concept to supporters as a basis to mobilise them. Second, expert models had an inherent complexity that helped industry to raise doubts. Third, likewise promoting biofuels, Southern governments were deploying their diplomatic resources to counter arguments for extra regulatory action, even though Southern NGOs had documented how land-use changes were harming the environment and rural populations (interview, NGO, 17.05.11).

For those reasons, as well as the expert-modelling focus, the ILUC debate marginalised controversy over 'agrofuel' expansion as inherently driving harm to natural resources and rural populations. The ILUC focus depoliticised those conflicts and reinforced the 10% target. Thus the 'only game in town' played out in reverse of NGOs' expectations for strengthening sustainability criteria, much less for weakening the target.

7. ILUC uncertainties: justifying discriminatory action?

As a further step towards its mandatory report on ILUC, the Commission held a public consultation. As its central question: Does the available knowledge justify extra regulatory criteria? Through the consultation procedure, dissent over the EU's optimistic assumptions was further channelled into arguments about the need for better accounting methods. Dominant arguments emphasised the need to maintain financial-regulatory incentives for investment in novel biofuels which would overcome harmful effects of land-use change. Through circular reasoning, the need for a predictable 'investment climate' deferred action on the ILUC issue, as this section shows.

7.1. Disputing evidence for GHG penalties

To address ILUC effects, the European Commission mentioned several policy options and questions about them. For example, the RED could impose a GHG-emissions penalty against some biofuels according to their feedstock type or geographical source (DG Energy, 2010). If extra criteria do so and then face a court challenge, then could this discrimination be defended with adequate evidence? Anticipating such a challenge, 'The policy-making system depends on a robust basis for legislative proposals' (DG Energy, interview, 29.07.10). Any robust basis was complicated by controversy over modelling assumptions – conveniently for defenders of the 10% target.

For the public consultation on ILUC, respondents were asked to comment on the expert studies, their models, assumptions, adequacy, etc. – as a possible basis to advocate EU action encouraging relatively greater or less use of specific biofuels. The Commission's consultation document took for granted the 10% statutory target and greater future sustainability via future novel biofuels (DG Energy, 2010). Respondents framed uncertainties in divergent ways – to oppose any extra regulatory action, or else to propose extra accounting measures to deter ILUC effects and thus to lower the 'carbon debt' (ILUC submissions, 2010; a small sample follows).

According to industry organisations involved in biofuels, as well as some member states, extra regulatory measures were not warranted by available ILUC models, which had methodological weaknesses, uncertainties and/or over-estimations. For example, 'ILUC remains a highly debatable, yet undemonstrated, concept and certainly one upon which public policies cannot be based'. Even worse, the available models over-estimate ILUC, e.g. by ignoring ways that biofuels reduce average GHG emissions and by underestimating GHG emissions from fossil fuel as a comparator. Moreover, 'ILUC mitigation provisions could in fact have discriminatory impacts against third countries' and thus may be incompatible with WTO rules, argued the European Biodiesel Board (ILUC submissions, 2010).

According to many NGOs, as well as some member states, available models provided an adequate basis to impose crop-specific ILUC factors via GHG penalties; protective measures are warranted, despite any uncertainties in the models. For example: 'The risk should be addressed in line with the precautionary principle', argued the UK (ILUC, 2010). Differentiated crop-specific ILUC factors cannot yet be known from available studies – but should be introduced by 2014, on the basis of further studies, argued the Netherlands (ILUC, 2010). Likewise extra ILUC factors are needed to incentivise sources which have low ILUC effects, e.g. residues, waste and advanced biofuels – which already receive a GHG-savings bonus in the RED. Yet WWF also questioned those unitary categories. For each crop, parameter values 'can vary per region', so further research should try to capture these variations, argued WWF (ILUC, 2010).

Friends of the Earth Europe argued that the EU's 2020 target 'will lead to an upfront "carbon debt" that is currently unaccounted for'. A practical regulatory solution would be 'a feedstock-specific ILUC factor' penalising some biofuels (ILUC, 2010). Like WWF, FoEE also questioned the RED's assumption that second-generation biofuels will be consistently more sustainable than current ones: 'Those second-generation biofuels produced from dedicated energy crops, such as ligno-cellulosic materials, also require land and can cause ILUC' (ILUC, 2010). Going beyond WWF's criticisms, moreover, FoEE questioned the EU target: 'Aggregate emissions underscore that propping up an artificial biofuel market with a 10% target without further legislative action is ill-advised…' (FoEE, 2010). Without an opposition campaign, however, the expert debate reinforced the EU target.

7.2. Favouring an 'investment climate' – despite ILUC

After its public consultation, the Commission issued a December 2010 report on ILUC. This reiterated the EU's beneficent expectations for the 10% target, linked with future technological innovation:

> Biofuels are important because they help tackle two of the most fundamental challenges in energy policy with regards to trans-

> port: the overwhelming dependency of the transport sector for oil and the need to decarbonise transport. Supporting biofuels offers other opportunities too. They can contribute to employment in rural areas, both in the EU and in developing countries and they offer scope for technological development, for example in second-generation biofuels (CEC, 2010: 2).

In discussing ILUC models, the report treated carbon as a universal measure of natural resources, even for classifying land quality in developing countries. They have little 'low-carbon stock land', so their use of 'carbon-rich areas' may contribute greatly to ILUC. Some countries have policies to prevent land expansion into such areas, according to the report (CEC, 2010: 4, 12).

At the same time, ILUC models assume that actors pursue maximum financial gain:

> Drivers behind deforestation are complex, where local authorities, land-use rights and political economy all play a role. It is not possible to properly reflect this real world effect in the models, where decision making is reduced to a purely rational economic question (CEC, 2010: 11).

According to optimistic models, for example, 'rational' motives may lead farmers to adopt more intensive cultivation methods – rather than cultivate new land, whose clearance would generate relatively more GHG emissions.

Most importantly, any extra regulatory criteria must preserve incentives for investment, according to the Commission. Its report reiterated that the RED creates a 'stable and predictable investment climate', which 'needs to be preserved', especially to stimulate advanced biofuels (CEC, 2010: 14). Within that aim, the Commission listed three medium-term choices: continue to emphasise deficiencies in modelling, or increase the general requirement for GHG savings, or impose a GHG penalty on some biofuels.

The penalty option provoked more warnings from biofuel promoters. According to the European Biodiesel Board, 'A penalty [for ILUC] would be totally arbitrary and would compromise the investments that have been made relying on the Renewables Directive'. According to the Brazilian sugarcane industry, such a penalty based on 'immature science' could be easily challenged at the WTO (cited in Rankin, 2011).

Those expert disagreements over ILUC served as a proxy for conflicting aims around the 10% target. Such conflicts arise because EU biofuel policy was not designed mainly for environmental protection – which was 'an afterthought to security-of-supply concerns', according to an author of the IFPRI study (cited in Rankin, 2011). As the RED's main official aim, GHG savings became bound up with contentious but complex assumptions – and thus was more easily subordinated to policy imperatives for investment incentives and energy security.

Soon a broader network of North–South development NGOs attacked EU policy for its 'energy-based target for agrofuels' (EuropAfrica, 2012: 12). Some have campaigned against the 10% target (e.g. Action Aid, 2012: 11), e.g. with a satirical appeal for 'Drive Aid' (Action Aid UK, 2012). Their campaign provoked conflict among NGOs:

> This has been a point of disagreement with some environmental NGOs, which concentrated all their lobbying efforts on the 'only realistic' aim of correctly accounting for carbon through specific ILUC factors. . .. They warned us that attacking the 10% target will weaken the Directive, which is globally important progress for renewable energy (personal correspondence, development NGO, 02.07.12).

At the same time, other environmental NGOs again explicitly opposed the 10% target (e.g. FoEE, 2012) and discussed with development NGOs how to plan a joint opposition campaign.

Nearly two years after its indecisive 2010 ILUC report, the Commission developed a proposal to limit 'the contribution made from biofuels and bioliquids produced from food crops' to 5% of energy use in the transport sector in 2020. The proposal aimed to 'limit the contribution that conventional biofuels (with a risk of ILUC emissions)' make to RED targets, while also 'protecting existing investments until 2020' (CEC, 2012: 2-3). As the latter phrase indicates, the timescale would not necessarily deter an increase of biofuel production from food crops before 2020. NGOs criticised the Commission proposal as insufficient to ensure that RED targets reduce GHG emissions and avoid various environmental harms (T&E, 2012).

8. Conclusion: imagining sustainable biofuels, depoliticising plunder

The EU aspires to global leadership in developing 'sustainable biofuels' which can substitute for fossil fuels and thus reduce GHG emissions, while also enhancing energy security and rural development. Those aims have been shaped by EU neoliberal agendas in several ways. Faster, more extensive Europe-wide transport networks intensify market competition, stimulate greater demand for fuel and increase GHG emissions, thus motivating a drive for energy security through oil substitutes. Biofuels are sought for their flexible, multiple suppliers which can be kept in competition with each other. This complements trade liberalisation agendas for better accessing natural resources, as well as technological innovation for better commercialising them in a future bioeconomy.

These EU policy agendas have been naturalised as objective imperatives – e.g. for fuel security via oil substitution – in turn to be fulfilled through targets for renewable energy. Future visions and ambitious targets for biofuels in particular have been promoted as expert advice by industrial interests (e.g. Biofrac, 2006; EBTP, 2008). Since the 2007 EU Council decision and 2008 Commission proposal for a 10% target, this has perversely incentivised moves towards dispossessing rural communities in the global South. Land grabs have appropriated fertile land and scarce water for agro-industrial production methods, whose harvest remains flexibly available for various buyers and product uses.

The Commission's 2008 proposal encountered many criticisms, provoking a high-profile controversy. Early opposition came from North–South NGO networks focusing on rural development issues. They denounced 'agrofuels' for degrading natural resources, competing with food needs, undermining livelihoods in the global South and incurring a large 'carbon debt', thus counteracting GHG savings from oil substitution. Such harm has been acknowledged by various expert reports and by some European Commission staff members.

Despite those criticisms and doubts, the 2009 Renewable Energy Directive (RED) set a mandatory target for European transport fuel to contain 10% renewable energy – in practical terms, meaning mainly biofuels by the 2020 deadline. As a political compromise between conflicting interests and aims, the Directive has generated policy tensions. In managing the tensions, the EU system has elaborated a prior vision of a feasible, desirable future through sustainable biofuels.

Here that vision has been analysed through two perspectives – namely, socio-technical imaginaries about technoscientific innovation for the public good, and economic imaginaries about a community of interests (cf. Fairclough, 2010; Felt et al., 2007; Jessop, 2005; Jasanoff and Kim, 2009). The EU imaginary combines several elements: mandatory targets creating 'an investment climate' for biofuels, R&D funds stimulating second-generation biofuels as more sustainable, techniques commoditising natural resources in the name of protecting them, sustainability criteria

homogenising the environment, and rural development models dependent on agro-industrial methods. Those elements have become linked through circular reasoning.

EU targets neoliberalise the environment: they guarantee a market for biofuels, thus further driving the commoditisation of natural resources, in the name of protecting the climate (cf. McCarthy and Prudham, 2004; Castree, 2008). In other cases neoliberalisation has taken more direct forms, e.g. by privatising resources or pricing carbon emissions. By contrast, targets require fossil fuels to share the higher production cost of biofuels; this method cross-subsidises their market value, ostensibly on grounds that they substitute for oil and therefore reduce GHG emissions – despite expected greater demand for transport fuel. EU targets stimulate changes in land use and global trade to supply the necessary biomass. Along with other incentives, EU targets create spaces that new technical regimes can plunder, as in earlier appropriations of resources (cf. Moore, 2010).

This greater access complements technoscientific innovation agendas for more efficiently designing and converting crops for diverse non-food uses. Agricultural production is imagined as 'oil wells' producing biomass whose valuable components can be extracted and marketed globally, while also privatising molecular-level knowledge for global value chains. This diversifies the earlier agri-food biotech project, which has sought intellectual property for novel inputs to produce standard commodity outputs (McAfee, 2003).

The RED's ambitious targets have been reconciled with environmental protection through a bioeconomy perspective. EU policy anticipates that technoscientific innovation will generate competitive, sustainable biofuels – e.g., by producing more co-products, using 'marginal land' and converting non-food biomass. Such innovation is envisaged as societal progress – enhancing energy security, economic competitiveness, technology export, rural development and GHG savings – while overcoming or avoiding the current harm from conventional biofuels.

Responding to controversy over harmful changes in land use, the RED further neoliberalises the environment through sustainability criteria for ostensibly protecting natural resources. The RED specifies eligibility for EU targets – e.g. what environments can be further industrialised for eligible biofuels, what must be the minimum GHG savings, and which biofuels gain a GHG-savings bonus. The latter optimistically assumes that they substitute for production and thus land use elsewhere.

Carbon accounting selectively quantifies some environmental effects, thus making nature administratively legible and calculable, while disregarding other environmental harm. For example, distinctions between 'high/low carbon stock land' reduce the environment to a single parameter of carbon accounting. This homogenisation dislocates agri-environmental changes from any local context and socio-cultural experience, in ways analogous to equivalence metrics in carbon–offset markets (cf. Bridge, 2001; Fairhead et al., 2012; Lohmann, 2011).

Amidst controversy over consequences for rural development, this has been imagined as beneficially incorporating rural populations into 'sustainable biofuel' production, mainly through agro-industrial methods. For example, crops will be selected or specially designed for cultivation on 'marginal land', thus supposedly avoiding conflicts with food production. In this imaginary, rural development primarily means employment opportunities, equated with higher individual income via waged-labour or contract farming. In ways analogous to carbon accounting, the focus on 'employment' obscures other resource usages, livelihoods and informal economies facing threats from resource grabs.

Despite widespread acknowledgement that indirect land-use change (ILUC) counteracts GHG savings, the 2009 Renewable Energy Directive did not count such effects. In subsequent debate about whether or how the RED should do so, ILUC became an implicit proxy for wider conflicts over the EU's 10% target. But the ILUC focus depoliticised the conflicts and reinforced the 10% target, while further marginalising opposition from North–South development NGOs.

When quantifying ILUC effects, expert reports incorporated assumptions which were criticised as over-optimistic. Counterposing more pessimistic assumptions, NGOs attacked EU sustainability criteria for 'carbon laundering', as grounds to impose GHG penalties on some biofuels. Industry opposed any such penalties, especially for undermining the 'investment climate' necessary to incentivise biofuel expansion and technoscientific innovation. Emphasising this imperative, as well as causal uncertainties about ILUC effects, in 2010 the European Commission further postponed any extra regulatory action.

In such ways, the EU policy framework depends on circular reasoning. Namely, the targets, narrow sustainability criteria and R&D funds together are necessary to stimulate innovation that would avoid the sustainability problems of early biofuels. Thus the policy framework presumes beneficent synergies between market forces, future technoscientific innovation, efficiency gains and environmental sustainability.

By default, the EU's political accountability for harm is reduced to efforts at accounting for carbon. The wider debate has been channelled into expert disagreements about carbon-accounting models and uncertainties. Biofuel critics have been drawn into expert procedures which obscure people's experiences of harm and dispossession in the global South. Economic growth has been discursively reconciled with climate protection (cf. Methmann, 2010) within a policy framework accommodating and naturalising the EU's greater demand for natural resources. By all those methods, the EU system can pursue global leadership for 'sustainable biofuels', while depoliticising its global plunder of resources.

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