WORLD GROWTH

OCTOBER 2010

The Issue of Indirect Land Use Change Associated with Biofuel Consumption

Submission to the European Commission

WORLD GROWTH

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Palm Oil Green Development Campaign

Alleviating Poverty through Wealth Creation

Palm oil provides developing nations and the poor a path out of poverty. Expanding efficient and sustainable agriculture such as Palm Oil Plantations provides small and large plantation owners and their workers with a means to improve their standard of living.

Sustainable Development

Sustainable development of palm oil plantations and growth of the palm oil industry in developing nations can and will be achieved through consultation and collaboration with industry, growers, lobby groups and the wider community.

Climate and the Environment

Palm Oil is a highly efficient, high yielding source of food and fuel. Palm Oil plantations are an efficient way of producing fossil fuel alternatives and capturing carbon from the atmosphere.

Opportunity and Prosperity

Developing nations must be allowed the chance to grow and develop without political intervention by environmental groups or developed nations. It is crucial that developing nations be given the same opportunities which developed nations have benefited from.

Property Rights

Efficient palm oil plantations and the growing demand for palm oil give smaller land holders greater opportunities to make a living off their land, maintain their ownership and support their rights to property and prosperity.

Submission to the European Commission on The Issue of Indirect Land Use Change Associated with Biofuel Consumption

Summary of Conclusions

1. **The analytical work undertaken to date on the issue of biofuel demand and indirect land use change at the global level does not provide a sound basis for the regulation of biofuel consumption.**

   - *Existing data on global land use are contradictory.* Although a variety of datasets of global land use exist, they give markedly different results.

   - *Assessing land use change is inherently difficult.* Rural land use change is a complex phenomenon, particularly in developing countries. It reflects the interplay of a wide variety of economic, social, legal, and biophysical factors.

   - *Modelling has not addressed all determinants of land use change.* To date most of the formal modelling studies that have been published on the issue of indirect land use change and biofuels have focussed on the commercial agricultural production and trade components of the issue. In doing so they have not sought to comprehensively address all the factors that influence land use change.

2. **Any action to address the greenhouse gas emissions from land use change should only be undertaken where the global economic benefits from the action can reasonably be expected to exceed its global economic cost.**

   - *Fundamental uncertainty over valuation of emissions.* The value of any reductions or additions to greenhouse gas emissions depends upon the different time paths in the global warming potential of global emissions between what is expected to occur over the longer term, with and without the land use change in question.

   - *Related developments in the US.* There have been similar moves in US to develop biofuel standards to ensure that net reductions in greenhouse gas emissions from their consumption. There seems to be a greater awareness among US policy makers, however, of the inherent risks involved in doing so and therefore greater caution in their policy development as a consequence.

   - *Regulation of biofuels is an inappropriate response to ILUC.* Attempts to prevent socially harmful land use changes by regulating production of individual biofuels are unlikely to be effective or economically efficient.

3. **It is not possible to draw reliable conclusions on whether, or to what extent, the impacts of any indirect land use change associated with a change in biofuel consumption has varied according to the type of feedstock that has been used to produce the biofuel in question, the geographical location of the land that is used differently as a consequence of the biofuel consumption, or how that land was managed prior to the change.**

4. **The far more sensible policy solution to the problem of socially undesirable land use change is for governments to contract with individual land owners and occupiers to get them voluntarily to forego making the land use changes that give rise to the problems in the first place.**

5. **Attempts to prevent socially harmful land use changes by regulating production of individual biofuels are unlikely to be effective or economically efficient. Both economic principles, as well as common sense, suggest that regulation works best when it directly targets the individual behaviour that gives rise to the harm in question.**

6. **The imposition of extremely stringent regulatory requirements on countries that export biofuel or biofuel feedstock, as the EU proposes to do, would be highly counterproductive — both in terms of international trade and bilateral relations.**

   There is no doubt that the approach proposed by the EU contravenes the spirit, if not the letter, of its obligations under the General Agreement on Tariffs and Trade of the World Trade Organisation.

Introduction

The EU Renewable Energy Directive directs the European Commission to prepare a report on the issue of indirect land use change associated with biofuel consumption.[1] The Commission is expected to present its report to the European Parliament and the European Council in December 2010.

The indirect land use change issue reflects concerns expressed in some quarters that, while biofuel feedstock may be grown on established crop land, some or all of any displaced cropping activity might involve conversion of environmentally sensitive land and emissions of greenhouse gases as a consequence. Accordingly, the Commission's report is to propose what the EU might do about this issue, including a methodology to measure the greenhouse gas emissions from any conversion that is indirectly caused by the consumption of biofuels in the EU.

Early in 2010 the Commission commissioned a number of analyses of different aspects of the issue. These analyses consist of three modelling analyses of the greenhouse impacts of indirect land use change, together with a review of the literature on this subject.[2] [3] [4] [5] The Commission has published the reports of these analyses together with a Consultation Document.[6] The latter seeks the views of interested parties on a series of specific questions to ensure the Commission's report reflects the latest thinking and evidence on the subject. It has sought responses by 31 October 2010.

This submission sets out World Growth's responses to each of the questions in the Consultation Document.

World Growth is a non-profit, non-governmental organization established to bring balance to the debate over trade, globalization, and sustainable development. World Growth embraces and celebrates globalization, as the replacement of trade wars with trade agreements is creating unprecedented levels of economic growth, social understanding and cultural richness.

Unfortunately, not everyone has welcomed the interconnected world in which we now live and we have seen a dramatic increase in protests against globalization, accompanied by attacks on corporations that do business on a global scale. The media profile of the anti-globalization movement has created a disturbing imbalance of information about international organizations and multinational businesses. World Growth seeks to restore balance to this debate by documenting how globalization promotes the health, wealth and freedom of those who are exposed to it.

1. Do you consider that the analytical work referred to above [the four studies published by the Commission], and/or other analytical work in this field, provides a good basis for determining how significant indirect land use change resulting from the production of biofuels is?

The analytical work undertaken to date on the issue of biofuel demand and indirect land use change at the global level does

1 European Union, 2009, 'Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009', *Official Journal of the European Union*, L 140/16- 45, 5 June

2 Joint Research Centre, 2010a, 'Impacts of the EU biofuel target on agricultural markets and land use: a comparative modelling assessment', European Commission, Luxembourg, June

3 Perrihan Al-Riffai, Betina Dimaranan, and David Laborde, 2010, 'Global Trade and Environmental Impact Study of the EU Biofuels Mandate', Report by the International Food Policy Institute (IFPRI) for the Directorate-General for Trade of the European Commission, March

4 Joint Research Centre, 2010b, ' Indirect Land Use Change from increased biofuels demand: Comparison of models and results for marginal biofuels production from different feedstocks', European Commission, Luxembourg

5 Energy Directorate-General [of the European Commission], 2010a, 'The Impact of Land Use Change On Greenhouse Gas Emissions from Biofuels and Bioliquids: Literature Review', An in-house review by the Energy Directorate-General for the European Commission's analytical work on indirect land use change, European Commission, Brussels, July

6 Energy Directorate-General [of the European Commission], 2010b, 'Indirect Land Use Change Impacts of Biofuels – Consultation', *Consultation Document*, European Commission, Brussels

not provide a sound basis for the regulation of biofuel consumption. This is true regardless as to whether the regulation in question were to be imposed by the EU or by any other jurisdiction in the world. The reasons supporting this conclusion are detailed below.

Existing data on global land use are contradictory

Any assessment of changes in global land use changes relies heavily on robust and comprehensive measurement of the different uses to which land is put around the world.

Although there are a variety of datasets of global land use, they give markedly different results. For example, they suggest that the global area of land under cultivation in 2000 was somewhere between 1,180 and 2,000 million hectares— a difference of nearly 70 per cent.[7] One of the datasets suggests the area under cultivation increased by 80 million hectares between 2000 and 2007, while another showed an increase of only 20 million hectares over the same period.

The datasets that generally have been used for this purpose are:

- FAO statistics: the FAOSTAT suite of food and agricultural databases (based on agricultural inventories)
- Mapping of land use: Global Land Cover 2000 (based on satellite maps), GlobCover 2005 (based on satellite maps) and the M3 Datasets (based on a combination of agricultural inventories and satellite maps)
- Mapping of forest areas: MODIS VCF (based on satellite data)
- Mapping of zones suitable for agriculture: Global Agro-Ecological Zones (GAEZ) 2002 (based on a recompilation of FAOSTAT data).[8]

The FAOSTAT suite includes ProdSTAT and ResourceSTAT. ProdSTAT has annual data on crop production and area harvested for each country in the world, while ResourceSTAT categorises land use in terms of arable land, permanent meadows and pasture, permanent crops, forest area (plantation and natural forest), and other land.[9] FAOSTAT — and GAEZ which recompiles the ResourceSTAT data — appear to be the only publically available datasets that have comprehensive information on the geographical distribution of global crop production, a critical input into any assessment of the land use changes due to biofuel consumption.[10]

As pointed out in the literature, the accuracy of the FAOSTAT databases is questionable.[11] They contain a significant number of values that have been estimated by FAO staff, which could result in unreliability or bias.[12] Although most of the concerns relate to the data on the smaller developing countries that lack a local auditing capacity, there are significant concerns about the quality of data reported by a number of the larger developing countries. This includes China where the crop production data are widely regarded as being understated.[13]

7 F. Ramos, O Gomez, and J-M Terres, 2009, 'Spatial allocation of extra areas resulting from land use change modeling', *Presentation to Workshop on Marginal Yields and Land Allocation in Land Use Change Emissions Estimates*, Brussels, 22 July

8 Ramos et al 2009

9 A. Bouët, L. Curran, B. Dimaranan, M-P. Ramos, and H. Valin, 2009, 'Biofuels: Global Trade and Environmental Impact Study', Report to the European Commission, ATLASS Consortium, 29 April

10 Energy Directorate-General [of the European Commission], 2010, 'The Impact of Land Use Change On Greenhouse Gas Emissions from Biofuels and Bioliquids: Literature Review', An in-house review by the Energy Directorate-General for the European Commission's analytical work on indirect land use change, Brussels, July

11 Energy Directorate-General 2010

12 Energy Directorate-General 2010

13 ADAS UK Ltd, 2008, 'Anticipated and potential improvements in land productivity and increased agricultural inputs with intensification', A study commissioned by AEA Technology as part of the Gallagher Biofuels Review for the Renewable Fuels Agency, UK Department for Transport, ADAS UK Ltd, Boxworth, UK, 21 May

Doubts have also been expressed about the reliability of the other datasets on global land use outlined above. There is, however, no consensus about which of the available datasets are best for assessing the impacts of land use changes due to changes in the consumption of biofuels.[14]

Assessing land use change is inherently difficult

Rural land use change is a complex phenomenon in all countries, but is particularly so in developing countries. It reflects the interplay of a wide variety of economic, social, legal, and biophysical factors. Many of these are difficult, if not impossible, to observe let alone measure with any precision. Many of them can exert an influence over land-use decisions over quite long time horizons. Most of them exhibit a high degree of geographical specificity and variability.

To take a specific example: the use of a particular parcel of non-residential land will depend upon the relative net economic benefits of its current and alternative uses to the occupier of the land.[15] These, in turn, will depend upon the stream of expected benefits and costs from each of the options, which the occupier is aware of, the occupier's discount rate[16], as well as the occupier's perception about the security of their tenure from the predation of others — be it private individuals or government officials. Many of these factors will be specific to the parcel of land in question or the locality in which it is situated. Others will be specific to the affected individuals.

In nearly all cases, a decision to change land use in the nature of an investment. The conversion nearly always involves resource costs — for example, in clearing away the existing vegetation and some or all of the physical structures so as to make way for the activities that will be required under the new land-use — as well as time costs — during the conversion process the owner or occupier will have to forego the economic return that was received under the former land-use.

The investor naturally expects to benefit from the conversion but only after these costs have been incurred. In some cases there is a considerable delay. For example, if crop land is converted to horticultural production, it can be up to a decade before the new trees reach their full potential in terms of productivity. After discounting the time stream of net benefits for the feasible options, the investor will only make the change if he or she perceives it as increasing the economic return value of the land in question.

For these reasons the assessment of the proximate causal factors that are associated with a particular land use change is inherently difficult. It stands to reason then that the assessment of the prior causal factors is even more challenging. The prior causal factors are, by their nature, rarely observed as they are occurring and even if they are, it can be difficult or impossible to demonstrate that they necessarily led to the subsequent change in land use that was observed. Accordingly, it is impossible to say that the introduction of a particular biofuel policy measure was essential to a particular parcel of land being subsequently converted to cropping, regardless as to whether the causal connection between the two events was direct or indirect.

In such cases, the best that can be done is to give some idea ex post of the probability that a given change contributed to the direction of the subsequent land use change, rather than to its extent. Such assessments generally need to be informed by economic modelling to maintain the internal consistency of what is generally a very complex analysis.

14 Energy Directorate-General 2010

15 The occupier may not be the formal owner of the land in question but he or she is likely, for all practical purposes, to have at least the first say in how it might be used

16 The discount rate is an individual's preferred trade-off between consuming a given quantity of resources at the present time compared to one year hence.

Modelling has not addressed all determinants of land use change

To date most of the formal modelling studies that have been published on the issue of indirect land use change and biofuels have focussed on the commercial agricultural production and trade components of the issue. In doing so they have not sought to comprehensively address all the factors that influence land use change. This includes the three modelling studies commissioned by the European Commission.[17] [18] [19]

In a sense, such a focus is understandable. The ability to use agricultural crops to make biofuel is well-established and virtually all cropland, or potential crop land, is a candidate to grow such feedstock if relative prices favour it. That potential exists with wheat, maize, sugar beet, sugar cane, oil seeds, and palm oil. Moreover, regardless of whether a particular feedstock is traded globally, the crops that they displace on-farm level are generally prominent in agricultural trade.

So an increase in the use of any one of these crops for biofuel will, to a greater or lesser degree, affect the supply of all these crops over the longer run. Cereals, sugar beet, sugar cane can all be used to produce ethanol. Rape seed, soy beans, and palm oil can all be used to make diesel. Cereals, sugar beet, and rape seeds are crop substitutes in much of the EU. Wheat, maize, and soy beans play a similar role in the US.

The EU modelling studies of indirect land use change are based on the application of both partial equilibrium and general equilibrium modelling approaches. A partial equilibrium model is a simplified quantitative representation of a single market — or a small group of highly inter-related markets. In contrast, a general equilibrium model seeks to capture, at some level of detail, all the key markets in an economy and all their significant inter-relationships.

In practice, the scope for applying either approach is severely limited by the paucity of the relevant data and the large gaps that exist in our empirical understanding of the relevant behavioural relationships. The latter are the relationships between price, on the one hand, and the quantities consumed and produced, on the other, for each of the inputs and products in question, particularly those relating to the use of land.[20]

Whichever modelling framework is used, to obtain robust and relevant results the analyse needs to address land use change in a way that captures the production and trade linkages involving all the crops that are potential farm production substitutes for crops that could be used as a biofuel feedstock, or could be used to produce substitute biofuels.

But that is not enough. Any analysis of the land use changes in land use that flow indirectly from changes in biofuel demand needs a far more comprehensive approach. It needs to address rural land use in its totality. Overall, rural land use is influenced by far more than simply the competition between cash crops within the farm sector.

Firstly, any analysis of rural land use should capture all the factors that determine all agricultural land-use and not just the use of crop land. This is particularly concerned with the role of pasture management, either for livestock production or as part of a long-cycle crop rotation process.

It also needs, however, to incorporate the factors that determine the other major rural land uses, particularly the use of

17 Joint Research Centre, 2010a, 'Impacts of the EU biofuel target on agricultural markets and land use: a comparative modelling assessment', European Commission, Luxembourg, June

18 Perrihan Al-Riffai, Betina Dimaranan, and David Laborde, 2010, 'Global Trade and Environmental Impact Study of the EU Biofuels Mandate', Report by the International Food Policy Institute (IFPRI) for the Directorate-General for Trade of the European Commission, March

19 Joint Research Centre, 2010b, ' Indirect Land Use Change from increased biofuels demand: Comparison of models and results for marginal biofuels production from different feedstocks', European Commission, Luxembourg

20 Thomas W. Hertel, Steven Rose and Richard S.J. Tol, 2008, 'Land Use in Computable General Equilibrium Models: An Overview', *GTAP Working Paper*, no. 39, Global Trade Analysis Project, Purdue University, Indiana

forest land or permanent grassland. The modelling analyses commissioned by the EU, however, largely ignore both the pasture and forestry linkages to the production of biofuel feedstock.[21] Moreover, more finely grained data than are currently available probably would be required for these relationships to able to be fully incorporated into such modelling.[22]

Secondly, any change in the demand for biofuel feedstock can be expected to alter rural land prices and the demand for labour in rural areas. There is clearly a relationship between the state of the rural economy — including land prices and demand for rural labour — and the rate of urbanisation.[23] There is also a relationship between subsistence agriculture and the state of the rural economy in many developing countries, particularly the poorer ones, given the share of their rural population that relies on subsistence agriculture for most, if not all, of their daily needs. Urbanisation has significant implications for emissions of greenhouse gases. The modelling studies that were commissioned by the EU, however, have not taken such impacts into account.[24]

Thirdly, the models used to date to address the land use issue have estimated the demand for each of the agricultural commodities in each country but it is unclear how they derive the area under cultivation in each case.

Ideally the translation of these demands into areas under cultivation should be endogenous to the model. This means that the model should incorporate the relevant behavioural parameters and assumptions regarding each of the different types of rural land use. These should encompass the full range of factors that influence overall land use decisions. These include but are not limited to:

- land tenure arrangements — including the nature of land title and the rights that they confer as well as the exclusivity, transferability and enforceability of those rights;
- proximity of economic infrastructure — such as roads, railways, irrigation, electricity, and telecommunications;
- nature and extent of the regulation of land use;
- taxation of land, land-use, and/or transfers of land titles; and
- availability of rural labour.[25]

On the other hand, it is clear that the conversion of particular types of rural land use to cropping — which is a key issue in the modelling of the interaction of land use change and biofuel consumption — is not endogenous in all of the modelling that has been published to date, including that commissioned by the EU.

Instead, this aspect tends to be is handled through independent modelling of the land-use issues. This means that there is no explicit and formal feedback mechanism linking the model of land use to the main model of the economy. In other words, the results from one model is unable to influence the results from the other, and vice versa. The whole point of using complex models is precisely to be able to take into account such feedback in a transparent and internally consistent way.

In recent years a substantial peer-reviewed literature on the interaction between land use change and biofuel consumption has emerged. A recent meta-analysis of this literature has con-

21 Energy Directorate-General 2010

22 Energy Directorate-General 2010

23 In developed countries this relationship needs to include the phenomenon of peri-urbanisation, also known as urban sprawl.

24 Energy Directorate-General 2010

25 Ecometricia, 2009, *A Practical Approach for Policies to Address GHG Emissions from Indirect Land Use Change Associated with Biofuels*, Technical Paper TP-080212-A,

cluded that, for most of the time, deforestation is due to a multiplicity of causal factors, rather than any single one, such as expansion of commercial agriculture, as is commonly believed.[26 27 28]

It looked at 152 case studies — 78 from Latin America, 55 from Asia and 19 from Africa — and identified four proximate causes — or direct drivers — of deforestation at the local level:

- agricultural expansion;
- timber harvest or wood extraction;
- development of infrastructure; and
- other causes — for example, predisposing environmental factors, biophysical factors, or social disruption.

In 25 per cent of the cases, three of these factors — agricultural expansion, wood extraction and infrastructure development — were all present. From an examination of them, the meta-analysis concluded that permanent cultivation, extension of transport infrastructure and commercial wood extraction were each present in more than 50 per cent of them but there were regional differences.

The meta-analysis also addressed the underlying or indirect drivers of deforestation. These are the fundamental processes that underpin the factors outlined above and which operate at either the local, national or global level. The study focused on five groups of these variables — economic; institutional; technological; cultural; and demographic — and found that they interacted synergistically. More than one-third of all the cases were driven by the full interplay between the economic, institutional, technological, and demographic variables.

For all these reasons, deforestation has to be addressed as a complex multivariate phenomenon. It cannot be rigorously analysed with a mechanistic approach; only a full systems approach is appropriate.[29] This conclusion has been strengthened by the results of more recent work.[30]

Overall there is little evidence that biofuel demand causes deforestation, directly or indirectly. In fact the key events that lead to the conversion of primary forest have often been underway for many decades before they were even officially identified, let alone properly measured and analysed. The regions of the world that have recently experienced first-time land conversion are characterized by market isolation, lawlessness, insecurity, instability, and a lack of clear and easily enforced systems of land tenure. Moreover, incremental degradation of the land, repeated and extensive fires, and shifting small plots for subsistence farming tend to occur long before any consideration is given to the choice of cash crops that that exposed to world commodity markets.

2. On the basis of the available evidence, do you think that EU action is needed to address indirect land use change?

In principle, any action to address the greenhouse gas emissions from land use change should only be undertaken where the global economic benefits from the action can reasonably be expected to exceed its global economic cost. Of course, one would expect that the EU would only be prepared to take any action when and where it expected that the EU member

26 Helmut J. Geist and Eric F. Lambin, 2001, *What Drives Tropical Deforestation?: A meta-analysis of proximate and underlying causes of deforestation based on subnational case study evidence*, LUCC Report Series no. 4, LUCC International Project Office, University of Louvain, Louvain-la-Neuve, Belgium.

27 Helmut J. Geist and Eric F. Lambin, 2002, 'Proximate Causes and Underlying Driving Forces of Tropical Deforestation', *BioScience*, 52(2), pp. 143-50

28 Eric F. Lambin, Helmut J. Geist, and Erika Lepers , 'Dynamics of Land-Use and Land-Cover Change in Tropical Regions', *Annual Review of Environment and Resources*, 28, pp. 205-41.

29 Alex de Sherbinin, 2002, *A CIESIN Thematic Guide to Land-Use and Land-Cover Change (LUCC)*, Center for International Earth Science Information Network (CIESIN), Columbia University, Palisades, NY, September [accessed at http://sedac.ciesin.columbia.edu/tg/]

30 Keith Kline, Virginia H. Dale, Russel Lee, Paul Leiby, 2009, 'In defense of biofuels, done right', *Issues in Science and Technology*, 25(3), pp. 75-84

states, at least collectively, would be net beneficiaries. In the same vein, every other country would have a similar expectation. All these expectations are perfectly understandable and reasonable.

Based on the research that has been undertaken to date it would be difficult to conclude categorically that the 'in principle' case for unilateral action by the EU, or any other jurisdiction for that matter, has been established on economic grounds. For the reasons that have been outlined in our response to the previous question, the uncertainties about the global state of rural land use and the relationship between greenhouse gas emissions from land use change and consumption of each biofuel are fundamental and would overwhelm the ability to derive a clear-cut result from any benefit-cost analysis at either a global or a jurisdictional level.

There are, however, fundamental uncertainties that are not specific to either land-use change or to biofuel production and consumption. One of these is the value to be placed on any reductions in emissions from preventing a given land use change from taking place. These uncertainties have caused moves in the US to put a moratorium on inclusion of indirect land use change in the US Renewable Fuel Standard. The EU should give serious consideration to following suit in relation to the treatment of the same issues under its Renewable Energy Directive.

Fundamental uncertainty over valuation of emissions

The value of any reductions or additions to greenhouse gas emissions depends upon the different time paths in the global warming potential (GWP) of global emissions between what is expected to occur over the longer term, with and without the land use change in question.

From a purely technical perspective, both scenarios involve severe estimation challenges. Some of the challenges are due to the profound variations in the atmospheric half-life of the different greenhouse gases. Some are due to differences in the composition of the emissions from different sources and in the composition of the emissions from the same source at different times.

To simplify the assessment, the IPCC has estimated GWP indexes for each of the major greenhouse gases over time horizons of 20, 100 and 500 years.[31] Although now widely used, the IPCC GWP indexes entail considerable value judgements in accounting for the overall warming potentials of the shorter-lived greenhouse gases, as against the potentials of the longer-lived ones. The problem is highlighted by the IPCC GWP index for methane, the second most important greenhouse gas and one of those most strongly associated with emissions from agriculture of from land use changes. Due to its relatively short half-life in the atmosphere, the GWP index for methane is 72 over a 20-year horizon but only 7.6 over a 500-year one, a difference of nearly ten-fold.

For the purposes of its Renewable Energy Directive the EU has adopted the 100-year indexes for the purpose of estimating the climatic consequences of the emissions associated with biofuels.[32] The 100-year index implicitly values a tonne of gas emitted in 100 years time the same as a tonne emitted today but places a zero value on a tonne emitted more than 100 years into the future. Such a treatment of time is arbitrary and inconsistent.

As indicated by the literature review prepared for the European Commission, there is a far more preferable alternative to the IPCC GWP Indexes.[33] This is to estimate the *accumu-*

31 P. Forster, V. Ramaswamy, P. Artaxo, T. Berntsen, R. Betts, D.W. Fahey, J. Haywood, J. Lean, D.C. Lowe, G. Myhre, J. Nganga, R. Prinn, G. Raga, M. Schulz and R. Van Dorland, 2007, 'Changes in Atmospheric Constituents and in Radiative Forcing', in S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.), 2007, *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

32 Energy Directorate-General 2010, p. 210

33 Energy Directorate-General 2010, p. 214

lated warming potential over the long term using a model that explicitly incorporates the physics of decaying concentrations of each of the greenhouse gases and then to discount the results to a common and commensurable basis.[34]

This would have the advantage of consistency of assumptions and their application over time. The application of an explicit, uniform, and non-zero discount rate makes far more sense that the discounting implicit in the GWP indexes of a zero discount inside the time horizon and 100 per cent outside of it. Although there is no consensus on the rate that should be used for the purpose of evaluating policy responses to climate change, there is broad agreement on the appropriate range, which provides a clear guide for the sensitivity testing that should be conducted around whatever rate might be chosen.

Related developments in the US

There have been similar moves in US to develop biofuel standards to ensure that net reductions in greenhouse gas emissions from their consumption. There seems to be a greater awareness among US policy makers, however, of the inherent risks involved in doing so and therefore greater caution in their policy development as a consequence. The EU would be wise to follow suit.

On 18 January 2007 the Governor of California issued an Executive Order to cut the carbon intensity of transport fuels sold in that State by 2020. The Order authorises implementation of a Low Carbon Fuel Standards (LCFS) measured on a full fuel 'life-cycle' or 'well-to-wheel' basis.[35]

In March 2009 the California Air Resources Board (CARB) issued the regulations to implement the Executive Order and explicitly included emissions associated with both direct and indirect land use changes.[36] Under the regulations, the mix of transport fuels sold in California has to meet a series of progressively more restrictive targets for greenhouse gas intensity over the period to 2020.[37] The rule-making has given rise to considerable controversy in California and the rest of the US, including at the Federal level.

In 2007 the US Congress passed the Energy Independence and Security Act (EISA). Among other things, the Act expanded the US Renewable Fuel Standard created by the *Energy Policy Act 2005* to encompass biodiesel as well as bioethanol and established mandatory 'life cycle' thresholds for emissions from US consumption of each.[38] The Act's definition of 'life cycle' emissions includes both 'direct emissions and significant indirect emissions such as significant emissions from land use changes'.[39] In May 2009 the US EPA gave notice that it proposed to regulate to modify the US Renewable Fuel Standard to include the emissions from all of the land use changes associated with US biofuel consumption, as required by the EISA.[40] The EPA proposal has also generated considerable controversy across the US.

On 26 June 2009, however, the US House of Representatives passed the *American Clean Energy and Security Bill* (also known as the Waxman-Markey Bill after its Congressional sponsors).[41] Among other things, the Bill includes a provision to direct the US EPA to exclude international indirect land use changes from the US Renewable Fuel Standard for a period of

34 Discounting takes account of individuals' consistent preference for consumption today over consumption tomorrow. The social rate of time preference is the trade-off that the community in question is prepared to accept to defer for one year the consumption of a given bundle of goods and services, or vice versa.

35 Office of the Governor, 2007, *Executive Order S-01-07*, Sacramento, California, 18 January

36 CARB [California Air Resources Board], 2009, LCFS - Low Carbon Fuel Standard: Proposed regulation to implement the low carbon fuel standard, 5 Mar 2009

37 Measured in terms of the 'life-cycle carbon intensity' of the fuel energy sold for transport purposes (grams of CO_2-equivalent emissions per megajoule of fuel sold).

38 Public Law 110-140 — 19 December 2007 — *Energy Independence and Security Act of 2007*

39 Section 204, Public Law 110-140

40 US EPA, 2009, 'EPA Proposes New Regulations for the National Renewable Fuel Standard Program for 2011 and Beyond', Regulatory Announcement, EPA-420-F09-023, Washington, DC, May

41 US House of Representatives 2454

five years. During this time, the Bill would mandate further research to be conducted with a view to developing more reliable models and methodologies for estimating the indirect land use changes due to US consumption of biofuels and Congress would then review the progress made in better understanding the indirect land use change issue before the EPA is allowed to rule on its inclusion in the US Renewable Fuel Standard.

The *American Clean Energy and Security Bill* is currently awaiting consideration by the US Senate, along with another Bill covering much the same ground that was passed by the Senate Committee for Energy and Natural Resources during 2009.[42] However, it has been widely reported that the Senate will not contemplate any climate change legislation during its current legislative term, which runs to the end of 2010.[43]

Regulation of biofuels is inappropriate response to ILUC

The EU Renewable Energy Directive sets biofuel consumption targets for each Member State requires Member States to implement whatever measures are necessary to achieve their national target.[44] Pursuant to the Directive, the Commission has developed sustainability criteria and compliance processes to ensure that eligible biofuels or the feedstocks used to produce them do not involve conversion of either biodiverse lands — such as forest, grasslands, wetlands, or peatlands — or areas specifically designated for environmental protection.[45] These requirements apply equally to domestically produced or imported products.

Under Article 18.4 of the Directive the Commission can negotiate bilateral or multilateral agreements with third countries to extend the Directive's sustainability criteria to their jurisdiction. Any biofuel or biofuel feedstock produced by such countries could be considered to comply with the Directive.

On 10 June 2010, the Commission announced that it would encourage industry, governments and NGOs to set up sustainable biofuel certification schemes for biofuels, including those imported by the EU. In doing so the Commission has laid down the requirements for such schemes to be recognised for compliance purposes under the Directive. The Energy Commissioner has stated that these requirements are the most stringent in the world.[46]

One of the main ones is for an independent audit of the whole production chain, from the farm to the filling station.[47] The audit has to be reliable and resistant to fraud, and involve a check of all the records kept by all participants, including a physical inspection of a sample of farms, mills and trading houses. In doing so, the auditor will have to check that the land used to grow the feedstock in question is in one of the eligible categories under the Directive. Such requirements are likely to be very expensive for third countries and their producers.

Attempts to prevent socially harmful land use changes by regulating production of individual biofuels are unlikely to be effective or economically efficient. Both economic principles, as well as common sense, suggest that regulation works best when it directly targets the individual behaviour that gives rise to the harm in question. In this case, regulation has to be

42 US Senate 1462, *American Clean Energy Leadership Bill 2009*

43 Carl Hulse and David M. Herszenhorn, 2010, 'Democrats Call Off Climate Bill Effort', *The New York Times*, 22 July [accessed at http://www.nytimes.com/2010/07/23/us/politics/23cong.html]

44 European Union, 2009, 'Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009', *Official Journal of the European Union*, L 140/16- 45, 5 June

45 European Commission, 2010a, 'Communication from the Commission on the practical implementation of the EU biofuels and bioliquids sustainability scheme and on counting rules for biofuels' (2010/C 160/02) , *Official Journal of the European Union*, C 160/8-16, 19 June

46 Günther Oettinger, 2010, 'Commission sets up system for certifying sustainable biofuels', *Press Release IP/10/711*, EU Commissioner for Energy, Brussels, 10 June

47 European Commission, 2010b, 'Communication from the Commission on voluntary schemes and default values in the EU biofuels and bioliquids sustainability scheme (2010/C 160/01), *Official Journal of the European Union*, C 160/1-7, 19 June

directed at those who have the right get to decide how the land in question may be used. The rights may be *de jure* (land owners) or *de facto* (land occupiers) and may be held individually or collectively.

This conclusion is confirmed by the OECD principles for improving the quality of regulation.[48]

- The policy problem should be precisely stated with clear evidence of its nature and magnitude, and an explanation of why it has arisen (identifying the incentives faced by the affected parties).

- Intervention should be based on clear evidence that action is justified, given the nature of the problem, the likely benefits and costs of action (based on a realistic assessment of government effectiveness), and alternative mechanisms for addressing the problem.

- Governments should carry out an informed comparison of a variety of regulatory and non-regulatory policy instruments, considering relevant issues such as costs, benefits, distributional effects, and administrative requirements.

As we have seen, the chain of causality that links a land use change in one period to the consumption of a certain biofuel in another period is highly complex and lengthy. The further downstream from the land use change the regulatory intervention is applied, the less effective and economically efficient that intervention is bound to be in controlling land use. In large part this reflects the fact that interaction with downstream factors will attenuate and redirect the impact of the regulation. Much of it will be dissipated or diverted away from influencing land use decisions that are a long way removed from them in time and space.

A simple illustration will suffice. In most developed countries, the legal obligation to preserve life and limb in the workplace is shared between employers, on the one hand, and their employees, on the other. Were these obligations to be shifted to the parents of the employers and their employees, the outcomes in terms of workplace injury can be expected to deteriorate. The parents are unlikely to have much, if any, knowledge of the risks to life and limb in the relevant workplaces or how best to avert those risks. Moreover, even if they posses such knowledge, their parental influence is likely to give them relatively little control over the behaviour in the workplace. Such a shift in the legal responsibility would thereby create additional economic costs in the management of health and safety in the workplace but would be ineffective in limiting workplace injury.

The regulation of land use change through biofuel consumption is a highly challenging task, even when both activities take place within the same jurisdiction. When the policy objective shifts to indirect land use change and change that occurs in another country from where the biofuel is consumed, then the complexity of the policy challenge rises enormously and the likelihood of successful intervention drops correspondingly.

When confronted with such complex policy challenges, larger economies have a tendency to think that they can simple extend the regulatory ambit to their smaller trading partners to oblige them prevent the undesirable land use change in question. They generally obtain the acquiescence of their trading partners by threatening to reduce any access their partners might enjoy to their domestic market. This is the approach used by the EU Renewable Fuel Directive. For a number of reasons it is fundamentally flawed.

Firstly other countries differ in the value that they place on environmental protection and the sacrifices that it necessarily entails. This is perfectly reasonable and entirely understandable. As with individuals, societies that are at different stages of economic development will necessarily value the benefits and costs of environmental protection quite differently. There

48 OECD, 1995, 'Recommendation of the Council Of The OECD on Improving the Quality of Government Regulation', OCDE/GD(95)95, Paris, 9 March.

is ample evidence that increasing wealth provides both the wherewithal and the wish to do more in terms of protecting the natural environment.

Secondly the imposition of extremely stringent regulatory requirements on countries that export biofuel or biofuel feedstock, as the EU proposes to do, would be highly counterproductive — both in terms of international trade and bilateral relations. There is no doubt that the approach proposed by the EU contravenes the spirit, if not the letter, of its obligations under the General Agreement on Tariffs and Trade of the World Trade Organisation. It is also likely to be viewed as 'environmental imperialism'. Having long since cleared their own extensive forests to allow for agriculturally lead economic development, the EU now wants developing countries to forego that option; it thereby shares in the benefits of preserving their forests without having to contribute towards the cost of doing so.

For the developing countries that accede to the EU Renewable Fuel Directive, fulfilment of their obligations to the best of their ability is unlikely to ameliorate the land use change that the EU judges to be desirable. Many of these countries lack the administrative capacity to administer their existing laws that regulate the use of their land, let alone reform them along the lines that have been proposed by the EU. Others already have dysfunctional regimes of land title and land law, such that their reform would be a precondition for improving land use outcomes.

Thirdly, using the EU Renewable Energy Directive to regulate land use change outside the EU would undercut the development of measures to reduce greenhouse emissions by those countries, which have committed to develop a global strategy to reduce such emissions under the United Nations Framework Convention on Climate Change (UNFCCC).

Under the global strategy envisaged by the UNFCCC each of the signatories in question is responsible for managing land use change within its jurisdiction so as one of the components in its national strategy for reducing emissions. This approach is based on the principle that each country should be allowed to select the combination of policy measures that will apply within its jurisdiction. The principle allows each country to be the judge of what may be expected to work best given its particular economic, social, and environmental circumstances.

Such an approach makes considerable sense. The knowledge required to design and implement each of the national strategies in question is highly dispersed. Much of it is informal and incapable of being formalised except at great cost. Collectively, these characterisations are known as the 'knowledge problem'. The 'knowledge problem' means that any attempt to centralise decisions on social or economic activities is bound to fail. This is true regardless of the organisation, where it may be located, or the extent of its formal legal powers.

The EU Renewable Energy Directive ignores the 'knowledge problem' and, in any event, it provides no practical solution to that problem. The Directive is based on the idea that the EU can determine a priori the policy parameters under which land use change is best managed by another country, with no knowledge of that country's economic, social, and environmental circumstances. This would not only be ineffective, it would be an intrusion into that state's rights under international law to manage its domestic affairs as it sees fit.

3. If action is to be taken, and if it is to have the effect of encouraging greater use of some categories of biofuel and/or less use of other categories of biofuel than would otherwise be the case, it would be necessary to identify these categories of biofuel on the basis of the analytical work. As such, do you think it is possible to draw sufficiently reliable conclusions on whether indirect land use change impacts of biofuels vary according to: (a) feedstock type; (b) geographical location; or (c) land management?

Given the nature and the extent of the uncertainties referred to in the previous two responses, it is not possible to draw reliable conclusions on whether, or to what extent, the im-

pacts of any indirect land use change associated with a change in biofuel consumption has varied according to the type of feedstock that has been used to produce the biofuel in question, the geographical location of the land that is used differently as a consequence of the biofuel consumption, or how that land was managed prior to the change.

As has been pointed out already, our knowledge of the behavioural relationships between consumption of biofuels and decisions regarding rural land use around the world is, at best, sketchy even when they are considered at the most aggregated level. It follows, therefore, that our knowledge of the underlying detail is significantly worse than that. This effectively precludes being able to place any confidence in a projection or forecast of the consequences of any given change in the demand for a particular biofuel feedstock on a particular land use in a particular country, especially when it is a developing one.

It follows therefore that the direction or the extent of any land-use consequences in one jurisdiction from a given policy action directed at the consumption of a particular biofuel in another jurisdiction cannot be forecast with any confidence.

4. Based on your responses to the above questions, what course of action do you think appropriate?

The EU Renewable Fuel Directive seeks to regulate land use change associated with biofuel consumption by setting strict quality standards for the biofuels that will be used by the transport sector in the EU. There have been similar moves in the US. Both have generated considerable controversy over the wisdom of this approach to addressing the adverse environmental consequences of land use change.

The key difference between the two approaches is that US policy makers seem to sense that they do not possess anywhere near enough information to be able to include, in the US Renewable Fuels Standard, the greenhouse gas emissions from any indirect land use changes associated with consumption of the biofuels that are covered by that Standard. Unfortunately the institutions responsible for policy in the EU collectively have not been wise enough to appreciate what they do not know. They have ignored the fact that to be effective and economically efficient regulation has to directly influence land use decisions.

The far more sensible policy solution to the problem of socially undesirable land use change is for governments to contract with individual land owners and occupiers to get them voluntarily to forego making the land use changes that give rise to the problems in the first place. Entering such a contract, however, would only be attractive to the land owners and occupiers in question if they were to be fully compensated for doing so. The compensation could take the form of either a series of payments over the contract period or a lump sum paid at the beginning of the contract.

This approach is valid regardless of the reason for the adverse land use changes and regardless as to where they occur. In the case where the land use changed in question are occurring in the developing countries, the governments of the concerned economies — such as the EU — would make the payments. The policy principles, however, would be essentially unchanged from those cases where a government pays its own land owners or occupiers to make the changes in question.

Other things being equal, a voluntary approach, such as this, is likely to be far more effective and efficient than the imposition of even highly differentiated regulatory controls on land use changes. This is so whether the regulatory controls in question are imposed by a government on its own citizens or extended to citizens of another country by agreement with their government.

Less differentiated regulatory controls are likely to be far worse in terms of effectiveness and economic efficiency, and outright prohibitions of such land use changes even worse still. Because such regulatory regimes are less-well-tailored to the individual cases that they affect, they will tend to some

prohibit land use changes that would have generated a net economic benefit to the community as a whole, even after accounting for their consequences for greenhouse gas emissions, while allowing other land use changes to proceed, which would represent a net economic loss.

It is true that any voluntary approach would probably involve a considerable burden in designing, administering, and enforcing the relevant contracts with individual land owners and occupiers. These costs are, however, unlikely to be any more onerous than what would be associated with a well-designed regulatory regime that successfully minimises such costs. Indeed to be as effective and as economically efficient as the voluntary approach, any regulatory option would have to mimic the outcomes from a well-designed system of voluntary contracts. That challenge is considerable and the chances of success are frankly slim.

Where land ownership or usage rights to land are held in common, it would, of course, be necessary to contract with the relevant group that holds the rights in question. From a technical perspective this issue is likely to complicate the analysis to a considerable degree. Nevertheless, they are unlikely to change the clear preference for voluntary solutions to the delivery of the desired outcomes on land use.

Concluding Comments

The EU Renewable Energy Directive has sets biofuel consumption targets for each of its member states, along with strict sustainability criteria for those biofuels or the feedstock used to make them. These criteria have been directed at preventing the conversion of primary forest or permanent grasslands to grow biofuel feedstock. More recently, however, concerns have been expressed about the possibility of forest and grasslands being converted to grow agricultural crops for traditional non-fuel uses as a consequence of the expansion biofuel consumption.

Palm oil has been at the forefront of these concerns. Environmental non-government organisations (NGOs), such as Friends of the Earth and Greenpeace, have campaigned strenuously and stridently against the use of palm oil, both as a biodiesel feedstock as well as a food additive or cooking oil. In doing so, these NGOs have asserted that palm oil is a net contributor to both greenhouse gas emissions and to tropical deforestation.

In their lobbying efforts they have been joined in a marriage of convenience with farmer organisations in the European Union (EU). The latter have seen this issue as an opportunity to press for an increase in the already considerable border protection that is enjoyed by EU farmers who grow biofuel feedstock from competition from abroad.

The current debate in the EU over biofuel made from palm oil has studiously ignored the importance of palm oil in the economic development of those developing countries that rely on producing or consuming this commodity.

Almost all the undernourished people in the world live in developing countries in tropical areas. In the Asia-Pacific region around 642 million people suffer from chronic hunger, while in Sub-Saharan Africa the number is 265 million.[49] Many of the world's poor are smallholder farmers in developing countries. They have the potential not only to meet their own needs but also to improve the food security of their economies and to accelerate their economic growth. Agricultural development is the only sustainable path to economic development for the bulk of the rural population of developing countries. Palm oil is important to rural development in many tropical countries and a major source of employment and prosperity. It offers substantial development opportunities not just in South-East Asia but also in Sub-Saharan Africa.

The debate over land use change in the developing world and its contribution to greenhouse gas emissions has generated

49 FAO [Food and Agriculture Organization of the United Nations], 2009, *The State of Food Insecurity in the World 2009: Economic crises – impacts and lessons learned*, Food and Agriculture Organization of the United Nations, Rome

much heat but little light. In part this reflects the paucity of comprehensive and reliable data on the state of global land use and how it has changed over time. It also reflects the poverty of our empirical understanding of the highly complex and lengthy process that is global land use change and the economic, technological, and demographic factors that drive it.

The recent policy moves in the UE and the US to promote the consumption of biofuels with a view to reducing greenhouse gas emissions have, paradoxically, only exacerbated that imbalance. Initially the concern was that forests were being cut down to grow biofuel feedstock. That concern has metastasised to the point where it now focuses on forest conversion to meet any increase in the demand for agricultural commodities as a consequence of policy measures to promote the consumption of biofuels.

As a consequence, both the EU and the US have recently moved to implement a quality standard for biofuels that allow for the impact of indirect land use change. In effect, both approaches seek to comprehensively regulate land use change elsewhere in the world by specifying the providence of the biofuel that may be consumed in their domestic market. While the US is moving to place a moratorium on implementation due to the considerable uncertainties involved in assessing the impact of indirect land use change, the EU is pressing on with its Renewable Fuel Directive.

This approach is neither an effective nor an economically efficient way to deal with this issue. Rural land use change around the world is driven by many factors and agricultural expansion is not even the most important of them. The only effective and economically efficient way of addressing this issue is at the source of the problem, by preventing or modifying the decisions of individual land owners and occupiers that give rise to the impacts in question.

When the source of the concern is located in one country and the source of the offending behaviour is in another, the imposition of regulatory controls by the former on the latter backed by threats to market access is fraught with difficulties in terms of operational practicalities, consistency with WTO principles, and implications for bilateral relations. The far more attractive solution in terms of policy effectiveness and economic efficiency is to be found in the concerned country contracting with individual land owners and occupiers to voluntarily achieve the desired result.

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