



LUND UNIVERSITY

Global Governance of Biofuels for Transport: Viewpoints of Key Stakeholders?

McCormick, Kes; McKinnon, Jeff; Fast, Stewart

2012

[Link to publication](#)

Citation for published version (APA):

McCormick, K., McKinnon, J., & Fast, S. (2012). *Global Governance of Biofuels for Transport: Viewpoints of Key Stakeholders?*. Paper presented at Earth System Governance Conference, 2012, Lund, Sweden.

Total number of authors:

3

General rights

Unless other specific re-use rights are stated the following general rights apply:

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

Read more about Creative commons licenses: <https://creativecommons.org/licenses/>

Take down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

LUND UNIVERSITY

PO Box 117
221 00 Lund
+46 46-222 00 00

Global Governance of Biofuels for Transport: Viewpoints of Key Stakeholders?

Kes McCormick^a, Jeff McKinnon^a & Stewart Fast^b

^a International Institute for Industrial Environmental Economics, Lund University, Sweden

^b Department of Geography, Ottawa University, Canada

Abstract: In the context of the emerging bioeconomy, the production and use of biofuels for transport is expanding rapidly around the world. This development presents both exciting opportunities and significant risks. Not least because biofuels are intimately connected to (and impacting on) food, water, climate and economic systems. The implications of different production chains and the international trade of biofuels is attracting interest from a range of actors across government, industry, society and academia. The purpose of this paper is to explore the viewpoints of key stakeholders (focusing on bioenergy, environmental, and scientific organisations) on the global governance of biofuels for transport. The key stakeholders investigated in this paper include: the World Bioenergy Association and the Global Bioenergy Partnership; Friends of the Earth and the World Wide Fund for Nature; and the Nuffield Council on Bioethics and the Scientific Committee on Problems of the Environment. This paper explores the governance of biofuels for transport through the analytical problems defined by the Earth System Governance Project, which encompass architecture, agency, adaptiveness, accountability, and allocation and access. With the analytical problems as a foundation, this paper argues that the global governance of biofuels demands critical attention.

Keywords: Biofuels, Governance, Stakeholders

Introduction and Background

Humans exploit biomass for many purposes. When it is utilized to produce heat, electricity or fuels for transport it is commonly called bioenergy. Biomass can be considered as “stored” solar energy because the process of photosynthesis “captures” energy from the sun in growing plants. Utilizing biomass for energy purposes is in fact tapping into the vast energy available from the sun. In a broader perspective, bioenergy systems comprise both the technical aspects of bioenergy, such as conversion technologies and biomass resources, and the overarching non-technical aspects of bioenergy, such as policies and actors. The term biofuels is used in different ways. Sometimes it refers to solid, liquid and gaseous fuels derived from biomass. In this paper, it refers to liquid biofuels for transport, including both first generation biofuels that exist today, and the more advanced second generation biofuels being developed and commercialised.

Broadly speaking the bio-economy represents a significant shift in socio-economic, agricultural, energy and technical systems. The concept of the bio-economy – also called the bio-based economy or the knowledge-based bio-economy in Europe – can be understood as an economy where the basic building blocks for materials, chemicals and energy are derived from renewable biological resources, such as plant and animal sources. This type of economy can meet the requirements of sustainability from environmental, social and economic perspectives. The bio-economy is being made possible by the recent surge in scientific knowledge and technical competences that can be used to harness biological processes. Significant advances can also be expected over the coming decades. Biofuels for transport are a key component of the fast-emerging global bio-economy.

The production and use of biofuels around the world has increased dramatically since 2000 promoted predominantly by government policies (Sorda, Banse & Kemfert, 2010). Looking to Europe, biofuels have been stimulated in the European Union (EU) by the Biofuels Directive, which ended in 2011 (EU, 2003). This support has been continued by the Renewable Energy Directive that defines binding targets for renewable energy in the overall energy mix of 20% and 10% renewable energy in the transport sector by 2020 (EU, 2009). The majority of the target for the transport sector is likely to be achieved by biofuels. Estimates suggest that biofuels will represent around 9% of the total energy consumption in transport in 2020 (EU, 2012). Furthermore, over 30% of the biofuels utilized in the EU in 2020 are expected to be imported (EU, 2012).

The main arguments to support the expansion of biofuels for transport can be summarized in three key points. Biofuels can reduce greenhouse gas (GHG) emissions, improve energy security, and promote rural and regional development. However, these benefits of biofuels are not without controversy. The main arguments against biofuels can be defined in four key points. Biofuels can result in direct and indirect land use change, affect food prices, some production chains for biofuels do not substantially reduce GHG emissions, and there are concerns over labour conditions and impacts on local communities, particularly in developing countries (Mol, 2007; German, Schoneveld & Pacheco, 2011). An underlying issue is that the demand for biofuels is predominantly in industrialized countries, while production will increasingly take place in developing countries, resulting in international trade and a complex North-South dimension (Lima & Gupta, 2009).

There are calls in academic, political, industrial and societal spheres to address the challenges associated with expanding biofuels through governance efforts at an international level (Lima & Gupta, 2009; Balis, 2009). While there are international agreements in place in areas that relate to biofuels, including climate, energy and agriculture, there are no agreements or frameworks that deal specifically with biofuels. Instead, international efforts have been in three main forms (Lima & Gupta, 2009). First, large multilateral organisations have addressed issues around biofuels through reports and studies. Second, forums and partnerships have been established to direct and promote the development of biofuels. Third, there have been initiatives that focus specifically on the sustainability of biofuels, mostly in the form of multi-stakeholder roundtables. Sustainability indicators and schemes have been a common output of all these efforts. This paper asks what the viewpoints are of key stakeholders (focusing on bioenergy, environmental, and scientific organisations) on how to design and shape the global governance of biofuels for transport?

Methodology and Framework

Launched in 2009, the Earth System Governance Project is a research initiative on Earth system governance, which is defined as follows: “*the system of formal and informal rules, rule-making mechanisms and actor-networks at all levels of human society (from local to global) that are set up to steer societies towards preventing, mitigating and adapting to environmental change and earth systems transformation*” (Biermann, 2007). Based on this definition, the Earth System Governance Project is advancing research around 5 analytical problems, including: the **architecture** or design of earth system governance; the role of **agency** and power relationships; the **adaptiveness** of governance mechanisms and processes; **accountability** and legitimacy or the democratic quality of governance arrangements; and **allocation and access** issues addressing questions of justice, equity and fairness (Biermann & Zondervan, 2011). In this paper, this is referred to as the 5A Framework.

In addition, there are 4 cross-cutting themes that are relevant to the 5 analytical problems and understanding of earth system governance, which encompass the role of power, knowledge, norms and scale. The starting point for the Earth System Governance Project is that global change is exposing gaps in social institutions for managing and responding to emerging global and local problems. The Earth System Governance Project has therefore identified 4 initial domains to focus research activities, which include the water system, food systems, climate system and economic system. This paper argues that biofuels systems could be included with these flagship activities (see Table 1). Not least because biofuels are intimately connected to (and impacting on) food, water, climate and economic systems. Additionally, a biofuels area would draw out the geopolitics and complexities of energy issues in a way that is not possible in the current domains.

Table 1: Organisation of the Earth System Governance Project

| | Power | Knowledge | Norms | Scale |
|------------------------------|--|-----------|-------|-------|
| Architecture | Food systems Water system Climate system Economic system <i>Biofuels systems</i> | | | |
| Agency | | | | |
| Adaptiveness | | | | |
| Accountability | | | | |
| Allocation and Access | | | | |

As suggested, this paper applies the analytical problems defined in the Earth System Governance Project to the global governance of biofuels for transport, focusing on the viewpoints of key stakeholders. The key stakeholders highlighted in this paper cover bioenergy, environmental, and scientific organisations (see Table 2). The 5A Framework is also tested in this paper as a way to scrutinise and examine the viewpoints of these actors. This paper is based on a literature review, encompassing the websites and documents of the selected organisations. Additionally, this paper draws on insights from interactions with a range of actors across government, industry, society and academia. This paper therefore represents a contribution to the discussion around the global governance of biofuels for transport rather than a comprehensive investigation of the viewpoints of key stakeholders.

Table 2: Background on Key Stakeholders

| Type | Organisation | Mission |
|------------------------|---|---|
| Bioenergy associations | World Bioenergy Association (WBA) | The stated purpose of the WBA is to promote bioenergy utilization in an environmentally friendly way. Members of the WBA include national and regional bioenergy organisations, institutions, companies and individuals. |
| | Global Bioenergy Partnership (GBP) | The GBEP promotes policy dialogue on bioenergy, facilitates cooperation internationally, supports national and regional bioenergy policy-making and market development, promotes the transformation of biomass use to more efficient and sustainable practices, and fosters information exchange skills and technology through multilateral collaboration. |
| Environmental groups | Friends of the Earth (FoE) | The FoE is an environmental group that campaigns on a range of environmental and social issues. It has actively campaigned against expanding biofuels. |
| | World Wide Fund for Nature (WWF) | The WWF is an environmental group that has a stake in many different sectors that cause environmental change. It is favourable to biofuels under certain conditions. |
| Scientific networks | Nuffield Council on Bioethics (NUFF) | The NUFF is an offshoot of the Nuffield Foundation. It is made up of 19 scientists from natural science, social science and the humanities in the UK. It was established in 1991 to fill a perceived need for a body that could review developments in biomedicine and biotechnology to make policy recommendations and stimulate public discussion. It has investigated the impacts of biofuels. |
| | Scientific Committee on Problems of the Environment (SCOPE) | The SCOPE is comprised of government organizations, science academies, universities, NGOs and industry. It published an assessment of biofuels involving 75 scientists. |

Analysis and Discussion

Bioenergy Associations

World Bioenergy Association

Established in 2008, the World Bioenergy Association (WBA) is a global organization that supports and represents a wide range of actors in the bioenergy sector. Priority areas for the WBA include sustainability, certification, standardization, and the associated impacts of bioenergy on food, land use, and water supply (WBA, 2012). There are several elements of WBA activity that relate to the 5A Framework. In fact, the WBA specifically addressed governance and a verification scheme in their report entitled “Certification Criteria for Sustainable Biomass for Energy” (WBA, 2010). The verification scheme they have designed aims to ensure biomass is developed in sustainable ways. This is further outlined in the document “Sustainable Biomass Verification Scheme” (WBA 2011). The WBA specifically addresses the *architecture* element of the 5A Framework by looking at the connections between local and international levels. The governance system arrangement suggested by the WBA has three important aspects to help ensure *accountability* and legitimacy. First, the WBA proposes that bioenergy producers will be inspected locally and that the self-assessment of local producers will be accurate, second, it will maintain the credibility of the local inspection through system verification, and third, the WBA argues it will ensure the credibility of the scheme internationally.

The WBA has proposed 15 criteria to ensure the sustainability of all forms of bioenergy (see Figure 1). The list of criteria “weakly” relates to *allocation and access* issues, for example, by suggesting that biofuels should contribute to local prosperity. The element of *adaptiveness* is also mentioned by the fact that the WBA stresses continuous improvement and exclusion of unacceptable practices. Turning to Europe, in order for the EU to reach the targets it has set out for 2020 it must rely on the import of biomass products from other countries more suited to production. Due to this fact national associations are not enough to ensure the risks of biomass production are dealt with effectively. *Agency* is mentioned in the WBA position paper by way of advocating itself as an international organization able to overcome the limitations of national industry associations in international trade markets for biofuels (WBA, 2010). The WBA mentions that it will work with the trade of biomass internationally by promoting technology and equipment, by harmonizing standards where they form a barrier to business, contribute to the development of simple and easy to use sustainability criteria, and support the development of world wide bioenergy development funds to finance bioenergy projects, and finally by spreading and minimizing project risks thereby improving returns (WBA, 2011).

Global Bioenergy Partnership

The Global Bioenergy Partnership (GBEP) and its partners comprise 23 countries and 13 international organizations and institutions with the intention of promoting policy dialogue on bioenergy, facilitating cooperation internationally, supporting national and regional bioenergy policy-making and market development, promoting the transformation of biomass use to more efficient and sustainable practices, and fostering information exchange skills and technology through multilateral collaboration (GBEP, 2011a). Another stated main function of the GBEP that connects to the *architecture* element of the 5A Framework is that they are a cross-cutting initiative working in synergy with other relevant activities to avoid duplications and promote

collaboration between diverse stakeholders. They have also published a document entitled “Sustainability Indicators for Bioenergy” that directly mentions several other aspects of the 5A Framework (GBEP, 2011b). The concept of *agency* is discussed through their encouragement of all stakeholders to take part in the use of these indicators from policy-makers to farmers.

Figure 1: Sustainability Criteria

| | WBA Proposed Criteria |
|-----|---|
| 1. | The use of chemicals |
| 2. | Forest/land management, planning |
| 3. | Forest/land monitoring |
| 4. | Contribution to local prosperity related to forest/land management, and the protection of employees |
| 5. | Provision of information to increase public awareness of management, planning, operations and/or outcomes |
| 6. | Protection of areas of particular historic, cultural or spiritual value |
| 7. | Maintenance or enhancement of the economic viability of operations |
| 8. | Maintenance of biological diversity |
| 9. | Protections of areas of high ecological value |
| 10. | Protection of the soil and prevention of erosion |
| 11. | Protection or enhancement of water quality |
| 12. | Regeneration following harvesting |
| 13. | The rights of children |
| 14. | Recognition and respect for the customary and traditional rights of indigenous/local people |
| 15. | GHG and energy balance |

Source: WBA, 2011

The indicators include contributions from 3 focus areas including environmental – led by the United Nations Environment Programme (UNEP), social – led by the Food and Agricultural Organisation of the United Nations (FAO), and economic – led by the International Energy Agency (IEA) (see Figure 2). In terms of *accountability* this set of criteria is not legally binding to GBEP partners, rather it is a way to identify progress towards or away from sustainable development paths as determined nationally (GBEP, 2011b). This represents a difficulty in establishing external legitimacy because the indicators system has little discussion of a verification scheme. *Allocation and access* are referred to throughout the document on “Sustainability Indicators for Bioenergy”. These indicators developed by the GBEP are comprehensive and incorporate many of the risks associated with biofuels production and trade. The GBEP also calls for continuous improvement of indicators to ensure that they are reviewed periodically in accordance with the site-specific factors that can effect production. This shows evidence of the *adaptiveness* aspect of the 5A framework with regards to a flexible system to evaluate the indicators.

Figure 2: Sustainability Indicators

| PILLARS | | |
|---|--|---|
| GBEP's work on sustainability indicators was developed under the following three pillars, noting interlinkages between them: | | |
| Environmental | Social | Economic |
| THEMES | | |
| GBEP considers the following themes relevant, and these guided the development of indicators under these pillars: | | |
| Greenhouse gas emissions, Productive capacity of the land and ecosystems, Air quality, Water availability, use efficiency and quality, Biological diversity, Land-use change, including indirect effects. | Price and supply of a national food basket, Access to land, water and other natural resources, Labour conditions, Rural and social development, Access to energy, Human health and safety. | Resource availability and use efficiencies in bioenergy production, conversion, distribution and end-use, Economic development, Economic viability and competitiveness of bioenergy, Access to technology and technological capabilities, Energy security/Diversification of sources and supply, Energy security/Infrastructure and logistics for distribution and use. |
| INDICATORS | | |
| 1. Life-cycle GHG emissions | 9. Allocation and tenure of land for new bioenergy production | 17. Productivity |
| 2. Soil quality | 10. Price and supply of a national food basket | 18. Net energy balance |
| 3. Harvest levels of wood resources | 11. Change in income | 19. Gross value added |
| 4. Emissions of non-GHG air pollutants, including air toxics | 12. Jobs in the bioenergy sector | 20. Change in consumption of fossil fuels and traditional use of biomass |
| 5. Water use and efficiency | 13. Change in unpaid time spent by women and children collecting biomass | 21. Training and re-qualification of the workforce |
| 6. Water quality | 14. Bioenergy used to expand access to modern energy services | 22. Energy diversity |
| 7. Biological diversity in the landscape | 15. Change in mortality and burden of disease attributable to indoor smoke | 23. Infrastructure and logistics for distribution of bioenergy |
| 8. Land use and land-use change related to bioenergy feedstock production | 16. Incidence of occupational injury, illness and fatalities | 24. Capacity and flexibility of use of bioenergy |

Source: GBEP, 2011

Environmental Groups

Friends of the Earth

Friends of the Earth (FoE) are an environmental group that campaign on a range of environmental and social issues. The FoE has several press releases and position papers related to biofuels development. In these documents, the FoE is critical of biofuels and does not support the use of biofuels currently but they do mention several elements of the 5A Framework that must be met for them to change their position. The FoE recognizes *architecture* as a key element to sustainable biofuels development. Focusing on Europe, the FoE states that the EU should take measures to address transport impacts on climate change by reducing demand for fuels, encouraging rail and sea transport, and introducing tougher EU policy on GHG emissions (FoE & ActionAid, 2012). This again shows that the biofuels issue must be embedded in other policy measures focused on the environment side of decision-making. The FoE also stresses the *agency* element of the 5A Framework insisting that stakeholders in developing countries must be involved in the development of sustainability criteria schemes. The cooperation of these stakeholders is needed as the expansion of biofuels is most likely going to affect them directly.

Accountability is discussed by the FoE in relation to sustainability standards. The FoE argues that most standards that have been developed “miss” key sustainability issues. They state that the EU has adopted a simple system that excludes social and macro effects. In addition they have exposed malpractices, such as illegal logging in rainforests related to biofuels production (FoE, 2007). The FoE argues that this shows that tougher enforcement and monitoring of practices is paramount to holding companies accountable. **Allocation and Access** is also addressed by the FoE in terms of the production of biofuels in which they mention that strict environmental and social criteria be developed for use that ensures that biofuels do not come into conflict with food production, do not result in displacement of people, are not grown in areas that are highly diverse or have sensitive ecosystems, conserve water quality and quantity, and have local ownership and control over biomass production in order to generate income for communities (FoE, 2007). The FoE mentions **adaptiveness** when talking about the development of sustainability standards that would ensure a democratic process that involves local and affected communities, which could change over time.

World Wide Fund for Nature

The World Wildlife Fund (WWF) is an environmental group that has a stake in many different sectors that cause environmental change. They have an official position document related to the development of biofuels with a specific focus on Europe, entitled “Position on Biofuels in the EU” (WWF, 2007). In this document, the WWF refers to the conditions that are necessary in order for the organization to support biofuels development and within it there are many of the elements of the 5A Framework. **Architecture** is a theme that the WWF stresses. WWF (2012) calls for the inclusion of sustainability criteria in legislation; support for multi-stakeholder roundtables and dialogues; and assistance for financial institutions and investors to apply environmental and social criteria to biofuels. Importantly, the WWF (2007) argues that the issue of biofuels must operate as a part of a larger goal to reduce consumption of fuels. In addition to this they mention the need for multi-level involvement of different stakeholders including representatives from forestry, agriculture, bioenergy production and trade, transport and the public. This brings forward the issue of power relationships and cooperation defined as **agency** in the 5A Framework.

The WWF highlights the topic of **accountability** and legitimacy, emphasizing the balance of opinions and perspectives needed to ensure “trust” in governance. The WWF also emphasizes the need to ensure that biofuels in fact reduce GHG emissions and that they are produced in sustainable ways. To do this they suggest a mandatory GHG certification scheme specifically for biofuels that are imported. This scheme touches on the **allocation and access** element of the 5A Framework albeit with strong priority given to minimizing biophysical risks addressing where biofuels are produced, ensuring integrity of high value forests and the biodiversity they harbour, how they are produced, ensuring integrity or improvement of water and soil resources, and finally food, water and land displacements that would ensure local communities will still be able to meet their needs without putting further unsustainable stress on the environment (WWF, 2011). The WWF (2012) also promote the development of a sustainability assurance system that will not use certification as a trade barrier. For the final element of the 5A Framework, the WWF mentions the need to continuously be developing these schemes through best practices and stakeholder involvement, meaning they need to meet the requirement of **adaptiveness**.

Scientific Networks

Nuffield Council on Bioethics

In 2011, the Nuffield Council on Bioethics (NUFF), who review developments in biomedicine and biotechnology, issued a report “Biofuels: Ethical Issues” (NUFF, 2011). The report sets out 6 principles for biofuels development including; 1) not at the expense of essential human rights (food, water, health, work, and land), 2) environmental sustainability, 3) net reduction in GHG emissions, 4) in accordance with trade principles, 5) equitable distribution of costs and benefits and 6) if the initial points are met, there is a duty to develop biofuels. The NUFF directs its recommendations toward international organisations and various UK government agencies, including research granting councils. Thus the *architecture* envisioned encompasses regional, national, and international institutions. In terms of the *agency* presumed of various actors, the NUFF presumes strong authority for itself by virtue of its scientific status. By directing recommendations at state and state-affiliated organisations, and not at other actors such as trade associations or NGOs, it also presumes the state is the “correct” agent to monitor and enforce rules on transport biofuels.

Turning to the issue of *accountability* the NUFF views governments as accountable and legitimate actors but at the same time it recognizes the legitimacy of non-state certification schemes like the Roundtable on Sustainable Biofuels and recommends that the EU and UK officials make compliance to these standards mandatory. The principles developed by the NUFF serve an additional function in that they identify the types of issues for which actors should be held accountable. In terms of *adaptiveness* the NUFF envisions changes between future and current biofuels and makes corresponding recommendations. For example, that granting agencies should promote research into biofuels with better GHG savings and recommend that future certification initiatives should not discourage decentralized production. Essentially though, the NUFF view their 6 ethical principles as a fundamental baseline equally applicable now as in future scenarios. Finally, concerns over *allocation and access* are given high priority by the NUFF and reflected in several principles, particularly on the equitable distribution of costs and benefits.

Scientific Committee on Problems of the Environment

The Scientific Committee on Problems of the Environment (SCOPE) is an organization comprised of government organizations, science academies, universities, NGOs and industry. It has a particularly strong affiliation with UNEP. It is governed by an international executive of scientists from universities around the world (SCOPE, 2012). In 2009, the SCOPE published an assessment of transport biofuels involving 75 scientists. The report issued several recommendations including: 1) promotion of best agricultural practices, 2) use biofuels from waste not energy crops, 3) second generation biofuels to be carefully promoted, 4) environmental costs will grow as production increases, 5) current mandates should be reconsidered, 6) conservation and reduced transport fuel demand should be required along with biofuels incentives, 7) certification schemes can enhance performance but need to incorporate measures of indirect land use change, 8) spatial inventories to help target biofuels production areas, and 9) policies to assure rural poor benefit from biofuels development (Howarth et al. 2009).

The audience for recommendations by the SCOPE is not always clear. Some recommendations, like the call to review mandates are directed at national governments, others favouring

development of certification schemes are to NGOs and industry. The actors responsible for governing biofuels are thus diverse. There is little distinction made between the *agency* of various actors in the SCOPE report, although the implication is that state authorities have the responsibility to guide biofuels developments in the directions that science (in this case as represented by SCOPE) tells them to act. Thus legitimacy and *accountability* are presumed to be through the existing authority of national governments, again with the view that certification schemes designed by non-state actors are positive. The SCOPE views itself as a legitimate actor by virtue of its scientific status and to some extent by its relatively apolitical sources of funding. The *architecture* of governance is not pursued from the perspective of different types of institutions but SCOPE does call for energy conservation to be part of governance efforts, which indicates that biofuels should be part of broader strategies on climate, energy and agriculture. In terms of *allocation and access* the SCOPE expects challenges in ensuring that any benefits of biofuels development accrue to the rural poor. As for *adaptiveness* the SCOPE is committed to publishing a more comprehensive review to stay up to date with changing conditions and developments.

Conclusions and Reflections

As discussed in this paper, the rapidly expanding market for biofuels presents both exciting opportunities and significant risks primarily because biofuels are intimately connected to (and impacting on) food, water, climate and economic systems. The implications of different production chains and the international trade of biofuels is attracting interest from a range of actors. The balance between benefits and risks depend largely on how biofuels are produced (which is directly affected by government policies) and wider efforts to promote sustainability. Tilman et al. (2009) state: “*biofuels done right can be produced in substantial quantities*”. Put simply, a key challenge for the governance of biofuels is to promote the “good” biofuels that produce multiple benefits, and prevent investments into “bad” biofuels (Timilsina & Shrestha, 2011). It is highlighted by many of the key stakeholders in this paper that biofuels must be part of broader strategies on climate, energy and agriculture in the context of sustainability.

All organisations studied in this paper discussed the need to address the risks (and potential benefits) associated with biofuels but there are few governance arrangements at an international level that can take on this challenge. The focus is currently on multi-stakeholder roundtables (such as the Roundtable on Sustainable Biofuels) and certification schemes, yet these are problematic and will take time and effort to develop and function effectively. Representation from exporting and importing nations of biofuels as well as a diversity of (small and large) stakeholders on roundtables is imperative to promote communication that could lead to meaningful discussions on global governance. However, it should be acknowledged that international conventions or organizations governing biofuels might be a “utopian” idea due to the complex North-South dimension of international trade of biofuels and achieving consensus on international principles could take years (if not decades). This challenges the basis of Earth system governance.

NGOs, particularly environmental groups, are certainly key drivers in the discussion of sustainability and biofuels, but it is clearly policy-makers who are the key actors in stimulating and shaping the market for biofuels. Bioenergy associations (and industry) and scientific networks are therefore focusing their attention on policy-makers. Clearly, this paper only

“scratches the surface” of the debate (focusing on bioenergy, environmental, and scientific organisations) on how to design and shape the global governance of biofuels for transport (see Table 3). A comprehensive investigation of the viewpoints of key stakeholders coupled with interviews would greatly improve understanding of this important topic, which is of growing relevance to the Earth System Governance Project and the flagship activities on the water system, food systems, climate system and economic system. Biofuels systems could (or should) be included in the Earth System Governance Project.

Table 3: Viewpoints of Key Stakeholders in the context of the Earth System Governance Project

| Element | Summary |
|------------------------------|---|
| Architecture | Architecture applies to biofuels in the sense that the risks (and benefits) associated with this sector are intertwined with other policy areas. A single international institution focused on developing policies for biofuels must interact with policies of nation states as well as with local stakeholders with an interest in biofuels. It is clear that the key stakeholders analysed in this paper have similar views on the need to incorporate regional, national and international elements to build a global governance system for biofuels. |
| Agency | Agency applies to biofuels because of the complex network of actors involved in this issue and who hold the power to act and influence policies. International organizations, NGOs, bioenergy associations and local communities all have different degrees of agency. It is clear that many actors engaged in biofuels realise the need for multi-stakeholder involvement from all of those who hold a stake in this issue. However, it is clear that power is unevenly distributed. Certification schemes appear to be viewed as a way to redistribute power to non-state actors. |
| Adaptiveness | Adaptiveness in the biofuels debate is well documented by the key stakeholders. Some organizations mention the need to continuously evaluate the basis for which their sustainability criteria is set whether through official review or through a democratic setting where the people and communities closest to the production can “voice” their concerns. The continuously developing market for biofuels, and the potential commercialisation of more advanced second generation biofuels, demand adaptability. |
| Accountability | Accountability poses a problem that is prevalent in the development of governance for biofuels. If biofuels are going to be governed effectively internationally from a sustainability point of view there must be participation of civil society in a way that balances different opinions and perspectives. In addition to this people and communities need to be reassured that actors involved in the production of biofuels are held accountable through verification schemes. Put simply, there must be “trust” between actors. |
| Allocation and access | In terms of allocation and access in the biofuels debate, the environmental and social risks can be shifted to developing countries while the benefits are accrued in industrialised countries. In order to ensure that risks are managed for the most vulnerable, it is imperative to have “strict” sustainability criteria, indicators or standards. However, given the regional differences and site-specific nature of the production of biofuels, getting all stakeholders to agree on universally acceptable criteria for sustainability will remain a challenge. |

References

- Balis, R. (2009) Constructing sustainable biofuels: Governance of the emerging biofuels economy. Proceedings from the Conference on the Human Dimension of Global Environmental Change, Amsterdam.
- Biermann, F. (2007) Earth system governance as a cross-cutting theme of global change research. *Global Environmental Change*, 17 (3-4): 326-337.
- Biermann, F. & Zondervan, R. (2011) *The Grand Challenges of Earth System Governance*. Lund: Earth System Governance Project.
- European Union (EU). (2003) Directive on the promotion of the use of biofuels or other renewable fuels for transport. 2003/30/EC.
- European Union (EU). (2009) Directive on the promotion of the use of energy from renewable sources. 2009/28/EC.
- European Union (EU). (2012) National Renewable Energy Action Plans.
URL: <http://ec.europa.eu/energy/renewables/>
- Friends of the Earth (FoE) & ActionAid. (2012) *The Bad Business of Biofuels*.
URL: <http://www.actionaid.org/>
- Friends of the Earth (FoE). (2007) *Agrofuels: Fuelling or Fooling Europe?*
URL: <http://www.foe.org/>
- German, L., Schoneveld, G. & Pacheco, P. (2011) Local Social and Environmental Impacts of Biofuels: Global Comparative Assessment and Implication for Governance. *Ecology and Society*, 16(4): 1-15.
- Global Bioenergy Partnership. (2011a). Purpose and Functions.
URL: <http://www.globalbioenergy.org/>
- Global Bioenergy Partnership. (2011b) *The Global Bioenergy Partnership Sustainability Indicators for Bioenergy*.
URL: <http://www.globalbioenergy.org/>
- Howarth, R., Bringezu, S., Bekunda, M., de Fraiture, C., Maene, L., Martinelli L. & Sala, O. (2009) *Rapid Assessment on Biofuels and the Environment: Overview and Key Findings*.
URL: <http://www.scopenvironment.org/>
- Lima, M. & Gupta, J. (2009) *Biofuels and Global Change: The Need for a Multilateral Governance Framework*. Proceedings from the Conference on the Human Dimension of Global Environmental Change, Amsterdam.

Mol, P. (2007) Boundless Biofuels? Between Environmental Sustainability and Vulnerability. *Sociologia Ruralis*, 47(4): 297-315.

Nuffield Council on Bioethics (NUFF). 2011. Biofuels: Ethical Issues.

URL: <http://www.nuffieldbioethics.org/>

Scientific Committee Problems of the Environment (SCOPE). (2012) About Us.

URL: <http://www.scopenvironment.org/>

Sorda, G., Banse, M. & Kemfert, C. (2010) An overview of biofuels policies across the world. *Energy Policy*, 38: 6977-6988.

Timilsina, G. & Shrestha, A. (2011) How much hope should we have for biofuels? *Energy*, 36: 2055-2069.

Tilman, D., Socolow, R., Foley, J., Hill, J., Larson, E., Lynd, L., Pacala, S., Reilly, J., Searchinger, T., Somerville, C. & Williams, R. (2009) Beneficial Biofuels: The Food, Energy and Environment Trilemma. *Science*, 325: 270-271.

World Bioenergy Association. (2012) About Us.

URL: <http://www.worldbioenergy.org/>

World Bioenergy Association. (2010) Position Paper on Certification Criteria for Sustainable Biomass for Energy.

URL: <http://www.worldbioenergy.org/>

World Bioenergy Association. (2011) Sustainable Biomass Verification Scheme.

URL: <http://www.worldbioenergy.org/>

World Wildlife Fund (WWF). (2012) Sustainable Bioenergy.

URL: <http://wwf.panda.org/>

World Wildlife Fund (WWF), Conservation International, International Union for Conservation of Nature (IUCN) & United Nations Environment Programme (UNEP). (2011) Joint Statement on the Launch of the Roundtable for Sustainable Biofuels.

URL: <http://wwf.panda.org/>

World Wildlife Fund (WWF). (2007) Position on Biofuels in the EU.

URL: <http://wwf.panda.org/>