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HIGH-LEVEL CONFERENCE ON WORLD FOOD SECURITY: THE CHALLENGES OF CLIMATE CHANGE AND BIOENERGY

Rome, 3 -5 June 2008

BIOENERGY, FOOD SECURITY AND SUSTAINABILITY – TOWARDS AN INTERNATIONAL FRAMEWORK

Table of Contents

	Paragraphs
Introduction	1
I. Bioenergy, Agriculture and Food Security	2 - 19
II. Bioenergy and the Challenges of Sustainable Development	20 -30
III. Managing Biofuels – The International Perspective	31 - 48
A. Global Bioenergy Policy Options Under Discussion	32 - 40
B. Towards an International Consensus on Sustainable Biofuels	41 - 45
C. Elements of an International Consensus	46 - 48
Appendix: Elements for international action on sustainable biofuels	

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Introduction

1. There is increasing international recognition that while growth in bioenergy offers new opportunities for sustainable agricultural development, it also carries significant risks. With use of current technologies and set policies, the growth in liquid biofuels is contributing to the rise of commodity prices and may have negative impacts on food security and the environment. While governments, the private sector and civil society can take important measures to promote sustainable production of bioenergy, many challenges are global in nature and cannot be tackled without a concerted international response. An international approach is needed to address the full spectrum of bioenergy applications including, most urgently, liquid biofuels for transport.

I. BIOENERGY, AGRICULTURE AND FOOD SECURITY

2. Bioenergy is energy produced from biomass such as energy crops, forestry residues and organic wastes. When biomass is produced in a sustainable manner, it is a renewable energy source. It stores chemical energy that can be used to produce power and heat as well as liquid and gaseous fuels. Much attention is currently paid to production of liquid biofuels for transport from food crops, the so-called first-generation biofuels.

3. The most important biofuels today are ethanol and biodiesel. Ethanol is produced predominantly from sugar cane and maize and, to a far lesser degree, from wheat, sugar beet and cassava. Biodiesel mostly uses rapeseed but also palm oil, soybean oil and jatropha.

4. Energy yield per ha is highest for feedstocks grown in tropical conditions, in particular sugar cane and palm oil. In addition to biofuel production, crops used for energy often provide co-products that can be used as animal fodder, fertilizers and combustion material. Biofuel production from ligno-cellulosic materials (i.e. woody and grass biomass), so-called “second-generation” biofuel technology, has the potential to increase energy yields per ha significantly, but is not yet commercially viable. In terms of overall biomass production, Eastern Europe, Latin America and sub-Saharan Africa have particularly high potential for expansion in view of abundant land resources, as long as environmental safeguards are respected.

Status

5. Total biomass contributed around 10 percent of the 470 EJ world primary energy demand in 2007, mainly in the form of non-commercial solid biomass for heating and cooking. Commercial bioenergy uses biomass to generate heat and electricity and to produce liquid biofuels for transport (approximately 1 percent of electricity and 1 to 2 percent of transport fuels respectively).

Definitions

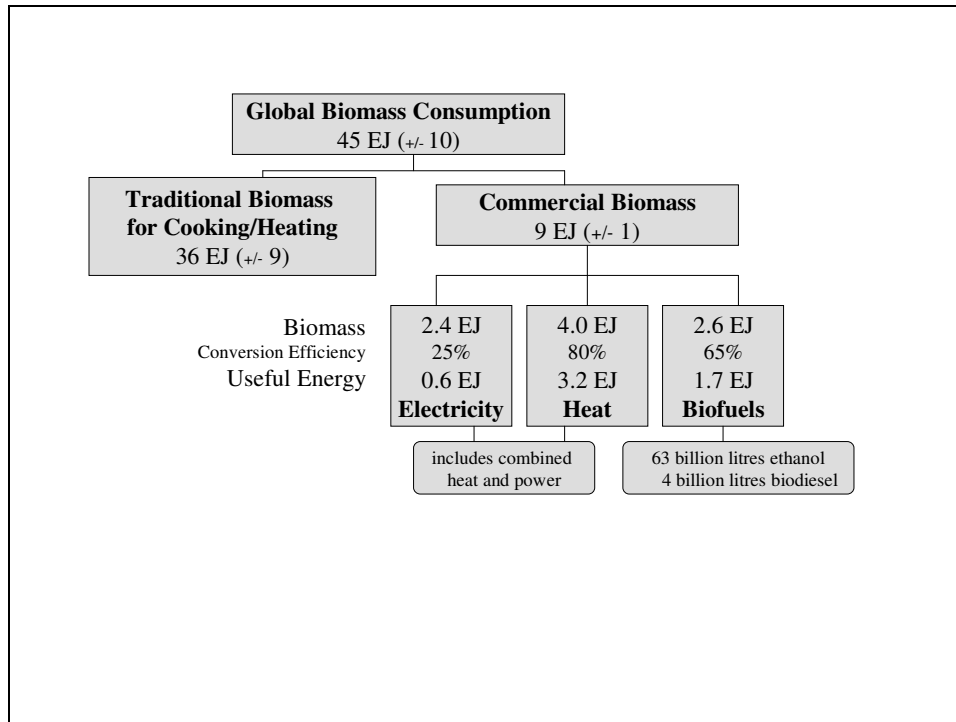
Biomass: non-fossil material of biological origin, such as energy crops, agricultural and forestry wastes and by-products, manure or microbial biomass.

Biofuel: fuel produced directly or indirectly from biomass such as fuelwood, charcoal, bioethanol, biodiesel, biogas (methane) or biohydrogen.

Bioenergy: energy derived from biofuels.

In this paper, unless specified otherwise, the term “biofuels” refers to liquid biofuels used for transport.

Figure: Contribution of biomass to global primary and consumer energy supplies in 2007¹



6. Sugar from Brazil and maize from the United States of America (USA) dominate global ethanol production. Together they comprise around 80 percent of global production. China, the European Union (EU) and India are other significant ethanol producers. In energy terms, ethanol accounts for almost 90 percent of the current total global biofuel use. Biodiesel, mostly produced and used in the EU (predominantly from rapeseed) and increasingly in Southeast Asia (oil palm) provides the remaining share. Ethanol trade has represented about 10 percent of world consumption in recent years, Brazil being the main exporter. The most important consumer markets are the USA and the EU.

7. In 2007, approximately 23 percent of USA coarse grain production was used to produce ethanol, as was about 54 percent of Brazil's sugar-cane crop. In the EU, about 47 percent of vegetable oil production was used in the production of biodiesel causing higher imports of vegetable oil to meet domestic consumption needs. In energy equivalence, the 2008 ethanol share of the gasoline transport fuel market in these countries is estimated at 4.5 percent for the USA, 40 percent for Brazil and 2.2 percent for the EU. The biodiesel share of the diesel transport fuel market is estimated at 0.5 percent for the USA, 1.1 percent for Brazil and 3.0 percent for the EU.

Trends

8. In its 2007 World Energy Outlook (WEO), the International Energy Agency (IEA) Reference Scenario projected that biofuels will meet 2.3 percent of world road-transport fuel demand by 2015 and 3.2 percent by 2030, up from around 1-2 percent today. In its Alternative Policy Scenario, it projects that production will rise much faster, to 3.3

¹ Best et al, 2008, *A Sustainable Biofuels Consensus*, Rockefeller Foundation, Bellagio Study and Conference Center, based upon IEA 2006, *World Energy Outlook 2006*, OECD/IEA, Paris, France and *World Energy Assessment Overview: 2004 Update*, UNDP, UN-DESA and the World Energy Council, 2004

percent by 2015 and 5.9 percent by 2030.² The estimates of biofuel growth in both scenarios may be conservative as they do not assume that second-generation biofuels will be commercially viable. The scenarios foresee a continuation of policies favouring domestic production, with Brazil, the EU and North America remaining the key producing regions.

9. In 2004, about 14 million ha of land were used for the production of biofuels, equal to about 1 percent of the world's arable land that was currently in use. However, land use has increased since. This share will rise to more than 2 percent in the Reference Scenario and 3.5 percent in the Alternative Scenario by 2030. If second-generation technologies based on ligno-cellulosic biomass were widely deployed, accounting for around one quarter of biofuels produced, overall production may be 60 percent higher with only a 0.4 percent increase in land requirements, according to a "Beyond Alternative Scenario".³ This is because, with the second-generation technologies, a significant share of the additional biomass needed is assumed to come from regenerated and marginal land not currently used for arable crops or pasture, as well as agricultural and forest residues and organic waste. In addition, the higher technological conversion efficiency of second-generation technologies could contribute to reducing feedstock requirements. However, realizing this potential will require significant improvement in agricultural efficiency in developing countries, as well as technological developments in the conversion of biomass into transportable pellets and liquids.

Drivers

10. Bioenergy growth is driven mostly by fossil fuel prices, agricultural feedstock prices and national policies. Rising oil and gas prices have made bioenergy more competitive for all applications – power, heat and transport. However, of all liquid biofuels, only Brazilian sugar-cane-based ethanol has been consistently competitive during recent years without continued subsidization. For all other technologies, support policies in the Organization for Economic Cooperation and Development (OECD) countries have been the critical factor driving growth, yet some technologies are increasingly becoming competitive with rising oil prices. The major policy objectives driving biofuel expansion are energy security, climate change mitigation, and agricultural and rural development. Government support typically takes the form of production subsidies and tax exemptions, mandates for fuel-blending and market share, and tariffs.⁴ These instruments have introduced market distortions that have favoured domestic production and, frequently, inefficient technologies. Market distortions also have hampered international trade, depriving developing countries of opportunities to build upon their comparative advantage in feedstock production.

² The Reference Scenario "is designed to show the outcome, on given assumptions about economic growth, population, energy prices and technology, if nothing more is done by governments to change underlying energy trends. It takes account of those government policies and measures that had already been adopted by mid-2007." The Alternative Policy Scenario, "takes into account those policies and measures that countries are currently considering and are assumed to adopt and implement." (IEA, WEO 2007)

³ Land-use figures relate to the 2006 IEA WEO projections of 3 percent by 2030 (Reference Scenario) and 5.2 percent by 2030 (Alternative Policy Scenario).

⁴ Mandates in the core consumer markets are 10% of biofuels as a share in transport fuel by 2020 in the EU and 36 billion gallons of biofuels in 2022 in the US. Other countries also have made commitments to biofuels in terms of mandates or financial support in recent years including Argentina, Australia, Canada, China, Colombia, India, Peru, the Philippines, South Africa and Thailand.

Energy and agriculture – the links

11. Energy and agriculture markets are closely linked, as agriculture both consumes and produces energy. Energy markets are much larger than agriculture markets which means that movements in the energy market affect agriculture more than vice versa. Rising oil prices have contributed significantly to the recent rise in agricultural commodity prices, in particular from intensive production systems that rely heavily on energy-intensive inputs such as fertilizer and mechanization. The growing biofuel market represents a new source of demand for agricultural commodities, and could reverse the declining trend in real commodity prices observed during the last decades. This presents new economic opportunities for the 2.5 billion people who depend on agriculture for their livelihoods. Biofuels are also a significant factor in recent commodity price hikes. Prices of maize and oilseeds have doubled during the last year while increasing demand and competition for land have exerted upward pressures on markets for substitute crops. The commercialization of second-generation biofuels that do not utilize food crops or compete for resources could reduce the pressure on commodity markets.

Safeguarding food security

12. Analysing the nexus between fuel and food is complex.⁵ Although there is a growing international consensus that the rapid increase in demand for biofuel feedstocks has contributed significantly to the current rise in food prices, its degree varies across countries and may not be quantifiable with certainty. From an aggregate perspective, there is enough food available to feed the world. The challenge lies in ensuring people's access to food. In addition, world food demand is expected to nearly double by 2050 and food security could be disrupted by more extreme weather events. These forces, combined with increased competition for land to produce biofuels, are of concern to some governments and international organizations.

13. With rising oil prices, low-income countries that are both food and energy importers are currently facing redoubled balance-of-payment pressures. Moreover, as world commodity markets become more integrated and changes in food prices on international markets affect domestic markets, biofuel production in one country will have important effects on food security in other countries. Price transmission between world markets and rural areas will depend upon domestic trade policies and infrastructure. Isolated areas that do not have access to markets are less affected by international price movements, but also have fewer possibilities to benefit from growing markets.

14. Consumers may be affected differently according to their dietary habits. For example, the type of food crops used for bioenergy, such as grains, may constitute a 40 percent share of one local diet yet 80 percent in another locality. In the big picture, from the perspective of food security, biofuel expansion may represent additional stress but also opportunities that affect all four dimensions of food security – availability, access, stability and utilization.

15. *Availability* of food can be threatened to the extent that land, water and other productive resources are diverted from food production to biofuel production. This competition for natural resources occurs whether edible or non-edible crops are cultivated for bioenergy purposes. The degree of competition among food, feed and fuel uses of biomass will hinge on a variety of factors, including crop selection, farming practices,

⁵ The Bioenergy and Food Security Approach (BEFS) of FAO provides the necessary analytical framework to assess the nexus.

agricultural yields and the pace at which next-generation biofuel technologies develop. Competition will affect availability less if non-edible perennial crops are cultivated on unused and marginal lands that do not provide subsistence functions for the most vulnerable. Food supply may be positively affected if the market for biofuel feedstock leads to new investments in agricultural research, infrastructure development and increased production.

16. *Access to food* refers to people's economic ability to access food as well as their ability to overcome barriers that stem from physical remoteness, social marginalization or discrimination on the basis of. The primary determinants of food security for the majority of poor people are their income levels and the cost of food. Higher food prices can cause substantial problems to net food consumers including agricultural labourers, the urban poor and the large proportion of rural poor without sufficient productive assets. Competition for resource inputs places upward pressure on food prices, even if the feedstock itself is a non-food crop or is grown on previously unused land. On the other hand, farmers who are net food producers are likely to benefit from higher prices. Bioenergy growth can boost incomes by revitalizing agriculture, providing new employment opportunities and increasing access to modern energy, which can stimulate rural development.

17. *Stability of food supplies* refers to those situations in which populations are not vulnerable to losing access to resources and other forms of livelihoods due to extreme weather events, economic or market failure, civil conflict or environmental degradation and, increasingly, conflict over natural resources. Further growth in biofuels could exert additional pressure on the stability of food supplies. The use of food crops (or crops which compete with them for land resources) for biofuels may establish an effective floor price for these commodities, and price volatility from the petroleum sector will be more strongly transmitted to the agricultural sector, increasing the risk of food insecurity. This impact will be enhanced as import dependence is expected to grow for most low income food deficit developing countries, and as price transmission increases between global and national markets with greater market liberalization and the forces of globalization.

18. *Utilization of food* refers to peoples' ability to utilize, i.e. absorb, nutrients. This is closely linked to health and nutrition factors, such as access to clean water, sanitation and medical services. If biofuel feedstock production competes for water supply, it could make water less readily available for household use, threatening the health status and, thus, the food security status of affected individuals. On the other hand, small-scale production of bioenergy in rural areas may reduce reliance on fuelwood, which means less pressure on the forest and less burden for women who usually are tasked with collecting fuelwood. In addition, there would be less health risk for household members who would no longer have to inhale the smoke from cooking with fuelwood in enclosed spaces.

19. In summary, all four dimensions of food security may be affected differently. Most likely, food security may improve for some people, while others will experience deterioration. The exact net outcome will depend on the socio-economic structure of society, as well as on the specific commodities whose prices increase and the relative wealth of the farmers who produce the commodities that have experienced the price increases. Negative effects may violate an individual's human right to food, a legal right enshrined in the International Covenant on Economic Social and Cultural Rights which is binding upon 156 States. On the basis of the right to food, the covenant obligates governments to provide food and other assistance for those who cannot feed themselves,

to the extent that resources permit. Right to food obligations will have to be interpreted in the specific context of biofuels development.

II. BIOENERGY AND THE CHALLENGES OF SUSTAINABLE DEVELOPMENT

20. To develop the full potential of bioenergy, growth has to be managed in a sustainable way to meet requirements related to the economic, social and environmental dimensions of sustainability. Much progress has been achieved in the local and global debate on criteria and mechanisms to achieve sustainability in various fields and for different products, particularly through multistakeholder and producer-consumer partnerships. The emerging biofuel market should build upon these lessons.

Economic dimension

21. In theory, bioenergy is economically sustainable if it is financially viable after all direct and indirect impacts –both positive and negative – have been accounted for. Policies can promote economic sustainability of bioenergy by rewarding those technologies and systems that perform well in terms of social and environmental impacts, for instance net greenhouse gas (GHG) reduction. By stimulating innovation and improving productivity over time, performance-based policies can promote dynamic efficiency. This is essential if the sector is to remain economically sustainable over time and bring economic opportunities to those who depend on the agricultural sector. Barriers to international trade constrain economic sustainability by hindering the exploitation of the most efficient production paths.

22. The economic dimension is critically linked to the scale and method of production, and the use of and impacts on human and natural resources discussed below.

Social dimension

23. Impact on food security is one of the core social factors to be considered in bioenergy development. Other factors include opportunities for pro-poor rural development, income generation through productive activities or employment, land access and labour conditions. The growing market for biofuels presents new income opportunities for agricultural producers, including smallholders. However, benefit distribution at household level may not be equal, with evidence suggesting that increased cash returns to farming disproportionately benefit male household members. The social impacts of biofuel development will depend upon the feedstock and the production system chosen. If economically viable, small-scale cultivation of crops such as jatropha and on-farm or community-level use of crude vegetable oil can revitalize rural economies by improving mechanization, irrigation and transport and decentralizing energy supply. In addition, biofuel production provides by-products and co-products such as glycerine, livestock feeds and fertilizers.

24. However, comparative experiences indicate that production of some biofuels, in particular ethanol, is more competitive if it relies on economies of scale related to large-scale industrial production. This is due to the high investment cost related to processing. While the employment generation potential, particularly for unskilled labour, may be significant, preliminary evidence hints at a rapid pace of mechanization and simultaneously a decrease of manual workforce. In addition, labour rights and socio-economic conditions in large-scale biofuel plantations can be precarious. Female workers tend to be particularly disadvantaged. Large-scale development also puts pressure on land. Increasing land value may strengthen the asset base of land holders, but make lease or purchase of land unaffordable for the landless. In situations of insecure land tenure, large-

scale developments may lead to displacement of vulnerable households with indigenous communities particularly at risk.

25. Small-scale and large-scale production systems must not be mutually exclusive. Governments can promote the adoption of contract farming in which the processor purchases the harvests of independent (smallholder) farmers under terms agreed to in advance through contracts. Further, assisting smallholders in building cooperatives, marketing associations, partnerships and joint ventures, and coordinating their supply into larger production facilities will benefit smallholder participation in biofuel markets just as it holds potential for other agricultural markets.

Environmental dimension

26. Bioenergy production affects the environment at the local and global levels, impacting land and water resources, biodiversity and the global climate. Although there are environmental impacts throughout the production chain – feedstock production, conversion and use – most impacts occur in the feedstock production stage and mirror those related to agricultural production in general.

27. *Climate change mitigation:* Mitigation of climate change is a policy goal of bioenergy development in many countries. However, life-cycle analyses that measure emissions throughout the bioenergy production chain indicate a wide divergence in carbon balances according to technologies used, locations and production paths – with some even leading to greater emissions than fossil fuels. Key sources of emissions are land conversion, mechanization and fertilizer use at the feedstock production stage, and the use of non-renewable energy in processing and transport. Systems that use organic waste and residues from agriculture and forestry, or perennial energy plants on degraded land, offer high potential greenhouse gas (GHG) emissions savings. The impact of land-use change, an aspect of particular importance in the carbon balance, remains clouded in uncertainty. When land with high carbon content, such as forest or peat land, is converted to grow biofuels, the immediate resulting carbon balance is inevitably negative, with conversion creating “carbon debts” that could take decades or even centuries to “repay”. In addition, a comprehensive carbon balance assessment must take into account “indirect” land-use change which refers to emissions from land in which biofuel feedstock replaces food crops. Such indirect effects are notoriously difficult to attribute and measure. The extent of land-use change caused by bioenergy growth depends upon the potential for intensification. Some further yield improvements on existing land will be possible in response to rising prices, in particular through increased input use and improved management practices. However, improved bioenergy feedstock technologies are still in the development stage so, in the short run, the lion’s share of increased production is likely to come from area expansion. The faster the growth in the market, the greater the likely negative impact on land-use.

28. *Biodiversity:* The threat to wild biodiversity from bioenergy growth is associated primarily with land-use change. When areas such as natural forests are converted for feedstock production, the loss of biodiversity may be significant, even if land expansion is a temporary phenomenon. A further concern is the introduction of invasive species for biofuel production. Agricultural biodiversity could be affected by large-scale monocropping practices and the introduction of genetically modified materials.

29. *Water and soil:* Many feedstocks – including sugar, palm oil and maize – are highly water intensive, meaning that their expansion is likely to create even greater competition for this already scarce resource, depending upon location and production methods. Liquid biofuels already account for approximately 1 percent of water transpired

by crops and 2 percent of irrigation water.⁶ Feedstock production also affects downstream water quality through run off of fertilizers and agrochemicals, and soil erosion. The impact of feedstock production on soil erosion depends critically on the farming techniques that are employed, in particular on the use of tillage practices, the level of soil cover and crop rotations. Where perennial bioenergy feedstocks replace annual crops, the permanent cover and root formation will help improve soil management and reduce soil erosion.

30. The adoption of good agricultural practices, such as no tillage and direct seeding, retention of soil cover, multiple cropping, appropriate crop choice and crop rotations, can mitigate negative impacts, in particular on carbon, soil and water resources. The application of these practices also can reduce the threat to biodiversity, particularly soil biodiversity, through the retention of crop residues and diversified crop rotations. Wildlife habitats can be enhanced by introducing landscape approaches in agricultural areas and retaining ecological corridors, as well as by careful and sustainable use of high-biodiversity biomass sources, such as grasslands, as feedstocks. Furthermore, non-food cropping systems could enrich agrobiodiversity. Promoting integrated local food-energy production systems, by combining feedstock production with crop production and feeding livestock on biomass not used for energy production or soil cover, can avoid waste and increase the overall system productivity for food and energy.

III. MANAGING BIOFUELS – THE INTERNATIONAL PERSPECTIVE

31. Bioenergy development, particularly the expansion of liquid biofuels, has reached a critical juncture. Governments, international organizations, the private sector, civil society and academia appear to be divided on many important issues. Some argue that the pathway taken should be continued, others advise caution or deem the climate change biofuel-based “cure” as “worse than the disease”. The different viewpoints on the way forward can be summarized under three main options: business as usual, moratorium and intergovernmental consensus building.

A. GLOBAL BIOENERGY POLICY OPTIONS UNDER DISCUSSION

Policy option 1: Business as usual

32. The “business as usual” option entails continuing along the path taken so far. Each country would proceed in setting and revising policy frameworks in line with national interests, taking into account international implications of policy decisions only where these are compatible with domestic priorities. Proponents of this approach point out that it is precisely the large uncertainties surrounding the exact impacts of biofuel growth that favour an approach in which a nascent market is not “strangled” before it has had time to develop and show its full potential. Proponents also highlight existing conflicts of interest and point to the difficulties in aligning views and interests along an international agenda.

33. The “business as usual” approach may be able to put some safeguards in place to mitigate negative impacts of biofuel growth through concerted national efforts, yet it cannot fully address issues with global repercussions such as negative impacts on food security and the environment. If those negative impacts continue to increase, it is likely that an increasingly hostile public opinion will turn against biofuels for good, thereby eliminating a market that has real potential to meet economic, environmental and social

⁶ Sugar production in Brazil and maize production in the USA is predominantly rainfed.

objectives. Without an international agreed standard, the desire expressed by many governments to start certifying sustainable biofuels may face serious obstacles, not least under international trade law considerations.

Policy option 2: Moratorium

34. The “moratorium” option denotes a temporary prohibition of production. There have been calls for global all-encompassing and feedstock-specific moratoria on biofuel production, to allow time for technologies to be devised and regulatory structures to be put in place. The UN Special Rapporteur on the Right to Food, among others, has called for a five-year moratorium to protect against negative environmental, social and human rights impacts and suggested that measures be put in place during such a moratorium to ensure that biofuel production has a positive impact and respects the right to adequate food. Such measures may include, *inter alia*, the reduction of overall energy consumption, energy efficiency, an immediate move to second-generation technologies, and protection for food insecure and small-scale farmers.

35. Such a global moratorium may not be differentiated enough and may only postpone the much needed quest for better technologies and smart regulatory solutions. Also, the call for immediately leap-frogging to second-generation biofuels may be unrealistic, given the lack of second-generation experience and investment potential in nearly all developing countries. Conversely, it might prevent or discourage countries from participating in the global learning on biofuels. Further, a global moratorium would most likely not do justice to the country- and site-specific complexities of the bioenergy-food security nexus. The one-size-fits-all option appears too rigid to capture dynamic developments and potentially positive effects on rural development, climate change and food security. By banning the nascent industry, investment could stop abruptly, existing ventures might not recover and interest in research and development vanish. This would delay or prevent the much needed quest for technological innovation and knowledge creation backed by practical experiences.

36. Finally, it is far from clear how a moratorium can be put into practice. A moratorium on feedstock production does not seem feasible as many feedstocks are also food crops and, at the production stage, it is not possible to distinguish what the final use will be. At the processing and supply stages, a moratorium could mean a number of things, such as a ban on new capacity/investments, a ceiling on production/sale or prohibition of an activity, all with very different impacts on the industry. In policy terms, a moratorium also could imply the abolition of national mandates or targets, or of public financial support for the industry.

37. Depending upon the option chosen, a moratorium may be virtually impossible to implement and enforce and also distract policy-makers from the need to design smart regulations that create the right enabling environment for sustainable bioenergy development.

Policy option 3: Intergovernmental consensus-building on sustainable biofuels

38. The option to build an international consensus on sustainable biofuels assumes that domestic policy measures or industry-based consensus-building are necessary, but may not be sufficient for sustainable biofuel development. The concern for food security relates in particular to the effect of commodity price impacts on the vulnerable, and these price impacts arise in global markets. A number of key sustainability challenges, in particular the mitigation of climate change and the protection of biodiversity, relate to the

provision of global environmental goods and services which, by definition, cannot be guaranteed at national level alone.

39. The need for a global response to the challenges of climate change, biodiversity and food security already has been recognized in international commitments and conventions. An internationally agreed approach is also indicated, as demand for biofuels is concentrated in developed countries and the supply potential lies primarily in developing countries.

40. An intergovernmental consensus might take the form of a forum for knowledge exchange and capacity building, a code of conduct with international guidelines, or a new agreement or an annex to an existing agreement (discussed below). It is worth noting that the consensus may incorporate elements from policy options one and two, by delegating authority for industry to self-regulate certain aspects, or establishing short-term partial and differentiated moratoria to achieve a specific purpose.

B. TOWARDS AN INTERNATIONAL CONSENSUS ON SUSTAINABLE BIOFUELS

Existing instruments and initiatives to be considered

41. Both governments and the private sector have requested that FAO assist in establishing a consensus on bioenergy, particularly liquid biofuels. This interest became evident in the preparatory process for the 2008 High-Level Conference. Although there is no formal international agreement or intergovernmental mechanism to deal with bioenergy or biofuels, several existing treaties and initiatives that touch upon issues related to food security, energy, environment, trade and human rights are relevant to bioenergy. In building international consensus on sustainable and food security-compliant biofuels, governments may wish to integrate elements or draw from the experiences of the existing agreements (Box 1).

Box 1: International Instruments of Relevance to Bioenergy, Food Security and Sustainability

The 1992 **United Nations Framework Convention on Climate Change** (UNFCCC) supports bioenergy as one of the “precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects”, requiring that these measures “take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors” (art. 4). The 1997 **Kyoto Protocol** to the UNFCCC recognizes the importance of renewable energy as a contributor to mitigating climate change. The Clean Development Mechanism (CDM) created under the Kyoto Protocol’s Article 12 attracts international carbon funding for bioenergy projects, with a view to assisting developing countries in achieving sustainable development and enabling industrialized countries to comply with their quantitative emission reduction targets under the Kyoto Protocol. The 1992 **Convention on Biological Diversity** (CBD) is relevant to sustainable bioenergy development as it commits parties to biodiversity conservation, the sustainable use of its components and the fair and equitable sharing of benefits arising from the use of genetic resources. The CBD objectives apply to bioenergy insofar as the Convention addresses feedstocks both as a component of biodiversity and as a habitat for terrestrial biodiversity. Key CBD obligations include establishing protected areas, restoring or rehabilitating degraded ecosystems and preventing the introduction of invasive alien species (art. 8); introducing environmental impact assessment for projects likely to have adverse effects on biodiversity (art. 14); and involving local populations and the private sector in sustainable use (art. 10). The **International Treaty on Plant Genetic Resources for Food and Agriculture**, negotiated by the FAO Commission on Genetic Resources for Food and Agriculture, aims at the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising from their use. The Treaty applies to all genetic materials of plant origin of actual or potential value for food and agriculture (art. 3). However, under the Treaty’s Multilateral System of Access and Benefit-Sharing, access to certain crops and species listed in Annex I shall be provided solely for the purpose of utilization and conservation for research, breeding and training for food and agriculture, “provided that such purpose does not include chemical, pharmaceutical and/ or other non-food/feed industrial uses” (art. 12.3(a)).

The 1992 **United Nations Convention to Combat Desertification** (UNCCD) binds parties to improving land productivity; fostering land and water rehabilitation, conservation and sustainable management, and improving living conditions, in particular at the community level (art. 2); targeting poverty reduction (art. 4) and ensuring the involvement of local communities (art. 3).

Several trade agreements apply to biofuels. The **General Agreement on Tariffs and Trade 1994** (GATT) governs all trade in , which includes ‘goods’ trade in biofuels. It commits countries to a liberalized trade regime through the lowering of tariffs with each round of international trade negotiations. The **Agreement on Technical Barriers to Trade** disciplines the use of technical regulations and standards by WTO Members, especially if such use would unnecessarily restrict trade. In countries that are members of the WTO, any requirements imposed on imported biofuels must comply with the principle non-discrimination in GATT Articles I and III. It is also noteworthy that in the *Harmonized System of Tariff Classification*, bioethanol and biodiesel are categorized differently (bioethanol as an agricultural product in HS 23 and biodiesel as an industrial product in HS 29). This means that the disciplines on subsidies and other forms of domestic support in the **Agreement on Agriculture** would also apply to bioethanol, while those in the Agreement on Subsidies and Countervailing Measures would apply to both bioethanol and biodiesel.

Furthermore, bioenergy production should not negatively affect the enjoyment of human rights and democratic principles, such as non-discrimination, freedom of information and expression, and participation of those affected, in particular the more vulnerable and marginalized segments of society. Bioenergy and biofuels should not impede the realization of the **right to food** (art. 11 of the 1966 International Covenant on Economic, Social and Cultural Rights) by undermining the implementation of the parties’ legal obligation to create an enabling environment for every person to feed him- or herself with dignity. The right to food also imposes an obligation to provide food and other assistance for those who cannot feed themselves, to the extent that resources permit. In line with the **Right to Food Guidelines**, governments should respect and protect non-discriminatory access to people’s livelihoods.

Furthermore, bioenergy initiatives must respect the **core labour standards and respective ILO conventions** and should not hinder the implementation of the **Decent Work Agenda**, which proposes an integrated approach to rights, employment, social protection and social dialogue, in accordance to Fundamental Principles and Rights at Work (freedom of association and the right to collective bargaining; elimination of forced and compulsory labour; abolition of child labour, and elimination of discrimination in the workplace), and relevant ILO Conventions, in particular Convention No. 184 “Safety and Health in Agriculture” (2001), and No. 182 “Worst Forms of Child Labour” (1999).

42. Complementing existing international legal instruments, over recent years a number of international multi-stakeholder initiatives have undertaken relevant work to contribute to policy guidance for sustainable bioenergy development. An intergovernmental consensus may build upon and integrate elements or draw experiences from these initiatives (Box 2).

Box 2: Global Multi-Stakeholder Initiatives

The *Global Bioenergy Partnership (GBEP)* with its growing membership of countries, private sector and civil society stakeholders, received a renewed mandate from the 2007 G8 Summit to “take forward the successful and sustainable development of bioenergy”. GBEP is chaired by Italy and its Secretariat is hosted at FAO. GBEP is establishing a Task Force on Sustainability to complement its ongoing work on the harmonization of methodologies to measure GHG emission reductions. The *Round Table on Sustainable Biofuels*, an international initiative that brings together governments, international organizations, farmer associations, private sector companies, NGOs, and academia is in the process of formulating key sustainability criteria. Roundtables already exist for some of the key bioenergy feedstocks, notably oil-palm, and - at an earlier stage of development - soy and sugar. The *International Biofuels Forum*, a joint initiative of Brazil, China, India, South Africa, the United States and the European Commission launched in 2007 aims to contribute to creating a world market for alternative fuels, resulting in economic, social and environmental benefits for developed and developing countries. *UN Energy*, the UN’s inter-agency mechanism on energy, is working on practical guidelines for policymakers for sustainable bioenergy as a follow up to its publication “Sustainable Bioenergy: A Framework for Decision Makers”.

Existing instruments and initiatives may not suffice

43. While existing international instruments are relevant for specific aspects of biofuel development, they do not cover sufficiently the complex relationship between the causes for biofuel expansion and its effects at the cross-roads of four main policy areas, namely energy, food and agriculture, environment and trade. Similarly, existing multi-stakeholder initiatives may not have the necessary authority to avoid duplication of standards at international level and, in light of their limited membership, may not fully represent the variety of interests.

44. It might well be argued that not all complex challenges the world faces require new international standard-setting. Quite often, markets and self-regulation may suffice, and existing standards may well be applied to emerging issues. However, the case of biofuels seems to be quite different. Biofuel demand has been “artificially” raised by government subsidies with the aim, at least to a considerable extent, to combat climate change and enhance sustainability. Concomitantly, preliminary lessons are revealing that under certain conditions, they not only may not reach the desired environmental outcome, they may even worsen sustainability including food security.

45. At the same time, developing countries face both greater opportunities and higher risks than developed countries. While the biofuel production potential in tropical countries far exceeds the potential of temperate climate zones, competition for natural resources and negative impacts on food prices may hit developing countries harder. The large supply potential from developing countries could meet a high demand from developed countries, if enhanced global trading were permitted. A reduction of trade barriers would not only facilitate more efficient and sustainable production patterns in both economic and energetic terms, it would eventually produce welfare gains in both developing and developed countries. Sustainable biofuels production could be facilitated through science-based and market-oriented mechanisms such as certification. In order to ensure compliance with WTO requirements, such certification would have to rely on an internationally agreed standard.

C. ELEMENTS OF AN INTERNATIONAL CONSENSUS

46. The structure and legal nature of an international biofuel consensus would depend largely on the focus that governments wish to take. To ensure sustainability, including food security, governments may wish to consider the following five areas for action:

- safeguard mechanisms for food security,
- sustainability principles,
- research and development, knowledge exchange and capacity building,
- trade measures and financing options,
- methodologies for measuring and monitoring biofuel impacts.

47. Specific measures in each of these areas are manifold and the Appendix includes concrete suggestions for consideration. An international response may include policy measures to create a conducive regulatory and incentive framework and investments to put in place an enabling environment that favours a sustainable bioenergy future.

48. Governments may wish to initiate an international dialogue to assess the various international motivations for biofuel development, the potentially diverging viewpoints and the global effects in an international forum in order to agree eventually on shared principles and the right way forward. A response would work towards consensus building on both scientific and policy matters. FAO, in close collaboration with other UN agencies and partners, is prepared to provide the appropriate forum to develop such an international consensus.

APPENDIX: ELEMENTS FOR INTERNATIONAL ACTION ON SUSTAINABLE BIOFUELS

The following measures could be considered as elements for international action.⁷

Safeguards for food security

In the context of biofuels, most of FAO's standard best practices and policy recommendations on food security continue to apply and should be reinforced. Among these are ex-ante assessments of policies or commercial activities on food security, vulnerability mapping, continuous monitoring and early warning. Measures also include protecting the most vulnerable through targeted safety nets and establishing competent food security agencies. The latter may henceforth have to be equipped with the necessary tools and capabilities to analyse the impact of biofuel production including transmission of world commodity prices for different feedstocks into local markets.

More specifically, policies may be adopted that:

- favour technologies that are likely to reduce competition with food supplies, in particular bioenergy based upon the use of organic waste and residues;
- support second-generation technology development using lingo-cellulosic material and feedstock production on land not suitable for food production;
- assess specific socio-economic vulnerabilities and livelihood impacts of communities affected by biofuel production such as labour relations, land management and tenure systems;
- discourage large-scale cultivation patterns in areas characterized by high poverty, land shortages, land conflict or tenure insecurity;
- avoid cultivation of water intensive feedstocks and production methods in water-scare environments;
- establish maximum thresholds for biofuel production based on assessments of local risks and vulnerability;
- create multi-stakeholder decision-making mechanisms on biofuel production at national and local levels.

Sustainability principles

A common reference framework of sustainability principles could be discussed and agreed at international level. Technical analysis and consultative processes have recognized and highlighted that environmental, social and institutional dimensions need to be considered if growth in biofuel production is to be sustainable.

Environmental dimension:

- ensure a positive GHG balance of biofuels over their lifecycle compared to fossil energy, taking into account land-use change related carbon emissions and sinks;
- prevent feedstock production in areas with high conservation values or high carbon content;
- ensure the sustainable use of natural resources, particularly land and water;
- mainstream the use of good agricultural practices, integrated food-energy systems and landscape approaches.

⁷ All activities would build upon and complement existing approaches and initiatives

Social dimension:

- generate benefits for local communities, workers and rural development;
- prevent negative impacts on food security;
- favour the involvement of small-holders through, for example, contract farming approaches and producer organizations;
- promote feedstocks and production systems that generate the most employment, as long as they also ensure decent working conditions.

Institutional dimension:

- adopt a consultative approach to national bioenergy policy development, including private and civil society stakeholders;
- consider biofuels in the context of the total energy mix, including other renewable energy sources and energy efficiency;
- promote policies that are outward looking and market oriented, environmentally sustainable, growth enabling and protective of the poor and food insecure;
- refrain from or revise policy instruments that create an artificially rapid biofuels expansion process in the face of uncertain impacts;
- align policies in agriculture, energy, environment and transport, at national and international level, to ensure coherence;
- respect national and international law, including human rights law;
- undertake stakeholder consultation in the preparation of biofuels investments;
- avoid downward competition among different national frameworks that aim to secure the least costly biofuels.

Research and development, knowledge exchange and capacity building

An international approach should capitalize on cost savings in undertaking basic research, sharing information and transferring capacity. Activities could:

- accelerate research and development for second-generation technologies, adapted to developing country conditions;
- initiate further analysis and knowledge exchange, in particular on direct and indirect land-use change, investment patterns, GHG emissions, trade flows and food security;
- initiate opportunity and risk assessments for biofuel development, vis-à-vis alternative use of bioenergy for power and heat;
- analyse and document best practices and provide training and capacity building to transfer technology and skills;
- increase consistency and information to educate consumers about the benefits of different technologies and systems, to build confidence in the market;
- provide assistance to developing countries in the design of functioning monitoring systems.

Methodologies, measurement and monitoring of bioenergy impacts

International collaborative initiatives could:

- measure food security impacts of bioenergy expansion;
- monitor and map food security impacts;
- work towards a common methodology for life-cycle analysis of GHG emissions, recognizing the importance of emissions from direct and indirect land use change;
- assess and quantify land-use change implications of bioenergy expansion;
- monitor and map land use change;

- assess and map marginal and degraded land and suitability for biomass production.

Trade measures and financing options

Governments may wish to:

- consider adopting socio-economic and environmental certification schemes based on an internationally agreed standard that satisfies international trade law requirements;
- prevent excessive burdens on producers related to compliance with a multitude of different national frameworks;
- work towards lowering current and avoiding new trade barriers for developing countries and small-scale producers;
- work towards acceptable disciplines on bioenergy subsidies and other forms of distortive state support measures;
- promote a harmonized tariff classification system for bioethanol and biodiesel;
- provide increased financing from multilateral sources for sustainable bioenergy development;
- tap financing mechanisms related to climate mitigation by improving the knowledge base and methodologies needed to assess GHG benefits of bioenergy and by amending the financing mechanisms to reflect new mitigation opportunities;
- promote and strengthen payments for environmental services (PES) mechanisms to encourage biofuel development that generates positive environmental impacts;
- work with private finance providers to establish good practices for lending to bioenergy to ensure sustainability.