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EXECUTIVE SUMMARY OF THE HIGH-LEVEL PANEL OF EXPERTS (HLPE) REPORT ON BIOFUELS AND FOOD SECURITY

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High Level Panel of Experts on Food Security and Nutrition

Extract from the Report[1] *Biofuels and Food Security*

Summary and Recommendations

In October 2011, the UN Committee on World Food Security (CFS) recommended a "*review of biofuels policies – where applicable and if necessary – according to balanced science-based assessments of the opportunities and challenges that they may represent for food security so that biofuels can be produced where it is socially, economically and environmentally feasible to do so*".
In line with this, the CFS requested the HLPE to "*conduct a science-based comparative literature analysis taking into consideration the work produced by the FAO and Global Bioenergy Partnership (GBEP) of the positive and negative effects of biofuels on food security*".

Analysing the relationships between biofuels and food security is especially challenging. It is at the intersection of some major global issues: energy, food, land use, and development. Biofuel production and the policies used to support its development can relate both positively and negatively with each of the four dimensions of food security – availability, access, utilization (nutrition) and stability. An appreciation of the relationships and causal impact and feedback links between biofuels and food security requires assessments at both global and local levels. It must also be situated within a dynamic perspective, given the fast changing developments, the complex and not necessarily instantaneous relationship between the drivers of biofuels' rise and the (positive and negative) impacts on food security, and the need for projections of the future. Such an approach requires making assumptions on various parameters, ranging from the role of bioenergy, to the evolution of techniques, and to potential impacts at global and local levels.

[1] HLPE, 2013. Biofuels and Food Security. A report by the High Level Panel of Experts on Food Security and Nutrition of the Committee on World Food Security, Rome 2013. Full report forthcoming at www.fao.org/cfs/cfs-hlpe.

Summary

Biofuel policies

1. Public policies have played a central role in the rise of biofuel production, with two major implications. First, biofuels have assumed quite different profiles in each country or region, given the diversity in institutions and natural endowments, which in turn has given rise to varied national biofuel plans and policy toolkits. Second, as a consequence of the national determination of biofuel policies, countries have often been inclined to regulate imports of biofuels, for example by applying tariffs and barriers, in order to protect their internal market. Exports have also been similarly subject to policy stimuli.

2. Policy tools that can be mobilized are quite diverse.

    - They can act on the demand and market creation side: tax exemptions or mandates for the incorporation of biofuels into petroleum fuels (obligations for fuel distributors or filling stations), public procurement (fuel or vehicles), user incentives such as car fleet subsidies among others. They may also act on the side of support for production and distribution: blending or transformation subsidies to compensate for the additional cost over petroleum fuels, agricultural subsidies for biofuel crops, public bank support to investors in the biofuel production chain, in installation and infrastructure, public support for research and development (R&D), energy crop production zoning (e.g. in Europe, the possibility of using set-aside lands where these existed).

    - In addition, some tools are trade-related regulation measures, either shielding domestic markets (e.g. import tariffs, eligibility requirements, quotas) or preventing exports (export tariffs, quotas).

    - A final set of tools is related to environmental and technical criteria, such as blending walls, fuel quality regulations and fuel certification tools.

3. Modern biofuel markets emerged in response to the two oil price hikes in the 1970s. Various countries responded with proposals for alternative fuels policies, but the two countries that created a biofuels ethanol market and a biofuels production sector in this period were Brazil and the United States of America (US), the former using sugar cane and the latter corn/maize. In both cases, this was done taking advantage of existing agricultural production capacities when low commodity prices encouraged the search for alternative outlets. Broader strategic goals were also central, such as reducing levels of dependence on energy imports and, especially in the case of Brazil, improving the balance of payments at a time of high oil import bills.

4. These biofuel policies went beyond issues of regulation and involved the creation of markets via obligatory or highly stimulated blending targets/mandates coupled with a range of tax exemptions, subsidies and favourable credit.

5. In Brazil, the sugar-cane sector responded well to the PROALCOOL Program launched in 1975: the programme addressed both supply and demand, with a mix of R&D support, supply or investment subsidies, mandatory installment of ethanol pumps, taxation of gasoline and regulatory policies. Production rose rapidly, reaching 12 billion litres/year within a decade.

6. In the US, interest for alternatives to petroleum fuels peaked during crisis situations, such as the First and Second World Wars, and the energy crisis in the 1970s. Ethanol production, however, only rose substantially in the 1980s in the wake of the Energy Tax Act of 1978, which introduced a subsidy for blending ethanol into gasoline, and the 1980 Energy Security Act, which offered insured loans for small ethanol producers, price guarantees and federal purchase agreements, and established a tariff

on foreign ethanol. Biofuels were initially promoted in the corn-producing regions where ethanol was a co-product of corn syrup.

7. When a new surge in biofuel promotion took off in the early years of 2000, the policies of these two countries had already consolidated a biofuels demand, a biofuels market and a biofuels industry. In the course of the first decade of this century, the Brazilian sugar/ethanol sector was now able to operate without direct controls and in response to movements in relative prices, and analysis has suggested that US ethanol production, given continuing high oil prices and the ban on the methyl tertiary butyl ether (MTBE) oxygenate (since 2003), could also survive without mandates.

8. In the European Union (EU), given that half the light vehicle fleet and in some countries well over half of all new car sales are equipped with diesel engines, biodiesel is more central to biofuel policy. From a feedstock perspective, this has involved giving greater weight to oil crops (over cereals and sugar beet) for the production of biofuels. EU targets cannot be fully met using only EU domestic biomass. The EU biofuel policy, therefore, has triggered the creation of an increasingly globalized biofuels and biofuels feedstock market, involving a key role for developing country agriculture. Currently, Latin America and Asia dominate these flows. At the same time, such production must conform to the "sustainability" criteria (e.g. the Fuel Quality Directive and the Round Table on Sustainable Biofuels – RTSB, among others) that underpin this market.

9. Biofuel policies in the US and EU are now at a turning point, with similar proposals to put a ceiling on food-based biofuels at around their existing levels.

10. Many more countries (over 50 at the time of writing) have now adopted biofuels policies, and the combined automobile fleets of China and India are now approaching that of the US with much faster growth rates and a concomitant preoccupation with greenhouse gas (GHG) emissions and urban pollution. In the biofuel policies of these emerging countries, food security has quickly become a central conditioning criterion for biofuels promotion, with explicit policies in China, India and South Africa not to base biofuels on food crops or on lands used for food. Hopes were based in the former two cases on the eminently non-food crop jatropha, which, in addition, was considered to thrive on marginal lands. South Africa, for its part, relied on the untapped resources of the homelands, marginalized during the apartheid regime. However, in all three cases, the potential of the chosen crop and of the marginal lands to grow biofuel feedstock efficiently has to date not yet effectively been proven.

Biofuels and the technology frontier

11. The degree to which the promotion of biofuels enters into competition with food production, raising questions of food security, depends on a variety of factors:
    - choice of feedstock;
    - natural resources (especially land and water) involved;
    - relative efficiencies (GHG emissions, yields, costs) of different feedstocks;
    - processing technologies adopted.

    Concern over competition between biofuels and food production has been particularly acute given the overwhelming use of food- and feedcrops for both ethanol and biodiesel.

12. The choice of preferred feedstock and technology determines much of the impact of biofuel production and policies on food security. It determines the form of competition for food, feed and land, with diverse land needs depending on the feedstock.

13. While the timeline for the deployment of 2nd generation biofuels has proved overly optimistic, as reflected in particular in the Renewable Fuels Standard of the US, the first commercial-scale plants to produce cellulosic biofuels are now coming online. Multiple pathways for the conversion of different biofuel feedstocks are being developed and deployed. In the next couple of years, we can expect to see long-awaited data on the costs of these technologies operating at commercial scale and their relative performance. Based on that information and relative performance, the number of pathways can be expected to narrow. Learning-by-doing can lower the costs of the industrial process, which is a major component of the costs of producing advanced biofuels, and these industrial advances can occur more quickly than the agronomic advances needed to lower feedstock costs of both conventional and advanced biofuels.

14. The experiences with jatropha have shown that any new biomass production for biofuels will induce some form of competition for land and water, which could have an impact on food security.

Biofuels, food prices, hunger and poverty

15. In less than one decade, world biofuel production has increased five times, from less than 20 billion litres/year in 2001 to over 100 billion litres/year in 2011. The steepest rise in biofuel production occurred in 2007/2008, concomitantly with a sharp rise in food commodity prices (HLPE, 2011a), quickly accompanied by food riots in the cities of many developing countries. In comparison with average food prices between 2002 and 2004, globally traded prices of cereals, oils and fats have been on average from 2 to 2.5 times higher in 2008 and 2011–12, and sugar prices have had annual averages of from 80 percent to 340 percent above their 2000–04 prices. These price increases were accompanied by price volatility and price spikes to an extent unprecedented since the 1970s.

16. Though a range of other factors have been adduced in the enormous amount of studies that have since been dedicated to the issue of rising food prices (HLPE, 2011a), the steeply rising demand for the production of biofuels was identified as an important factor by many observers and a wide range of organizations, from civil society organizations (CSOs) to the World Bank.

17. The biofuel and food price debate is a long-standing, controversial one in the literature, with wide-ranging views. This is due to the number of impacts and feedback loops involved that can positively or negatively affect the price system. The relative strengths of these positive and negative impacts are furthermore different in the short and long terms, involving delayed effects that substantially increase the complexity of the analysis. The expert debates are also blurred by the use of different economic models and competing forms of statistical analysis, and to draw robust conclusions it is impossible to avoid at least some of their complexities.

18. Many factors do influence, concomitantly with biofuels, the world supply and demand for food. What matters most for the present report and analysis is not the net overall effect of all factors on the net food price -– this has been dealt with, for example, in HLPE (2011a) – but the isolated effect of biofuels on food prices, *everything else being equal*. A central challenge here is to disentangle and separate the impact of biofuels from all the other factors so that it can be analysed from the standpoint of its *additional* impact, which leads to *additional* price effects.

19. When crops are used for biofuels, the first direct impact is to reduce food and feed availability. This induces an increase in prices and a reduction of food demand by the poor. It also encourages farmers to produce more. There is also a substitution effect, at consumption level and at production level, which is one of the reasons price increases spread to other crops.

20. The following robust pattern emerges from the observations and analysis and the results of the different bodies of literature:

    (i) Everything else being equal, the introduction of a rigid biofuel demand does affect food commodity prices. This observation holds in each context, even in the context of prices going down for other reasons than biofuels.

    (ii) In the last few years (since 2004) of short-term commodity food price increase, biofuels did play an important role. The fact that biofuels have been the most important contributor is still disputed. The important role of biofuels is mainly due to:
    - the difficulty of the recent growth in total supply in keeping up with the growth in total demand, including the biofuel component (MTBE ban, other mandatory biofuels policies);
    - the rise in oil prices being transmitted to food prices via biofuel production capacities, as biofuels created an opportunity gain for key foodcrops (corn, oilseeds, sugar).

    (iii) Different biofuels have different impacts, although impacts can translate from one crop to another as far as substitutions between those crops can be made in the field or at demand level. Situations in different markets can vary. Ethanol markets and biodiesel markets do not evolve in the same way. Within the ethanol market, an increase in demand has different effects if met by an increase in corn-based ethanol production or by an increase in sugar-cane ethanol production.

    (iv) Biofuels provide a link between the food and energy markets. The existence of such linkages, as well as the induced correlation between prices, is widely recognized. However, the strength of the correlation is disputed. In addition, short-term (effects on volatility) and long-term correlations are shown to be quite different, as well as very dependent on the different biofuel feedstocks and pathways.

These findings substantially confirm the results of HLPE (2011a), while refining them in important ways.

21. In the present context, oil prices can play a central role. With a continued trend of rising oil prices, corn- and sugar-cane ethanol will be increasingly competitive with respect to fossil gasoline, even without incentives or tariff protection (for example, the US eliminated the tax credit for first-generation (corn), ethanol at the end of 2011). In theory, this could open up an almost infinite market worldwide for corn- and sugar-cane ethanol (HLPE, 2011a). In practice, given the current regulatory frameworks in the US and the EU and level of development of biofuel markets, mandates and targets can become transformed into technical or political ceilings, as in the case of the blending wall in the US or the global limits established by both the US and the EU, which constitute substantial barriers to the expansion of US ethanol. As biodiesel competes economically only in situations of very high oil prices, it will remain driven by government policies, in the absence of major technological advances, and any change in such policies could eliminate its growth.

22. If foreign markets are willing to absorb excess biofuel production, and so long as other obstacles, such as blending requirements or target ceilings do not limit the domestic uses of biofuels, the growth in biofuel demand could continue *so long as oil prices remain higher than the cost of biofuel production*. This leads to oil prices ultimately defining an “opportunity floor” on crop prices, and opens a space for transmission of volatility and speculative behaviour from the petroleum market to food markets.

Biofuels and land

23. Except when relying on crop residues and waste, biofuel production requires land. It thus competes for land with other agricultural activities, including production of other forms of bioenergy, other economic activities, urbanization and, increasingly, with land protection for environmental objectives, especially biodiversity and carbon sequestration. This last point is of particular relevance concerning biofuel production as one of its aims is to mitigate climate change; which implies that, when entering into competition with carbon sequestration, both activities should be assessed with regard to their comparative mitigation potential. To what extent is land availability a constraint to biofuel development and to ensuring world food security?

24. The debate is very much oriented by prospective considerations on what is/would be the land needed to produce a certain quantity of biofuels versus what is/would be the land "available" globally, given the need to increase food production to satisfy a growing demand. Answers to these questions are driven by the assumptions made in terms of yield (crop yield, biofuel yield) and by the information on land availability (including quantities and definition).

25. Much of the literature on land availability is devoted to calculations on the amount of agronomically "suitable" and available land, with high and low suitability parameters. Major assessments suggest that ample amounts of land can be mobilized to confront future food demand on the condition that good management practices are adopted, and the same arguments are developed when discussing biofuels. The argument has also been advanced that some biofuel feedstocks would not compete with food even via land use as they could be grown on areas not suitable for foodcrops.

26. The debate on the global amounts of land available from an agronomic point of view often hides other dimensions of "land availability". Many authors point to the need for a clearer picture of what "available land" means, some preferring to use "underutilized" land, while others contest the very notion, arguing that most, if not all, land is already used, in various ways (HLPE, 2011b). Some critical analyses on land availability argue that land that is apparently idle or underutilized is in fact generally integrated into traditional forms of land use, ranging from itinerant pasturing, to fallow lands, to land used for energy, complementary foods and raw material for a variety of non-food activities.

27. In particular many have questioned the role of biofuels as a driver of domestic and foreign large-scale investments in land, often called "land grabbing". In the initial accounts, and in the literature that has emerged as from 2008 focusing particularly on sub-Saharan Africa (SSA) countries, biofuels were identified as a central, if not the leading, motive behind these investments. Subsequent analysis has reduced the weight originally attributed to biofuels, identifying a wider concern with: (i) food security by capital-rich and resource-poor emerging countries;
(ii) speculative interests in securing scarce resources in the wake of the financial meltdown of 2008; and (iii) an increasing convergence of food and bioenergy markets through the use of common feedstocks (sometimes called "flex crops"), which can be directed equally at fuel or food markets depending on price advantages. Nevertheless, there is ample documentation that large-scale biofuel investments are playing an important role in transforming land use in many developing countries.

Biofuels and bioenergy: socio-economic impacts and development perspectives

28. For many, biofuels provide important new opportunities for income and employment generation, in addition to bringing much needed capital, technology and knowledge to developing country agriculture. Other analyses have identified negative impacts of biofuels on poor farmers and their communities, either directly in the form of land expropriations or indirectly through the concentration of resources on large-scale farming operations.

29. Developing countries are still in the process of putting policies together on biofuels, with many investments and initiatives still in various stages of implementation. An appreciation of impacts over time and on a macro or regional scale is, therefore, still largely speculative.

30. An exception here is the Brazilian case, which in terms of sugar-cane ethanol has now a 40-year history, and a decade if we consider its ambitious biodiesel programme. Although the evidence is mixed, in the case of ethanol in the State of São Paulo, a number of studies point to the relatively favourable effects of ethanol investments at municipal level when compared with the other municipalities, particularly those dominated by cattle ranching. The Brazilian biodiesel programme was designed with the objective of rural development based on the family-farming sector and its typical regional oil crops. Huge resources and ingenuity have been invested, but after ten years it is soybeans and the already best-organized sections of family farmers who have benefitted most. On the other hand, the programme confirms that if small farmers have inadequate access to basic resources of land and water, little can be done to consolidate their income on a productive basis.

31. Sub-Saharan Africa has been a specific focus of impact analysis with the use of computable general equilibrium (CGE) models in Mozambique and the United Republic of Tanzania (this latter as part of the bioenergy and food security [BEFS] studies). The countries are equally poor but quite different in energy and food dependences. Transmission of high food and fuel prices was direct in Mozambique leading to a sharp decline in the welfare index (5 percent) and even more in household consumption (7 percent). On the other hand, simulation showed that implanting large-scale biofuels for export would produce positive results with an overall increase of 0.65 percent in overall GDP, rising to 2.4 percent in the case of agriculture and 1.5 percent for industry. The Tanzanian study, conducted in partnership with the FAO BEFS programme, also shows positive welfare results with the expansion of ethanol replacing other export crops rather than foodstuffs.

32. The BEFS project has developed a detailed toolkit for country analysis that includes a long-term analysis of agriculture within an international perspective, a survey of natural resources, detailed feasibility studies of individual projects and a socio-economic analysis of likely impacts. Peru, the United Republic of Tanzania and Thailand have been analysed, covering each of the developing world continents.

33. A growing number of studies have tried to bring to the attention of policy-makers the importance of taking gender into account in biofuels development. These studies highlight the issues of the security of access to and ownership of land as key factors determining whether the expansion of biofuel feedstocks could potentially benefit the rural poor, women in particular.

34. The most positive use of biofuels in highly rural developing countries where transport fuels are less important and where the majority of the rural poor live without access to energy is in the development of bioenergy initiatives for cooking, heating and local power generation. Hundreds of initiatives in this direction are currently being supported in developing countries and there is an urgent need to benchmark the most successful of these experiences for funding and diffusion.

35. A number of scholars have produced typologies to identify both the conditions under which biofuel/bioenergy policies should be adopted in developing countries and the specific focus that these policies should have in each country, given an appreciation of key variables in terms of country endowments and levels of economic development and urbanization. Similarly, farm-level typologies are being adopted to assess relative income and employment implications. Such typologies can be important instruments in guiding the formulation of country and local biofuel policies.

Recommendations

Food security policies and biofuel policies cannot be separated because they mutually interact. Food security and the right to food should be priority concerns in the design of any biofuel policy.

Governments should adopt the principle: biofuels shall not compromise food security and therefore should be managed so that food access or the resources necessary for the production of food, principally land, biodiversity, water and labour are not put at risk. The CFS should undertake action to ensure that this principle is operable in the very varied contexts in which all countries find themselves.

Given the trend to the emergence of a global biofuels market, and a context moving from policy-driven to market-driven biofuels, there is an urgent need for close and pro-active coordination of food security, biofuel/bioenergy policies and energy policies, at national and international levels, as well as rapid response mechanisms in case of crisis.

There is also an urgent need to create an enabling, responsible climate for food and non-food investments compatible with food security.

The HLPE recommends that governments adopt a coordinated food security and energy security strategy, which would require articulation around the following five axes/dimensions.

1. Adapt to the change to global, market-driven dynamics

a. Governments must adjust biofuel policies and devise mechanisms to prevent (market-driven) biofuel demands posing a threat to food security from price rises and diminishing access to land and associated resources for food.

b. Governments and concerned stakeholders should promote the international coordination of such policies and mechanisms in an appropriate forum, which could address also short-term, coordinated responses in times of crisis.

c. The CFS could invite the Global Bioenergy Partnership (GBEP), the Committee on Commodity Problems and its Intergovernmental Group on Grains to make a proposal on possible response mechanisms, based on a state-of-the-art review and evaluation of options.

d. The CFS may recommend/request that governments regularly communicate their biofuels policies and targets to the Agricultural Market Information System (AMIS), with the aim of setting up a comprehensive database.

2. Address the land, water and resource implications of biofuel policies

a. Governments should ensure that the principles for responsible investment in agriculture, currently being elaborated by the CFS, will be effectively implemented and monitored, especially in the case of investments for biofuel production.

b. The principles of free, prior and informed consent and full participation of all concerned in land-use investment should be used, as preconditions for any land investments.

c. Measures taken to implement the *Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security* should ensure that biofuel investments should not undermine tenure rights, and ensure that women participate fully in land negotiations and that their land tenure rights are recognized.

d. Policies must integrate land and water impact assessment so that land concessions cannot be made without an evaluation of the impacts of land use on water resources.

e. All crops compete for the same land or water, labour, capital, inputs and investment and there are no current magic non-food crops that can ensure more harmonious biofuel production on marginal lands. Therefore, non-food/feedcrops should be assessed with the same rigour as food/feedcrops for their direct and indirect food security impacts.

3. Foster the transition from biofuels to comprehensive food-energy policies

a. Governments should adopt a comprehensive bioenergy policy approach, wider than simply biofuels, promoting the development of a modern biomass-based sector, which, in many developing countries, can be an effective development strategy to provide high-value products, electricity and alternative power for cooking, power for water management and local productive facilities, in addition to transport fuel.

b. Governments should support smallholder participation in biofuels and bioenergy value chains on the basis of fair and equitable conditions of market access and contractual arrangements.

c. As a key part of a coordinated food security and energy security strategy, governments need to explore alternative policy measures (such as improvements in fuel efficiency and a transition to collective transport, and the development of alternative renewable fuels) in order to reduce fossil-energy-based transport and associated GHG emissions according to the specificities of both developing and developed countries.

4. Promote Research and Development

a. Research and development (R&D) have an important role to play in improving the efficiency of the technologies used for biofuels both as regards resources and processes. Research partners should devise solutions adapted to the needs of the least developed countries and of smallholders who are most in need of access to energy. The public sector has here an important role to play, in partnership with the private sector, to upgrade and finance related R&D systems.

b. Research should examine if and how both first- and second-generation biofuels could contribute to restoring degraded land and to the better management of watersheds. Such research could be developed in collaboration with the Global Soil and the Global Water Partnerships.

c. Given the relative energy inefficiencies of current biofuel technologies and those in the pipeline, R&D resources should be dedicated to accelerating the commercial feasibility of more advanced renewable energy pathways.

d. In order to better inform decision-making, governments, FAO, research and associated institutions should promote and facilitate exchange of information and cooperation for food security and biofuels assessments and projections, including by providing transparent information on assumptions, methods, tools and data used.

5. <u>Develop methods and guidelines for coordinated food, biofuels, bio-energy policies at national and international levels</u>

a. The CFS could encourage FAO and relevant stakeholders to elaborate methodologies, including typologies, for assessing national biofuel potential based on land and water availability, population density, food and energy needs, agricultural production, per capita income and other relevant variables to provide a preliminary orientation on the incorporation of biofuel/bioenergy policies within a national food security and energy security plan.

b. The CFS could invite GBEP to launch an inclusive process to ensure that only certification schemes that are multistakeholder, fully participative and transparent be recognized for access to the biofuels market. These schemes should also limit transaction costs to avoid excluding smallholders.

c. While it might be difficult to request all agricultural production to be subject to sustainability criteria ratified by recognized certification schemes, the question should be raised of how to improve the overall sustainability of agriculture at the macro-aggregate level. The CFS could invite the Committee on Agriculture (COAG) to prepare proposals for the development of sustainability criteria, testified by certification schemes, for farming activities and products.

d. The CFS could launch, with support of FAO and GBEP, the development of guidelines to be adopted by countries and used to evaluate the impact and viability of biofuels policies. These guidelines should include:

    i. the prior existence of technical, social and environmental zoning to delimit “available land” and accompanying resources;

    ii. the prior existence of “responsible land investment” practices;

    iii. the prior existence of mechanisms to ensure the capacity to react quickly to food price spikes and problems of food availability (price triggers, waivers, “minimum” levels of food stocks);

    iv. the prior evaluation of the implications for the origin of feedstock provision (domestic/imported); and for trade;

    v. a prior evaluation of the implications of the policy for domestic and international food security.