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POLICY BRIEF

Key points

- Major challenges in developing the biofuels industry include harmonization of international sustainability norms, tariffs and subsidies, understanding the impact on land use and mainstreaming second-generation biofuels, especially in developing countries.
- Developing renewable energy industries and beneficial use of biofuels is critical to promoting sustainable development goals for the post-2015 period to ensure affordable, reliable, sustainable and modern energy for all.

THE GLOBAL BIOFUELS MARKET: ENERGY SECURITY, TRADE AND DEVELOPMENT

Particularly after the sharp rise in oil prices in 2008, but throughout the 2000s, there was an unprecedented increase in public and private interest in diversifying energy sources. Reasons for this included volatility in prices of petroleum products, the finite nature of fossil fuels (peak oil scenarios) and ever growing environmental concerns, especially related to greenhouse gas emissions. There was also an emphasis placed on novel ways to add value to agriculture and to promote growth poles which could deliver green jobs in non-carbon intensive sectors of the economy. These factors energized interest in renewable energy sources, including biofuels. In 2006, just prior to the climax of the energy crisis with very high oil prices, the biofuels market was only starting to become truly international. By the beginning of 2014, bioethanol and biodiesel had become established products, traded daily and globally.

Meeting global challenges: From local consumption to international trade

The market for biofuels increased based primarily on demand from the transport sector, especially road vehicles, which use biofuels either in pure form or blended into conventional fossil fuels (e.g. diesel or gasoline). Moreover, since 2006 alternative markets for biodiesel and bioethanol, beyond their core usage in road transport, have emerged. Biofuels started to be used on increasingly larger scales in aviation, to generate electricity, for cooking and even in maritime transport. The policy focus of many countries on biofuels also evolved from one of limited scope covering liquid biofuels, to broader notions of bioenergy (solid, liquid and gaseous energy products) and bioeconomy. A bioeconomy – i.e. a biobased economy – considers using biomass not only for energy, but also adds food, feed and fibre as outputs.

A 2006 UNCTAD report on biofuels anticipated a quick rise in international trade in biomass as this type of renewable energy has many linkages to the livelihoods of people in developing countries. UNCTAD published an updated report in 2014, covering developments in biofuels since then. With United Nations Member States on the eve of setting the post-2015 development agenda and sustainable development goals, the role

of energy is seen as crucial for the future well-being of populations. Bioenergy and biofuels are an integral part of the energy–development equation, as they are the renewable energy sources closest to the realities that many people face in the poorest countries.

Introduction of sustainability requirements

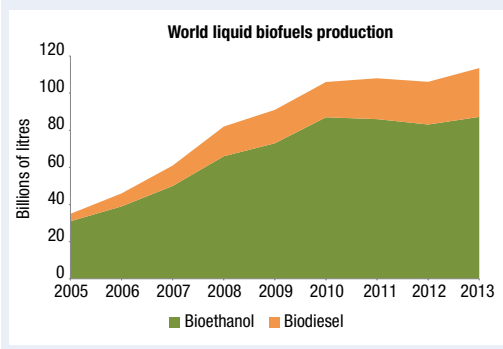
Several developed and developing countries have established (and continue to pursue) regulatory standards for biofuels since 2006, including blending targets and sustainability norms.

Between 2006 and 2014, sustainability certification became a new norm in the industry, as well as a prerequisite for market access. After intense debate on the formulation of sustainability regulations, certification and labelling of biofuels and feedstocks, sustainability criteria for biofuels have evolved mainly via voluntary schemes which adhere to legislation adopted in major markets (e.g. the United States of America and the European Union).

The key challenge of sustainability rules is to create convergence between domestic sustainability norms and the trade-enabling international standards adopted in the European Union and the United States.

Changes in global biofuels production

Countries have also engaged in research and deployment strategies for advanced biofuel technologies which could reduce social and environmental risks associated with biofuel production and use. While subsidies and incentives continue to be provided, the biofuels industry as a whole is more self-reliant today than it was in 2006. The gradual reduction in subsidies is one of the reasons behind the relative stabilization in demand for biofuels – and overall growth rate in the industry – after 2010.



The emergence of better analyses on the impacts of land use for biofuel production raised questions about the suitability of conventional (first generation, land-intensive) biofuels as a tool to mitigate greenhouse gas emissions. A challenging scenario then arose as policymakers sought to incorporate sustainability provisions in their biofuels markets, while catering to other demands such as green jobs, energy security and overall improvement in agricultural returns, all of which are greatly needed in many developing and least developed countries. Many countries also launched incentives to promote a second-generation, capital-intensive form of biofuels. These second-generation biofuels are based on non-food feedstock such as cellulose.

The large increases in production, use and international trade of biofuels, seen after 2006, have contributed to giving the industry a professional standing in line with other major tradable commodities. However, the basket of producing countries has not changed substantially since 2006. The economies that dominated the market then (Brazil, the United States and the European Union) were the ones with the strongest influence in the establishment of sustainability rules in the market. In some instances, this represented a barrier for developing country participation, since it is often complex and expensive to obtain sustainability certification and meet the requirements needed to enter major markets.

Use and trade of biofuels in the world

Bioethanol and biodiesel continue to be the primary forces behind international biofuels markets. While biofuels still represent less than 1 per cent of global energy usage (UNCTAD, 2014), they have been particularly prominent in many countries. Among such countries are the United States, where fuel blended with bioethanol receives a partial exemption from the motor fuels excise tax (UNCTAD, 2014), and Malaysia, where the mandatory bioethanol component in gasoline was increased to 10 per cent in 2014 (UNCTAD, 2014). While biofuels trade flows between the major markets (Brazil, the United States and the European Union) have dominated, UNCTAD (2011) has pointed out that South–South trade and transfer of technology are also taking place between numerous developing countries around the world, especially between Brazil, China and India. The new production areas that are emerging in African countries are an example of this. For instance, Mozambique is expected to have 170,000 ha dedicated to jatropha production in 2015, up from 7,900 ha in 2008, while Sierra Leone recently inaugurated a large-scale commercial ethanol plant in Makeni (UNCTAD, 2014).

These examples illustrate the spread of the biofuels industry beyond the traditional production regions which dominated during the late 2000s. At the same time, there has been little international trade in bioethanol feedstocks, partially due to the non-tradable and perishable characteristics of some feedstocks (e.g. sugar cane) and to the dual role that some countries have as both producers of feedstock and consumers of biofuels (e.g. cereals-based bioethanol, sunflower-based biodiesel in the United States and in the European Union). Local biofuels production for domestic consumption still influences trade, through lower dependency on fuel imports and foreign currency savings. The Brazilian National Development Bank (BNDES) estimated that between 1975 and 2008 alone, the national bioethanol programme saved Brazil \$195.5 billion in foreign exchange, \$69.1 billion in avoided imports and \$126.4 billion in foreign debt interest (BNDES and Centre for Strategic Studies and Management (CGEE), 2008).

Biodiesel production outside of the European Union has grown since 2006, with production in India, though still small, doubling between 2009 and 2012 (UNCTAD, 2014). Most imports into the European Union still take the

form of vegetable oil from countries such as Argentina, Indonesia and Malaysia. The second generation of biofuels, which began to be marketed at commercial levels in 2013, could change this panorama by allowing increased trade of feedstocks such as cellulosic and waste material, in line with practices adopted in the heating pellets and the pulp and paper industries.

International trade in biofuels remains important to provide win-win opportunities to all countries, prompting the recent mutual reduction of import tariffs between Brazil and the United States (UNCTAD, 2014). It has been noticed over the years that successful cases of biofuel strategy implementation involved first the creation of domestic markets, with regional and international trade emerging afterwards from them. Since international rules on biofuels sustainability and trade have been constantly changing, risk-wary producers have avoided export-oriented production models. Instead, domestic markets have been the core market for biofuels, subsequently serving as a bridgehead for exports (Pacini et al., 2013). Today, developing countries can also look to other sectors beyond transport for use of biofuels, such as cooking energy, electricity generation and niche fuels, for example aviation biodiesel, as ways to start on a small scale but on the more solid footing of local demand.

While the market has grown more liberalized since 2006, biofuels still face both tariff measures – such as the US\$0.54 per gallon on bioethanol imports to the United States until December 2011 (United States Energy Information Administration, 2012) – and non-tariff measures, such as sustainability requirements. Brazil and the United States both reduced their respective bioethanol import tariffs, primarily due to a mutual dependency to cover short-term demand needs from each other. The European Union, on the other hand, has maintained its applicable tariffs for bioethanol unchanged since 2006, at €0.19 per litre (around US\$0.72 per gallon) (Sugarcane.org, 2014), although it offered some waivers in the case of imports of E85 (an 85 per cent bioethanol blend with gasoline) by Sweden. While tariffs were somehow reduced, domestic subsidies continued to exist, such as in the United States which reported subsidies of \$2.5 billion per year in 2009–2011 or \$6 per hectare, as well as in Norway and Switzerland with high subsidies – \$56 and \$43 per hectare,

respectively (Elliott, 2013). In some cases these subsidies were strengthened, such as in Brazil during 2012–2013 when the country launched a plan to revitalize its bioethanol industry.

Biofuels and sustainability in the future

With a considerable increase in biofuels trade since 2006, the market now consists of internationally traded products such as bioethanol and biodiesel (83.1 and 22.5 billion litres, respectively, as of 2012), as well as a number of additional sectors which have increased in size and importance over recent years.

As sustainability criteria are incorporated in major biofuels markets, developing countries continue to face key decisions while advancing their broader bioenergy policies.

Bioenergy and biofuels are an integral part of the energy-development equation

Beyond sustainability rules, the balance between large-scale energy crop production and traditional, small-scale farming needs special attention. Only by balancing the two can farmers continue their livelihoods without drastic changes in rural tenures, while having access to the opportunities that bioenergy sectors can offer. This involves a renewed emphasis on deployment of small-scale biofuel technologies which can result in favourable economics and positive social spillovers, such as higher participation of small-scale farmers and better adaptation of traditional crops to bioenergy purposes. Especially in the numerous rural communities which are isolated from large urban centres, bioenergy has the potential to increase energy access, create local employment and potentially increase income from agriculture (Food and Agriculture Organization of the United Nations (FAO), 2009). Attempts to bridge the large- and small-scale world of biofuels can be found in Brazil, where companies sell microdistilleries for the production of 400, 1,000 or 2,000 litres of bioethanol per day, using a variety of starch and sucrose-based feedstocks (UNCTAD, 2014).

Another important area is avoiding the conflict between food and fuel by increasing the share of non-food feedstocks and better managing resources. A key target for developing countries is to successfully manage the deployment of technologies and business models that enable plentiful, low-cost residues from agriculture to be used as biofuel feedstocks. Biofuels made from

residues fare the best in terms of sustainability and contribute to much-needed value creation in production chains of agricultural products, with direct economic spillovers in rural areas.

Conscious decisions, sharing of information and data collection, organizational strategies, government support services, as well as technical and financial assistance will continue to be needed to guide developing countries in this highly dynamic market. Through its work on biofuels and renewable energy, UNCTAD is providing developing countries with access to economic and trade policy analysis, capacity-building activities and consensus-building tools to help them not only address those challenges but also take advantage of emerging opportunities.

Policy recommendations

Looking forward, the following are specific recommendations for developing countries to make beneficial use of biofuels:

- Create regulatory arrangements for bioenergy tailored to national resource endowments, which do not upset food and energy supply, but instead enhance agricultural productivity, rural income and worker's skills;
- Deploy strategies to avoid the emergence of a technological gap between land-intensive first generation and capital-intensive second generation biofuels. This is especially critical for poorer countries which have a strong incentive to attract pilot plants and commercial demonstrators of second-generation biofuels.
- Offer support and training to ensure that the costs of sustainability certification are spread along supply chains in a way that protects small farmers from undue cost burdens;
- Secure a continuous inflow of private investment in production and process technologies for developing countries, especially through predictable business environments;
- Prioritize research and deployment of advanced technologies that can convert non-edible biomass, and specially agricultural residues, into bioenergy products, in cooperation with other countries to reduce costs;
- Facilitate international trade by engaging in consultations, negotiations and adoption of harmonized sustainability requirements that are compatible with sustainability regulations in place in the main international markets.

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