

Case studies on
bioenergy policy and law:
options for sustainability



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ISBN 978-92-5-106455-9

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PREFACE

Sound legal and regulatory frameworks for bioenergy are gaining increased importance as means to ensure that socio-economic and environmental sustainability considerations are taken into account in the production, promotion and use of bioenergy, with a view to minimizing risks of negative impacts and maximizing benefits in the immediate and long term. With regards to potential benefits, the primary policy drivers for bioenergy promotion have been recognised as energy security and self-sufficiency, although the contribution of liquid biofuels to meet transport and energy needs is limited. Many countries are also looking to bioenergy as a mechanism for climate change mitigation, both as a way to reduce the consumption of fossil fuels and also to emit reduced greenhouse gases from the use of liquid biofuels. Other countries, developing ones in particular, may benefit from the increased demand in bioenergy-related agricultural commodities to revive agricultural trade and stimulate agricultural and rural development. Other potential benefits include: the restoration of degraded lands; reduced land abandonment; increased income-base for farmers and forest owners; and improved employment opportunities in rural areas.

These opportunities should be addressed alongside the risks associated with bioenergy. The increased competition over agricultural crops for bioenergy purposes instead of food production has been highlighted as a concern for food security. Competition over the use of land and water resources for bioenergy production and for agricultural purposes augments pressures on these resources at a time where global water reserves are dwindling and potentially greater effect are feared on indigenous and local communities and small-holder farmers. In addition, evidence favouring the use of bioenergy as a way to reduce carbon dioxide emissions from burning fossil fuels is not conclusive, whereas the clearing of forests for agricultural purposes and bioenergy production presents a significantly higher contribution to greenhouse gases emissions into the atmosphere. Other risks include the loss, fragmentation and degradation of valuable habitats (such as natural and semi-natural forests, grasslands, wetlands and peatlands, and other carbon sinks), the loss of essential ecosystem services and increases in greenhouse gas emissions as a result of these changes. Further negative effects may also

be seen in the increased application of fertilizers and pesticides; increased water pollution and eutrophication; soil degradation and erosion; uncontrolled cultivation; introduction and spread of genetically modified organisms or of invasive alien species; and emissions from burning biomass and its adverse effects on human health.

This study builds on the preliminary findings of Legislative Study No. 95 on *Recent trends in the law and policy of bioenergy production, promotion and use* which sought to stimulate discussion on the features of national legal and policy frameworks for bioenergy in Latin America, Asia and Africa. The study concluded that in order to assess national legal frameworks for bioenergy and identify their strengths, weaknesses, gaps and overlaps, it is necessary to map out the existing regulatory structure as a whole, by reviewing policy, legal and institutional frameworks in a variety of relevant sectors, including the environment, forestry, water management, land and trade to name a few. Legislators and policy-makers should thus take into account a range of views that arise from different sectors through an interdisciplinary approach to designing the regulatory features of any bioenergy programme.

Maximizing the advantages offered by bioenergy while minimising the risks therefore depends on the existence of an enabling institutional and regulatory environment based on well-informed holistic policies. The aim of this study is to deepen the understanding of the interconnection of legislation on bioenergy with a number of other sectors. A narrow focus exclusively on bioenergy alone will prove insufficient to provide a solid regulatory basis that is fundamental to the sustainable development of the sector. To this end, this study examines bioenergy and bioenergy-related legislation, policy and institutions in selected countries in Latin America, Asia and Africa, namely: Argentina, Brazil, Estonia, Mexico, Tanzania, Thailand and the Philippines. The aim of this in-depth review is to identify legal tools that can significantly contribute to the economic, social and environmental sustainability of bioenergy production.

This publication is a joint project of the FAO Development Law Service and the FAO Inter-departmental Working Group on Bioenergy. The authors of the case studies under contract with FAO were Soledad Aguilar (Argentina and Brazil); Aaron Leopold (Brazil); Kati Kulovesi (Estonia); Alice Bisiaux (Mexico); Sabrina Shaw, with research assistance from Laura Choon Cheng Lee and Kiratiya Pitisant (Thailand); Mercy Camba (Tanzania); James L Kho and Aleta C. Nuñez (the Philippines). Elisa Morgera (FAO Legal Officer),

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1. INTRODUCTION

Discourse on potential opportunities and risks has increasingly propelled bioenergy high onto the legislative and policy-making agendas of governments around the world. At a time of rising fossil fuel and food prices, and ever-increasing international attention on climate change mitigation, the production and use of bioenergy has been analysed against its potential economic, social and environmental implications. The nature of bioenergy production and consumption brings together the agricultural and energy sectors; both impact (and are affected by) laws and policies on forestry, biodiversity and the environment, rural development, food security, trade, land management and land-use planning, and labour. Although perspectives vary significantly on the interactions between bioenergy and each of these areas, integrated policy action (through programmes or laws) is increasingly recognized as an essential element to ensure long-term sustainability of biofuel production vis-à-vis food security goals, agricultural and rural development and environmental sustainability. Through case studies focusing on Argentina, Brazil, Estonia, Mexico, Tanzania, Thailand and the Philippines, this publication is designed to canvass national legal frameworks across the different sectors relevant to bioenergy and to identify opportunities and challenges for effective linkages.

A bulk of the literature on bioenergy has initially focused on energy generation from liquid biofuels for transport derived from agricultural crops, the two most prevalent being ethanol and biodiesel. Biodiesel feedstock options are rapeseed and soybean. These are the so-called 'first generation biofuels'. Controversies regarding threats to food security stem from the fact that the feedstock used for the production of ethanol is largely food crops – sugar cane, maize, wheat and cassava. The recent rise in food prices has been arguably attributed to an increased demand for biofuel feedstock. With world food demand expected to almost double by 2050, the use of agricultural crops for non-food purposes such as bioenergy production is expected to have even more significant impacts on food insecurity. The situation is exacerbated by the role of climate change in producing extreme weather events, which may further negatively impact on food production. The range of incentives or subsidies offered for biofuel production will also impact land use patterns and likely increase competition for land. This may further marginalize poor or vulnerable segments of the population from access to natural resources needed for their livelihoods. Owing to favourable agro-climatic

conditions in Africa, Asia and Latin America, and the proliferation of south-south cooperation programmes these regions are likely to see a surge in bioenergy-related projects and the concomitant challenges for food security, land tenure, land management and land use planning, water availability and rural development will also increase.

Bioenergy sources are not only food crops, as indicated above; palm oil and jatropha are also increasingly used feedstock. 'Agrofuel' refers to products of agriculture biomass, by-products at farming level and industrial processing of raw material (agroindustries). Municipal by-products are produced by the urban population and comprise solid, liquid and gaseous biomass by-products. 'Woodfuel' is derived from forests, shrubs and other trees, or from wood processing activities. These are the so-called 'second generation' biofuels that are emerging as alternatives to 'first generation' biofuels (ethanol and biodiesel). These new fuels seem more promising in terms of reduced greenhouse gas emissions and reduced pressure on the natural resource base. The conversion technology is expensive, however, even though the cost of the cellulosic feedstock is much lower than for first-generation feedstock. Most policies and legislation thus currently tend to focus mostly on first generation biofuels, as second generation biofuels are not yet commercially viable.

In order to harness the full potential of bioenergy, its production and use have to be managed in a manner that takes into consideration the economic, social and environmental aspects of sustainability. Economic considerations mainly address whether production is commercially viable and profitable. In addition, policies and legislation that endorse or provide incentives for systems or products that have reduced environmental impacts or that incorporate social benefits can also advance economic sustainability. The implications for food security are one of the essential social dimensions of bioenergy strategies. Other social aspects include rural development that takes into account poor or vulnerable groups, employment and income generation, equitable access to land and other natural resources, and fair labour conditions. Stimulating bioenergy development through adequately structured law and policy can potentially provide additional income and employment for small-holders and other agricultural producers. Environmental sustainability requirements entail reducing harmful impacts on land and water resources, biodiversity and the climate. There is also the need to

prevent and mitigate negative environmental impacts throughout the biofuel production chain: mostly during feedstock production (agricultural cultivation) but also during the conversion process as well as use.

Legislative Study No. 95 on *Recent trends in the law and policy of bioenergy production, promotion and use* demonstrated that provisions on bioenergy production, promotion and use that could typically be contained in a law are instead often spelt out in policy and other strategy documents. These might cover issues such as designating the agencies responsible for regulatory oversight and their specific mandate. Another trend is that typical bioenergy legislation is much more specific and detailed than other types of legislation, as it includes specifications on blending and other technical quality standards. This peculiar complexity of bioenergy legislation explains why policy-makers should clearly understand what tools are available to intervene in the sector, and the relative efficiency of each of these tools (namely, policies, legislation or, as is usually the case, a mix of both). The choice of the type of instruments to use in regulating the bioenergy sector is usually informed by the sector's relative importance to the overall energy security of the country, the level of technological advancement and how organized or influential the players in the sector are.

Countries are at varying stages of bioenergy policy and legislative activity, ranging from those with no official policy on bioenergy to those that have developed their bioenergy policies over a number of decades, and thus have various legal instruments exclusively regulating different aspects of bioenergy. Geographic trends in policy and legislative activity can also be distilled – many Latin American countries are pushing forward with laws and policies that address bioenergy production and use, led by Brazil's pioneer biodiesel programs which started in the 1970s and have evolved over time. Asian countries have also been active, more recently, in formulating policies on renewable energy and bioenergy, and some such as the Philippines have translated this into legislative action. African states, in turn, have the fewest official policy documents on bioenergy in general, although several countries are forging ahead with concrete programmes and biofuels production targets. Mozambique is one of the legislative pioneers in Africa with a national biofuels directive passed in 2009, which includes mandatory blending requirements and creates a National Biofuels Council to coordinate policy and strategy.

Another example is South Africa whose Biofuels Strategy proposes to make biofuels contribute 2 percent of the total fuel supply by 2011 and is currently drafting a law regulating bioenergy.

The countries selected for the case studies have been chosen with a view to ensure broad geographic representation and to demonstrate the range of approaches to promoting and regulating bioenergy through diverse legal and policy solutions. Each of the case studies contains a comprehensive review of the country's legal framework for bioenergy. In addition to special legislation on some aspects of bioenergy and other renewable energy sources, each of the national case studies assesses a host of other laws and regulations, including legislation applicable to agriculture, water management, land management and land-use planning, environmental protection, forestry, labour, international trade and investment.

2. METHODOLOGY AND OVERVIEW OF CASE STUDIES

The seven case studies included in the next chapter engage in a comprehensive review of the national legal frameworks for bioenergy in selected countries. Some of the key questions addressed in the reviews are:

- Have adequate legal arrangements been made to back government policies and targets for renewable energy and bioenergy?
- Are appropriate market regulations and incentives in place to boost production and consumption of bioenergy?
- Have legislative measures been taken to ensure that the cultivation of energy crops to produce biofuels does not have adverse impacts on food security?
- Are questions concerning competing land uses and their social and environmental implications adequately addressed?
- How is bioenergy legislation related to the legal framework applicable to deforestation, protection of biodiversity, greenhouse gas emissions and introduction of alien species into the natural environment?
- Are appropriate procedures in place for assessing environmental impacts of bioenergy projects and ensuring stakeholder participation?
- Is the national institutional framework adequate and are there appropriate mechanisms for inter-institutional coordination?

The relevance of each question depends, naturally, on the specific circumstances of each country. To provide the reader with the necessary background information, the case studies describe the factual situation relating to the production, consumption and further potential of bioenergy in each country and review various national policy instruments relevant for bioenergy.

The Argentina case study elucidates the country's potential for bioenergy development by looking at the benefits of its agricultural industry as set against its domestic energy market. Argentina's legislative framework for biofuels focuses on domestic consumption, and sets out a rather complex regime to promote the construction of new facilities to supply the domestic market with biofuels. Three main mechanisms are established for domestic biofuel promotion: a 5 percent mandatory biofuel blending requirement with gasoline and diesel as from 2010, fiscal incentives for plants producing biofuels for the domestic market, and a price for biofuels set by the Argentine Government. The country is also looking to supply international markets with biodiesel, independent of the regime designed to supply the domestic market. The government has thus put in place a tax differential benefiting biodiesel exports by 27 percentage points in order to promote exports, (biodiesel had an *ad valorem* export tax rate of 5 percent compared with one of 32 percent for its alternative export product, soybean oil). The biofuels legal regime contains a definition of biofuels and a clear distribution of competencies among government agencies. It does however also entail complex administrative procedures and grants wide discretion to the implementing agency in determining the recipients of fiscal benefits. No provisions are made for credit opportunities or technical support for small and medium-sized enterprises. The government has proven to be keen on preventing fuel prices and agricultural exports from impacting on domestic food and energy prices (through the use of export taxes).

Brazil's biofuels program is currently hailed as one of the most advanced in the world, following thirty years of government initiatives and support. This is evidenced by the mandatory blending requirement set at a high 25 percent for bioethanol in gasoline and 4 percent for biodiesel in diesel. The bioenergy plan in place focuses primarily on bioethanol and biodiesel, but also includes research and development plans to improve planted energy forests (for charcoal), and agriculture and forestry residues (including sugarcane bagasse) for the co-production of energy. Given the

longer legislative history of the bioenergy industry in Brazil as compared with other countries under review, the Brazil case study focuses primarily on federal legislation promoting bioethanol and biodiesel before looking at laws and policies related to bioenergy.

Other market instruments used to promote bioenergy production and use include tax exemptions for biofuels and sales tax reductions for flex-fuel automobiles which represent more than 80 percent of market sales in 2009. The government is also taking steps towards augmenting the social and environmental sustainability of its plans to increase production areas for sugarcane and soybean, through programmes which benefit family-based agriculture as well as through zoning restrictions which prevent the planting of biofuel crops in vulnerable ecosystems and areas where food crops are grown. Some of the recent zoning initiatives include economic-ecological zoning strategies (known as ZEEs) and land-planning strategies that reward compliance with zoning requirements. The National Biodiesel Program (PNPB) has the stated goal of increasing domestic production and consumption of biodiesel while decreasing socio-economic inequality within and between regions. To this end, the first government-led certification scheme for biofuels – the Social Fuel Seal (*Selo Combustível Social*) – has been introduced, which ties tax incentives, federal credit and government-led procurement of biodiesel to the fulfillment of requirements which promote regional development by integrating smallholders into the biodiesel production chain. The Social Fuel Seal is essentially a reward for biodiesel producers who procure a percentage of primary crops from family-based agriculture.

Estonia has developed a rather elaborate legal framework applicable to bioenergy in line with the renewable energy and climate change policies of the European Union, such as EC Directive 2003/30 on the promotion of the use of biofuels or other renewable fuels for transport and EC Directive 2003/87 establishing a scheme for greenhouse gas emission allowance trading within the Community. Both these instruments have been recently superseded and require further updates to the Estonian legislative and policy framework. Incentives are created through several laws to increase the viability of biofuel development. Estonia's Alcohol, Tobacco and Fuel Excise Duty Act (2003) enhances the economic attractiveness of biofuels, by exempting the latter from the fuel excise duty. The Long-term Development Plan for the Fuel and Energy Sector 2002–2015 establishes a target to increase the share of renewable energy

sources to 5.1 percent of the total energy consumption by 2010. In order to promote the use of bioenergy and other renewable energy sources, the Electricity Market Act (2003) contains incentives for electricity production from renewable sources as well as the co-generation of heat and power. Article 19 of the Environmental Charges Act (2005) exempts biomass from the pollution charge for carbon dioxide emissions. Estonia participates in the EU's Emissions Trading Scheme (ETS), which sets a price for carbon dioxide emissions, thereby increasing the economic attractiveness of bioenergy in comparison to fossil fuels. The rules for implementing the EU ETS are contained in Estonia's Ambient Air Protection Act (2004). Estonia can also participate in Joint Implementation (JI) and emission trading under Articles 6 and 17 of the Kyoto Protocol, and is currently hosting four JI projects using bioenergy.

Until recently, no legislation dealing specifically with bioenergy existed in Mexico. This gap was filled in February 2008, when the Law on the Promotion and Development of Bioenergy came into force. The law aims to diversify the energy consumption of the country and achieve sustainable development. It outlines the responsibilities of the various federal ministries, as well as the states and municipalities in the elaboration of the policy in the area of bioenergy. Although the recent bioenergy legislation contains clear references to other pieces of legislation and includes social and environmental guarantees, its future enforcement and success may be contingent on factors such as having a well-functioning permit system. Mexico's energy policy is currently undergoing some transformation and the marginal contribution of renewable energy to the gross domestic energy supply is expected to increase. The Mexican Government has recently made significant efforts to establish the bases for a sustainable energy transition and adopted a number of strategic instruments to that end, including the 2007 Climate Change Strategy and the National Development Plan 2007–2012.

As a long-term energy strategy, the Philippines is exploring and developing renewable energy sources. Biomass, hydro, solar and wind are estimated to remain the largest contributors to the total share of renewable energy in the energy mix, with an average share of 27.5 percent. Meanwhile, hydrothermal and geothermal power will continue to be significant sources of electric power in the future. The Biofuels Act was passed in January 2007 to support the Philippine program on energy security. It was designed to strike a balance between maximizing the

benefits of locally produced bioenergy for energy security and mitigating the negative impacts on environment and food production. It sets up an institutional mechanism that considers the interests of all stakeholders. Specifically, it requires oil companies to blend biofuels in gasoline and diesel for use in the transport sector. The National Biofuels Board is tasked with specifying policies and priorities through the Biofuels Programme. Recent policy pronouncements indicate however, that the government may reduce its emphasis on biofuels, which primarily refer to biodiesel and bioethanol blends, as a major energy development strategy, as it faces challenges relating to costs of production and unanticipated impacts.

A striking feature of the Tanzanian energy matrix is the 90 percent contribution of biomass as the primary energy source. However, unlike the other countries selected for review, Tanzania does not have framework legislation and policy specifically dealing with bioenergy. Notwithstanding, the Petroleum Supply Act (2008) brings biofuels within its legal remit making provisions for the import, export, transport, storage, wholesale and retail trade of biofuels. Furthermore, several laws and policies indirectly address issues relevant to bioenergy, such as policies on renewable energy in general, forestry and environmental protection laws (which govern access to and management of natural resources such as agricultural land and forest areas), and trade, labour and food security legislation. Although the primary focus of these instruments is not bioenergy, the rules contained therein may be sufficient to create an enabling environment for the production and use of bioenergy. The harmonisation of relevant laws and the creation of appropriate institutional and legal linkages is thus a priority in order to harness the environmental and social guarantees afforded by the legislative framework.

Thailand, on the other hand, has put in place a legislative and institutional framework for bioenergy development. The Gasohol and Biodiesel Strategic Plans establish phased-in development of targets and blending requirements. In 2005, Thailand approved its first National Energy Strategy focusing on energy conservation and alternative energy development. Highlighting the need to develop renewable energy, the Energy Industry Act (2007) established the mandate for the Ministry of Energy to develop biofuels standards, which were finalized for biodiesel and gasohol in 2008. In March 2009, a revised 15-year Renewable Energy

Development Plan (2008–2020) was approved by the Cabinet, which envisages increasing the proportion of alternative energy to 20.4 percent of national energy consumption by 2022. The biofuels sector is a key element of this strategy. A National Committee on Biofuels Development and Promotion was established in 2005 to facilitate domestic coordination. The Biodiesel Strategic Plan promotes the expansion of palm oil plantations by 2010 and since February 2008, a 2 percent blend of biodiesel (B2) is mandatory nationwide, with B5 targets in place for 2011. The government is providing incentives to increase palm oil and jatropha cultivation for biodiesel and is promoting community-based biodiesel production to enhance energy self sufficiency at the local level. A National Committee on Food Security was created in 2008 to discuss concerns relating to the impact of the promotion of biofuels on food crops. In addition, a National Commission on Climate Change Policy is tasked with coordinating national policies while the Thailand Greenhouse Gas Management Organization is the designated national authority for the CDM. Thailand has also attempted to begin the transition away from first generation to second generation biofuels based on non-food feedstocks, such as cellulosic materials, oil nuts and algae.

To conclude, a word of caution on the terminology used in this study. Literature on bioenergy often contains definitions with diverse parameters as to what constitutes bioenergy and its various forms have proliferated. In this study, 'bioenergy' is defined to mean "energy generated from biofuels", while 'biofuels' are "fuels of renewable and biological origin, including woodfuel, charcoal, livestock manure, biogas, biohydrogen, bioalcohol, microbial biomass, agricultural wastes and by-products, and energy crops." Attempts have been made to use these terms consistently throughout the study. In the individual case studies, any deviations from these definitions have been clearly spelled out and clear indications provided as to which type of bioenergy is covered by the legal instrument under review. Also ethanol and bioethanol have been used interchangeably.

Prior to the case studies, this legislative study begins by mapping out international commitments that are relevant to bioenergy production, promotion and use. Special emphasis is placed upon three areas of international law: trade, climate change and biodiversity. The relevant international legal instruments are addressed to varying degrees in the case studies and were selected based on their likely influence in shaping

national legal frameworks for bioenergy. All the country studies contain ratification information on the relevant international legal instruments. The second part of the study contains the country reviews, while the third part of the study compares and analyses the main findings and explores legal and other options for ensuring economic, social and environmental sustainability in bioenergy development.