PART III

COMPARATIVE ANALYSIS OF THE CASE STUDIES

1. INTRODUCTION

This chapter reviews and compares the findings of each of the seven case studies. It should be noted at the outset that each of the case studies has placed emphasis on different features of national legal and policy frameworks on bioenergy, depending on the information available and the priorities of the government as well as the author's perceptions of the relative importance of a particular area. This precludes a "true" comparative approach, but still allows bringing together various elements of the case studies organized under the following key issues relevant for assessing national legal frameworks for bioenergy:

- economic and market-based mechanisms;
- environmental guarantees;
- social guarantees;
- institutional framework and public participation; and
- links with international trade and carbon financing.

Not all case studies will be addressed with regard to each of the above-outlined themes, but rather attention will be focused on countries that either present specific challenges or include innovative legal options. The chapter will conclude by presenting a menu of legal and other options that can be a source of inspiration for legal drafters and policy-makers in setting up or reviewing national frameworks on bioenergy.

2. ECONOMIC AND MARKET-BASED INSTRUMENTS

The countries under review in this study are all taking steps to harness the potential benefits of biofuels in reducing their dependence on fossil fuels and generating income by exporting biofuels to supply burgeoning regional and international markets. Different economic and market-based mechanisms have been highlighted in the laws and policies under review to promote the production and use of biofuels. Options related to targets, mandatory blending requirements and fiscal mechanisms are discussed in turn below.

2.1 Targets and mandatory blending requirements

The rationale behind targets for the production and use of renewable sources and mandatory national blending requirements is the creation of a domestic market for biofuels which provides a degree of certainty for investors and ensures the persistence of demand for consumption and use of these fuels. Compulsory blending requirements seem to be an effective regulatory instrument to promote the creation of a domestic biofuels market as biofuels are not yet competitive with fossil fuels in many nations. In addition to simply creating demand, blending requirements also provide stability to an industry that can be radically affected not only by the fluctuation of oil prices but by international prices of feedstocks, such as sugar or corn. Blending requirements also reduce the quantity of fossil fuels used, resulting in diminished air pollution and reduced emission of carbon dioxide into the atmosphere.

Overall, targets and blending requirements are likely to be most successful if the figures are progressive; flexible enough to respond to changing or unforeseen economic, social or environmental circumstances; and in conformity with installed (and carefully calculated projections of future) production capacity to prevent bottlenecks in the supply. They should be set through a multi-sector, transparent and possibly participatory process, with a view to limiting discretion of national authorities, thereby building trust and understanding among relevant stakeholders and security for investors.

ARGENTINA: A target to achieve an 8 percent share of renewable energy in the national energy matrix by 2018 has been adopted. The Biofuels Law (2006) establishes a 5 percent of bioethanol or biodiesel blending target for gasoline and diesel oil, respectively, starting 1 January 2010. A price formula was adopted in 2008 to demonstrate how bioethanol prices would be calculated in the market following the introduction of the mandatory blending requirements in 2010.

The Biofuels Law empowers the Secretary of Energy to alter these blending percentages, increasing them in times of domestic market growth or decreasing them where there are shortages. Estimates indicate that an annual production of 625 000 tonnes of biodiesel and 160 000 tonnes of bioethanol will be necessary to satisfy the 2010 blending target. The law goes on to declare that blending facilities that sell gasoline and diesel will have to purchase fuel from biofuel plants that are beneficiaries of fiscal incentives, at

prices defined by the Secretary of Energy. Thus blending facilities can only source from other plants when these specific beneficiaries are exhausted.

While flexibility is a beneficial feature of the law, the author of the case study cautions against the excessive discretion granted to the government to change the blending percentage requirements, which may lead to uncertainty for investors and industry operators.

BRAZIL: Separate legislation covers blending requirements for bioethanol and for biodiesel. Law No. 8.723 (1993) on vehicle emission pollutants had set the figure at 22 percent bioethanol blend with an option for the Executive to raise this to a 20–25 percentage. This power was already exercised in 2007 through Ministry of Agriculture *Portaria* No. 143, thus setting the existing blend figure at 25 percent. Biodiesel targets have been set more recently; Law No. 11.097 of 2005 called for a medium-term target of 2 percent biodiesel blend by 2008 with a 2013 target of a 5 percent biodiesel blend. However, given the success of the National Programme for the Production and Use of Biodiesel in augmenting production, this 5 percent target was instead moved up to 2010. In addition, the PNPB boosted the interim blending mandate to 4 percent in July 2009.

MEXICO: The Law for the Promotion and Development of Bioenergy is characteristic in the absence of mandatory targets and blending requirements to promote the creation of a domestic market for bioenergy. Economic incentives such as tax reductions can however be found in other laws (see section 3.2.1 below). Notwithstanding, the law directs the Mexican Energy Ministry to determine when biofuels will be blended with conventional fuels, although the law does note that this will be a voluntary programme and not legally binding.

On the other hand, the Climate Change Strategy of 25 May 2007 sets a target of generating 16 000 GWh annually from renewable energy sources except for large hydroprojects by 2014.

THAILAND: A National Alternative Energy Development Plan was adopted in 2009 with the goal of increasing the share of renewable energy to 8 percent by 2011 and 20 percent by 2020. At present, however, renewable energy accounts for only 16 percent (14 percent coal and 2 percent hydroenergy) of the national energy consumption. With a view to increasing the use of renewable energy, the Thai Ministry of Energy has put forward

various mechanisms, including an obligatory quota system that makes mandatory the use of renewable energy in power plants as part of the Renewable Energy Portfolio Standard.

In addition, the Gasohol Strategy, that was adopted by Cabinet Resolution of 9 December 2003, consisted of two phases: 2002–2006 and 2007–2012. During the ongoing second phase, the objective is to increase ethanol production to 3 million litres per day and make Gasohol 95 available throughout the country. Licences for 18 new ethanol plants have already been granted in addition to the eight existing ones. The Cabinet Resolution of 17 May 2005 established the objective of increasing the number of gas stations supplying gasohol from 730 to 4 000 by the end of 2005. The updated Gasohol Strategic Plan, as approved by the National Biofuels Committee on 16 May 2007, adjusts the ethanol production target to 2.4 million litres per day by 2011 and 9 million litres per day by 2022. This is in line with Thailand's earlier Energy Conservation Plan (1995–2011) which sets out targets for industry and transport, and equipment and appliance standards. A related Cabinet Resolution stipulates that the production of ethanol and biodiesel should reach 2.4 million litres and 3 million litres per day respectively by 2011. Gasohol 95 and 91 are to be made available nation-wide.

In addition, a Renewable Portfolio Standard sets a target for new power plants to have 5 percent of their generation capacity derived from renewable energy (i.e. solar, wind and biogas). A National Alternative Energy Development Plan sets the target at 8 percent contribution by renewables by 2011 and 20 percent by 2020.

PHILIPPINES: The Biofuels Act (2007) imposes mandatory requirements to blend biofuels with gasoline and diesel in the transport sector. The minimum blending requirement for biodiesel is 1 percent within three months of the entry into force of the Biofuels Act (applicable from August 2007 onwards), 2 percent for biodiesel from May 2009 and 5 percent for bioethanol from May 2009. Starting in May 2011, the minimum blending requirement for bioethanol is set at 10 percent. A number of technical challenges have been identified, however, for the full implementation of these provisions. For instance, the required 1 percent biodiesel blend is still not available throughout the country. The case study also indicates that the estimations concerning biofuels production used as a basis for the Act may have been unrealistic.

2.2 Fiscal mechanisms

Of the seven countries analysed in Part II, Brazil has incorporated the most diverse range of fiscal strategies in its legal and policy framework for biofuels. The combination of the provision of federal funding for construction of plants or enlargement of installed capacity; price controls to ensure competitive bioethanol prices at the pump; tax incentives for the purchase of hybrid vehicles; and maintenance of strategic bioethanol reserves, is conducive to the development of a strong bioethanol domestic industry. For biodiesel, the Social Fuel Seal certification scheme created by Decree No. 5.297 of 2004 links tax incentives, federal credit and government-led procurement of biodiesel to the satisfaction of requirements that promote regional socio-economic development by requiring the integration of smallholders into the biodiesel production chain. Other countries have used one or other fiscal instruments. This section will first analyse tax incentives, then price-setting and finally funds, credit provision and subsidies.

2.2.1 Tax incentives

ARGENTINA: The biofuels legislation creates fiscal incentives mainly in the form of tax reductions for plants producing biofuels for the domestic market. Export taxes are also used as a means to control domestic food and fuel prices from increasing. Although export taxes in general are a controversial instrument to be used as they are perceived as a disincentive to investment, differential export taxes have also been utilised to promote an export-oriented biofuel industry. Beneficiaries of the Biofuels Law are exempt from several taxes applicable to liquid and gas. The Renewable Energy Law No. 26.190 (2007) grants the same fiscal benefits found under the Biofuels Law until 2016 to plants that generate electricity from biomas biogas or other renewable energy sources not falling within the remit of the Biofuels Law. Other tax benefits can be found in the Capital Investments Promotion Law encompassing VAT rebate for purchasing or producing capital goods, or investments in infrastructure, and reduced income tax or income tax holidays.

BRAZIL: The primary economic instrument to promote the bioenergy industry is a specific federal tax scheme for fuels enforced through Law No. 10.336 of 2001. An excise tax on the import and sale of fuel ethanol (and *inter alia,* petroleum and gas), considerably favours bioethanol. The

so-called CIDE excise tax is used to finance subsidies for the price of bioethanol, natural gas and petroleum as well as other environmental and transport infrastructure projects (Law No. 10.336, 2001 as amended, art. 1). Through Law No. 10.453 (2002), proceeds from this tax would go towards, *inter alia,* equalizing production costs of raw materials, purchasing and selling bioethanol, and financing bioethanol storage in the form of reserves. The most recent addition to this favourable tax structure is found in Decree No. 6.875 of June 2009 which lays down a tax for gasoline of the equivalent of US$ 122 per m^3 and lowers the tax for bioethanol to zero.

The tax incentive structure for biodiesel is based on a reduction of sales and social security tax rates (PIS/PASEP and COFINS), and its exclusion from the aforementioned CIDE excise tax. Law No. 11.116 (2005) sets out a complex tax framework whereby biodiesel producers may choose between a percentage of sales tax rate or a fixed tax amount per cubic metre. The law also reduced tax percentages for biodiesel import and production and empowered the Executive to alter the sales and social security tax rates if necessary. Further tax reductions are tied by the law to factors such as raw materials used in production and the status of the producer or seller and the regional origin of raw materials (art. 5). Through Decree No. 5.297 (2004) and its subsequent amendments (the latest in Decree No. 6.606, 2008) federal taxes are reduced to zero for biodiesel produced from family farmers in the less developed areas of the North, Northeast and semi-arid areas.

The purchase of flex-fuel vehicles allows buyers sales benefit from a tax differential reduction of up to 7 percent for vehicles over 2000cc; and 1 percent for those between 1000 and 2000cc (Decree No. 6.890 of 2009). The size of this differential, which was augmented as a result of the most recent spike in oil prices and economic downturn, is gradually being decreased.

ESTONIA: The Alcohol, Tobacco and Fuel Excise Duty Act (2003) in line with the EC Directive 2003/30/EC on the promotion of the use of biofuels, improves the economic attractiveness of biofuels by exempting them from the fuel excise duty. The European Directive mandated the reduction of tax rates on energy from biomass and advocated the use of tax differentiation as a promotional measure.

MEXICO: Although tax incentives are notably absent from the Law on the Promotion and Development of Bioenergy, other laws contain favourable

tax provision for the use of bioenergy. The General Law on Ecological Balance and Environment Protection of 28 January 1988 empowers the federal government and state authorities to formulate economic incentives to encourage compliance with the objectives of the environmental policy within their respective jurisdictions. Thus the law favours tax incentives for those who carry out research in technology that would lead to reduced pollution. Favourable economic, financial and tax schemes are to be granted to activities concerned with energy-saving mechanism or energy sources that reduce pollution. However, the condition attached to such tax incentives is that the activity does not produce significant negative environmental impacts. Thus under these provisions, bioenergy production activities would be prioritised to receive governmental incentives if carried out in a manner that does not produce significant negative environmental impacts.

In addition, the Income Tax Law,as modified on 1 December 2004, grants a rate of accelerated depreciation equal to 100 percent of the cost of investments made in machinery and equipment used for renewable energy (valid where the machinery and equipment depreciated at the rate of 100 percent is used at least for a five-year period).

PHILIPPINES: The tax incentives contained in the Biofuels Act to encourage the production, distribution and use of locally-produced biofuels include specific tax exemptions for the biofuel component of blended gasoline and diesel. The Act further exempts biofuels industries from wastewater charges. Other laws reviewed in the study also provide other examples of tax benefits for bioenergy activities. For example, the National Internal Revenue Code, as amended by the Expanded Value Added Tax Reform Law of 2005, exempts the sale of raw materials used in biofuel production from value added tax.

However, a more detailed tax structure is provided in the Renewable Energy Act of 2008 that grants fiscal and other benefits for the development and advancement of renewable energy resources. It stipulates that in the ten years subsequent to the coming to force of the Act, persons engaged in the plantation of crops used as biomass resources and certified by the Department of Energy, are entitled to duty free importation and shall be exempted from VAT on all types of agricultural inputs, equipment and machinery. These persons shall also benefit from tax and duty-free importation of components, parts and materials; tax credit on domestic capital components, parts and materials; tax exemption for carbon credits;

income tax breaks developers, manufacturers, fabricators and suppliers of locally-produced renewable energy equipment, components and materials; special realty tax rates on equipment and machinery, accelerated depreciation, exemption from the universal charge and zero-rated value added tax; and the 'net-operating-loss carryover scheme' through which net operating loss in the first three years of commercial activities are carried over as a deduction from gross income for the next five consecutive taxable years.

TANZANIA: Investors targeting the energy sector benefit from the Investment Act, according to which a holder of a certificate of incentives issued by the Tanzania Investment Centre enjoys benefits such as exemption from import duties and deferment of VAT on project capital goods, land rent cutbacks and deductions on corporate tax. If biofuels are to be produced for export purposes, investors in these enterprises would also benefit from export tax reductions designed to boost trade and investment flows. It is the priority of the government to encourage export of value-added goods and to discourage export of unprocessed products, which means that a more favourable tax regime will be a available for the biofuel products rather than for biofuel feedstock.

Similarly to Mexican legislation, the Environmental Management Act uses taxation schemes to support environment protection by waiving or imposing lower taxes on environmentally friendly technologies or products. By this reasoning, biofuel production and processing that takes into account environmental considerations could fall under such a category.

THAILAND: A detailed tax scheme is in place regulating bioenergy activities, some included in legal and policy documents governing the sector and others found in instruments regulating related sectors such as investment. The ethanol component of gasohol is exempt from the excise tax and municipality tax, meaning that the retail price of gasohol is lower than gasoline. Also, a tax credit system has been established which encourage the purchase of power from renewable sources as well as special investment privileges administered by the Board of Investment (BOI), such as favourable tax and duty exemptions. In the latter case, the BOI promotes projects based on various types of incentives, including *inter alia*: exemption or reduction of import duties on imported machinery; exemption from income tax for a period of between 3 to 8 years; and exemption from paying income tax on dividends.

With a view to promoting cars that can run on gasohol, the excise tax was reduced by 5 percent and a ceiling rate of 50 percent was set for cars fuelled by ethanol blended with gasoline, at not less than 20 percent, beginning in January 2008. In order to benefit from these rates, cars fuelled by E20 gasohol need to complete certain performance requirements.

Furthermore, industrial operators located in Export Processing Zones (EPZ) qualify for tax-based privileges, which include exemptions from: import and export duties; value added tax; excise tax on products and byproducts derived from the production if they are exported; excise tax on machinery, equipment, including raw materials or any other items used in the manufacture of goods that are imported into the (EPZ); and a refund of taxes, if goods are taken into another export processing zone as if they have been exported.

2.2.2 Price-setting

ARGENTINA: The biofuels legislation create fiscal incentives, among which price-setting and adjustment are primary mechanisms through which domestic prices are isolated from rising international fossil fuel prices, in order to prevent inflation, preserve the national industry's competitiveness and protect consumers. Of the countries under review, Argentina has the highest degree of government intervention through this mechanism. Constant negotiations between the government and the private sector to maintain domestic price levels isolated from rising international prices have preceded the issuance of a number of resolutions by the Secretary of Energy. One example is Resolution No. 1294/2008 (on the Bioethanol Purchase Price Determination Procedure), which sets out a formula to determine bioethanol reference prices. This resolution also indicates the price to be established based on the highest price resulting from two formulas detailed in the Annex minus 3 percent. This regime is not yet operational, and the firms interested in supplying the domestic market are waiting for the application of the formula by which the price of biofuels will be set, as well as of the criteria to allocate fiscal benefits, in order to evaluate the commercial attractiveness of shifting from existing production of sugar, alcohol and soybean oil to the production of bioethanol and biodiesel for the domestic market. The case study reveals that a large amount of discretion is granted to the government in price setting for biofuels in the market. Another downside to this strategy for industry operators is that in view of the absence of a price set for biodiesel, the significant oscillation in the prices

of commodities used to manufacture biofuels (such as soybean oil) results in difficulty in developing business planning and strategies.

BRAZIL: Brazil's experience with the *Pró-Álcool* program is useful to highlight with respect to price-setting. The initial focus of the government was to ensure security of supply and assurance demand for bioethanol, using six primary mechanisms to promote production and consumption, two of which were the requirement that bioethanol be priced lower than gasoline at the pump and that a guaranteed even price would be applied across the country for all bioethanol producers. This significant government intervention was designed to be temporary, with the industry becoming highly competitive and self-sufficient only after release from governmental price controls. The National Petroleum Council was tasked with fixing the price at which bioethanol was sold.

Government control of bioethanol prices was later relinquished and the 33rd amendment to the Brazilian Constitution in 2001 completed the deregulation process in the fossil fuel sector by relaxing the state's monopoly on the oil industry, and by removing the last subsidies and price controls for gasoline, diesel oil and liquid petroleum gas (LPG). This amendment enabled the Federal Government to establish a specific tax on fuels (CIDE excise tax - *Contribuição de Intervenção do Domínio Econômico*) – which was nevertheless established to finance subsidies for the price or transport of bioethanol, natural gas and its derivatives and petroleum derivatives.

ESTONIA: The Estonia case study highlighted certain situations in the legislative framework where the government intervened in the setting of prices. The clearest example is seen in the Electricity Market Act of 2003, which contains an obligation for network operators to purchase electricity produced from renewable energy sources at a more favourable tariff of 81 Estonian crown cents per kilowatt hour. A new support scheme was implemented in May 2007 where producers have two alternatives: the sale of electricity at a fixed, favourable tariff, or the receipt of a subsidy with the option of selling the electricity at market price. Also, the Long-Term Development Plan for the Fuel and Energy Sector (2004) included key strategic objectives such as ensuring fuel and energy supply with the required quality and optimal prices.

TANZANIA: The Petroleum Supply Act sketches out different pricing mechanisms for petroleum products (which are defined to include biofuels)

and parameters for the determination of prices in the supply chain. The Act facilitates the monitoring of consumer prices in certain situations.

THAILAND: The sale price of ethanol is set by the government. Cabinet Resolution of 17 May 2005 directed the replacement of conventional unleaded gasoline by Gasohol 95 in 2008. Unleaded Gasoline is sold at the pumps at a price set at 4 baht/litre lower than regular gasoline. As contribution rates to the Oil Fund from gasohol sales are lower than for gasoline, the retail price of Gasohol 95 (with a higher proportion of ethanol mix (20 percent) called E20) is lower as compared with unleaded gasoline. At present, the gap is 4 baht (US$ 0.11)/litre; the price gap between Gasohol 91 and unleaded gasoline is 3.50 baht (US$ 1)/litre.

2.2.3 Funds, credit provision, subsidies and other forms of fiscal incentives

ARGENTINA: Law No. 26.190 (2007) establishing a Promotional Regime for Renewable Energy used for Electric Generation endows fiscal benefits until 2016 to power plants using renewable energy sources. It also establishes that a specific Trust Fund for Renewable Energies to be managed by the Federal Council on Electric Energy, will receive levies of up to 0.3$/MWh collected by the Secretary of Energy to provide a subsidy of up to US$ 1.50[1] per kilowatt/hour to those plants that are not beneficiaries under the Biofuels Law. The Fund for the Use of Renewable Sources of Energy is in turn financed by mandatory governmental contribution and was established to help attain the minimum 8 percent target in the national supply by 2012 for electricity production from renewable sources (excluding large hydro projects).

The Argentina case study draws attention to the absence in the national legislative framework of a system to provide access to credit for the construction of biofuel facilities by small- and medium-sized enterprises. This is a valid observation for most of the other countries under review.

BRAZIL: The Brazil case study states that 25 percent of the National Agency for Biofuels' concession royalties shall be allocated to fund scientific research and the development of applied technologies to prevent and compensate environmental damage caused by the oil, natural gas and biofuels industries through Law No. 9.478 on National Energy Policy, as amended by Law No. 11.921 in 2009.

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[1] Equivalent to US$ 0.004 kW/h.

The Agroenergy Plan 2006–2011 also created a consortium to guide research and development that has not yet been established due to Brazilian laws on public-private partnerships. Embrapa, a state agricultural research entity, has thus sought to form a company from which a national fund could be established that would pool public and private resources to implement the Agroenergy Plan.

In addition, ecological-economic zoning (ZEE) is tied to governmental agricultural subsidies and credits. Prior examples of tying insurance and credit schemes to climatic risk zoning by Embrapa have reportedly been successful in saving millions of dollars in avoided losses that would have resulted from growing crops in areas subject to negative climatic or hydrological conditions.

ESTONIA: In line with European legislation, Estonia's Electricity Market Act of 2003 (as amended in 2007) provides a legal foundation for support schemes whereby renewable energy electricity producers or cogeneration facilities may choose between a subsidy and a more favourable fixed tariff. Efficient cogeneration can be subsidized if waste, peat or oil shale processing retorting gas is used as source of energy production, or if the combined heat and power plant replaces existing district heating supply boiler plant with the capacity not exceeding 10 mega watts.

The subsidy rates per kilowatt hour for renewable energy sources and efficient cogeneration is 84 Estonian crown cents and 50 Estonian crown cents respectively. Both the subsidy and the purchase obligation are financed through the transmission network operator. The case study notes that the transmission operator estimates the necessary amount of subsidy at the start of each year and divides it between distribution operators proportionate to their sale volume. This amount is then reflected in the distribution service bills.

MEXICO: The Law on the Promotion and Development of Bioenergy does make provisions for promoting bioenergy projects through incentives for the manufacturing, purchase, installation, operation or maintenance of machinery for bioenergy production. In addition, the Law on Sustainable Rural Development of 2001 sets out a subsidies scheme for the agricultural sector through provisions for rural capitalization, compensation and direct payments.

In addition, the Energy Conservation Promotion Fund (ECON Fund) was established to support renewable energy research under the Energy Conservation Promotion Act (1992). The primary purpose of this fund is to provide financial support to designated factories and buildings involved in energy conservation programmes, including renewable energy projects (the bioenergy sources included in the law's definition of renewable energy include wood, firewood, paddy husk, bagasse and biomass).

Should a draft law on the use of renewable sources of energy be adopted, it would establish sources of financing for the production of energy from renewable sources. The funds envisioned by the draft law include a fund for the use of renewable sources of energy; a Green Fund; a Fund for Emerging Technologies; a fund for rural electrification; and a bioenergy fund in order to support the creation of a market for bioenergy by subsidising the difference between its cost and sale price.

PHILIPPINES In the Philippines, the Biofuels Act contains provisions on access by biofuels projects to high-priority financing from the government. The Renewable Energy Act sets up a Renewable Energy Trust Fund monitored by the National Renewable Energy Board.

TANZANIA: Aside from the pricing mechanisms to be used by the government outlined in the Petroleum Supply Act, the case study draws attention to economic instruments in the broader regulatory framework related to bioenergy, such as the Environmental Management Act, whose relevant provisions may be utilized in the context of bioenergy products and activities. The Directorate of Environment is tasked with formulating proposals on packages of economic instruments and financial incentives to the Minister for Environment with the consent of the Finance Minister. This Act provides the legal basis by which the government can use economic instruments, such as subsidies, for advancing environmental objectives in the bioenergy sector.

THAILAND: The importance of using certain fiscal incentives and funding facilities was emphasized during the 26th ASEAN Ministers on Energy Meeting in Bangkok in 2008. Accordingly, some of the incentives Thailand has put in place to encourage the purchase of power generated by renewable energy, include loans and subsidies in the form of 'adders' for small power producers from the Energy Conservation Promotion Fund. The National Energy Policy Council called for 0.036 baht/litre from gasohol sales to be

directed towards the fund. This fund allocated approximately US$ 33 million between 1995–2004 for the research and development of biogas generation from wastewater treatment systems in industrial factories. In addition, over US$ 86 million from the Energy Conservation Promotion Fund was set aside in 2001 to subsidize small power producers using renewable energy, as noted above. This policy raised the purchase price of electricity from small power producers to 1.96 baht/KW. Biogas benefits from a feed-in tariff of 0.3 baht per kilowatt hour. Pilot projects throughout the country to raise awareness on the use of biogas technology have been implemented with support from this fund.

The case study also notes that the Energy Industry Act sets up a Power Development Fund to promote the use of renewable energy and technologies in the electricity sector. Furthermore, the Enhancement and Conservation of Natural Environmental Quality Act establishes an Environmental Fund which is financed by the Fuel Oil Fund. The government plans to continue to subsidize gasohol and biodiesel in addition to using the Oil Fund to support a competitive price in relation to conventional gasoline. Finally, the case study mentions the allocation by the Ministry of Energy and the Bank for Agriculture and Agriculture Cooperatives of 7 000 million baht to provide soft loans to farmers to invest in palm oil production.

3. ENVIRONMENTAL GUARANTEES

One of the most difficult questions related to bioenergy, in particular biofuels, concerns the impacts of their production and use on the environment. Several case studies in this report drew attention to environmental benefits associated with bioenergy, such as diminished local air pollution and reduced carbon dioxide emissions. At the same time, international studies have raised concerns over the cost-effectiveness of biofuels in terms of climate change mitigation. Furthermore, the production of biofuels is also associated with environmental problems such as deforestation and loss of biodiversity resulting from the clearing of forested areas for agricultural purposes and the preference for large-scale monoculture.

This section will first compare how general environmental provisions contribute to ensuring the environmental sustainability of the bioenergy

sector. It will then turn to provisions related to environmental impact assessment (EIA) and to forests and biodiversity.

3.1 General environmental protection provisions

ARGENTINA: Specific environmental guarantees are not integrated into the biofuels regime in Argentina, but the Biofuels Law creates a specific institutional mandate to ensure environmental sustainability. Prior to awarding permits to biofuel production facilities, the law requires the Secretary of Energy to ensure compliance with relevant quality standards for biofuels and their sustainable production. Each facility is requested to present an environmental impact assessment including information on the treatment of effluents and waste management. In practice, however, the Secretary of Energy requires projects and facilities to present the permits awarded by provinces where facilities will be located as sufficient proof of compliance with environmental norms. Therefore, there is currently no true evaluation at national level of compliance with specific environmental standards. It should also be noted that federal jurisdiction over natural resource management is limited, so that environmental standards vary significantly across the country depending on province-level legislation.

BRAZIL: Brazilian legislation embodies several tools to the ensure environmental sustainability of the bioenergy sector. It enshrines in the objectives of the National Energy Policy Law the increase of the contribution of biofuels to the national energy matrix based on economic, social and environmental considerations (art. 1). It also includes environmental considerations in relevant institutional mandates. The National Agency of Petroleum, Natural Gas and Biofuels is responsible in particular for overseeing and authorizing activities related to the production, quality control, import, export, storage, distribution, retail, marketing of national biofuels taking into account environmental conservation concerns.

Ecological-economic zoning regulations (ZEE) are land-planning instruments that can be considered another key environmental sustainability tool in Brazil's legislative framework. Established by criteria stipulated in Decree No. 4.297 (2002, as amended) to Brazil's Environmental Policy Law No. 6.938 (1981), the primary method of carrying out these zoning tools is to link them with agricultural subsidies, insurance and credit schemes. The case study notes that projections of national ZEE planning foresee an area of 25 million hectares suitable for sugarcane, specifically excluding sensitive

areas such as the Amazon rainforest and Pantanal. It is expected that future zoning criteria will take into account the need to protect primary vegetation, sensitive ecosystems, Indian Reserves and conservation areas (national and state parks). The authors of the case study note that ultimately the utility of ZEEs will be contingent upon the actual weight given to social and environmental considerations in the actual zoning exercise, as well as to compliance or monitoring mechanisms that will be put in place.

Finally, national legislation has also prohibited environmentally destructive practices related to the production of biofuels. Brazil's National Climate Change Plan called for the gradual elimination of burning to clear sugarcane fields in areas where harvesting mechanization could take place. The plan drew attention to the need to foster state and private sector cooperation where sugarcane field burning still occurred as well as the implementation of a monitoring system to enforce existing legislation that mandated that areas larger than 150 hectares that could be mechanized should use harvesting mechanization, increasing in increments of 25 percent of each agro-industrial unit every five years. To this end, Brazil's leading sugarcane production region, partnered with the National Sugarcane Industry Union to end the practice by 2014 in most areas where mechanization may take place.

ESTONIA: Since its independence from the former Soviet Union in 1991, Estonia has developed an elaborate legal framework for environmental protection and transposed into its national legal system the key environmental instruments of the European *acquis communautaire*. These laws lay down a number of general rules and requirements affecting the production of bioenergy in the main relevant sectors, namely forestry, agriculture, waste and animal farming. The main environmental law is the Sustainable Development Act (1995), which serves as the basis for all environmental legislation and policies in Estonia. It is complemented, *inter alia,* by the Environment Monitoring Act (1999), the Environmental Impact Assessment and Environmental Management System Act (2005), the Integrated Pollution Prevention and Control Act (2001), the Environmental Supervision Act (2001), the Nature Conservation Act (2004), the Environmental Liability Act (2007) and the Waste Act (1998).

The sectors relevant for bioenergy production in Estonia are therefore comprehensively governed by the above-mentioned laws, imposing detailed obligations on environmental impact assessment, environmental permitting, monitoring and supervision as well as liability to restore damage to the

natural environment. These laws also contain provisions on public participation in environmental decision-making and on the introduction of invasive alien species.

MEXICO: The Bioenergy Law can be said to contain comprehensive environmental guarantees through express inclusion of environmental concerns in its objectives and its explicit references to applicable environmental laws such as: the Law on Sustainable Rural Development; the General Law for Ecological Balance and Environment Protection; the General Law on Forest Life; the General Law on Sustainable Forestry Development; the Law on Biosafety; the Planning Law and the international conventions to which Mexico is a party.

In addition the case study draws attention to the detailed and coordinated institutional framework contained in the Bioenergy Law with regards to environmental protection. Specific institutional mandates have been devised to this end: the Secretary of Environment and Natural Resources (SEMARNAT) is responsible to ensure that the activities regulated by the Bioenergy Law are compatible with the preservation, restoration and sustainable use of natural resources and biodiversity, to evaluate the sustainability of programmes and activities based on the law and ensure the respect of applicable environmental laws. In addition, the Secretary for Agriculture, Livestock, Rural Development, Fisheries and Food (SAGARPA) and the Secretary for Energy (SENER) will support scientific and technological research aimed at determining the necessary conditions for the production of bioenergy to be in harmony with the environment.

The case study further points to the importance of integrated implementation of the Bioenergy Law and the General Law on the Prevention and Management of Waste (2003), which could otherwise potentially lead to legal uncertainty for projects that generate electricity from forest residues and waste. The production of energy from waste falls within the scope of the latter piece of legislation. The Law on the Prevention and Management of Waste contains provisions detailing the division of responsibilities between the federal government, the states, the federal districts and the local governments in waste management and use. The Bioenergy Law confers the power to the Mexican Energy Ministry to grant the permits necessary for the production of all forms of bioenergy, including bioenergy production from waste, which could conflict or cause an overlap of functions with that of other federal or state authorities in charge of waste management and use.

PHILIPPINES: The objectives of the Biofuels Act (2007) include "to reduce dependence on imported fuels with due regard for the protection of public health, the environment, and natural ecosystems consistent with sustainable economic growth that would expand opportunities for livelihood…" (section 2). The Act does not, however, provide more detailed environmental guarantees. This contrasts with the Renewable Energy Law (applicable to biomass), which contains a provision devoted to environmental compliance subjecting renewable energy projects to an environmental compliance certificate.

Another interesting point of the Biofuels Act as regards environmental protection is that it exempts biofuel production facilities from the wastewater discharge fees under the Clean Water Act, as one of the economic incentives to spur investments in the industry. This exemption may appear problematic in light of the fact that ethanol plants are among the most polluting industries and would otherwise be expected to pay the highest wastewater discharge fees. On the other hand, the author of the case study argues that, because bioenergy operators are not exempt from the obligation to secure a discharge permit, the wastewater discharge fee exemption only applies if the company meets the effluent standards. The relevant provisions of the Biofuels Act may thus very well provide an incentive to biofuel producers to comply with environmental standards in order to qualify for such an exemption.

TANZANIA: According to the case study, Tanzania's environmental legislation provides a relatively strong legal basis for environmental protection with respect to bioenergy activities. The influence of the Convention on Biological Diversity can be seen in Tanzania's first environmental policy in 1997 as well as in the Environmental Management Act (2004), which lays down a comprehensive legal framework inspired by the polluter pays principle and the precautionary principle. According to the author of the case study, environmental impact assessment is required for bioenergy projects.

THAILAND: The case study on Thailand reveals challenges in enforcement of forestry laws and policies, and insufficient environmental and cost-benefit analyses concerning biofuels production. The primary drivers of the Thai policy for renewable energy and bioenergy seem to be economic ones, which may have led to an insufficient consideration of the potentially harmful environmental impacts of using biofuels. For instance,

while the policies to promote the use of Gasohol 95 may initially reduce carbon dioxide emissions, economic incentives and lower fuel prices may encourage more fuel use and more traffic congestion and pollution. The legal guarantees for environmental sustainability are limited to a provision of the Energy Industry Act that empowers the Energy Regulatory Board to determine the criteria, procedures and conditions for energy industry operation, including environmental standards.

3.2 Environmental impact assessment

ARGENTINA: The Biofuels Law requires that before granting permits to biofuel production facilities, the law requires the latter submit an environmental impact assessment including information on the treatment of effluents and waste management. The case study reveals that in practice however, such considerations do not lead to an additional layer of protection, but simply rely on pre-existing controls at provincial level as the Secretary of Energy demands only the permits awarded by provinces where facilities will be located as proof of compliance with environmental norms. Environmental requirements for the construction of new facilities are governed by provincial legislation (and therefore subject to much variation) as well as land-use planning instruments.

In addition, it emerges from the case study that environmental impact assessments are not required for regular agricultural activities, although some provinces have specific requirements to issue deforestation permits that include environmental impact assessment and public participation requirements.

BRAZIL: According to Resolution No. 1 (1986), as amended, of the National Commission on Environment, the activities that are subject to environmental impact assessments include bioenergy-related ones such as agro-industrial complexes and units, including alcohol distilleries; any activity using charcoal or similar products in quantities exceeding 10 tonnes per day; and agricultural projects exceeding 1 000 hectares. This instrument also stipulates that EIA must follow state or municipal regulations and shall include at minimum: an environmental diagnosis of the area affected by the project; an analysis of impacts of the project and its alternatives; identification of mitigation actions; and a monitoring programme of positive and negative impacts. An EIA summary is to accompany information containing alternative options for the justification of the project's

compatibility with sectoral and governmental programme, which is to be made available to the public for comment.

MEXICO: The Bioenergy Law makes explicit reference to the procedures for environmental impact assessment contained in the Law for Ecological Balance and Environmental Protection (1988), the Law on Biosafety as well as legislation governing the forest sector. The first of these laws mandates a preliminary environmental impact assessment authorized by SEMARNAT for the cultivation of crops or algae for biofuels production that may threaten the preservation of any species or damage ecosystems. Importantly, the law also directs SEMARNAT to carry out environmental impact assessment studies prior to granting authorizations for land use changes thereby minimizing possible damage or ecological imbalance to the concerned area.

PHILIPPINES: The Environmental Impact Statement System Law of 1978 requires that all public or private entities prepare an environmental impact assessment for every proposed undertaking that may significantly affect the quality of the environment. This law is buttressed by Presidential Proclamation No. 2146, which declares certain areas and types of projects as environmentally critical. Activities involving heavy industries that are resource-intensive or take place on prime agricultural lands, among others, fall within the scope of the environmental impact statement system. Information requirements concern the expected impacts including any adverse ones, short-term and long-term effects, and the use of renewable or non-renewable resources.

TANZANIA: According to the case study, Tanzania's EIA regulations may be considered adequate because they give sufficient notice for the general public to provide comments and call for the organization of public hearings. The Environmental Management Act, however, does not specify how the comments made by the public should be integrated in the course of decision-making.

THAILAND: The Enhancement and Conservation of National Environmental Quality Act (1992) includes provisions on project types requiring an environmental impact assessment that can be relevant for large-scale bioenergy projects. For instance, large-scale CDM projects are required to conduct an EIA and submit a report to the Office of the Natural Resources and Environmental Policy and Planning. The EIA process also

incorporates public participation and mandates the consideration of views of experts into environmental decision-making. However, the case study highlights that there have been negligible efforts to carry out cost-benefit analysis, environmental evaluation or environmental impact assessments prior to the installation of biofuel production projects and plants.

3.3 Specific protection of forests and biodiverse areas

ARGENTINA: As one of Argentina's most important export, soy occupies more than half the land devoted to agriculture: an area which has quadrupled since the 1990s encroaching on forests, wetlands and other areas rich in biodiversity. Several provinces did not previously have land-use planning strategies, so left the decision to landowners as to whether or not to maintain forest cover or deforest the land. The 2007 Native Forests Law was introduced to rectify this situation. It encourages all provinces to adopt a land use planning strategy for native forests; those failing to do are required to refrain from issuing any further deforestation permits. This piece of legislation establishes that all deforestation of native forests will require a permit by local authorities, granted in addition to an environmental impact assessment and following public participation procedures.

BRAZIL: The Forest Code determines the percentage of forest areas that may be used for productive activities and sets out limitations on deforestation for agricultural and charcoal production (Law No. 4771, 1965 last revised in 2006). The authors of the case study consider this as a key instrument ensuring the environmental sustainability of biofuel production. The Forest Code further establishes Permanent Preservation Areas to protect riparian vegetation and any logging in these areas requires federal authorization. Authorities are also empowered under the law to determine other permanent preservation areas, for example to prevent erosion (art. 3). Cutting is allowed on the condition that a stipulated portion (which can be altered by EEZs) must be left as a 'legal reserve', where only sustainable activities may be performed. These portions are: 80 percent in rural forest properties within the Amazon states; 35 percent on rural savannah properties within the Amazon states; 20 percent on rural forest, native vegetation properties in other regions; and 20 percent in rural properties on general farming areas in any region of the country.

In addition to the these general legal requirements, the case study draws attention to the use of voluntary mechanism where by the private sector has

agreed to a moratorium not to use soy cultivated on deforested areas of the Amazon Biome after 24 July 2006. Other aspects of the commitment relate to monitoring soybean plantations in the Amazon biome and raising awareness of the importance of complying with environmental regulations.

ESTONIA: The forest sector, which plays a key role with regard to bioenergy production in Estonia, is governed by the Forest Act (2007), which lays down detailed rules designed to regulate forest management and ensure the sustainable use of forest resources. The Forest Act also contains detailed provisions on the rights and obligations of private forest owners and on stakeholder consultations. Furthermore, it contains detailed provisions designed to guarantee that the general public is able to take advantage of the social and cultural benefits associated with forests.

MEXICO: As one of the laws explicitly recalled in the Bioenergy Law, the General Law on Sustainable Forestry Development covers the conservation, protection, restoration, production, cultivation, management and use of the forest ecosystems and forest resources. One of the specific objectives of the law is the consolidation of permanent forest areas, thereby avoiding land use changes for agricultural purposes which affect forests' permanence and potential. Biofuel cultivation which entails cutting or deforestation therefore falls foul of the law.

Implicitly, the Bioenergy Law also makes relevant the General Law on Forest Life that covers fauna and flora species that are under threat or rare and that have a special status whose sustainable use requires a special permit and the establishment of Environmental Management Units. The law also provides that the objective of the national forest policy to achieve forest conservation through protection and sustainable use, while maintaining and promoting the restoration of its diversity and integrity. The use of forest waste to produce biofuels would be a sustainable forest use.

Some policies also contain relevant environmental protection elements. The Climate Change Strategy, for instance, refers to the need to preserve Mexican agrobiodiversity through programmes jointly implemented by SEMARNAT and SAGARPA. In addition, the Agricultural and Fisheries Sectoral Programme 2007–2012, which was developed by SAGARPA to promote the diversification of agricultural products, cautions against the use of forestland for the cultivation of crops for bioenergy.

PHILIPPINES: In addition to the Biofuels Act, the Presidential Decree on the Environmental Impact Statement System lays down regulations on large-scale plantations (including energy crops such as jatropha) if these are located in public lands (those classified as forestlands or protected areas, regardless of its actual forested condition). Currently, there are, however, no provisions on invasive alien species, although the Wildlife Act mandates the Department of Environment and Natural Resources to develop regulations on the matter.

Through its National Integrated Protected Areas System Act the country benefits from a framework that sets aside portions of forestlands as protected areas, thereby subjecting activities carried out therein to tight regulation with a view to protecting resources and biodiversity. The clearing of forests for plantations or other purposes is prohibited in these areas.

TANZANIA: There are sectoral environmental laws and subsidiary legislation affecting Tanzania's legal framework for bioenergy, including the Forest Act (2002). The case study, however, indicates that the Environmental Management Act is too general and does not offer any specific measures for dealing with land degradation caused by unsustainable agricultural practices. The National Strategy on Land Management, in turn, empowers the relevant minister to issue guidelines for forest harvesting and trading in forest produce, among others. These may serve as quick responses to the danger of land degradation, as their issuance is considerably less costly and time-consuming than the enactment of regulations.

THAILAND: Overall, the case study indicates that despite the environmental legislation and the principle of 'sufficiency economy' in the Tenth National Social and Economic Development Plan (2007–2011), the state of the environment in Thailand has been affected by over forty years of economic growth and lack of sufficient enforcement of the existing environmental laws. Thus, there are a number of critical environmental threats such as deforestation and encroachment of protected areas that are considered relevant for the bioenergy sector. For instance, deforestation has occurred in alarming rate in large part due to lack of sufficient enforcement of forest legislation.

4. SOCIAL GUARANTEES

This section synthesizes the country reviews of bioenergy policy and legislation of Part II from a social perspective, exploring themes relating to food security; land tenure, management and use planning; employment and rural development.

4.1 Food security

In some countries, the production of bioenergy from energy crops has given rise to concerns over national food security: producing biofuels can be economically more attractive than food production, especially given financial incentives to promote the creation of national markets for bioenergy. Of the seven case studies, questions concerning food security were particularly important in Mexico, where specific legal provisions were made to ensure the availability of corn, the key crop for Mexican diets. In Estonia, conversely, where forests constitute the main source for bioenergy and the forested area has increased due to abandoned agricultural land, food security concerns have not emerged. As soy – the crop currently used for biodiesel production in Argentina– is a product that does not feature prominently in Argentine diet, food security concerns in relation to bioenergy have not been raised there either.

BRAZIL: It emerges from the case study that scattered provisions in the legal framework relate to food security. For instance, the four guiding principles of the types of technical assistance to be provided by biofuel producers to family farmers under the Social Fuel Seal scheme explicitly state food security and sovereignty as a goal, together with sustainable production systems; generation of income; and reducing rural poverty.

Interestingly, the case study makes reference to the Ministry of Agriculture Ministerial Resolution (*Portaria*) 54 establishing agricultural zoning for sugar cane in the State of Rio Grande do Sul for the period 2008–2009, which incorporates a food security criterion as one of the limiting factors in the production of bioethanol.

MEXICO: The prevalence of food security concerns in Mexico can be explained by the fact that this country is already suffering from a problem nicknamed 'ethanoinflation', whereby the price of corn – a key crop for Mexican diets – has arguably increased significantly due to ethanol

production in the United States. Accordingly, an earlier proposal for a law on bioenergy, vetoed by the President, was criticized for "feeding cars instead of humans". Conversely, the Bioenergy Law has as one of its main objectives the protection of food security and promotion of food sovereignty in Mexico, making express reference to the Law on Sustainable Rural Development.

The Bioenergy Law empowers the Secretary of Environment and Natural Resources to periodically review and publicize the impacts of bioenergy programmes on food security and sovereignty. In setting up a permitting system for carrying out activities and services related to the production, storage, transport, distribution and marketing of bioenergy, the Bioenergy Law further provides that permits to produce biofuels from corn are only granted in case a national surplus production exists. The effectiveness of this provision by itself in addressing food security concerns is questionable, however, given that Mexico is not self-sufficient in corn production and its food security is therefore affected also by the price of corn on international markets and not only by the existence of national surplus production. The Bioenergy Law also contains relatively strong language on research and development focusing on new uses of non-food products and the diversification of crops for biofuels production and should be beneficial for Mexico's agricultural sector and food security.

Furthermore, a draft law on planning for agricultural food and nutrition sovereignty and security, which was approved by the Lower House of the Parliament in March 2006 and is currently before the Senate, could complement the provisions outlined above. This draft law underscores the importance of strategic food products on a national level in order to meet the population's basic needs. The case study notes that the draft law would enable a preference to be given to the cultivation of crops for food purposes over biofuels.

THE PHILIPPINES: There are fears that biofuels production could compete with food production in the Philippines. In fact, one of the lead authors of the Biofuels Act has proposed that the Act's implementation be deferred due to persistent concerns related to land use and food security. According to the case study, no studies are available on the impact of the increased production of biofuels on the agricultural sector. Unless such comprehensive studies are conducted, the public opinions are based on speculations.

One authority that is relevant for administering the relationship between biofuels production and food security in the Philippines is the Sugar Regulatory Administration, mandated to ensure adequate sugar supply at all times to meet domestic demand. The role of the Sugar Regulatory Administration has been explicitly acknowledged in the Biofuels Act, as the sugar industry is estimated to be the main contributor to the production of biofuels.

TANZANIA: Issues relating to food security are regulated in Tanzania by the Food Security Act (1991) designed to guarantee strategic grain reserve. The Act creates a Board of Trustees to oversee and coordinate the activities of the government aimed at procuring, storing and releasing grain for security purposes and preparedness for any crisis in the country. In addition, one of its provisions state that the Food Security Act will prevail over conflicting provisions in any other laws. Though the Act is not detailed with regard to specific food crops, it entails the possibility to address any emerging food security issues in Tanzania by empowering the minister to pass regulations on any matter related to the effective implementation of the Act (section 14).

Significantly, the primary goal of the Agricultural and Livestock Policy of 1997 is to guarantee basic food security and to augment the national standards of nutrition by boosting the output, quality and availability of food commodities. The policy also lays emphasis on meeting these goals through increased productivity, while drawing attention to the benefits of earning foreign exchange through 'cash crops' exports.

THAILAND: The creation of a Committee on Food Security in 2008 enabled a coordinated national debate on how to ensure that a switch in demand for fuel does not impact negatively on agricultural production for food.

4.2 Land

In some countries, plans to increase the production of bioenergy derived from wood-based biomass or energy crops can have important ramifications for land use involving areas set aside for food production, protection of biological diversity and forested areas, and for the preservation of cultural spiritual or traditional practices of indigenous and local communities. The importance of land use considerations depends largely on the specific

circumstances of each country, and each case study has highlighted different aspects, sometimes related to land tenure, sometimes to sustainable land management and land use planning.

ARGENTINA: Notwithstanding the positive development effect that having a high-value export crop as soy generates on local communities, serious concerns have been raised about the total area devoted to soy monoculture in Argentina using technological packages with genetically modified seeds. The area has quadrupled since the 1990s and moved into lands previously unsuitable for agricultural activities, altering valuable ecosystems like forests and wetlands.

Environmental concerns associated with the expansion of the agricultural frontier in Argentina have led to the adoption of the Native Forest Law that establishes a moratorium on the issuance of any new deforestation permits, until land planning strategies for native forests are adopted by each of the different provinces. Although most experts contend that biodiesel production is unlikely to alter or produce any significant impact on existing patterns of agricultural production, the adoption of the Native Forests Law constitutes an important step towards the coherent regulation of land use planning by the different provinces and the protection of vulnerable ecosystems.

BRAZIL: Besides pointing to highly divisive issue of land tenure arrangements in the Amazon that may have impacts on or be exacerbated by bioenergy projects, the case study highlighted land use planning through ecological-economic zoning regulations (ZEE). The main mechanism for the implementation of these zoning strategies is the tying of governmental agricultural subsidies and credits to ZEEs. In the case of bioenergy crops, it has yet to be defined how the ZEE will be linked with other existing agricultural zoning strategies (like those based on climatic and hydrological conditions), as well as strategic environmental assessments and environmental licenses, although zoning is already used for the cultivation of sugarcane in Brazil. A 2009 Ministerial Resolution, for instance, established agricultural zoning for sugar cane in the State of Rio Grande do Sul for the period 2008–2009 using a map of climate risks, as well as incorporating a food security criterion as one of the limiting factors in the production of bioethanol. The zoning criteria for bioenergy reportedly will incorporate the general criteria applicable to agricultural zoning along with cropland limitations based upon political aims to preserve: primary vegetation,

sensitive ecosystems (mainly the Amazon rainforest and Pantanal), Indian Reserves, conservation areas (national and state parks) and areas considered strategic for food security (mainly soybean, corn, cotton, bean and rice).

ESTONIA: The case study highlights how existing legal provisions on land tenure and use may hinder bioenergy development. Nearly half of the abandoned agricultural land is owned by the state. According to the Land Reform Act (1991), it is possible for producers to use such land by usufruct. Some producers could be interested in using the state-owned, unused agricultural land for willow plantations to produce bioenergy from fast-growing trees. However, according to the Land Reform Act, the usufruct of land is possible for 10 years only, whereas the lifetime of a short-rotation plantation can be up to 25 years.

MEXICO: The Law on the Promotion and Development of Bioenergy specifically provides that no land use change from forest to agricultural land should be carried out for the cultivation of energy crops. The Secretary of Environment and Natural Resources is specifically mandated to ensure this.

In addition, certain provisions of the law specifically address soil protection: biofuels production should be compatible with the natural use of the soil and not alter the ecosystem balance and should maintain the soils' physical integrity and productive capacity. Furthermore, bioenergy crop cultivation must avoid practices that cause erosion, degradation or which adversely modify the topographical characteristics of the cultivated area. In addition, cultivators of bioenergy crops should perform preservation, sustainable use, and restoration practices to avoid soil degradation and ecological imbalance and, where possible, enable their restoration. In addition, the Secretary of Environment and Natural Resources is to promote soil protection and restoration practices in agricultural activities, and shall carry out environmental impact assessment studies prior to granting authorizations for land use changes so that possible damage to the concerned area or any upset of its ecological balance can be anticipated.

PHILIPPINES: The Philippines does not have a comprehensive legal or policy framework for land-use planning. Nonetheless, the case study refers to a newly created bicameral oversight committee tasked with holding public hearings on the effects of biofuel farming on land use policy in order to prevent indiscriminate biofuel development. Significantly, the Biofuels Act does not address the question of land rights and transparency of land

agreements between local or indigenous communities with respect to the land and water resources to be used for the cultivation of energy crops.

Land use is thus largely determined by local government units through local zoning ordinances within their political jurisdictions. Local government decisions on zoning though are mainly concerned about tax rates and identifying areas for urban development. There are no national standards or guidelines on how decisions are to be made by either a national agency or local government on whether farmland is to be used for biofuel or food production. The Environmental Impact Statement System sets regulations on large-scale plantations (including energy crops such as jatropha) if these are located in public lands (those classified as forestlands or protected areas, regardless of its actual forested condition). Currently, there are no regulations on alien invasive species, although the Wildlife Act mandates the Department of Environment and Natural Resources to develop regulations on this matter.

TANZANIA: The Tanzania case study provides the most in-depth look at land issues out of the countries under review. Issues related to land-use planning are governed by the new Land-Use Planning Act (2007), establishing land planning commissions from the national level to the village level. Depending on their jurisdictions each designated land planning authority is responsible for preparation and supervision of land-use plans. The National Land-Use Planning Commission has the overall responsibility for land use plans in Tanzania, and is also responsible for the preparation of the national land use plan. All villages, districts and regions are required to have land-use plans, which are subject to registration.

The Act does not specify which land should be used for the cultivation of energy crops, but it has been left to the villages, councils and districts to determine which land areas are suitable for that purpose. The Act is thus based on a bottom-up rather than top-down approach, allowing local communities to determine how their land should be utilized. The law is quite new and the experience with the former Land Planning Commission Act (1984) shows that preparation of land use plans is quite demanding in terms of time and money, and most of the villages are poor and cannot afford to implement them.

The case study also highlights that the Land Act and the Village Land Act seem to provide adequate protection to property rights. Importantly for the

production of biofuels, the Land Act (1999) contains provisions on the allocation of lands to investors. In practice, this takes place through the Tanzanian Investment Centre. As a general rule, non-citizens cannot be allocated land for other than investment purposes. Registers of land areas suitable for investment purposes are kept by the Tanzanian Investment Centre through the land bank scheme. In accordance with the Village Land Act (1999), the allocation of village land for non-villagers is subject to approval by the village assembly. The poverty level of village land holders, however, especially in rural areas, means they are often in a weaker bargaining position in the negotiations with investors. The author of the case study also noted that the original title to land is vested with the President of Tanzania, who is also empowered to acquire land for public purposes under the Land Acquisition Act (1967). The right to land in Tanzania through the right of occupancy under the Land Act can only be granted for a period not exceeding 99 years after which the title reverts back to the government.

The case study also highlights problems related to desertification and land degradation in Tanzania. Issues related to sustainable land management are addressed by the Environmental Management Act (2004) and the National Strategy for Sustainable Land Management and Protection of Water Catchments Areas (2006). The latter lays down a comprehensive five-year programme to address twelve key challenges and promote the development of renewable and alternative energy sources especially in dry land areas and address the problem of deforestation.

THAILAND: In Thailand, the key laws concerning land use questions are the Land Code (1954) and the Land Reform for Agriculture Act (1975). The Ministry of the Interior is responsible for regulating land use. For bioenergy projects, the provisions of the Land Code prohibiting foreign individuals and companies from owning land in Thailand can also be relevant. There are, however, some exceptions under the Investment Promotion Act (1977) and the Foreign Business Act (1999), as well as for projects under the Thailand Board of Investment and the Industrial Estate Authority.

4.3 Employment, rural development and community-based production

As the case study on Argentina demonstrates, bioenergy policies and laws may have a significant impact on rural populations when both cultivation areas and main biofuel facilities are located in rural areas. The same case

study points out those detrimental effects may be seen in regions where soy monoculture displaces traditional livestock farming practices. Several other case studies addressed questions related to rural development and employment, as synthesized in this section.

ARGENTINA: The Biofuels Law contains several provisions supporting small and medium-sized enterprises (SMEs), for example its stipulation that the Ministry of Federal Planning should prioritize SMEs as well as promoting agricultural production and regional economies in the allocation of fiscal benefits. The law also provides provisions for supporting SMEs purchase of capital goods for biofuels production and for endorsing research, cooperation and transfer of technology among small and medium-sized enterprises and relevant institutions. Social considerations are clearly espoused in provisions of the Biofuels Law that allocate fiscal benefits to projects or industries according to: (i) the promotion of small and medium-sized enterprises, (ii) agricultural production, and (iii) regional economies. Furthermore, the Biofuels Law states that blending facilities selling gasoline and diesel must first purchase fuel from the biofuel plants of beneficiaries of fiscal incentives, at prices defined by the Secretary of Energy, and only when their supply is consumed can purchase from other plants be allowed. The author of the case study, however, notes some shortcomings in this regard, namely: complex procedures, excessive discretion of the implementing agency in defining the recipients of the fiscal benefits, and the lack of credit opportunities or technical support for small and medium-sized enterprises.

BRAZIL: The Social Fuel Seal scheme in Brazil is the most notable example in the country reviews of where economic benefits for bioenergy production are tied to fulfilling socially advancing criteria. Biodiesel producers are mandated to comply with three conditions in order to benefit from the scheme. First, a percentage of the overall feedstock used must be from smallholders (the precise figure depends upon regional locations – higher proportions are set for more socio-economically disadvantaged regions). The second stipulation is that producers must negotiate and sign contracts with the family farmers concerned, or an organization representing them. Third, in those contracts the price to be paid for the feedstock must be detailed (including conditions and the deadline for feedstock delivery), as well as an outline of the technical assistance to the families that will be provided to the families. According to the authors of the case study, the impacts of this scheme are significant: at the 14th auction, 80 percent of biodiesel purchase was from firms with the Social Fuel Seal.

However, concerns have recently arisen that the social impact of the scheme would be diminished following a lowering of required percentage in one of the areas in 2009 on the grounds that small-holders were unable to keep up with production capacities, therefore necessitating a reduction in percentage to enable operations to continue legally. Furthermore, approaches which may see a flat rate of 30 percent requirement across all regions to provide benefits to areas where soybean flourishes has been criticised on the same grounds – i.e. that the 'social' objectives of the seal were precisely to promote family agriculture in the poorest and most disadvantaged regions, not those with the highest rates of production.

The case study notes that compliance with labour laws and standards is not comprised among the Social Fuel Seal eligibility requirements. Voluntary agreements favouring corporate social responsibility are instead used to address the most serious violations of labour law. A National Pact for the Eradication of Slave Labour comprises private actors that have agreed not to use feedstock from firms that have been found to impose working conditions analogous to slavery and have been included on an online list published by the Ministry of Labour and Employment (Ministry of Labour, *Portaria* No. 540, 15 October 2004).

Social impacts were finally taken into account also in the implementation of the ban on destructive practices related to bioenergy production (sugarcane field burning), with the commitment for private companies to re-train workers that were negatively affected by the mandated mechanization of bioenergy crop production.

MEXICO: The Bioenergy Law includes among its objectives specific reference to the need to stimulate rural sector activities, generate employment and improve the quality of life of the population, especially that of marginalised communities. Furthermore, it creates specific institutional mandates to this effect. The Bioenergy Law provides that the ministries that comprise the Bioenergy Commission will elaborate on actions that serve social goals and enhance the sustainable production of (bioenergy) crops. It further states that these actions should drive productivity, favour employment creation, and motivate the creation and mergers of rural companies, of which at least 30 percent of the shareholders should consist of the crops producers.

PHILIPPINES: The policy objectives underlying the Biofuels Act include the protection of public health and increased livelihood from biofuel production – all contributing to balanced economic growth.

The Biofuels Act outlines responsibilities for the Department of Labour and Employment linked to providing certain social guarantees in the bioenergy sector, for example promoting livelihood and employment opportunities, providing access to workers in the biofuels industry to social coverage and making recommendations in biofuels policies and programmes which further their social benefits. Under the Sugar Amelioration Act of 1991, workers in this industry benefit from a system of production sharing. According to the Biofuels Act, the National Biofuels Board is responsible for establishing a similar mechanism for biofuel workers.

TANZANIA: The case study identifies the Occupational Health and Safety Act (2003) and the Employment and Labour Relations Act (2005) as legal instruments providing adequate social guarantees for those employed in the biofuels sector.

THAILAND: The case study highlights government support to community-based bioenergy production, through a pilot Community Biodiesel Production Plan that aimed at promoting biodiesel production and use in 72 communities across the country, in order to reduce local communities' expenses on energy by producing and using biodiesel from used cooking oil or other oil plants grown in the community, such as jatropha in order to replace diesel use. Technical assistance is also to be provided through learning centres which demonstrate biodiesel production, financing pressing and biodiesel processing machines, as well as conducting training and information sharing on farming oil crops.

Other government programmes include a Small Power Producers Initiative in 1992 and a "very small renewable energy power producers" programme in 2002.

Finally under the Investment Promotion Act (1977), additional benefits are allocated to producers located in least developed areas of Thailand, such as deductions for infrastructure costs and public utility costs, an additional 50 percent reduction in corporate income tax for up to ten years and further deductions for infrastructure installation and construction costs.

5. INSTITUTIONAL FRAMEWORK AND PUBLIC PARTICIPATION

In principle, effective national policies and programmes for bioenergy benefit from clearly defined institutional mandates, inter-institutional cooperation and coordinated implementation of sectoral laws. At the same time, provisions for public participation and transparency are important to guarantee the legitimacy of the national legal framework in an area that can have important implications on the interests of various actors from private enterprises and consumers to small-hold farmers and local communities. In most of the selected countries, special committees or similar bodies were created to advice on national laws and policies on bioenergy. Often such bodies included representatives from various ministries and other government agencies, as well as the private sector. However, according to the case studies, not all of these bodies were satisfactory in terms of broad participation by all the relevant stakeholders (particularly non-governmental ones) and transparency in the functioning.

ARGENTINA: The Biofuels Law and its regulatory decree created an adequate institutional set up for bioenergy regulation and clearly allocated tasks to different government agencies. Furthermore, inter-institutional coordination is provided through the creation of a National Advisory Commission on Biofuels. According to the biofuels legislation, however, private institution 'may' contribute to the fulfilment of the tasks allocated to the Implementing Authority, but they are not permanent members of the Commission. In practice, the National Advisory Board serves as a mechanism for interagency information sharing, but does not participate in the final stages of policy-making, which are usually defined by the Secretary of Energy.

With a view to enhancing transparency, the Biofuels Law requires an updated public registry of permits awarded to biofuel production and processing plants to be maintained together with a list of those firms that receive promotional benefits (to be made available online). Other information that must be published includes reference prices for biofuels which provides an annual estimate of the total volume of biofuels required to meet domestic market needs. Nonetheless, a concern expressed by different stakeholders is the lack of transparency in decision-making by authorities, as the public information requirements set out in the Biofuels Law have not been

complied with yet, and the National Advisory Commission on Biofuels lacks visibility and transparency in the conduct of its proceedings.

BRAZIL: The Brazil case study highlights numerous examples of multi-sectoral agencies responsible for implementing policies, formulating programmes and in general regulating the biofuels sector. Under the Ministry of Energy, the National Agency for Biofuels and the National Council for Energy Policy are the primary institutions for bioenergy created by the National Energy Policy Law. The Council was set up as an interagency body, the secretariat of which is made up of, among others, the ministers of: mines and energy; science and technology; planning, budget and management; finance; environment; development, industry and foreign trade; national integration; and agriculture. Thus, interagency coordination and information exchange and dialogue can take place through this forum. In addition, the Council is one of rare examples in which participation of non-governmental stakeholders is provided for: energy experts from civil society and academia chosen by the President of Brazil may participate in the meetings of the Council.

Another example of institutional integration in Brazil is the Inter-ministerial Sugar and Alcohol Council, which acts as an inter-ministerial steering committee with representatives from the finance, development, industry and foreign trade, and energy government sectors. This interagency entity coordinates current policy and is responsible for the development of new policy.

With respect to public-private partnerships, the Agroenergy Plan 2006–2011 intended the creation of a consortium to guide research and development but has not yet come to fruition as Brazilian law mandates that government investment of public funds must remain entirely under governmental control. To side-step this obstacle, Embrapa has sought the formation of a purpose-specific company that would conform to Brazilian public-private-partnerships law from which this consortium could be set up.

As to biodiesel, the institutional framework preceding the Programme for the Production and Use of Biodiesel, displayed a similar set-up to the policy formation and implementation bodies of the bioethanol program. Both the Executive Inter-ministerial Commission on Biodiesel, responsible for policy design, and the Managerial Biodiesel Group, responsible for policy implementation, comprise representatives from 13 other ministries. There

are also instances of public consultation, for example with respect to the Social Seal programme: changes in percentages resulting from a regular review of the programme by the Executive Inter-ministerial Commission on Biodiesel and the Managerial Biodiesel Group, involve consultation with stakeholders. The case study draws attention to normative instructions that were adopted following the public consultation process.

ESTONIA: The institutional framework in Estonia is well-developed with clear mandates for each of the relevant ministries as well as provisions for inter-institutional coordination. The Ministry of the Environment plays a key role in the forestry sector as well as climate change policies, while the key institution in the energy sector is the Ministry of Economic Affairs and Communications. Estonian legislation also contains elaborate provisions on public participation, including the Forest Act (2007) and various environmental laws. The formulation of Estonia's forest policy has been characterized as one of the most participatory processes in the country's history.

MEXICO: One of the strengths of the Mexican Bioenergy Law is its elaborate and detailed establishment of a supportive institutional framework for bioenergy activities. The Inter-secretarial Bioenergy Commission is responsible for ensuring inter-institutional coordination. Importantly, several inter-institutional cooperation and coordination mechanisms outside the framework for bioenergy have been put in place through other laws that nevertheless impact the bioenergy sector. These coordination entities include the Inter-secretarial Commission for Sustainable Rural Development; the Energy Sector Committee on Climate Change; and the Consultative Council for the Enhancement of Renewable Energy – the latter including also participation from non-governmental stakeholders. The Planning Law contains specific provisions to ensure the public participation of organizations representing, *inter alia*, workers, farmers, academic and research institutions, business groups and indigenous peoples.

It is interesting to note, however, that permits required under the Bioenergy Law for carrying out activities and services related to the production, storage, transport, distribution and marketing of bioenergy are granted by the Secretary for Energy, while an important part of bioenergy production reportedly related to energy crops and agricultural activities falls within the domain of the Secretary for Agriculture. The law provides, however, that the

permits are to be granted in consultation with the Inter-secretarial Bioenergy Commission, where also the Secretary for Agriculture is represented.

The Mexican case study highlights a degree of lack of transparency in the permit approval process. The author thus recommended that these issues should be kept in mind when adopting secondary legislation to implement the Bioenergy Law. The case study also stresses that the participation of the private sector in the development of Mexico's legal and policy framework for bioenergy should be enhanced.

THE PHILIPPINES: The Biofuels Act lays down provisions on the institutional framework for biofuels. The principal institution in charge of the implementation of the Act is the Department of Energy with its responsibilities clearly defined

The Act also creates the National Biofuels Board in which various ministries as well as the Philippine Coconut Authority and the Sugar Regulatory Administration participate. The tasks of the National Biofuels Board relate to implementation of the biofuels programme and making policy recommendations. On a critical note, the case study notes that the Department of Environment and Natural Resources is not given a role in the implementation of the Biofuels Act, even if environmental issues are mentioned as one of the Act's objectives. Notwithstanding the fact that the Board is well-represented by the major sectors concerned, the Department of Environment and Natural Resources is not included.

Significantly, the Biofuels Act also contains provisions on stakeholder participation in crafting the implementing rules and regulations of the Act: it mandates that the formulation of secondary legislation must be conducted in consultation with stakeholders and concerned agencies, and that that prior to its entry into force, the draft of the implementing rules shall be posted on the Department of Energy website for at least one month and published in at least two newspapers of general circulation. However, in contrast to the recent trends in environmental legislations, there are no civil society or private sector representatives in the policy-making body, the National Biofuels Board. This is a critical gap, especially because the success of the law hinges entirely on private sector participation – investments in biofuel production, distribution and use.

TANZANIA: Though there is no specific legislation currently in force on bioenergy from energy crops which would have provided for a clear layout of institutional mandates, in March 2006 the government created the National Biofuels Task Force consisting of representatives from various ministries such as Ministry of Food and Agriculture, Ministry of Energy, Ministry of Planning and Privatization and other relevant private sector and the civil society actors. The task force is one of the few exceptions to take on board views of different non-governmental groups in the formulation of biofuels guidelines.

The Petroleum Supply Act, also applicable to biofuels, identifies the Tanzanian Energy and Water Utilities Regulatory Authority as the authority responsible for granting licences in operators in the petroleum sector. The Act also lays down provisions concerning inter-institutional cooperation. Accordingly, environmental authorities would be involved in the classification of projects in the petroleum sector that require environmental impact assessment.

The Environmental Management Act (2004), the Constitution of the United Republic of Tanzania of 1979 (as amended in 2000) and the Forest Act (2002) contain provisions on public participation.

THAILAND: Thailand has made several special institutional arrangements for bioenergy. In general, the national energy policy is guided by the National Energy Policy Council chaired by the Prime Minister and including representatives from several ministries and other state agencies. In 2005, the government also appointed a Committee on Biofuel Development and Promotion, which acts as a focal point for matters relating to biofuel policy making, monitoring and promotion. Also relevant for bioenergy is the National Commission on Climate Change Policy, created in 2006 and chaired by the Prime Minister. Nonetheless, according to the case study, inter-institutional coordination continues to be a challenge. The government is in the process of establishing a more rigorous direction for Thailand's alternative energy strategy including ensuring policy coordination amongst government agencies and other public and private actors.

The Energy Regulatory Board is empowered to issue licenses for energy industry operation and to determine the criteria, procedures and conditions for energy industry operation. These include, *inter alia*, requirements for the use of renewable energy and environmental standards.

Concerning public participation, the Enhancement and Conservation of National Environmental Quality Act contains provisions on the right of individuals to access information and the duty of individuals to assist and cooperate in enhancing and protecting the environment. The Energy Industry Act also advocates the participation of the local communities and the general public in the management and monitoring of energy-related operations.

6. TRADE, INVESTMENT AND CARBON FINANCING

In many countries, laws and policies designed to promote bioenergy are closely connected with market regulations as well as with the legal framework applicable to international trade and investment. As the case studies in this report illustrate, national legal frameworks for bioenergy bring to the fore questions related to the WTO Agreements, such as tariffs, product standards, sustainability criteria and agricultural subsidies. In Estonia and other members of the EU, concerns over the sustainability of the 10 percent target for biofuels by 2020 have lead to the adoption of a European directive laying down sustainability criteria for domestically produced and imported biofuels, including the requirement that imported biofuels do not originate from lands with high carbon stock or high biodiversity. In countries like Argentina, some concerns have been voiced identifying the need to avoid costly certification procedures and bureaucracies associated with the EU's sustainability scheme. Similar concerns also emerged from the case study on Tanzania. The case studies on Thailand and Tanzania also highlight the role of agencies designed to promote foreign investment in implementing national bioenergy programmes. In Tanzania, for example, international investors are an important force driving the development of the national bioenergy industry and benefiting from various incentives administered by the Tanzanian Investment Centre.

In all of the seven case studies, carbon financing also held some potential in promoting the national bioenergy sector. In Estonia, three different carbon financing mechanisms were available, namely the EU Emissions Trading Scheme as well as joint implementation and emissions trading under the Kyoto Protocol. The impact of the EU ETS in Estonia is to increase the economic attractiveness of bioenergy by imposing a price on carbon dioxide emissions, whereas the two Kyoto mechanisms could be used to attract international carbon financing for bioenergy projects in Estonia. Of the six

other countries classified as non-Annex I countries under the UNFCCC and the Kyoto Protocol, all had benefited from carbon funding under the Clean Development Mechanism. However, the case studies reflected general problems concerning the regional distribution of CDM projects: Tanzania was hosting only one registered CDM project and focused on capacity building activities – reflecting a common trend in Africa, while the Latin American and Asian countries had much more extensive CDM project portfolios. In Mexico and the Philippines, concerns emerged over the impact of mandatory blending requirements for biofuels on the 'additionality' of CDM projects in the sector. In the Philippines, the government attempted to address this issue through a special provision indicating that the Biofuels Act does not affect the additionality of CDM projects in the Philippines.

As questions concerning international trade and carbon finance depend largely on international legal rules, the scope for innovative legislative solutions at the national level is more limited than concerning questions addressed in the previous sections. It will be interesting to see, for example, how the CDM Executive Board will treat the provision indicating that the Biofuels Act does not affect the additionality of related CDM projects in the Philippines. On the other hand, the EU ETS and plans to launch a Green Investment Scheme in Estonia can be mentioned as examples of the potential of carbon financing to promote bioenergy and other renewable energy source beyond the CDM.

ARGENTINA: As the third largest producer of soybeans and largest exporter of soybean oil, Argentina is taking advantage of its capacity to develop a biodiesel industry and has already built export-oriented facilities with a capacity to produce 1.5 million tonnes of biodiesel per year. Argentina's prospects for exporting ethanol, on the contrary, are not as good as those for biodiesel, as the former is affected by import tariffs imposed by the United States and the European Union.[2]

The biodiesel industry in Argentina is also wary of new environmental requirements put in place by the European Union. Most of Argentina's production should be in line with said requirements, and may in fact benefit from a shift away from palm oil. It will be important, however, for authorities to maintain active participation in the process, including through consultations between Mercosur and the EU, to prevent the establishment of

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[2] Both the EU and the US place a tariff of over US$ 0.50 per gallon (3.78 lts) of ethanol.

costly bureaucratic procedures or certification schemes that may violate WTO rules. A Mercosur group on biofuels was created in December 2006 to present a common regional strategy towards export markets regarding tariff and non-tariff barriers to trade. Participation in WTO meetings on environmental goods and services (where the issue of reducing tariffs for biofuels was presented by Brazil) have, however, not yet been approached as a regional strategy.

Regarding the CDM, Argentina has ten projects registered by the CDM Executive Board, three of which relate to bioenergy. However, biodiesel plants are waiting for specific CDM methodologies for biodiesel production to be adopted by the CDM Executive Board in order to make better use of this mechanism. The expected average annual CERs from CDM projects in Argentina amount to 2.04 percent of the total contribution by all CDM registered projects. Argentina's participation in the CDM is, therefore, still limited in comparison to such other countries in Latin America such as Brazil and Mexico.

ESTONIA: Unlike in countries hoping to supply the growing international markets for biofuels or develop their national biofuels industries, questions concerning incentives for bioenergy exports and foreign investment are not prevalent in Estonia. However, Estonia is currently exporting some 17 percent of its wood-based bioenergy, including briquettes and pellets. These are sold to Northern European countries such as Finland and Sweden. Bioenergy exports from Estonia are thus governed by the legal rules and principles applicable to the EU's internal market, designed to guarantee the free movement of goods, services, capital and people.

Discussions on national implementation of the EC Directive on the promotion of the use of renewable energy sources highlights, however, the relevance of the WTO and international trade law for national legal frameworks on bioenergy. The relevance of these considerations from the perspective of the Estonian national legislator is, however, limited. Any legal challenge of the EC directive at the WTO would fall under the competence of the European Community rather than the Estonian national government.

Carbon trading plays an important role in the legal framework for bioenergy in Estonia. The country participates in the EU's Emissions Trading Scheme, which increases the economic attractiveness of bioenergy in comparison to fossil fuels by setting a price for carbon dioxide emissions. Estonia also hosts

four Joint Implementation projects related to bioenergy in accordance with Article 6 of the Kyoto Protocol. Potential for more JI bioenergy projects has been estimated to exist. Meanwhile, Estonia is also investigating possibilities to establish a Green Investment Scheme to enhance its possibilities to participate in emission trading under Article 17 of the Kyoto Protocol. Carbon funding through the scheme could constitute an additional source of funding for bioenergy projects.

MEXICO: In terms of carbon trading and the CDM, Mexico is one of the most important CDM host countries and currently holds a 10.5 percent share of the CDM market. Under the CDM, 110 projects from Mexico have been registered of which 33 of these are bioenergy projects. Most of the Mexican bioenergy projects (28) relate to methane recovery and electricity generation from animal manure, while 5 are based on electricity generation from landfill gas.

The Mexican case study identified the additionality requirement applicable to all CDM projects as an important obstacle for bioenergy projects that are either very profitable, not facing major barriers or part of the national policy. As discussed in Part I of this study, these requirements are based on the international rules for the CDM. In general, they are seen as a guarantee for the environmental integrity of the Kyoto Protocol and emissions reductions credited through the CDM. The regulatory barrier relating to the CDM is therefore something that cannot be addressed through Mexico's national legal framework for bioenergy but is intimately connected to decisions by the CDM Executive Board and the parties to the Kyoto Protocol. At present, significant changes to the additionality requirements seem highly unlikely. On the other hand, questions concerning the CDM and carbon funding are playing a key role in the ongoing negotiations for the post-2012 international legal framework for climate change after the expiry of the first commitment period under the Kyoto Protocol. It remains to be seen whether this could lead also to some changes concerning the additionality requirement.

THE PHILIPPINES: One of the main motivations for the biofuels policy in the Philippines has been to reduce the country's dependence on imported fossil fuels. On the other hand, the Biofuels Act contains some provisions to allow tariff-free imports of biofuels in cases of inadequate domestic supply.

The Biofuels Act specifically states that its provisions shall not be interpreted as prejudicial to CDM projects that reduce the emissions of carbon dioxide

and other greenhouse gases by means of biofuels (Sec. 18, RA 9367). This provision should be understood in the light of the requirement adopted by the Parties to the Kyoto Protocol that CDM projects must be additional and not fall under the "business as usual" scenario set up of the country owing to a specific mandate for the setting up of biofuel plants. This provision thus attempts to pre-empt the determination of additionality by the CDM Executive Board under the Protocol. At best it clarifies that, while biofuel projects are encouraged and are becoming numerous, these projects are still not the norm.

TANZANIA: The Tanzanian Investment Act (1997) contains a number of incentives for investors meeting the minimum investment capital requirements, which are higher than those for Tanzanian investors. The Tanzanian Investment Centre (TIC) provides a number of services for investors and after receiving a certificate from the TIC, investors enjoy a number of benefits including exemption from the import duty and deferment of the value added tax on project capital goods, favourable investment allowances and deductions on corporate tax. Also a number of other incentives may be possible (Investment Act, sections 20 and 23). In practice, multinational companies investing in the bioenergy sector in Tanzania are registered with the TIC and taking advantage of the incentives.

Importantly for the production of biofuels, the Land Act (1999) contains provisions on the allocation of lands for investors. In practice, this takes place through the TIC. As a general rule, non-citizens cannot be allocated land other than for investment purposes (section 20.10). In accordance with the Village Land Act (1999), the allocation of village land for non-villagers is subject to approval by the village assembly (section 8.1).

Tanzania is also taking steps to improve its capacity to benefit from carbon funding under the CDM. It is currently hosting one registered CDM project relating to landfill gas recovery and electricity generation and two more bioenergy projects are under development. A capacity building project for the CDM in Tanzania, known as 'the CD4CDM', is also ongoing in cooperation with the UNEP Risoe Centre.

THAILAND: Since November 2006, the Thai government has prioritized the promotion and production of biofuels. The Thailand Board of Investment (BOI) has drawn up incentives in accordance with the Investment Promotion Act (1977) to stimulate investment in the Thai

ethanol industry, including duty free imports of necessary equipment, eight-year corporate tax exemption, expanded land ownership rights for foreign investors beyond those contained in the Land Code (1954) and additional benefits for producers located in North-East of Thailand as well as in the extreme South. The BOI is currently supporting 28 ethanol projects.

Concerning trade, exports of ethanol for liquor are allowed but the sale of Thai-produced ethanol for energy purposes to foreign consumers is prohibited. However, given surplus supply, the Department of Alternative Energy Development and Efficiency is currently considering changing this restriction. On the import side, the Export and Import Act (1979) empowers the Minister of Commerce to restrict imports absolutely or conditionally for economic stability, public interest, public health, national security, peace, order, morals or any other reason in the national interest. The case study mentions palm oil as an import that may be prohibited for health and safety reasons. At present, the imports and exports of palm oil are restricted under the Fuel Trade Act (2000).

The case study recommends that further emphasis should be placed on strengthening the legal framework in which CDM projects are developed and implemented in order to attract foreign direct investment. The author also noted, in this regard, that the Foreign Business Law (1999) restricts foreign investment in 43 business sectors, including agriculture and forestry. Investment in these sectors is only possible through a joint venture with a Thai company.

7. CONCLUSIONS: OPTIONS FOR SUSTAINABILITY

The case studies confirm the importance of a **holistic approach** in devising effective national policy and legal frameworks to ensure the environmental and social sustainability of the bioenergy sector. The Tanzania case study provides the clearest evidence that, even in the absence of specialised legislation, existing laws and policies of sectors relevant to bioenergy can create a supporting or enabling environment for the development of a domestic bioenergy industry.

The existence of a general policy and legal framework addressing matters related to bioenergy does not take away the utility of **specialized legislation** expressly targeting bioenergy. All the countries analysed in this report had

either recently enacted such legislation or taking steps towards doing so. Bioenergy laws in Argentina and the Philippines have established mandatory blending requirements for bioethanol and biodiesel in the transport sector and provide economic incentives for the development of the national biofuels industry. In Mexico, the recent Law on the Development and Promotion of Bioenergy governs both liquid biofuels and bioenergy derived from the decomposition of biomass. In Tanzania, the National Biofuels Task Force is preparing guidelines for biofuels and has recommended the development of an act on biofuels. The Thai Government is actively promoting renewable energy, including bioenergy, and contemplating legislative measures to implement its 8 percent target by 2011 and increase the consumption of biofuels in the transport sector. For Estonia, the legislative instruments and policies of the EU concerning climate change, renewable energy sources and biofuels in the transport sector play an important role in the existing and future national legal framework for bioenergy. Brazil's biofuels program is currently hailed as one of the most advanced in the world, following thirty years of government initiatives and support.

The development of bioenergy-specific legislation still needs to take into account pre-existing legislation directly or indirectly related to bioenergy. Possibly bioenergy legislation should establish **clear linkages with other sectoral laws** to facilitate interpretation and coordinated implementation. This is the approach adopted in Mexico, where the Bioenergy Law contains clear references to other relevant legal instruments that create social and environmental guarantees related to bioenergy. Another interesting example is that of the Philippines, where the Biofuels Act exempts biofuel production facilities from the wastewater discharge fees provided under the Clean Water Act, but does not release operators from the obligation to secure a discharge permit: thus, the wastewater discharge fee exemption only applies if the company meets the effluent standards. Overall, synergies should be created between bioenergy law and legislation on trade and investment, environmental protection (including environmental impact assessment), biodiversity, climate change, land (including land tenure, sustainable land management and land-use planning), water, rural development, food security and labour.

Other key ingredients for comprehensive legal frameworks for bioenergy include **institutional coordination**. The creation of multi-sectoral advisory bodies may be useful in institutionalizing dialogue and exchange of

information among different national authorities, albeit care must be exercised to ensure transparency and truly multi-sectoral and multi-stakeholder participation. Some challenges in this respect have been identified in the case studies. In the Philippines, for instance, the National Biofuels Board, where various sectors are well-represented to ensure the balancing of various interests, does not include the environmental authority. In Brazil's National Council for Energy Policy, energy experts from civil society and academia may participate if chosen by the President of Brazil, but only on an ad hoc basis. Argentina's National Advisory Board serves as a mechanism for interagency information sharing, but does not participate in the final stages of policy-making. Thus decisions are ultimately made by the Secretary of Energy without sufficient transparency. Only in few instances multi-sectoral bodies include civil society representatives, as in the case of the National Biofuels Task Force of Tanzania. Thus, legal drafters should ensure that coordination mechanisms include all interests related to or potentially affected by bioenergy, and allow relevant representatives to have timely, effective and transparent interactions with the ultimate decision-makers. Participation by non-governmental stakeholders should also be specifically envisaged by the law, as in the case of the Philippines, where the Biofuels Act contains provisions on stakeholder participation in crafting the implementing rules and regulations of the Act.

Transparency requirements may also be useful with regards to bioenergy producers and operators. In the Philippines, any individual or entity intending to engage in the production of biofuels shall apply for accreditation as a biofuel producer with the Department of Energy and to register their distributors with the Department, as well as submit monthly reports on production, sales, inventory and weekly price of biofuels. In Argentina, the Biofuels Law requires the creation and maintenance of an updated public registry of permits awarded to biofuel production and processing plants together with a list of those firms that receive promotional benefits (to be made available online). This may facilitate monitoring by authorities as well as by enabling interested stakeholders, thereby building trust towards bioenergy operators.

All case studies demonstrate that to be effective and create the necessary changes in economic and market conditions, policies aiming to promote bioenergy should be backed by legislation that lays down **incentives for bioenergy production** and **obligations for consumption of bioenergy** (such as blending requirements). However, the case studies also illustrate that

without comprehensive assessments and realistic estimates on the impact of biofuels production on agriculture, food security, land use, land tenure and environmental protection, a purely economic focus to render bioenergy commercially viable and to reach energy independence and security will not be sufficient for sustainability and success of these initiatives. In addition, discretional limits with respect to the design and allocation of incentives should be built in relevant legislation, as highlighted in the case study on Argentina. Flexibility should at the same time be preserved. Overall, targets and blending requirements are likely to be most successful if the figures are progressive; flexible enough to respond to changing or unforeseen economic, social or environmental circumstances; and in conformity with installed (and carefully calculated projections of future) production capacity to prevent bottlenecks in the supply. They should be set through a multi-sector, transparent and possibly participatory process, with a view to limiting discretion of national authorities thereby building trust and understanding among relevant stakeholders and providing security for investors. What is more, incentives should be carefully drafted so as to avoid negative impacts on the realization of other policy objectives (most notably, environmental and social ones) or possibly to actively support also the realization of environmental and social policy objectives. The latter approach is exemplified by Brazil's Social Fuel Seal.

With regards to **environmental sustainability**, various legal options have emerged. Although scattered across different types of legislation, general environmental provisions can be effective in preventing land use changes in favour of the production of crops for biofuels in environmentally sensitive areas such as lands rich in biodiversity or having a high carbon stock. Thailand's Enhancement and Conservation of Natural Environmental Quality Act, for example, establishes general environmental principles that should be reflected in laws and regulations concerning the energy, industrial and transport sectors. Forest law may also have an impact on wood-based bioenergy. The Estonian Forest Act, which aims to ensure the protection and sustainable management of forest as an ecosystem, through its detailed provisions on forest management restricts felling volumes, thus limiting the availability of wood resources for energy production. In Brazil, ecological-economic zoning regulations are expected to function as one of the primary tools for ensuring the sustainability of biofuel production. They have already contributed with respect to sugarcane to incorporate a food security criterion as one of the limiting factors in the production of bioethanol. This instrument is still been developed and seems to have the potential to also address

environmental issues such as the protection of primary vegetation, sensitive ecosystems, Indian Reserves and conservation areas (national and state parks).

Large-scale bioenergy projects may fall under general provisions of **environmental impact assessment** (EIA) legislation, which usually also provide for significant opportunities for public participation. In Tanzania, EIA regulations include in the list of projects requiring an EIA several activities that may be linked to the large-scale production and storage of biofuels. Thailand's legislation explicitly requires large-scale CDM projects to be subject to an EIA. In Estonia, in line with European legislation, an environmental assessment is also requested for policies and strategies (the so-called strategic environmental assessment), which may be a significant tool to ensure the environmental sustainability of bioenergy policies and programmes.

On the other hand, **specific environmental guarantees** can be built into bioenergy legislation. These may take the form of legal provisions on objectives, as in Mexico where the bioenergy law explicitly aims at contributing to sustainable development and decreasing air, soil and water pollution. Similarly, the Philippines' Biofuels Act declares as its objective the promotion of environment-friendly fuel alternatives. Statement of policy objectives may be a useful reminder to bioenergy authorities and operators, although they may need to be implemented in more detailed legal tools, or at least not contradicted by more detailed provisions. The Philippines' Renewable Energy Law (applicable to biomass), for instance, contains a provision devoted to environmental compliance subjecting renewable energy projects to an environmental compliance certificate.

Another approach can be that of devising **institutional mandates** related to environmental sustainability. In Mexico, specific clauses stipulate that the Secretary of Environment will apply GMO regulations in order to ensure that the activities regulated by the bioenergy law are compatible with the preservation, restoration and sustainable use of natural resources and biodiversity. The Secretary of Environment is also in charge of ensuring that no land use change from forest to agricultural land is carried out to cultivate biofuels crops, and for evaluating the sustainability of programmes and activities based on the law and ensuring the respect of applicable environmental laws.

Other tools identified in the case studies for environmental sustainability include: the prohibition of specific destructive practices used for bioenergy production (such as sugarcane field burning in Brazil), the inclusion of bioenergy in environmental permitting systems and land use management planning, and certification of environmentally sustainable bioenergy production. An additional legal tool may also be that of supporting research aimed at determining the environmental conditions for the production of bioenergy, as is the case in Mexico.

With regards to **social guarantees**, these may be enshrined in general labour and rural development laws, but may also be included in specific clauses of the bioenergy law. The latter approach has been adopted in Mexico where the bioenergy law explicitly aims at promoting the economic development of rural populations. Social guarantees may also be explicitly made part of **institutional mandates** in bioenergy legislation. In the Philippines, the Biofuels Act lists among responsibilities for the Department of Labour and Employment promoting livelihood opportunities and productive employment; ensuring the access by workers to productive resources and social coverage; and making recommendations for plans, policies and programmes that will enhance the positive social impacts of the National Biofuels Programme. In Mexico bioenergy-specific legislation provides that the ministries that participate in the Bioenergy Commission must address social issues.

Another interesting tool is that of providing **incentives** to ensure an effective integration of social concerns in the bioenergy sector. In Thailand, for instance, legislation provides for additional benefits for producers located in least developed areas. In Brazil, federal taxes are reduced to zero for biodiesel produced from family farmers in the North, Northeast and semi-arid areas. In addition, a **certification system** for biofuels, the Social Fuel Seal, ties tax incentives, federal credit and government-led procurement of biodiesel to the satisfaction of requirements that promote regional socio-economic development by requiring the integration of smallholders into the biodiesel production chain. The Social Fuel Seal allows biodiesel producers who source a percentage of their input from feedstock produced by smallholders to receive certain fiscal incentives and to sell their biodiesel in national auctions to satisfy the regulatory blending requirement.

Legal or other measures should also facilitate access to credit for the construction of biofuel facilities by **small and medium-sized enterprises**.

The Argentina case study provides an example of other support measures for SMEs. Furthermore, legislation may create a basis for bioenergy initiatives favouring or targeting local and indigenous **communities**. These initiatives can also existing without legislation, as in the case of Thailand, where in 2006, the government launched the Community Biodiesel Production Plan. However, a solid legal basis for this type of initiatives may significantly contribute to empowering local communities and providing them the necessary legal certainty to invest in bioenergy production and use. Legislation should also allocate responsibility for the provision of financial resources and technical support to communities to this end, and support research in the area of community-based and small-scale bioenergy production.

Interesting legal options have also been identified with regards to **food security**. Mexico's Law on the Promotion and Development of Bioenergy explicitly establishes that biofuels production should not threaten the country's food security and sovereignty, and clearly links to the Law on Sustainable Rural Development. In addition, it creates an obligation for the Secretary for Agriculture to periodically review and publicize the impacts of bioenergy programmes on food security and sovereignty. In Tanzania, the legislation clarifies that the Food Security Act will prevail over conflicting sectoral legislation, thus food security concerns will take precedence over energy security issues when it comes to the production and consumption of crops. Emerging legal options therefore include: enshrining food security among the objectives of bioenergy laws, including consideration of food security in the mandates of bioenergy institutions, including specific reference to food security legislation in bioenergy laws, mandating conservation of food security concerns in zoning (as discussed in the case study on Brazil) and management planning, supporting research related to food security and bioenergy, creating institutional mandates to monitor and report on food security impacts of bioenergy, and prioritizing biodiversity projects containing food security guarantees in permitting processes.

Several **land** issues have emerged in the case studies. Land tenure may be affected by bioenergy project, and this may raise particular concerns when indigenous people or disadvantage sectors of society may be negatively affected. In Tanzania villages are empowered to negotiate the terms of foreign investment on their lands, but actual capacity and resources may hinder the effectiveness of these legal guarantees. Land use planning may also be a useful tool, when integrated in forest management (in the case of

Argentina) or in ecological zoning (as in the case of Brazil). Finally, issues related to sustainable land use may be relevant. The Mexican Bioenergy Law specifically incorporates provisions specifically devoted to avoiding soil degradation in the bioenergy sector. Relevant legal options may therefore include: integrating land-related issues in the objectives of bioenergy laws and in their institutional mandates, mandating consideration of land-related issues in bioenergy decision-making and permitting systems, and linking certification of bioenergy production with good land use practices. In addition, legal provisions should request the consent of concerned indigenous and local communities when land traditionally belonging or used by them may be impacted by bioenergy projects, as well as ensuring that technical assistance and other support may be provided to them by the government and other actors, upon request.

Finally, it should be noted that legal instruments can be effectively coupled with policy instruments and even **voluntary initiatives** to achieve a sustainable bioenergy sector. The Brazilian case study has shown how voluntary agreements or formalized partnerships between government entities, the private sector and NGOs may significantly help in achieving social and environmental goals within the bioenergy sector.

FAO LEGISLATIVE STUDIES

1. Wildlife and national park legislation in Asia, 1971 (E*)
2. Wildlife and national park legislation in Latin America, 1971 (E* S*)
3. Vicuña conservation legislation, 1971 (E* S*)
4. Legal systems for environment protection: Japan, Sweden, United States, 1973 (E*)
5. Agrarian law and judicial systems, 1975 (E* F* S*)
6. Agricultural credit legislation in selected developing countries, 1974 (E*)
7. An outline of food law, 1983 (E* F S*)
8. Legislación de aguas en América Central, Caribe y México – Vol. I, 1983 (S)
9. A legal and institutional framework for natural resources management, 1983 (E S)
10. Water law in selected European countries (Belgium, England and Wales, France, Israel, Italy, Spain, Turkey) – Vol. I, 1979 (E* F S*)
11. Fundamentos teóricos para una legislación tributaria en el sector agropecuario, 1976 (S*)
12. International food standards and national laws, 1976 (E F*)
13. Derecho agrario y desarrollo agrícola: estado actual y perspectivas en América Latina, 1978 (S*)
14. Legal and institutional responses to growing water demand, 1977 (E* F* S*)
15. Systematic index of international water resources treaties, declarations, acts and cases by basin – Vol. I, 1978 (E/F/S*)
16. Seed legislation, 1980 (E F* S)
17. Water law in selected African countries, 1980 (E* F S)
18. Reforma agraria y desarrollo rural integrado, 1979 (S*)
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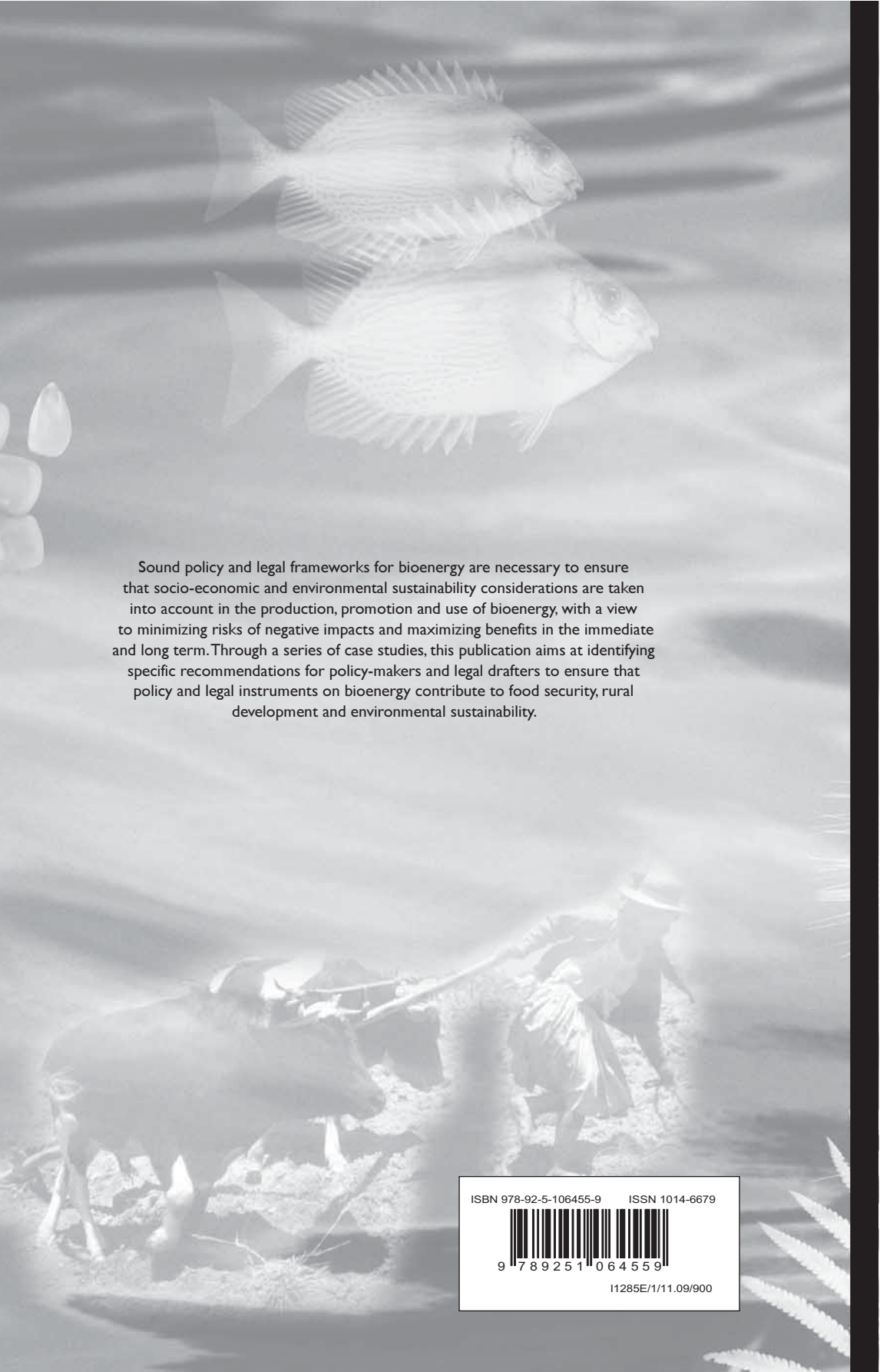

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