

## BIOFUELS REGULATORY FRAMEWORKS IN THE CONTEXT OF ENERGY SECURITY AND CLIMATE CHANGE

‘Focus your operations on [oil production], especially in Iraq and the Gulf area, since this [lack of oil] will cause them to die off [on their own].’

Al Qaeda leader Osama bin Laden, on terrorist attacks to U.S. oil facilities in the Middle East, 2004.<sup>1</sup>

‘Now is the time for serious leadership to get us started down the path of energy independence’.

U.S. Senator Barack Obama, on the American Fuels Act, 2007<sup>2</sup>

### Introduction

Almost forty per cent of Australia’s energy consumption is attributable to the transportation sector, with road transportation accounting for most of the petroleum products used in Australia. For geophysical reasons the country’s economy is dependent on transport either international or domestic. Moreover, the Australian transportation sector is almost entirely dependent on fossil fuels.<sup>3</sup> To make things worst some says that the oil global peak production has already occurred,<sup>4</sup> whilst others have confirmed sharp increase in the crude oil demand and international oil prices.<sup>5</sup> But this is not the end of the story. The burning of fossil fuels liberates greenhouse gases to the atmosphere, which are main factors of the climate change. Furthermore,

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<sup>1</sup> Cited by Daveed Gartenstein-Ross’s article entitled ‘*Jihad for Oil*’, as a statement contained in a video released on the eve of the U.S. 2004 elections. At <<http://www.weeklystandard.com/Content/Public/Articles/000/000/015/407lfacv.asp>> (accessed on 09.09.11).

<sup>2</sup> Member of the Foreign Relations Committee as well as the Environment and Public Works Committee of the U.S. Congress. Speech on Oil & Alternatives Fuels, entitled: *Energy Independence. A Call for Leadership*. At <<http://obamaspeeches.com/089-Energy-Independence-A-Call-for-Leadership-Obama-Speech.htm>> (accessed on 09.09.11).

<sup>3</sup> In a global context, however, Australia could be considered a relatively small consumer of imported oil products, due to it produces a significant proportion of both oil and refined products that consumes domestically. Nevertheless, its economy does not escape the volatility of international oil crude prices because the Australian transport sector uses imported petroleum based fuels in more than 97% of its fuel needs. The Australian Institute of Petroleum (AIP) has estimated self-sufficiency in oil and refined products at 77% (in 2003-2004). At <[www.aip.com.au](http://www.aip.com.au)> (accessed on 28.07.10).

<sup>4</sup> Chris Skrebowski, editor of *Petroleum Review*, a monthly magazine published by the Energy Institute in London, conventional oil reserves are now declining about 4-6 per cent a year worldwide and predicted global oil production peak in 2008. Cited by John Bonnardeaux, ‘Crude Oil – Facing the End of the Oil Age’, Department of Agriculture and Food, Government of Western Australia (June 2006). At <[http://www.agric.wa.gov.au/objtwr/imported\\_assets/content/sust/biofuel/facingtheendvs5final.pdf](http://www.agric.wa.gov.au/objtwr/imported_assets/content/sust/biofuel/facingtheendvs5final.pdf)> (accessed on 03.08.11).

<sup>5</sup> International Energy Agency (IEA). At <<http://www.iea.org/>> (accessed on 28.07.11).

transport-related emissions accounts for one fifth of Australia's total emissions of greenhouse gases.<sup>6</sup> On top of that, Australia has committed its international responsibility in reducing its GHGs emissions under the *Kyoto Protocol*.

Having said that, it seems clear that something must be done regarding the transportation sector fuels, climate change and energy security. Well, here comes into play renewable energy sources, particularly biomass and liquid biofuels.

The objective of this paper is to analyze the current state of biofuels policy and regulatory frameworks in the world's largest ethanol and biodiesel manufacturer countries, focusing our attention on three key elements: *biofuels standards*,<sup>7</sup> *volumetric targets*, and *incentives schemes* in order to *assess the opportunities and policy and legal instruments* for enhancing the development of the biofuels industry in Australia, not only as a driver for major a change in the transportation sector and oil reliance, but also as a powerful tool for GHGs emissions abatement.<sup>8</sup>

The paper is structured as follows. Its *first part* deals with the climate change issue and the hopes put on biomass and biofuels as renewable energy sources suitable to address it as well as to reduce fossil oil dependency. The *second part* of the paper is devoted to the biofuels

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<sup>6</sup> It has been estimated that emissions resulting from transport account for 21% of the total emissions of greenhouse gases. At <[www.aip.com.au](http://www.aip.com.au)> (accessed on 28.07.10).

<sup>7</sup> Standards or technical regulations set out specific characteristics of a product - such as its size, shape, design, functions and/or performance, or the way it is labeled or packaged - before it is put on sale. The drafting of technical regulations and standards may be accorded to either *per se* characteristics of a product or in connection with product's process and production methods, if the way a product is produced is likely to affect such characteristics. In the context of international trade, the GATT/WTO system encompasses the Technical Barriers on Trade Agreement (TBT), which deals with both categories. While standards are of voluntary compliance, technical regulations are mandatory by nature. At <[http://www.wto.org/english/docs\\_e/legal\\_e/18-trims.pdf](http://www.wto.org/english/docs_e/legal_e/18-trims.pdf)> (accessed on 05.08.09).

<sup>8</sup> This paper does not deal with international trade and international trade implications of subsidy policies or other incentives or measures that might not be allowed under the multilateral trading system of the GATT/WTO and the negotiations launched at the Doha Ministerial Conference in November 2001. The preamble of the Marrakesh Agreement establishing the WTO includes among its objectives, optimal use of the world's resources, sustainable development and environmental protection. It encompasses 'umbrella clauses', such as Article 20 of the GATT, which allow countries to take actions to protect human, animal or plant life or health, and to conserve exhaustible natural resources. Specific agreements on specific subjects also take environmental concerns into account (like product standards, food safety, intellectual property protection among others); and subsidies are permitted for environmental protection. The GATT/WTO system, particularly its *Agreement on Subsidies and Countervailing Measures* deals with two categories of 'specific' subsidies. First, the 'prohibited subsidies': those contingent, in law or in fact, whether solely or as one of several other conditions, upon export performance; and - likewise - those contingent upon the use of domestic over imported goods, which if found must immediately withdraw, otherwise countermeasures might apply. Secondly, the so-called 'actionable' subsidies: those causing adverse effects or 'serious prejudice' to other signatories' interests which may trigger change in *onus probandi* rules. Under the WTO system existed only for five years until 31 December 1999, a third category: the 'non-actionable' subsidies, which were either non-specific subsidies, or specific subsidies involving assistance to industrial research and pre-competitive development activities, assistance to less better-off regions, or infrastructure adaptation assistance to new environmental legal/regulatory requirements. This latter WTO subsidy category was not extended. At <[http://www.wto.org/english/docs\\_e/legal\\_e/24-scm.pdf](http://www.wto.org/english/docs_e/legal_e/24-scm.pdf)> (accessed on 05.08.10) and at <[http://www.wto.org/english/thewto\\_e/whatis\\_e/tif\\_e/agrm8\\_e.htm#subsidies](http://www.wto.org/english/thewto_e/whatis_e/tif_e/agrm8_e.htm#subsidies)> (accessed on 06.08.10).

regulatory frameworks in Brazil, the United States, and the European Union. The former is relevant for pioneering incentives schemes and developing the market, while the two latter for regulatory policies, promotion of biofuels as complementary measure to emissions trading schemes and cooperation with developing countries. The *third part* deals with and focuses mainly on Australia's current Commonwealth regime on biofuels<sup>9</sup> and the analysis of opportunities and threats for the Australian biofuels industry. Conclusions will be drawn in the *final part*.

## **Part I. Climate Change and Renewable Energy Sources**

### **A. The Facts...**

The nature of the Climate Change problem has been directly addressed by the *IPCC Fourth Assessment Report* in 2007. The UN Intergovernmental Panel on Climate Change unequivocally concluded that empirical evidence shows that 'many natural systems are being affected by regional climate changes, particularly temperature increases',<sup>10</sup> which in turn has caused the poles to melt and consequently the sea-level to rise, along with other associated environmental changes, like the extinction of ecosystems and the change of climate patterns. Thus, there is a growing international need for reducing GHG emissions to counteract or at least stabilize climate change impacts.<sup>11</sup>

### **... of a Global Concern...**

At international level the Climate Change framework is mainly composed of the *United Nations Convention on Climate Change (UNFCCC)* and the *Kyoto Protocol*. The former contains principles relevant to renewable energy, especially, that there is a need for appropriate international response to face such common concern though with differentiated responsibilities, and that developed countries are encouraged to take action for developing comprehensive strategies. In this context, Annex I countries agreed on returning GHGs emissions to 1990 levels by reversing the trend of growing GHGs emissions.<sup>12</sup> The Kyoto Protocol was the result of the third Conference of the UNFCCC signatories in 1997, through this instrument they set

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<sup>9</sup> However brief reference to State regimes is also addressed.

<sup>10</sup> Above n. 3. Such as extreme weather events such as droughts, floods, heat waves and violent storms.. The World Health Organization (WHO) has pointed out that the decade of the 1990s recorded the highest average temperatures ever, and that in 2000 alone anthropogenic global warming was responsible for an estimated 150,000 deaths.

<sup>11</sup> Intergovernmental Panel on Climate Change (IPCC), *Summary for Policymakers, 1, from Climate Change 2007: Impacts, Adaptation and Vulnerability: Working Group II Contribution to the IPCC Fourth Assessment Report*, at <<http://www.ipcc.ch/SPM13apr07.pdf>> (28.07.2010).

<sup>12</sup> However, achieving those targets necessarily requires a multilateral approach capable to overcome national sovereignty concerns, the recognition of the unequal conditions of developing countries, as well as a long-term willingness to make binding and enforceable commitments aimed to emissions reductions.

differentiated and legally binding individual emission targets, a timetable for achieving emissions reductions,<sup>13</sup> as well as ‘flexible mechanisms’ to do so.<sup>14</sup>

### ... with local implications.

At national level, if the Parliament passes the proposed bill, Australia is to have an Emission Trading Scheme (ETS) by 2011. For Australia, coal is its largest export commodity with more than AUD\$ 45 billion in export in 2008.<sup>15</sup> Moreover, coal is used to generate more than 80% of its electricity demand and its combustion accounts for 92% of the GHGs emissions from power generation.<sup>16</sup> Thus, despite its relatively modest overall GHGs emission reduction target for the first commitment period, power generation represent a major concern for Australia.<sup>17</sup>

In summary, anthropogenic emissions derived from burning fossil fuels, particularly for energy production,<sup>18</sup> are the major cause of climate change. Coal or petroleum burning has significantly adverse environmental, economic,<sup>19</sup> social, demographic<sup>20</sup> and energy security impacts, and is the primary cause of air pollution and GHGs emissions. The concerns about such environmental impacts coupled with the carbon fuels supply have led to the progressive introduction of renewable energy sources, particularly based on biomass.

## B. Biomass, the transport sector long awaited renewable fuel

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<sup>13</sup> In the first commitment period: 2008-2012.

<sup>14</sup> Like joint implementation (JI), clean development mechanism (CDM), and emissions trading (ET). The scheme for GHGs emissions trading under the Kyoto Protocol is based on marketable permits (MP) designed to create financial incentive to improve performance above minimum standard, to stimulate the introduction of cleaner technologies or new energy sources including renewable ones, in order to trade the excess emission permits to those emitters whose treatment costs are higher.

<sup>15</sup> Australian Bureau of Statistics. At <<http://www.abs.gov.au>> (accessed on 20.08.11)

<sup>16</sup> Ibid.

<sup>17</sup> Australia’s climate change policy relies heavily on mitigation efforts and flexible markets as essential components because coal and carbon prices flow through its whole economy. The Garnaut Review considered a comprehensive cost benefit evaluation of climate change mitigation, in line with a market-based approach for an emissions trading scheme whose primary policy objective is to meet a specified trajectory of emissions reductions at the lowest possible cost. Although, it acknowledged that some costs and benefits from climate change avoidance are not amenable to economic modeling or standard economic valuation. See the Garnaut Review at <[http://www.garnautreview.org.au/domino/Web\\_Notes/Garnaut/garnautweb.nsf](http://www.garnautreview.org.au/domino/Web_Notes/Garnaut/garnautweb.nsf)> (accessed on 28.07.10).

<sup>18</sup> Energy production represents 57% of the climate change causes. Intergovernmental Panel on Climate Change (IPCC), *Summary for Policymakers, 1, from Climate Change 2007: Impacts, Adaptation and Vulnerability: Working Group II Contribution to the IPCC Fourth Assessment Report*, at <<http://www.ipcc.ch/SPM13apr07.pdf>> (28.07.2010).

<sup>19</sup> What it can be represented by the increased sums that insurance companies have had to pay out in claims for damages caused or associated to climate change events.

<sup>20</sup> It is estimated that global warming has the potential to create as many as 150 million environmental refugees by 2050. Intergovernmental Panel on Climate Change (IPCC), *Summary for Policymakers, 1, from Climate Change 2007: Impacts, Adaptation and Vulnerability: Working Group II Contribution to the IPCC Fourth Assessment Report*, at <<http://www.ipcc.ch/SPM13apr07.pdf>> (28.07.2010).

All organic matter is known as biomass. From an ecological perspective, is the term used to describe all plants and animals, including humans, upon the earth.<sup>21</sup> However, the name is also used to refer to ways of using plants (vegetation biomass)<sup>22</sup> and animals and other biodegradable wastes (animal biomass)<sup>23</sup> as energy sources. Basically, biomass can be transformed into energy either by generating electricity through its combustion in steam generators; or by transforming the biomass into a liquid or gas fuel.<sup>24</sup>

Unlike fossil liquid fuels, which are also of biological origin, liquid biofuels are renewable energy sources. Nowadays, uncertainties of fossil fuel supplies, increasing oil prices, and the need for developed countries<sup>25</sup> to meet the targets of reducing GHG emissions have promoted a growing interest in biomass as a promising technological alternative for managing CO<sub>2</sub> emission reductions and climate change impacts.<sup>26</sup>

## **Biofuels**

Biofuels come mostly from cellulose-rich energy crops<sup>27</sup> and the use of acids and/or micro-organisms capable of modifying its chemical structure and generating new transport fuel products. The so-called 'first generation biofuels' are mainly ethanol, bioethanol/ETBE, biodiesel, biomethanol/ MTBE and bio-oil (or pyrolysis-oil).<sup>28</sup>

## **Ethanol.**

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<sup>21</sup> This includes also the biodegradable fraction of products, wastes and residues from agriculture, forestry, industry and households. Renewable biomass can be also categorized into dry biomass (like cattle manure and sewage, which net heat value ranges from 8000 to 9000 Btu/pound of wood), and wet biomass (with around 2500 to 3500 Btu/pound net heat value on freshly cut basis).

<sup>22</sup> Vegetation biomass has some advantageous properties as fuel, due to its insignificant content of sulfur, reasonably low ash content, and presence of oxygen. Its negative impacts vary upon the type of biomass involved (Ethanol or ethyl alcohol; other cellulosic ethanol; biodiesel, and e-diesel (ethanol mixed up with diesel)), and also its use poses a threat of deforestation and desertification in inadequately regulated countries as to sustainable agriculture.

<sup>23</sup> Biomass is an energy resource derived from organic matter. These include wood, agricultural waste and other living-cell material that can be burned to produce heat energy. They also include algae, sewage and other organic substances that may be used to make energy through chemical processes.

<sup>24</sup> Like ethanol or biodiesel.

<sup>25</sup> Annex I countries of the Kyoto Protocol.

<sup>26</sup> Moreover, mature refining technologies enable its use and exploitation to be not only economically profitable as a potentially large-scale, but also and most importantly environmentally sustainable fuel.

<sup>27</sup> Protein and cellulosic-rich crops like swichtgrass, linseed, rapeseed, soy bean, jojoba, wheat, barley, potatoes, sugar cane, sugar beet and particularly corn; but also from agricultural waste, forest residues and municipal solid waste. Institute for Agricultural and Trade Policy. At <<http://www.iatp.org>> (accessed on 30.08.10)

<sup>28</sup> However, there is a second generation of them: the cellulose-based ethanol or synthetic fuels made from a wide variety of biomasses and which offer interesting perspectives when considering the somewhat limited potential of the first generation biofuels especially because their extensive resource and land uses requirements for production. Between 2001 and 2006 the global production of ethanol doubled. By its part, the global production of biodiesel increased nearly six-fold. However, in the same period, the global crude oil production expanded by c. 80 million lts./year, compared to about 5 million lts/year for biofuels.

One of the most successful biomass products is ethanol, which can be manufactured by the fermentation of biomass feedstock containing sugar, or components like starch or cellulose that through chemical processes can be converted into sugars. To obtain the highest amount of biomass energy in ethanol production, feedstock must be low in nitrogen and high in cellulose content.<sup>29</sup> Through fermentation and distilling processes using acids or enzymes, sucrose is converted into a form of alcohol; ethanol, which is a clean-flammable liquid can be specially used as a substitute to petroleum-based transportation fuels. Additionally, the life-cycle<sup>30</sup> for GHGs reductions for E-10<sup>31</sup> range from 1.7% to 3.7% depending on the feedstock used to produce it.<sup>32</sup>

### **Biodiesel.**

Another clean-burning biodegradable and non-toxic product coming out from biomass sources is biodiesel, which is derived from the methyl esters of fatty acids in vegetable and tallow oil triglycerides. It can be mixed with petroleum diesel and used in engines without significant alteration; it also can be produced from almost any vegetable oil, through a process that is relatively easy and inexpensive even in small quantities. Biodiesel, particularly at higher concentrations, has great potential to abate GHG emissions, for instance, the life-cycle GHG reductions for B-20 range from 7.6 per cent to 19.3 per cent.

## **Part II. Regulatory Frameworks for Biofuels in major producer countries.**

It is not surprising that the most vibrant periods of the industry's development have been inextricably linked to the rising of the international price of crude oil, rather than to the emergence of the climate change problem. However, this latter has propelled a myriad of new approaches on how to accelerate the application of long-time dormant technologies and how to promote the soon-as-possible development of the biomass and biofuels industry suddenly seen as the solution to energy insecurity. Tax incentives to production from renewable energy sources are one of those approaches, and the mechanisms employed are wide and varied. Some countries waive excise fuel taxes by conferring offsetting credits to alternative-fuel producers or exempt

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<sup>29</sup> Cellulose is broken down either by an acid or enzymes into fermentable sugars. IEA *Energy Technologies Essentials. Biofuel Production*, ETE 02, January 2007. At <<http://www.iea.org/Textbase/techno/essentials2.pdf>> (accessed on 04.08.10)

<sup>30</sup> Life cycle analysis is a method of assessing whether a good or service is environmentally friendly. IEA *Energy Technologies Essentials. Biofuel Production*, ETE 02, January 2007. At <<http://www.iea.org/Textbase/techno/essentials2.pdf>> (accessed on 04.08.10)

<sup>31</sup> The standard blend of 10% ethanol.

<sup>32</sup> Ethanol is the most widely used biofuel. Brazil and the United States produce 90% of the world's ethanol production, calculated in 2005, in 36GL. IEA *Energy Technologies Essentials. Biofuel Production*, ETE 02, January 2007. At <<http://www.iea.org/Textbase/techno/essentials2.pdf>> (accessed on 04.08.10).

taxes for vehicles capable to run on biofuels; others prefer temporary tax preferential treatments applying reduced tax rates over a certain period of time; while some others waive the excise or reduce the fuel tax burden differentiating producers, regions, feedstock and raw materials, or even linking tax rates to the environmental performance of particular fuels.

### A. Brazil, a pioneer developing country

The world's largest producer<sup>33</sup> of ethanol and bioethanol is Brazil, followed by the United States. As earlier as 1975, when a significant increase in international crude oil prices occurred, Brazil adopted the first political and economic measures to overcome its long dependency on imports of foreign energy sources, particularly oil. It did so by stimulating larger investments in the hydroelectricity sector, pioneering research and development of alternative energy sources,<sup>34</sup> promoting energy crops like sugar cane and cassava, and introducing ethanol in the Brazilian fuel matrix through mandatory programs to replace gasoline, particularly, through the National Alcohol Program, *PROALCOOL*, developed as a response to the oil crisis of 1973. The capital investment in the agricultural and industrial sectors for ethanol production over mid 70's and 80's rose US\$ 4.92 billion.<sup>35</sup> The program was a success both in avoiding oil imports and in replacing oil for ethanol to power automotive vehicles.<sup>36</sup>

Subsequently, renewable energy policies were fostered under the principles of *social function of property* and *freedom to compete*, but also in others less liberal principles based on an active role of the State as economic regulator. These are set forth in the Brazilian Federal Constitution of 1998. This constitutional framework made possible for Brazil to articulate a comprehensive and consistent public policy linking energy, water and agriculture, as the baseline for the development of the renewable energy industry, either nationally or as suited to the particularities of each region through delegated legislative powers granted on the state members. Such statutory framework is complemented by legal directives, strategies and programs, like the Incentive Program for Alternative Electricity Sources, *PROINFA*,<sup>37</sup> or the National Program of Biodiesel Production and Use, *PNPB*, launched by the end of 2003. These programs were aimed at promoting the industry and the diversification of the energy matrix, as a direct consequence of biodiesel increasing demand in the aftermath of the Kyoto Protocol.

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<sup>33</sup> And also the major consumer thereof.

<sup>34</sup> A.H.M. Santos, J. Haddad, and S. Masseli, *As Fontes Alternativas Renovaveis de Energia e a Sociedade: um Analise institucional*, Revista Direito da Energia, 1 (2004), 137.

<sup>35</sup> *Ibid.* Triggering benefits in terms of import savings with a value of over US\$52 billion in the period 1975–2002.

<sup>36</sup> From the inception of *PROALCOOL* to 2002, savings on substituted oil imports accounted for US\$52.1 billion. Nowadays, 70% of the automotive park of Brazil is powered by ethanol. Decree 76,593/1975, PRFB. National Alcohol Program, *PROALCOOL*.

<sup>37</sup> Which includes wind, small hydroelectricity power stations, and biomass, as a system in line with the Kyoto Protocol and the UNFCCC.

The Brazilian case study highlights the importance of a gradual though continuing public policy. Even in spite of some economic setbacks in periods in which the crude oil price has fallen or the price of sugar has risen in the international markets, successive Brazilian governments have persevered on its support to renewable energy sources and the agricultural sector. Remarkably, they have done so along with policies and programs aimed to create jobs, reduce inequalities, and encourage social inclusion.<sup>38</sup>

Biodiesel must be produced only by companies incorporated in Brazil and subject to the Brazilian regulatory framework according to *Resolution ANP 41/2004*<sup>39</sup> and to the Social Fuel Label's requirements set forth by *Decree 5.297/2004*.<sup>40</sup> The former imposes a licensing procedure, while the latter compels industrial producers to acquire supplies from subsistence farmers with whom had entered into price-regulated purchase agreements with specific obligations on training and technical assistance. Finally, the formal recognition of biodiesel into the Brazilian energy matrix was made by *Law 11.097/2005*,<sup>41</sup> which encompasses the principal instrument in the regulation of the biodiesel, namely, a compulsory requirement to liquid fuels distributors and refineries of adding a minimum quantity to traditional diesel: all petrol is sold with an ethanol component of 20–26%. Nowadays, there are no subsidies for ethanol production and the product (E-20) is competitive both internationally and in the domestic market.<sup>42</sup>

That regulatory framework would not be complete without addressing the somewhat paradoxical threat posed by deforestation over rainforest. The issue is the subject matter of the *Law 11.428/2006 on Use and Protection of the Native Vegetation of Bioma Atlantic Rainforest*.<sup>43</sup> However, its allegedly limited scope has been object of strong conservationist criticisms.<sup>44</sup>

## **B. The United States, an enthusiastic follower... in a rush**

The combination of factors like rising oil prices, energy security concerns, and promising results of years of continuing research on biofuels have propelled the United States to address all

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<sup>38</sup> The programs are known as PIS/PASEP, Programa de Integração Social/Programa de Formação do Patrimônio do Servidor Público.

<sup>39</sup> Resolution ANP 41/2004, Agência Nacional do Petróleo, Gas Natural e Biocombustíveis. The Resolution requires a licensing procedure. At <2000.179.25.133/NXT/Gateway.dll/leg/resolucoes\_anp/2004/dezembro/ranp%2041%20%202004.xml?f=templates\$fn=default.htm&sync=1&vid=anp:10.1048/enu> (accessed on 29.09.11).

<sup>40</sup> Decree 5.297/2004, Presidência da República Federativa do Brasil, 20 June 2007, at <www.presidencia.gov.br/legislacao/> (accessed on 29.09.11).

<sup>41</sup> Law 11.097/2005, Presidência da República Federativa do Brasil, 24 June 2007, at <www.presidencia.gov.br/legislacao/> (accessed on 29.09.11).

<sup>42</sup> The variety of hydrated-ethanol is sold for 60–70% of the price of gasohol (which is a blend of 90% petrol and 10% ethanol, similar to the standard E-10 in the United States).

<sup>43</sup> Law 11.428/2006, Presidência da República Federativa do Brasil, at <www.presidencia.gov.br/legislacao/> (accessed on 29.09.11)

<sup>44</sup> See Greenpeace website, at <http://www.greenpeace.org/international/> (accessed on 18.09.10).



of them from the perspective of national security rather than in connection to environmental concerns,<sup>45</sup> and to enact aggressive legislative schemes for substantial production and use of biofuels, particularly biodiesel.

### **The First steps.**

Few years ago, there was only a restrictive ethanol tax incentive in the U.S. But, in 2004, amendments were introduced to the *Energy Tax Act* to promote the use of biofuels. Thus, the *Volumetric Ethanol Excise Tax Credit* (VEETC) introduced a tax exemption to all levels of blending up to the end of 2010 at a rate of US\$0.51 per gallon. The Act also improved the *Small Ethanol Producer Tax Credit*, which grants a tax credit of US\$0.10 per gallon on the first 15 billion gallons of ethanol or biodiesel produced by facilities with an annual capacity of less than 60 million gallons. It also introduced a tax credit of US\$1.0 per gallon for new-oil-made biodiesel or US\$0.50 per gallon if made from recycled oil. Additionally, several States confer subsidies to intra-state production of ethanol or biodiesel at rates of US\$0.20 per gallon of pure biofuel.

In the following year, 2005, the U.S. Congress passed the *Energy Policy Act* which amended the *Clean Air Act* and required the Environmental Protection Agency (EPA), in coordination with the U.S. department of Energy, the U.S. Department of Agriculture, and stakeholders, to devise a program requiring the blending of renewable fuels into the automotive fuel supply. The EPA then established the *Renewable Fuel Standard Program* (RFS1), which basically set up an increasing volume of renewable fuels to be blended into vehicle fuel supply, every year through 2012. Although its goals were modest at the outset, the program proved itself successful in increasing ethanol production and use. In fact, in 2006, 5.4 billion gallons (Bgal) of renewable fuel were used in the U.S., almost a quarter more than required for that year. In 2007 the floor was 4.7 Bgal, while in 2008 was 9 Bgal. The RFS1 requires by 2012, at least, 15.2 Bgal of renewable fuels to be blended, and 36 Bgal. by 2022. The gasoline currently used in the United States is blended with ethanol at levels of up to 10% (E-10). Blends at higher volumes, like 85% (E-85) are available for flexible-fuel vehicles (FFV).

### **A focused policy shift: the EISA.**

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<sup>45</sup> Under the *United Nations Framework Convention on Climate Change* (UNFCCC) and its principle objective of ‘stabilization of greenhouse gas concentrations in the atmosphere’ all parties are obliged to produce inventories of GHG sources and sinks, to formulate programs to reduce global warming, to cooperate in adaptation and to promote scientific research. Nonetheless, it is in the Kyoto Protocol where the signatories developed countries committed themselves to targets and timetables to achieve GHG emission reductions and to international mechanisms to ensure such achievement. The United States (US) has been reluctant to ratify the Kyoto Protocol, raising suspicions about the seriousness of its commitment to solve the climate change problem when this is placed in the balance with US national energy security and the idea to move away from an oil-based economy as soon as possible.

It is far from being a coincidence that the first legislative act of the new United States Democratic Congress in 2007 was passing the *Energy Independence and Security Act* (EISA),<sup>46</sup> also known as the ‘Biofuels Act’. This was a bi-partisan motion which remarks the significance that the US attributes to energy security, namely, to decrease fossil fuels dependence through domestic production of biofuels.

Title II of the EISA refers specifically to ‘Energy Security through Increased Production of Biofuels’. In four subtitles it introduced a *Renewable Fuel Standard*,<sup>47</sup> addressed Biofuels *Research and Development*, *Biofuels Infrastructure* and *Environmental Safeguards* regarding waivers for fuel or fuel additives.<sup>48</sup> It is worth analyzing in detail the first three.

The EISA aims directly to expand renewable fuels use and production through setting *new specific volume standards* for cellulosic biofuel, biomass-based diesel, advanced biofuel, and total renewable fuel to be used in transportation each year; including new definitions for both renewable fuels and feedstock used to produce them. It includes, as well, the first *mandatory lifecycle GHGs emission reduction thresholds* for renewable fuel categories,<sup>49</sup> stating that those produced in facilities constructed after its enactment must achieve at least 20% reduction in lifecycle GHG emissions compared to the set baseline. Building upon statutory standards for blending and national consumption, the EISA adjusts the volumes of renewable fuels required for 2008–2012 and specifies those for the period 2013–2022 making them, also, applicable to cellulosic biofuel, biomass-based diesel and advanced biofuel for certain of these years.<sup>50</sup> In respect to the latter, the EISA directed the Secretary of Energy to establish a grant program to encourage the production of advanced biofuels, which is consistent with its transitional character and compatibility. The total renewable fuel volume standard required by EISA for 2009 is 11.1 Bgal.

As to *R&D* the measures adopted in Sub-Title B are wide and varied, but the most relevant are as follows: Firstly, the Secretary of Energy is entrusted with the task to provide grants for R&D, demonstration and commercial application of biofuel in states with low rates of production, as well as to establish R&D programs destined to enhance biorefinery efficiency and to retrofit technologies to accept a wider range of feedstock as biomass for ethanol production. Further, under a peer-reviewed competitive process the Secretary may confer grants to entities proposing research projects on cellulosic ethanol and biofuels.<sup>51</sup> Secondly, the Secretary must

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<sup>46</sup> Biofuels Security Act 2007, 7 USC (2008).

<sup>47</sup> Energy Independence and Security Act of 2007, EISA, H.R. 6 (2007), s. 202.

<sup>48</sup> See Subtitle D of the Energy Independence and Security Act of 2007, EISA, H.R. 6 (2007), s. 251.

<sup>49</sup> For each renewable fuel pathway, GHG emissions must be evaluated over the full lifecycle, including feedstock production and transport; land use change; production, distribution, and blending; and end use of the renewable fuel. The purpose of a lifecycle GHG analysis is to determine whether renewable fuels meet the GHG thresholds for its different categories.

<sup>50</sup> Energy Independence and Security Act of 2007, EISA, H.R. 6 (2007), s. 202.

<sup>51</sup> Energy Independence and Security Act of 2007, EISA, H.R. 6 (2007), s. 228.

report to the U.S. Congress on: potential efficiency of optimizing FFV to use E-85 fuel, durability and performance of engines associated with the use of biodiesel, and methods to increase fuel efficiency in biogas and hybrid-electric vehicles. Thirdly, the EISA amended the Energy Policy Act of 2005 to create a research, development, and demonstration program in environmental science, and to foster technological development of less resource and land-intensive feedstock,<sup>52</sup> as well as to direct the creation of at least seven Bioenergy Research Centers with the straightforward aim to accelerate basic transformational R&D of biofuels, including biological processes.<sup>53</sup> Fourthly, the Act requires some Congressional Committees to be reported on R&D concerning the use of algae as biofuels' feedstock.<sup>54</sup>

In Sub-Title C, the EISA *prohibited franchise agreements imposing restrictions upon renewable fuel pump installations*,<sup>55</sup> and required a feasibility report on setting-up E-85 dispensers in certain regions, the feasibility of constructing dedicated ethanol pipelines,<sup>56</sup> and the adequacy of using railroad transportation system for domestically-produced renewable fuel.<sup>57</sup> More comprehensively, it directs the Secretary of Energy to implement a research, development, and demonstration program relating to existing transportation fuel distribution infrastructure and new alternative distribution infrastructure.<sup>58</sup> In this light, the EISA instructed the EPA Administrator to establish a series of *uniform per gallon fuel standards* for categories of fuels containing biodiesel. Moreover, it directed the set up of a grant program to assist fuel dealers with installation, replacement, conversion or development of motor fuel storage and dispensing infrastructure to be used exclusively for renewable fuel blends. It also introduces a competitive grant pilot program to establish refueling infrastructure corridors.<sup>59</sup>

### **The aftermath: the American Fuels Act.**

As a direct consequence of EISA's expanded scope beyond gasoline to cover all transportation fuels,<sup>60</sup> changes had to be proposed to the RFS1 in order to introduce specific volume standards for cellulosic biofuel, biomass-based diesel, advanced biofuel, and total renewable fuel consumption in transportation per annum. These changes, like the volume standard increase beginning in 2008 from 5.4 Bgal. to 9.0 Bgal., and thereafter to reach 36 Bgal. by 2022, the inclusion of diesel and non-road fuels, and the threshold set forth to GHGs

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<sup>52</sup> Energy Independence and Security Act of 2007, EISA, H.R. 6 (2007), s. 232.

<sup>53</sup> Energy Independence and Security Act of 2007, EISA, H.R. 6 (2007), s. 233.

<sup>54</sup> Energy Independence and Security Act of 2007, EISA, H.R. 6 (2007), s. 228.

<sup>55</sup> Energy Independence and Security Act of 2007, EISA, H.R. 6 (2007), s. 241.

<sup>56</sup> Energy Independence and Security Act of 2007, EISA, H.R. 6 (2007), s. 242 (2), (3).

<sup>57</sup> Energy Independence and Security Act of 2007, EISA, H.R. 6 (2007), s. 245.

<sup>58</sup> Energy Independence and Security Act of 2007, EISA, H.R. 6 (2007), s. 248.

<sup>59</sup> Energy Independence and Security Act of 2007, EISA, H.R. 6 (2007), s. 244.

<sup>60</sup> Now including gasoline and diesel fuel for use in highway vehicles and engines, and nonroad, locomotive and marine engines.

reductions, are implemented by the EPA constitutes the current *Renewable Fuel Standard*, known as RFS2.

The U.S. National Petrochemical & Refiners Association (NPRA)<sup>61</sup> has bitterly criticized the EISA on the grounds that energy-saving policy should not be mandatory, that E-85 blend is neither economic nor energy-efficient as a wide-ranging alternative to imported crude oil, and in the lack of infrastructure to transport, store or distribute it.

The U.S. Congress enacted also the *American Fuels Act 2007*,<sup>62</sup> an initiative promoted i.a. by the then U.S. Senator Barack Obama, to work jointly with the EISA. Its objectives are consistent with decreasing U.S. dependence on foreign oil by promoting domestic production of cellulosic biomass ethanol (CBE) to 250 million gallons by 2012 through tax credits to producers and qualifying ethanol blending and processing equipment;<sup>63</sup> providing incentives to investment and research in biofuels,<sup>64</sup> and encouraging producers to blend and sell on-site<sup>65</sup> as a means to avoid refinery and shipping costs, strengthening - by the same token - the distribution network of renewable fuels. The Act allows also tax credits to raise production of FFV and contains stimulus for the motor industry by requiring the whole federal fleet to be fuel-efficient by 2014,<sup>66</sup> as well as buses acquired with federal funds<sup>67</sup> to use clean technologies.<sup>68</sup> Modeled in the RFS1, the Act introduced an *Alternative Diesel Standard (ADS)*<sup>69</sup> that requires 2 Bgal. of alternative diesel be mixed into the 40 Bgal. annual national diesel pool by 2015. Further, it made explicit that fuel produced in the U.S using starch, sugar, cellulosic biomass, plant or animal oils, or thermal chemical conversion, thermal depolymerization, or thermal conversion processes meets the needs of the U.S. Department of Defense,<sup>70</sup> thus encouraging private sector companies competition in finding and supplying energy efficient alternatives fuels for defense purposes.

### C. The European Union in an Energy Crossroad.

For the European Union (EU), the policies relating to renewable sources of energy form part of a broader strategy directly linked to the *Scheme for Greenhouse Gas Emission Allowance Trading* within the Community established by the joint Directive 2003/87/EC of the European

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<sup>61</sup> U.S. National Petrochemical & Refiners Association (NPRA). At <<http://www.npra.org>> (accessed on 30.07.09).

<sup>62</sup> American Fuels Act of 2007, AFA, H.R. 2354 (2007), s.133, at <<http://thomas.loc.gov/cgi-bin/query/z?c110:s.133>> (accessed on 01.08.10).

<sup>63</sup> *Ibid*, s. 9.

<sup>64</sup> The demand for biofuels is incentivized by providing a short-term, 35 cents/gallon tax credit for E85 and by providing automakers with a US\$100 tax credit for every E-85-capable Flexible Fuel Vehicle (FFV) produced.

<sup>65</sup> Above n. 48, s. 4.

<sup>66</sup> *Ibid*, s. 8.

<sup>67</sup> Like those using funds made available from the Mass Transit Account of the Highway Trust Fund.

<sup>68</sup> Above n. 48, s. 11.

<sup>69</sup> *Ibid*, s. 6.

<sup>70</sup> *Ibid*, s. 12.

Parliament and the Council, dated 13<sup>th</sup> October 2003, which amended Council Directive 96/61/EC concerning integrated pollution prevention and control. In the context of achieving sustainable development, several programs and strategies have complemented these instruments introducing a wide range of measures.

The EU consumes over 15 million barrels of oil per day and is the world's second largest oil consumer after the United States. Although it has important petroleum reserves especially in the North Sea, the EU oil production model seems to have peaked<sup>71</sup> and is currently a declining one.<sup>72</sup> Just in monetary terms, the EU oil dependence is valued €100 billion per year, of which 80% can be attributed to the transport sector, which also accounts for more than 30 % of final energy consumption in the EU, currently, in expansion. In turn, CO<sub>2</sub> emissions are expected to increase in 50% in the lapse 1990-2010, namely, 1,113 million tons of which 84% would be transport-related CO<sub>2</sub> emissions;<sup>73</sup> in sum, transport is responsible for an estimated 21% of all GHGs emissions contributing to global warming.

### **Biofuels and Transport: the Directive 2003/03/EC**

As to policies concerning renewable fuels for transportation the regulatory framework was set by *Directive 2003/03/EC* of the European Parliament and of the Council, of 8<sup>th</sup> May 2003, on the promotion of the use of biofuels or other renewable fuels for transport.<sup>74</sup> The Directive established an indicative target of 2% share of biofuels in road-transport's overall fuel consumption by 2005, a 5.75% target to be achieved by 2010, and a further one of at least 10% to be attained by 2020.

Accordingly, the Member States enacted measures to implement the Directive, many of them relying on fuel tax exemptions to support biofuel production which were facilitated by *Directive 2003/96/EC*, naturally, conforming to the Commission's State Aid Action Plan.<sup>75</sup> However, tax measures presented certain difficulties, like distortion of competition and over-compensations, unlike biofuel obligations in some other Member States which worked better,

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<sup>71</sup> The 'peak theory' is based on the presumption that at a certain date in the future the demand for oil will outstrip production.

<sup>72</sup> Euan Mearns, *EU oil imports set to grow by 29% by 2012*, in *The Oil Drum: Europe* (2006). The article analyzes the EU oil production and consumption with the aim of establishing import trends and EU energy security implications. At <<http://europe.theoil Drum.com/story/2006/9/22/95855/4850>> (accessed on 02.08.10).

<sup>73</sup> Commission of the European Communities, White Paper: *European Transport Policy for 2010: time to decide*, 12.09.2001, COM (2001) 370 final.

<sup>74</sup> Directive 2003/03/EC, of 8<sup>th</sup> May 2003, of the European Parliament and of the Council, on the promotion of the use of biofuels or other renewable fuels for transport. [2007] OJ C 202/2.

<sup>75</sup> Directive 2003/96/EC, of 27 October 2003, of the European Parliament and of the Council, restructuring the Community framework for the taxation of energy products and electricity (the 'Energy Taxation Directive') [2003] OJ L 283. The 'Energy Taxation Directive' made it possible for Member States to grant tax reductions/exemptions in favour of biofuels, under certain conditions. These tax concessions are regarded as state aids, which require prior authorization by the Commission in accordance with the Community guidelines on state aid for environmental protection. The EU, as such, has no Community-wide excise tax on transport fuels.

particularly by ensuring that consumption targets are achieved cost-efficiently and also making it easier to award favorable treatment to second-generation biofuels,<sup>76</sup> what the Commission encourages.

In 2005, biofuels were used in 17 of the EU Member States. In the first two years under the Directive the consumption of biofuels doubled up, and the biofuels market-share experienced a significant increase reaching, on average, 1%. Despite such a rising trend this percentile remained below the reference value set at 2%, which was only achieved by Germany (3.8%) and Sweden (2.2%).<sup>77</sup> Biodiesel got a stake of about 1.6% of the diesel market, while ethanol only 0.4% of the oil market. Hence, and relying upon several projections, in its *Report of 10<sup>th</sup> January 2007* on the progress made by EU Member States in terms of biofuels and other renewable fuels,<sup>78</sup> the EU Commission considered unlikely that Member States will achieve the 5.75% target set by the Directive for 2010, for that reason recommended that the Biofuels Directive be amended, particularly, by promoting high-quality biofuels and setting a mandatory target for the EU as a whole of 10% for 2010.

### **The Biomass Action Plan**

The European Commission's *White Paper for a Community Strategy* sets out a plan to double the share of renewable energies to 20% in gross domestic energy consumption by 2020, including a timetable of actions to achieve this objective in the form of the *Biomass Action Plan*,<sup>79</sup> adopted at the end of 2005. In order to reach the ambitious target of a 20% share of energy from renewable sources in the overall energy mix, the EU plans to focus its efforts on the electricity, heating and cooling sectors,<sup>80</sup> as well as on biofuels. Whilst electricity production consumes only a marginal 3% of the total EU's oil demand, basically, because it is primarily produced by nuclear stations; the heating sector is responsible for c. 17% of the EU's oil consumption. By contrast, the EU's transportation sector - which is almost exclusively dependent on oil, even in a far greater degree than that of the United States -<sup>81</sup> accounts for c. 80% of the EU total imported oil consumption. The Biomass Action Plan proposed the amendments of existing standards<sup>82</sup> to allow the use of a wide variety of suitable oils for biodiesel and the

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<sup>76</sup> By the same token, monitoring was also conducted to assess the performance.

<sup>77</sup> In the UK, for instance, to satisfy the indicative target of 2% for 2005 it would have been required an amount of biodiesel estimated in 42,560 tons., while meeting the 2010 target would require 135,585 tons..

<sup>78</sup> Which also contains a detailed account of environmental and economic impacts linked to the back-up of biofuels. Commission Communication. Report on the progress made by EU Member States in terms of biofuels and other renewable fuels, 10.01.2007, COM (2006) 845 final. [Not published in the Official Journal].

<sup>79</sup> Commission of the European Communities. *White Paper for a Community Strategy, which sets out a plan to double the share of renewable energies to 20% in gross domestic energy consumption in the European Union by 2020*. Biomass Action Plan, 07.12.05, [2005] OJ C 49.

At < <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0628:FIN:EN:PDF> > (accessed 02.08.09).

<sup>80</sup> For houses and buildings.

<sup>81</sup> The U.S. transportation sector uses a 64% of the total imported oil.

<sup>82</sup> European Committee for Standardization. EU Standard EN14214, adopted on 14<sup>th</sup> February 2003.

removing of unjustified or discriminatory technical barriers to using biofuels. The Plan, additionally, set eligibility requirements and minimum sustainability standards for biofuels production,<sup>83</sup> as well as ensured non-discriminatory market access conditions for imported bioethanol.<sup>84</sup> It adopted also a balance approach as to ongoing and future free-trade agreements negotiations with ethanol-producing countries.

In regard to biomass supply, realistically, the Action Plan discarded an autarkic approach as impossible and undesirable considering that biofuels' raw materials are traded on world markets and the externalities and international obligations derived from the global warming might represent an opportunity to achieve CO<sub>2</sub> emissions reduction targets and to enhance the cooperation with developing countries. Thus, the Biomass Action Plan addressed the changes to be made to the *Common Agricultural Policy (CAP)*.<sup>85</sup> In 2008 the EU commenced the revision of the CAP which relevant themes were: common market organizations, EU budget, allocation and transparency of CAP payments, and biofuels.<sup>86</sup> In fact, the demand for the latter triggered a price increase for commodities leading farmers towards biofuels feedstock production, making it more pressing the need for trade agreements and cooperation with third countries in order to balance food production within the EU.

### **The EU Strategy for Biofuels.**

Finally, the Biomass Action Plan was complemented by the Commission through the *EU Strategy for Biofuels*,<sup>87</sup> released in 2006 with the view to reduce GHGs emissions, boost the decarbonisation of transport fuels, diversify fuel supply sources and develop long-term replacements for fossil oil. It upholds the use of biofuels not only in the EU, but also in developing countries or regions,<sup>88</sup> with which the EU intends to cooperate in the sustainable production of biofuels' feedstock in order to prepare a large-scale use of cost-competitive biofuels, particularly of the second generation. The Strategy was accompanied with an *Impact Assessment* of different policy options, from which that of a regulated market-based approach

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<sup>83</sup> In this context re-examining the fuel quality Directive, namely, Directive 98/70/EC of the European Parliament and of the Council of 13 October 1998 relating to the quality of petrol and diesel fuels and amending Council Directive 93/12/EEC . The Fuel Quality Directive establishes specifications for petrol and diesel, for environmental and health reasons, e.g. limits on the content of ether, ethanol and other oxygenates in petrol. It also limits the vapour pressure of petrol. Standard EN590 sets further limits for technical reasons, and states that diesel must contain no more than 5% biodiesel by volume. In its origin form, the Fuel Quality Directive put restrictions on the use of biofuels.

At < <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:31998L0070:EN:HTML>> (accessed at 02.08.11).

<sup>84</sup> The EU's biofuels policy is aimed at reducing the demand of diesel because it has competitive advantages in producing ethanol bioethanol rather than biodiesel.

<sup>85</sup> In order to secure necessary feedstock supplies, i.a. introducing 'aids for energy crops'.

<sup>86</sup> Institute for Agricultural and Trade Policy. 'The Common Agricultural Policy (CAP): A brief introduction'. At < <http://www.iatp.org/iatp/factsheets.cfm?accountID=451&refID=100145>> (accessed on 02.08.10).

<sup>87</sup> Commission Communication, 8<sup>th</sup> February 2006. *An EU Strategy for Biofuels*, [2006] OJ C 67.

<sup>88</sup> *Ibid*, Annex 3 'Policies promoting biofuels in non-EU countries'.

was chosen.<sup>89</sup> In turn, this policy broke down into seven policy areas or ‘axes’: 1. Biofuels’ demand stimulation, 2. Environmental benefits assurance, 3. Biofuels’ production and distribution development, 4. Feedstock supplies expansion, 5. Trade opportunities enhancement, 6. Developing countries support, and 7. Research and Innovation support; all of them further developed in specific measures.<sup>90</sup>

### **Analysis of the Development of the Biofuels Industry in developed countries.**

Surprisingly, the approach for developing the industry has not been very different in well-settled market economies like the U.S. or the E.U., where the biofuels industry have been fostered in varied ways until making it competitive. In this context, biofuels have been object of aggressive market penetration strategies coupled with intensive R&D investments and significant equity transfers from the State to privately-held businesses either via government loan programs (for construction of processing plants) or subsidizing the price of biofuels (via tax credits). Therefore, liberal trade policies i.e. those that allow unrestricted flow of goods and services on sharp competition have been set aside. The explanation for this is two-fold: *firstly*, it has been necessary to create the demand for biofuels in an existing consolidated oil market; and, *secondly*, it is consistent with crucial national concerns of energy security and diversification of energy matrix. Biofuels obligations, volumetric targets and quality fuel standards have also been applied on phase-basis. It is expected that once the market for biofuels be stabilized, policy approaches will respond more to ‘deregulatory trends’ and reliance on market mechanisms to allocate the use of resources.

### **Part III. Australia. Threats, Opportunities, and Tools.**

The 70’s witnessed the first Australian attempts on environmental legislation, both at federal and state level.<sup>91</sup> In the next decades, though creepingly, the legal framework becomes

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<sup>89</sup> Option 2 in the Impact Assessment.

<sup>90</sup> Suitable policy measures considered range from eco-labelling, environmental quality promotion through education and information to consumers and producers, environmental systems for vehicle users, promotion of public procurement of clean vehicles; making the non-food regime on set-aside land and the energy crop premium suitable for sugar production of bioethanol; developing a coherent Biofuels Assistance Package to be used in developing countries with potential for biofuel production; clarifying standards for secondary use of waste materials; developing a Forestry Action Plan; monitoring the behaviour of relevant industries to ensure no discrimination against biofuels; addressing nomenclature codes for biofuels; setting national targets for the biofuels market share as well as minimum sustainability standards towards targets accountability; price differentiation through emission charges and product taxes; favourable treatment to second-generation biofuels in biofuels obligations; environmental performance bonds and accounting of biofuel use towards CO2 emission reduction targets; continuing support to research and development of biofuels and the ‘bio-refinery’ concept; strengthening the competitiveness of the biofuel industry; requiring funds and environmental risk assessment in banking procedures, and the use of marketable permits schemes (MPS).

<sup>91</sup> The first Federal environmental legislation was the Environment Protection (Impacts of Proposals) Act 1974 (C’t), ‘EPIP’, and the National Parks and Wildlife Act. At this time is relevant the work done by the Heritage



more comprehensive in scope and also more aware of the cross-border and cross-cultural nature embedded in environmental issues, as well as of the idea of sustainable development.<sup>92</sup>

### **The Commonwealth's renewable energy regime**

After years of fluctuating policies regarding the promotion of renewable energy sources, a different scenario emerged under the federal *Renewable Energy (Electricity) Act 2000* (Cth)<sup>93</sup> and the *Renewable Action Agenda* (REAA).<sup>94</sup> The latter was a joint initiative with the industry<sup>95</sup> aimed to strategically analyze the sector's position and to develop a set of actions to achieve a sustainable and competitive renewable energy industry. The Action Agenda's Leading Group gave birth to the *Renewable Energy Technology Roadmap Report* in 2002.<sup>96</sup> After three years of implementation, in November 2005,<sup>97</sup> the REAA was subjected to an Evaluation Report.<sup>98</sup> However, existing Action Agendas processes were concluded by mid 2008 following the change of the Government and substituted for new policies based upon *Industry Innovation Councils*<sup>99</sup> designed to 'facilitate interaction within industries and between government, industry and the research community'<sup>100</sup> and to 'provide strategic advice on innovation priorities'<sup>101</sup> to the

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Commission in pursuing the objectives of the Australian Heritage Commission Act. The states also had an important role in enacting environmental legislation, though limited in scope and most of the time designed to address specific environmental concerns like the air pollution, land uses, resource extraction, and waste disposal.

<sup>92</sup> During the 80's the problem-response legislative agenda continued, being an example of this the enacting of the *World Heritage Properties Conservation Act* in 1983 aimed at tackling the Tasmanian Dam case. In the 90's, the cross-cultural dimension of environmental issues was in evidence after the recognition of native titles in 1992 and the recognition of the indigenous people's relationship with land and waters, situation that led to the enactment of the *Native Title Act* in 1993. Finally, the rise of environmental international law particularly under the auspices of the United Nations Environment Program (UNEP) has been a major driver of environmental policy in Australia as well as a constant reminder of the global nature of the problem at stake. The enacting of many Commonwealth Acts respond thereto, e.g. the *Environmental Protection and Biodiversity Conservation Act* of 1999, 'EPBC Act', which address environmental concerns raised by several international instruments ratified by Australia like the *Convention on the World Cultural and Natural Heritage*; the *Convention on the Conservation of the Migratory Species of Wild Animals*; the *RAMSAR Convention on Wetlands of International Importance*, and the *Convention on International Trade in Endangered Species*.

<sup>93</sup> Hereinafter, 'Renewable Energy Act'.

<sup>94</sup> At <[http://www.industry.gov.au/Section/Industry/Documents/RE\\_AA\\_Action\\_Agenda\\_Report.pdf](http://www.industry.gov.au/Section/Industry/Documents/RE_AA_Action_Agenda_Report.pdf)> (accessed on 29.07.10).

<sup>95</sup> The Renewable Energy industry, in 2000, was fragmented and consisted of a number of small associations. It was difficult to facilitate the formation of a Leaders' Group to work out the Action Agenda.

<sup>96</sup> As well as the Australian Photovoltaic Industry Roadmap in 2004.

<sup>97</sup> Evaluation on the Renewable Action Agenda is available at <[http://www.industry.gov.au/Section/Industry/Documents/RE\\_AA\\_Evaluation\\_Report\\_Summary.pdf](http://www.industry.gov.au/Section/Industry/Documents/RE_AA_Evaluation_Report_Summary.pdf)> (accessed on 29.07.10).

<sup>98</sup> The Evaluation Report recommended that the DITR should support, on an on-going basis, the compilation of data on the Renewable Energy Industry, and the consideration of the REAA to be continued refocused in to take advantage of new policy framework and market environment. It stated also that any further action was to be subjected to industry's leadership demonstrating continuing commitment to the Action Agenda process and to identify appropriate range of constructive industry-led actions.

<sup>99</sup> Members of the Councils are drawn from representatives from business, the research community, unions and government agencies.

<sup>100</sup> At <<http://www.industry.gov.au/Section/Industry/Pages/IndustryInnovationCouncils.aspx>> (accessed on 29.07.10).

Minister for Innovation, Industry, Science and Research. By April 2009, the Minister had established two relevant Councils: the Automotive Industry Innovation Council (AIIC),<sup>102</sup> and the Future Manufacturing Industry Innovation Council (FMIIC).<sup>103</sup> The Councils acts as an advisory body to the Minister considering industry innovation challenges like climate change, sustainability and industry competitiveness as well as issues such as regulatory reform and access to new technologies.

The Renewable Energy Act not only determines which are ‘eligible renewable energy sources’ for its purposes,<sup>104</sup> but also imposes a *Mandatory Renewable Energy Target* (MRET)<sup>105</sup> on electricity generation requiring that - by 2010 - at least 2% thereof (an additional 9,500 GWh) must come from renewable energy sources.<sup>106</sup> The MRET applies nationally but to a specified category of ‘liable parties’,<sup>107</sup> who are directly responsible for supporting an increase in the amount of renewable energy-sourced electricity, through the surrender of Renewable Energy Certificates (RECs) in proportion to their acquisitions of electricity to meet their annual quota<sup>108</sup> of ‘required renewable energy’. Shortfalls trigger penalties, and surplus might be carried forward.<sup>109</sup> The overseeing of the implementation of the Act is entrusted to a statutory authority: the Office of the Renewable Energy Regulator (ORER), who is in charge of registering liable entities, accredited power stations, and RECs. The MRET scheme, however, is focused in the generation of electricity, in other words, it is not directly related with the energy used to fuel transport. Hence, its applicability to biomass and biomass derivatives as biofuels should be necessarily linked to the production of electricity.<sup>110</sup> A particular issue arose at the time of the enactment of the Act as to whether the burning of biomass coming from native forest would

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<sup>101</sup> At <[http://www.industry.gov.au/Section/Industry/Documents/IIC\\_Information\\_Brochure.pdf](http://www.industry.gov.au/Section/Industry/Documents/IIC_Information_Brochure.pdf)> (accessed 29.07.10).

<sup>102</sup> As part of the Government's *A New Car Plan for a Greener Future* initiative. The AIIC comprises representatives of three car makers, component producers, the research community, unions and government agencies. The Council is aimed at coordinating the undergoing transformation of the industry in order to prepare it for a low-carbon future, to provide strategic advice on innovation and help to build connections in the industry. In this context, Toyota is to produce a hybrid vehicle in Australia from 2010 and GM Holden will build a small four-cylinder vehicle, with assistance from the Green Car Innovation Fund.

<sup>103</sup> The FMIIC looks at the area of manufacturing services and at opportunities for manufacturers in the global response to climate change, such as clean energy and water technologies, as well as to ensure the sustainable development of Australian industry, and respond to challenges including social inclusion and climate change.

<sup>104</sup> *Renewable Energy (Electricity) Act 2000* (C'th), s 16.

<sup>105</sup> All relevant participants of the Mandatory Renewable Energy Target (MRET) must comply with the *Renewable Energy (Electricity) Act 2000* (the Act), *Renewable Energy (Electricity) Charge Act 2000* and *Renewable Energy (Electricity) Regulations 2001* for the creation of renewable energy certificates (RECs), reporting and other requirements.

<sup>106</sup> In 2003, the Review Panel of the *Renewable Energy (Electricity) Act 2000* (C'th) recommended a MRET target of 20,000 GWh by 2020.

<sup>107</sup> Largely wholesale purchasers of electricity having retail sale obligations to end-customers.

<sup>108</sup> The quota is calculated by multiplying the total amount of electricity in MWh that a liable entity acquired annually by the renewable power percentage for the corresponding year.

<sup>109</sup> The *Renewable Energy (Electricity) Act 2000* (C'th) trading scheme is designed to operate in close connection with the National Electricity Market (NEM) established by the National Electricity Law (NEL).

<sup>110</sup> Rosemary Lyster and Adrian Bradbrook, ‘Energy Law and the Environment’ (Cambridge University Press, 2006), p. 94.

trigger the Environmental Impact Assessment (EIA) of the EPBC Act. The fact is that forestry operations are regulated by Regional Forestry Agreements (RFAs), to which the EPBC Act does not apply and rendering the use of that kind of biomass for renewable energy to be assessed only at a State level.

### **The Australian Biofuels regulatory framework**

In Australia, the regulatory framework for using biofuels gets back to 2000 with the *Fuel Quality Standard Act* (Cth) which set mandatory nation-wide quality standards for fuel supply and sulphur-content caps to premium unleaded petrol and diesel.<sup>111</sup> The following year, under the auspices of the *Green Power Program* and the *Biofuels for Cleaner Transport* policy,<sup>112</sup> the Government announced a volumetric target of at least 350 million liters of biofuel production by 2010.

In order to meet the 350 ML biofuels production target, in 2005 was announced the *Biofuels Action Plan*, a joint initiative of the industry and the Government which sets out annual volumetric goals and business plans, including marketing and retail strategies, for ethanol and biodiesel blended fuels. At the same time and being a part thereof, the Biofuels Capital Grants Program was launched aimed at promoting new or expanded biofuels production capacity by allocating AUD\$37.6 million. Under this scheme funding was provided to projects for the construction of processing plants or the development of feedstock in Queensland, New South Wales, Victoria and South Australia. The program is over but it set the starting-point for the expansion of the industry.

Later on, the Parliament enacted the *Energy Grants (Cleaner Fuels) Scheme Act 2003* aimed to promote cleaner fuels production by providing long-term incentives and security to the industry<sup>113</sup> by giving to domestic ethanol/biodiesel producers or importers of biodiesel a grant that offsets the excise currently applicable to petrol, ultra-low sulphur biodiesel and biofuels<sup>114</sup> until 30<sup>th</sup> June 2011.<sup>115</sup> Thereafter and until 1<sup>st</sup> July 2015, a phased introduction of excise on

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<sup>111</sup> Rosemary Lyster and Adrian Bradbrook, 'Energy Law and the Environment' (Cambridge University Press, 2006), p. 105.

<sup>112</sup> Commonwealth of Australia. Biofuels for Cleaner Transport Policy, 2001. At <<http://www.liberal.org.au/documents/bio.pdf>> (accessed on 03.08.10).

<sup>113</sup> Namely, ethanol, biodiesel, liquefied natural gas (LNG), methanol, liquefied petroleum gas (LPG), and compressed natural gas. Rosemary Lyster and Adrian Bradbrook, 'Energy Law and the Environment' (Cambridge University Press, 2006), p. 105. gas (CNG). See, specially, Ronal Steenblik, 'Subsidies: The Distorted Economics of Biofuels', Discussion Paper No.7, December 2007, Joint Transport Centre, The Global Subsidies Initiative (GSI), International Institute for Sustainable Development (IISD), Geneva, Switzerland at <<http://www.internationaltransportforum.org/jtrc/DiscussionPapers/DiscussionPaper3.pdf>> (accessed on 03.08.10).

<sup>114</sup> The excise applicable to petrol, ultra low sulphur diesel, and biofuels is of 38.143 cpl. At the end, once the offsetting grant is applied, the excise rate become zero for domestically produced ethanol and imported and domestically produced biodiesel. The grant was originally to expire on July 2008, but its timeline was extended to 30<sup>th</sup> June 2011.

<sup>115</sup> Biodiesel must meet the Fuel Quality Standard in order to receive the grant.

biofuels will apply although with 50% discount on energy content fuel tax rates.<sup>116</sup> This fuel excise exemption acquires greater significance when considered in connection with electricity generation by private and businesses eligible under the MRET scheme. In sum, under the form of a subsidy there is no effective excise on commercially produced biodiesel or ethanol until 2011, which it has enabled the setting-up of biofuels business and to make them competitive. Main beneficiaries of these measures have been the CSR and the Manildra Group, Australia's largest producers of ethanol which have a combined capacity of 150 million litres (ML).

In addition, the *Energy Grants Credits Scheme* provides businesses with credits of a certain amount depending on off-road or on-road use of biodiesel.<sup>117</sup> Ethanol credit<sup>118</sup> for on-road use is also granted. The credit scheme is being phased out from 1<sup>st</sup> July 2006 to 30<sup>th</sup> June 2010 when it will be replaced with fuel tax credits.

In a broader context, under the *Fuel Tax Credit Reform* alternative fuels for off-road business use are eligible for a fuel tax credit.<sup>119</sup>

Finally, there is the *Ethanol Distribution Infrastructure Upgrade Grants program* aimed to support upgrading in ethanol storage and transport infrastructure.

### **Brief overview on State regimes.**

At state level, based on predictions that ethanol and biodiesel will become the major alternative fuels produced in the state, in 2005, Queensland (Qld) developed its *Ethanol Industry Action Plan*. It encompassed two components: the Queensland Ethanol Conversion Initiative worth AUD\$4.8 million and a Marketing, Communications, and Labeling campaign<sup>120</sup> valued AUD\$2.28 million to support Queensland's ethanol industry. Queensland has already 100 megalitres of ethanol production capacity, which will increase with the introduction of 5% ethanol mandate in regular unleaded petrol produced and wholesaled in the state from 31 December 2010. There is 190 megalitres of biodiesel production capacity in Queensland; thus, the *Biodiesel Industry Action Plan* follows as part of its comprehensive *Alternative Fuels Sector Action Plan*. In addition, Queensland pioneered in government E-10 powered fleets, biofuels trial programs and retail stations distribution network.

In August 2006 New South Wales (NSW) also announced its support to a 10% ethanol mandate (E-10) in unleaded petrol on a phase-in basis to be fully implemented by 2011. An

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<sup>116</sup> The grant decreases from 1<sup>st</sup> July 2011 meaning that excise will effectively be applied in five equal, annual steps until July 2015. Final excise rates from July 2015 onwards will be 19.1 cpl for biodiesel and 12.5 cpl for ethanol.

<sup>117</sup> The off-road use credit amount is \$38.143 cpl, while \$18.51 is credited to businesses for on-road usage.

<sup>118</sup> The Ethanol credit is \$20.809 cpl.

<sup>119</sup> The fuel tax credit equals the amount of the fuel tax. This scheme is phasing out from 1<sup>st</sup> July 2006 to 30<sup>th</sup> June 2010.

<sup>120</sup> The +e ethanol awareness campaign.

*Ethanol Mandate Taskforce* was established thereto. In February 2007 the NSW Government announced that it will introduce E-2 mandate on the total volume of petrol sold from September 2007 as the first step to the E-10 mandate.

Victoria (VIC) addressed biofuels use in December 2005 by giving support to E-10 and encouraging government fleets to use it where available, practicable and cost-effective, and also funding the development of the publication *Driving Growth: A Biofuels Roadmap and Action Plan for the Development of the Victorian Biofuels Industry*<sup>121</sup> released in 2007, which identified the design and implementation of quality standards. Although VIC has not established any mandatory volumetric target for biofuels,<sup>122</sup> it has an indicative biofuels target of 5% of the market, which is expected to be met largely by biodiesel. Finally, VIC has implemented grant programs to biofuels infrastructure.<sup>123</sup>

Due to the fact that most of their supplies are sourced from NSW, Australian Capital Territory (ACT) generally follows NSW's policies on fuel supply and standards.

The government of South Australia (SA) established a *Biofuels Taskforce* to examine the latest scientific evidence on the impacts of ethanol and other biofuels use on human health, environmental outcomes and automotive operations, which reported in August 2005. However, SA has no plans to mandate or setting a target for biofuels.

All fuel is imported into the Northern Territory (NT), and its Government encourages the use of biofuels by requiring or testing the use of ethanol or biodiesel in either Government car or bus fleets.

Although Tasmania's alternative fuel policy for buses is currently based on compressed natural gas (CNG) supplied through a pipeline from the Bass Strait, it has conducted a Parliamentary Inquiry into Alternative Fuels.

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<sup>121</sup> At <[http://www.business.vic.gov.au/BUSVIC/STANDARD/PC\\_61930.htm](http://www.business.vic.gov.au/BUSVIC/STANDARD/PC_61930.htm)> (accessed on 28.07.10).

<sup>122</sup> In 2006 an inquiry into the Production and/or Use of Biofuels in Victoria was required by the state government. The Report, released in October of said year, addressed the potential to manufacture and use biofuels for transport applications, and it contained five recommendations to assist the biofuel industry and the government. The Government response followed on May 2007. At that stage it concluded that the introduction of a mandate for biofuels was premature, mainly, because it would introduce a range of problems, particularly regarding the industry supply capacity. Further it required a new inquiry to be conducted on the merits or otherwise of a Mandatory Ethanol and Biofuels Targets, whose Report was tabled in the Victorian Parliament on February 2008. The Government response came on August 2008 supporting the recommendation (No.8) not to establish mandatory targets for biofuels at the time. The recommendation to conduct a formal review of the merits of a mandatory biofuels target by 2013 (No.9) was considered to require further consideration. At <[http://www.parliament.vic.gov.au/edic/inquiries/biofuels/Report/Biofuels\\_Govt\\_Response.pdf](http://www.parliament.vic.gov.au/edic/inquiries/biofuels/Report/Biofuels_Govt_Response.pdf)> (accessed on 04.08.09).

<sup>123</sup> The Victorian Biofuels Infrastructure Grants program is worth AUD\$5 million program aimed at assisting the development of the industry by addressing the removal of mechanicals or infrastructure barriers to the distribution and transport of biofuels.

## **Analysis of opportunities and threats for Australia**

In December 2007, the new Government of Australia ratified the Kyoto Protocol. Behind were left previous skepticism about the science underlying the Kyoto commitments, the suspicions on exempted highly polluting developing nations such as India and China, the consideration of potential damages for domestic oil-dependent industries,<sup>124</sup> or even the initially shared idea with the U.S. that a country can reduce its GHGs emissions with no need to ratify the treaty.

Australia is in a goof position to take advantage of two large problems. The first is new and common to the whole humankind: the climate change and its impacts; the second is an old and known one, but particular and twofold: geographic isolation and the cost of transportation.

Due to the fact that being Australia rich in mineral resources, the main feedstock for power stations and to produce electricity is coal,<sup>125</sup> and so it is expected to be for considerable time in the future even under the operation of the *Carbon Pollution Reduction (CPRS)* and the *Emission Trading Schemes (ETS)*. In Australia, energy production industry is by far the largest CO<sub>2</sub> emitter, but it is also an industry of national security concern, thus, it is presumably that its transition to new basis and forms of production will be progressive but escalated.

In the context of abundance of coal and high long-term investments in coal-fired based power infrastructure, Australia should certainly do its part in the solution of climate change problem by committing international CO<sub>2</sub> trajectory reduction targets through CPRS and ETS and evolving to a low carbon economy, but - although promising - the substitution for biomass as fuel for electricity generation seems not to be readily at hand and relegated -at least for a while- just as complementary measures to CPRS and ETS. However, relatively long-term horizons for transition in this sector might precisely represent the time needed for the domestic Renewable Energy industry (REI) to make-up the pace of innovation and research and development, particularly in the field of biotechnology<sup>126</sup> in order to develop suitable energy crops and to stimulate necessary changes in agricultural patterns<sup>127</sup> as well as to create a competitive market for those produces and make possible to increase production capacity. However, the conclusion

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<sup>124</sup> The Australian position pre Kyoto Protocol relied on economic modeling undertaken by the Australian Bureau of agricultural and Resource Economics (ABARE), a public sector economics research agency linked to the Commonwealth Department of Primary industry and Energy.

<sup>125</sup> In spite of using oil as fuel to produce electricity.

<sup>126</sup> Biotechnology is the application of science and engineering principles to living organisms to alter living or non-living materials for the production of knowledge, goods and services.

<sup>127</sup> This is also a major challenge, because although Australia's agricultural landscapes support a wide range of soils, most are infertile by world standards, some lacking nutrients like phosphorus and nitrogen while others large areas are naturally affected by salt or acidity, restricting particular agricultural activities. Very few are considered good quality soils for agriculture purposes, particularly pasture and cereal crops.

of a biotechnology-related R&D expenditure analysis mimic the unstable policy toward renewable energy sources applied in Australia, it is highly indicative that in 2003-04 only 304 business organizations performed<sup>128</sup> biotechnology-related R&D, totaling \$378 million, and that in 2004-05 such expenditure plummeted to just \$299.4 million.<sup>129</sup> This is something that should change if Australia seriously considers biomass as an alternative energy source.

### **The Opportunity: Exporting the Climate Change Problem?**

Australia needs to tackle the CO<sub>2</sub> emissions reductions via CPRS and ETS, in line with its international commitments, but at the same time it should prepare itself to make a step forward in order to materially change the composition of its own energy matrix from one heavily relying on fossil fuels to other predominantly based on renewable sources. The faster this transition occurs, the greater the economic benefits will be coming out from trading excess carbon permits and reorienting coal domestic consumption to export market. In the climate change crisis, Australia has a joint opportunity to discharge its international responsibility as to CO<sub>2</sub> emissions reductions and transform its energy matrix in a way that might represent economic advantages as to emissions trading and external trade. The shift to renewable energy sources, like biomass and biofuels, is for Australia the way to export the climate change problem.

Nonetheless, the second and possibly more attainable way of Australia to take advantage of biomass concerns transportation. Transport activity is a basic component of developed economies, connecting businesses to markets and to supplies of inputs; it also has significant economic, social, and environmental impacts. Due to its physical geography,<sup>130</sup> Australia's trade and economy depends profoundly on transportation, this is especially true as to international trade, because goods can only be carried out of or into the country by air or by sea. In 2005-06, the transport industry was the largest end-user of energy.<sup>131</sup> In the same period, road transport<sup>132</sup> accounted for 78% of the sector's energy use, followed by 12% of air transport, water transport

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<sup>128</sup> And/or paid another to perform biotechnology R&D.

<sup>129</sup> Performed by the Government and private non-profit organizations. Information on biotechnology-related R&D for businesses was collected in 2003-04, and on government and private non-profit organisations in 2004-05, by the Australian Bureau of Statistics.

<sup>130</sup> The bulk of the Australian land mass lies between latitudes 10°41' and 43°38' south, and between longitudes 113°09' and 153°38' east. It is the lowest, flattest and, and the second driest of the continents, following Antarctica. Continental Australia comprises an area of almost 7.7 million sq km. Its land area is almost as great as that of the continental United States of America (excluding Alaska), and about twice the size of the European Union. It includes about 12,000 islands, many of them are near-coastal islands while a large number thereof site remote from the coast. It has an Exclusive Economic Zone (200 nautical miles wide, equivalent to 370.4 km) which gives Australia jurisdiction over a marine area of approximately 10 million sq km., and also areas of the continental shelf beyond the 200-mile limit. Australian Bureau of Statistics. At <<http://www.abs.gov.au>> (accessed on 05.08.11).

<sup>131</sup> Using 1,316 PJ.

<sup>132</sup> At March 2006 there were registered in Australia 14.4 million of motor vehicles (excluding tractors, plant and equipment, caravans and trailers). Almost 8 out of 10 were passenger vehicles. The total distance travelled by motor vehicles was estimated in 206,383 million kms. in 2005, at an average of 15,500 km /per vehicle. Business use accounted for 33% of aggregate distance travelled, and private use 67%; of the latter, 35% consisted of travel to and from work, and 65% for personal and other use travel. Australian Bureau of Statistics.

with 3,4%, and rail transport with 2%. The second largest end-user of energy was the manufacturing sector. These two sectors combined account for 67% of total energy end-use.<sup>133</sup> If these data is considered in connection with the fact that the transport sector is the one major area where oil has not still effectively substituted, unlike the electricity sector for instance, the potentiality of biomass as alternative greener fuel is highlighted.

### **The Threat: Energy Security**

According to APPEA<sup>134</sup> the Australian production of liquid fuels peaked in 2000, when the country met nearly 100% of its demand. Six years later the situation has changed substantially with only 57% of demand being met. According to Geoscience Australia<sup>135</sup> production levels will fall by a third by 2015, and two third lower by 2025, meaning that just the remainder third of Australian current demand will be met then by domestic production. Further, if demand growing trend persists, less than 20% of likely requirements would be met in 2025. More recently, ABARE's report on commodities (2009)<sup>136</sup> shows production figures even lower. All these projections pose a threat on Australia's reliance on conventional energy sources.

### **Policy and Legal Instruments to take advantage**

From our analysis of several frameworks on biofuels we can now draw out some principles underlying the statutory regimes, as well as some trends in current policy approaches. These will serve to tackle the Australia's opportunity to kill three birds with just one stone: restructure its transportation sector, reduce its oil dependence, and abate GHGs emissions. The main policy and regulatory lessons to learn are as follows:

#### **1. Multi-approach towards incentives and R&D**

Based on the belief that technology is crucial to developing comparative advantages<sup>137</sup> in new industries,<sup>138</sup> different approaches have been developed in the context of *market-based*

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<sup>133</sup> Australian Bureau of Statistics. At <<http://www.abs.gov.au>> (accessed on 07.08.11).

<sup>134</sup> Estimation made in 2006 by the Australian Petroleum Production & Exploration Association (APPEA). At <<http://www.appea.com.au>> (accessed on 20.07.10).

<sup>135</sup> Ibid, estimation made in 2006.

<sup>136</sup> At <[http://www.abareconomics.com/publications\\_html/ac/ac\\_09/ac09\\_June.pdf](http://www.abareconomics.com/publications_html/ac/ac_09/ac09_June.pdf)> (accessed on 05.08.09). According to ABARE, 'World oil consumption in 2010 is forecast to increase by 1 per cent to 84.5 million barrels a day', p. 332.

<sup>137</sup> The principle of "comparative advantage" says that countries prosper first by taking advantage of their assets in order to concentrate on what they can produce best, and then by trading these products for products that other countries produce best. In fact, increasing funding has been channeled to R&D on second generation biofuels, particularly, lygno-cellulosic ethanol. It is worth noting the U.S. biofuels funding program - within the RFS2 framework - of US\$150 million per year to support researches on cellulosic ethanol.

<sup>138</sup> Historically, the Brazilian industry is a study case for the 'command and control' regime. In such light, incentives are no more than political will in practice. The Brazilian ethanol industry born as a product of subsidies to production and mandatory blending standards aimed to reduce import crude oil.



*economy frameworks* in regard to the promotion of biofuels. Either directly or through individuals, governments have invested in technological innovation and provided incentives for the biofuels industry, the removal of technical or logistic barriers,<sup>139</sup> and the creation of a market. As we have seen, in devising biofuels incentives the EU policymaker has been extremely creative.

## **2. Production-related subsidies and clear reorientation of the policy towards renewable energy sources**

The EISA and the American Fuels Act represent the U.S. *commitment to energy security* and to a significant *shift in the composition of energy matrix* toward alternative fuels; first creating a market for, making them accessible for consumers, and later moving them gradually into additional markets; along with advancing vast financial support for research and development in renewable sources. The policies are targeted to gradually replace hydrocarbons with carbohydrates as soon and fast as possible, and this is - not surprisingly - the reason why they have started to be applied precisely in the transportation sector, which accounts for 60% of American oil consumption. The underlying goal of energy independence requires to increasingly off-set amounts of imported crude oil, and - in general - the preferential way to achieve that is through *production-related subsidies*.

## **3. Market-based incentives mechanisms and biofuels supply obligations**

As we have seen, there are many possible forms of biofuels supply obligations. However, the compatibility between them and tax incentives is a matter to be assessed. It is expected that the former would render unnecessary fiscal support in the form of ‘state aids’. To the EU, the incentive schemes should be linked to the *environmental performance of individual fuels and market-driven and demand-side measures* for biofuels. The EU Commission encourages biofuels supply obligations instead of tax measures,

## **4. Renewable energies (Biofuels) potential for GHGs emissions abatement**

The use of biofuels may lead to reduced life-cycle air pollutants and GHGs emissions. The amount of reductions, however, is dependent upon the feedstock used in the production of the wide range of biofuels. In this context, biomass and biofuels use in transportation should be considered as *complementary measure* to Emission Trading Schemes. Its potentiality in terms of applicability of Carbon Reduction Schemes such as those of the EU and some States of the US, or the proposed Carbon Pollution Reduction Scheme (CPRS) and the use of international

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<sup>139</sup> Barriers to dissemination of biofuels and creation of a market These include low level of consumer confidence and infrastructural and mechanical obstacles. The existing distribution, blending and storage facilities normally requires adaptations or the installation of additional infrastructure, as well as changes to handling procedures.

‘flexible mechanisms’ under the Kyoto Protocol (particularly CDMs) looks promising and more readily achievable.

### **Final Part. Conclusion**

Our objective was to analyze current relevant policy and regulatory frameworks for the biofuels industry focused on some recurrent comparative key elements. That was made, firstly, as a way of contrast with Australia’s policy and regulatory approaches and, secondly, to identify the opportunities and threats that the Australian biofuels industry faces.

As to the opportunities, we noted that they are several and varied. Australia has the chance to reorganize its energy matrix by turning the focus upon renewable energy sources, like biomass and biofuels. It has also the possibility to induce a major change in one of its most strategic though oil-dependent economic areas: transportation. Most importantly, Australia has the opportunity to discharge its international responsibility as to CO<sub>2</sub> emission reductions - literally and metaphorically - exporting its share on the climate change problem.

The answer to how to do all of that is clearly a policy answer. But the study of comparative regimes provides us with adequate tools. Indeed, at an international level, Australia can take advantage of the ‘flexible mechanisms’ like those of the the Kyoto Protocol (particularly, CDMs projects on biofuels feedstock) while in the national context it can phase-in *biofuels standards* and/or *volumetric targets*, as well as provide *incentives schemes* for the use and production of biomass products. However, there are also associated threats, against which the policy options will have to be balanced.

To take advantage of those opportunities it is decision-time. The prospect of economic rewards in trade - particularly in the transportation sector - and emissions trading, as well as the new political asset of energy security make a timely change of Australia’s energy matrix and consumption patterns an imperative. This is the kind of multifaceted-challenge that the shift to cleaner renewable energy sources, like biomass and biofuels, are suitable to deal with.

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