BIOFUELS – AT WHAT COST?

Government support for ethanol and biodiesel in the European Union

One of a series of reports addressing subsidies for biofuels in selected OECD countries

October 2007

Prepared by:

Géraldine Kutas, Carina Lindberg and Ronald Steenblik

GSI Global Subsidies Initiative

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For the Global Subsidies Initiative (GSI)
of the International Institute for Sustainable Development (IISD)
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Biofuels—At What Cost? Support for Ethanol and Biodiesel in the European Union

By Géraldine Kutas, Carina Lindberg and Ronald Steenblik

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Table of Contents

Figures

Tables

Abbreviations and acronyms

ACP	Africa Caribbean Pacific
AGRICE	Agriculture for Chemicals and Energy (FR)
CAP	Common Agricultural Policy
CDTI	Centre for Industrial Technology Development
CMO	Common Market Organisation
CN code	Combined Nomenclature code
CO_2	Carbon dioxide
CSE	Consumer Support Estimate
DME	Dimethyl-ether
E85	A blended fuel comprised of 85 percent ethanol and 15 percent petrol
EBA	Everything But Arms
EC	European Commission
ECA	Enhanced Capital Allowances (UK)
EFP	Energy Research Programme (DK)
EIA	Energy Investment Deduction Scheme (NL)
ETBE	Ethyl-tertiary-butyl-ether
EU	European Union
FAME	Fatty acid methyl ester
FFV	Flexible Fuel Vehicle
GAVE	Climate Neutral Gaseous and Liquid Energy Carriers (NL)
GSP	Generalised System of Preferences
ICO-IDEA	Official Credit Institute and the Institute for Diversification and Saving of Energy (ES)
IEA	International Energy Agency
IISD	International Institute for Sustainable Development
LDCs	Least developed countries
MAPE/POE	Measure for Supporting the Use of Energy Potential and Rational Use of Energy (PT)
MFN	Most favoured nation
MTBE	Methyl-tertiary-butyl-ether
OECD	Organisation for Economic Co-operation and Development
ONIGC	Office national interprofessionnel des grandes cultures (FR)
OPC	Operational Programme for Competitiveness (GR)
PAEE	Saving and Efficiency Plan (ES)
PFER	Plan for Promoting Renewable Energy (ES)
PPO	Pure plant oil
PSE	Production Support Estimate (OECD)
RERD&D	Renewable Energy Research Development and Demonstration (IE)
RES	Renewable energy sources
RME	Rape-methyl-ester
RSA	Regional Selective Assistance (UK)
RTFO	Renewable Transport Fuel Obligation (UK)
SFP	Single farm payment scheme

SEI	Sustainable Energy Ireland
TGAP	General Tax on Polluting Activities (FR)
TOE	Tonnes of oil equivalent
ULSD	Ultra-low sulphur diesel
US	United States
WTO	World Trade Organization

Executive summary

In recent years, governments of numerous countries have promoted industrial-scale production and use of liquid biofuels—fuel-grade ethanol and biodiesel[1]—and backed that commitment with financial support. This report, one of a series of country studies undertaken by or for the Global Subsidies Initiative (GSI) of the International Institute for Sustainable Development (IISD), examines the types and magnitude of support to biofuels in the European Union (EU).

In 2006, total transfers[2] in support of biofuels associated with policies of the EU and the Member States were around € 3.7 billion in 2006 (see Table). This is probably a gross underestimate of the total amount of support provided, as many subsidies are under-reported. Because the bulk of support is tied to production, consumption, or blending targets (for 2020 the EU target of 10 percent is more than five times the current rate of incorporation), EU support to biofuels could treble if the current rates of subsidization are not modified.

Support for ethanol and biodiesel in the European Union in 2006

	Units	Ethanol	Biodiesel
Total transfers	€ millions	1,290	2,436
Support per litre consumed	€ / litre	0. 74	0.50
Support per gigajoule (GJ)	€ / GJ	35	15
Support per litre of petrol or diesel equivalent	€ / litre equivalent	1.10	0.55

Source: main report.

Biofuels have been produced on an industrial scale in the EU since the 1990s but production significantly accelerated starting in the early 2000s, largely in response to rising petroleum prices and favourable legislation passed by EU institutions and Member States. Biofuels have been promoted as part of the EU strategy to encourage renewable energy, and their production and use has expanded rapidly. Although EU measures have applied equally, most of the time, to biodiesel and ethanol, biodiesel production has developed at a faster rate. The emphasis has been on biodiesel because the EU is a net importer of diesel, while gasoline surpluses are exported. In 2006 approximately 4.9 million tonnes (5.5 billion litres) of biodiesel were produced in 24 EU Member States, mainly from rapeseed oil. Although the majority of countries use it in low blends with fossil fuels (up to 5 percent biodiesel), some authorize the utilization of higher blends as well as straight vegetable oil.

The EU ethanol industry is about one quarter the size of the biodiesel industry. In 2006, 1.2 million tonnes (1.5 billion litres) of ethanol were produced in 13 Member States and used mainly in low-level blends with

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1 *Biofuels* refers to renewable fuels such as ethanol (an alcohol fermented from plant materials) and biodiesel (fuels made from vegetable oils and animal fats) that can substitute for petroleum-based fuels. Although specially modified vehicles can operate on pure versions of these fuels, most biofuels are sold mixed with conventional gasoline or diesel for use in standard production vehicles. Mixes are usually indicated by the percent biofuel, such as B5 (5 percent biodiesel) and E85 (85 percent ethanol) blends.

2 The term 'transfers' is used here synonymously with 'support', which encompasses both market price support and subsidies.

gasoline, and to a lesser extent in ETBE (ethyl tertiary butyl ether) and high blends (e.g., E85, which is a blend of 85 percent ethanol and 15 percent petrol). In the EU, most ethanol is made from cereals (wheat, maize, rye, barley) or sugar beets.

The year 2003 saw the acceleration and deepening of European policies to encourage biofuels. The EU biofuels policy pursues three objectives: to reduce the EU's dependency on foreign sources of energy, to reduce greenhouse gas (GHG) emissions, and to support farmers' incomes by providing new outlets for agricultural products. In 2003 two new Commission directives were adopted. Directive EC 2003/30 promotes the use of biofuels or other renewable fuels for transport (also known as the Biofuels Directive), including by setting a target of 5.75 percent for biofuels in the transportation fuel market by 2010. Although the actual 2006 market share (1.8 percent) fell far short of this objective, in March 2007 the European heads of States and Governments endorsed a 10 percent binding minimum target to be achieved by all Member States by 2020.

To help Member States comply with the target set by Directive EC 2003/30, the Commission introduced Directive EC 2003/96 on Energy Taxation, which allowed Member States—after authorization by the Commission—to exempt or reduce excise duties so as to compensate for the higher costs of producing biofuels. Since 2003 other documents, such as action plans and roadmaps, have been adopted by the Commission to complement and deepen the EU biofuel policy. In addition, the review of Directive EC 2003/30 is due at the end of 2007.

Biofuels benefit from a broad range of public support measures at the EU level and among Member States. Excise tax exemptions account for the largest share of support and amounted to almost € 3 billion in 2006. Because this type of subsidy is directly linked to production or consumption, the cost of this measure (in terms of foregone revenue) is expected to rise significantly in the coming years as biofuels production is boosted to reach the Commission's targets.

Complementing or replacing favourable tax treatment, some Member States have adopted mandatory blending requirements. In most of these cases, the blending ratios are set to increase progressively over time so as to attain, or exceed, the target for 2010 set by the Commission. Although data limitations prevent accurate quantification of these mandatory blending requirements, it is certain that they represent powerful government interventions in the market for transport fuels and provide significant support to the biofuels industry. Meanwhile, high tariff barriers (€ 0.102 or € 0.192 per litre, depending on whether it is denatured) continue to protect the European ethanol market against imports from third countries, particularly Brazil. Theses tariffs provide price support to EU producers (of an estimated € 420 million in 2006), preventing access by its consumers to cheaper foreign imports and isolating EU producers from international competition.

The 2003 reform of the Common Agricultural Policy (CAP) has introduced a specific area payment (€ 45 per hectare) for the production of energy crops, on up to 1.5 million hectares.[3] In 2005 agricultural producers used more than 0.5 million hectares of the land eligible to receive this aid, at a cost to the EU budget of € 25.6 million. Farmers were also authorized to cultivate non-food crops (i.e., feedstock for biofuels) on land set aside from food production, while still receiving the set-aside area payment. In addition, some of the new Member States grant national subsidies for biofuel feedstocks.

In many Member States the manufacturing of biofuels is supported through subsidies for production-related capital. Public support usually represents a percentage of investment costs incurred to produce biofuels. Rates of support and eligibility criteria vary from country to country. Capital grants are also provided for demonstration projects. These subsidies are often provided by several institutions within each Member State and sometimes by different levels of government. Because of the difficulty of identifying such subsidies, it was not possible for this report to provide an exhaustive list of capital support programmes available to biofuels plants, or to quantify the level of pubic support in this area.

[3] This limit was increased to 2 million hectares in 2007.

Research and development activities in the biofuels sector, including pilot projects, are encouraged by public funded programmes both at the EU and at the Member State levels. The amount of public funding available for the year 2006 is estimated to have been € 91 million.

Finally, in some Member States, distribution and consumption of biofuels is encouraged through national incentives such as reduced vehicle registration fees and tax credits for flex-fuel vehicles (FFVs), and subsidies for E85 pumps.

Translated into litres of petrol and petroleum diesel equivalent, the rates of support are considerably higher for ethanol than for biodiesel. In the case of ethanol, its level of support on a petrol-equivalent basis is more than twice that of the € 0.46 ex-tax market price for regular unleaded (RON 91) petrol in 2006. Transfers as a share of market value were around 65 percent for biodiesel and between 70 and 110 percent for ethanol. These rates would rise were gasoline and diesel prices to fall.

While biofuels do displace some petroleum and fossil fuels, and reduce some GHG emissions, this study finds that the cost of obtaining a unit of CO_2-equivalent reduction through biofuel subsidies is very high. The subsidy cost per tonne of CO_2-equivalent removed is estimated to be between € 575 and € 800 for ethanol made from sugarbeet, around € 215 for biodiesel made from used cooking oil, and over € 600 for biodiesel made from rapeseed. Hence, even under the best-case scenario assumptions for GHG reductions from biofuels, governments could achieve far more reductions for the same amount of public funds by simply purchasing the reductions in the marketplace. The cost per tonne of reductions achieved through public support for biofuels made from crops in the EU could purchase more than 20 tonnes of CO_2-equivalent offsets on the European Climate Exchange, for example.

Support for ethanol and biodiesel per tonne of CO_2-equivalent avoided, 2006

		Ethanol		Biodiesel	
	Units	From sugarbeets	From grains	From used cooking oil	From rapeseed oil
Support per litre equivalent of fossil fuels displaced	€ per litre equivalent	1.70–2.20	3.50–5.00	0.60–0.70	0.90–1.20
Support per tonne of CO2-equivalent emission avoided	€ per tonne	575–800	2,100–4,400	210–220	600–800
NB: Market price of a CO2-equivalent offset[1]	€ per tonne	3.50–26			

[1] Lower number corresponds to maximum price on the Chicago Climate Exchange to date, and the higher number corresponds to the maximum price on the European Climate Exchange to date.

Source: main report.

The EU biofuel policy is expected to be modified by the end of 2007 with the revision of Directive EC 2003/30 (the Biofuels Directive). The challenge for the Commission and the Member States is to find effective responses to rising oil prices and climate change, while ensuring that the solutions adopted are the most appropriate in economic, environmental and social terms. The upcoming policy review provides an important opportunity for the Commission and Member States to recognise that mandatory domestic production and consumption of biofuels is an expensive and inefficient means to achieve the desired policy outcomes.

The study concludes with several recommendations for the European Union and its Member States. In our opinion, they should:

- Resist instituting new consumption mandates for biofuels, at least without first undertaking a thorough examination of the costs and benefits of doing so.

- Eliminate all tariffs on imported fuel ethanol.
- Avoid providing new specific subsidies to the industry, and move to re-instate fuel-excise taxes on biofuels where this has not already been done.
- Improve the information available on support provided to the biofuels industry, and the effects of such support, as well as on production, capacity and trade in biofuels.
- Put in place an evaluation process that can thoroughly assess the cost-effectiveness of each Member State's support policies in attaining all three of the objectives behind the EU biofuels policy.

1 Introduction

1.1 Biofuels in the European Union[4]

The European Union (EU) is the world's leading producer of biodiesel, and the fourth-leading producer of fuel-grade ethanol. Total production of biofuels increased from 946,690 tonnes in 2000 to more than 5.9 million tonnes in 2006. Despite the rapid expansion in output, biofuels contributed just 1.8 percent of the EU's transport fuel supply in 2006, far from the ambitions posted by the European Commission (2 percent in 2005 and 5.75 percent in 2010).

European production of biofuels is largely dominated by biodiesel, accounting for an estimated 4.9 million tonnes in 2006. Four EU Member States account for more than four-fifths of the EU's production capacity: Germany (54 percent of the total), France (15 percent), Italy (9 percent) and the United Kingdom (4 percent). That situation will soon change, however, as new plants are under construction all over Europe, including in the new Member States, and proposed new plants are announced every week.

Consumption is even more concentrated, with 80 percent of the marketed quantities in 2006 sold in three countries: Germany (63 percent), France (14 percent) and Italy (5 percent).[5] Rapeseed oil is the most important feedstock, with an estimated share of approximately 90 percent, followed by sunflower oil, recycled oils and animal fats. Other feedstock sources from exporting countries include soy oil, palm oil and non-food oil crops such as jatropha.[6]

In the production of ethanol, the EU ranks fourth (behind Brazil, the United States and China); 1.2 million tonnes were produced in Europe in 2006. This amount is expected to increase significantly over the next couple of years. Feedstocks used are cereals (mainly wheat and barley), sugar beet and distilled wine. Facilities located in Germany, France, Spain and Italy can produce more than 1.77 million tonnes (more than 80 percent of the EU production capacity). Although the majority of these countries are also the largest consumers of ethanol, Italy exports virtually all its production. Sweden only produced 0.11 million tonnes in 2006; it is however, the EU´s second-largest consumer of ethanol (254,500 tonnes). Sweden uses its ethanol directly as a blend in petrol and consumes much more ethanol than it produces, importing additional supplies mainly from Brazil, while Spain, Germany and France convert the majority of their ethanol production into ETBE (ethyl-tertiary-butyl-ether).

The EU also uses straight vegetable oil as fuel, especially in Germany, and biogas, both of which are used as fuels in the transport sector. In 2006, the consumption of these two types of biofuels represented 12.1 percent[7] of the total consumption of biofuels in Europe.

Public policies have played, and will play, a crucial role in the development of the biofuels industry in the EU. Targets and incentives have been provided at the European level, through Directives passed by the European Commission that are applicable in the EU-27, and at the national level through measures enacted by each of

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4 According to the European Commission (DG Transport, 2004), biofuels are liquid or gaseous fuels made from plant matter and residues, such as agricultural crops, municipal wastes and agricultural and forestry by-products. The major types of biofuels include ethanol, biodiesel, Ethyl-tertiary-butyl-ether (ETBE), pure vegetable oil and biogas. In this study a narrower definition of biofuels is used since this report focuses on ethanol and biodiesel for road transportation. However, in some cases, references are made to other types of biofuels for road transportation such as pure vegetable oil and ETBE.

5 Biofuels Barometer 2007.

6 *Independent Review of the European Biodiesel Market*, Austrian Biofuels Institute, 2005.

7 Biofuels Barometer 2007.

the Member States. As a result of this dual-level system the scale of the supporting and promoting measures and the type of biofuels targeted differ widely across Member States.

The European Commission's biofuels policy promotes three main objectives: energy security, through the reduction of dependency on imported petroleum; improvement of air quality and the reduction of greenhouse gas (GHGs) emissions; and support of crop farmers' incomes through new outlets for agricultural feedstock. Although the Commission had already adopted legislation to promote biofuels in the mid-1980s, in 2003 it took the much more significant step of passing a directive that fixed indicative targets for the consumption of biofuels in the EU's domestic markets (2 percent in 2005 and 5.75 percent in 2010). To help Member States attain these objectives, the Commission authorized countries to exempt biofuels, partially or totally, from excise taxes on fuels. In addition, as part of the last set of reforms of the Common Agricultural Policy (CAP), it created a new per hectare payment for the production of energy crops. The Commission also provides funds for research and development (R&D) in the biofuels area.

Based on the framework provided by the Commission, Member States are free to take all the measures they consider appropriate to promote the development of biofuels production and consumption. As a result, each country has adopted different instruments (without any previous consultation with other Member States) ranging from full excise-tax exemption, through production quotas and mandatory purchasing mandates. The landscape for support has thus changed frequently as countries search for an equilibrium between their own objectives—which may not necessarily match exactly those of the Commission or other EU members—and fiscal constraints.

1.2 Objectives and outline of the study

This report examines public support for biodiesel and ethanol for road transportation in the European Union.[8] It forms part of a multi-country effort by the Global Subsidies Initiative (GSI) of the International Institute for Sustainable Development (IISD) to characterize and quantify subsidies to biofuels production, distribution and consumption, as well as policies affecting prices of key factor inputs, based wherever possible on primary sources. Such information, the GSI believes, is vital to understanding the cost effectiveness of different policy options. Given the growing share of crops that are being diverted to energy production, the amount and form of support provided to biofuels is also relevant to issues relating to agriculture, such as trade and food security.

This report follows a standardized outline common to all the reports in this series. After a brief explanation of the framework used in GSI's studies, Chapter 2 surveys the European biofuel industry and Chapter 3 offers an overview of the past and recent policy initiatives of the European Commission and its Member States.

Chapter 4 describes and quantifies the different elements of support for biodiesel and ethanol at the European level, and at the national level, to the extent that information could be obtained, for each of the Member States. The discussion is informed by a standard economic classification scheme, which proceeds from the most economically distorting (production-linked) to the least-distorting (expenditure on R&D) forms of support.

Chapter 5 presents summary estimates of total support to biofuels in the EU. In addition to expressing support in total euros (€) and euros per litre, the chapter estimates the amount of support in terms of several indicators relevant to the question of its cost-effectiveness: subsidy per litre of gasoline and diesel equivalent, subsidy per unit of fossil fuel avoided, and subsidy per tonne of CO_2-equivalent avoided.

Finally, Chapter 6 provides some concluding observations and recommendations.

The authors acknowledge that the description of supporting measures and their quantification can only be partial, due to the large number of countries that are members of the EU. Access to relevant information on biofuel policy in the EU is a challenge, given language barriers, the lack of up-to-date and available data in

[8] Support for pure vegetable oil is also considered, especially that provided through excise-tax exemptions.

some Member States, and the difficulty of obtaining access to information on local measures to support biofuels. Nevertheless, this study provides the most extensive overview to date of public support provided to the biofuel industry in the EU.

1.3 Framework of the analysis

Figure 1.1 illustrates the framework used in this report to discuss subsidies provided at different points in the supply chain of biofuels, from production feedstock crops to final consumers. Defining a baseline requires deciding how many attributes to look at, and determining what programs are too broadly cast to consider in an analysis of one particular industrial sector. This analysis focuses on subsidies that affect production attributes that are significant to the cost structure of biofuels, including subsidies to producers of intermediate inputs to production, namely crop farmers. More remote subsidies, such as to particular modes of transport used to ship biofuels or their feedstocks, fell beyond the boundaries of this analysis.

For the purpose of this report, consumption occurs downstream of the point at which the biofuel leaves the manufacturing plant.

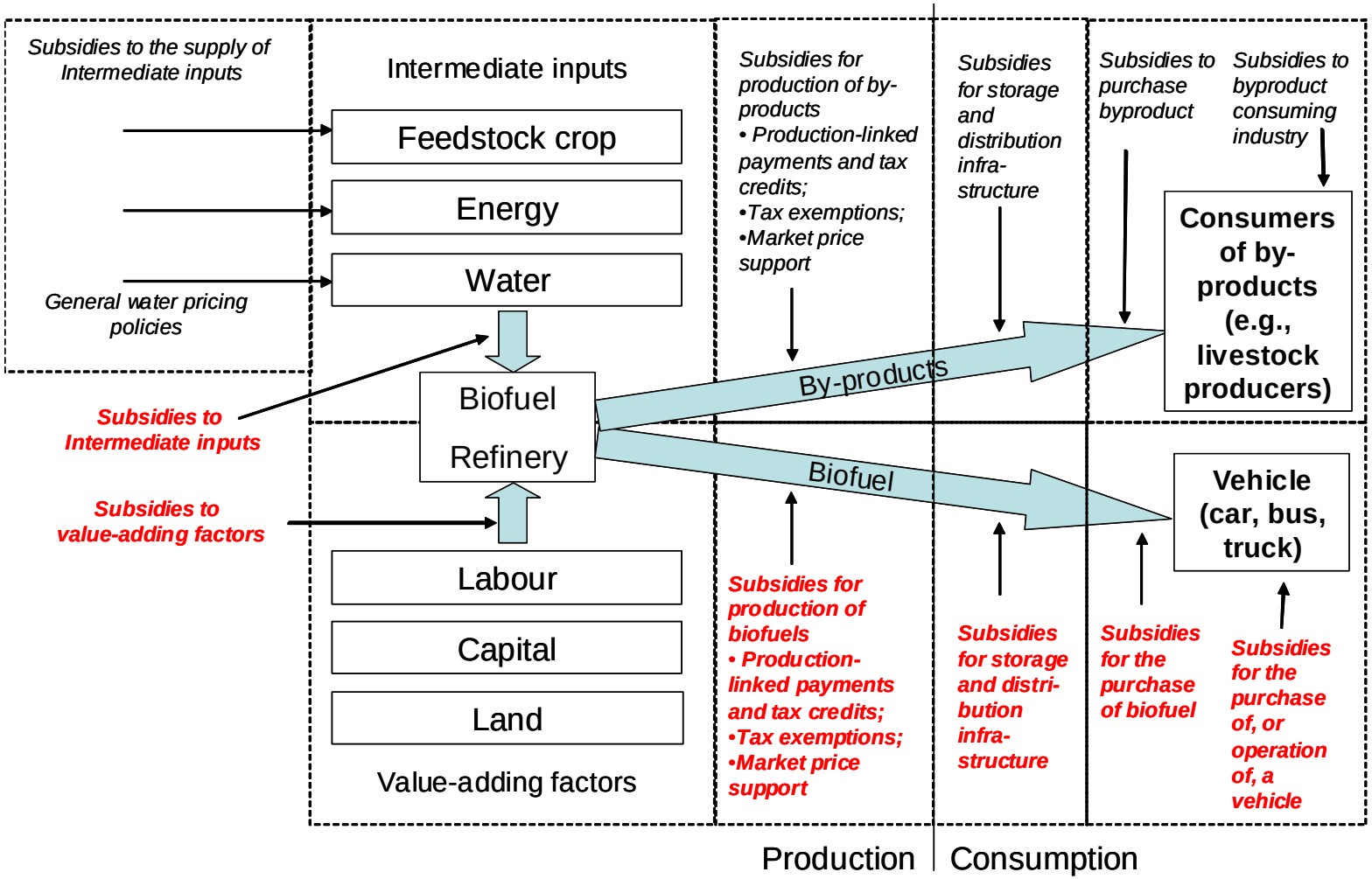
Support for production and consumption is provided at many points in the supply chain. At the beginning of the supply chain are subsidies to what economists call "intermediate inputs"—goods and services that are consumed in the production process. The largest of these are subsidies to producers of feedstock crops used to make biofuels, particularly oilseed rape for biodiesel. Various schemes are available such as the energy crop aid paid per hectare, the possibility to produce biofuel feedstock on set-aside land, and the distillation crises aid paid to transform wine into alcohol to be used in the production of ethanol.

Subsidies to intermediate inputs may be complemented by subsidies to value-adding factors—capital goods, labour employed directly in the production process, and land for plant construction. Many Member States provide capital grants or subsidized loans for this purpose. In some countries, public authorities have also participated in the financing of demonstration plants. These types of subsidies lower both the fixed costs and the investor risks of new plants, thereby improving the return on investment.

Further down the chain are subsidies directly linked to output. Output-linked support includes exemptions from fuel-excise taxes, which enables biodiesel, ethanol and straight vegetable oil to be sold at retail prices that are roughly at parity with their taxed fossil-fuel counterparts. Relief from excise taxes accounts for the largest share of public support granted to biofuels in the EU. However, the magnitude of the subsidy varies widely from Member State to Member State. In the majority of the European countries, public policies do not discriminate between imports and domestic supplies, except in Member States that allocate production quotas through European public tenders, since this policy impedes the ability of foreign producers to capture domestic market share. Import tariffs on ethanol are particularly high and protect most EU producers from foreign competition.

Subsidies for consumption are minor in the EU, but for ethanol they are expanding simultaneously with the development of flexible fuel vehicles (FFVs)—i.e., vehicles able to run on blends of ethanol and gasoline containing up to 85 percent ethanol (E85). In countries such as Sweden where such cars are sold, governments usually grant a support package that may include specific excise-tax reductions on E85 fuel, tax credits and low registration fees for FFVs owners, or free parking, among other measures.

Figure 1.1 Subsidies provided at different points in the biofuel supply chain

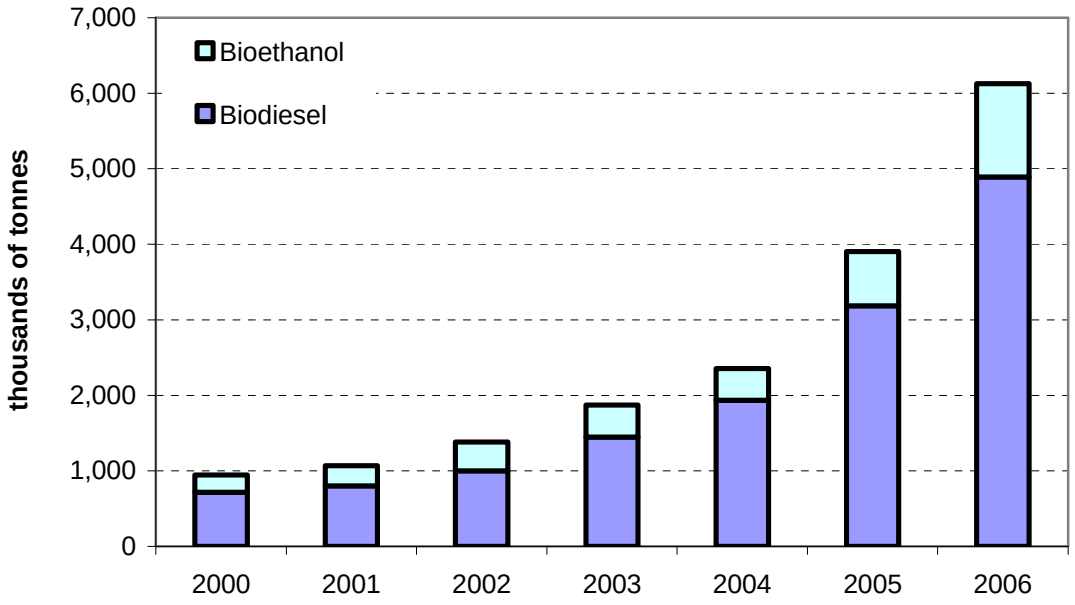


2 Overview of the EU biofuels industry

Biofuels have been produced on an industrial scale in the EU since the beginning of the 1990s, largely in response to favourable legislation passed by EU institutions following the 1992 CAP reform. Although EU measures have applied equally, most of the time, to biodiesel and ethanol, the production of biodiesel has developed at a faster rate. The emphasis put on fatty acid methyl ester (FAME) is explained in part by the fact that the EU is a net importer of diesel, while gasoline surpluses are exported. In addition, the first European countries to engage in significant production of biofuels consumed important quantities of diesel for road transportation. In France for instance, where the production of biodiesel started in 1993, 22.9 million tonnes of oil equivalent (TOE) of diesel and 16.4 million TOE of gasoline were sold in 1995.[9] Although German diesel sales were slightly inferior to gasoline in 2000, diesel consumption accounted for 48 percent of road transportation fuels.[10]

In recent years, the biofuel industry has evolved very rapidly, thanks mainly to the strong incentives provided by EU Member States, and the construction of new plants is being announced almost every week. As shown in Figure 2.1, biofuels production has increased from 1 million tonnes in 2000 to 6.1 million tonnes in 2006. Biodiesel continues to lead the expansion of the EU biofuels market with a production that reached approximately 4.9 million tonnes in 2006 (1.23 million tonnes for ethanol).

Figure 2.1 Evolution of biofuel production in the EU



Sources: eBIO, EBB and EurObserv'ER 2006.

[9] Statistics from the French Ministry of Industry, available at: www.industrie.gouv.fr/energie/statisti/pdf/cons-energie-transp.pdf

[10] Eurostat statistics.

2.1 The biodiesel industry

In 2006 biodiesel was being produced in almost all of the 27 EU Member States (EU-27), except for Finland, Hungary and Luxembourg. Total production capacity for the EU-27 in 2006 was just over 6 million tonnes, a potential 20 percent higher than the actual production for the same year. Germany, Italy, France, the United Kingdom and Spain have the largest production capacities; however, in some countries actual output is much smaller than installed capacity. This is the case in the United Kingdom for instance where the production capacity was 445,000 tonnes in 2006 while actual production only amounted to 192,000 tonnes.[11] More than 90 percent of biodiesel produced in the EU is made from rapeseed oil.

Germany is Europe's and the world's leading producer of biodiesel, with a production exceeding 2.6 million tonnes in 2006, very close to the limits of its production capacity (2.7 million tonnes in 2006). Currently, Germany has 30 biodiesel plants within its national territory and plans have been announced for another nine. As a result, the German production capacity should attain around 4.2 million tonnes over the next three years. Multiple operators are present on the German market, but strong investments made in several plants by firms such as Verbio, CropEnergies (Südzucker) and Saria Bio-industries can be observed.

France is Europe's second-largest producer of biodiesel. Until 2001 it was the world's leading producer, but then experienced a gradual decline in production until 2004. New plants started to be built in 2005, raising output in that year to 492,000 tonnes and to 743,000 tonnes in 2006. France's biodiesel industry is currently highly concentrated. Installed capacity is just under 1 million tonnes, distributed among five plants, four of which produce for Diester Industry. Diester is currently constructing five additional plants, with a combined capacity of 2 million tonnes per annum. In order to diversify the country's production base, the French government has recently allocated production quotas to operators other than Diester Industry. As a result, new firms have started to supply biodiesel to the French market. In total, 15 additional production facilities are under construction. Once these are all competed, France's total production capacity in biodiesel should attain around 3.3 million tonnes by 2010.

In **Italy**, biodiesel production in 2006 reached 447,000 tonnes, compared with 396,000 tonnes in 2005. This growth occurred despite a reduction in 2005 of the quota eligible for tax exemption under Italian law. Thus far, much of the biodiesel produced in Italy has been used as heating oil rather than as a transport fuel. Italy has currently Europe's second-largest production capacity (1.38 million tonnes) but some plants are running under capacity. Six new plants should be constructed in the coming years and the installed capacity should increase by 40 percent.

The majority of the **EU's new Member States** have committed to develop new biodiesel industries. In 2006, these countries produced 351,000 tonnes of biodiesel (7.2 percent of the EU total production) and current installed capacity is around 706,000 tonnes. The Czech Republic, Poland and Estonia have the largest installed capacity. The biodiesel industry is expanding rapidly in this region and many international companies are investing, often in partnership with local operators, in production facilities in the new Member States. In the coming years, 33 new plants should be constructed and the production capacity of these countries should reach 3.2 million tonnes.

Unfortunately, data on biodiesel trade among EU countries is not available. It is well known, however, that Germany is an important importer of biodiesel from neighbouring countries. In 2005, for example, **Austria** exported 50 percent of its biodiesel production (around 35,000 tonnes) to Germany and Italy, where the prices obtainable for biodiesel were higher than in Austria.[12] Poland's Trzebina biodiesel plant exports almost three-quarters of its production to Germany.[13]

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[11] European Biodiesel Board (EBB).

[12] Member State report under Directive EC 2003/30 for 2005 – Austria.

[13] USDA, GAIN Report Number: PL6051, 2006.

The construction of two pilot plants for the production of second-generation biodiesel has been reported: one in **Lithuania**[14] and one in **Finland**. The Finnish refiner Neste Oil has announced plans to build a second biodiesel plant at its Porvoo refinery in Finland. The capital costs of the facility are estimated to be around € 100 million and production is scheduled to begin towards the end of 2008. The plant will have the same capacity, 170,000 tonnes per year, as the first one at Porvoo, due to start up in summer 2007.[15]

Projections made for the EC Joint Research Centre[16] indicate that 10.2 million TOE of biodiesel (11.3 million tonnes) should be offered on the EU-27 market in 2010 in order to meet the indicative objective of 5.75 percent set by the Commission. Table 2.1 shows that the EU installed capacity is expected to reach 22.48 million TOE [17] within the next couple of years, a production capacity largely superior to the Commission's 2010 objective.

Table 2.1 Estimation of current and future biodiesel production capacity in EU-27

	Plants in operation 2007	Estimated production capacity 2007 (tonnes)	Plants planned or under construction	Additional production capacity (tonnes)
Total EU-27	**115**	**8,377,000**	**115**	**16,608,000**
EU-15				
Austria	10	166,000	3	400,000
Belgium	5	590,000	2	200,000
Denmark	1	41,000	1	48,000
Finland	1	170,000	1	n.a.
France	5	980,000	15	2,320,000
Germany	30	2,581,000	9	1,613,000
Greece	5	620,000	1	39,000
Ireland	1	44,000	2	230,000
Italy	10	1,380,000	6	610,000
Luxembourg				
Portugal	7	200,000	5	410,000
Spain	11	297,000	27	4,945,000
Sweden	2	80,000	1	160,000
The Netherlands			5	1,316,000
United Kingdom	4	522,000	4	1,100,000
Subtotal EU-15	**92**	**7,671,000**	**82**	**13,391,000**
New Member States				
Bulgaria	3	65,000	12	1,110,000
Cyprus				
Czech Republic	3	220,000	1	100,000
Estonia	1	100,000		
Hungary	3	60,000	4	300,000
Latvia	4	19,000	5	272,000

[14] Member State report under Directive EC 2003/30 for 2005 – Lithuania.

[15] F.O. Lichts, 01/12/2006.

[16] Kavalov, B. *Biofuel potentials in the EU,* European Commission Joint Research Center, January 2004.

[17] One tonne of biodiesel is equivalent to 0.9 TOE.

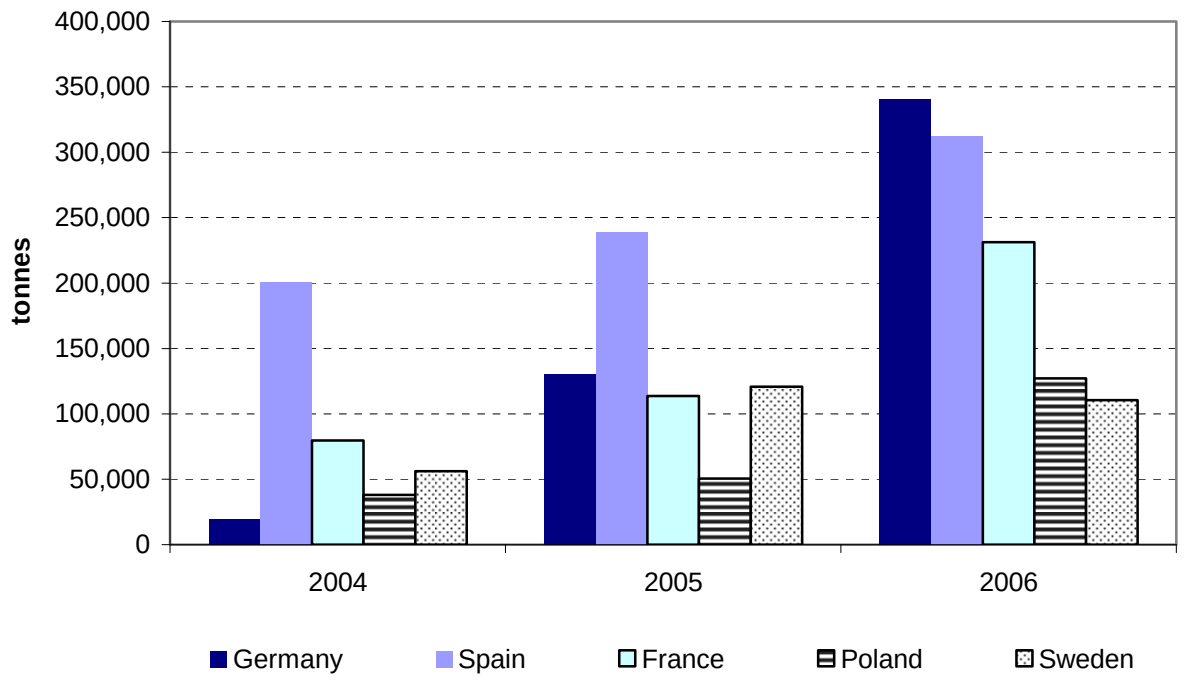
	Plants in operation 2007	Estimated production capacity 2007 (tonnes)	Plants planned or under construction	Additional production capacity (tonnes)
Lithuania	1	30,000	3	145,000
Malta				
Poland	2	114,000	3	900,000
Romania			4	330,000
Slovakia	2	81,000		
Slovenia	4	17,000	1	60,000
Sub-total NMS	**23**	**706,000**	**33**	**3,217,000**

Sources: Data collected from various sources by the authors.

2.2 The ethanol industry

Contrary to the situation prevailing in other big biofuel producing countries such as Brazil and the United States (U.S.), the ethanol industry is less developed in Europe than its biodiesel industry. In 2006 ethanol accounted for 21 percent of EU biofuel production. In the same year, ethanol was produced in 13 - less than 50 percent - of the current EU Member States. Production increased from 232,000 tonnes in 2000 to 1.2 million tonnes in 2006, and between 2005 and 2006 alone it increased by 71 percent. However, production is running below capacity, which was almost 2.2 million tonnes in 2006. Figure 2.2 shows that Germany, Spain and France are the leading ethanol producers. In the EU ethanol is mainly made from cereals (wheat, corn, rye, barley), sugar beets and distilled wine.

Figure 2.2 Evolution of fuel ethanol production in EU major producers



Source: eBIO, 2006.

Between 2004 and 2006 German ethanol production increased from 19,732 tonnes to 340,174 tonnes. As a result, **Germany** became Europe's leading producer of ethanol, overtaking Spain. The country currently has six plants with a total production capacity of 563,000 tonnes using cereals as the main feedstock. Plans to construct 19 additional plants have been announced, which could increase current capacity by as much as 2 million tonnes.

In 2006, **Spain** was the second-leading European producer, with a production of 312,549 tonnes. From 2004 to 2006 ethanol output grew by 56 percent, which is low compared with growth rates in production witnessed in the other leading European producing countries. Four plants capable of producing up to 437,000 tonnes are currently operating in Spain; 95 percent of that capacity is controlled by just one company, the Abengoa group, which also owns ethanol plants in France and the United States.[18] Another four facilities are scheduled to come on line within the next several years, and by 2010 Spanish production capacity could double to reach 862,000 tonnes.

Producing 231,255 tonnes in 2006, **France** is Europe's third-largest producer of fuel ethanol, after Spain. Currently its 15 plants have a combined production capacity of just under 1 million tonnes. However, because many production facilities also distil alcohol for beverage and other uses, it is difficult to know how much fuel ethanol could be produced at these plants. In the wake of the EU's sugar reforms, which began to be implemented in 2006, some small sugar distilleries are preparing to close; or produce only the quantities of ethanol needed to fulfil the production quotas allocated to them in previous years by the French government. The leading producer is the co-operatively owned company Tereos, which operates seven plants and is constructing an additional one close to Rouen. Other significant operators include national firms such as Cristal Union but also foreign operators such as Abengoa (Spain) and Südzucker (Germany). With five additional plants planed or under construction, France's production capacity should reach 1.7 million tonnes by 2010. Ethanol in France is used mainly to produce ETBE; however, this trend should change in the next few years as the government has limited the production quotas allocated to ETBE producers in order to promote the direct incorporation of ethanol in gasoline.

Consumption of fuel ethanol in **Sweden** exceeds domestic production (110,497 tonnes produced in 2006 for a consumption exceeding 254,569 tonnes) and the country imports large quantities of ethanol from Brazil (derived from sugar cane), France (derived from wine), Spain and Italy. About 80 percent of Sweden's ethanol production is based on cereals. The remaining 20 percent is based on wood through fermentation of sulphite liquor, a by-product of paper pulp production. A majority of the ethanol is used directly as a blend in petrol, and since 2004 all 95-octane petrol must contain 5 percent ethanol. Sweden has also seen a strong development of FFVs – cars that can run on 85 percent ethanol or conventional petrol.

New EU Member States are also major producers of ethanol. With a production of 127,072 tonnes produced in two plants, **Poland** is the fourth-largest EU producer. Current installed capacity will be complemented by two new plants. Total production capacity should increase to 200,000 tonnes by the end of 2007. **Hungary** could become a very important actor, with an installed capacity that could reach 1 million tonnes in the coming years.

Five second-generation ethanol pilot and demonstration plants are currently in operation in Denmark, Germany, Lithuania and Sweden.

Projections made for the EC Joint Research Centre[19] indicate that 8 million TOE (12.5 million tonnes[20]) of ethanol will be needed by 2010 in order to meet the indicative target of 5.75 percent set by the Commission. Table 2.2 shows that the EU's installed biofuel manufacturing capacity should reach 9.97 million tonnes and therefore will not be sufficient to meet the 2010 objective.

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[18] *Biofuels Barometer*, EurObserv'ER, 2006.

[19] Kavalov, B. *Biofuel potentials in the EU,* European Commission Joint Research Center, January 2004.

[20] 1 tonne of ethanol is equivalent to 0.64 TOE.

Table 2.2 Estimation of current and future ethanol production capacity in EU-27

	Plants in operation 2007	Estimated production capacity (tonnes)	Plants planned or under construction	Additional production capacity (tonnes)
Total EU-27	**46**	**2,991,000**	**76**	**6,988,000**
EU-15				
Austria			1	173,000
Belgium	1	80,000	3	383,000
Denmark			3	126,000
Finland			2	36,000
France	15	999,000	5	683,000
Germany	6	563,000	19	1,451,000
Greece			2	95,000
Ireland				
Italy	3	237,000	4	75,000
Luxembourg				
Portugal			1	100,000
Spain	4	437,000	4	425,000
Sweden	3	120,000	1	122,000
The Netherlands	1	28,000	1	158,000
United Kingdom			5	1,070,000
Sub-total EU-15	**33**	**2,464,000**	**51**	**4,897,000**
New Member States				
Bulgaria	2	108,000	5	220,000
Cyprus				
Czech Republic	2	84,000	7	352,000
Estonia				
Hungary	2	91,000	7	1,000,000
Latvia	2	17,000		
Lithuania	1	24,000		
Malta				
Poland	2	130,000	2	200,000
Romania	1	14,000	2	160,000
Slovakia			1	109,000
Slovenia	1	59,000	1	50,000
Sub-total NMS	**13**	**527,000**	**25**	**2,091,000**

Sources: eBIO and data collected from various sources by the authors.

3 Policy Initiatives of the European Commission

3.1 A Retrospective on EU biofuels policy

The utilization of biofuels is not a recent practice. As early as the end of the nineteenth century, the partial or total substitution of gasoline by denatured alcohol was being considered in some European countries. Before the First World War, Parisian buses were running on a blend of denatured alcohol and gasoline. Between 1920 and 1950, France was one of the EU pioneers in the utilization of ethanol. Its objective was twofold: to secure a higher degree of energy independence, but also to reduce the French trade-balance deficit. Thanks to government intervention, the substitution rate of fossil fuels with sugar-beet-based ethanol was significant during those years and the obligation to blend ethanol with regular gasoline was even a condition for the import of crude oil at one stage.[21] The emphasis on ethanol can be explained by the fact that, by that time, almost all cars had spark – ignition engines; diesel engines were not an option for private vehicles.

At the beginning of the 1960s, ethanol disappeared from the fuels market for two main reasons. First, oil had become abundant and prices were attractive, diminishing the competitiveness of ethanol. Second, sugar-beet surpluses disappeared because of the strong demand from the agribusiness and chemical industries.

The European interest in biofuels re-emerged in the mid-1980s as part of a broader strategy geared to promote the use of renewable energy sources (not limited to biofuels). The European Council listed the promotion of renewable energy sources and alternatives to oil as among its energy objectives as early as 1985. Council Directive 85/536/EEC of 5 December 1985 on crude-oil savings through the use of substitute fuel components in petrol stressed the role of biofuels in reducing Member States' dependence on oil imports and authorized the incorporation of up 5 percent ethanol into petrol by volume and up to 15 percent of ETBE by volume. Its primary aim was to diversify and thus increase the security of the EU's energy supply.[22] However, it was not until the 1990s that biofuels production began in several European countries and expanded rapidly, with subsequent policy developments at the European level and among the individual Member States. By then, the priority had shifted to biodiesel, while ethanol production continued on a slower development path. The emphasis on biodiesel is explained by the EU's significant trade balance deficit posted for diesel (whereas the EU exports gasoline). From the beginning of the industry, biodiesel was supported through agricultural policies affecting production of feedstock, expenditure on research and development, tax exemptions, capital grants, quality standards and, eventually, targets for biofuel consumption.

The first policies to benefit biodiesel production in Europe were not specific to biodiesel. The Common Agricultural Policy (CAP) provided important indirect support to the early industry, given that feedstocks comprise the greatest operating cost for biofuels. In addition to the specific aid provided to feedstocks through minimum guaranteed prices or per hectare payments, or both, the 1992 CAP reform introduced the obligation to set aside 15 percent of the areas dedicated to cereals and oilseeds. This measure was taken to reduce the agricultural surpluses that could not easily be exported. However, the reform allowed farmers to produce non-food crops, for example oilseed rape for biodiesel, on these areas while benefiting from the set-aside compensatory payment.

Similarly, research and development policies assisted development of new technologies. As early as 1973, the Austrian Ministry of Agriculture initiated research on biodiesel at the Federal Institute for Agricultural

[21] Ballerini, D. 2006. Les biocarburants: états des lieux, perspectives et enjeux du développement.

[22] OJ C 241 of 25.9.1986, p.1, cited in Kraemer, R.A. and S. Schlegel (2007), European Union Policy on Bioenergy, GMF Policy Brief, German Marshall Fund, Washington, March 2007.

Engineering in Wieselburg, and in 1982 it supported the production of fatty acid methyl ester (FAME) from rapeseed oil in a pilot project.[23]

Biodiesel quality standards assisted the development of the industry by providing greater consistency and certainty for both producers and consumers. In 1991 Austria published the first final standard for biodiesel for rapeseed oil methyl ester (RME; standard ON C 1190).[24] Other standards followed in France (by decree in 1993), Italy (CUNA NC 635-01), Sweden (SS 15 54 36) and Germany (DIN E 51606). An Austrian standard for FAME (ON C 1191) followed in 1997, thus allowing a broader scope of raw materials to be used for biodiesel production.

The first policies promulgated by the European Commission in support of biofuels focused on the possibilities for tax exemption. The "Scrivener" Directive, drafted in 1992, recommended exempting liquid biofuels from fuel-excise taxes, noting that without this relief the price of biofuels would be two to three times that of petroleum fuels.[25] Over 80 percent of biofuel production in the EU is biodiesel.[26] On this occasion, however, the Commission failed to get its proposals approved by the Member States. The Scrivener Directive nevertheless influenced subsequent thinking in respect of European biodiesel policy.

Commission legislation from 1992 did, however, allow a tax exemption on biofuels produced in pilot projects.[27] France was the first country to grant full excise-tax exemption in 1992 to biofuels produced in approved pilot plants. However, the tax relief was conditioned on the utilization of specific feedstock (rapeseeds, sunflower seeds, cereals, potatoes, sugar beet and jerusalem artichoke) exclusively grown on non-food set-aside areas. In 1997, France had to reform this policy after the Commission declared it in violation of EU legislation.[28] In 1996 Austria implemented a tax-exemption policy for biodiesel[29] by allowing a 95 percent reduction from the normal fuel tax when used as a 100 percent fuel (B100) in diesel engines, and full tax exception for the biodiesel component of blends of up to 5 percent. Farmers were given a 100 percent tax exemption when using biodiesel derived from their own crop when used on their farm.

Biodiesel was also tax exempt in Germany because, until 2004, German law stated that mineral oil taxation applied only to mineral-based fuels such as petrol and diesel. By definition, fuel derived from other sources was free from taxation. However, this applied only to biofuels used in pure form, not those mixed with fossil fuels. Germany also made biofuels exempt from its eco-tax, imposed in 1999, which was intended to reduce greenhouse emissions.[30]

Italy and France were the first EU countries to apply quotas to the amount of biofuel[31] that could qualify for tax exemption. These quotas matched the desired level of biofuel production and were intended to limit

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[23] Renewable Energy Action (2004), Development of Biodiesel Case Study #5: Austria, 2002-157, 21 October 2004. www.senternovem.nl/mmfiles/The%20Development%20of%20Biodiesel_tcm24-117024.pdf

[24] Austrian Biofuels Institute for the International Energy Agency (1997), Biodiesel: Documentation of the worldwide status, Commissioned by the Federal Institute for Agricultural Engineering (BLT), Wieselburg, Austria.

[25] Proposal of 19 February 1992 (COM(1992) 36, as published in JO C/92/73, p.6), as amended on 1 July 1994 (COM(1994) 147). Withdrawn in 1999.

[26] Schnepf, R. (2006), "Report for Congress on European Union Biofuels Policy and Agriculture: An Overview", U.S. Congressional Research Service: The Library of Congress, Washington, D.C.

[27] Article 8, EC Directive 92/81/EEC.

[28] The conditions to receive tax exemption (specific crops and produced on French non-food set aside areas) violated the EU law.

[29] Revision of the Mineral Oil Tax as part of the Revision of Excise Duties Act 1996.

[30] Each year from 1999 to 2003 this tax added DM 0.06 (ca. €0.03) per litre to the mineral-oil taxation, to a total amount of DM 0.30 per litre in 2003.

[31] Italy only applies quota for biodiesel. Bioethanol does not benefit from any tax privilege.

subsidy expenditure. In 1997 Italy provided full tax exemption on up to 125,000 tonnes of biodiesel used for transport fuel and heating, while France provided full tax exemption up to a quota of 350,000 tonnes of biodiesel and 270,000 tonnes of ETBE (1998).[32]

Sweden, Poland and Slovakia also provided full tax exemption to biodiesel, but their production was and remains at a much lower level.[33] Spain provided a reduced rate of excise duty for biofuel[34] as well as subsidies covering up to 30 percent of eligible costs for projects relating to fuel production from forestry, agriculture and industry residues.[35] The Irish government introduced legislation in order to reduce excise duty on the use of biofuels in the 1995 Finance Act, but the legislation was not activated and the Department of Finance refused to reduce excise duty for a business proposing to develop a liquid biofuels plant.

By the late 1990s commercial biodiesel production had well exceeded the pilot scale in several EU countries. Accordingly, several Member States, particularly France, sought changes to European policies on biofuels to encourage expansion of the industry.[36]

A white paper[37] for a Community Strategy and Action Plan was first published in 1997 with the aim of contributing to the achievement of the overall energy policy objectives of the EU: security of supply, competitiveness, environment protection and sustainable development. The most important contribution of this white paper was to set an indicative target to increase the contribution of renewable energy sources from 6 percent to 12 percent of the EU's gross energy consumption by 2010.

Following the publication of the white paper, the European Commission signed the Kyoto Protocol on GHGs. The EU committed itself to reducing annual GHGs by 8 percent in 2010, compared with the 1990 level. With transport producing almost 30 percent of Europe's carbon dioxide emissions, the development of substitute fuels with lower CO_2 emissions was seen as potentially playing an important role in meeting these commitments.

A green paper[38] published in 2000 raised concerns about Europe's dependence on energy imports and put forward a target of 20 percent substitution of conventional fuels by alternatives, such as biofuels, natural gas and hydrogen, by 2020. This need for substitute energy sources was underlined again in a white paper[39] published by the Commission in 2001, which again proposed the adoption of tax exemptions for alternative fuels.

3.2 Recent policy initiatives of the European Commission

The year 2003 marked the beginning of the acceleration and deepening of European initiatives to encourage the development of biofuels. That very same year, the CAP was substantially reformed. Biofuels represent a

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32 Rapport No 168. Projet de loi de finances rectificatives pour 1997 adopté par l'Assemblée Nationale. Article 21, modification du régime fiscal applicable aux biocarburants.

33 Austrian Biofuels Institute for the International Energy Agency (1997), Biodiesel: Documentation of the worldwide status, Commissioned by the Federal Institute for Agricultural Engineering (BLT), Wieselburg, Austria.

34 Royal Decree 1165/95.

35 Royal Decree 615/1998, cited in Frankl P. and E. Menichetti (2002) "Policies and Market Development, case study: Spain", Remac 2000. Available at: http://www.ecn.nl/docs/library/report/remac/remac00_2.pdf.

36 van Thuijl, E., Roos, C.J., and Beurskens, L.W.M. (2003), An overview of biofuel technologies, markets and policies in Europe, Energy Research Centre of The Nethlands (Report ECN-C-03-008), Amsterdam. www.ecn.nl/docs/library/report/2003/c03008.pdf.

37 *White Paper: Energy for the future: Renewable sources of Energy*, COM(1997) 599 final, 1997.

38 *Green Paper: Towards a European strategy for the security of energy supply*, COM(2000) 769 final, 2000.

39 *White Paper: European Transport Policy for 2010: Time to decide*, COM(2001) 370 final, 2001.

new opportunity for farmers under a reformed CAP since one of the objectives of the EU biofuels policy is to support farmers' incomes by providing new outlets for agricultural products.

In 2003, two Commission directives aimed at encouraging the development of biofuels by Member States were adopted. The directives have been updated and complemented by several initiatives, as described below.

3.2.1 The Directive EC 2003/30 on the promotion of the use of biofuels or other renewable fuels for transport (Biofuel directive)

Directive EC 2003/30, issued in May 2003, calls for an increased use of alternative fuels and requires Members States to place a minimum proportion of biofuels and other renewable fuels on their markets. The indicative reference values for these proportions are:

- 2 percent market share (in energy content) of all petrol and diesel for transport purposes by 31 December 2005;
- 5.75 percent market share (in energy content) of all petrol and diesel for transport purposes by 31 December 2010.

The target for 2005 has not been reached (Table 3.1) and the 2006 market share of 1.8 percent is still far from the 2010 indicative target of 5.75 percent.

Article 4.2 of the Directive requires Member States to report each year to the Commission on the measures taken to promote biofuels or other renewable fuels. The Commission is obliged in return to prepare every two years an evaluation report on the progress made in the Member States. The first report from the Commission was due before the end of 2006. Its publication was delayed, however, and the report was only published in January 2007 (see detailed information in Section 3.2.5).

Table 3.1 Market shares and targets for biofuels in EU-25 (in percentage)

EU Member State	Market share for 2005 (energy content)	Target for 2005 (energy content)	Target for 2010 (energy content)
Austria	0.93	2.5	5.75
Belgium	0	2	5.75
Cyprus	0	1	5.75
Czech Rep.	0.05	3.70	5.55
Denmark	n.a.	0.1	n.a.
Estonia	0	2	5.75
Finland	n.a.	0.1	5.75
France	0.97	2	7
Germany	3.75	2	5.75
Greece	n.a.	0.7	5.75
Hungary	0.07	0.6	5.75
Ireland	0.05	0.06	n.a.
Italy	0.51	1	2.5
Latvia	0.33	2	5.75

EU Member State	Market share for 2005 (energy content)	Target for 2005 (energy content)	Target for 2010 (energy content)
Lithuania	0.72	2	5.75
Luxembourg	0.02	0	5.75
Malta	0.52	0.3	n.a.
Netherlands	0.02	2	5.75
Poland	0.48	0.5	5.75
Portugal	0	2	5.75
Slovakia	n.a.	2	5.75
Slovenia	0.35	0.65	5
Spain	0.44	2	5.83
Sweden	2.23	3	5.75
United Kingdom	0.18	0.19	5
EU-25	**1** *	**2**	**5.75**

Underlined figures are mandatory objectives.

Sources: European Commission, *Biofuels Progress Report 2007*, Member States' reports on the implementation of Directive EC 2003/30 for 2005.

3.2.2 The Energy Taxation Directive

In order to compensate for the higher costs of producing biofuels, and to comply with the objective of the Directive EC 2003/30, the Commission introduced the Directive EC 2003/96 on Energy Taxation, allowing Member States—after authorization by the Commission—to exempt or reduce excise duties so as to promote biofuel production and use. As of July 2007, 16 Member States had notified their tax system to the Commission and received the authorization to introduce state aid (the majority of time in the form of an excise tax exemption, as shown in Table 3.2). The exemption must be proportionate to blending levels and should take into account changes in raw material prices, so as to avoid over-compensation of the additional costs of biofuel production. Exemptions and reductions are limited to a maximum of six years, but may be renewed.

Table 3.2 Biofuel tax exemptions that have received state aid approval from the European Commission

Country	Case	Title	Biofuels concerned
Austria	NN 43/04	Tax exemption for biofuels	Ethanol, biodiesel and vegetable oil
Belgium	N 334/2005	Tax exemption for biofuels	Rapeseed oil, ethanol and biodiesel
Cyprus	N 652/2006	Tax exemptions on biofuels for transport	Ethanol, biodiesel, pure vegetal oil
Czech Republic	N 613/05	Amendment excise reduction and operating subsidies for biodiesel	Biodiesel
	N 223/05	Amendment excise reduction and operating subsidies for biodiesel	Biodiesel

Country	Case	Title	Biofuels concerned
	N 206/2004	State support for encouragement of biofuel production	Biodiesel
Denmark	NN 59/2005	Tax exemption for biofuels used as motor fuels	Biodiesel, ethanol
Estonia	N 314/05	Excise duty exemption for biofuels	Ethanol, biodiesel, pure vegetal oil
Germany	N 579/06	Tax rebates for biofuels (amendments to an existing scheme)	Ethanol, biodiesel, pure vegetal oil
	N 685/02	Oil tax release for biofuels	Ethanol, biodiesel, ETBE, pure vegetal oil
Hungary	N 427/2004	Excise tax exemption for biofuels	Biodiesel and ethanol after transformation into ETBE
Ireland	N 473/2006	Biofuel Mineral Oil Tax Relief Scheme II	Biodiesel, ethanol and pure plant oil from oilseed rape
	N 599/04	Excise tax reduction on biofuels	Pure plant oil, biodiesel and ethanol
Italy	N 582/2004	Modification of aid N 461/2004 on subsidies for biodiesel	Biodiesel
	N 717/2002	Excise tax reduction on biofuel	ETBE
	N 461/2001	Extension of the excise tax reduction for biodiesel	Biodiesel
	N 457/97		Biodiesel
Lithuania	N 44/2005	Excise tax reduction on biofuels	Ethanol, biodiesel, ETBE, pure vegetal oil
Netherlands	N 570/2005	Reduction excise duty biofuel	Ethanol and biodiesel
Poland	N 580/2005	Excise duty reduction for biofuels	Ethanol, ETBE, biodiesel and pure vegetal oil
Spain	NN 61/2004	Extension of the excise tax reduction for biofuels	Ethanol and biodiesel
Sweden	N 112/04	Tax exemption for biofuels	Ethanol and biodiesel
	N 480/2002	Tax exemption for biofuels	Ethanol and biodiesel
United Kingdom	N 407/2003	Reduced rate of excise duty on ethanol used for road transport	Ethanol and ETBE
	N 804/2001	Reduced rate of excise duty on biodiesel	Biodiesel

Source: DG Competition.

More recently, the European Commission released two policy papers that are expected to shape the nature of future support to biofuels across the EU: the *Biomass Action Plan* and the *Biofuels Strategy*.

3.2.3 The Biomass Action Plan

Following the Directive EC 2003/30 on biofuels, a Communication from the Commission, "The share of renewable energy in the EU" (2004) concluded that further efforts—in particular in the biomass sector—are needed in order to achieve the above policy objectives. To that extent and in order to collect useful

recommendations on how to reach these objectives, between February and March 2005 the Commission launched a Public Consultation for a Biomass Action Plan.

The result of this consultation has been summarized in a *Biomass Action Plan*,[40] published by the Commission in December 2005, which proposes several steps or measures to increase the development of biomass energy. As regard to biofuels, the Plan states that the Commission will (among other things):

- Bring forward a report in 2006 in view of a possible revision of the Biofuels Directive;
- Encourage Member States to give favourable treatment to second-generation biofuels in biofuels obligations;
- Pursue a balanced approach in ongoing free-trade agreement negotiations with ethanol-producing countries and regions;
- Propose amendments to the "biodiesel standard" to facilitate the use of a wider range of oils, including imported oils, to produce biodiesel, and allow ethanol to replace methanol in biodiesel production;
- Assess the impact of options to address the issues of limits on the content of ethanol, ether and other oxygenates in petrol; limits on the vapour content of petrol; and limits on the biodiesel content of diesel;
- Bring forward a communication dealing specifically with biofuels in early 2006.

The conclusions of the 8-9 June 2006 meeting of the Council of the European Union clearly endorsed the Biomass Action Plan and particularly "invited Member States to develop or update national Biomass Action Plan in response to the present conclusions." Initiated by DG Transportation, two meetings on national biomass action plans took place in July 2006 and in March 2007.[41]

3.2.4 The Biofuels Strategy

The *Biomass Action Plan* was followed shortly thereafter, in February 2006, by the publication of a *Biofuels Strategy*.[42] This communication complements the Biomass Action Plan and aims to promote and further explore the opportunities for biofuels in the EU as well as in developing countries, and to prepare for the large-scale use of biofuels by reducing production costs. To this end, the strategy sets out seven policy objectives:

- Stimulate the demand for biofuels (including the use of national targets and biofuel obligations, measures to encourage second generation biofuels and public procurement policies);
- Capture environmental benefits (including measures to ensure greenhouse gas benefits and sustainability of feedstock cultivation);
- Develop the production and distribution of biofuels (in particular through national frameworks under cohesion policy and rural development policy);
- Expand feedstock supplies (including making sugar used for ethanol production eligible for both the non-food regime on set-aside land and the energy crop premium, and exploring other opportunities for additional processing of cereals);

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40 COM(2005)628 final, 7 December 2005.

41 More information on National Biomass Action Plans is available at: http://ec.europa.eu/energy/res/biomass_action_plan/nationa_bap_en.htm.

42 COM(2006)34 final, 8 February 2006.

- Expand trade opportunities (maintaining market access at no less than current levels and pursuing a "balanced approach" in future trade negotiations);
- Support developing countries (accompanying measures for Sugar Protocol countries affected by the EU sugar reform to support the development of ethanol production, Biofuels Assistance Package in developing countries that have a potential for biofuels) ;
- Support research and development.

As of July 2007, detailed information on how these measures might be implemented and on what the associated costs and available budget might be had not yet been released by the Commission.

3.2.5 The Public Consultation on biofuels: "Biofuels Directive Review and Progress Report"

Two months after the publication of the *Biofuel Strategy*, a public consultation under the name of *Biofuels Directive Review and Progress Report* was launched in order to prepare the mandatory report required by Article 4.2 of the Directive EC 2003/30. This consultation ended in July 2006 and addressed the following questions, as well as a number of technical issues:

- Is the objective of promoting biofuels still valid?
- The Directive sets a reference value of 5.75 percent for the market share of biofuels in 2010. Will this share be achieved with existing policies and measures? If not, why not?
- Looking towards 2010, does the EU system of targets for biofuel production and use need to be adapted? If so, how?
- Should a certification system be introduced to avoid using "poor performing" biofuels or give more support to "better performing" ones?
- Looking towards 2015 and 2020, should further measures be adopted to promote biofuels?

The results of this consultation, published in January 2007,[43] will be used by the Commission as a basis for the future modification of the Directive EC 2003/30. Three main elements have been pointed out in this report regarding the future revision of the directive: the need to send a clear signal of the determination of the Commission to reduce the EU's dependence on the use of petroleum in transport and to move to a low-carbon economy; the need to set a minimum target for the share of biofuels in 2020 (10 percent); and the need to ensure that the use of poor-performing biofuels is discouraged while the use of biofuels with good environmental and security-of-supply characteristics is encouraged.

3.2.6 The Renewable Energy Road Map

In January 2007, 10 months after the European Council called for EU leadership on renewable energy and asked the Commission to produce an analysis of how to further promote renewable sources of energy, the Commission announced a new *Renewable Energy Road Map.*[44] This road map sets out a long-term vision for renewable energy in the EU and fixes two main targets:

- The establishment by the EU of a mandatory target of 20 percent for renewable energy's share of energy consumption in the EU by 2020;

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[43] Documents related to this public consultation are available at: http://ec.europa.eu/energy/res/legislation/biofuels_consultation_en.htm.

[44] COM(2006) 848 final, 10 January 2007.

- A legal binding minimum target of 10 percent for biofuels in 2020 and the appropriate modifications to the fuel-quality Directive EC 98/70.

The Commission is currently drafting proposals to incorporate the above-mentioned targets into the new Directive on biofuels that should amend Directive EC 2003/30, and it has launched a new public consultation process to solicit feedback from all interested parties.

3.2.7 The Public Consultation on biofuels: "biofuel issues in the new legislation on the promotion of renewable energy"

In the same spirit as the Renewable Energy Road Map and the review of the Directive EC 2003/30, the Commission launched a Public Consultation in April 2007,[45] which ended on 18 June 2007. This consultation aimed to collect the viewpoints of public authorities, businesses, non-governmental organizations and other interested parties on the following questions:

- How should a biofuel sustainability system be designed?
- How should overall effects on land use be monitored?
- How should the use of second-generation biofuels be encouraged?
- What further action is needed to make it possible to achieve a 10 percent biofuel share?

This consultation was intended to help the European Commission to draft a new directive for biofuels in the second half of 2007 that will probably include the 10 percent target.

3.2.8 The amendment to the Directive EC 98/70 on the quality of petrol and diesel fuels

In order to set a minimum legal target of 10 percent biofuels in 2010 and, more broadly, to increase the share of biofuels in the EU's market for transport fuels, the Commission must modify the fuel-quality Directive of 1998, which limits the incorporation of biofuels blended with fossil fuels up to 5 percent by volume. In January 2007 the Commission issued a proposal for a directive[46] amending Directive EC 98/70 on the specification of petrol, diesel and gas oil, and the introduction of a mechanism to monitor and reduce GHG emissions from the use of road transport fuels. The two main elements of this proposal are the establishment of a separate petrol blend with higher permitted-oxygen content, including up to 10 percent ethanol, and the increase of the vapour pressure limit for petrol blended with ethanol. This proposal did not consider any modification for biodiesel. However, according to the Impact Assessment of the Renewable Energy Road Map, the European Standardization Committee (CEN) is already working on a Commission mandate for a 10 percent share of biodiesel—sufficient to accommodate the volume of biodiesel referred to above.[47]

At the European Council meeting of March 2007, the European Heads of States and Governments endorsed a binding target of securing a 20 percent share for renewable energy in overall EU energy consumption by 2020; and a 10 percent binding minimum target to be achieved by all Member States for the share of biofuels in overall EU transport petrol and diesel consumption by 2020. The Council further called for these targets "to be introduced in a cost-efficient way." In addition, they stipulated that the target for biofuels would be made obligatory only as long as production of the biofuels were done sustainably, that second-generation biofuels would become commercially available, and the fuel-quality Directive would be amended to allow for higher

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[45] More information on this public consultation is available at: http://ec.europa.eu/energy/res/consultation/biofuels_en.htm#stakeholders.

[46] COM(2007)18, 31 January 2007.

[47] SEC(2006) 1719, 10 January 2007.

levels of blending.[48] Specific proposals on national targets to achieve the overall figure are due out in December 2007. The Biofuel directive (Directive EC 2003/30) had also to be revised before the end of 2007.

But the blizzard of legal texts recently published that relate to biofuels suggests that the European Commission does not have a clear perspective on where it is heading. While consulting stakeholders on "what should be done, to what extent and how", the Commission wants to remain consensual, as close as possible to the interests of the different parties. Unfortunately, what is at stake is too important for the Commission to remain confusing and a strong position from its part is needed.

Some progress toward clarification has been made recently. In several public meetings, such as the International Conference on Biofuels organized by the DG for External Relations on 5-6 July 2007, the EU commissioners[49] that participated in the event stated clearly that the Directive proposals will provide for a mandatory share of 10 percent of biofuels in all Member States markets' by 2020. They stated also that only biofuels produced in a sustainable way will be able to count against the 10 percent obligation. In addition, biofuels that will not respect the agreed sustainability standards would not benefit from public support provided through either European or national measures. However, these are only proposals that must be discussed by all the Member States before the end of 2007 and a consensus will probably be difficult to reach. In fact, the discussions on the future EU biofuels policy are taking place in a highly controversial framework. Strong criticisms have emerged on current and future actions taken in response to the challenges posed by climate change and rising oil prices.

Although the conclusions presented by the DG for Agriculture and Rural Development are optimistic regarding the impact of a 10 percent obligation for biofuel use in the EU-27 in 2020 on agricultural markets,[50] many organizations from civil society argue that the 10 percent objective cannot be achieved in an environmental and socially sustainable way. Some experts also state that the pressure on feedstock prices will become intolerable. In addition, new research findings point out that, depending on the production method and on the feedstock used, some biofuels might have no positive impact on CO_2 emissions.

Finally, the emphasis put on the same biofuels production is sometimes criticized on the arguement that other bioenergies can be produced out of the same biomass more efficiently. Opinions in favour and against the deepening of the biofuels policy in Europe are constantly present in the media and increasingly in public debates, forcing the Commission to react to these arguments. The challenge for the Commission and the Member States is to find equilibrium between the necessity to address concerns relating to oil prices and climate change, and the obligation to take actions that will ensure that the solutions adopted are the most appropriate in economic, environmental and social terms.

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[48] Brussels European Council 8-9 March, 2007, Presidency Conclusions, 7224/1/07 REV 1, Brussels, May 2, 2007.

[49] Andris Piebalgs, Commissioner for Energy, Peter Mandelson, Commissioner for Trade, Stavros Dimas, Commissioner for Environment.

[50] European Commission (2007), Impact Assessment Renewable Energy Roadmap March 2007: The impact of a minimum 10 percent obligation for biofuel use in the EU-27 in 2020 on agricultural markets, DG for Agriculture and Rural Development, March 2007.

4 Support for Liquid Biofuels

Major financial incentives for the production of biofuels are decided and implemented by individual Member States, the most common type of support being the partial or total exemption of biofuels from excise tax. Several countries have also implemented biofuels obligations, where suppliers of transport fuels are obliged to incorporate a fixed percentage of biofuels in total sales.

Support policies that are implemented by the European Commission include border protection, output payments (distillation measures), the aid to energy crops and other agricultural policies affecting the supply and price of biomass feedstock's, support for research and development, and various regional and rural development initiatives.

4.1 Assistance to outputs

4.1.1 Market Price Support

Market price support refers to financial transfers to producers from consumers generated by public policies that artificially elevate the price of a good. Two main policy instruments provide support to market prices for biofuels in the EU: border protection, mainly through tariffs, and mandatory biofuel blending or content requirements. It is difficult to assess which of the two mechanisms provides the greater support. The effect of mandatory blend requirements on prices is complicated by the lack of uniform blending policies among EU Member States. There are currently no specific tariff lines for fuel ethanol or biodiesel in the EU (see Box 4.1), which hinders the accurate assessment of trade flows and their impacts on prices. As a result, this section can only provide a partial assessment of the support provided to market prices for biofuels in the EU.

4.1.1.1 Border protection for biofuels

The rate of EU border protection varies significantly depending on the type of biofuel imported. As shown in Table 4.1Table 4.1, most favoured nation (MFN) tariffs on ethanol are relatively high: € 19.2 per hectolitre and € 10.2 per hectolitre (or 63 percent and 39 percent *ad valorem* equivalent in 2004–2005). The tariff on biodiesel imports is only 6.5 percent and the tariffs on pure vegetable oils for the production of biodiesel range from 0 to 3.2 percent. These tariffs were in place well before the recent wave of enthusiasm for biofuels and were intended to protect other products classified in the same tariff lines as fuel-grade ethanol and biodiesel.

Imports of ethyl alcohol of agricultural origin require an import licence in EU Member States (Commission Regulation 2336/2003). The license is valid for four months and requires the lodging of a security of € 1 per hectolitre to guarantee that the products will be imported during the period of validity of the licence.

While MFN tariffs on ethanol are high, many developing countries benefit from duty-free and quota-free access to the EU for ethanol. This is the case for African, Caribbean and Pacific (ACP) countries (except South Africa), least developed countries (LDCs) under the Everything but Arms Initiative, and beneficiaries of the Generalized System of Preferences Plus (GSP+). Countries with free access to the EU ethanol market are listed in Table 4.2. Under previous GSP systems, all beneficiaries (if not graduated) benefited from a substantial tariff reduction when exporting ethanol to the EU. This was the case of Pakistan, which held a dominant position among ethanol exporting GSP countries, with competitive production costs. However, the new GSP system (effective January 2006) excluded a wide range of GSP beneficiaries (except GSP+ countries) from the list of countries having unlimited duty-free access to the EU market. As a result, Pakistan, a competitive producer, no longer enjoys a tariff preference.

Table 4.1 The EU's MFN bound and applied tariffs on biofuels and vegetable oils for biodiesel production

CN code and description	MFN bound tariff	*Ad valorem* equivalent (2004–2005 averages*)	Tariff rate quotas with reduced tariffs
Ethanol			
2207 10 00 *undenatured alcohol with an alcohol content of >80 percent*	€ 19.2/hl	63 percent	no
2207 20 00 *Denatured alcohol*	€ 10.2/hl	39 percent	no
Biodiesel			
3824 90 99 99 *Other*	6.5 percent		no
Vegetable oil for biodiesel production			
15071010 *crude soy oil for industrial use*	3.2 percent		no
1511 10 10 *crude palm oil for industrial use*	free		no
1512 11 10 *crude sunflower oil for industrial use*	3.2 percent		no
1514 11 10 *crude rape oil for industrial use*	3.2 percent		no

* *Ad valorem* equivalents (AVE) calculated based on import unit values from COMTRADE.

Sources: TARIC and COMTRADE databases.

Box 4.1: EU tariff lines for ethanol and biodiesel

The EU does not have specific tariff lines for fuel ethanol or biodiesel. The great majority of ethanol imports enter the EU market under the 2207 10 classification (undenatured alcohol with an alcohol content of >80 percent), while a small proportion of imports are brought in under 2207 20 (denatured alcohol). Both tariff lines apply to a large variety of alcohol imports. Biodiesel is imported under classification 3824 90 98 (other chemicals).

The absence of a specific classification for biofuels complicates the assessment of biofuel trade flows. It also provides the opportunity for biofuels to be imported under alternative tariff lines that face lower duties. Ethanol for blending was previously imported into Sweden under the "other chemicals" tariff line by mixing the ethanol with 20 percent gasoline (thus incurring a tariff of 6.5 percent rather than approximately 63 percent for pure ethanol). Until January 2006, ethanol imported in this way was eligible for tax exemption as a biofuel. The law was changed so that only ethanol entering under the higher duty could benefit from the tax break, but the loophole is still utilized when cheap imports and the lower duty compensate for the absence of the tax exemption (US Embassy in Stockholm, 2007).

The European Commission is expected by 2008 to split the "other chemicals" tariff line in order to create a new line dedicated to biodiesel. However, no similar measure is being considered for fuel-grade ethanol. Unlike biodiesel, ethanol has other end-uses (industrial, pharmaceutical, and beverage) besides as a fuel, and some customs experts claim that it would be too difficult to verify that ethanol imported for fuel was being used for that purpose.

Table 4.2 Preferential agreements providing duty free and quota free access to the EU ethanol market

Preferential agreements	Beneficiary countries
Cotonou Agreement ACP countries	Angola, Antigua and Barbuda, Bahamas, the Barbados, Belize, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Republic of the Congo, Cook Islands, Côte d'Ivoire, Cuba, Djibouti, Dominica, Dominican Republic, East Timor, Equatorial Guinea, Eritrea, Ethiopia, Fiji, Gabon, Gambia, the Ghana, Grenada, Guinea, Guinea-Bissau, Guyana, Haiti, Jamaica, Kenya, Kiribati, Lesotho, Liberia, Madagascar, Malawi, Mali, Marshall Islands, Mauritania, Mauritius, Federated States of Micronesia, Mozambique, Namibia, Nauru, Niger, Nigeria, Niue, Palau, Papua New Guinea, Rwanda, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Samoa, São Tomé and Principe, Senegal, Seychelles, Sierra Leone, Solomon Islands, Somalia, Sudan, Suriname, Swaziland, Tanzania, Togo, Tonga, Trinidad and Tobago, Tuvalu, Uganda, Vanuatu, Zambia and Zimbabwe
Everything but Arms Initiative LDCs	Afghanistan, Angola, Bangladesh, Burkina Faso, Burundi, Benin, Bhutan, Cambodia (Kampuchea), Cape Verde, Central African Republic, Chad, Comoros (excluding Mayotte), Democratic Repulic of the Congo, Djibouti, East Timor, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Laos, Lesotho, Liberia, Madagascar, Mali, Mauritania, Maldives, Malawi, Mozambique, Myanmar, Nepal, Niger, Rwanda, Samoa, São Tomé and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, Sudan, Tanzania, Togo, Tuvalu, Uganda, Vanuatu, Yemen and Zambia
GSP +	Bolivia, Colombia, Costa Rica, Ecuador, El Salvador, Georgia, Guatemala, Honduras, Mongolia, Panama, Peru, Sri Lanka and Venezuela
Western Balkan Countries	Albania, Bosnia and Herzegovina, Kosovo, Montenegro and Serbia
Bilateral agreements	Andorra, Croatia, Egypt, Jordan, Liechtenstein, San Marino, Switzerland and the former Yugoslav Republic of Macedonia,

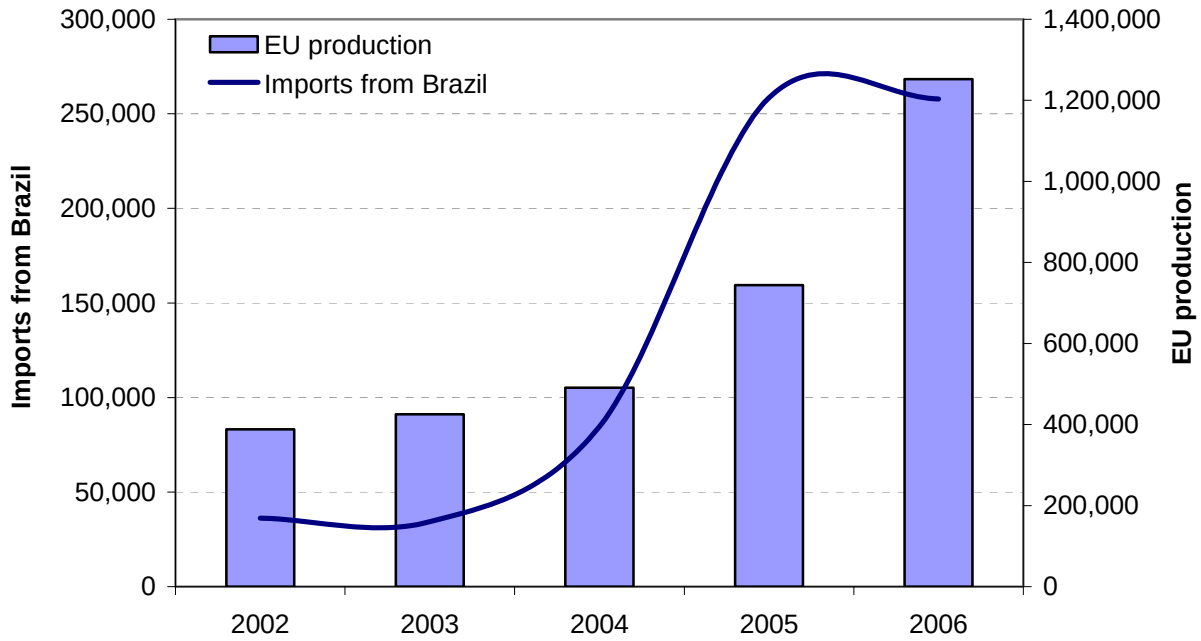
Source: TARIC database.

In 2005, the EU imported approximately 200,000 tonnes (21.7 percent of EU consumption). In 2006, import flows decreased slightly in absolute terms to 184,000 tonnes, but the share of imports in the EU consumption shrunk to 13.5 percent. Extra-EU ethanol was imported from Brazil by Sweden and the United Kingdom (eBIO 2006 and 2007). Figure 4.1 shows clearly that the surge of Brazilian exports is correlated with the boom of ethanol production and consumption in the EU. The revenues from tariffs on ethanol imports amounted to € 48.65 million in 2005 and € 44.76 million in 2006.

Although EU border protection for biodiesel is low, there are no significant import flows because the EU is by far the world's biggest producer. However, according to the European Biodiesel Board (EBB), the EU imported 400,000 tonnes of biodiesel (B99) from the United States in 2006. US biodiesel producers receive as much as € 0.20 (US$ 0.26) in subsidy per litre from the U.S. government and benefit from tax exemptions in some EU Member States. This allows U.S. biodiesel to be sold at the same price as EU producers have to pay for their raw materials (DTN Ethanol Center, May 2007). It has not been possible to calculate the tariff revenues from biodiesel imports since the duty is an *ad valorem* tariff that is applied on the monetary value of imports and such data are not available.

Fuel standards for biofuels, particularly for biodiesel, also provide an element of border protection. Two types of EU standards apply to biodiesel and may restrict its use. First, the European Diesel Standard EN590 limits the percentage of biodiesel that can be blended in diesel to 5 percent. Higher blends require separate pumps and labelling—a significant capital investment. Consumption of biodiesel is therefore constrained by this incorporation rate. However, the rate is likely to be reviewed shortly given it is in contradiction with Directive EC 2003/30, which sets an objective of 5.75 percent (6.5 percent by volume) for the year 2010.

Figure 4.1 Evolution of EU production and imports from Brazil of ethanol (in tonnes)



Note: Ethanol imports are for tariff lines 2207 20 and 2207 10, all the quantities are not necessarily intended for fuel use.

Sources: Data from COMEXT European Commission and eBIO, elaboration by the authors.

Second, in 2003 the Commission published guidelines to ensure the quality and performance of biodiesel (in compliance with the CEN Standardization, EN 14214). The guidelines restrict the iodine value of the biofuel to a maximum of 120 milligrams of I_2 per 100 grams. Soybean oil has a higher iodine value and therefore its use in the production of biodiesel in the EU is limited. This norm prevents significant imports of soybeans or soy oil from world's major producers such as Brazil and Argentina while ensuring profitable outlets for EU rapeseed producers. Another limitation is temperature. Palm oil has a high cloud point, which means that it is not suitable for use in cold weather, and the biodiesel industry in the EU has therefore been restraining its use. However, these characteristics can be overcome with technological advances (use of specific additives and winter grades as for mineral diesel now, for example).

4.1.1.2 Biofuels mandatory blend requirements

Directive EC 2003/30 stipulates that biofuels should constitute 5.75 percent of the fuels market of each Member State by the year 2010. However, this is a target rather than a legal obligation. Nine countries have decided to go beyond the EC Directive and have enacted mandatory requirements for the incorporation of biofuels. Some of them already apply the obligation to blend a percentage of biofuels with petroleum fuels, while others have passed legislation to do so in the coming years (Table 4.3).

Setting a fixed market share for a good usually puts an upward pressure on its price. The scale of the impact depends on factors, such as the extent to which the mandate increases consumption above what it might have been otherwise, the degree to which output of the good increases as prices rise, and whether competition from imports is allowed. Because the production costs of biofuels in the EU are much higher than those for fossil fuels, the obligation to incorporate biofuels should increase the price of fuels for consumers. Price rises can be offset if governments subsidize the industry (by providing excise tax exemptions, for example). This is often the case in EU Member States where biofuel blending is mandatory. Austria, Slovakia and Spain provide full tax exemption for biofuels, while the Netherlands, Slovenia and the United Kingdom offer a partial exemption. Tax exemptions for blended fuels have been removed in the other countries. In some cases, fuel prices may even decline if the effects of public support are fully passed on to consumers by the fuel industry.

At the present time, it is difficult to estimate the impact of biofuel mandatory blend requirements since Member States have established different obligations that are effective at different periods (Table 4.3) and there have been no studies measuring the impact that the mandatory blend requirements are having on prices. Whereas blending requirements diverge significantly across the varying phase in periods, the sample countries consistently show endpoint blending ratios of between 5 percent and 6 percent in 2010. While Germany is the only outlier, with a 6.7 percent quota in 2010, Spain is notable not only because it is the latest to schedule mandatory blending in 2009, but because is also second only to Germany in the ambition of its final blending requirement, the following year.

Table 4.3 Mandatory market shares or blending targets for biofuels in the EU (percent)

Member State	2006	2007	2008	2009	2010
Austria	2.5	2.5	4.3	5.75	5.75
Finland	-	-	2	4	5.75
Germany	-	diesel: 4.4	Diesel: minimum quota applies also to subsequent years		
		gasoline: 1.2	gasoline: 2	gasoline: 2.8	gasoline: 3.6
		-	-	total quota: 6.25	total quota: 6.75
Luxembourg	-	2	n.a.	n.a.	n.a.
Netherlands	-	2	progressive annual increase	progressive annual increase	5.75
Slovakia	2	2	2	2	5.75
Slovenia	1.2	2	3	4	5
Spain	-	-	-	3.4	5.83
United Kingdom	-	-	2.5	3.75	5

Sources: Biofuels Technology Platform for Luxembourg, *le betteravier français* for Spain, Member States Reports in the frame of Directive EC 2003/30, UFOP for Germany.

The French government has also established biofuel-incorporation objectives, which commenced in 2006.[51] While these are officially not mandatory, distributors are required to pay a special tax if they fail to comply (general tax on polluting activities, or TGAP), in addition to the regular excise tax applied on fuels. The tax is expensive and therefore the system has been effective in forcing oil companies to blend biofuels with petroleum fuels.

French support to the biofuels sector is complemented by the allocation of production quotas, so only operators approved by the government can benefit from partial tax exemption. The allocation of quotas (through public tender) is proportional to the incorporation objectives mentioned above. This combination of policy measures significantly reduces business risks for approved operators (who are also isolated from international competition), as the amount of production allocated through the public tenders corresponds to the quantities that fuel distributors must buy to avoid paying the TGAP.

[51] 2006: 1.75 percent, 2007: 3.5 percent, 2008: 5.75 percent, 2009: 6.25 percent and 2010: 7 percent.

4.1.1.3 Measuring market price support

There are several methods to estimate the value of market price support provided to a product. The support provided to ethanol has been calculated as the "price gap" between the EU ethanol prices and the Brazilian ethanol prices (taken as a reference for world prices), applied to the quantities produced in the EU.[52]

Table 4.4 shows that the price gap between the Brazilian and the EU prices is significant and market price support in the EU increased from € 184 million in 2005 to € 306 million in 2006.

Table 4.4 EU market price support for ethanol through border protection

	2005	2006
EU production of fuel ethanol (million litres)	930	1,565
EU ethanol imports for fuel use (million litres)	250	230
EU ethanol average price (€ /litre)	0.55	0.65
Brazilian ethanol average price (€ /litre)	0.27	0.38
Tansport and handling charges, Brazil to the EU (€ /litre)	0.08	0.08
Price gap (€ /litre)[1]	0.20	0.20
Market price support (€ millions)[2]	184	306

(1) Values do not equal exactly the difference of the numbers shown because of rounding.

(2) Values do not equal exactly the product of the numbers shown because of rounding.

Sources: • **Prices:** CEPEA/ESALQ, CGB, COMEXT; • **volumes:** eBIO; • **transport cost**: authors' estimates; • **market price support:** calculations by the authors.

Because the EU is the major biodiesel producer in the world, and because EU imports of biodiesel are very small and directly linked to the subsidy scheme available in the U.S., no international price reference can be identified. In addition, there are no studies available estimating the impact of biofuels mandatory blends that are currently in place in some EU Member States, on fuel costs and consumer prices. As a result, this study has been unable to quantify the market price support provided by EU countries to biodiesel.

4.1.2 Excise-Tax Exemptions

Exemption from fuel excise taxes is one of the main financial incentives used to support the production and consumption of biofuels in the EU. The possibility for Member States to exempt biofuels from these taxes, partially or totally, is embodied in the Directive EC 2003/96, commonly known as the energy taxation directive. Since tax concessions are considered as state aids, they must be notified to and authorized by the Commission. The majority of Member States have notified tax-exemption schemes and as of July 2007 the Commission had approved all the requests it had received so far. Exemptions are usually granted for a fixed period of six years, and can be renewed.

[52] The EU domestic prices were derived from the average import unit value for intra-EU trade. The results have been successfully compared to the data on EU ethanol prices released by the Confédération Générale des Planteurs de Betteraves (CGB) in 2007. The Brazilian prices are the ones published by the CEPEA/ESALQ Ethanol Index for the São Paulo State and they have been cross-checked with import unit values provided by COMEXT.

EU Member States have chosen different options regarding the taxation of biofuels. Some of them provide full or partial tax exemptions to all types of biofuels (blended or not), while others limit this benefit to specific types of biofuels such as pure biodiesel (B100) or E85. While some countries have opted for a production-quota system, where tax relief is only granted to the agreed amount of production from approved operators, other countries provide tax relief for an unlimited quantity of biofuels. Finally, some Member States have imposed mandatory supply objectives for biofuels and grant partial, full or simply no tax exemptions to all or some types of biofuels. The variety of schemes applied increases the complexity of analyzing the EU policy of support granted through tax relief. This difficulty is compounded by the frequent changes in Member States policies and policy settings.

4.1.2.1 Excise tax exemption on biofuels in the absence of production quotas

Excise tax exemptions for low blending of biofuels

In the EU, biofuels are commonly sold as blended in low proportions to fossil fuels (up to a maximum of 5 percent). In order to compensate for the high production costs of biofuels and to foster consumption, the majority of Member States—21 out of 25 countries[53]—currently grant a tax exemption (full or partial) for each litre of biofuel supplied on the market. Ten Member States provide full tax relief on biodiesel and nine on ethanol. Finland,[54] Germany, Greece and Luxembourg are the four countries that do not grant any exemption for low blending of biofuels. Italy offers partial tax exemption for biodiesel but no exemption on ethanol. Tables 4.5 and 4.6 detail the fuel and biofuel taxation system of all the EU Member States. The tax exemption, whether full or partial, is supposed to take into account changes in raw material prices, so as to avoid over-compensation for the additional costs of biofuels production. In practice, however, modifications in the tax exemption rates have been infrequent.

Normally, the rate of excise tax on blended fuels is reduced according to the proportion of biofuel included in the blend. Since biofuels are more expensive than petroleum fuels, the tax relief allows distributors to sell the blends at the same price as their petroleum-fuel counterparts. Because the Directive EC 2003/30 states that biofuels are required to represent a given percentage of the total share of fossil fuel and not a given percentage of each litre of fossil fuel supplied on the market, Member States have not in all cases met the objectives of the Directive by uniformly blending low concentrations of biofuels.

Excise tax exemptions for medium and high blending of biofuels and biofuels used in pure form

Besides the general blending of biofuels at low levels, medium and high blends (B30 or E85) and biofuels in pure form (B100) are sold in some countries. The commercialization of these types of biofuels requires the creation of a dedicated distribution system with special pumps, storage and sometimes the adaptation of car engines. For the most part, Member States apply tax exemptions to medium and high blends in the manner that they do to low blends—i.e. they provide tax exemptions to the biofuel content of the mixture. Germany stands out against this backdrop as a country that has not only already established a significant infrastructure for distributing B100, but provides tax exemptions only to high blends such as E85 and B100, while employing quotas to maintain production of low and medium biofuel blends. The uptake of high-blend ethanol fuels has been slow due to the lack of distribution infrastructure. Sweden has the most advanced infrastructure, aided in part by the government's promotion of vehicles that can run on high ethanol blends as well as standard petrol. Although both Germany and Austria offer tax exemptions for E85, Germany has only 30 stations distributing it and Austria has none. The strategy employed in France with respect to distribution of B30 as well as E85 is to rely mainly on captive fleets for demand, thus ostensibly reducing the need for dense as well as broad distribution networks to enable significant consumption. Public distribution of E85 was authorized in France starting January 2007. Currently, 13

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[53] Twenty-one countries grant tax exemptions on biodiesel and 20 countries grant tax exemptions on bioethanol. No information available for the two new member states, Bulgaria and Romania.

[54] During 2004, Finland reduced the tax on the bioethanol component in petroleum blends by 30 cents per litre. This tax exemption ended on 31 December 2004.

distributors have installed E85 pumps at approximately 110 filling stations. However, the distribution network should expand to 500 pumps by the end of the year 2007.

Austria allows the distribution of pure biodiesel (B100) and fully exempts it from excise tax. In 2005, 17,000 tonnes of B100 were consumed in the Austrian market. Biodiesel blended with diesel benefits also from full tax relief. Regarding ethanol, the Austrian law entails a special excise-tax reduction for E85, but this type of biofuel is not distributed yet in the country. In the **Czech Republic** a biodiesel blend, containing 31 percent RME by volume, is produced for the domestic market according to the national standard ČSN 656508 and to the European standard for fatty acid methyl ester, EN 14214. This product is distributed separately from conventional diesel at petrol stations. The excise tax on this blend is € 22.85 per hectolitre, compared with € 33.11 per hectolitre for regular diesel. In 2005, 10,223 tonnes of B31 were consumed in the country. The Czech Republic does not offer low biodiesel blends on its market.

France authorizes B30 to be sold only for use in captive fleets, such as buses, vehicles used by public authorities and company cars. Currently, users must have a dedicated distribution system. However, the French oil company Total has announced that it will install B30 pumps at a number of its commercial gas stations by the end of 2007. This blend will be called *Ecolium* and pumps will be accessible with a special card issued only to operators of captive fleets. The objective of this measure is to encourage firms and local authorities to invest in vehicles running with this biofuel. The reduced excise tax on the 30 percent of biofuels included in B30 is € 25 per hectolitre, a rate that is similar to the one applied on biodiesel used in low blends. The French vehicle's constructor, Peugeot, has recently announced that in 2008 it will launch a 4x4 capable of running on B30 that will be made available to the general public. The French government recently created a special taxation system for E85. The ethanol included in the blends is totally tax free, while the remaining 15 percent of gasoline benefits from a reduced excise duty (€ 33.43 per hectolitre, compared with € 60.69 per hectolitre for regular gasoline). The total excise tax on E85 paid by the consumer is thus only € 5.01 per hectolitre.

B100 has been sold in **Germany** since 1993. In 2005, 1.2 million tonnes of pure biodiesel were consumed, accounting for 66 percent of the biodiesel market. B100 is available at 1,900 filling stations and prior to 2007 benefited from a full tax exemption. However, Germany has adopted a quota system, effective 1 January 2007, which mandates a designated percentage of biofuels. With this new taxation system, only quantities of pure biofuels exceeding the quota are granted a tax rebate.[55] E85 still accounts for only a tiny share of the market and, in order to promote its use, the German government provides a full exemption on unlimited quantities of fuel. In the first quarter of 2007, E85 was available at 30 filling stations.

Sweden's first E85 filling stations were inaugurated in 1994, but for legal reasons private persons were not allowed to buy cars that ran on E85. In recent years, this prohibition has been removed and demand for this fuel has increased dramatically. As of June 2006, the country's 50,000 FFVs could refill their fuel tanks at 415 stations. The enthusiasm for these types of cars is clear: 40,000 new FFVs were sold in 2006, representing 18 percent of new vehicle registrations.[56] The country also hosts 370 buses that are powered by ethanol (E95). By 2005, 92 percent of the supplied quantity of petrol sold in Sweden was being blended with 5 percent ethanol.[57] Biodiesel is used in smaller quantities and its utilization is authorized in pure form or blended. All biofuels are fully exempted from excise duty.

E85 is also available in **Ireland** and in the **United Kingdom**, while B30 is distributed in **Italy**. In these three cases, the tax relief granted to these medium and high blends of biofuels follows the same conditions as the ones being applied to low blends of biofuels with fossil fuels. Effective January 2007, Luxembourg has made the incorporation of biofuels into transport fuels mandatory, and tax exemptions for biofuels blended with fossil fuels are no longer provided. However, pure biofuels remain fully exempt from excise taxes.

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[55] For more details, see State aid No N 579/06 – Germany, available at: http://ec.europa.eu/comm/competition/state_aid/register/ii/by_case_nr_n2006_0570.html#579

[56] *La filière bioéthanol: Etats des lieux et perspectives*, France Betteraves/Passion Céréales, 2007.

[57] Member State report under Directive EC 2003/30 for the reporting year 2005 – Sweden.

Table 4.5 Fuel excise tax exemption on biodiesel, countries without quota (€ /hl)

	Exemption on biodiesel 2005	Excise tax on diesel 2007	Exemption on biodiesel 2007	Period of the exemption	Granted for biodiesel from all origin
Austria	31.7	32.5	Full	Until 30.09.2011	Yes
Cyprus	No tax exemption	No information	Full	From 31.10.2006 until 31.12.2010	Yes
Czech Republic	31	33.11	Full	From 2004 until 2010	Yes
Denmark	3 (DKK 24.3)	35.49 (DKK 273)	Full	From 1.1.2005 for 6 years	No information
Estonia	24	No information	Full	Until 1.1.2010	Yes
Finland	No tax exemption	31.90	31.90		
Greece	No tax exemption	26	26		
Germany	47	47	Used as additive: no exemption any more but a quota obligation. Used as pure fuels: tax rebates for the amounts of biofuels exceeding the quota	Until 31.12.2011	Yes
Hungary	34	34	Full	From 01.01.2005 until 31.12.2010	Yes
Latvia	n.a.	23	Full	Until 2011	Yes
Lithuania	24.37	24.37	Full	Until 31.12.2010	Yes

	Exemption on biodiesel 2005	Excise tax on diesel 2007	Exemption on biodiesel 2007	Period of the exemption	Granted for biodiesel from all origin
Luxembourg	4.61	27.80	Pure biofuels only	No information	Yes
Malta	No information	No information	Yes	No information	No information
Netherlands	No tax exemption	37.49	30.5	2006	No information
Poland	No tax exemption	29.75 (PLN 119)	26 (PLN 104)	From 01.01.2007 until 30.04.2011	Yes
Slovakia	34.80 (SKK 1450)	34.80 (SKK 1450)	Full	From 01.05.2004	No information
Slovenia	n.a.	n.a.	Proportionate to the percent of biofuels added but may not exceed 25 percent of the excise duty paid.	n.a.	n.a.
Spain	26.98	26.98	Full	Until 2012	n.a.
Sweden	n.a.	39	Full	Until 31.12.2013	Yes
United Kingdom	32	68.06	28.90	Until 31.12.2007	Yes

Notes: (a) From 1.1.2007 to 31.12.2007: 7.1 € /hl

From 1.1.2008 to 31.12.2008: 13.4 € /hl

From 1.1.2009 to 31.12.2009: 19.7 € /hl

From 1.1.2010 to 31.12.2010: 26 € /hl

From 1.1.2011 to 31.12.2011: 32.3 € /hl

From 1.1.2012: 44.9 € /hl

Sources: IEA, MS reports for 2005, Notifications of state aid for each Member State (DG Competition), Pons (forthcoming), *USDA GAIN report PL7028*, elaboration by the authors.

Table 4.6 Fuel excise tax exemption for ethanol (€ /hl), countries without quota

	Exemption on ethanol 2005	Excise tax on gasoline 2007	Exemption on ethanol 2007	Period of exemption	Granted for biofuels from all origin
Austria	Unleaded: 43.2 Leaded: 50.4	Unleaded: 44.5 leaded: 51.7	full	from 1.10.2007 until 30.09.2011	yes
Cyprus	no tax exemption	n.a.	full	from 31.10.2006 until 31.12.2010	yes
Czech Republic	no tax exemption	41.44 CZK 1184	under consideration	-	-
Denmark	3 (DKK 22)	52.39 (DKK 403)	3 (DKK 22)	from 1.1.2005 for 6 years	n.a.
Estonia	28	n.a.	full	until 31.12.2010	yes
Finland	no tax exemption	58.80	no tax exemption		
Greece	no tax exemption	31.3	no tax exemption		
Germany	65.45	65.45	quantities to reach the mandatory blending: no tax exemption. E85: ethanol exempted from the excise tax	until 31.12.2009	yes
Hungary	41.40	41.40	full	from 01.01.2005 until 31.12.2010	yes
Latvia	n.a.	27	full	until 2011	
Lithuania	27.88	27.88	full	until 31.12.2010	yes
Luxembourg	7.85	44.20	no tax exemption	n.a.	n.a.

	Exemption on ethanol 2005	**Excise tax on gasoline 2007**	**Exemption on ethanol 2007**	**Period of exemption**	**Granted for biofuels from all origin**
	Exemption on ethanol 2005	Excise tax on gasoline 2007	Exemption on ethanol 2007	Period of exemption	Granted for biofuels from all origin
Malta	no tax exemption	n.a.	yes	n.a.	n.a.
Netherlands	no tax exemption	66.81	50.50	2006	n.a.
Poland	no tax exemption	39.12 (PLN 156.5)	39 (PLN 156)	01.01.2007 to 30.04.2011	yes
Slovakia	37.2 (SKK 1 550)	37.2 (SKK 1 550)	full	from 01.05.2004	n.a.
Slovenia	no tax exemption	n.a.	proportionate to the percent of biofuels added but may not exceed 25 percent of the excise duty paid.	n.a.	n.a.
Spain	37.17	37.17	full	until 2012	n.a.
Sweden	n.a.	53	full	until 31.12.2013	yes
United Kingdom	28.90	68.06	28.90	from 2005 for 6 years	yes

Sources: IEA, MS reports for 2005, Notifications of state aid for each Member State (DG Competition), Pons (forthcoming), *USDA GAIN report PL7028*, elaboration by the authors.

4.1.2.2 Excise-tax exemption for biofuels under a quota system

Although tax exemptions are generally granted for unlimited quantities of biofuels, some countries have established quota systems under which they allow only a limited quantity of biofuels to benefit from tax relief. The objectives of these systems are threefold: to limit the government revenue losses, to control the expansion of biofuels production, and to exclude imports from outside the EU. Five Member States have adopted this type of system: Belgium, France, Italy, Ireland and Portugal. The amount of the quotas and the tax exemptions applied by each of these countries are detailed in Table 4.9.

In 2006 **Belgium** decided to modify and to complement its legislation on biofuels. Production quotas were set and allocated through Europe-wide calls for tender. The quantities produced by approved operators benefit from a full tax exemption but must be used in low blends. The first call for tender was issued in July 2006 and referred to an annual supply of around 334,346 tonnes of biodiesel and 195,409 tonnes of ethanol. The fuels are to be delivered over the period from 1 November 2006 to 30 September 2013 for biodiesel and from 1 October 2007 to 30 September 2013 for ethanol. The quantities and the list of approved firms are presented in Table 4.7. It is noteworthy that the operators that won the tender are all located in Belgium, but several of them belong to multinational companies (Tate & Lyle, Sudzücker BioWanze) that operate biofuels plants in other countries besides Belgium.

Table 4.7 Approved operators benefiting from full tax exemption in Belgium (tonnes)

Biodiesel	Localization	Total quantities 1 Nov 200 to 30 Sept. 2007	Total quantities 1 Oct. 2007 to 30 Sept. 2013	Annual quantities 1 Oct. 2007 to 30 Sept. 2013
Bioro	Gand	-	870,158	145,026
Neochim	Feluy	110,035	571,831	95,305
Oleon	Ertvelde	63,380	338,028	56,338
Proviron	Ostende	42,535	226,056	37,676
Flanders Bio Fuel	Gistel	35,810	-	-
Total quota		**251,761**	**2,006,074**	**334,346**
Bio-ethanol			**Total quantities 1 Oct. 2007 to 30 Sept. 2013**	**Annual quantities 1 Oct. 2007 to 30 Sept. 2013**
Biowanze	Wanze		591,949	98,658
AlcoBiofuel	Gand		428,966	71,494
Tate&Lyle	Alost		151,539	25,257
Total quota			**1,172,455**	**195,409**

Source: *Etat des lieux des biocarburants en Belgique et proposition de ValBiom*, June 2007. Conversions from m^3 to tonnes by the authors.

In **France,** the production quotas are based on the quantities necessary to reach the annual objectives set by the government for the incorporation of biofuels in the national fuel market. Approved biodiesel quantities increased from 417,000 tonnes for the year 2005 to 1,342,505 tonnes in 2007 (Table 4.8). The quantities within the quotas benefit from a partial tax exemption of € 25 per hectolitre. For ethanol, including ethanol used in ETBE, the quantities are lower (207,003 tonnes in 2005 and 561,795 tonnes in 2007). Both fuels benefit from a tax exemption equivalent to € 33 per hectolitre. Production quotas are attributed through calls for tender published in the *Official Journal of the European Union*. All the operators producing in the EU can participate in the tenders and the quantities attributed to each firm are valid for six years. Twenty-seven operators have been approved for the production of biodiesel. Some of the quotas

have been attributed to operators located in Belgium (two firms), Germany (six firms), Italy (two firms) and Spain (one firm). Regarding ethanol, four operators have been authorized to produce ETBE and 20 have received quotas for the production of pure ethanol. In France's case, no firm located outside of the country was approved. Unfortunately, the French government refuses to communicate the amount of the quotas granted to each of the operators. Operators that do not hold production quotas and operators producing in excess of the quotas allocated must pay the excise duty applying to fossil fuels when sold in the French market.

Table 4.8 Annual quota benefiting from tax exemption in France

Tonnes	2005	2006	2007	2008	2009	2010
Biodiesel	417,502	677,502	1,342,503	2,477,503	2,727,503	3,177,503
ETBE	134,587	169,858	224,648	224,648	224,648	224,648
Ethanol	72,416	137,147	337,147	717,147	867,147	867,147

Source: French Ministry of Agriculture.

The other countries applying a quota system grant a partial tax exemption on approved quantities. The exceptions are Ireland, which provides full tax relief, and Italy, which does not (yet) give any exemption to ethanol.

4.1.2.3 Biofuels obligation

Up to now, excise tax exemption has been the major incentive used to support biofuels. However, in recent years, nine countries[58] have set mandatory blending requirements in order to ensure that a certain percentage of biofuels is supplied on the market. Directive EC 2003/30 did not mandate the supply of biofuels but only set an indicative target of 5.75 percent for 2010. However, the future directive on biofuels, expected by the end of 2007, might transform this indicative target into a mandatory requirement of 10 percent by 2020. The list of Member States where biofuels supply is mandatory and the mandatory targets are provided in Table 4.3 (Section 4.1.1.2). While the majority of countries consider that the supply requirement does not provide enough support to the sector, and couple this obligation with partial or full excise-tax exemptions, two Member States, Germany and Luxembourg, have recently decided to abolish tax privileges for some biofuels.

Biofuels obligations coupled with excise tax exemptions

Most Member States combine tax exemptions and simple blending requirements with scheduled increases over time. In some cases, however, policies are designed to create more sophisticated incentives. In the United Kingdom, for example, petroleum distributors are offered the option of paying a pre-set amount if they choose not to meet the blending requirements. In the case of France, oil producers are required to pay a pollution tax-penalty if they fail to supply the market with pre-specified quantities of biofuels.

Austria was one of the first countries to create a regulation making it obligatory to blend a biofuel with a petroleum fuel. Since 1 October 2005 there has been a substitution requirement for primary suppliers of petrol and diesel fuels. Suppliers subject to mineral oil tax in Austria must include 2.5 percent biofuels or other renewable fuels in their petrol and diesel, calculated on the basis of total energy content of their

[58] Lithuania approved regulations that set forth mandatory requirements for mixing oil products that are marketed and used in the country with biofuels, but in the absence of detailed information on this scheme we have decided to exclude it from our analysis.

marketed transport fuels each year. In the future, this proportion must increase to 4.3 percent on 1 October 2007 and to 5.75 percent on 1 October 2008.[59]

In 2006, a law was proposed and submitted by the Government of **Finland** to their Parliament, setting out a minimum percentage of biofuels to be supplied for consumption annually by the distributors of transport fuels. The level of obligation is scheduled to increase from 2 percent on 1 January 2008 to 4 percent in 2009 and 5.75 percent in 2010.

[59] Member States report under Directive 2003/30/EC for the reporting year 2004 – Austria.

Table 4.9 Fuel excise-tax exemption for countries with production quotas (€ /hl)

	Exemption on biofuels 2005	Quota (tonnes) 2005	Excise tax on fossil fuels 2007	Exemption on biofuels 2007	Period of the exemption	Quota (tonnes) 2007	Final excise tax pure biofuel 2007	Final excise tax blended biofuels 2007
BIODIESEL								
Belgium	No tax exemption	no	16.31	Full	6 years	257,760 (a)	0	15.41 for 2.45 percent
France	33	417,502	42.84	25	6 years	1,342,503	17.84	-
Italy	38.2	300,000	41.3	38.20	until 30.06.2010	200,000	3.1	-
Ireland	36.80	880	36.80	full	2006–2010	52 816	0	-
Portugal	n.a.	n.a.	33.90	Yes	n.a.	n.a.	n.a.	-
ETHANOL								
Belgium	No tax exemption	no	35.30	full	6 years	37,884 (b)	0	31.15 for 7 percent
France	38 (ethanol for ETBE)	134,587 (ethanol for ETBE)	60.69	33 (ethanol for ETBE)	6 years	ETBE: 224,648	17.84	59.03 for 5 percent
	37 (direct ethanol)	72,416	33.43 (for E85)	33		ethanol: 337,147	0.43	4.52 for 85 percent
Italy	No tax exemption	no	56.40	No tax exemption				
Ireland	44.30	789	44.27	full	2006–2010	67,087	0	-
Portugal	n.a.	n.a.	55.80	yes	n.a.	n.a.	n.a.	n.a.

Notes: (a) from 1January 2006 until 30 September 2007; (b): 48,000, 000 from 1 December 2007 until 31 December 2007.

Sources: IEA, Member State reports for the reporting year 2005, Notifications of state aid for each member state (DG Competition), Pons (forthcoming).

In the **Netherlands**, as of 1 January 2007, all suppliers of petrol and diesel for transport purposes must ensure that biofuels make up 2 percent (by energy) of the total fuels placed on the Dutch market. This percentage is to be increased gradually to 5.75 percent by 2010.[60]

Under the Government regulation No 246/2006 Coll., **Slovakia** introduced a requirement for producers and vendors to offer in petrol and diesel fuels for transports purposes minimum amounts of biofuels. The level of obligation is fixed at 2 percent by the end of 2006 and 5.75 percent by the end of 2010.

The **United Kingdom** announced the introduction of the Renewable Transport Fuel Obligation (RTFO) in November 2005, stating that, together with fuel duty incentives, it will be the country's primary mechanism to deliver the objectives set forth in the Biofuels Directive. The Budget 2006 of the United Kingdom set out the levels of obligation (i.e. the percentages of vehicle fuels that must come from biofuels, on a volume basis): 2.5 percent in fiscal year 2008–2009, 3.75 percent in fiscal year 2009–2010 and 5 percent in fiscal year 2010–2011. The so-called buy-out price, the price for each litre of fuel that oil companies must pay if they do not meet their obligation by delivering enough biofuels, is set at € 21.7 (15 pence) per litre in the first year covered by the obligation. With a tax concession of € 0.289 per litre (20 pence per litre), this makes for a combined total support for biofuels of € 0.506 per litre (35 pence per litre) in the first year covered by the obligation.

As mentioned in section 4.1.1.2, the situation in **France** is quite particular. Although French legislation does not make reference explicitly to a mandatory blending, the TGAP introduced in the Finance Law for 2005 has an effect similar to that of a mandatory blending requirement. Indeed, the TGAP must be paid by oil suppliers if they do not supply on the market the required quantities of biofuels established by the government (this tax equals the difference between the expected quantities and the current quantities supplied).

Biofuels obligation in the absence of an excise tax exemption

The two countries that do not provide tax exemptions for some biofuels apply very different strategies. Whereas Luxembourg simply establishes a cost-prohibitive fine for operators that do not meet the blending requirement, Germany applies a hybrid quota and tax exemption system designed to reduce budgetary losses created by the previous policy of blanket tax exemptions for biofuels.

Luxembourg introduced a mandatory blending of 2 percent as from 1 January 2007. In case of non-compliance with this target, a tax must be paid. The amount of the tax is equal to € 120 per hectolitre that the oil retail companies failed to supply.

Germany introduced biofuel obligations as of 1 January 2007. Separate requirements for diesel and petrol apply during the first years of implementation and will be replaced by a common requirement in 2009, which increases gradually until 2015, as shown in Table 4.10. Germany previously granted full tax exemptions for biofuels but the adoption of the quota system has been associated with the full taxation of biofuels required to fill the quotas (pure biofuels and biofuels used in blending). The objective of the German government was to alleviate the budgetary pressure exerted by the tax relief granted to biofuels. The supply obligation represented a shift from financial support toward minimum guaranteed sales (so minimizing the risk of investment) through mandatory biofuels supply. Biofuels sold in excess of the quota, as well as E85, will still benefit from tax relief.

According to some analyst reports in the press,[61] biodiesel sales in Germany fell dramatically during the first half of 2007 after the government changed policies and began taxing biofuels. Sales at filling stations reportedly collapsed, with reductions in sales of up to 35 percent occurring due to price increases making the fuel less attractive to consumers. High fossil fuel prices cushioned the effect of the new tax, but if fossil-fuel prices fall then drivers will have no special incentive to buy biodiesel. Moreover, the prices of feedstock oilseeds have risen. As a result, German production facilities are not running at their full capacity, production is being cut steadily since 2005, and the first biodiesel refinery in the country,

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[60] Ministry of Housing, Spatial Planning and the Environment, March 2006.

[61] "EU biodiesel firms blame politicians as demand falls", *International Herald Tribune* , 22 March 2007.

BioWerk Kleisthohe, has actually stopped production at its 6,500-tonnes-a-year plant. Biodiesel producers and distributors went to court to denounce the new taxation system on the basis it was introduced after they had entered the business on the premise that it would remain tax free. But the Constitutional Court ruled in favour of the German government and confirmed that the new taxation system is absolutely legal.[62]

Table 4.10 German biofuel obligations

Fuel	Year (as of)	Obligation, based on energy content (percent)
diesel fuels	2007	4.4
petrol fuels	2007	1.2
	2008	2.0
	2009	2.8
	2010	3.6
diesel and petrol fuels	2009	6.25
	2010	6.75
	2011	7.0
	2012	7.25
	2013	7.5
	2014	7.75
	2015	8.0

Source: www.adac.de.

Finally, some Member States, such as Austria, Belgium, Estonia and Ireland, provide full tax exemptions on pure vegetable oils used as fuel. France and Germany, as well as some other countries, apply no excise duty and no quota restriction on pure vegetable oil used for agricultural or forestry machines.

4.1.2.4 Assessing the cost of excise-tax exemptions

Financial support through tax relief is the main instrument of support provided by the majority of EU Member States to the biofuels sector. However, these fiscal measures represent significant losses for governments. In addition, as the targets of supply increase to reach 5.75 percent in 2010, the budgetary burden is becoming more and more expensive for national authorities. As previously discussed, some countries, such as Germany and Luxembourg, have decided that they cannot bear this cost any longer.

Calculating the cost of the tax exemptions provided in the EU would provide a global picture of the real cost of the support policy to biofuels and could contribute to the current debate on the economic interest of biofuels. The fiscal cost of tax relief has been calculated for 2005 and 2006 based on the quantity of biofuels consumed and the level of exemption. Final results are expressed in Tables 4.11 and 4.12.

Between 2005 and 2006, the consumption of biofuels in the EU increased by 78 percent. Total sales of biodiesel reached 4.27 million tonnes (4.8 billion litres) while ethanol consumption rose to 1.3 million tonnes (1.7 billon litres). As a result, total revenue losses for Member States amounted to € 2.9 billion[63] according to our estimates for 2006 (Table 4.12). Although **Germany** changed its tax exemption system starting 1 August 2006, introducing an excise tax equivalent to € 15 per hectolitre on blended biodiesel and

[62] Article from Ends *Europe* Daily, published on 2 August 2007. Available at: http://www.endseuropedaily.com/21465.

[63] This amount is probably underestimated due to missing information on excise tax exemption in some countries where biofuels are reported to be consumed.

to € 9 per hectolitre on pure vegetable oil, the fiscal cost to the German government remained very expensive (€ 1.97 billion).

Though far behind Germany, **France** nevertheless spent more than € 334 million to support biofuels production, principally biodiesel (€ 221 million). **Sweden** ranks third with a total cost around € 201 million dedicated mainly to ethanol production, and it is followed by **Austria** with € 113 million spent to support biodiesel. **Spain, Italy** and the **United Kingdom** spend between € 105 and € 73 million. The revenue losses range between € 20 and € 10 million in the **Netherlands, Poland and Lithuania.** Less than € 10 million was spent in the **Hungary**, the **Czech Republic, Denmark**, **Ireland**, and **Luxembourg**. Revenue losses generated by tax exemptions increased in all the European countries, except in Luxembourg. Member States support provided through tax relief increased by € 1.17 billion between 2005 and 2006 while the share of biofuels in the total consumption of fuels devoted to transport only increased from 1 percent to 1.8 percent over the same period.

Table 4.11 Estimated cost of excise tax exemption in EU-25 (2005)

	ETHANOL			BIODIESEL			PURE PLANT OIL			
	Quantities (litres)	Exemption (€ /l)	Loss of fiscal revenues (€)	Quantities (litres)	Exemption (€ /l)	Loss of fiscal revenues (€)	Quantities (litres)	Exemption (€ /l)	Loss of fiscal revenues (€)	TOTAL COST
Austria	0	0.43	0	99,867,022	0.32	31,957,447	0	no exemption	0	**31,957,447**
Belgium	0	no exemption	0	0	0	0	0	no exemption	0	**0**
Cyprus	0	no exemption	0	0	0	0	0	no exemption	0	**0**
Czech Republic	0	no exemption	0	3,534,222	0.31	1,095,609	0	no exemption	0	**1,095,609**
Denmark	0	0.03	0	0	0.03	0	0	no exemption	0	**0**
Estonia	0	0.28	0	0	0.25	0	n.a.	0.25	n.a.	**n.a.**
Finland	0	no exemption	0	0	no exemption	0	0	no exemption	0	**0**
France	148,278,594	0.38	56,345,866	434,456,889	0.33	143,370,773	0	no exemption	0	**199,716,639**
Germany	286,342,000	0.65	186,122,300	1,953,920,000	0.47	918,342,400	218,994,293	0.47	102,927,318	**1,207,392,018**
Greece	0	no exemption	0	3,426,933	no exemption	0	0	no exemption	0	**0**
Hungary	4,763,128	0.41	1,952,883	0	0.34	0	0	no exemption	0	**1,952,883**
Ireland	17,817	0.44	7,840	934,044	0.37	345,596	397,600	0.36	143,136	**496,572**
Italy	10,038,995	no exemption	0	217,102,222	0.38	82,498,844	0	no exemption	0	**82,498,844**
Latvia	892,839	n.a.	n.a.	3,136,622	n.a.	0	n.a.	full	n.a.	**n.a.**
Lithuania	1,781,719	0.28	498,881	9,466,667	0.24	2,272,000	0	no exemption	0	**2,770,881**
Luxembourg	0	0.078	0	716,942	0.046	32,979	0	no exemption	0	**32,979**
Malta	0	no exemption	0	886,080	n.a.	0	0	no exemption	0	**0**
Netherlands	0	no	0	0	no	0	2,524,444	0.37	934,044	**934,044**

	ETHANOL			BIODIESEL			PURE PLANT OIL			
	Quantities (litres)	**Exemption (€ /l)**	**Loss of fiscal revenues (€)**	**Quantities (litres)**	**Exemption (€ /l)**	**Loss of fiscal revenues (€)**	**Quantities (litres)**	**Exemption (€ /l)**	**Loss of fiscal revenues (€)**	**TOTAL COST**
		exemption			exemption					
Poland	56,029,116	no exemption	0	16,490,933	no exemption	0	0	no exemption	0	**0**
Portugal	0	n.a.	n.a.	176,711	n.a.	n.a.	0	n.a.	n.a.	**n.a.**
Slovakia	0	0.37	0	11,940,622	0.35	0	0	no exemption	0	**0**
Slovenia	0	no exemption	0	6,248,000	n.a.	n.a.	n.a.	no exemption	0	**n.a.**
Spain	223,625,500	0.37	82,741,435	29,275,982	0.27	7,904,515	0	no exemption	0	**90,645,950**
Sweden	286,082,661	0.55	156,086,700	10,559,751	0.37	3,891,268	0	no exemption	0	**159,977,968**
United Kingdom	85,401,739	0.28	23,912,487	31,666,631	0.32	10,133,322	0	no exemption	0	**34,045,809**
TOTAL	**1,103,254,108**	**,**	**507,668,391**	**2,833,806,276**	**,**	**1,201,844,755**	**219,580,000**	**,**	**104,004,498**	**1,813,517,644**

Sources: Biofuels Barometer 2007, Member State reports under Directive EC 2003/30 for the reporting year 2005, Notification of State Aid to the European Commission, calculations by the authors.

Table 4.12 Estimated cost of excise tax exemption in EU-25 (2006)

	ETHANOL			BIODIESEL			PURE PLANT OIL			
	Quantities (litres)	Exemption (€ /l)	Loss of fiscal revenues (€)	Quantities (litres)	Exemption (€ /l)	Loss of fiscal revenues (€)	Quantities (litres)	Exemption (€ /l)	Loss of fiscal revenues (€)	TOTAL COST
Austria	0	0.43	0	347,363,556	0.33	112,893,156	0	0.33		**112,893,156**
Belgium	n.a.	0.59	0	n.a.	0.37	n.a.	n.a.	0.37		**n.a.**
Cyprus	n.a.	n.a.	0	n.a.	n.a.	n.a.	n.a.	n.a.		**n.a.**
Czech Republic	2,375,625	no exemption	0	22,593,778	0.33	7,480,800	0	no exemption		**7,480,800**
Denmark	0	0.03	0	4,455,644	0.35	1,581,308	0	n.a.		**1,581,308**
Estonia	n.a.	0.28	n.a.	n.a.	0.25	n.a.	n.a.	0.25		**n.a.**
Finland	1,520,400	no exemption	0	n.a.	no exemption	0	0	no exemption		**0**
France	297,349,063	0.38	112,992,644	671,249,778	0.33	221,512,427	0	0.25		**334,505,070**
Germany	608,160,000	0.65	395,304,000	3,039,431,111	0.47–0.32	1,238,568,178	793,296,569	0.47–0.38	343,100,766	**1,976,972,944**
Greece	0	no exemption	0	87,838,044	no exemption	0	0	no exemption		**0**
Hungary	21,265,803	0.41	8,718,979	0	0.34	0	0	no exemption		**8,718,979**
Ireland	1,290,756	0.44	567,933	865,884	0.37	320,377	1,662,347	0.37	611,744	**1,500,054**
Italy	0	no exemption	0	223,413,333	0.41	92,269,707	0	no exemption		**92,269,707**
Latvia	n.a.	0.27	n.a.	n.a.	0.23	n.a.	n.a.	full		**n.a.**
Lithuania	16,799,628	0.28	4,703,896	22,846,222	0.24	5,567,624	0	no exemption		**10,271,520**
Luxembourg	0	0.08	0	679,076	0.05	31,237	0	n.a.		**31,237**
Malta	0	n.a.	0	994,631	n.a.	n.a.	0	n.a.		**n.a.**
Netherlands	40,544,000	0.50	20,272,000	n.a.	0.31	n.a.	n.a.	0.37	n.a.	**20,272,000**

	ETHANOL			BIODIESEL			PURE PLANT OIL			
	Quantities (litres)	**Exemption (€ /l)**	**Loss of fiscal revenues (€)**	**Quantities (litres)**	**Exemption (€ /l)**	**Loss of fiscal revenues (€)**	**Quantities (litres)**	**Exemption (€ /l)**	**Loss of fiscal revenues (€)**	**TOTAL COST**
Poland	104,028,619	0.37	0	53,288,498	0.25	13,215,547	0	full		**13,215,547**
Portugal	0	n.a.	0	73,587,556	n.a.	n.a.	0	n.a.		**n.a.**
Slovakia	n.a.	0.37	n.a.	n.a.	0.35	n.a.	n.a.	n.a.		**n.a.**
Slovenia	0	n.a.	0	3,612,480	n.a.	n.a.	0	full		**n.a.**
Spain	226,717,772	0.37	83,885,576	79,405,138	0.27	21,423,506	0	n.a.		**105,309,082**
Sweden	322,538,606	0.55	175,977,064	64,763,360	0.39	25,257,710	0	n.a.		**201,234,774**
United Kingdom	95,448,653	0.28	26,725,623	162,171,573	0.29	46,867,585	0	n.a.		**73,593,208**
TOTAL	**1,738,038,925**		**829,147,714**	**4,858,559,662**		**1,786,989,162**	**794,958,916**		**343,712,510**	**2,959,849,386**

Sources: Biofuels Barometer 2007, Member State reports under Directive EC 2003/30 for the reporting year 2005, Notification of State Aid to the European Commission, calculations by the authors.

4.1.3 Output payments

4.1.3.1 Distillation measures

One of the ways that production of ethanol in the EU is supported is through the distillation of wine surpluses. The 1999 reform of the Common Market Organization (CMO) for wine introduced a voluntary scheme of wine distillation called "crisis distillation", the objectives of which are to eliminate specific pockets of surplus and to guarantee the continuity of supply from one vintage to another. This type of distillation has existed for a long time in the CMO, but since the 1999 reform two substantial amendments have been introduced: *(i)* its application is subject to acceptance of the Member State's request but is voluntary on the part of producers and may be restricted to certain categories of wine or certain production areas; and *(ii)* it may affect not only table wines, but also quality wines - but only at the request of the Member State concerned. One of the criteria for introducing the measure is a demonstrable deterioration, over time, in the market price for a specific category of wine or for wine from certain production areas.

Alcohol resulting from a crisis distillation must be disposed of outside the potable alcohol market, generally either for **new industrial uses** (e.g., the heating of glasshouses, the drying of feedstuffs, the fuelling of heating systems), for **fuel in countries outside the EU**[64] or **as a fuel within the EU**. This last outlet was created in order to stimulate the development of biofuel projects in Europe. At the outset, alcohol was disposed of via a system of public sales, in which only a very limited number of approved undertakings could participate. Those limited competitive conditions resulted in rather modest selling prices. More recently, following the rapid growth of the biofuels sector supported by the Community initiative on biofuels and the sharp rise in oil prices, traders' interest in and demand for wine alcohol have increased considerably. In order to take this into account, as well as to insure fair competition, the public sales system was replaced with a tendering procedure in 2005 (European Commission Working paper on Wine CMO, 2006).

Crisis distillation costs included around € 13 per hectolitre of wine for aid to distillers, and storage and disposal costs of around € 11 per hectolitre of wine (Table 4.13). In 2005, some 7.8 million hectolitres of wine were removed through the crisis-distillation mechanism, at a total cost to the EU of € 185 million. A little bit less than 30 percent of these quantities were intended for use as fuel ethanol in the Community, for an approximate cost of € 51 million. In 2006 the share of alcohol dedicated to fuel ethanol reached 50 percent and the associated cost amounted to around € 80 million.

Table 4.13 Quantities and cost of crisis-distillation measures under the current CMO for wine

Item	Unit	2005	2006
Total quantities produced under crisis distillation	hectolitres	7,482,000	6,785,000
Estimated cost	€	185,075,000	158,720,536
Quantities for use as fuel ethanol in the Community	hectolitres	2,067,948	3,423,608
Estimated cost	€	51,140,354	80,078,191

Sources: EC regulations opening crisis distillation for several EU Member States, *European Commission Working paper on Wine CMO* (February 2006) and authors' calculations.

Support provided through distillation measures is likely to be abolished in the proposals for CMO for wine reform that the Commission is expected to release in 2007. Commissioner for Agriculture and Rural Development, Mariann Fischer Boel, has already expressed her concern about the regularity of crisis

[64] This utilization is discontinued since 2003.

distillation, noting that Europe is producing too much wine for which there is no market. She has proposed to eliminate aid for distillation and private storage.

4.1.3.2 National support to output

Policy instruments applied at the national level have been provided mainly by newer Member States. This support has taken various forms. Governments such as the Czech Republic apply subsidies based on the volume of output, whereas Latvia bases its subsidies on historical levels of output.

In 1999, the **Czech Republic** made available a subsidy of € 0.41 (CZK 15) per litre for the pilot production project of ETBE at an MTBE production plant in Kralupy nad Vltavou.[65] In 2000 the government provided a subsidy of € 0.10 (CZK 3.50) per litre for fermented, dewatered alcohol. From 2004 to 2006 the Commission authorized the Czech Republic to grant a direct non-reimbursable subsidy of € 257 per 1000 litres (€ 292 per tonne) of RME to producers located in the Czech Republic, subject to a cap of 113.6 million litres (100,000 tonnes). This scheme was revised in 2005 (State Aid N223/05) when the Commission authorized a non-reimbursable grant of € 232.90 per tonne of RME. The eligible quantities for the subsidy (125,000 tonnes instead of 100,000 tonnes) were modified most recently in 2006.

In **Latvia**, aid is granted directly to biofuel producers according to their annual quota allocated in proportion to their production capacities. The total quota of direct aid is calculated according to the amount of biofuel necessary to comply with Directive 2003/30/EC. A figure for financial support is allocated to businesses until 2011 and cannot be reduced. The rate of support amounts to € 96.6 per 1000 litres (LVL 140) of ethanol and € 117.3 per 1000 litres (LVL 170) of biodiesel. The ethanol quota for 2005 was 11,392,000 litres and was granted in full to the SIA "Jaunpagasts Plus" company, while the quota for biodiesel was equivalent to 12,500,000 litres. However, the quota was not fulfilled, as only 3,000,000 litres were produced by the SIA "Delta Rīga" company. Calculations carried out as part of this study show direct support amounted to € 1.0 million for ethanol and € 351,900 for biodiesel.[66]

In **Lithuania**, grain ethanol producers receive € 30.28 (LTL 114) per tonne of ethanol produced while biodiesel producers receive € 42.24 (LTL 160) based on raw input.[67]

In September 2007, **Poland's** President approved an amendment that, subject to European Commission approval, would provide a new income-tax concession for biofuel producers. Under the amendment, biofuel producers would be able to subtract 19 percent of the difference between their production costs and the costs that would be incurred to manufacture fuels with similar characteristics. The measure will cover income gained from the beginning of 2007 and will remain in force until 2014. According to estimates reported by *FO Licht's World Ethanol & Biofuels Report* (24 September 2007), the amendment will reduce state tax revenues for 2007 by PZL 120 million (€ 31 milllion) and 2008 revenue by as much as PZL 240 million (€ 63 million).

4.2 Assistance to value-adding factors

Two types of aid are available for the specific production of energy crops: non-food crops produced on set-aside land and energy crops. The two regimes are run in parallel and both support the development of energy crops. Farmers may opt for one or the other regime depending on their specific situation. The aid for energy crops, however, cannot be granted for farmland subject to compulsory set-aside zoning, but farmers producing raw materials for energy purposes on set-aside land covered by the non-food set-aside scheme are entitled to receive the set-aside payment.

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[65] Member State Report under Directive EC 2003/30 for the reporting year 2004 – Czech Republic.

[66] However, the amount of direct aid reported by the Latvian government in its Member State report under Directive EC 2003/30 for the reporting year 2005 differs substantially from calculations generated during the preparation of this report. Amounts reported are €247,696 (LVL 358 980.84) for ethanol and €139,223 (LVL 201 773.36) for biodiesel.

[67] Gain Report LH7001.

4.2.1 Payments for energy crops grown on set-aside land

Three imperatives motivated the 1992 CAP reform: the need to reduce agricultural surpluses, the incentive for producers to be competitive on the world market, and the need to reduce budgetary outlays. The reform focused mainly on the cereal and the oilseeds sectors, reducing administrated prices and compensating for this decrease through compensatory payments granted per hectare. The 1992 reform also introduced the obligation for cereals and oilseeds producers to set aside a proportion of their land as a condition for receiving support payments. Set-aside is the term that refers to the removal of farmland from market production, usually with the overall aim of reducing the production of arable crops, particularly cereals. Farmers must set aside a fixed share of their farmland (compulsory set-aside) but they can also remove from production more areas than required by the reform (voluntary set-aside). In the latter case, they will also receive a payment up to a limit. Since 1993, it has been possible to cultivate on set-aside land for industrial and energy purposes, i.e. non-food crops. The available set-aside area has varied over time and is currently around 10 percent of total EU farmland. Farmers are compensated for setting aside land and can be considered as indirect support to the production of energy crops, crops used in the production of some form of energy. In 2006, the Commission reported that the regime has been, in practice, a significant measure favouring the development of energy crops. More than 95 percent of non-food crops grown in set-aside areas were indeed dedicated to energy crops.[68]

Over the last decade, the amount of arable land under the compulsory set-aside scheme has averaged 4 million hectares. Because of EU enlargement and the progressive application of CAP to new Member States, it is expected to increase to 5 million by 2010 and to 5.5 million hectares by 2013. In 2005, around 800,000 hectares of set-aside land were dedicated to the production of non-food oilseeds for biodiesel and around 100,000 hectares were used for other energy crops.[69] Although set-aside areas offer a significant reserve of land that could be used to cultivate biofuel crops (around 2.9 million hectares are not used for any type of cash crop), some restrictions limit its utilization. First, some land cannot be cultivated due to the nature of the soil or the slope of the ground. In addition, depending on the location of the set-aside areas, agronomic conditions may not be suitable for the cultivation of some energy crops. Finally, oilseed production on set-aside land can only increase marginally, because of the limitations set by the Blair House Agreement (Box 4.2).[70]

Box 4.2 The Blair House Agreement and oilseed production in the EU

The 1992 Memorandum of Understanding on Oilseeds between the European Economic Community and the United States, known more commonly as the Blair House Agreement (BHA), places a limit on the total area that can be planted in oilseeds for food production purposes and on the output from the processing of oilseeds planted on set-aside land for industrial purposes, up to a maximum of 1 million tonnes of soybean meal equivalent annually.

EU oilseed plantings for food purposes are limited to 5,428 million hectares in the EU-15, as reduced by arable crop land designated as being set-aside (which has ranged between 5 percent and 10 percent in recent years). The Commission reports that, in 2004, 6.3 million hectares of oilseeds were planted in the EU—4.5 million hectares in the EU-15 and 1.8 million hectares in the 10 new Member States. The BHA also limits the production of oilseeds planted on set-aside land for non-food (industrial) uses to 1 million tonnes of soybean meal equivalent annually. In recent years, the area planted with oilseeds for non-food uses has varied between 540,000 and 880,000 hectares.

Starting with the 2002–2003 marketing year, the European Commission has maintained that the EU is no longer bound by the Blair House commitments on acreage limits on non-set aside land. It maintains that the equalization of compensatory payments for both cereals and oilseeds do away with the crop-specificity of oilseeds payments and consequently the Blair House restrictions. Consequently, the BHA was no longer valid after 2002–2003. The U.S. position remains that, as the BHA on oilseeds was incorporated into the EU's WTO schedule, it is a multilateral commitment, and the EU will continue to be bound by the provisions of the BHA. In addition, the Blair House limits have not been adjusted to account for the recent enlargement of the EU to 25 Member States.

Sources: EU25—Oilseeds and Products: Outlook for EU Oilseeds and Biofuels 2005 (GAIN Report), USDA Foreign Agriculture Service, September 2005.

[68] COM (2006) 500. Report from the Commission to the Council on the review of the energy crops scheme, 22.09.2006.

[69] European Commission, Fact sheet: Biofuels in the European Union, an agricultural perspective, 2006.

[70] EU25 – Oilseeds and Products – Outlook for EU Oilseeds and Biofuels 2005, GAIN Report E35172, USDA Foreign Agriculture Service, September 2005.

With the application of the 2003 CAP reform, payments for compulsory set-aside land are included in the single farm payment (SFP) scheme. However, set-aside obligations are maintained. The payment received will be based on the amount of land a farmer had in compulsory set-aside in the simplified payment reference period (2000–2002). This land is covered by the same payment system, but a subsidy is only paid if the same amount of land is kept in set-aside, though land rotation is allowed. Because set-aside payments are integrated into the SFP, it is not possible to identify the amount of aid perceived by farmers for "freezing" the use of these areas. In addition, Member States applying the SFP do not have to communicate the areas under set-aside.

However, the amount of aid granted to farmers under the SFP can be calculated as the average of all the support received by holdings over the years 2000–2002. The average payment for set-aside aid during that period was around € 290 per hectare. If this rate is applied to non-food crops produced on set-aside areas, the total of support for crops used for biofuel production in 2005 amounted to approximately € 260 million. In 2010, it could reach € 1 billion if 70 percent of available set-aside areas were to be used for the growing of biofuel feedstocks. The recent proposals by Mariann Fischer Boel[71] to set at zero the compulsory set-aside rate for autumn 2007 and spring 2008 sowings in response to the increasingly tight situation on the cereals market will not affect the SFP income received by farmers. However, any decision to permanently abolish compulsory set-aside requirement would require a careful analysis on how and by which means the positive environmental side effects of set aside could be addressed. Such a debate is expected to occur in the context of a review of the cereals policy that will be conducted during the 2008 Health Check of the CAP.

4.2.2 Payments under the Energy Crop Scheme

The Energy Crop Scheme was introduced as part of the 2003 reform of the CAP and is one element of the wider EU strategy to encourage the development of renewable energy sources. The scheme offers producers € 45 per hectare of land that is used to grow crops for energy use, which includes for heat and electricity, as well as for biofuels production. Initially, the scheme was only available to EU-15 members and Slovenia and Malta,[72] and all energy crops, except sugar beet, grown on a maximum guaranteed area of 1.5 million hectares were eligible for annual support. However, the reform of the EU sugar regime, beginning in 2006–2007, includes the possibility for sugar beet grown as a non-food crop to qualify for set-aside payments and energy crop aid, and to be excluded from production quotas.

Thus far, the energy crop scheme has not been applicable within the simplified premium systems used in most new Member States, with the exception of Malta and Slovenia. However, the data available on biofuel consumption and national indicative targets for the EU-25 show that many new Member States have fixed their objectives in accordance with or beyond those of the EU-15 Member States in the implementation of the EU's Biofuel Initiative. As well, all new Member States have already adopted national measures (e.g. exemptions from excise duty) for supporting the production and use of biofuels. Following the recommendations of the Commission,[73] European Agricultural Ministers decided in December 2006 to extend the benefit of the energy-crop premium to all EU Member States (including Romania and Bulgaria) and to expand the eligible area to 2 million hectares, in order to stimulate the production of biofuels.

Overall uptake of the scheme has been slow, with about one third of the quota used in 2005 (Table 4.14) but this is expected to increase over time due to the rapid expansion of biofuels production capacity in the EU.

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[71] Press Release, "Cereals: Proposal to set at zero the set-aside rate for autumn 2007 and spring 2008 sowings", IP 07/1101, Brussels, 16 July 2007.

[72] The new member states choosing not to apply the Single Area Payment Scheme — SAPS (Slovenia, Malta) are subject to the same general conditions as the EU–15 Member States, except that the "phasing–in" established under Article 143a of Council Regulation (EC) No 1782/2003 applies. The energy crop scheme and its maximum guaranteed area and mandatory set aside (including the possibility of cultivating energy crops on those areas) therefore apply.

[73] Report from the Commission to the Council on the review of the energy crops scheme. COM(2006) 500 final.

The associated costs increased from € 13.7 million to € 25.2 million between 2004 and 2005. Germany, France and the United Kingdom have taken most advantage of the scheme thus far, while Denmark, Finland, Spain and Sweden (along with Germany and the United Kingdom) dramatically increased their uptake in 2005 compared with 2004. Because production of biodiesel in the EU is larger than that of ethanol and because the possibility to grow oilseeds on set-aside land is limited (Box 4.2), oilseeds areas are the ones that benefit most from the energy crop premium (80 percent in 2005).

Table 4.14 Cultivation of energy crops and estimated associated costs, 2004–2005

Member State	Areas under aid for energy crops (ha)		Estimated associated costs (€)	
	2004	2005	2004	2005
Austria	3,498	8,130	157,410	365,850
Belgium	13	2,428	581	109,266
Denmark	4,450	17,445	200,250	785,025
Finland	3,475	10,300	156,375	463,500
France	130,034	135,823	5,851,530	6,112,035
Germany	109,100	237,704	4,909,500	10,696,680
Greece	0	0	0	0
Italy	0	285	0	12,843
Ireland	419	1,613	18,855	72,585
Luxembourg	108	216	4,860	9,720
Netherlands	139	320	6,255	14,420
Portugal	0	77	0	3,465
Spain	6,705	27,321	301,725	1,229,445
Sweden	14,547	31,076	654,615	1,398,420
United Kingdom	32,928	88,590	1,481,760	3,986,550
Malta	0	0	0	0
Slovenia	292	116	13,140	5,216
Total	**305,708**	**561,445**	**13,756,856**	**25,265,020**

Note: For 2004, areas paid; for 2005, areas claimed.

Sources: Report from the Commission to the Council on the review of the energy crops scheme, Annex 1 SEC (2006) 1167, and calculations by the authors.

According to estimates published by ONIGC (2006)[74], oilseed areas under the energy crops scheme should reach 840,000 hectares in 2006 and the estimated associated cost would total € 37.8 million. With 2 million hectares eligible for support each year, the maximum annual support for energy crops would be € 90 million. In 2005, actual expenditure totalled about € 25 million. ONIGC estimated that the amount of support should have almost doubled in 2006, reaching € 47.5 million, as a result of the increasing biofuels production in the EU.[75]

Some crops, such as oilseeds or cereals, used for the production of biofuels do not benefit from any specific area payments. In 2005, the Commission estimated that energy crops produced on 400,000 hectares, dedicated to the production of crops, did not receive energy crops aid or set-aside payments. Farmers have consistently complained that the system for receiving benefits from the energy-crop premium is too difficult due to the

[74] ONIGC: French office national interprofessionnel des grandes cultures.

[75] According to data from COPA-COGECA published by ONIGC, oilseeds areas under the Energy crop scheme cover 840,000 hectares in 2006. In 2005, oilseeds areas represented 79.5 percent of the total area eligible for energy crop payments. The same proportion has been maintained when generating this reports estimation for 2006.

schemes complexity. In order to qualify for EU assistance for a single-farm payment, farmers are obliged to conclude, a contract with a collector or first processor by the date they send in their application. In practice, this means that farmers lose their freedom of decision on how to market crops (food or non-food, depending on the market price). As a result, some farmers produce energy crops outside the energy-crop scheme, without specific support, as they consider that the financial benefits provided by the scheme are not commensurate with the disadvantages of the contracting obligation.

4.2.3 Rural development initiatives

In February 2006, the Council of the European Union adopted strategic guidelines for rural development throughout the period 2007–2013. The guidelines assist Member States in preparing their national Rural Development programmes:

1. improve the competitiveness of the agricultural and forestry sector (including further development of high-quality food products, as well as the development of new outlets for agricultural and forestry products including energy crops);
2. improve the environment and the countryside (including increased biodiversity and use of renewable energy sources, water management, prevention of climate change and preservation of high nature value farming and forestry systems);
3. improve the quality of life in rural areas and encourage diversification of the rural economy (in particular through the creation of employment opportunities and conditions for growth);
4. build local capacity for employment and diversification (including promoting cooperation and innovation and improvements in local governance);
5. ensure consistency in programming (when developing national rural strategies, Member States should also take into account other EU-level strategies); and
6. complement other community instruments (i.e., Member States should ensure coherence and actions financed under the various EU funds are complimentary).

Resources devoted to rural-development priorities will depend on the specific situation, strengths, weaknesses and opportunities of each program area.[76] However, the exact nature and amount of support to be provided in the area of biofuel production, if any, is unknown.

4.2.4 Capital grants

Many EU Member States provide subsidies for production-related capital. Public support usually represents a percentage of investment costs incurred to produce biofuels. Rates of support and eligibility criteria vary from country to country. Capital grants are also provided for demonstration projects. Demonstration plants, which are bigger than pilot plants but smaller than commercial plants, are built to demonstrate the commercial feasibility of a process. Because in each Member State subsidies might be granted by several institutions, and sometimes at the local level, it is impossible to provide an exhaustive list of the public support available to biofuels plants.

Reflecting the diverse economic impacts of biofuel production, Member States administer grants related to biofuels through a wider spectrum of government agencies, ranging from those responsible for environmental policy, to energy, agricultural and economic-development agencies. Whereas Belgium and Poland provide significant biofuel-related grants through environmental agencies, Cyprus, Germany, Ireland, Portugal and Spain focus key grants through programs related to the promotion of renewable energy. Noteworthy biofuel-related grants in the Czech Republic are concentrated through the Ministry of Agriculture for rapeseed production. Austria, Estonia, Latvia and the United Kingdom administer substantial biofuels-related grants via programs related to economic development in rural and resource poor regions, or at the national level overall.

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[76] Council Decision 2006/114/EC on Community strategic guidelines for rural development (programming period 2007 to 2013), 20/02/2006.

Countries supporting grant funding through agencies related to national competitiveness and support for the development of biofuel related technologies include Denmark, Greece and the Netherlands.

In **Austria**, biofuel production facilities can receive support under the Austrian Rural Development Programme. The administration of this support is the responsibility of the provincial governments (who may also issue their own regulations). A pre-condition for support is that at least 75 percent of the biomass used in production must come from the local region. A maximum of 55 percent of the total investment costs for private or community facilities can be subsidised, as long as 51 percent or more of the facility in question is owned by farmers. The costs of the subsidies are shared by the EU, the national authorities and provincial authorities (50, 30 and 20 percent respectively).[77] Unfortunately, the authors were unable to identify the corresponding amounts spent under this program.

In **Belgium,** the Tax Deduction for Environment-Friendly Investments program, initiated in 1992, provides capital grants up to 13.5 percent of costs to industry for environmentally sound investments (energy efficiency, or energy resulting from non-polluting treatment of industrial and urban waste etc.), and up to 25.5 percent for especially innovative enterprises.[78]

Cyprus' Grant Scheme for Energy Conservation and the Promotion of Renewable Energy Sources 2004–2006 includes measures to support the production of biofuels. Under this scheme, up to 40 percent of eligible costs can be subsidized, to a maximum € 690,000 (CYP 400,000) per plant.[79]

The **Czech Republic's** Ministry of Agriculture began supporting the processing of rape seed into RME during the years 1992 to 1995, providing subsidized loans to producers or processors of RME for the purchase of processing technologies (*Oleo program*). Some € 21.7 million (CZK 772.7 million) in the form of refundable grants was allocated from the state budget in the years 1991–1995 to establish manufacturing capacity for RME.[80]

Denmark has decided to substantially reinforce its efforts to develop second-generation technologies by earmarking € 27 million (DKK 200 million) for co-financing large-scale private development programs. The total amount of additional private and public development funding is expected to rest appreciably above € 27 million (DKK 200 million).[81] In addition, BioGasol is currently building the first second-generation ethanol demonstration plant at the island of Bornholm in the Baltic Sea. The plant will convert waste, grass and agricultural residues into ethanol and other energy products. It will cost around € 37 million (DKK 275 million) and will produce around 10 million litres of ethanol annually, converting 90,000 to 100,000 tonnes of wet biomass every year. The consortium behind the plant consists of BioGasol and invited partners who will work together in a public–private collaboration.[82]

In **Estonia** the Estonian National Development Plan: Business Development, which aims to strengthen the competitiveness of existing firms and stimulate the formation of new firms, granted € 3,682 (EEK 57,600) in 2005 to support the development of business plans for producing liquid biofuels.[83]

Finland's State Report for 2004 reported that the Ministry of Trade and Industry is able to grant investment aid for demonstration projects aiming to produce liquid biofuels, both for motor fuel and heating use, but the amount of public funds available is not currently reported in the public domain.

Germany's annual expenditure on investment support for bioenergy amounted to € 1.75 billion in 2004, € 1.57 billion in 2003 and € 1.4 billion in 2002.[84] The share of the funds directed towards biofuel projects has

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77 M. Eder et al., 2005.

78 IEA database.

79 Member State report under Directive 2003/30/EC for the reporting year 2004 – Cyprus.

80 Member State report under Directive 2003/30/EC for the reporting year 2004 – Czech Republic.

81 Member State report under Directive 2003/30/EC for the reporting year 2005 – Denmark.

82 www.biogasol.dk/4me1_20070314.htm, last visit 24 June 2007.

83 Member State report under Directive 2003/30/EC for the reporting year 2005 – Estonia.

84 German Association for Bioenergy (BBE), 2006.

not been separately identified. With the support of the Federal Ministry for Consumer Protection, Nutrition and Agriculture, the German Energy Agency has prepared a feasibility study for an industrial BTL plant (biomass availability, comparison of different BTL technologies, biomass logistics and possible financing tools).[85] In addition, Germany received state aid approval in 2005 for the grant scheme Support of Demonstration Projects for Use of Energy from Renewable Sources. The main objective of the scheme is to provide environmental support via investment or operating aid. There are no conditions imposed on the origin of the biomass employed. The scheme, which runs through 31 December 2010, has a maximum budget of € 8 million a year, but estimates on how much of this will actually benefit biofuels are not available. Because of the scheme's various possible beneficiaries, the notification was divided between DG Competition (N 175a/2005), and DG Energy and Transport (N 175b/2005).[86]

In **Greece**, the Operational Programme for Competitiveness (OPC) was initiated in 2000 and provides support for "environmentally friendly" investments.[87] Maximum available support in the field of renewable energy sources and biomass is 40 percent of the total budget.[88] Greece's two biodiesel plants have each received financial aid under the OPC, but the exact amounts have not been identified.

In **Ireland**, biofuel projects benefit from capital grants under the country's Sustainable Energy program. For biodiesel, 10 percent of the capital cost for plants with capacities between 15 and 25 million litres per year can be granted. For smaller plants (less than 10 million litres per year), grant ratios up to 25 percent are possible. Ethanol plants with capacities between 15 and 25 million litres per year also benefit from grants representing up to 10 percent of total capital costs.[89]

The Infrastructure and Services operational program in **Latvia** supports fuel conversion projects aiming to reduce the impact of energy production on the environment. This program is financed by the European Investment Bank and the European Bank of Reconstruction and Development, and totalled € 11.2 million (LVL 7,886,345) in 2005.

To meet its biofuel obligations, the **Netherlands** has allocated € 60 million in capital over the next five years (2006–2010) to encourage the development of innovative biofuels—i.e., biofuels with better environmental performance than existing biofuels, for example ligno-cellulosic ethanol.[90]

In **Poland**, investments in renewable energy sources have been supported for many years by the National Environmental Protection and Water Management Fund (EkoFundusz), and several regional district and local environmental protection and water managements funds. These funds result from revenues obtained from actors who have failed to comply with environmental laws. Support is allocated exclusively to activities specified in the Environmental Protection Act, such as harnessing local renewable energy sources, and the introduction of more environmentally benign energy carriers.[91] The EcoFund Foundation was established in 1992 and subsidizes projects intended to help attain environmental goals. Its funds originate in the Polish debt-for-environment swap scheme pursuant to agreements signed by Poland with the U.S., France, Switzerland, Sweden, Italy and Norway. Within the Foundation's priority areas (one of them being the reduction of greenhouse gas emissions), support is limited to investment projects at the project implementation stage. The financial support provided is exclusively in the form of grants. The share of a grant in a project's cost can range from 15 percent to 60 percent, depending on the project type and the formal and organizational status of the project investor.[92]

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85 Member State report under Directive 2003/30/EC for the reporting year 2005 – Germany.

86 State aid case N175a/2005 and state aid case 175b/2005 (Official Journal C 75, 28/03/2006).

87 The OPC is co-funded by the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Greek government and private funds.

88 OPC Call for tender, Ministry of Development, September 2002.

89 Member State report under Directive 2003/30/EC for the reporting year 2004 – Ireland.

90 Ministry of Housing, Spatial Planning and the Environment, March 2006.

91 Member State report under Directive 2003/30/EC for the reporting year 2005 – Poland.

92 www.ekofundusz.org.pl.

For the past decade, **Portuguese** investments in renewable energy sources have been eligible for public support under two main programs: the ENERGIA Program and the MAPE/POE (Measure for Supporting the Use of Energy Potential and Rational Use of Energy) Program.[93] While the ENERGIA Program provided financial support between 1994 and 1999, the MAPE/POE Program was created in 2001 and aims to promote energy diversification, improved energy efficiency and increased use of renewable energy sources. Both public and private organizations might apply to this program, which supports biofuels along with fuel-switching to natural gas, renewables for electricity generation and energy management measures and co-generation. The subsidy rate varies depending on the type of renewable energy source and the economic feasibility of the project, but averages 40 percent of the investment cost. There has been little, if any, support for biofuel production. According to the IEA, the Portuguese government approved financing of 50 percent of the building costs for a biodiesel plant (approximately € 12.5 million) due on stream in July 2004.[94]

Until 1999 **Spanish** government support to investment was provided under the Energy Saving and Efficiency Plan (PAEE), which supported fuel production from forests, agricultural and industrial residues, including the production of biofuels. The subsidy rate of these activities was fixed at 30 percent of the "eligible costs".[95] From 1999 until 2004 the PAEE was replaced by the Plan for Promoting Renewable Energy (PFER) under which public support for biofuels was provided for in the following amounts: € 2.4 million in 2000, € 2.7 million in 2002 and € 1.1 million in 2003.[96] Biofuels investments are also eligible for support from the Official Credit Institute and the Institute for Diversification and Saving of Energy (ICO-IDEA). Under this scheme, interest subsidies worth 0.5 percent of the interest rate are available on up to 70 percent of capital invested in new fixed assets. In order to qualify, such assets must be destined for the production and use of renewable energy.[97] Pursuant to the Spanish Corporation Tax Law, a tax deduction has been in force since October 1997 for investments in tangible fixed assets intended for environmental protection. An accompanying law from 2002 explicitly recognizes that investments in assets intended for the use of renewable energy sources qualify for this deduction.[98]

Sweden has recently introduced a state aid scheme to promote the distribution of renewable fuels. Under this scheme, investments related to the production of renewable fuels can receive a grant of up to 30 percent of the total investment cost. The grant may not, however, exceed the investment cost minus the lowest cost needed to fulfil the requirement.[99]

In the **United Kingdom**, the Regional Selective Assistance (RSA) is a national grant scheme used to encourage investment and job creation in areas designated for regional aid under the EU law on Assisted Areas. The Argent Plant in Scotland, which started production in March 2005, benefited from an RSA grant of € 1.8 million (GBP 1.2 million). At full capacity, this plant will produce up to 50 million litres of biodiesel per year. The North East Regional Development Agency has also offered grant funding to biofuels production.[100] The Biofuels Corporation PLC benefited from a grant of € 2.9 million (GBP 2 million) to help build Europe's largest biodiesel plant at Seal Sands in England. The plant, which has an annual production capacity of more than 280 million litres of biodiesel, started production in September 2005.[101] The 2005 Budget of the United Kingdom announced that the government considers Enhanced Capital Allowances (ECA) to be a useful

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93 *Subsidies measures in Portugal*, ENER-IURE Phase III, 2002.

94 *Biofuels for transport – An international perspective*, IEA, 2004.

95 *Subsidies measures in Spain,* ENER-IURE Phase III, 2001.

96 *La energía en España 2004*, Ministry for Industry, Tourism and Commerce.

97 *Subsidies measures in Spain,* ENER-IURE Phase III, 2001.

98 Law 53/2002 on Tax, administrative and social measures.

99 Member State report under Directive 2003/30/EC for the reporting year 2005 – Sweden.

100 With effect from 1 April 2004, *Selective Finance for Investment in England* replaced the *Regional Selective Assistance Grants* and the *Enterprise Grants* in England.

101 www.onenortheast.co.uk.

measure of support to domestic biofuel production. Such a scheme would allow biofuel producers to write off the costs of capital assets against their business's taxable profits.

4.3 Assistance to intermediate inputs

Policies that affect the prices of the crops and other feedstock material used to produce biofuels have a large bearing on the effective rate of assistance of the final product since feedstocks typically account for 50 percent to 80 percent of the direct operating costs of producing ethanol and biodiesel. Policies cut in two ways. Those such as tariffs raise internal prices for biofuel feedstocks and thus act like a tax on inputs. Other policies, by reducing farmers' costs may indirectly increase the supply of a feedstock and have an ameliorating effect on its price. Finally, countries may reduce the costs for biofuel producers of procuring feedstocks directly, such as through targeted consumption subsidies; these types of subsidies are not known in the EU at present.

4.3.1 Border protection for biofuel feedstocks

Tariffs applied on feedstock intended for biofuels production differ according to the type of biofuel (Table 4.15). Oilseeds enter the EU market duty free and therefore duties are not a barrier to trade flows. Tariffs are much higher for feedstocks for ethanol production. Low- and medium-quality wheat face an in-quota tariff of € 12 per tonne and an out-of-quota tariff of € 95 per tonne. Maize incurs variable tariffs, calculated as the difference between 155 percent of the EU intervention price and the CIF price[102] (based on Chicago prices). Due to high international prices for cereals, the tariff as of July 2007 was zero. However, there is currently no incentive to import cereals for ethanol production because the EU produces more than it consumes and because international prices are elevated. In addition, cereals grown in the EU that are intended to be processed into agro-fuels benefit from a specific subsidy (energy crop aid) and ethanol plants are usually located close to the feedstock production zones, which reduces transport and logistics costs.

A specific-rate tariff of € 329 per tonne is applied to raw sugar, and € 419 per tonne to white sugar, imported from countries with which the EU trades on an MFN basis. Tariffs on sugar beet and sugar cane — at, respectively, € 67 and € 46 per tonne — are prohibitive, though from a practical standpoint irrelevant since these commodities are bulky and would not likely be imported in large volumes even if they could be imported duty-free. As a result of these various measures, no significant amounts of feedstocks for ethanol production are imported from outside the EU.

[102] CIF: Cost, insurance, freight.

Table 4.15 The EU's MFN bound and applied tariffs on feedstock intended for biofuels production

CN code and description	MFN bound tariff	*Ad valorem* equivalent (2004–2005 averages*)	Tariff rate quotas with reduced tariffs
Feedstock for ethanol production			
1001 90 99 *wheat (medium and low quality)*	€ 95/tonne	63.4 percent	2,981,600 tonnes import duty: € 12/tonne
1002 00 00 *rye*	variable tariff. max. tariff is € 93/tonne	79.1 percent	no
1003 00 90 *barley*	€ 93/tonne	68.9 percent	306,215 tonnes import duty: € 16/tonne
1005 90 00 *corn*	variable tariff. max. tariff is € 94/tonne	68.4 percent	2,500,000 tonnes imported exclusively by Spain and Portugal
1212 91 80 *sugar beet*	€ 67/tonne	136.5 percent	no
1212 99 20 *sugar cane*	€ 46/tonne	92.3 percent**	no
1703 10 00 *cane molasses*	€ 0.035/tonne	4.86 percent**	no
1703 90 00 *beet molasses*	€ 0.035/tonne	3.86 percent**	no
Feedstock for biodiesel production			
Oilseeds *(rape, sunflower, soybeans)*	free		no

* *ad valorem* equivalents (AVE) calculated based on import unit values from COMTRADE.

** calculated on average import values for 1999–2001.

Sources: TARIC and COMTRADE databases.

4.3.2 EU subsidies benefiting feedstocks

Feedstock used for biofuel production also benefits from the substantial support granted to traditional food crops. Until the end of 2003, producers of oilseeds and cereals received per hectare compensatory payments. In 2004, payments under this mechanism amounted to € 1.3 billion for oilseeds and to € 11.9 billion for cereals. The share of these subsidies dedicated to oilseeds used for biodiesel production totalled approximately € 61.5 million. The 2003 CAP reform modified substantially the modalities of agricultural direct support, but the total level of subsidies has remained essentially unaffected. Since 2005, producers of oilseeds and cereals have received support through the SFP system,[103] through payments decoupled from production. As a result, irrespective of the commodity or quantities produced, farmers receive the same amount of support each year.[104] Even if they do not produce, farmers receive the direct payment. Because payments are decoupled from production, it is not appropriate to include these subsidies, an estimate of public support recorded for

[103] The amount of the single farm payment is calculated on the basis of all the direct aids a farmer received in a reference period (2000–2002). In order to ensure continued land management activities throughout the EU, beneficiaries of direct payments will be obliged to keep their land in good agricultural and environmental condition.

[104] The amount is increased by 1 percent each year.

biofuels. Cereals benefit from a minimum guaranteed price of € 101.31 per tonne.[105] However, this mechanism has not been used very frequently over recent years due to very high international prices.

Because new EU Member States do not benefit yet from the totality of CAP payments to which they are entitled (they will receive 100 percent of the corresponding aid by 2013), governments are authorized to grant national aid to agricultural producers if the Commission has approved the support scheme. As a result, some new Member States support the production of feedstock for biofuels through domestic mechanisms.

4.3.3 National subsidies for feedstock

In the **Czech Republic**, since 2001, the State Agricultural Intervention Fund buys rapeseed produced on set-aside lands and sells the feedstock to producers of RME at a price that enables the final product to be sold 10 percent cheaper than petroleum diesel fuel.

From 2003 until May 2004, the **Latvian** Government paid producers of biofuel from oilseeds € 105,000 (LVL 71,000) in compensation for the difference between the higher Latvian price and the international price for their feedstock.[106] For 2005 the Latvian government allocated € 700,000 to this end and is currently awaiting approval on this state aid from the European Commission.[107] In addition, the government paid out approximately € 3.4 million (LVL 2.3 million) to farmers on 56,439 hectares used for rapeseed production. On 20 December 2005 the Latvian government adopted a regulation defining the procedure for supporting the use of processing in the production of biofuels. The procedure regulates subsidies totalling € 746,269 (LVL 500,000) to be granted for promoting the processing of oil crops grown in Latvia.[108]

Lithuania offers support of € 46.34 (LTL 160) per tonne of oilseed rape and € 17.38 (LTL 60) per tonne of cereal grains to farmers growing crops intended for transformation into biofuels.[109]

In addition to the EU crop subsidy, **Polish** farmers contracting rapeseed for the production of esters will qualify to receive a locally funded subsidy of € 46 (PLN 176) per hectare. It is expected this additional financial incentive will encourage farmers to contract and plant rapeseed for biodiesel production.[110]

4.4 General services

4.4.1 Research and Development (R&D)

Research projects to promote the production and the consumption of biofuels are developed and funded by the Commission and by Member States. Some of the initiatives are clearly co-sponsored by both and many projects involve public and private institutions from several European countries. As a result, it is difficult to identify the origin of the funds.

4.4.1.1 European Framework Programs

The EU Framework Programmes define the Commission activities in the field of research, technological development and demonstration.

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[105] Rye does not benefit from a guaranteed price anymore.

[106] Member State report under Directive 2003/30/EC for the reporting year 2004 – Latvia.

[107] Member State report under Directive 2003/30/EC for the reporting year 2003 – Latvia.

[108] Member State report under Directive 2003/30/EC for the reporting year 2005 – Latvia.

[109] Member State report under Directive 2003/30/EC for the reporting year 2004 – Lithuania.

[110] USDA GAIN Report Number: PL7028, May 2007.

Table 4.16 List of projects in the biofuel areas under the Sixth Framework Programme

Project	Date	Total cost (€)	EU contribution (€)
BIO-ETOH energy and cost reductions in production of fuel ethanol from biomass through membrane technology	04/2004 - 10/2007	6,840,000	1,710,000
BIOFUELTP Biofuels Technology Platform Secretariat	04/2005 - 09/2007	650,360	490,360
BIO-PRO new burner technologies for low grade biofuels to supply clean energy for processes in biorefineries	12/2003 - 12/2006	3,630,000	2,170,000
BIOSPEC remote monitoring and control of biological processes for environmental protection and sustainable development	11/2004 - 10/2008	523,849	523,849
BIOSYNERGY biomass for the market competitive and environmentally friendly synthesis of bio-products together with the production of secondary energy carriers through the biorefinery approach	01/2007 - 12/2010	13,420,000	7,000,000
GREASOLINE new technology for conversion of waste fats to high-quality fuels	07/2005 - 07/2007	2,000,000	1,040,000
ERA- NET BIOENERGY networks national bioenergy research programs to improve cost-effectiveness and ensure the maximum research impacts for this vital energy sector	10/2004 - 11/2008	2,650,000	2,650,000
FLEXFUEL demonstration of a flexible plant processing organic waste, manure and/or energycrops to bio-ethanol and biogas for transport	07/2004 - 12/2007	12,750,000	3,740,000
NEW AND CLEAN ENERGY TECHNOLOGY ASSESSMENT SYSTEMS	No information	No information	No information
NILE new improvements for ligno-cellulosic ethanol	10/2005 - 10/2009	12,460,000	7,520,000
NOE-BIOENERGY overcoming barriers to bioenergy	01/2004 - 01/2009	8,050,000	8,050,000
RENEW renewable fuels for advanced powertrains	01/2004 - 01/2008	16,300,000	8,230,000
SOLVSAFE advanced safer solvents for innovative industrial eco-processing	03/2005 - 03/2009	9,890,000	5,700,000
SYSAF systems for alternative fuels	No information	No information	No information
Total		**89,164,209**	**48,824,209**

Note: Only projects related to liquid biofuels for road transportation are included.

Source: Compiled by the authors from the Sixth Framework Programme web page.

Total funding available under the Sixth Framework Programme (2002–2006) was € 17.5 billion. Reportedly, € 68 million was made available under the Sixth Framework Programme to "support research in the area of biomass to develop second-generation biofuels, new technologies for clean and cost-efficient power generation from biomass, integrated biomass use through biorefineries and overcoming market barriers."[111] Fourteen projects in the specific area of biofuels have been approved for a total cost of € 89.1 million. The financial participation of the European Commission amounted to € 48.8 million (Table 4.16). Less than 50 percent of these funds are dedicated to projects for the development of second-generation biofuel technologies.

The total budget for the Seventh Framework Programme (2007–2013) is € 53.2 billion, but the amounts that will be allocated to projects related to biofuels are not available yet. The calls for proposals issued in the framework of the 2007 work program reveal that, in the energy sector, two projects on first-generation biofuel from biomass will be developed while seven will deal with second-generation biofuels. Other project areas include biorefineries, biofuel use in transport, biomass resources, standardization and sustainability assessment and promotion and dissemination activities. Altogether, 18 calls for proposals have been published in 2007 for projects linked to biofuels. Other research themes of the Seventh Framework Programme, such as agriculture, environment and transport, may include projects related to biofuels.

To complement the Sixth and Seventh Framework Programmes, the Competitiveness and Innovation Programme (CIP) has been created and its sub-programme called "Intelligent Energy – Europe Programme" (IEE) has been designed to encourage the wider uptake of new and renewable energies and to improve energy efficiency, as well as to foster compliance with the energy regulatory framework. Projects on biofuels should be supported under ALTENER: New and Renewable Resources of IEE. Specific objectives set in the 2007 work programme include:

- To support policy development by transferring experience and improving understanding and benchmarks of the energy performance, environmental impact, land-use requirements and potential contributions of biofuels (biodiesel, bio-alcohols, biogas and bio-additives) to fuel consumption in transport and other uses; to promote and exchange experience of EU, national, local and regional policies, legislation and support schemes; and to make biofuels policies more consistent with other sectoral policies and objectives.
- To promote production, transparent certification of environmental sustainability, processing and trading of the potentially most economical and sustainable biofuels (within the EU and in non-EU countries), while removing market barriers and simplifying approval procedures.
- To change the behaviour of public and fuel industry decision-makers as well as stakeholders (including farmers, foresters and distributors) so that they communicate better and work together to create competitive products and services through economies of scale.
- To encourage investment in production (planting, managing growth and harvesting) and processing of more competitive first-generation biofuels with less environmental impact and in second-generation biofuels and in enhanced distribution infrastructure for biofuels.
- To train more biofuels professionals, technicians and craftsmen.

Support to biofuels projects should also be available under STEER: Energy in Transport, especially projects embodied in the "Alternative fuels and clean vehicles" section.

In 2005 and 2006, 13 projects in the biofuel areas were funded by ALTENER: Alternative Fuels (previous version of ALTENER: New and Renewable Resources) and EU support was € 7.6 million (Table 4.17). The work program for 2007 indicates that € 1,885,000 will be dedicated to projects on biofuels (under ALTENER) and € 3,300,000 will be granted under the STEER program for projects related to clean vehicles and alternative motor fuels. In addition, up to 75 percent of the eligible project costs will be supported, up from 50 percent in previous years.

[111] www.bymnews.com/new/content/view/25906/57.

Table 4.17 Biofuel projects under ALTENER: Alternative Fuels (2005–2006)

Project	Total cost (€)	EU contribution (€)
BIODIENET Developing a network of actors to stimulate demand for locally produced biodiesel from used cooking oils	1,564,394	782,197
BIOFUEL MARKETPLACE Web-based biofuel marketplace for supporting the e-commerce of biofuel products and technologies	792,014	396,007
MAGALOG Marine gas fuel logistics	1,257,745	628,873
Pro-Biodiesel Overcoming non-technological barriers for full-scale use of biodiesel in Europe	772,244	386,122
REFUEL Renewable Fuels For Europe	1,836,570	918,285
SUGRE Sustainable Green Fleets	2,580,000	1,290,000
BIODIESEL CHAINS Promoting favourable conditions to establish biodiesel market actions	759,995	379,998
Bio-NETT Developing local supply chain networks, linking biofuel producers with public sector users	1,148,305	574,153
COMPRO Common procurement of collective and public service transport clean vehicles	1,593,594	732,735
PROCURA Green Fleet Procurement Models	1,748,646	874,323
STAR BUS Promoting sustainable energetic pathways for buses' fleet	1,407,194	703,567
Carbon Labeling Carbon/efficiency labeling and bio-blending for optimizing benefits of biodiesel and additive use	n.a.	n.a.
PROBIO Integrated promotion of the biofuel chain	n.a.	n.a.
total 2005–2006	15,460,701	7,666,258

Source: Projects fact sheet Intelligent Energy – Europe.

4.4.1.2 National research programs

A variety of national research programs exist within the Member States, which generally focus on biofuel technology and economic research at the policy level. Under the heading of technology, inter-related work-streams exist. Several Member States are supporting research into new methods to produce biofuels, for more efficient production or process technologies. Several others are seeking to identify new raw material feedstocks. Much of this research is conducted by government institutions, but in Poland's case research funds

are channelled through a federation of engineering associations seeking to promote biofuel related small- and medium-sized start-ups.

In **Austria**, research funding is provided both at state and federal levels. Research spending on liquid biofuels was approximately € 253,000 in 2003 and € 186,500 in 2004. More than half of the funds were provided by the government and various funding organizations. Universities and research institutes (which are partly publicly financed) accounted for the remainder.[112]

Research in **Denmark** has focused on the development of new methods to produce biofuels, with particular emphasis on ligno-cellulosic processes to produce bio-ethanol. The objective is to be able to produce bio-ethanol from organic residues and waste from the agriculture, forestry and timber industries on a commercial basis within the next 15 years. Research has been carried out by different parties in the framework of the Danish Energy Authority and its Energy Research Programme (ERP). Projects that have received ERP funding are summarized in Table 4.18.

Table 4.18: Denmark: research initiatives with ERP funding (in €)

Year and project	Beneficiary	Total budget	EFP funding
2005			
Socio-economic analysis of the co-production of bio-ethanol, thermal heating and biogas	Forskningscenter Risø	310,000	187,000
Maxi Fuels – pilot project with a "fermentation platform" to produce ethanol, hydrogen and methane from biomass	DTU-Biocentrum	1,882,000	1,448,000
2004			
IEA, Fischer-Tropsch fuels for transport	DTU (Mechanics, Energy and Construction)	141,000	28,000
Bio-ethanol production, phase 3	DTU-Biocentrum	312,000	218,000
IEA, Fischer-Tropsch fuels for transport	DTU (Mechanics, Energy and Construction)	34,000	28,000
2003			
Bio-ethanol production, phase 2	DTU-Biocentrum/CPB (Forskningscenter Risø and Novozymes)	362,000	264,000
2001			
Bio-ethanol production, phase 1	DTU-Biocentrum	341,000	388,000
Total		**3,381,000**	**2,561,000**

Sources: ERP 2001, 2003, 2004, 2005. Conversion to euro by the authors.

The ERP 2006 reportedly also allocates funds to research in the field of biodimethylether (DME). Additional support has been provided by the Ministry of Science, Technology and Innovation, but information on the actual amounts is not available at this stage.

The **Finnish** Parliament approved in the second amending budget for 2006 a € 9 million appropriation over three years for the development of novel second-generation production technologies for biofuels. The appropriation is based on the proposal of the working party on transport biofuels. The development work to be launched will be focused on advancing new second-generation biofuel production technologies with a view to reducing considerably the additional cost of biofuel production incurred by the national economy, and increasing the energy share of biofuels in transport.

[112] Energie – Forschung und Entwicklung/ Ausgaben der öffentlichen Hand in Österreich, Austrian Energy Agency, 2003 and 2004.

Funding from **Germany's** federal government for ongoing research and development projects in the field of biofuels for transport amounts to € 6.8 million. Total project costs are € 13.2 million.[113]

Since 1994, the **French** government-sponsored scientific interest group Agriculture for Chemicals and Energy (AGRICE) has funded and monitored research and development in the area of alternative uses for agricultural products and by-products. As such, AGRICE is supporting the long-term research of biofuels and bio-additives. Over AGRICE's 11 years of activity, 19 percent of the available budget was dedicated to projects on liquid biofuels. Funds allocated to biofuels during the period 1994–2005 are summarized in Table 4.19.

Table 4.19 Biofuel projects supported by AGRICE, 1994–2005

Type of biofuel	Number of projects	Completed projects	Total cost (€)	Public funding (€)
Esters and oils	19	14	8,341,399	2,415,415
Ethanol and ether	29	23	10,471,457	3,872,902
Technical and economic studies	12	9	2,352,248	926,710
Total	**60**	**46**	**21,165,104**	**7,215,027**

Source: AGRICE Financial statement 1994–2005.

In addition, the National Program for Research on Bioenergies (PNRB) was launched in 2005. As regards biofuels, the objectives of the program are to master the thermochemical and/or biological conversion process of ligno-cellulosic biomass in order to increase the production of biofuels that can be used in current engines. An industrial demonstration plant should be ready by 2010–2015. The budget for 2005 and 2006 covered 23 projects on biofuels and public support amounted to € 16.5 million. (The total cost was € 42 million.)

A **Latvian** research project entitled The Potential of Biofuels – Possibilities and Obstacles Concerning the Implementation of EU Directive EC 2003/30 in Latvia has received grant funding from the Environmental Protection Fund. The project aims to define existing and potential biofuel user-groups as well as to estimate what volume of biofuels each group would be able to consume. The project will also suggest measures to promote the use of biofuels in Latvia. In 2004, the Technical Department of the Latvian Agricultural University was granted € 7,800 (LVL 5 200) for the acquisition of pilot devices and the testing of new bio-ethanol production technologies.[114]

In the **Netherlands**, effective from 2004, EOS Unique Opportunities (as part of the Energy Research Strategy) supports experiments that contribute to the transition towards a sustainable energy economy in the Netherlands. Among the types of projects eligible for assistance are ones related to improving the efficiency of chains of production, and alternative motor fuels. Selected projects are awarded a subsidy, which is 40 percent of the additional costs compared with a reference situation, in rounds of tenders.[115] Annual costs for liquid biofuel projects, if any, are not available.

In **Poland**, between 2003 and 2005 and within the framework of the Programme of the Polish Federation of Engineering Associations – Special Purpose Projects for Small and Medium Size Enterprises, two special-purpose projects, related to the start-up of biofuel production, were carried out. They were subsidized approximately € 68,000 (PLN 271,500).[116]

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[113] Personal communication with Fachagentur Nachwachsende Rohstoffe (FNR), March 2006.

[114] Member State report under Directive 2003/30/EC for the reporting year 2004 – Latvia.

[115] Global renewable energy policies and measures database, International Energy Agency; www.iea.org.

[116] Member State report under Directive 2003/30/EC for the reporting year 2005 – Poland.

More recent Polish research in the area of biofuels has been undertaken in the form of targeted projects or broader research projects.[117] Targeted projects have received total government funding of € 312,500 (PLN 1,250,000); the corresponding amount for broader research projects is € 260,000 (PLN 1,039,000). In addition, eight research projects with completion deadlines falling within the 2006–2009 period have been allotted funds of € 400,400 (PLN 1,601,700).[118]

In **Spain**, the CENIT Biodiesel Initiative is a recent research and development project that will run over the next four years. The project, which is managed by Repsol YPF and 14 other Spanish companies, has received funds of € 22 million from the Ministry of Industry, Tourism and Commerce provided through the Centre for Industrial Technology Development (CDTI). The project aims to identify new raw materials and develop new processes and technologies to produce biodiesel.[119]

The **Swedish** government supports research, development and demonstration measures for developing more energy-efficient and more cost-effective processes for the production of biofuels. In June 2006, the Swedish Parliament adopted a Research Bill containing guidelines for continued long-term energy policy contributions concerning research, development, demonstration and marketing in the energy sector. The legislation gives a high level of priority to investments in, among other things, bioenergy, biofuels, and efficient vehicles and engines. The approved budget for energy for 2006–2008 amounts to € 88 million (SEK 815 million).[120]

4.4.2 Pilot Projects

A pilot plant is a small chemical processing system which is operated to generate information about the behaviour of the system for use in designing larger facilities. Pilot plants are used to reduce the risk associated with construction of large process plants. They do this in two ways. First, they are substantially less expensive to build than full-scale plants. The business does not put as much capital at risk on a project that may be inefficient or unfeasible. Further, design changes can be made more cheaply at the pilot scale and kinks in the process can be worked out before a larger plant is constructed. Second, they provide valuable data for designing a full-scale plant. In the EU, many pilot plants in the biofuels sector have been financed with public funds. The following list of pilot plants is not exhaustive and only includes projects that have received public support.

While the bulk of pilot projects seek to assess ligno-cellulose production technologies, a few support work in other areas. Producing biofuels from woodchips, straw and household waste (variously and in combination) is the object of significant pilot projects in Denmark, Germany and Sweden. France is exploring other chemical related approaches, and Ireland has initiated a small project related to pure plant oils that is unrelated to ethanol or biodiesel.

In **Denmark**, Elsam is carrying out a large pilot project for a total budget of € 13.4 million (DKK 100 million) financed partly by the EU, with the objective of reducing the cost of producing electricity and bio-ethanol from straw and household waste. Elsam has also received support from Energinet.dk (under its Public Service Obligation for Research and Development) for another biofuels pilot plant. The project runs over two and a half years, from 1 July 2006 to 31 December 2008. Energinet.dk has provided € 809,128 (DKK 6,028,000) out of the total budget amounting to € 1,024,698 (DKK 7,634,000).[121]

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[117] *Targeted projects* are projects scheduled to be carried out within a set timeframe and under defined conditions, undertaken inter alia by entrepreneurs and research entities on their own initiative, by ministries or by autonomous regional authorities. They cover applied research, development work, industrial research, or pre-competition studies. *Broader research projects* are defined research tasks whose completion is expected within a fixed timeframe under set conditions.

[118] Member State report under Directive 2003/30/EC for the reporting years 2004 and 2005 – Poland.

[119] http://www.energias-renovables.com (News, 30/04/06).

[120] Member State report under Directive 2003/30/EC for the reporting year 2005 – Sweden.

[121] Personal communication with Energinet.dk, April 2006.

In **France**, former President Chirac announced in 2005 that the government would support the construction of two pilot plants: one designed to explore thermochemical (TC) and the second to explore biochemical (BC) approaches for producing biofuel.[122]These projects are still in the conception phase.

The **German** Federal Ministry of Economics and Labour co-sponsored with DaimlerChrysler AG and Volkswagen the expansion of the Alpha plant developed by Choren Industries located in Freiberg. This plant has been able to produce the first synthetic automotive fuel from wood chips in April 2003**.** A pilot plant is under construction as of mid-2007.

In **Ireland**, a direct investment scheme supported biofuels pilot plants up to the end of 2006. Total capital support under this scheme amounted to € 500,000 in 2006 and was allocated to pure plant oil applications, excluding biodiesel and bio-ethanol.[123]

In its Member State Report for 2005, **Lithuania** mentioned that it is involved in one ethanol and one biodiesel pilot plant.

In **Sweden** the company Etek, hosted by the group Sekab, is running a pilot project financed by the government of Sweden to produce ethanol from wood raw material and other raw material that contains ligno-cellulose.[124] The pilot project became operational in early 2005 and has capacity at around 300–400 litres of ethanol per day, based on an input quantity of around 2 tonnes of wood chips or other ligno-cellulosic feedstock.[125]

4.5 Support for consumption

In this section, all incentives encouraging the consumption of biofuels or the use of vehicles capable of operating on high blends of biofuels are considered, with the exceptions of the tax exemptions for E85 and B100 described above. The description of support to consumption such as tax credit, reduced registration fees for vehicles and free parking have not been classified by measure because Member States typically grant packages of support for biofuels consumption that include several instruments at the same time.

Support for the consumption of high bio-content fuel seeks to overcome two main barriers to expanded sales of biofuels: distribution networks and the number of vehicles able to operate on high-percentage blends of biofuels. Some countries, such as France and the United Kingdom, provide capital allowances or grants for establishing fuel stations. Sweden, by contrast, applies legal mandates requiring large fuel stations to establish on-site biofuel-dispensing facilities.

To promote increases in the stock of FFVs capable of consuming high bio-content fuels, reduced registration fees and road taxes are variously provided by Cyprus, Ireland and Sweden. The latter also provides consumer tax incentives, and has waved congestion fees for FFVs in some cities. Biofuels are also subsidised by captive government and private-vehicle fleets through requirements applied to government vehicle purchases in Ireland and Sweden, and tax incentives for private FFV fleets in France and Sweden.

In order to promote the use of FFVs in **Cyprus**, registration fees and road taxes for FFVs were set at a very low rate of € 85 (CYP 50) and € 17 (CYP 10) respectively.[126] A tax relief amounting to € 1,200 for the purchase of FFVs is also available. The government is also considering biofuels for use in its captive automobile fleets.[127]

In **Denmark**, € 8 million (DKK 60 million) has been granted for the period 2006–2008 for the use of biodiesel in some specific fleets of vehicles.

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[122] www.ciionline.org/events/4001/Dr_CHAUVET.pdf, last visit 24 June 2007.

[123] State aid case N599/2004 – Ireland.

[124] GAIN Report SW6013.

[125] www.sekab.com/default.asp?id=1292&refid=1282, last visit 24 June 2007.

[126] Member State report under Directive 2003/30/EC for the reporting year 2004 – Cyprus.

[127] Member State report under Directive 2003/30/EC for the reporting year 2005 – Cyprus.

In the *Charte pour le développement de la filière superethanol E85* signed in November 2006, the **French** government promised to establish favourable fiscal measures for FFVs. The Finance Law for 2006 formalized these commitments through the following measures: full exemption of the tax on business vehicles for 2 years (for vehicles in circulation since 1 January 2007), an enhanced capital allowance over a 12-month period, relief of between 50 to 100 percent of the tax on registration certificates, and VAT reduction or elimination for E85. The Finance Law also created an enhanced capital allowance for investments in fuels stations and deposits. Among the signatories to the Charter (ethanol producers, fuels distributors and automobile producers), fuels distributors committed themselves to supply E85 in 700 fuels stations by the end of 2007 (currently, only 90 stations are supplying this fuel).

In **Ireland**, Maxol fuel distributors and Ford Motor Company submitted a joint project which has seen the introduction of the first FFVs in the EU outside of Sweden. Thirty FFVs have already been introduced into Ireland as part of this initiative and three stations dispensing E85 have been opened. In April 2006, the Irish bus company Bus Éireann announced that it wanted to pilot the use of biofuel on part of its fleet in the city of Cork, while the Galway City Council announced in July 2006 that in their fleet of trucks and vans, which consumes an estimated 350,000 litres of mineral diesel fuel per annum, they will introduce a 5 percent component of biodiesel to its annual consumption. In order to complement the introduction of the biofuels excise relief scheme, the budget for 2006 provided a 50 percent Vehicle Registration Tax rebate on FFVs for 2006 and 2007.[128]

In the **United Kingdom,** the Refueling Infrastructure Grant Programme aims to increase the infrastructure of alternative refuelling stations for road vehicles (ethanol, biogas, natural gas, hydrogen and electricity). Biodiesel is not covered by the scheme since it can be delivered using the current refuelling infrastructure at no extra cost. Under this program, grants at 30 percent of eligible costs were funded by the Department for Transport, with support from the Scottish Executive, based on a total budget of € 1,012,762 for 2005–2006 (GBP 690,000).

In December 2004, the **Swedish** government adopted an ordinance stating that a certain proportion of all state-owned vehicles purchased in 2005 must be environmentally sound. From 2006 onwards, at least 75 percent of vehicles purchased by state authorities (including leasing agreements during a calendar year) must be environmentally sound. Passed in 2005**,** the Act (2005:1248) stipulates that from 1 April 2006 onwards, petrol stations selling more than 3,000 cubic metres per year of petrol or diesel must sell renewable fuels such as biogas or ethanol. From 2009, this requirement will apply to stations providing 1,000 cubic metres per year of conventional fuel. Small enterprises selling less than 1,000 cubic metres per year of fossil fuels will be exempted from these regulations.

This Act also stipulates that operators investing in the distribution of renewable fuels can receive a subsidy of up to 30 percent of investment cost.[129] Incentives are also available to car owners, such as cost reductions for company cars, free parking in some cities and waived congestion fees. The Swedish Energy Agency estimates that FFV owners would realize benefits equivalent to € 2,350 per year under these rules.[130] These measures have, in sum, supported dramatic growth in the use of FFVs running on E85 within Sweden. Such FFVs totalled 50,000 by the end of 2006 (compared with 13,362 in 2004) and the number of filling stations supplying one or more biofuels totalled 415 by the end of June 2006.

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[128] Member State report under Directive 2003/30/EC for the reporting year 2005 – Ireland.

[129] Member State report under Directive 2003/30/EC for the reporting year 2005 – Sweden.

[130] Swedish Energy Agency, "Why second-generation biofuels ?", presentation made by Ann Segerborg-Fcik.

5 Aggregate Support to Biodiesel and Ethanol

To develop a better sense of how the individual subsidy programs affect the overall commercial environment for biofuels, this chapter presents several aggregate measures of support. The aggregate data provide important insights into a variety of policy questions ranging from the financial cost of the subsidy policies to taxpayers, to estimates of the costs of achieving particular policy goals. Among arguments put forth in support of biofuel subsidies are that they help a country to diversify from fossil fuels in general, and petroleum in particular, and that they have a better environmental profile than fossil fuels. We discuss in turn total financial support to the industry, subsidies per unit of energy output, subsidies per unit of fossil energy displaced and the subsidy cost for greenhouse gas reductions. Policy implications and recommendations, as well as areas for additional research, are discussed in chapter 6.

5.1 Total support estimates

We estimate that total support for ethanol used as a fuel has grown rapidly, from roughly € 800 million in 2005 to around € 1,300 million in 2006 (Table 5.1). These are underestimates since we were not able to quantify the value of support for investment in fixed capital used in ethanol production, which in some countries accounts for up to 30 percent of total investment costs. The largest of the identified elements of support is support provided through exemptions from excise taxes, and market price support. On a per-litre basis, this support (including support for research and development) works out to at least € 0.74 per litre.

Table 5.1 Total Support Estimate for ethanol in the EU, 2005 and 2006 (€ millions)

Support element	2005	2006
Market transers	**223**	**334**
Market price support (benefiting domestic production)	184	306
Other market transfers (benefiting net imports)	38	28
Budgetary support linked to volumes produced or consumed	**559**	**909**
Reductions in or exemptions from fuel-excise tax	508	829
Distillation aid	51	80
Support for intermediate inputs	**NC[1]**	**NC[1]**
Support for value-adding factors	**34**	**39**
Grants for investment in fixed capital	NC	NC
Payments for crops grown on set-aside land	29	29
Payments under the energy crops scheme	5	10
Support related to distribution and consumption	**NC**	**NC**
Support for research and development	**24**	**55**
Budget revenues (revenues from import duties)	**-49**	**-45**
Total Support Estimate (TSE)	**790**	**1,290**
Consumption (millions of litres)	1,103	1,738
Support per litre consumed (€/litre)	**0.72**	**0.74**

(1) NC = not calculated

Source: authors' estimates.

Total support for biodiesel is much larger than for ethanol, and also has grown grown rapidly, from just under € 1.6 billion in 2005 to more than € 2.4 billion in 2006 (Table 5.2). As with ethanol, these are underestimates since we were not able to estimate the value of support for investment in fixed capital used in biodiesel production. Of the identified elements of support, output-linked support provided through exemptions from excise taxes constitutes the largest element. On a per-litre basis, this support (including support for research and development) works out to around two-thirds that of ethanol — at least € 0.50 per litre.

Table 5.2 Total Support Estimate for biodiesel in EU, 2005 and 2006 (€ millions)

Support element	2005	2006
Market transfers	**NC[1]**	**NC[1]**
Budgetary support linked to volumes produced or consumed	**1,306**	**2,131**
Reductions in or exemptions from fuel-excise tax	1,306	2,131
Support for intermediate inputs	**NC[1]**	**NC[1]**
Support for value-adding factors	**252**	**270**
Grants for investment in fixed capital	NC	NC
Payments for crops grown on set-aside land	232	232
Payments under the energy crops scheme	20	38
Support related to distribution and consumption	**NA[2]**	**NA[2]**
Support for research and development	**17**	**36**
Total Support Estimate (TSE)	**1,575**	**2,436**
Consumption	2,834	4,860
Support per litre (€/litre)	0.56	0.50

(1) NC = not calculated

(2) NA = not applicable

Source: authors' estimates.

As with ethanol, the largest element of support is that provided through exemptions from excise taxes. Grants for investments in new capacity are also believed to be important, but information was insufficient to estimate this element of support.

5.2 Subsidy intensity

Estimates of total support provide only a crude measure of potential market distortion. Large subsidies, spread across a very large market, can have less of an effect on market structure than much smaller subsidies focused on a small market segment. Subsidy–intensity metrics can be used to normalize subsidies for the size of particular energy markets, and for differential heat rates of similar volumetric units (i.e., litres).

For the purpose of the subsidy–intensity metrics, we used the per-unit support values for 2006. These values are slightly lower than the marginal rates one would obtain by summing the main per-litre components of

support (Table 5.3). While the marginal rates may overstate the transfers provided by tax exemptions, they are probably closer to the actual per-unit transfers, which would also include support for investment in biofuel plants.

Table 5.3 Marginal support per litre for ethanol and biodiesel in the EU

Support element	Ethanol	Biodiesel
Market price support	0.200	—
Excise tax exemption	0.477	0.419
Energy crop payment	0.013	0.027
Set-aside payment	0.085	0.172
Total support (€/litre)	**0.775**	**0.618**

Note: All the calculations are made on 2005–2006 averages.

Source: Authors' estimates.

One measure of the degree to which a product is supported is the share of support as a percentage of its market value. This ranges from between 70 percent and 100 percent of the estimated market value for ethanol[131] and 60 to 70 percent for biodiesel, based on average prices in 2005 and 2006 (Table 5.4). That is to say, if all the support were reflected in the price of these biofuels, they would cost consumers 60 to 110 percent more than their actual market value. Since none of the support elements change in response to changes in the prices of either petrol or diesel fuels, lower or higher prices for petroleum fuels will generate correspondingly higher or lower values of support as a share of market prices than those indicated here.

Other ways to look at support is per unit of energy and per unit of fossil-fuel equivalent. Since ethanol has a heating value per litre that is 66 percent that of biodiesel, normalizing each in terms of € per gigajoule (GJ) raises the rate of support to ethanol considerably above that of biodiesel: around € 35 per GJ for ethanol, compared with € 15 per GJ for biodiesel. Translating these into litres of petrol and petroleum diesel equivalent also shows that the rates of support are higher for ethanol than for biodiesel: € 1.10 and € 0.55, respectively. In the case of ethanol, its level of support on a petrol-equivalent basis is more than twice that of the € 0.46 before tax market price for regular unleaded (RON 91) petrol in 2006 (IEA, 2007). In other words, at the rate at which the EU and Member States are supporting the production of ethanol, they could have gone to the world market and bought twice as much energy in the form of petrol for slightly less money.

[131] The rather wide range in the values for ethanol reflects two different assumptions. One assumes that there is no penalty in fuel economy (per litre) using ethanol in ethanol–gasoline blends containing up to 5 percent ethanol. The other assumes that there is a penalty proportional to the ratio of the heating values of ethanol and gasoline multiplied by the share of ethanol in the blended fuel. Ratings of fuel economy in the United States, for example, routinely show that distances travelled in FFVs on an equal volume of E85 are on average 25 percent less than on gasoline, which is only slightly better than the 30 percent reduction in performance one would expect from comparing ethanol's and gasoline's heating values (EPA, 2007).

Table 5.4 Support intensity values for ethanol and biodiesel

Indicator	Unit	Ethanol		Biodiesel	
		Low	High	Low	High
Support per litre	€ /litre		0.74		0.50
Estimated market value, average, 2005–2006 (1)	€ /litre	0.63	1.03	0.82	0.95
Support as a percent of market value (2)	percent	70%	110%	60%	70%
Support per gross GJ of biofuel consumed	€ /GJ	35		15	
Support per litre of petrol or diesel equivalent (3)	€ /litre equivalent	1.10		0.55	

Notes:

(1) The higher reference market value for ethanol is the price of RON 91 unleaded petrol, including excise taxes but not including VAT. The lower reference value assumes the price for ethanol would be proportional to the relative thermal value (68 percent) of ethanol compared with RON 91 unleaded petrol. The average price for biodiesel is assumed to be proportional to the relative thermal value (90.9 percent) of biodiesel compared with non-commercial petroleum diesel sold for non-commercial purposes, including excise taxes but not including VAT.

(2) The range for ethanol reflects support per litre divided by, respectively, the highest and lowest market values in the previous line. Values are rounded to the nearest € 0.10.

(3) For ethanol, the lower value in the range is based on an assumption that there would be no loss in vehicle performance if used in a low-ethanol (less than E5) blend; the higher value assumes a penalty proportional to the ratio of the heating values of ethanol (21.41 MJ/litre) and petrol (31.88 MJ/litre), which is more typical of vehicle performance when used in a higher ethanol blend. For biodiesel, the support per litre estimates are both grossed up by the ratio of the heating values of biodiesel (32.65 MJ/litre) and petroleum diesel (35.95 MJ/litre). The range in values thus represents the range in support under these different assumptions.

Sources: •**support estimate:** authors; • **heat values:** Zah et al. (2007); • **prices of petroleum fuels:** International Energy Agency, *Energy Prices & Taxes—Quarterly Statistics: First Quarter 2007*, Paris: OECD Publications, 2007.

5.3 Support per unit of fossil-fuel-equivalent displaced

Public financial support for biofuels is often proposed as a way to wean a country from its dependence on fossil fuels in general, and petroleum in particular. To estimate how efficiently biofuel subsidies help to reduce reliance on petroleum, or on fossil fuels in general, one needs to avoid crediting the ethanol or biodiesel with the fossil fuels used to create and deliver them.

The degree to which the use of biofuels displaces fossil fuels varies fairly widely across estimates by different researchers, even when system boundaries have been standardized. We have side-stepped this controversy by simply using the highest and lowest normalized values from published sources, such as CSIRO et al. (2003), the International Energy Agency (IEA, 2004), Edwards et al. (2007), Farrell et al. (2006b), Jank *et al.* (2007), and Zah et al. (2007a and 2007b). These sources usually express either the fossil (or non-renewable) energy input required to produce a GJ of biofuel, or the net energy yield as a share of the gross energy content of the biofuel. The higher the net displacement, the more of the gross energy content remains as a base over which to spread the biofuel support numbers. Generally, fossil-fuel displacement factors are greater for biofuels made from high-sugar crops or waste materials like used cooking oil than from biofuels made from grains or oilseeds. That is chiefly because in the latter case more fossil fuels are used in producing and processing the feedstocks.

In the case of ethanol derived from sugar beet, the amount of support per litre of fossil fuels avoided (expressed in petrol equivalent) is slightly more than the market value of the fuels they displace. For ethanol derived from maize, the support ranges between € 3.50 and € 5.00 per litre of petrol equivalent avoided, which is several multiples of the retail price of petrol in 2006 (Table 5.5).

Table 5.5 Support for ethanol per unit of fossil fuel displaced

Indicator	Unit	Ethanol from sugar beet		Ethanol from grains	
		Low	High	Low	High
Support per litre of petrol equivalent (note 1)	€ /Litre equiv.	1.10			
Displacement factor (note 2)	GJ fossil-fuel input / GJ output	0.325	0.50	0.685	0.774
Net gain in non-fossil energy	Percent	50–68%		22–32%	
Support per litre petrol equivalent of fossil fuels displaced (note 3)	€ /Litre equivalent	1.70	2.20	3.50	5.00

Notes:

(1) For explanation of the ranges, see note (3) to Table 5.4.

(2) Ranges reflect ranges in the literature forethanol from sugar beet and, respectively, ethanol from maize in the USA and rye in the EU.

(3) Equals support per litre of petrol equivalent divided by the percentage net gain in non-fossil energy.

Sources: •**support estimate:** GSI; • **displacement factor:** GSI estimates, based on Janks et al. (2007) and Zah et al. (2007).

For biodiesel (Table 5.6), the subsidy cost of displacing fossil fuels is lower: around € 0.65 per litre of diesel equivalent for biodiesel made from tallow or used cooking oil, and between € 0.90 and € 1.20 per litre of diesel equivalent for biodiesel made from virgin rapeseed oil—i.e., about the same as, or slightly higher than, the retail price of diesel (excluding VAT).

Table 5.6 Support for biodiesel per unit of fossil fuel displaced

Indicator	Unit	Biodiesel from used cooking oil		Biodiesel from canola (rme)	
		Low	High	Low	High
Support per litre of diesel equivalent (note 1)	€ /Litre equivalent	0.55			
Displacement factor (note 2)	GJ fossil-fuel input / GJ output	0.11	0.23	0.37	0.55
Net gain in non-fossil energy	Percent	77–89%		45–63%	
Support per litre equivalent of fossil fuels displaced (note 3)	€ /Litre equivalent	0.60	0.70	0.90	1.20

Notes:

(1) For explanation of the ranges, see note (3) to Table 5.4.

(2) Ranges reflect ranges in literature for, respectively cellulosic ethanol and biodiesel made from canola (rape) oil.

(3) Equals support per litre of diesel equivalent divided by the percentage net gain in non-fossil energy.

Sources: •**support estimate:** GSI; • **displacement factor:** GSI estimates, based on CSIRO et al. (2003); and Zah et al. (2007).

5.4 Support per tonne of CO_2-equivalent displaced

A final issue worth examining is the subsidy per unit of CO_2-equivalent displaced through the substitution of biofuels for their petroleum-derived equivalents. The key policy question is whether these investments are efficient with regards to GHG mitigation.

As a measure of cost-effectiveness, the level of support per unit of CO_2-equivalent avoided are compared with the cost of purchasing carbon credits. Buying GHG reductions by subsidizing grain-based ethanol is not very efficient, costing at least € 2,100 (US$ 2,600) per tonne of CO_2-equivalent avoided (Table 5.7). The cost per

CO_2-equivalent tonne avoided through ethanol drived from sugarbeet is lower, though higher than many other GHG mitigation options, falling somehere in the neighbourhood of € 575 to € 800 (US$ 720 to US$ 1000).

Table 5.7 Support per tonne of CO_2-equivalent avoided from using ethanol

Indicator	Unit	Ethanol from sugarbeets		Ethanol from grain	
		Low	High	Low	High
Baseline emissions (from gasoline or petroleum diesel)	Kg of CO_2 equivalent/GJ	94			
Percentage reduction from baseline	Percent	50%	65%	8.5%	18%
Support per GJ of biofuel consumed	€ /GJ	35			
Support per tonne of CO_2 equivalent avoided (note 1)	€ /Tonne of CO_2 equivalent	575	800	2,100	4,400
	US$ /Tonne of CO_2 equivalent	720	1,000	2,600	5,500
Price of a CO_2-equivalent offset, Chicago and European Climate Exchanges, FY 2006–2007 (note 2)	€ /Tonne of CO_2 equivalent	US$ 4.40 (~ € 26) to ~ US$ 33 (€ 26)			

Notes and Sources:

(1) Calculated as support per GJ divided by the product of the baseline emissions and the percentage reduction. Ranges reflect the combination of ranges of subsidy values and estimated emission reductions.

(2) Maximum average of daily trades of futures contracts on the Chicago Climate Exchange (CCX CFI) and the European Climate Exchange (ECX CFI) to date. Euro to U.S. dollar conversions made at the average rate in 2006 of 1.2563 dollars per euro.

Sources: •**support estimates:** GSI; • **CO_2-equivalent reduction values:** GSI estimates, based on CSIRO et al. (2003) , Edwards et al. (2007) and Zah et al. (2007); • **CO_2-equivalent futures prices:** Chicago Climate Exchange (www.chicagoclimatex.com/market/data/summary.jsf) and the European Climate Exchange (www.europeanclimateexchange.com/index_flash.php).

In the case of biodiesel, the cost of avoiding a CO_2-equivalent tonne is about € 600 to € 800 (US$ 760 to US$ 1,000) if the biodiesel is made from virgin plant oils, but under € 220 (US$ 275) per tonne of CO_2 equivalent for biodiesel made from used cooking oil (Table 5.8).

No matter what the biofuel, however, the support levels are not particularly cost-effective. For the same cost of obtaining one tonne of CO_2-equivalent reduction through public support for ethanol, even ethanol produced from sugarbeet, the government could have purchased at least 160 tonnes, and perhaps as many as 230 tonnes, of CO_2-equivalent offsets on the Chicago Climate Exchange (assuming a price of under US$ 4.40 per tonne of CO_2-equivalent); the transfers would have purchased between 17 and 24 tonnes on the European Climate Exchange. For the same cost of one tonne of CO_2-equivalent reduction through public support for biodiesel, even biodiesel made from used cooking oil, the government could have purchased between 6 and 230 tonnes of CO_2-equivalent offsets.

Table 5.8 Support per tonne of CO_2-equivalent avoided from using biodiesel

Indicator	Unit	Biodiesel from used cooking oil		Biodiesel from canola oil	
		Low	High	Low	High
Baseline emissions (from gasoline or petroleum diesel)	Kg of CO_2 equivalent/GJ	82.32			
Percentage reduction from baseline	Percent	85%	89%	23%	30%
Support per GJ of biofuel produced	€ /GJ	19			
Support per tonne of co_2 equivalent avoided (note 1)	€ /Tonne of CO_2 equivalent	210	220	600	800
	us$ /tonne of co_2 equiv.	260	275	760	1,000
Price for a CO_2-equivalent offset, US climate exchange (note 2)	US$ /tonne of CO_2 equivalent	US$ 4.40 (~ € 26) to ~ US$ 33 (€ 26)			

Notes and Sources:

(1) Calculated as support per GJ divided by the product of the baseline emissions and the percentage reduction. Ranges reflect the combination of ranges of subsidy values and estimated emission reductions. See note 2 to Table 5.6.

(2) Maximum average of daily trades of futures contracts on the Chicago Climate Exchange (CCX CFI) and the European Climate Exchange (ECX CFI) to date. Euro to U.S. dollar conversions made at the average rate in 2006 of 1.2563 dollars per euro.

Sources: •**support estimates:** GSI; • **CO2-equivalent reduction values:** GSI estimates, based on CSIRO et al. (2003), Edwards et al. (2007) and Zah et al. (2007); • **CO2-equivalent futures prices:** Chicago Climate Exchange (www.chicagoclimatex.com/market/data/summary.jsf) and the European Climate Exchange (www.europeanclimateexchange.com/index_flash.php).

6 Discussion and Recommendations

This report set out to provide a comprehensive survey of public support to date for liquid biofuels in the EU. Although data and resource limitations prevented us from identifying and quantifying all the subsidies now supporting EU Member State's ethanol and biodiesel industries, we believe we have in large measure accomplished that goal. By constructing an integrated picture of subsidies to biofuels at both the European and Member State levels of government, and examining a wide variety of programs, we have assembled a more comprehensive assessment of the level of public support than has previously existed. We hope that other researchers will be able to build on this study, correct errors and continue the process of quantifying support to the industry.

The picture that emerges from our analysis of biofuels markets shows that the level of support to ethanol and biodiesel is significant in the EU, and strongly linked to volumes produced or consumed. Moreover, this support has been provided through a large number of programs, mainly provided by the Member States. The diversity of approaches across multiple jurisdictions makes developing a comprehensive picture of support to biofuels in the EU a major challenge.

6.1 Key Findings

Total support for biofuels in EU is currently around € 3.7 billion annually

The largest subsidies remain those provided through relief from fuel excise taxes, but many Member State programs provide significant amounts of support to their domestic industries through other means. In total, subsidies provided for liquid biofuels are currently approximately € 1.3 billion for ethanol (€ 0.74 per litre) and € 2.4 billion for biodiesel (€ 0.50 per litre).

Because of incomplete data, any estimate is likely to be an underestimate

These are probably gross underestimates of the total amount of support provided, as many subsidies are underreported. No central database exists on their nature and scale. The reports of national programs to the European Commission provide some degree of transparency. But often key information is lacking, especially on support for capital investment. Countries typically report their rates of subsidization, but not the actual amounts spent. Moreover, to translate even the reported information into suitable comparable subsidy metrics requires a considerable amount of expertise and effort.

Differences in the approaches taken by Member States means that rates of support for biofuels are not uniform across the EU

The difficulty of obtaining information on actual expenditure at the Member State level is complicated by the wide variation in support policies across the EU. Although the European Commission has established guidelines according to which support may be provided, and has established a system for monitoring progress towards the achievement of its objectives in the area of biofuels, the Member States have been allowed considerable discretion in the manner and amounts of support that they can provide to their individual industries. Although such an approach is consistent with the principle of subsidiarity, it has created a complex system of support, with varying degrees of protection against competition from imports from non-EU countries.

The lack of standardized and up-to-date information on the EU biofuels industry also makes it difficult to estimate levels of support

Assessing support is also hampered by inadequate data on such variables as the amounts of feedstock used for the production of biofuels, and production, consumption and trade in biofuels by country. Some information on capacity and production is reported by the industry and by some governments, but only on an annual basis. Given the rapid pace of expansion of the industry, much more up-to-date and comprehensive information is needed in order to measure the implications of policies on future subsidies.

Data on trade—both intra-EU and with third countries—is similarly poor. Because trade statistics do not provide specific tariff lines for either fuel ethanol or biodiesel, analysts can only estimate approximate trade flows.

Subsidies to biofuels are set to continue to grow through 2020

Nonetheless, enough is known about the setting of current support policies and plans for the continued expansion of the sector to conclude that subsidies to biofuels in the EU are likely to grow significantly over the next decade. Because the bulk of support is tied to production or consumption, and blending targets (for 2020 the target of 10 percent is more than five times the current rate of incorporation), the support to biofuels could treble if the current rates of subsidization are not modified.

For those Member States that continue to support biofuels through exemptions or reductions in fuel-excise taxes, the burden on national treasuries will rise in proportion to domestic consumption. For this form of support, at least, the EU has established criteria that require Member States to limit support to the difference between oil prices and biofuels production costs. Thus, if the prices of petroleum fuels were to rise high enough, the Member States would be required to reduce the amounts of any tax exemptions accordingly. On the other hand, it is not clear whether Member States would review the amount of excise tax concessions they grant if production costs were to decline, since these costs are complex to assess.

The trend towards making percentage volumetric targets mandatory, and simultaneously phasing out or eliminating excise-tax concessions, only gives the appearance of reducing support to the industry. What it does, however, is transfer the burden of supporting the sector to consumers. Up to the point at which the biofuel target is satisfied, the market will clear at whatever price is necessary to bring forth the needed supplies. And, barring a large increase in the price of petroleum products, that price could be very high.

A mitigating factor in the biodiesel market could be imports from countries with lower production costs. The relatively low MFN tariff (6.5 percent ad valorem) on biodiesel means that if EU-produced biodiesel becomes too costly, blenders could (within the limits imposed by quality restrictions) easily turn to imports. The same situation does not exist for fuel ethanol, however, which attracts specific-rate tariffs of € 0.192 per litre for undenatured ethanol and € 0.102 per litre for denatured ethanol imported from countries to which the EU applies its full MFN tariffs.

The ways in which biofuels are encouraged are among the most market and trade distorting

The balance of support to biofuels are provided in ways—through tariffs, excise-tax concessions and mandates, or some combination of these—that are directly related to levels of production, consumption or input use, and therefore potentially market and trade distorting. Moreover, this has the potential to add to the distortions that already exist in the international markets for agricultural products and energy.

In principle, the mandates, tax concessions and area payments for energy crops do not specify particular feedstocks, and in the future could be met by ethanol and biodiesel made from a great diversity of biomass types. Because the costs of producing biofuels from feedstocks other than food or feed crops (and a limited volume of waste or by-products) are still prohibitively high, however, the current support policies are directly affecting production choices in favour of crops used for making first-generation biofuels—namely, wheat, maize and oilseed rape.

Nor are distortions created by current policies confined only to the supply side. Several countries have adopted policies that specifically support ownership or operation of vehicles, especially FFVs able to operate on high blends of ethanol, through reduced taxes or regulatory preferences. In contrast with a technologically neutral policy, such as a carbon or pollution tax, such policies favour one way of addressing oil use and reducing GHG emissions over others that may be more cost-effective.

The settings of current support policies are frequently ad hoc

Not only are most of the current support measures market distorting, but the settings of current policies show little evidence of having been determined through any cost–benefit or cost-effective analysis and every indication of having been determined through political compromise. The complete exemption of a biofuel from the fuel-excise tax charged on its petroleum counterpart, for example, may appear logical, but only by

coincidence is likely to reflect the difference in net social costs between the two fuels. And the percentage targets themselves—2 percent in 2006 and 10 percent in 2020—are simply conveniently round figures.

The rationales for maintaining subsidies to biofuels merit re-examination

Government subsidies to liquid biofuels in the EU are used to pursue different policy objectives. Biofuels production is supported as a way to reduce oil imports and prices, improve air quality, and reduce CO_2 emissions. They have also been promoted as a way to expand the markets for arable crops in order to raise farmer incomes and promote rural development. Yet economic theory warns that promoting multiple policy objectives with one set of policies is rarely efficient.

Evaluating the alternatives to subsidizing biofuels was beyond the scope of this study. However, the subsidy costs per unit of conventional energy and carbon displaced that we have estimated do suggest that there may be many quicker and cheaper ways to achieve these same goals. Before setting a higher target for biofuels use in 2020, the Commission should conduct a comparative study in order to assess if the current and future support granted to the biofuels sector is justified or if there are more efficient ways to reach the Community's objectives.

The cost-effectiveness of subsidies to biofuels in the EU is low

The absolute value of subsidies to an industry is not the only, and perhaps not the main, indicator of the market-distorting potential of a set of support policies. Per unit of energy produced, the transfers generated by policies supporting liquid biofuels are high—on a thermal-equivalent basis, in the neighbourhood of € 35 per gigajoule for ethanol and € 15 per gigajoule for biodiesel. Transfers as a share of market value were around 60 percent or greater as of mid-2007, and would rise if gasoline and diesel prices were to fall.

Such high rates of subsidization might be considered reasonable if the industry were new, and ethanol and biodiesel were being made on a small-scale, experimental basis using advanced technologies. But that is not the case for the most part: ethanol is being produced using mature technologies that, notwithstanding progressive improvements, have been around for decades. Biodiesel manufacturing is more recent in the EU but it is based on long-established chemical processes that are well understood.

Supporting first-generation biofuels is not a cost-effective way to reduce greenhouse-gas emissions

Biofuels have some greenhouse gas and local pollution benefits. But the cost of obtaining a unit of CO_2-equivalent reduction through subsidies to biofuels is very high, especially for biofuels produced from virgin materials. We calculate that subsidies per tonne of CO_2-equivalent avoided are between € 575 and € 800 for ethanol made from sugarbeet, and around € 215 for biodiesel made from used cooking oil, and over € 600 for biodiesel made from rapeseed. Hence, even with best-case scenario assumptions for GHG reductions from biofuels, one could achieve far more reductions for the same amount of money by simply purchasing the reductions in the marketplace. The cost per tonne of reductions achieved through public support for biofuels in the EU could purchase more than six tonnes of CO_2-equivalent offsets on the European Climate Exchange. Whether the benefits of reduced local air pollution, energy supply security and employment opportunities would warrant this additional cost to the taxpaying public is unproven.

Some differential in the excise tax might be appropriate to reflect the lower emissions of atmospheric pollutants produced from biofuels, and their (generally) lower life-cycle emissions of greenhouse gases compared with unleaded petrol and low-sulphur diesel. But the differential is likely to be smaller than the current support level. A tax of € 30 per tonne of CO_2, for example, would equate to € 0.07 per litre of petrol. That is far lower than the current excise-tax differential between petrol and ethanol, or diesel and biodiesel, in most EU countries. In any case, that differential would represent an upper limit even if biofuels could offset 100 percent of the CO_2 emissions from petroleum fuels. They do not, but moreover the life-cycle GHG emissions of biofuels differ enormously, depending on the kind of feedstock used, and how they are produced and processed. Some ethanol produced in the EU from sugarbeet currently results in 65 percent reductions in GHG emissions compared with petrol on a life-cycle basis (Edwards et al., 2007 and Zah, 2007). But other plants, such as those that use wheat or rye as a feedstock, yield much smaller GHG emission reductions.

Despite these differences, all biofuels currently receive the same excise-duty treatment pertaining to their category (ethanol, biodiesel, straight vegetable oil). Some of the measures being considered at both the EU

level and in some Member States envisage establishing minimum threshold criteria for qualifying for tax exemptions. These criteria would relate to emissions of CO_2 on a life-cycle basis and also probably to the sustainability of the biofuel and feedstock for biofuel production process (to ensure that imported feedstock was not grown in the rainforest, for instance). How the system would be applied, especially in respect of biofuels (or their feedstocks) imported from outside the EU, is not yet known, however.

The potential for unintended consequences is large

Subsidies to liquid biofuels are being injected into an agricultural economy that, although less distorted than in the past, is certainly affected by distortions at the global level. Moreover, the wider markets in which feedstocks for, and the by-products of, biofuel manufacturing are sold are subject to considerable volatility. Risks of unintended consequences are plentiful.

Concerns over competition for biomass feedstocks between biofuel and other consumers of those same feedstocks argue for caution. Farmers should of course be free to plant crops for biofuel production, and manufacturers to make biofuels, as long as they conform to prevailing environmental standards. But by establishing mandates for biofuel consumption, the EU has interfered with the workings of a market that previously was geared to the production of food, animal feed and a small number of industrial products. While this study has not examined the question of fuel–food competition, we would note that many economic assessments of feedstock outlet markets under increasing demand for biofuels imply rising crop prices. Were demand to grow quickly it is likely that shifts in the fuel–food balance could also occur quickly, with important economic and social implications beyond the EU's borders.

Political support for biofuels is clearly strong in the EU, especially from crop farmers. Yet there has never been a more urgent need to examine the claimed benefits from biofuel subsidies, and to compare them with the costs of meeting the same goals in other ways.

6.2 Recommendations

Our advice to the EU and its Member States derives from the foregoing analysis and observations:

Resist instituting new blending mandates for biofuels, at least without first undertaking a thorough examination of the costs and benefits of doing so. The Commission is to be commended for soliciting comments from the public regarding its proposals to make its target values for biofuels obligatory. Once a mandate is established, it is difficult to abandon it as significant investments will have been made on the assumption that the mandate will continue indefinitely. Moreover, it creates a priority for fuel over competing uses of feedstock, which might otherwise have a higher value use. It also creates a priority for biofuels over other bioenergy technologies such as biogas or combustion that are often much more cost effective and save more GHG emissions.

Eliminate all tariffs on imported fuel ethanol. Some fuel ethanol is imported into the EU duty-free. But continued maintenance of high specific-rate tariffs on fuel ethanol imported from the most efficient producers runs counter to the professed policy of the EU to encourage the substitution of petrol by ethanol, protects EU producers from competition, and adversely affects efficient producers in developing countries.

Avoid providing new specific subsidies to the industry, and move to re-instate fuel-excise taxes on biofuels where this has not already been done. The current Community scheme grants excise-tax exemptions or reductions for six years, and these concessions can be renewed. In effect, this type of support can therefore be prolonged indefinitely. If consumption of biofuels increases substantially, the losses in tax revenues over time could be substantial.

Put in place an evaluation process that will assess if the current policy of support allows each Member State to attain all of the three objectives behind the EU biofuels policy. In the absence of evaluation mechanism, the current policies provide a uniform level of support for ethanol, irrespective of how it is made, and for biodiesel, irrespective of how it is made. Criteria to assess the energy efficiency and the environmental performance of the biofuels produced in the EU should be established and any tax differentiation favouring biofuels over other fuels should reflect differences in net social costs only. Frequent re-evaluation of policy settings would avoid the renewal of inefficient policies and the spending of public funds to support some biofuels production that neither reduces energy dependency nor reduces significantly the emissions of GHGs.

Improve the information available on support provided to the biofuels industry, and the effects of such support. More research into the effects of continuing to promote domestic production of liquid biofuels is sorely needed. But good research requires data, and that in turn necessitates that the Member States collect and publish better data than they have so far on the production of biofuels and their demand for feedstocks. Some information on actual support to biofuels is reported, but much related to support for capital investments and for consumption is extremely difficult to identify and quantify. As a result, it is hard to obtain an accurate picture of what the public is getting for its money.

Develop specific customs classifications for fuel ethanol and biodiesel. Because fuel ethanol and biodiesel are not covered by their own customs classifications, intra-EU and extra-EU trade flows cannot be assessed. Data on trade in biofuels needs to be collected systematically by the Member States, according to a common methodology, and communicated to the Commission so that it can be disseminated publicly.

Focus support on second-generation biofuels and not on first-generation as is currently the case. The high concentration of subsidies on first-generation biofuels does not encourage firms to invest in second-generation technologies (a necessary breakthrough if the EU wants to reach its targets) and makes the EU biofuels industry an "eternal" infant.

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Danish Energy Authority:
http://www.ens.dk

Dutch Ministry of Housing, Spatial Planning and the Environment:
http://international.vrom.nl

EcoFund Foundation:
http://www.ekofundusz.org.pl

Energías Renovables – Clean Energies Journalism:
http://www.energias-renovables.com

Energinet.dk:
http://www.energinet.dk

Ener-Iure Project:
http://eneriure.jrc.es

European Biodiesel Board (EBB):
http://www.ebb-eu.org

European Bioethanol Fuel Association
http://www.ebio.org/home.php

European Climate Exchange:
http://www.europeanclimateexchange.com/index_flash.php

European Commission, DG for Agriculture and Rural Development
http://ec.europa.eu/agriculture

European Commission, DG for Energy and Transport
http://ec.europa.eu/dgs/energy_transport/index_en.html

Eurostat:
http://epp.eurostat.cec.eu.int

Finnish Technology Development Centre (TEKES):
http://www.tekes.fi

German Agency of Renewable Resources (FNR):
http://www.fnr.de

German Association for Bioenergy (BBE)
http://www.bioenergie.de

Greek Ministry of Development:
http://www.ypan.gr

International Energy Agency (IEA)
http://www.iea.org

Intelligent Energy – Europe Programme:
http://ec.europa.eu/energy/intelligent/index_en.html

Irish Department of Communications, Marine and Natural Resources:
http://www.dcmnr.gov.ie

OneNorthEast England Regional Development Agency:
http://www.onenortheast.co.uk

SenterNovem:
http://www.senternovem.nl

Sixth Framework Programme:
http://www.cordis.europa.eu/fp6

Sustainable Energy Ireland (SEI):
http://www.irish-energy.ie

Swedish Energy Agency:
http://www.stem.se

TARIC database:
http://ec.europa.eu/taxation_customs/dds/en/tarhome.htm

Union zur Förderung von Oel- und Proteinpflanzen e.V. (UFOP):
http://www.ufop.de

USDA Foreign Agricultural Service:
http://www.fas.usda.gov

Annex: Descriptive summary of current national policies delivering subsidies

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
Assistance to outputs (excise-tax exemptions)					
Austria	Tax exemption for pure biofuels until 2011. E85 exempt from mineral oil tax.	Biodiesel; ethanol; vegetable oil	Fiscal measure	Biodiesel: € 325 per 1,000 litres Ethanol: € 445 per 1,000 litres	
Belgium	Tax exemption, 2006 to 2011, within an annual quota. In the case of ethanol, a minimum blend of 7 percent is required. For biodiesel, the minimum blend is currently 3.37 percent (increasing to 5 percent).	Biodiesel; ethanol; ETBE; vegetable oil (colza)	Fiscal measure	Biodiesel: € 163 per 1,000 litres Ethanol: € 353 per 1,000 litres ETBE: € 278.33 per 1,000 litres Vegetable oil (colza): € 376.34 per 1000 litres	Annual quota: Biodiesel: 257,760 litres Ethanol: 37,884 litres
Cyprus	Tax exemptions on biofuels for transport, 2006 to 2010.	Biodiesel; ethanol; vegetable oil	Fiscal measure	Full exemption, rate not known	
Czech Republic	Tax exemption on the biodiesel portion in 31 percent blends, 2004-2010.	Biodiesel	Fiscal measure	Biodiesel: € 331 per 1,000 litres Ethanol: tax exemption under consideration	
	(i) Pilot projects: Grant funding for the pilot production of ETBE in 1999. (ii) A subsidy is offered for fermented, dewatered alcohol, for use in the manufacture of ETBE.	ETBE	Production-related grant for pilot projects	(i) € 410 per 1,000 litres (ii) € 100 per 1,000 litres	
Denmark	Tax exemption, 2005 to 2010. The total taxes on conventional petrol and diesel are not affected and a rebate only on the CO_2-tax component of biofuels is provided.	All biofuels used for transport	Fiscal measure	Biodiesel: € 355 per 1,000 litres Ethanol: € 30 per 1,000 litres	
Estonia	Tax exemption, 2005 to 2011 on pure biofuels and the biofuel content in blends.	Biodiesel: ethanol; biomethanol;	Fiscal measure	Full tax exemption, rate unknown. Total cost of the policy is estimated at EEK658 (€ 42 million) million	Potential beneficiaries must obtain a biofuel permit.

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
		vegetable oils		over the six years.	
Finland	A tax reduction was provided to two demonstration projects in 2004.	Ethanol	Output payment	Tax on the ethanol component in blends of ethanol and petrol was reduced by 30 cents per litre	
France	Partial tax exemptions are applied to quantities of biofuels within a production quota. Distributors are required to pay the General Tax on Polluting Activities (TGAP) if they fail to comply with biofuel incorporation objectives. A reduced excise tax is applied on the biodiesel component of B30 (note: B30 is authorized only for use by public and commercial fleets). The ethanol component of E85 is exempted from the excise tax, and the gasoline component benefits from a reduced excise tax.	Biodiesel; ethanol; ETBE	Fiscal measure	As of 2007, within-quota production: Biodiesel: € 250 per 1,000 litres Ethanol: € 330 per 1,000 litres ETBE: € 330 per 1,000 litres TGAP rate increases each year, from 1.2 percent in 2005 to 5.75 percent in 2010). Biodiesel component of B30: € 25 per 1,000 litres. E85: Zero tax on ethanol component, € 33.43 per 1,000 litres on gasoline component (compared with € 60.69 on regular gasoline)	2007 quota (tones): Biodiesel: 1,342,503 Ethanol: 337,147 ETBE: 224,648 Within quota biofuels must be produced by government-designated operators, allocated by public tender.
Germany	Quantities of biofuels required to reach the mandatory blending requirements are not tax exempt. Biofuels sold in excess of the quota, as well as E85, will still benefit from tax relief. This policy is in place until 2011.	Biodiesel; ethanol; ETBE; biomethanol; MTBE; DME; vegetable oils	Fiscal measure	Biofuels replacing diesel: € 470.40 per 1,000 litres Biofuels replacing petrol: € 654.50 per 1,000 litres	Tax exemption only on above-quota quantities.
Greece	Tax exemption on biodiesel from 2007.	Biodiesel	Fiscal measure	Biodiesel: € 260 per 1,000 litres.	
Hungary	Tax exemption, 2005 to 2010, proportionate to the volume of biofuel in final blends, limited to a maximum 5 percent in the case of biodiesel and 15 percent in the case of ETBE. Ethanol is exempted only as a component of ETBE. The exemption is granted for 47 percent of the ETBE in the	Biodiesel; ETBE	Fiscal measure	Biodiesel: € 340 per 1,000 litres ETBE: € 414 per 1,000 litres	Exemption limited up to 2 percent of the total quantity of motor fuel placed on the market in 2005. This limit will be increased by 0.25 percent each year until

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
	final product blend, which corresponds to its biofuel contents.				2010.
Ireland	Tax exemption, 2006 to 2010, within an annual quota.	Biodiesel; ethanol; pure plant oil	Fiscal measure	Biodiesel: € 368 per 1,000 litres Ethanol: € 443 per 1,000 litres	2007 quota (tonnes): Biodiesel: 52,816 Ethanol: 67,087
Italy	Tax exemption, 2001 to 2010, for pure biodiesel and the volume of biodiesel in blends (containing 5 percent to 25 percent of biodiesel) within an annual quota.	Biodiesel	Fiscal measure	Biodiesel: € 382 per 1,000 litres	2007 quota: 200,000 tonnes
Latvia	Tax exemption, until 2011.	Biodiesel; ethanol; vegetable oil	Fiscal measure	Biodiesel: € 230 per 1,000 litres Ethanol: € 270 per 1,000 litres	
	Aid granted directly to biofuel producers according to their annual quota allocated in proportion to their production capacities.	Biodiesel; ethanol	Direct payment	Ethanol: LVL 140 (€ 96.6) per 1,000 litres Biodiesel: LVL 170 (€ 117.3) per 1,000 litres.	2005 quota (litres): Ethanol: 11,392,000 Biodiesel: 12,500,000
Lithuania	Tax exemption, 2006 to 2010, proportionate to the volume of biofuel content in the final fuel blend. Biofuels can also be exempted from the pollution tax but a potential beneficiary is required to conform to set quality standards and submit documents confirming actual biofuels consumption.	Biodiesel; ethanol; ETBE; vegetable oils	Fiscal measure	Biodiesel: € 244 per 1,000 litres Ethanol: € 279 per 1,000 litres	
	Direct financial support is granted to grain ethanol and biodiesel producers.	Biodiesel; grain ethanol	Direct payment	Biodiesel: LTL 160 (€ 42.24) per tonne Ethanol: LTL 114 (€ 30.28) per tonne	
Luxembourg	From January 2007, non-compliance with the 2 percent mandatory blend requirement results in tax penalty.	Biodiesel	Fiscal measure	From 2007: Tax penalty for non-compliance with mandatory blend requirement: € 1,200 per 1,000 litres that the operator failed to supply.	
Malta	Tax exemption, as of 2005. Exemptions from the excise tax are granted to pure biofuels and the biofuel content in blends.	Biodiesel; ethanol; biomethanol;	Fiscal measure	n.a.	

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
		vegetable oils			
Netherlands	An exemption from the excise tax was granted during 2006 only for biofuels blended with fossil fuels up to 2 percent.	Biodiesel; ethanol; ETBE	Fiscal measure	Biodiesel: € 305 per 1,000 litres Ethanol € 505 per 1,000 litres	2006 only
	Since 2003, the output of pure plant oil used for fuel, produced by three demonstration plants with a combined annual capacity of 7 million litres, has benefited from an exemption of the excise tax. The value of this tax relief amounts to almost € 2.5 million per year. The exemption is due to expire at the end of 2010.	Pure plant oil	Fiscal measure	Pure plant oil: € 350 per 1,000 litres	
Poland	Tax exemption, 2007 to 2011.	Biodiesel; ethanol; ETBE; MTBE; DME; vegetable oils	Fiscal measure	Biodiesel: 104 PLN (€ 260) per 1,000 litres Ethanol: 156 PLN (€ 390) per 1,000 litres	The exemptions may not exceed the excise duty due on the sale of these fuels.
Portugal	Tax exemption for biofuels, within a production quota.	Biodiesel; ethanol	Fiscal measure	Rate of exemption not known.	Details of the quota not known.
Slovakia	Tax exemption, since 2004. Biocomponents blended with fossil motor fuels, in an amount not exceeding 5 percent vol. in the case of esters and in an amount not exceeding 15 percent vol. in the case of ETBE, are not subject to excise duty.	Not specified	Fiscal measure	Biodiesel: € 348 per 1,000 litres Ethanol: € 372 per 1,000 litres	
Slovenia	Tax exemption, proportionate to the volume of biofuels in the end product.	Biodiesel; ethanol; ETBE; DME	Fiscal measure		The exemption must not exceed 25 percent of the excise duty paid.
Spain	Tax exemption until 2012. The tax break is applicable exclusively to the volume of biofuels in blended product, whether in pure or blended form.	Biodiesel; ethanol	Fiscal measure	Biodiesel: € 269 per 1,000 litres Ethanol: € 372 per 1,000 litres	
Sweden	Tax exemption, to 2013. The exemption is applicable to biofuels in pure form or on the biofuel portion of blended fuels.	All CO_2-neutral fuels	Fiscal measure	Biodiesel: € 390 per 1,000 litres Ethanol: € 530 per 1,000 litres	
	Tax exemption, 2003 to 2007, for fuels produced by pilot plants aimed at promoting the development of	Biofuels	Fiscal measure	Biofuels replacing petrol: a maximum of € 470 per 1,000 litres	Ethanol-related projects must be approved by

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
	environmentally friendly fuels. The annual cost to the government is estimated to be about € 16.5 million (SEK150). In 2005, this scheme was granted a one-year extension, until end 2008.			Biofuels replacing diesel: a maximum of € 320 per 1,000 litres	the European Commission.
United Kingdom	Tax exemption for biodiesel, 2002 to 2007.	Biodiesel	Fiscal measure	Biodiesel: € 289 per 1,000 litres	
	Tax exemption for ethanol, 2005 to 2010.	Ethanol	Fiscal measure	Ethanol: € 289 per 1,000 litres	
Assistance to value-adding factors (capital, land, labour)					
Austria	Biofuel production facilities can receive support under the *Austrian Rural Development Programme*, where farmers own at least 51 percent of the facility in question.	Biodiesel; ethanol	Capital grants	A maximum of 55 percent of the total investment costs for private or community facilities can be subsidised	At least 75 percent of the biomass must be derived from the local region.
	Investment support is also available through domestic environmental support measures, applicable where farmers do not have majority ownership.	Biodiesel; ethanol	Capital grants	A maximum of 30 percent of the investment costs can be subsidised.	
Belgium	Walloon Region: Since 2006, an investment subsidy and exemption from real estate taxes is available to companies that carry out an investment programme aiming at a sustainable use of energy.	Renewable fuels	Capital grants and tax exemption	Walloon Region: Grants range from 20 to 40 percent but cannot exceed € 1 million over 4 years for an SME or € 2 million for a larger enterprise.	Walloon Region: Real estate tax exemption can be granted for up to 7 years.
	Flemish Region: Since 2006, the state electricity utility invested € 12 million in a fund to support emerging renewable energy.				
	The *Tax Deduction for Environmentally-Friendly Investments* program provides support for investments including non-polluting treatment of industrial and urban waste.		Capital grants	13.5 percent of costs; up to 25.5 percent for especially innovative investments	
Cyprus	The *Grant Scheme for Energy Conservation and the Promotion of Renewable Energy Sources 2004-2006* included measures that support the production of biofuels.	Biofuels	Capital grants	A maximum of 40 percent of the eligible costs can be subsidised.	The grant must not exceed CYP400,000 (€ 690,000).
Czech Republic	Direct support was provided to biodiesel producers during 2004 to 2006 as non-reimbursable subsidies to producers	Biodiesel	Capital grants	From 2004 to 2005: € 257 per 1,000 litres (€ 292 per tonne) of	Cap from 2004 to 2005: 113.6 million litres

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
	located in the Czech Republic, within a cap.			RME Revised in 2005: € 232.9 per tonne of RME	(100,000 tonnes). Cap in 2006: 125,000 tonnes.
Denmark	The Danish Government has set aside funds for co-financing large scale private development programs for second generation technologies.	Second-generation technologies		A total of DKK200 million (€ 27 million) has been set aside.	
Estonia	The *Estonian National Development Plan: Business Development* aims to strengthen existing firms and stimulate formation of new firms.		Business plan grant	Granted € 3,682 in 2005 to support development of business plans for biofuel producers.	
Finland	The Ministry of Trade and Industry may grant investment aid (energy aid) to businesses and the non-corporate sector to promote the use of renewable energy sources, including biofuels.	Renewable fuels	Capital grants		
Germany	Approximately € 400-500 million were invested for the production of biodiesel in recent years. It is not clear how much of this might be government contributions, relative to private investments.				
	Annual expenditure on investment support for bioenergy amounted to € 1.4 billion in 2002, € 1.57 billion in 2003 and € 1.75 billion in 2004. The share of funds directed towards biofuel projects has not been separately identified.		Capital grants		
Greece	The *Operational Programme for Competitiveness* (OPC) was initiated in 2000 and provides support for environmentally friendly investments. Greece's two biodiesel plants have received financial aid under the OPC, but the exact amounts have not been identified.		Capital grants	Maximum available support in the field of renewable energy sources and biomass is 40 percent of the total budget.	
Ireland	Biofuel projects benefit from capital grants under the *Sustainable Energy* program.		Capital grants	Biodiesel: 10 percent of the capital cost for plants with capacities between 15 and 25 million litres per year, or 25 percent for plants less than 10 million litres. Ethanol: 10 percent of capital costs	

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
				for plants of 15 to 25 million litres.	
Latvia	In 2005 the government granted subsidies totalling LVL500,000 (€ 746,269) for the development of oilseed processing plants.		Capital grants		
	Infrastructure and Services program supports fuel conversion projects to reduce the impact of energy production on the environment. This program is financed by the European Investment Bank and the European Bank of Reconstruction and Development.		Capital grants	Funding totalled € 11,198,609 (LVL7 886,345) in 2005.	
	In 2005 the government paid LVL2 million (€ 3.4 million) to farmers on 56,439 hectares for rapeseed production.		Subsidies to land		
Netherlands	The government has allocated € 60 million in capital support over f2006 to 2010 to encourage the development of innovative biofuels.		Capital grants		
	The Energy Investment Deduction Scheme allows investments in renewable energy sources, including liquid biofuels, to be deducted from taxable profit up to a fixed percentage of the investment cost		Tax measure linked to investment	The fixed percentage was 44 percent in 2005; with a taxation level of 31.5 percent for Dutch entrepreneurs, the scheme offers a discount of 12.5 percent of the investment cost if the full deduction is applicable.	Maximum deduction is € 107 million per year per fiscal entity and the investment must amount to at least € 2,000.
Poland	Investments in renewable energy sources can receive financial support from national, regional, district and local funds for environmental protection and water management. Support is allocated to activities specified in the Environmental Protection Act, such as harnessing local renewable energy sources and the introduction of more environmentally friendly energy carriers.		Capital grants	Grants of 15 to 60 percent of total capital costs, depending on the project type and the project investor.	
	Farmers growing rapeseed for biodiesel production qualify for a locally funded subsidy.	Biodiesel	Subsidies to land	€ 46 per hectare.	
Portugal	For the past decade, investments in renewable energy sources have been eligible for support under two programmes: ENERGIA (1994-1999) and MAPE/POE		Capital grants	The subsidy rate under MAPE/POE varies depending on the project, but averages 40 percent of the	

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
	(the Measure for Supporting the Use of Energy Potential and Rational Use of Energy Programme, 2000-2006). Thus far, there has been little, if any, support for biofuel production. According to the IEA, the Portuguese government approved financing of 50 percent of the building costs for a biodiesel plant (approximately € 12.5 million) due on stream in July 2004.			investment cost.	
Spain	The *Plan for Promoting Renewable Energy* (PFER) provided funding for renewable fuels projects until 2004.		Capital grants	The following amounts were allocated to biofuels: 2000: € 2.4 million 2002: € 2.7 million 2003: € 1.1 million	
	Biofuel investments are eligible for support from the Official Credit Institute and the Institute for Diversification and Saving of Energy.		Interest subsidies on capital investment	Up to 70 percent of investments in new fixed assets destined to the production and use of RES can be financed under this scheme, and the benefit provided is a reduction of 0.5 percent of the interest rate.	
	A tax deduction has been in force since 1997 for investments in tangible fixed assets intended for environment protection. An accompanying law from 2002 explicitly recognised the right to the deduction of investments in assets intended for the use of RES.		Tax measures linked to investment		
Sweden	Investments in renewable fuels, in response to Swedish biofuel obligations, can receive a subsidy.			Up to 30 percent of the total investment cost can be financed.	The subsidy may not exceed the investment cost minus the lowest cost needed to fulfil the requirement.
United Kingdom	Regional Selective Assistance Grants (RSA) is a national grant scheme aimed at encouraging investment and job creation in areas designated for regional aid under EU law on Assisted Areas. An RSA grant of GBP 1.2 million (€ 1.8 million) helped fund the Argent Plant in Motherwell, Scotland. The North East Regional Development Agency has also		Capital grants		

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
	offered grant funding to biofuel production. The Biofuels Corporation PLC benefited from a grant of GBP2 million (€ 2.9 million) to help build Europe's largest biodiesel plant at Seal Sands, England.				
	The *Enhanced Capital Allowances* initiative allows biofuel producers to write off the costs of capital assets against their business taxable profits.		Tax measures linked to investment		
Support for intermediate inputs (feedstocks)					
European Union (EU-15 only)	Since 2005, producers of oilseeds and cereals have received support through the Single Farm Payment system, through payments decoupled from production. Farmers can also grow oilseed crops on land that cannot be used for food crops (set aside land). New EU members do not benefit until 2013.	Biofuels	Feedstock subsidy	Because payments are decoupled from production, these subsidies cannot be quantified.	
	The Energy Crop Scheme offers producers incentives to grow crops for energy use, including biofuel production. The scheme was introduced in 2003 for the EU-15 but was extended to all EU member states in 2006.	Biofuels	Feedstock subsidy	€ 45 per hectare.	The maximum eligible area is 2 million hectares.
	Since 1999, 'crisis distillation of wine' has been used to dispose of wine surpluses. The alcohol must be disposed of outside the potable alcohol market, either for industrial or energy uses. In 2005, 7.8 million hectolitres were removed via this mechanism. Approximately 30 percent was dedicated to ethanol fuel, which increased to 50 percent in 2006.	Ethanol	Feedstock subsidy	€ 13 per hectolitre of wine, paid to distillers. € 11 per hectolitre of wine for storage and disposal costs.	
Czech Republic	Since 2001, the *State Agriculture Intervention Fund* buys rapeseed produced on set-aside lands and sells the feedstock to biodiesel producers at a price that enables the final product to be sold 10 percent cheaper than petroleum diesel fuel.	Biodiesel	Feedstock subsidy	Variable rates	
Latvia	From 2003 until May 2004, producers of biofuel from oilseeds were granted a total compensation of LVL 71,000 (€ 105,000), in order to compensate the	Biofuels	Feedstock subsidy		

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
	difference between the higher Latvian price and the international price for their feedstock.				
Lithuania	Lithuania offers support of LTL160 (€ 46.34) per tonne of oilseed rape and LTL60 (€ 17.38) per tonne of cereal grains to farmers growing crops intended for transformation into biofuels.	Biofuels	Feedstock subsidy		
General services (Research and development)					
European Union	The EU Framework Programmes define the Commission's activities in the field of research, technological development and demonstration. The total budget for the Sixth Framework Programme (2002-2006) was € 17.5 billion and € 53.2 billion for the Seventh Framework Programme (2007-2013).	Biofuels	R&D	Sixth Framework Programme: € 72.5 million for biofuel-related projects. Seventh Framework Programme: amounts for biofuel projects not yet available.	
Austria	Research funding is provided both at state and federal levels. More than half of the funds were provided by the government and various funding organisations. Universities and research institutes (which are partly publicly financed) accounted for the remainder.	Biofuels	R&D	Research spending on liquid biofuels was approximately € 253,000 in 2003 and € 186,500 in 2004.	
Cyprus	A major research project, the *Evaluation of Energy Crop Potential in Cyprus*, is being carried out by the Cyprus Institute of Energy, the Agricultural Research Institute and the National Technical University of Athens. It commenced in October 2004, with scheduled completion in October 2007.	Energy crops	R&D	The project received a grant of CYP136,000 (€ 235,000) from the Research Promotion Foundation of Cyprus.	
Denmark	Research projects can receive funding from the Danish Energy Authority through its *Energy Research Programme*.		R&D		
Finland	The Technology Development Centre provides funds for R&D through Technology Programmes and selective project financing.		R&D		
	The Finnish Parliament approved € 9 million for 2006, for the development of novel second generation production	Biofuels	R&D		

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
	technologies for biofuels.				
France	The government-sponsored scientific interest group *Agriculture for Chemicals and Energy* (AGRICE) funds and monitors research and development in the area of biofuels and bio-additives.	Biofuels	R&D	Public funds allocated to biofuels during AGRICE's initial eleven years of activity, 1994 to 2005, amounts to over € 7.2 million.	
	Since 2005, the National Program for Research on Bioenergies has funded 23 projects on biofuels.	Biofuels	R&D	Public funding support totalled € 16.5 million.	
Germany	The federal government provides ongoing funding for R&D projects in the field of biofuels for transport.	Biofuels	R&D	Government contribution was € 6.8 million. Total project costs are € 13.2 million.	
	Grant scheme *Support of demonstration projects for use of energy from renewable sources*, 2005-2010.	Renewable fuels	Demonstra-tion projects	The scheme has a maximum budget of € 8 million a year, but estimates on how much of this will actually benefit biofuels are not available.	
Ireland	Support is available under the Renewable Energy RD&D programme (RERD&D), launched in July 2002.		Pilot projects	Financial support is available in the three categories: (i) shared-cost demonstration (grant support of up to 25 percent of eligible costs); (ii) shared-cost R&D (grant support of up to 45 percent of eligible costs); and (iii) commissioned public good activities (grant support of up to 100 percent)	
Latvia	In 2004, the Technical Department of the Latvian Agricultural University was granted funding for the acquisition of pilot devices and the testing of new ethanol production technologies.	Ethanol	Pilot projects	LVL5,200 (€ 7,800)	
Netherlands	Effective from 2004, *EOS Unique Opportunities* (as part of the Energy Research Strategy) supports transition experiments that contribute to the transition towards a sustainable energy economy in the Netherlands	Sustainable energy	R&D	Selected projects are awarded a subsidy, which is 40 percent of the additional costs compared with a reference situation, in rounds of tenders.	
	The programme GAVE actively supports government and	Biofuels	Marketing &		

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
	market actors to increase biofuel production and use in the Netherlands.		Promotion		
Poland	Recent research in the area of biofuels has been undertaken in the form of targeted projects or broader research projects.	Biofuels	R&D	Targeted projects: total government funding of PLN 1,250,000 (€ 312,500) Broader research projects: PLN 1,039,000 (€ 260,000) 8 additional research projects: PLN 1,601,700 (€ 400,400)	
Spain	The CENIT Biodiesel Initiative is a recent R&D project that will run over the next four years. It aims to identify new raw materials and develop new processes and technologies to produce biodiesel. The project is managed by Repsol YPF and 14 other Spanish companies, and is funded by the Ministry of Industry, Tourism and Commerce.	Biodiesel	R&D	Government funding of € 22 million	
Sweden	The Swedish government supports research, development and demonstration measures for developing more energy-efficient and more cost-effective processes for the production of biofuels.	Biofuels	R&D	Funds provided vary from year to year, but are estimated to amount to at least € 5.5 million a year.	
Support to consumption (distribution infrastructure, biofuel vehicles, biofuel use)					
Belgium	In the Flemish Region, "environmentally friendly investments" are eligible for an *ecological* premium. Only the use, however – not production – of biofuels qualifies for an ecological premium	Biofuels		The subsidy is 35 percent of the costs for SMEs and 25 percent for large companies.	
Cyprus	Registration fees and road taxes for flexible fuel vehicles (FFVs) are set at a low rate. A tax relief is available for the purchase of FFVs.		Alternative fuel vehicles	Registration fees set at € 85 (CYP50) Road taxes set at € 17 (CYP10) Tax relief for FFV purchase: € 1,200	
Denmark	For the period 2006 to 2008, funding has been allocated to support use of biodiesel in specific fleets.	Biodiesel	Alternative fuel vehicles	€ 8 million.	

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
France	Favourable tax measures are in place since 2006 to support ownership of FFVs.		Alternative fuel vehicles	Full exemption from the vehicle tax on FFVs for business use for 2 years; enhanced capital allowance over a 12-month period; relief of between 50 to 100 percent of the proportional tax on registration certificates; relief of 50 percent of the additional tax on registration certificates.	
	The Government created an enhanced capital allowance for investments in fuels stations and deposits.	Biofuels	Distribution infrastruc-ture		
Germany	The *Market Introduction Programme*, introduced in 2000, is a multi-year programme that supports the use of biolubriants, bioplastics and liquid biofuels. The programme will pay 50 percent of the building costs of filling stations for biofuel use in agriculture, forestry or environmentally sensitive areas.	Biofuels	Capital grant for distribution infrastruc-ture	Federal government funding: € 10.22 million per year	
Ireland	Under the RERD&D, grant aid is provided for pure plant oil applications.	Pure plant oil	Capital grants	The subsidy is up to 25 percent support for oil presses and up to 45 percent for vehicle engine modifications (for up to 100 vehicles per project)	
	For 2006 and 2007, a Vehicle Registration Tax rebate is available for Flex Fuel Vehicles.		Alternative fuel vehicles	50 percent Vehicle Registration Tax rebate	Applies to 2006 and 2007
Sweden	From 2002 until 2008, company cars powered by alcohol or gas other than diesel qualify for a tax reduction. “Clean cars” enjoy free parking in several cities and are also exempted from the recently introduced congestion charge in Stockholm.		Alternative fuel vehicles	80 percent reduction tax reduction relative to that for the most closely comparable conventional cars.	
	From 2006 onwards, the largest petrol stations must sell renewable fuels, a requirement that will be extended to additional petrol stations in 2009.	Renewable fuels	Mandatory supply, Capital grants	Operators investing in the distribution of renewable fuels can receive a 30 percent subsidy on investments.	

Subsidy Description		Fuel(s)	Category	Subsidy Rate	Limitations/Other Eligibility Criteria
United Kingdom	The Refuelling Infrastructure Grant Programme aims to increase alternative refuelling stations for road vehicles. Biodiesel is not eligible, as it can be distributed using existing infrastructure.	Transport fuels except biodiesel	Capital grants	30 percent of eligible costs can be funded	Total program budget is £690,000 for 2005-06 (€ 1 million)
Mandatory supply requirements (see Table 3.1 and Table 4.3 in main body of report for further details)					
Austria	2.5 percent in 2006, rising to 5.75 percent by 2010.	Biofuels	Mandatory supply		
Finland	2 percent in 2008, rising to 5.75 percent by 2010.	Biofuels	Mandatory supply		
Germany	4.4 percent in diesel from 2007, rising to 8% by 2015.	Biodiesel	Mandatory supply		
	1.2 percent in gasoline in 2007, rising to 8 percent by 2015.	Ethanol	Mandatory supply		
Luxembourg	2 percent from 2007 onwards.	Biofuels	Mandatory supply		
Netherlands	2 percent in 2007, rising to 5.75 percent by 2010.	Biofuels	Mandatory supply		
Slovakia	2 percent in 2006, rising to 5.75 percent by 2010.	Biofuels	Mandatory supply		
Slovenia	1.2 percent in 2006, rising to 5 percent by 2010.	Biofuels	Mandatory supply		
Spain	3.4 percent in 2009, rising to 5.83 percent by 2010.	Biofuels	Mandatory supply		
United Kingdom	2.5 percent in 2008, rising to 5 percent by 2010.	Biofuels	Mandatory supply		

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