

**Department of Communications, Marine  
and Natural Resources**

- Compliance with Directive 2003/30/EC

*“Report on measures taken to promote the use of biofuels or other  
renewable fuels to replace diesel or petrol.*

*Compliance with Directive 2003/30/EC (Article 4)”*

**1. Introduction**

*DIRECTIVE 2003/30/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 8<sup>th</sup> May 2003 on the promotion of the use of biofuels or other renewable fuels for transport, inter alia, requires Member States to report to the Commission before 1<sup>st</sup> July each year on specific measures to promote biofuels and biomass, indicative targets for market penetration and current market status of biofuels and biomass. In 2004, the Commission has extended this deadline to 1<sup>st</sup> October.*

In their first report following entry into force of this Directive, Member States must indicate the level of their national indicative targets for the first phase. In the report covering the year 2006, Member States must indicate their national indicative targets for the second phase. Differentiation of the national targets, as compared to the reference values referred to in Article 3 (1) (b), must be motivated and could be based on the following elements:

- a) Objective factors such as the limited national potential for production of biofuels from biomass;
- b) The amount of resources allocated to the production of biomass for energy uses other than transport and the specific technical or climatic characteristics of the national market for transport fuels;
- c) National policies allocating comparable resources to the production of other transport fuels based on renewable energy sources and consistent with the objectives of this Directive.

This report sets out Ireland’s position as follows:

- The measures taken or planned to promote the use of biofuels or other renewable fuels to replace diesel or petrol for transport purposes;
- The national resources allocated to the production of biomass for energy uses other than transport;
- The total sales of transport fuel and the share of biofuels, pure or blended, and other renewable fuels placed on the market for the preceding year;
- The national indicative target for the first phase;
- Objective factors which may limit the national potential for production of biofuels.

**2. Measures taken to promote the use of biofuels or other renewable fuels to replace diesel or petrol for transport purposes.**

**National Drivers and Institutional Support**

Ireland published its National Climate Change Strategy in October 2000. This strategy sets out the Government's approach in a ten-year framework to ensure Ireland meets its Kyoto target. The Strategy identifies a range of sectoral and cross-sectoral measures each aimed at achieving reductions in carbon emissions. In terms of the transport sector, the strategy has set a target of reducing greenhouse gas emissions by 2.67m tonnes. In order to assist in this goal, the strategy calls for the introduction of measures that will be used to encourage the use of more CO<sub>2</sub> efficient fuels, including the promotion of alternative clean fuels.

The Green Paper on Sustainable Energy (September 1999) established a revised policy framework for energy efficiency and the use of renewable energy sources in Ireland. The paper provided for the establishment of a new National Energy Authority. The Authority, entitled Sustainable Energy Ireland (SEI) was established on 1st May 2002, and is charged with promoting and assisting environmentally and economically sustainable production, supply and use of energy, in support of Government policy, across all sectors of the economy. Its remit relates mainly to improving energy efficiency, advancing the development and competitive deployment of renewable sources of energy and combined heat and power, and reducing the environmental impact of energy production and use. SEI is charged with implementing significant aspects of the Green Paper on Sustainable Energy and the National Climate Change Strategy. It is also responsible for advising Government on policies and measures on sustainable energy, implementing programmes agreed by Government, and stimulating sustainable energy policies and actions by public bodies, the business sector, local communities and individual consumers. Included in this remit, is the task of promoting further research, development and demonstration of renewable energy technologies and alternative fuels.

SEI have concluded a resource study into the use of recovered vegetable oil and tallow produced from rendering plants with a view to converting such waste materials to bio-diesel<sup>1</sup>. The study shows that there is an immediate potential for 22,000 tonnes of tallow and 5,000 tonnes of recovered vegetable oil to be recycled as biofuels. A copy of this resource study is attached to this Report.

SEI are also funding University College Dublin's participation in the FP6 RENEW project which aims to quantify and map both the existing and the future biomass resources across Europe with a view to developing a liquid fuel from woody biomass that is suitable for use in the vehicles of tomorrow. This project also aims to develop a liquid biofuel from biomass based on Fischer Tropsch synthesis. The project is led by Volkswagen and also includes other partners such as Shell and BP

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<sup>1</sup> A Resources Study on Recovered Vegetable Oil and Animal Fats

A further report “Strategies to Reduce Greenhouse Gases from Irish Transportation” was published by SEI in the last week. The report examines underlying causes for rises in greenhouse gas emissions in the transport sector and recommends a number of reduction strategies. A copy of the publication is attached to this Report.

The Department has engaged international Consultants EcoFys, through SEI, to consider options for the implementation of the Biofuels Directive in Ireland. The Consultants’ report notes the following:

- More detailed evaluation is required on the advantages and disadvantages of various fiscal incentive systems
- Long term biofuels objectives, in line with the EU Directive, can only be met by Ireland in the presence of direct or indirect imports and such opportunities need to be evaluated in more detail
- Policies should be developed to stimulate development of second generation longer-term biofuels, including international R&D programmes and information on various environmental performance levels of biofuels;
- A biofuel certification system should be investigated as it allows for the long-term stimulation of the market and provides an opportunity to track sustainability of various fuels through specific environmental reporting arrangements for certificates.

In parallel to the commissioning of the Consultant’s report, an interdepartmental group has been formed, consisting of the Department of Communications, Marine and Natural Resources, Department of Finance, Department of Environment, Heritage and Local Government, Department of Transport, Department Agriculture and Food and Sustainable Energy Ireland. Discussions are taking place around the various available policy options and the inter-departmental group is currently considering the EcoFys final report and recommendations, and will consider the options presented in the recently published report on “Strategies to Reduce Greenhouse Gases from Irish Transportation”. A Biofuels Strategy for Ireland will be developed on foot of these considerations.

### **Fiscal Measures**

Section 98 (a) of the Finance Act (1999) as inserted by 50 of the Finance Act (2004) allows the Minister for Finance to apply a relief from mineral oil tax, for biofuels essential to a pilot project, which is designed either to produce biofuel or to test the technical viability of biofuel for use as a motor fuel. The relief is subject to the approval of the Minister for Finance, following consultation with the Minister for Communications, Marine and Natural Resources.

Subsection 2 states that Relief may be restricted to a specified quantity of biofuel and a specified period in which such biofuel may be produced. The quantity or period may be increased or extended by the Minister for Finance, following consultation with the Minister for Communications, Marine and Natural Resources. The Finance Act 2004 was enacted at the end of March and a Commencement Order will be required before the provision in relation to biofuels can be implemented. Proposals have been drawn up to develop a scheme involving excise relief, in order to test the commercial viability of biofuels initiatives. The European Commission has confirmed that the scheme would represent a State Aid and consequently its approval is required and has been sought. Under the proposed scheme, applications for excise relief will be invited within three distinct categories of biofuels consisting of pure plant oil, biodiesel blends, and bioethanol blends. These projects taken together are subject to a maximum production capacity of 8 million litres per annum, costing in the region of €3m in excise forgone on petrol and diesel displaced.

The purpose of the Scheme is to:

- Pilot a programme to investigate and evaluate the market for biofuels in Ireland;
- Stimulate the initial development of that market;
- Instil consumer confidence in biofuels through the application of appropriate quality standards;
- Provide a basis on which future policy decisions can be made.

Under the scheme, the excise relief is proposed in the following categories:

- Six million litres per annum of pure plant oil produced from oil seed rape for use in modified diesel engines. The minimum project size in this category is 50,000 litres of biofuel per year.
- One million litres per annum of biodiesel which complies with the standard EN 14214 and which is blended with mineral diesel to a maximum of 5% (biodiesel) blend, with the blend complying with diesel standard EN 590. The minimum project size in this category is 100,000 litres of biofuel per year.
- One million litres of bioethanol, which is blended with petrol to a maximum of 5% (bioethanol), and used in standard petrol vehicle engines. This category also allows higher blends, up to 85%, for use in flexible fuel vehicles (FFV's). The minimum project size in this category is 100,000 litres of biofuel per year, except where the fuel is to be used in a flexible fuel vehicle application where smaller limits may be considered.

The above measure, once implemented will to a large degree, influence initial targets for biofuels production. The measure has been agreed and is currently awaiting State Aids Approval from DG Competition, before the first Call for Proposals can be advertised.

Sustainable Energy Ireland is funding a number of biomass projects and studies through its Renewable Energy Research Development and Demonstration (RE RDD) programme. To date €3.3m of this budget has been committed to biomass projects. Under the programme, Sustainable Energy Ireland offers capital grant aid for biofuels projects, as part of its RD&D programme, as follows:

- **Pure plant oil applications** - up to 25% support for oil presses and up to 45% support for the vehicle engine modifications for up to 100 vehicles per project; SEI anticipate supporting two projects in this category, one of which is already being supported (Biogreen in Wexford – see below);
- **Biodiesel plant** - 10% of the capital cost for a plant with a capacity of 15 million litres to 25 million litres per year. SEI will also consider 25% support for a plant which is smaller scale (less than 10 million litres per year);
- **Bioethanol plant** - 10% of the capital costs for a plant with a capacity of 15 million litres to 25 million litres per year.

The Department of Agriculture and Food (DAF) introduced an Energy Crops Scheme in March 2004. Under this Scheme an aid of €45 per hectare is granted for areas sown under energy crops and used for the production of the following energy products:

- biofuels
- Electric and thermal energy produced from biomass

The aid is granted only in respect of areas whose production is covered by a contract between the farmer and a processor, except in the case of processing undertaken by the farmer on the holding. Any agricultural raw material with the exception of sugar beet may be grown under the Energy Crops Scheme provided that they are intended primarily for use in the production of energy products derived from biomass. Areas which are the subject of an application under the Energy Crops Scheme, may not be counted as being set-aside for the purposes of the set-aside requirement under the DAF Arable Aid Scheme.

### **Current Project Activities**

Ireland's second largest city – Cork – is involved in a MIRACLES (Multi Initiatives for Rationalised Accessibility and Clean Liveable Environments), initiative under the EU CIVITAS programme. The initiative involves four European cities: Rome (I), Barcelona (E), Winchester (UK), Cork (IRL). The four cities have drawn together key public, private and educational / research organisations in local Consortia. Their aim is to achieve a number of strategic goals including the reduction of transport-related environmental emissions.

In Ireland, Cork City Council converted 17 City Council vehicles to run on vegetable oil, in order to reduce transport emissions in the city. The project involved the installation of conversion kits in all 17 vehicles and associated training, and commenced in February 2002. This conversion and training was funded by CIVITAS at a total cost of €16,370. After initial monitoring and testing it was agreed that the vehicles would use a blend of diesel and vegetable oil. Diesel is now added to the fuel mix at a rate of 25% diesel to 75 % vegetable oil. The vegetable oil is being provided by Eilish Oils in Co Wicklow. Over the first year of its operation, the City Council purchased 23,059 litres of Rapeseed Oil. It is estimated that the City Council requires at least 500 litres per week to run the scheme though it is expected that this could rise to 1000 litres, now that fuel blending has become more standardised.

Another project currently underway is the “Biogreen” project in County Wexford where oilseed rape is being grown by local farmers and used to produce an environmentally friendly vehicle fuel. SEI is providing funding of €249,012 for this project, to support engine modifications of up to 100 vehicles and provide plant and monitoring equipment.

**3. National resources allocated to the production of biomass for energy uses other than transport.**

**Alternative Energy Requirement (AER) Programme**

The development of renewables based electricity generating plant has been achieved to date mainly through the offer of contracts through competitions administered by the Department of Communications, Marine and Natural Resources, under the Alternative Energy Requirement (AER) Programme. Under this scheme, prospective generators are invited to make a formal application to build, own and operate newly built plant and to supply electricity from these to the Electricity Supply Board (ESB) under a Power Purchase Agreement (PPA) of up to fifteen years duration.

Since the Programme was launched in 1995, six AER competitions have been held. The biomass technologies supported include biomass (landfill gas), biomass-anaerobic digestion and biomass-combined heat and power (the latter two technologies were supported in the most recent AER VI competition). A total of 20.204 MWe from biomass (landfill gas) projects has been commissioned to date. Three biomass-CHP projects (26.8MW) and ten biomass-AD projects (2.022MW) were successful in AER VI. The offer of contracts has yet to be confirmed.

Ireland is currently in the process of reviewing future support mechanisms for its renewables industry. A consultation document was published in late 2003 and invited submissions from stakeholders on the best way forward for the renewables sector in order to maximize the natural resource potential the country has for renewable electricity development.<sup>2</sup> The consultation document, which examines in detail support mechanisms and renewable energy policies in Ireland as well as in other European countries, looked at key areas in the future including future renewables policy, future green energy contribution to Ireland's electricity markets, how to overcome barriers to the deployment of renewable energy and future options for market support mechanisms. After an assessment period, it is intended that a new policy for the renewable energy sector will be submitted to Government for approval in 2004.

### **Strategy Groups**

A Renewable Energy Development Group was set up in May 2004 and has been requested to report to the Minister for Communications, Marine and Natural Resources on an on-going basis on its policy recommendations. The Group is chaired by the Department of Communications, Marine and Natural Resources and includes representatives from various state and regulatory bodies, expert agencies and industry participants. The work of the group is primarily focussing on future renewable electricity support mechanisms, overcoming technical barriers to further renewable development and the funding of research, demonstration & development of renewable energy technologies, including technologies other than wind. In this context, the group is also considering the outputs arising from the consultation process underway since December 2003

Separately, a Bio-energy Strategy Group (BESG) was established in 2003 and is scheduled to complete a report for consideration by the end of 2004. The primary objective of the group is to consider the policy options and support mechanisms available to Government to stimulate increased use of biomass for energy conversion and electricity generation, and to make specific recommendations for action to increase the penetration of biomass energy in Ireland. Membership of the BESG comprises representatives of various Government Departments as well as State Agencies in the Agriculture and Energy sectors and industry representatives. BESG will produce a Strategy Report for publication in Autumn. This report will contain a road map for development of bio-energy with the identification of staged, achievable targets, and will link directly into the work of the Renewables Development Group.

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<sup>2</sup> "Options for Future Renewable Energy Policy, Targets and Programmes", Department of Communications, Marine and Natural Resources, December 2003.

## **EU INTERREG Programme**

INTERREG is a Community initiative, which aims to stimulate interregional cooperation in the EU. It is financed under the European Regional Development Fund (ERDF). The current phase of the initiative, INTERREG III (2000-06), is designed to strengthen economic and social cohesion throughout the EU, by fostering the balanced development of the continent through cross-border, transnational and interregional cooperation. Special emphasis has been placed on integrating remote regions and those which share external borders with the candidate countries. Strand A of the INTERREG 111 Programme focuses on cross-border cooperation between adjacent regions, aims to develop cross-border social and economic centres through common development strategies.

Under Measure 2.3, funding of €5.1m in ERDF Aid is available for cross border renewable energy/energy efficiency proposals. The programme was aimed at Small and Medium Enterprises (SMEs), community groups, community businesses, farmers, the tourism sector, public and voluntary sector and individuals. Examples of the technologies being considered for funding include wind energy, solar power, photovoltaics, hydropower, geothermal, biomass, anaerobic digestion, Combined Heat and Power (CHP) and efficient heating and lighting systems.

Under the first call for proposals in 2003 a sum of €50,000 was allocated to Donegal Farm Relief Services from Measure 2.3 of the INTERREG 111A Programme towards the cost of producing a development plan for a proposed anaerobic digestion plant to be located at Castlefin, Co Donegal. This project will attempt to establish anaerobic digestion as a commercially viable method of waste disposal. The proposed plant will treat waste materials from the agriculture industry in East Donegal and Strabane District Council area and fish waste from Co Donegal and Strabane District Council area. The output from the digester will be the production of fertiliser, compost, biogas and electricity.

A second call for proposals was opened in early June 2004 and it was strongly emphasised that proposals which make use of biomass as a resource would be particularly welcomed. The programme is now fully subscribed. A number of biomass projects have been approved under the second call and include:

- A proposal to develop a cross border network establishing and producing short rotation coppice willow, involving co-ordinated production and utilisation in a managed supply chain. The project will see 2MW of installed thermal capacity produced at a minimum of six locations and the establishment of 100hectares of short rotation willow coppice at a minimum of 8 locations. The total cost of the project is estimated at up to €2.4m
- A proposal to install a number of pellets stoves and boilers to demonstrate the environmental and economic benefits of pellets as a heating fuel. The total cost of the project is estimated at €94,000.



### **EU LEADER Programme**

LEADER is the EU Community Initiative for Rural Development that provides approved Local Action Groups with public funding (EU and National) to implement multi-sectoral business plans for the development of their own areas.

The LEADER II Programme was introduced in May 1995 and continued until the end of 1999. LEADER II supported projects developed by individuals and private sector companies as well as Community Groups. Under this phase €22,600 was allocated to fund biomass projects. The projects included the establishment of a nursery and education centre in short rotation forestry of willow and poplar with the aim of encouraging renewable energy crop growing in south Donegal with the development of other end uses of crops. A study was also funded to assess the viability of a Fluidised Bed Combustion (FBS) Unit to dispose of chicken litter in the west Limerick area and in turn generate electricity.

LEADER + is the third phase of the LEADER Initiative and it will run from 2001-2006. Under this phase €44,589 has been allocated to date to fund biomass projects. The projects include carrying out a feasibility study on the use of waste timber/wood as a renewable energy fuel for the heating of public buildings and industrial heating in the Roscommon area. West Limerick Biomass also received further funding to develop and build a Fluidised Bed Combustion (FBS) Unit to process poultry waste and use the output to heat the on-farm poultry shed.

### **EU LIFE Programme**

The EU LIFE programme aims to contribute to the development of innovative technology and methods by co-financing environmental demonstration projects including land-use development and planning, water management, reduction of the environmental impact of economic activities and products, and waste management. The purpose of the Programme is to bridge the gap between research and development results and support their large-scale application through the funding of demonstration projects.

Silver Hill Foods, Co Monaghan is one of the largest duck farming enterprises in Europe and generates approximately 70,000 tons of slurry per annum. The company has received funding from the EU LIFE programme, to transform this wet sludge into a solid fertiliser which can be used as replacement for artificial fertiliser. The total budget for the project is €2.8m of which €490,000 is being provided from the EU LIFE programme. Construction of the associated facility commenced in May 2004, with a target completion date of April 2005.

**4 Total sales of transport fuel and the share of biofuels, pure or blended, and other renewable fuels placed on the market for the preceding year.**

A number of different fuels are used in the transport sector and are closely aligned with the mode of transport used. Kerosene consumption in transport is exclusively used for aviation, fuel oil for shipping and electricity for public electric transit services. LPG is almost exclusively used for road transport, as is petrol. The bulk of petrol consumption for road transport can be assumed to be for private car use although there are a significant number of petrol driven taxis in operation. Diesel consumption is used for navigation, rail and road purposes but the bulk is used for road transport. This road diesel consumption is used for freight transportation, public transport in buses and taxis, private car transport and other applications such as agricultural, construction and other machines. The following table illustrates the latest statistics available on transport energy consumption by fuel.

**Table 1: Transport final energy by fuel in 2002 (3.3 Mtoe)**

<b>Fuel Type</b>	<b>% of Total</b>
Petrol	37.9
Kerosene	17.6
Fueloil	0.4
LPG	0.1
Diesel	44.0
Electricity	0.04

**Source: SEI Energy in Ireland 1990 – 2002 Trends, issues and indicators.**

From May 2003 to May 2004 18,000 litres of rapeseed oil was sold and used as fuel in Ireland. This was supplied by Eilish Oils and used in its entirety by Cork City Council for its fleet of 17 light commercial vehicles. This is the only biofuel that has been sold in Ireland to date.

**5 Level of National Indicative Targets for first phase**

Ireland proposes an initial indicative target of 0.06% by the end of 2005, rising to 0.13% in 2006. This figure compares with current market penetration of less than 0.0003%. The initial target is based on the projections from a scheme for excise relief on pilot biofuels projects, under the 1999 Finance Act as inserted by 2004 Finance Act. The indicative target for 2005 is based on an estimated percentage arising from this scheme, and reflects a first-stage initiative as part of an emerging national biofuels policy. That policy is being formulated by an inter-Departmental Biofuels Group and will draw from a Government commissioned report on a biofuels strategy for Ireland, which is scheduled for publication in late 2004. Any revised targets arising from these discussions and the findings of the report, will be notified to the Commission as early as possible.

It should be noted that any large-scale projects which could yield higher national targets, would require significant capital investment and involve a lead-in time of the magnitude of two years. The scope for such large scale projects is currently being considered in the context of post-2005 targets but a decision at this point would not, due to lead-in times, impact on 2005 targets.

## 6 Objective factors, which may limit the national potential for production of biofuels from biomass.

A number of factors have impeded development of an indigenous biofuels industry in Ireland, or the widespread placing of biofuels on the transport fuels market. These factors are considered in detail below and include the relatively high cost of biofuels as a carbon abatement measure, a potential conflict in respect of EU Directive 2001/81/EC arising from a 30% increase in lifecycle NOx emissions associated with biofuels production, potential increases in particulate emissions associated with biofuels, technical difficulties with blending and its impact on conventional engines and agricultural limitations on the amount of feedstock which can be produced.

Table 2 presents indicative estimates of biofuel production and delivery costs in Ireland together with comparison with their fossil fuel equivalents. VAT is applied to the pump price plus excise duty. The diesel and petrol costs are based on average pump prices in September 2004. While “price at pump” could be affected by a change in excise levels, thus creating an incentive for biofuels producers, concerns have been expressed about the high costs of such initiatives when compared to other CO<sub>2</sub> abatement measures.

**Table 2: Cost of biofuels per litre in Ireland**

	Prices in €/Litre				
	Oilseed/ rape oil	Biodiesel <sup>2</sup> (derived from pure plant oil/tallow/RVO)	Bioethanol	Diesel	Petrol
Price at Pump	0.560 <sup>1</sup>	0.730	0.590 <sup>3</sup>	0.41	0.380
Excise Duty <sup>4</sup>	0.368	0.368	0.443	0.368	0.443
VAT	0.195	0.231	0.217	0.163	0.173
<b>Consumer Price</b>	<b>1.123</b>	<b>1.329</b>	<b>1.250</b>	<b>0.941</b>	<b>0.995</b>

<sup>1</sup> The cost of oilseed rape oil at €0.56 per litre is derived from work by Teagasc, Oak Park, and includes an apportionment of the cost of the modification kit that is required for each vehicle using it as a fuel.

<sup>2</sup> The biodiesel cost is a ‘price at pump’ best-cost estimate taken from a recent study by Novems. This cost is based on the use of oilseed rape oil exclusively as feedstock for the production of biodiesel. It could be expected that this cost would reduce by including quantities of RVO and tallow, given that these would be lower cost raw materials. There is no current work on which to draw information to determine the amount of the resulting cost reduction.

<sup>3</sup> The ‘price at pump’ cost estimate for bioethanol is similarly taken from the Novem study<sup>9</sup> and is based on the use of sugar beet as the feedstock. The study indicates that using wheat, as the feedstock would result in an increase of approximately €0.04 per litre.

<sup>4</sup> Current excise levels are €0.36805 / litre and €0.44268 / litre for diesel and petrol respectively.

The cost of importing oilseed rape oil and biodiesel is unlikely to be cheaper than the cost of indigenous production and this may be an impediment to market penetration. A similar problem exists for the importation of ethanol from non-EU States, as these imports are subject to EU import duty of €0.19.

Given that the energy content of biofuels is less than their mineral equivalents, it is important to take into account the relative performance in terms of fuel consumption. Compared to mineral diesel both oilseed rape oil and biodiesel have a reduction in performance of about 10%, i.e. 1 litre of either would replace 0.9 litres of mineral diesel. Bioethanol compared to petrol has a reduction in performance of about 34%. However, there is some evidence to suggest that at low blend levels (5% bioethanol and 95% petrol, for example) which would be typical of the expected use, the performance is similar, i.e. 1 litre of 5% ethanol blend could replace 1 litre of petrol.

## **7 Cost of carbon abatement**

The cost of using biodiesel or ethanol from wheat as an option for reduction in greenhouse gas emission is about €300/tonne<sub>CO<sub>2</sub>equivalent</sub>. Note that the feedstock production costs include agricultural subsidies. The actual costs without any subsidy of these options are more expensive, at approximately €550 and €450 / tonne<sub>CO<sub>2</sub>equivalent</sub> for biodiesel and ethanol respectively from wheat. Long term costs when driving FT diesel or lignocellulose ethanol could be as low as €50 – 100/tonne<sub>CO<sub>2</sub>equivalent</sub>. This points to the desirability of accelerating research into the possibilities for developing FT diesel or lignocellulose ethanol. Ireland welcomes the proposal to quantify and map existing and future European biomass resources for these purposes, under the FP6 RENEW project, and is participating in this project.

## **8 Environmental Impacts**

Life-cycle emissions of NO<sub>x</sub> from biodiesel (on a “neat fuel” basis) are about 30% higher than from diesel. The difference mainly occurs during the feedstock production as a result of tractor use. This is also caused by the relatively low yield of rapeseed per hectare, which cause significant in-field emissions. Although future more stringent NO<sub>x</sub> emission standards for new tractors should reduce the indirect NO<sub>x</sub> emissions in the RME chain, NO<sub>x</sub> vehicle emissions of biodiesel are estimated to be about 5% higher (on a “neat fuel” basis) than diesel NO<sub>x</sub> emissions. Thus, even in the case of imported biodiesel or bio-oil, the NO<sub>x</sub> associated transport emissions could increase by 5% for pure biofuel. Ireland’s proposed initial indicative target of 0.06% biofuels uptake by 2005 is relatively small and environmentally sustainable but further uptake would require detailed environmental appraisal as any significant increase in national NO<sub>x</sub> emissions from biofuel production, together with definite tailpipe emission increases is of concern given the challenging nature of the NO<sub>x</sub> National Emission Ceiling (NEC) required to be achieved by Ireland by 2010 under Directive 2001/81/EC.

The NO<sub>x</sub> ceiling (65 kilotonnes per annum) is the same under the 1999 UNECE “Gothenburg” Protocol to abate acidification, eutrophication and ground level ozone as under Directive 2001/81/EC. This is the most challenging NEC for Ireland and transport is the most intractable sector in which to seek emission reductions. Any appreciable increase in NO<sub>x</sub> emissions due to the production and/or use of biofuels will further reduce national potential to achieve the current challenging transboundary NO<sub>x</sub> target.

In addition, a potential increase in particulate emissions (research suggests that this may be of order of 15%) from production and use of biodiesel would also be of concern particularly given that ambient PM<sub>10</sub> levels in heavily trafficked urban areas have potential to cause national and EU air quality standards to be exceeded.

It is proposed that further details research be commissioned to examine in detail the problem of life-cycle and vehicle NO<sub>x</sub> and particulate emissions. Such research may be appropriate on a collaborative basis between the Commission and Member States.

## **9 Technical Constraints**

Biodiesel can technically be blended in any ratio into conventional fossil diesel fuel. However, biodiesel is more aggressive to certain coatings and elastomers than conventional diesel, so fuel systems need to be adapted for the use of pure biodiesel and for high percentage biodiesel blends. The relatively low biodiesel percentages in conventional diesel that are needed to meet the Directive’s 2005 Reference Percentage (RP) of the European Directive 2003/30/EC do not require vehicle modifications. The new diesel standard EN590: 2003 will maximise the volumetric content of FAME in diesel to 5%. This corresponds with an energy share of about 4.6%, which is lower than the 2010 biofuel target.

Biodiesel can also be produced from Recovered Vegetable Oil (RVO) or tallow. Low temperature behaviour of these fuels make it unlikely that they can meet the FAME specs as mentioned above. In order to achieve this, they will have to be blended with RME. The EcoFys report suggests that the RVO part of such a blend should be limited to about 15-20%. For tallow this figure is expected to be lower, since its temperature behaviour is poorer than that of RVO.

In Europe, currently a maximum of 5-v/v (volume on volume)% ethanol is allowed in gasoline by European Directive 98/70/EC (as amended by Directive 2003/17/EC). This corresponds with an energy share of 3.4%. This is higher than the 2005 biofuel target, but lower than the 2010 target. Summer period vapour pressure is a gasoline characteristic that is limited to a maximum of 60 kPa by European Directive 98/70/EC, or 70kPa for Member States with “arctic” conditions. For certain ethanol contents between 0% and 10-v/v% in gasoline, the vapour pressure shows a peak above this value. Changing the base gasoline properties (for instance reducing the butane

content) can remedy this issue, but it requires modification of the refineries product output, which incurs a cost. There are therefore long-term technical constraints on the wide-scale penetration of biofuels in the market.

## **10 Quantitative and Agricultural Limitations**

In order to fulfill the full biofuel Directive targets with indigenously produced biomass, part of agricultural productive land that is currently used for feed, would have to be diverted towards biofuels. This would, in turn, induce additional feed imports. Furthermore, while there are few agronomic limits to an expansion of the cereal area, contracts to grow beet for sugar production include a clause limiting production to every third year in the rotation. Rapeseed production is not recommended more often than one year in five, and it should not be grown within two years of sugar beet.

The amount of biofuels that can be produced from Irish residues is about half the Directive's 2005 Reference Percentage. If on top of this, currently unproductive set-aside land is used for biofuel production, about 79% of the 2005 and 23% of the 2010 Reference Percentages could be achieved through indigenous Irish biomass. However, under an EU allocation of quotas following the Blair House Agreement, Ireland is at present subject to some restrictions on the growing of oilseeds in Ireland on set-aside land.

In order to produce biodiesel and bioethanol that can compete with biodiesel and bioethanol production from other EU15 countries, it would be necessary to work with relatively large-scale plants. Implementation of such large-scale plants could be facilitated, but would by necessity have to rely partly on imported feedstock and may thus have even higher cost implications.

## **11 National policies allocating comparable resources to the production of other transport fuels based on renewable energy sources and consistent with the objectives of this Directive.**

National policy is focused primarily on developing biofuels in the biodiesel, bioethanol and pure plant oil categories.

As an environmental measure, it is intended to introduce, during 2005, an excise differential for sulphur free petrol (defined as petrol with a sulphur content of less than 10 parts per million) along the lines of a similar scheme for sulphur free diesel introduced in 2002.

Section 135C of the Finance Act 1992(as amended) provides for a reduction of 50% of the Vehicle Registration Tax due on a hybrid electric vehicle which derives its motive power from a combination of an electric motor and an internal combustion engine, and is capable of being driven on electric propulsion alone for a material part of its normal driving cycle. The Toyota Prius is the leading hybrid vehicle available on the Irish market and the Honda Insight is also available on the market. There has been a marked increase in

sales for 2004, which is attributed to the launch of a new Toyota Prius model in November 2003, and an aggressive marketing campaign undertaken by Toyota. A total of 247 hybrid vehicles were sold between 2001 and 2004.

**ends**