

Report on the present state of bio-diesel in Malta and measures for its promotion

A report in relation to Work Package 6 of the IEE funded project:

*Carbon/Efficiency Labelling & Bio-Blending for Optimising Benefits of Bio-diesel
& Additive Use*

Pre-Blending of bio-diesel & CO₂ Labels for Small EU States

Malta Resources Authority

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Disclaimer

The views contained in this report reflect only the Authority's position in regard to the matters expressed therein. They should in no manner whatsoever be understood as being the Government of Malta's official policy.

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1. Introduction

1.1 Role of the Malta Resources Authority (MRA)

The Malta Resources Authority Act, which establishes the Malta Resources Authority as the Maltese regulatory agency for energy, water and mineral resources provides that, one of the functions of the MRA is to:

(a) in relation to energy -

- (i) promote, encourage and regulate the harnessing, generation and use of all forms of energy; and*
- (ii) encourage the use of alternative sources of energy*

In this regard, the Authority is taking as many steps as possible to promote such use of alternative energy as is reasonably possible. One such form of renewable energy are biofuels, and in the context of this report especially bio-diesel.

1.2 Scope of project

Given its function to promote renewable sources of energy, the MRA accepted to participate as co-beneficiary in an Intelligent Energy Europe Agency funded project on *Carbon Labelling & pre-blending of bio-diesel for small EU states*. The main aim of the part of the project pertinent to the Authority is to find ways on to how to promote the use of bio-diesel, disseminate information to fuel importers and fuel distributors on the potential carbon efficiency of bio-diesel, educate the public and in general promote the concept of Carbon labelling.

Bio-diesel is already available in the Maltese market, and this study aims to put forward proposals on how bio-diesel market penetration can be increased in order for Malta to augment its share of biofuels in its energy mix and also be in a favourable position to comply with the reference value set by Directive 2003/30/EC on the promotion of the use

of biofuels or other renewable fuels for transport.

The report will analyse what hinders biofuel penetration in small countries by taking Malta as an example and suggest possible solutions on how bio-diesel could be better promoted, either through government incentives or through the reduction of costs associated with bio-diesel production, importation, wholesaling and retailing.

1.3 Importance of biofuels

Apart from the environmental benefit of using biofuels (as will be attempted to be shown in the next chapter), biofuels may also provide a better diversification in the fuel mix of a country, reduce dependence on fossil fuels and create new possibilities of employment. In countries similar to Malta, which do not have their own indigenous sources of fossil fuels and which presently rely completely on imported fuels for their energy needs, diversification of the fuel-mix would go a long way in enhancing security of supply.

Unfortunately, unlike larger EU member states, large scale-farming of vegetable plants for use in the production of biofuels in Malta, and in the other small EU countries is not deemed feasible and hence Malta with its limited land resource would still need to import biofuels from third countries in this exercise of diversifying its fuel mix. On the plus side however, biofuels are potentially available from a larger number of countries, than from the smaller one made up of oil-producing countries, many of which have political stability problems.

The importance of biofuels was also recently emphasised in the Presidency Conclusions¹ of the Brussels European Council held in March 2007, where the EU endorsed a 10% 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 conclusions however, also stated that the binding character of this target was to be appropriately subject to production being sustainable, second-generation biofuels becoming commercially available and the Fuel Quality Directive being amended accordingly to allow for adequate levels of blending.

1.4 Bio-diesel

Bio-diesel is a renewable, environmentally friendly biofuel. Its production is relatively unproblematic and can be easily manufactured. In order to be produced², fat and oils are degummed then reacted with alcohol, typically methanol in the presence of methanol and a catalyst to produce glycerin and a methyl ester. The catalyst employed is typically sodium or potassium hydroxide.

Bio-diesel's positive attributes include its environmentally-friendly nature. In its pure form, that is, not blended with petroleum fuel it is non-toxic, free from sulfur and aromatic compounds. It is primarily a Carbon Dioxide (CO₂) neutral fuel, that is, over a complete cycle from vegetable plant cultivation, in which fuel is produced and which takes CO₂ out of the atmosphere, up to combustion-point when CO₂ is released into the atmosphere, the net production of CO₂ on balance is very low. Hence, replacing fossil fuels with biofuels helps in no small way to reduce the release of CO₂ into the atmosphere and therefore reduces the effect on climate change. Best be said that it is calculated that EU-produced "first-generation" biofuels can deliver Green House Gas (GHG) savings³ of 40-50% when compared to gasoline and diesel.

Bio-diesel is also a biodegradable and a renewable fuel unlike petroleum fuels that will eventually run out as an available resource at some point in time.

Bio-diesel is mainly used as a replacement for petroleum diesel. Hence, its utilisation is mainly related to the same uses as diesel. This mainly occurs in the transportation and construction fields to power diesel-engine vehicles, to power boilers (various industrial uses and in hotels, hospitals for heating, etc), for power generation and bunkering.

At present, through the efforts of a private company, which uses recycled waste cooking oil collected mainly from the hotelier industry but also through collection from households, bio-diesel is already available on the Maltese market and its use has shown a very encouraging positive trend from the day of its introduction.

1.5 Emission impacts of bio-diesel

Figures 1, 2, 3 and 4 reproduced from a report⁴ drawn up in May 1998 by the U.S. Department for Agriculture and the U.S. Department for Energy, show how bio-diesel emissions from a four stroke compression ignition engine vary with varying blends of bio-diesel. As can be seen from Figures 1, 2 and 3, significant reductions in Carbon Monoxide (CO), Hydro Carbons (HC) and Particulate Matter 10 (PM 10) respectively are obtained as the percentage of bio-diesel in the blend increases.

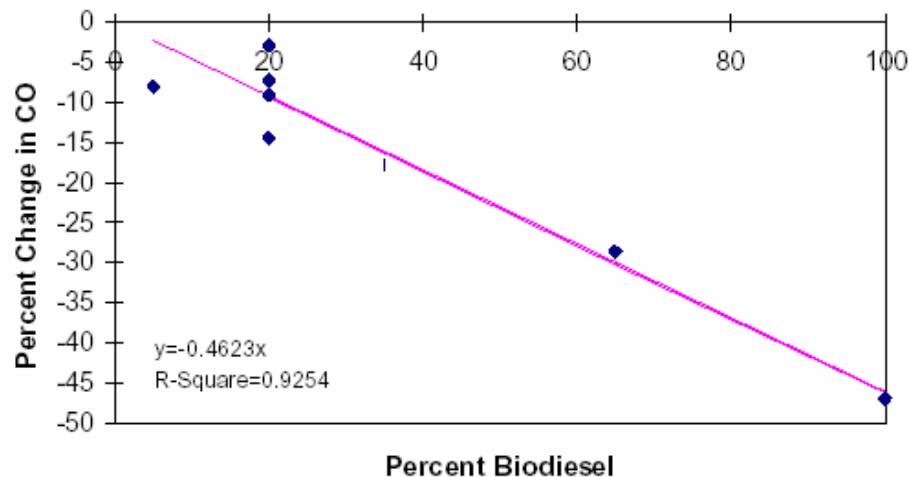


Figure 1 - Effect of Bio-diesel blend level on CO emissions for a four-stroke engine

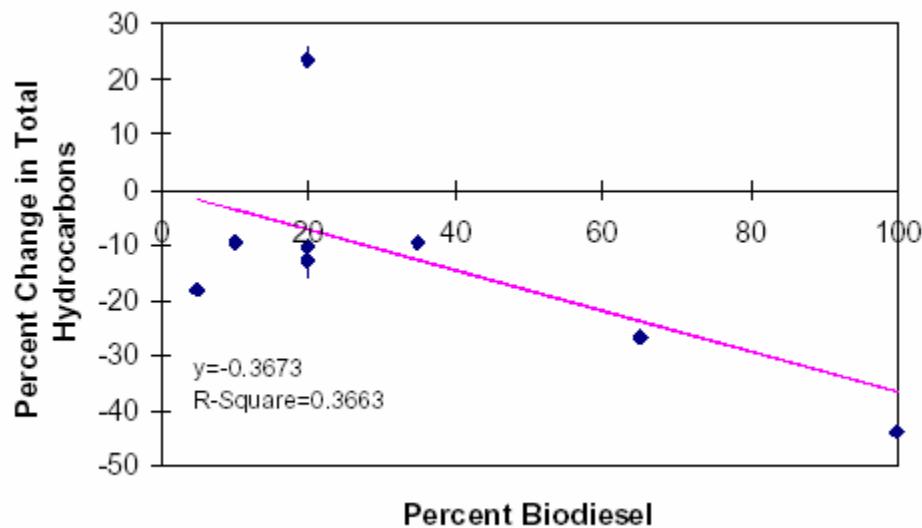


Figure 2 - Effect of Bio-diesel blend level on HC emissions for a four-stroke engine

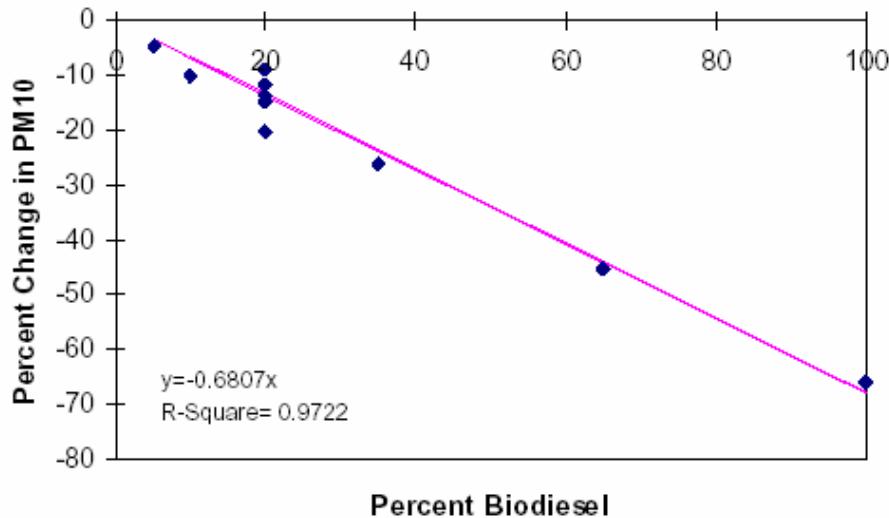


Figure 3 - Effect of Bio-diesel blend level on PM10 emissions for a four-stroke engine

However, Nitrogen Oxides (NOx), as shown in Figure 4, is one pollutant, which increases with an increase in purity. This is a negative aspect that is often mentioned in relation to bio-diesel.

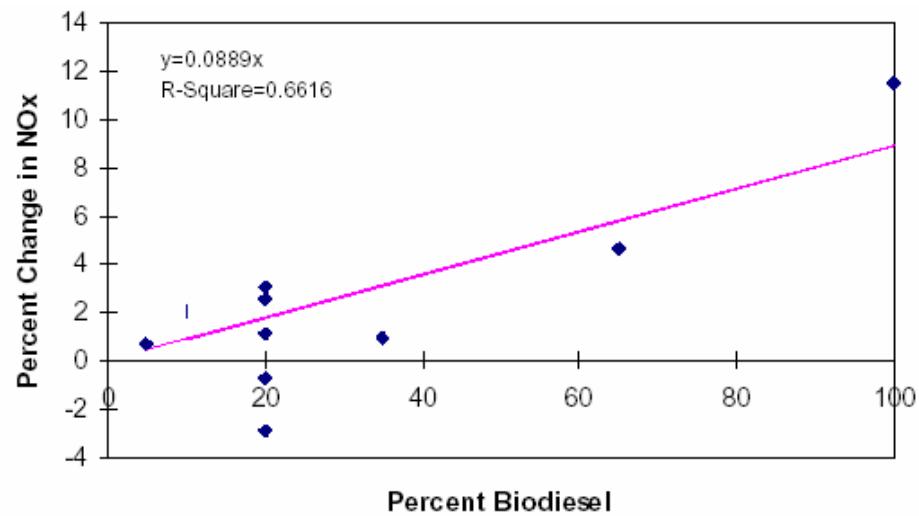


Figure 4 - Effect of Bio-diesel blend level on NOx emissions for a four-stroke engine

1.6 The Biofuels Directive

EU Directive 2003/30/EC on the promotion of the use of biofuels and other renewable

fuels for transport requires Member States to set targets for a percentage of the fuel used in the transport sector to originate from biofuels; in this regard the Directive gives an indicative reference target of 5.75% for the year 2010. This is the amount of biofuel, which should replace petroleum fuel used in the transport sector and is calculated on an energy basis. **A Member State can opt for lower targets than those suggested in the Directive but it must however justify its decision and the national target being proposed.**

The following table (Table 1) is extracted form the Malta's 2006 report on biofuels⁵ (covering the year 2005), submitted to the European Commission as part of the obligations set down by the directive, and illustrates the actual petroleum transport fuel (diesel and gasoline) used in the Maltese Islands and the corresponding share of biofuel, which for 2005 was exclusively equivalent to the share of bio-diesel.

	Fuel Consumed (Million litres)	Energy content (MJ/l)	Energy (TJ)	Percentage of Total Fuel Sales (%)
Gasoline	82.924	31.2	2,587.2	45.6
Diesel	86.524	35.7	3,088.9	54.4
Total fuel Sales	169.448		5,676.1	100
Bio-diesel	0.895	32.8	29.4	0.52

Table 1 - Use of road transport fuels in Malta in 2005

Based on the above figures for fuel consumption in 2005 and assuming that fuel consumption in 2010 will not register a significant increase from the 2005 level, the increase in the amount of biofuel consumption needed in Malta to reach the reference target set in the Directive can be computed as shown in Table 2.

Percentage of the 5.75% reference target reached by use of bio-diesel	100	80	60	40	20	0
Percentage of the total fuel consumption provided by bio-diesel (%)	5.75	4.6	3.45	2.3	1.5	0
Bio-diesel required (Million litres)	9.94	7.96	5.97	3.98	1.99	0
Fossil diesel offset (Million litres)	9.14	7.31	5.49	3.66	1.83	0
Fossil diesel offset as a percentage of total diesel consumption in 2005	10.57	8.45	6.34	4.23	2.11	0

Table 2 - Bio-diesel required for Malta to comply with the Directive's reference target

The first row of the table shows the percentage of biofuels should the reference target be exclusively met by the use of bio-diesel. In practice, if 80% (first row) of the 5.75% is reached, this would be equal to 4.6% of the total fuel sales. For Malta to comply with the reference target set by the Directive by 2010, 9.94 Million litres of bio-diesel, substituting 9.14 million litres of petroleum diesel should be used.

2. Limitations in reaching the Directive's reference target in small EU Member States

Pre-amble

Figure 5⁶ below is of particular interest. Although throughout this report, the difficulties which Malta encounters in reaching the reference target set by the EU are often mentioned, Malta placed sixth in 2005 in the production of bio-diesel within all EU members.

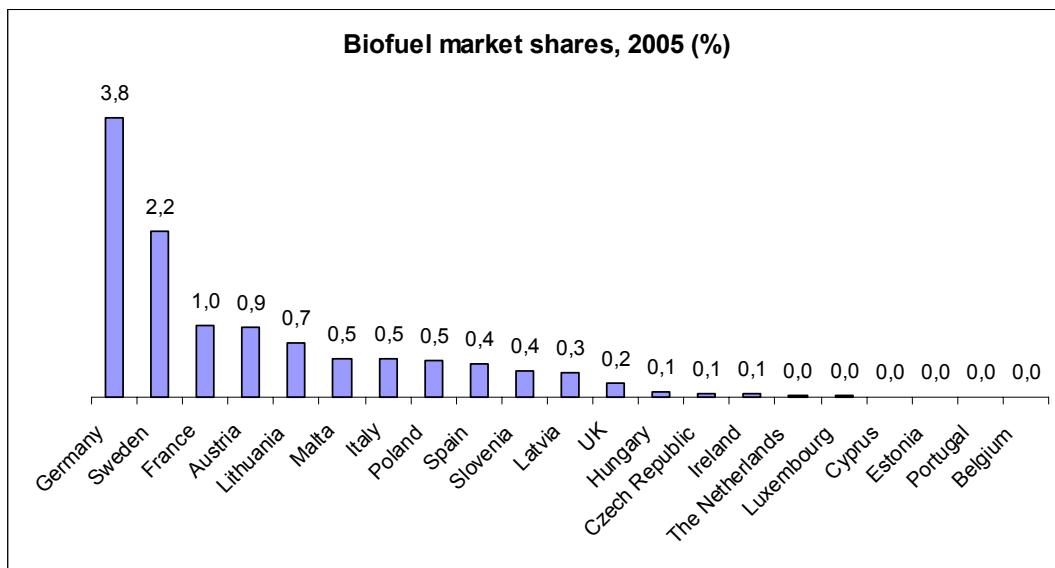


Figure 5 – Biofuels markets share in 2005

This result might seem contradictory to what might be expected from a small Member State, however, the problem is not creating a market for bio-diesel but actually reaching higher targets of biofuel market penetration. To reach *higher feasible market penetrations* without altering the market structure is very difficult, since this requires a country to possess certain characteristics, features and resources, which are hardly modifiable in small states. Issues such as:

- Availability of raw material;

- Infrastructure limitations;
- Quality Issues;
- Economies of Scale Issues;
- Negative Publicity; and
- Competing Sectors

are all considered as obstacles which might hinder a larger market penetration. All these issues and their relative influence are analysed in a more in-depth manner below.

2.1 Raw material

All studies related to the use of bio-diesel and to its probable increase in use in the future, given the ambitious targets being set by the European Union, clearly state that one of the problems which may be encountered in reaching such targets will be related to the sourcing of the raw material. A number of raw materials are being used in this regard, with rape seed oil, palm oil and soy-bean oil being the front runners in this sense. However, in order to grow these plants, a number of decisions as to land space allocation and good water reserves must necessarily be made. In this regard small states are already at a disadvantage given that the arable land available is scarce and water is also a highly valued and highly priced commodity.

In this regard, Malta's potential for growing crops for producing biofuels is negligible due to both limited availability of arable land and water resources as was amply described in the Malta Environmental and Planning Authority's Structure Plan⁷, wherein it was stated that "*Cultivated land has however decreased from 15,200 ha in 1971 to 12,000 ha in 1986 and the trend is continuing.*" Malta's 2006 report on biofuels, submitted to the European Commission as part of the obligations set down by the directive, in this regard underlines these two limitations and specifies that the only current indigenous source available for the production of bio-diesel is waste cooking oil.

However, even waste cooking oil as a source of raw material for the production of bio-

diesel is a finite source. In addition to this, the fact that not all of this source material for bio-diesel is collected makes it even more difficult for the reference target to be met. A report⁸ has shown that only 2,850 tons of waste cooking oil equivalent to 50% of the current 5,700 tons of waste cooking oil produced is collected. Should all the 2,850 tons of waste cooking oils collected in Malta be diverted for the production of Bio-diesel, at the current rates of production it is estimated that 2.85 million litres of bio-diesel would be produced, resulting in only 1.56% by energy content of the total fuel sales to the transport sector. As can be seen this figure is still short of the reference value set by the EU Directive.

2.2 Infrastructure limitations

As far as infrastructure is concerned, oil storage in Malta is paid at a high premium given its strategic location in the middle of the Mediterranean, the not so high oil storage capacity and the competing local and bunkering markets for this capacity. Additionally, building new storage capacity is not an immediately feasible option and would require further investment commitment for many producer and lengthy planning permissions and discussions for land allocation. This problem as regards bio-diesel is not very acute for the time being since quantities are still relatively small, however should the amount of bio-diesel consumption increase considerably, then bio-diesel would find itself competing for storage space.

Given that the production of bio-diesel is currently not cost effective without financial incentives, this added cost would further hinder bio-diesel uptake.

A real problem on the other hand currently exists at petroleum filling stations. At least a third of existing petroleum filling stations in Malta are kerb-side pumps with limited space available to dedicate tanks and dispensers exclusively to bio-diesel or specific blends of bio-diesel. This limits the amount of the product that can be retailed.

In order to partially overcome this problem a number of petroleum-filling stations have modified their petroleum fuel storage facilities and re-directed their use for the sale of

100% bio-diesel. Presently and for the foreseeable future, petroleum filling stations are permitted to store and dispense 100% bio-diesel only. It is left up to the individual consumer to decide upon which blend is best suited for his vehicle. About twenty stations, out of the 83 operating, licensed petroleum filling stations are currently using this system.

2.3 Quality issues

As for all other fuels, ensuring fuel quality is of extreme importance in developing trust and building confidence in a particular product.

The issue of quality control is thus a matter of utmost importance in the development of a thriving biofuel market. In ensuring that only biofuels and particularly bio-diesel products of the right quality are allowed into the market, the following minimum objectives should be made to be met:

- (i) the consumer must be protected from being given a product which is different from what he is being sold;
- (ii) the product sold must be suitable for the engine for which it is being marketed. In particular it must not cause damage to the engine;
- (iii) the product must comply to any existing standard or legislation.

In particular in the case of Malta, where again economies of scale (or the lack of them) play an important role, the absence of appropriate laboratory facilities to ensure that the bio-diesel offered on sale in the market is up to the applicable standard is a big drawback in the efforts to reduce costs.

2.4 Economy of scale issues

Although these issues have been raised within this study already for a number of times, in relation to other services connected with the provision of bio-diesel, one should also underline that this fact in itself and the fact that Malta is an island creates problems in

regards to the CIF (Cargo, Insurance & Freight) price at which bio-diesel might be bought from the international market. In the international carriage of goods business, prices per litre tend to increase with a decrease in the size of the cargo; hence smaller volumes of bio-diesel tend to become more expensive per litre of product purchased, than when imported in larger quantities. Therefore unless a way is found to increase cargo sizes, importing pure bio-diesel will very rarely be cost-effective by its own merits.

2.5 Negative publicity

Publicity is a key issue in developing a market for a particular product, however, negative publicity can create an opposite a devastating ripple effect on the market. For this reason, it is of the utmost importance that confidence in bio-diesel is ensured through proper education on the pros and cons of using bio-diesel, throughout all the fuel market chain from the producer/importer level, down to the retailer and consumer level.

2.6 Competing sectors

Indeed competing sectors further reduce the potential for bio-diesel use for transport purposes. Although in itself this is also a good thing, diverting bio-diesel use from transport to other uses, such as electricity and heat generation would further diminish Malta's chances of reaching the EU set targets for biofuel use in the transport sector.

In this regard, it could be highlighted that in 2005, although 0.895 million litres of bio-diesel were sold to the transport sector, this amount accounted to only 60% of the total bio-diesel produced locally, with the balance (40%) going to industrial use.

3. Proposals to reach the target

3.1 Proposals made by other EU countries⁹

“Biofuels and other renewable fuels for transport”, a study report on the transposition and implementation of Directive 2003/30/EC on the promotion of the use of biofuels or other renewable fuels for transport, commissioned by the Government of Belgium, and conducted by Price Waterhouse Coopers, gives a very good overview of the various measures adopted by the various EU Member States to promote biofuels. The most popular and effective is, without any doubt, the exemption in part or in full of the excise duty normally paid for transport fuels.

Other measures considered within the EU member states include the following:

Austria: uses the substitution obligation, i.e. persons who place petrol and diesel on the market for the first time or import these fuels into Austria are obliged to market a percentage of biofuels (based on energy content) determined by legislation.

Belgium: provides support for growing crops and grants for the production of biomass. Biofuels may also benefit from schemes promoting cleaner technologies, such as green certificates for CHP.

Cyprus: has introduced a green levy of 0.22 Euro cents/kWh on all electricity consumption that goes towards a fund for the promotion of renewables, including a specific provision for funding investments for the production of biofuels for transport (40% of the investment up to 680,000euros). Cyprus has introduced low registration fees (85 Euros) and road taxes (17 Euros) for flexible fuel vehicles. It is also considering tax relief (2,400 Euros) for these vehicles.

Czech Republic: grants subsidies for the production of rapeseed methyl ester (this has been authorised by the Commission).

Estonia: reported that growers of energy crops can apply for CAP funds and investment aid from structural funds.

Germany: has undertaken a strong PR campaign in favour of biofuels and recently introduced substitution obligation.

Ireland: provides support to farmers to grow energy crops.

Latvia: compensated producers of biofuels for the extra cost of production and gave grants for cultivating energy plants.

Lithuania: grants free land and compensation for the cultivation of energy crops, and funds the development of production of biofuel for transport.

Portugal: gives support to farmers to grow energy crops at the rate of 45 Euros/ha.

3.2 Measures that could be implemented in the local market

Some of the measures used by other EU countries cannot be, in their entirety applied to the Maltese market, given the particular conditions intrinsic to Malta. However, certain features of these measures can be used and the following is a list¹⁰ of such suggestions, some of which will be analysed in further depth:

1. Creating a proper legislative framework;
2. Enhance education, communication and information throughout all the fuel market chain, from importer/producer to consumer;
3. Facilitating the collection of waste oils, from commercial establishments as well as from domestic sources;

4. Enforcement of the regulations regarding dumping of oils in sewers;
5. Creating stable market conditions through the publication of clear government commitments and policies in the short, medium and long term;
6. Encourage consumer confidence through enforcing of quality standards and control and policing “back street” blending;
7. Encouraging research and development in the use of bio-diesel;
8. Voluntary agreements especially with fleet operators;
9. Government purchase of vehicles that can take higher blends. Green procurement, and government policy requiring its fleet to run on bio-diesel;
10. Provision of capital allowances for producers of bio-diesel;
11. Substitution obligation, which could mean either an obligation on fuel suppliers to add percentage of bio-diesel to diesel or an obligation on fuel suppliers to ‘push’ a certain quantity of bio-diesel into the market; and
12. A renewable fuels certificate system.

Whereas some of the issues such as creating a proper legislative framework listed would go a long way into further strengthening the biofuels market, other proposals such as research and development would be probably difficult to implement in Malta without EU funding.

3.3 Proposals in more detail

3.3.1 Legislation

A number of proposals have been put forward as a means to increase the amount of bio-diesel used in Malta. One of the most advocated is the strengthening of the legislative framework, in order to create a complete set of guidelines and regulations to establish a level playing field for all operators.

Currently, the present biofuels legislation merely transposes the Directive, and it is generally agreed that specific regulations are required to create legal certainty as regards issues like the quality of bio-diesel products and penalties for non-compliance.

The Malta Resources Authority has also in relation to the liberalisation of the inland fuel market published draft legislation in the form of a legal notice named the **Biofuels Market Regulations, 2007** which amplifies the scope of the existing legislation to cover activities other than transport, and which creates a legislative framework within which all operators of biofuels must operate.

Together with this draft legal notice a draft licence has also been prepared. The aim of this licence, which covers all activities related to biofuels, that is production, importation, storage, wholesaling and retailing is primarily intended to ensure quality standards, good operational practices, safeguard health and safety and lay the basis for environmentally sound operations. It is believed that once this legislation comes into force, the biofuels market may increase its share of the fuel market through increased consumer confidence and accountability on behalf of the operator.

3.3.2 Fiscal incentives

Bio-diesel's economics are such that before taxes, the cost of bio-diesel is much costlier than that of fossil-fuel derived diesel. In fact it is considered that the excise duty imposed on diesel makes up for the difference in cost, although the recent increases in the price of diesel should have lessened the gap. According to an American Government report¹¹ "biofuel production costs currently are at least twice those of conventional fuels". This is supported by figures quoted by the EU Commission in its justification of its decision not to raise any objections to a total exemption from excise duty in favour of biofuels in Germany.

Given these facts another way to increase the share of biofuels in the fuel market is by creating fiscal incentives in favour of biofuels. During November 2004, the Maltese Government announced that as from 2005, the biomass content (i.e. the percentage element) in bio-diesel is exempted from the payment of excise duty under fiscal control where such energy products are made up of, or contain, one or more of the following products:

- products falling within CN Codes 1507 to 1518;
- products falling within CN Codes 3824.90.55 and 3824.90.80 to 3824.90.99 for their components produced from biomass;
- products falling within CN Codes 2207.20.00 and 2905 11 00 which are not of synthetic origin;
- products produced from biomass, including products falling within CN Codes 4401 and 4402; and
- products which contain water (CN Codes 2201 and 2851.00.10).

However, care should be taken not to alter the market too much. There is a limit as to how much fiscal incentive government can grant in favour of a particular product, and this in theory should only serve as an initial boost to start off the market and operators should do their utmost to improve their processes in such away as to reduce their costs in order to really create a competitive market product. In this regard one should also remember that the possibility exists that if considerable amounts of bio-diesel are being imported in Malta, the government would in fact be subsidising an imported commodity with all the implications which this might have on the local fiscal system.

Further to this fiscal issue is whether or not to discriminate in favour of locally produced bio-diesel, *if at all permissible under EU Law*.

Local lobbies and bio-diesel producers have often stated that locally produced bio-diesel also creates a secondary benefit by requiring the collection of waste cooking oil which would otherwise finish in the sewer-system thus alleviating any problems caused by this sort of dumping. In view of this fact they state that indigenous production of bio-diesel should be discriminated in its favour, and obviously against that of imported bio-diesel.

Pricing and incentives policy are still to be finalised by Government however one way to go about this issue, should this be allowed under EU law, would require the government to create a *three-tier* fiscal incentive system as follows:

- No taxation or the least taxation possible on bio-diesel produced from indigenous raw material;
- Second level of taxation on bio-diesel produced locally from imported raw material; and
- Third level of taxation on imported bio-diesel.

Should this not be acceptable to the EU, bio-diesel products could be taxed on the low side equally, without reference to their origin. However, the government could then opt to consider granting incentives favouring the collection of local waste cooking oil.

3.3.3 Substitution obligation

In order to reach the targets set by the EU Biofuels directive, Malta might opt to impose a substitution obligation on all its petroleum diesel imports that is to replace 5% of all petroleum diesel imports with 5% bio-diesel. The issue would then be left in the hands of importers and wholesalers to source this 5% bio-diesel. They could either obtain it from locally produced bio-diesel or from pre-blending at refinery or shipment stage.

The latter option would also have a significant affect on the cost for complying with the Directive, as there would be no added costs related to the need of additional separate infrastructure such as different depot storage tanks or petroleum filling station tanks. Bio-diesel obtained in this manner would also be probably cheaper due to economies of scale resulting from overall lower CIF value cost per litre of fuel imported.

In this regard, the Authority will be enquiring on the feasibility of this option and the willingness of fuel importers and wholesalers to go down this route.

Before doing so however, it shall have to be ensured that the origin of bio-diesel brought into the local market is of the right quality and that it is priced appropriately.

3.3.4 Carbon labelling & public education

Definitely one way in which biofuels could be promoted is through the delivery of better information to the public. To this effect, part of the project in which the Authority is currently participating in as co-beneficiary, is to study and implement carbon labelling to bio-diesel and fuel additives. Carbon labelling basically consists of creating a system of clearly identifiable labels, associable with bio-diesel, lubricants and freight services that will lead to an integrated approach to improving efficiency in the passenger transport and freight sectors.

The main aim is to create a system, aimed at educating the public on the environmental, economic and efficiency advantages and improvements of using bio-diesel. The implementation of carbon labelling coupled to the proper dissemination of educational material to the public, including environmental and efficiency facts and figures would lead to a better understanding of the product, probably leading to an increase in consumption of bio-diesel.

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