Implementation of the Biofuels Directive in the European Union

Lorenzo Di Lucia*, Lars J. Nilsson

Energy and Environment Systems Studies, Box 118

SE-221 00 Lund, Sweden

Abstract

In this paper the implementation of the Biofuels Directive (2003/30/EC) in the 25 member states is assessed against the background of implementation theory. The aim is to identify and analyse implementation problems for the purpose of suggesting a way forward for biofuels policy in the European Union. Three main patterns of policy implementation are observed: effective implementation, formal compliance and weak implementation. Implementation barriers and problems encountered all along the policy process are both of practical and more fundamental nature. Based on this, we argue that the European Union should allow member states more flexibility in achieving the policy objectives of the Biofuels Directive.

Acknowledgments

Keywords: member states, policy process, transport, transposition.

* *Corresponding author.* Tel. +46-46 222 9840; fax. +46-46 222 8644.

  E-mail address: Lorenzo.di_lucia@miljo.lth.se

1. Introduction

Transport will remain dependent on fossil fuels for many years to come (EEA, 2006). Nevertheless, in view of the forecasted peak in conventional oil production, increasing dependence on imports, climate change and the need for new income and employment opportunities in rural areas, alternative fuels are high on the political agenda in Europe and elsewhere. There are several alternatives to conventional gasoline and diesel. Liquid biofuels, such as ethanol and biodiesel, are top candidates partly because they are highly compatible with current engine technologies and can be blended with gasoline and diesel. Biofuels also have the potential to improve energy security, decrease vehicle contribution to greenhouse gas (GHG) emissions and create new opportunities of income and employment in rural areas.

In 2003, after a difficult negotiation process, the EU policy-making culminated in the adoption of a Directive for the promotion of biofuels and other renewable fuels (EC, 2003). The Directive 2003/30/EC, commonly referred to as the Biofuels Directive, requires member states (MS) to support consumption of biofuels for transport as a means to achieve the policy objectives[1] stated in Art. 1:"…contributing to objectives such as meeting climate change commitments, environmentally friendly security of supply and promoting renewable sources." For this purpose MS shall set national indicative targets for the market share of biofuels in the transport sector. Reference values for these targets are 2% by the end of 2005 and 5.75% by the end of 2010 of all transport fuels based on energy content. However, MS can legitimately differentiate from the reference values if suitable motivations, on the basis of Art. 4[2], are presented to the European Commission (EC). MS are allowed to import biofuels and biomass to supply national consumption and may employ policy instruments and measures[3] that best fit their national conditions and domestic interests[4] in respect of all EU regulations[5].

Since 2003, MS have worked on the implementation of the Biofuels Directive, taking decisions and confronting various obstacles. In this process, first, the Biofuels Directive is transposed into national laws, regulations and administrative provisions (formal transposition); second, national policies are adopted and executed to achieve consumption targets (practical application). However, despite MS efforts, consumption levels show that implementation, which for the purpose of this paper is defined as "the degree to which the formal transposition and the practical application of supranational measures at the national level correspond to the objectives defined in European legislation" (Knill, 1998, p. 2), has been problematic in most MS. The implementation of policies for increased use of biofuels in the EU is assessed in this paper. The overall aim is to suggest a way forward for biofuels policy in the EU and for that purpose we identify and analyse problems in the implementation process of the Biofuels Directive. The implementation of the Biofuels Directive in the 25 MS is described and three main patterns of implementation are identified.

It should be noted that the area of biofuels is characterised by uncertainty and debate concerning technical options, technical development and resource potentials, costs, importance of various policy objectives, etc. There is no common vision or agreement between countries, car makers, fuel companies, and others concerning what would constitute good solutions. We make no attempt in this study to resolve this situation but acknowledge that the uncertainty and lack of agreement on technical options is important to consider when discussing ways forward in terms of EU policy.

2. Material and methodology

A qualitative approach is used to analyse data included in national progress reports submitted by the 25 MS to the European Commission (EC) as required by Art. 4 of the Biofuels

Directive. The reports provide a broad overview of the status of implementation of the Directive in the EU[6]. They contain a semi-standardized series of data in regard to important issues related to national policies and implementation results in each MS. The data gathered from national progress reports, complemented with national regulations and other documentation, is used to identify different patterns of policy implementation.

The written material is complemented with interviews. A strategy based on theoretical sampling (see Glaser and Strauss, 1967) is used to identify suitable respondents and informants among professionals and policy makers working at national and European levels in the field of transport biofuels. In total, 11 interviews were done with government officials and experts from private research institutions and associations[7]. The interviews used in this study are semi-structured and focus on policy drivers, interests and attitudes of national authorities on issues such as biofuels production, consumption and imports. Furthermore, interviews allow the collection of the most recent data on policy and other issues. The function of the interviews is to allow a deeper understanding of the implementation patterns and to identify important key issues of the policy process.

An analytical framework was constructed in order to account for the different ways in which MS have implemented the Biofuels Directive. A distinction is made between MS that have effectively implemented the Directive *(effective implementation)* and MS that have not. Within this second group, a distinction is made between MS that have adopted national targets in line with the reference values of the Directive, but have not achieved them *(formal compliance)* and MS that have national indicative targets set below EU values and have consumed no or only limited amounts of biofuels *(weak implementation)*. The framework is employed in section 5 to identify and analyse key issues of the implementation process.

3. Theoretical background

The existence of an implementation gap or deficit in the EU is widely recognized (Jordan, 1999) and it is by no means unique to the biofuels sector. Policy implementation has been studied in political science since the early 1970's. This paper takes some of the theories in this area as a starting point, although there is no ambition to contribute to the development of implementation theory. The policy process of EU Directives can be described in different ways but in a simple form includes the four basic elements of policy formulation at EU level, transposition into national systems, practical implementation (design of national instruments and their application) and finally evaluation. It has been argued that implementation research should not be limited to the design and application of policies and strategies, but it should include the policy formulation process because it is here that problems with implementation may originate (Winter, 1990).

Once Directives are adopted at EU level they have to be transposed into national legal systems. This phase has been widely investigated to understand and explain MS compliance. Hence, different approaches to explain this process and its outcomes have been developed. On one side, the *enforcement approach* sees non-compliance as a choice of MS resulting from a difference between an international obligation and its own interests (Tallberg, 2002). Compliance problems, theorists suggest, are a product of poor incentive structures. It is less expensive, easier and more rational for MS not to comply (for examples of the enforcement approach, see Olsen, 1965; Axelrod and Keohane, 1986; Yarbrough and Yarbrough, 1992; and Downs, Rocke and Barsoom, 1996). In contrast, the *management approach* suggests that insufficient administrative capacity, or the complexity of the legislative issues at hand, affects implementation results. Non-compliance is not a result of deliberate decisions to violate treaties, but an effect of capacity limitations and rule ambiguity (Tallberg, 2002; for examples

of the management approach, see Young, 1992; Mitchell, 1994; Chayes and Chayes, 1995; and Keohane and Levy, 1996).

The third step of the policy process is here considered to be about the design of policy instruments and their application. The practical implementation is a critical stage because the success of a policy can only be judged on the impacts it has on the ground (Glachant, 2001). Some practical implementation problems can be inferred from the progress reports and identified through the interviews. However, it is beyond the scope of this paper to make a full inventory of such problems at the national level and at this early stage of the implementation process. It is also too early to evaluate the policies in terms of effectiveness and cost-efficiency.

4. Biofuels in the EU Member States

4.1 National indicative targets of biofuels consumption

The Biofuels Directive requires all MS to set non-binding national targets for a minimum share of biofuels in the overall transport-fuel market. National targets are a key component of biofuels policies since they convey the level of ambition of national policies. When those responsible for the policy state a set of targets, they define the direction to be taken and provide a benchmark against which to evaluate the success of the instruments employed. MS can legitimately differentiate from EU reference values and such differentiation is assessed by the European Commission (EC).

Table 1

National indicative targets for 2005 are generally not in line with the EU target of 2% (Table 1). 22 MS have adopted an indicative target for 2005 but in 12 cases they are lower than the

EU value[8]. Hence, the aggregate value for the EU in 2005 is only 1.4%. The EU Directive does not require MS to adopt targets for the year 2006. However, some MS have set 2006 targets that in some cases represent a significant progress from the 2005 levels. In contrast, the targets for the year 2010 already adopted by 20 MS are generally in line with the EU reference value of 5.75%.

4.2 Policy instruments adopted by national governments

MS have employed different types of policy instruments to achieve their indicative targets for biofuels consumption (Table 2).

Table 2

Policy instruments adopted by MS have so far focused on support for demand and supply of biofuels. Tax incentive systems and fuel quota obligations have been used to ensure consistent levels of national demand for biofuels. MS have also made use of production subsidies and investment grants for conversion plants to ensure supply of biofuels at competitive prices on their markets.

Allowed by Art. 16 of the Directive on energy taxation (2003/96/EC), tax incentives are currently the most employed policy instrument. 19 MS have executed this market-based support system to improve price competitiveness of biofuels. However, MS like France, Hungary, Ireland, Italy and Portugal have agreed tax reductions, partial or total, only for limited quantities of biofuels due to the high cost of these instruments for national budgets.

Alternatively, or in combination with tax systems, MS have employed biofuels obligation systems. This type of instruments generally consists of an obligation on fuel suppliers that a certain share of the fuels sold in the country should be biofuels. In a quota obligation system the costs of supporting biofuels are paid directly by consumers and not through the national

budget. The government officials interviewed confirm that this is a key reason for the current switch of national policies from tax incentives to obligation systems.

In order to ensure sufficient supply of biofuels on national markets, MS have supported national production through subsidy systems, in addition to the EU common agriculture policy (CAP) financial incentives, for farmers who decide to grow biofuel feedstocks, and capital grant schemes to support investments in production facilities. These two types of instruments directly influence national production, but do not guarantee that biofuels are consumed within the country. Hence, external factors such as production costs and fuel prices in other countries affect consumption levels.

Research and development programmes represent a third type of policy instrument which is widely employed in national policy strategies. In 14 cases MS are officially funding programmes for the development of new technologies for feedstock production, fuels conversion and use in power trains. National authorities interviewed consider this type of instrument crucial for future developments of the sector, but less effective on current consumption levels.

The rest of the policy instruments, which include tax incentives for Flex Fuel Vehicles (FFV), biofuels quality standards, use of biofuels in public fleets, congestion charge and parking fee exemptions, increased availability of filling stations and public relations activities can be seen as complementary to the ones previously described. These instruments seem to be employed only in a few MS. However, it should be noted that it is difficult to get a clear and comprehensive picture of these complementary instruments, especially when it comes to initiatives at sub-national administrative levels.

4.3 Consumption of biofuels in the MS

If national indicative targets are an expression of formal compliance with the Biofuels Directive, consumption levels are evidence of practical compliance.

Figure 1

In 2005 biofuels shared a very small percentage of transport fuels in the EU. As shown in Fig. 1, only Germany, Sweden and Austria achieved the 2% EU target and a few other MS such as France reached part of the EU target. Although the consumption of biofuels in the EU has been constantly increasing in the last years going from 0.6% in 2003 (EC, 2006a) to 0.7 in 2004 (EC, 2006b), it is expected to reach a modest 1%[9] in 2005. This is below the 1.4% which results from aggregating the MS indicative targets, see Section 4.1.

5. Patterns of policy implementation

There is significant variation across MS with regard to the implementation of the Biofuels Directive. The analytical framework described in Section 2 is applied here for the purpose of structuring the analysis of implementation patterns in different countries. Three main patterns are recognised:

- *Effective implementation:* national indicative targets are set in line with EU reference values and corresponding consumption levels are reached.

- *Formal compliance*: national indicative targets are in line with EU values, but consumption levels in 2005 are lower.

- *Weak implementation*: national targets are set below the values of the Directive and nil or only modest consumption levels are attained in 2005.

5.1 Effective implementation

Austria, Germany and Sweden are the only MS that achieved the EU reference value of 2% in 2005. This group of MS illustrates the case of *effective implementation*. In order to understand this situation, first, the level and type of domestic interest in complying is assessed and, second, the policy instruments employed nationally are observed.

Figure 2

In these MS, interest in liquid biofuels for transport existed well before the adoption of the EU Directive. As shown in Fig. 2, in 2002 relevant quantities of biofuels were produced in all three MS (EurObserv'ER, 2005) and the stance of the national authorities towards the EC proposal for a EU directive was generally positive (CEU, 2002a). This is confirmed by the government officials interviewed. However, dissimilarities are evident in regard to the type of domestic interest prevailing in each MS. Sweden has promoted consumption of biofuels for environmental and energy security reasons, whereas agricultural development has not been a particularly relevant motivation as indicated by that 80% of the biofuels consumed in 2005 was imported (EC, 2006b).

In contrast to Sweden, a key driver for the development in Austria has been rural development and exploitation of agricultural potentials. As a result, Austria was a net exporter of biofuels before the Directive took effect. In Germany, domestic interests in agricultural and rural development have motivated support to production of biofuels, while climate protection and energy security have motivated biofuels consumption. In sum, three main factors – environment, energy security and, or, rural development – have motivated the development of biofuels in this group. However, there are considerable differences between the three countries in terms of how much weight has been given each factor.

Tax incentives have been fundamental for the achievement of the targets in all these MS. The obligation system that recently took effect in Austria has provided support to consumption in addition to previous support to production of biofuels. In Sweden, an extensive use of

complementary instruments, such as free parking and increased availability of filling stations, has reinforced the effect of tax incentives. Germany, in contrast, relied almost exclusively on total tax exemptions. In sum, tax incentives have been widely employed and their effectiveness is evident. However, Austria and Sweden have also used other policy instruments as complements when, depending on national conditions, tax incentives were not sufficient to achieve agreed consumption targets.

5.2 Formal compliance

France, Spain, Belgium, Hungary, Slovakia, Lithuania and Latvia adopted the EU reference target of 2%, but did not reach it in 2005 (Fig. 3). This group of MS illustrates a specific pattern of implementation here referred to as *formal compliance*.

Figure 3

Within this group two subgroups are distinguished separating *new* and *old* MS. One crucial difference between the two sub-groups is that whilst old MS participated in the negotiations of the Biofuels Directive, new MS did not have that opportunity. In 2004, countries like Hungary, Latvia, Lithuania and Slovakia, were asked to implement the Biofuels Directive as part of their accession process to the EU.

The new MS had none or only little experience with production and consumption of biofuels for transport in 2004. However they transposed EU targets into their national policies as required by the conditions for accession[10]. In contrast, in 2003 both France and Spain had substantial experience with biofuels and available agricultural land to exploit. In these two countries, agricultural interests supported biofuels well before the adoption of the EU Directive. In Belgium, pressure to set biofuels targets came only recently through the Biofuels

Directive, but also from local actors interested in biofuels production although the agricultural potential is relatively small (Pelkmans, 2006).

The new MS diverge from the old MS also in terms of policy strategy. Substantial policy instruments were missing until the end of 2005 in the new MS and in some cases are still missing (Table 2). The late introduction of policy instruments greatly affected their possibility of reaching the 2005 target. In contrast, France and Spain had adopted biofuel policies well before 2003. However, the specific policy instruments were not suitable to achieve the targets[11]. In France, the problem was a lack of political agreement among public authorities and private stakeholders for the definition of a coherent policy strategy (Van Walwijk, 2006). Such agreement materialized only at the end of 2005 (MEFI, 2005). In Spain, the problem has been related to the existence since 1999 of a national policy supporting production and not consumption targets (Bustos, 2006). In Belgium, policy instruments to support the use of biofuels were missing until 2006 (EC, 2006b).

In sum, the implementation of the Biofuels Directive has been delayed in these countries even if the transposition of the EU targets was duly performed. In accordance with the enforcement approach theory, domestic interests – accession to the EU and partly agricultural development – have promoted effective transposition in new MS, but the costs associated with implementing suitable policies have prevented the achievement of results. The development in the group of old MS appears to be more in accordance with the management approach. In these MS, the EU targets correspond well to agricultural development and other domestic interests but were missed due to the difficulty of quickly reaching political agreement on a coherent and adequate policy strategy agreed by all main stakeholders.

5.3 Weak implementation

The majority of the MS has followed a pattern of implementation which is denoted here as *weak implementation*. This heterogeneous group includes 15 MS that, as shown in Fig. 4, have adopted indicative targets below the Directive's reference value and have consumed nil or only modest quantities of biofuels in 2005.

Figure 4

Table 3

The assessment of the implementation process in these countries is based on national indicative targets and arguments for differentiation from the EU reference target. In Table 3 the arguments presented by the national authorities to the EC are summarized:

- Agricultural potentials: 10 of the 15 MS of this group claim that limited potentials for the production of agricultural feed stocks justify their low targets. This supports the notion that development of agriculture and employment in rural areas is in practice a crucial motivation for investments in transport biofuels.

- Reduction cost of GHG emission: this claim embodies a profound disagreement towards a central idea of the EU Directive that sees biofuels as a viable means, though costly, for climate protection.

- Decision making and investments lead-time: the transposition process has been characterized by a time consuming policy formulation stage at national level in consideration of the lack of experience with biofuels and the virtual non-existence of biofuels industries in some MS.

- National budget limitations: the financial cost of biofuels policies is a concern for MS. The Czech Republic, Denmark and Poland explicitly claim the lack of financial resources and the losses in government revenues to justify their targets. In addition, MS like France and Hungary (*formal compliance*), as well as, Italy and Portugal (*weak implementation*) have set maximum volumes for tax incentives. Several other MS

(including Germany, the UK and the Netherlands) are planning to phase out tax incentives in the next years in favour of quota obligations to reduce budget expenditures.

- Investments in advanced biofuels: three MS, all with limited availability of agricultural land, claim that investments in research and development of advanced biofuels are a suitable justification for their low targets.

- Alternative use of biomass: three MS explicitly claim that biomass should be used for heat and power production and not for transport. The argument is consistent with various studies showing that using biomass resources for replacing fossil fuels in stationary applications is a more cost-effective way of reducing carbon dioxide emission than as transport fuels (for an early example, see Gustavsson *et al.*, 1995).

- Negative impacts on the environment: few MS are concerned with the impact of the production of biofuels on the natural environment. The same MS acknowledge that through the application of minimum environmental standards this risk would be minimized, if not excluded.

The legitimacy of the arguments is assessed by the EC in regard of Art. 4. In July 2005, the EC initiated an infringement procedure against 7 of the 9 MS which presented national indicative targets not in line with the Directive. The EC noted that having examined the targets and the justifications presented by the MS "(they)… lack relevance, seem incorrect, put the desirability of the Directive itself into question, or would (if correct) apply to all Member States" [12]. Two MS, Cyprus and Malta, were not changer for their low targets, due essentially to an indisputable lack of agricultural potentials.

In conclusion, weak implementation appears to be the consequence of numerous barriers, illustrated by the described national arguments. Most of the arguments, including lack of agricultural potentials, high cost of GHG emission reduction, national budget limitations,

investments in advanced biofuels and alternative use of biomass, relate somehow to a lack of domestic interest to implement the Directive and are consistent with the *enforcement approach* in implementation theory. There are also a few factors such as environmental concerns, technical suitability, or lead times for decision making and investments, which relate to a lack of capacity, or to the difficulty of the issue at hand, proposed by the *management approach* to explain the implementation deficit.

6. Process of policy implementation

The implementation of the Biofuels Directive in the 25 MS is observed in this section from a policy process perspective which includes formulation, transposition and practical implementation of the EU policy.

6.1 Policy formulation

Implementation problems can originate at the stage of policy formulation and thereafter affect the entire policy process. In the case of biofuels for transport, two types of problems originate at the EU level.

The first problem is about the policy objectives of the Directive. Directives are the result of a legislative process in which it is fundamental to attain broad consensus among MS. During the policy formulation phase, the EC cleverly used a policy hitchhiking strategy, pointing to the benefits of biofuels to rural areas, in order to build support for the Directive. Support from agricultural lobbies was important for the adoption of the proposal. MS like Germany, France, Spain, Italy and Austria, which at that time already had national production of biofuels and interest in the development of new markets for agricultural products, supported the EC

proposal (CEU, 2002a; Weber, 2006; Van Walwijk, 2006: Bustos, 2006; Bach, 2006). However, this has left room for interpretation at the national level and eventually brought the strategy to backfire. Rather than hitchhiking on agricultural interests, the policy has been hijacked. Increased production of cereals and rapeseed oil to feed biofuels production has been the result in some countries. Lack of domestic agricultural potentials is the main argument for not implementing in other countries. Although agricultural and rural development is not stated as a policy objective in the Directive, our analysis shows that it has been interpreted as such and it has received priority over the other objectives becoming in practice a motivation for both compliance and non-compliance.

A second type of problems emanates from the perceived weak link between policy means and policy objectives. The suitability of biofuels consumption as a means to achieve the policy objectives stated in Art. 1 was criticised during the negotiation of the EU Directive by MS like Denmark, Finland, the Netherlands and the UK (CEU, 2002a; Furness, 2006; Trier, 2006)[13]. These same countries appear in 2005 among the MS that have not effectively implemented the Directive (weak implementation group). That first generation biofuels is not a cost-efficient option for reducing greenhouse gas emissions and to secure energy supply is an argument that can be substantiated. In any case, MS compliance with the EU policy becomes problematic if biofuels consumption is not perceived as a suitable means to attain the intended policy objectives.

6.2 Transposition of EU targets into national systems

Compliance with EU Directives requires national authorities to transpose them into national systems. Transposition is important since it forms a precondition for effective implementation

of EU policy (Steunenberg, 2004). To assess this phase, national indicative targets are compared to EU reference values for the year 2005.

Based on the assumption that transposition is influenced by *domestic interests*, two distinctive types of interests appear to be important in the case of biofuels. On one side there are short-term interests, *(a)* compliance with accession requirements for EU candidates and *(b)* agricultural development in rural areas, which concern politically sensitive issues and important economic sectors. On the other side, *(i)* climate protection and *(ii)* security of energy supply are two long-term issues, which may be less influential on short-term politics and more difficult to evaluate in monetary terms. The analysis shows that the transposition of EU targets has been successful in MS where at least one short-term interest *(a, b)* was present or alternatively, in the case of Sweden, both the two long-term interests *(i, ii)* provided sufficiently strong motivation for national government decisions.

The presence of domestic interests explains the cases of effective transposition in the groups of countries with *effective implementation* and *formal compliance*. However, several countries in the group *weak implementation* that are clearly sharing these interests have not transposed the Directive into national legislation (for example, Poland, Netherlands, Slovenia, Czech Republic, Estonia, Cyprus, Malta and Finland). Evidently in the case of biofuels the transposition process has been affected by other factors than domestic interests. In order to understand these cases it is necessary to assess whether the transposition of the EU targets was interpreted by MS as a viable means to fulfil their domestic interests, or whether specific conditions and practical constrains have affected the transposition process.

In the case of Finland and the Netherlands, climate protection and energy security are high on the political agendas. However, consumption of first generation biofuels was not seen as a viable means for meeting those objectives (CEU, 2002a; Godfroij, 2006). These MS invested

time and resources to investigate how best to fulfil their interests with transport biofuels causing a delay in the transposition process.

Former accession countries like Poland, Slovenia, the Czech Republic, Estonia, Cyprus and Malta had a short-term interest in the transposition of the EU targets. These countries do not dispute the viability of biofuels as a means for reaching the objectives of the Directive but nevertheless adopted lower targets, claiming various practical constraints, and presented their justifications to the EC. Malta and Cyprus argued, successfully, that lack of agricultural potentials justify their low targets. In the other four countries a combination of lack of experience with biofuels, scarce financial resources and limited availability of time, explains the *weak implementation.*

In conclusion, transposition has been successful in the cases where sufficiently strong domestic interests were present and the viability of biofuels as a means not disputed. Several countries that share these same domestic interests did not, however, transpose the EU targets. Consistent with the enforcement approach, one set of reasons given is that first generation biofuel is an uneconomic and ineffective means of reaching environmental policy objectives. Consistent with the management approach, several countries, all of which new MS, claimed a lack of capacity, time and resources for not transposing the targets.

6.3 Practical implementation of indicative national targets

The last phase of the policy process observed in this paper consists of the adoption and implementation of policy instruments for the achievement of consumption targets. The national progress reports presented to the EC show that most national governments transposed the Biofuels Directive, albeit with lower targets, into their national legal systems through national laws, whereas the selection of suitable policy instruments has usually been referred to

lower-level actors such as national ministries and agencies. In this context, national policy strategies have often been the product of intense negotiations, not only with private actors and stakeholders, but also and especially between ministries.

The interviews confirmed the existence of inter- and intra-organisational differences in values and interests as a source of problems and delays in the implementation process. Policy instruments were in many cases not executed until the end of 2005 (see Table 2) – too late for producing results in that year. Lead-times in national decision making have delayed the implementation of policy instruments and, as a result, targets have not been met. France, which missed by far its 2005 indicative target, is a case in point (see Section 5.2). However, we have not come across any fundamental practical implementation problems that should prevent targets from being reached given sufficient time for policy instruments to induce change and investments to be made.

7. Discussion

The analysis of the implementation of the Biofuels Directive shows that there are numerous barriers and problems that have hindered the adoption of reference targets and prevented the adopted targets from being reached. Various barriers consistent with the management approach in implementation theory have been identified. These include technical issues related to fuels and fuel quality, lead-times in decision making due to negotiations or administrative capacity, and the like. In addition, policy instruments adopted have not been in place long enough to affect the market in most of the MS. This type of implementation problems should be of a temporary nature, unless, of course, there is more fundamental disagreement behind the advancement of these arguments.

The analysis shows that the fundamental implementation barriers are related mainly to (i) several and partly competing objectives, specifically concerning security of supply and the role of domestic agriculture in production, and (ii) that many MS do not see first generation biofuels as a suitable means for (Art 1): "…contributing to objectives such as meeting climate change commitments, environmentally friendly security of supply and promoting renewable sources." These concerns of are substantiated through several studies showing that biomass potentials in the EU are limited (e.g., Ericsson and Nilsson, 2006), that using biomass for energy in stationary applications is a more cost-effective way of reducing GHG emissions (e.g., Gustavsson *et al.*, 1995), and that the environmental benefits of first generation biofuels (i.e., biodiesel from vegetable oils and ethanol from cereals) are small (e.g., VIEWLS, 2005). Hence, these concerns are real and will not go away.

Limited agricultural potentials and the availability of feedstocks in the EU for the production of biofuels are at the root of the matter due to the resulting competition for resources. One way of addressing this problem is to invest in research and development for second generation fuels with higher overall well-to-tank efficiencies and production potentials. This, however, does not contribute to the achievement of near term consumption targets. Another option is to import biofuels, or feedstock. Although imports are admissible under the Directive, nearly all MS are strongly reluctant to this option. In their view, it would mean that benefits for rural areas in the respective country would be lost and that the enhancement of security of supply would be compromised.

Consistent with the enforcement approach in policy theory we have identified a mismatch between domestic interests and the Biofuels Directive as the key reason for the lack of implementation. Given the reluctance among MS to implement EU reference targets, the question we set out with in this study is what can be done in order to move forward with biofuels policy in the EU. Enforcement theorists generally stress the need for monitoring and

sanctions, two central elements of enforcement strategies (Tallberg, 2002). The monitoring by the EC and the threat of sanctions has already produced some results. Poland, Greece and Ireland recently adopted national indicative targets for 2006 that are in line with the EU reference value (EC, 2006b). A question that follows is how far enforcement must go in order to ensure compliance and whether strong enforcement is even politically possible in the EU. Before the end of 2006 the EC has to review the implementation of the Directive and, if necessary, can propose a revision of the EU law to the Council of the EU and to the Parliament. Within this process in April 2006 the EC released a document where some options are considered (EC, 2006c). However, such approach does not address the fundamental problem of a mismatch between the Directive and domestic interests.

A second option for moving forward is to seek consensus on the priority of policy objectives and how they should be interpreted. What is more important: to reduce oil-dependence, support conventional crops in domestic agriculture, reduce GHG emissions cost-efficiently, support free trade, nurse second generation technologies, or promote renewable energy sources? With a clear and precise view on the objectives it would be easier to agree on the means for reaching them. However, our analysis has shown that there is considerable divergence between domestic interests and interpretation of objectives in this area. In addition, there are inherent technological and economic uncertainties associated with future options. As a result, there is no common vision on what would constitute good solutions in the longer term.

A third option for moving forward is to allow MS a large degree of flexibility and freedom in the development of markets and technologies for biofuels. An amended Directive should allow MS to adopt lower consumption targets in return for, for example, efforts to support fuel efficient vehicles, or considerable investments in research and development of advanced biofuels that show better energy balances and higher production potentials. MS where first

generation biofuels bring only small environmental, economical and social benefits will focus on developing alternative options and technologies. At the same time, agricultural interests will serve in other MS but the hijacking of biofuels policy will be avoided. Greater flexibility would not completely eliminate the need for reaching some level of consensus on issues such as the role of imports and domestic agriculture in relation to free trade. It would, however, facilitate a greater flexibility in approaches and an exploration of various options in a situation where it is too soon to pick winners. The current emphasis on near term targets is in effect turning first generation biodiesel and ethanol into winners. Hence, based on our analysis of implementation problems, and noting that several of the arguments against fully implementing the Biofuels Directive have a sound scientific basis, we conclude that a more flexible approach would be the best option for moving forward. The EU can become a leader in this area, or waste precious time and resources on inferior solutions.

8. Conclusions

The implementation of the Biofuels Directive in the 25 member states is assessed here against the background of implementation theory for the purpose of suggesting a way forward for biofuels policy in the European Union. Implementation so far has been weak and for the first target year, 2005, only three countries reached the indicative 2% target for biofuels consumption. The weighted average of targets adopted by member states was 1.4%, but a level of about 1% was actually reached. The types of implementation problems encountered are both practical in nature, e.g., due to lead-times or lack of capacity, and more fundamental, i.e., due to a mismatch between the Directive and domestic interests. For example, several countries take the legitimate position that first generation biofuels are not a suitable means for reaching climate and energy policy objectives. Due to the lack of consensus on the priority of

competing policy objectives, and disagreement on the best means for reaching the objectives, we argue that stronger enforcement is not a constructive approach. Instead we propose, based on our analysis and informed by the literature on biofuels, that the European Union should allow for more flexibility so that low targets can be compensated for by other efforts. This does not mean that efforts to reach consensus on policy goals and means should be abandoned. Specifically, the future policy process should more clearly address the role of, and interaction between, competing policy objectives.

List of references

Bach, H. (2006). Personal communication. Federal Ministry of Agriculture, Forestry, Environment and Water – Management Division V/5 – Transport, Mobility, Human Settlement and Noise (Government official), 15 March 2006.

Bustos, M. (2006). Personal communication. Spanish Renewable Energy Association (APPA) (Biofuels expert), 6 June 2006.

CEU [Council of the European Union] (2002a). Outcome of the proceedings of the Working Party on Energy, Brussels, 22 February 2002.

CEU [Council of the European Union] (2002b). Statement of the Council's reasons on the Common position adopted by the Council on 18 November 2002 with a view to the adoption of a Directive of the European Parliament and of the Council on the promotion of the use of biofuels or other renewable fuels for transport, Brussels, 18 November 2002.

EC [European Commission] (2003) 'Directive 2003/30/EC of the European Parliament and the Council on the Promotion of the use of Biofuels or other Renewable Fuels for Transport', Brussels, 8 May 2003.

EC [European Commission] (2005) 'European Commission sends Reasoned Opinions to 9 Member States for failure to implement European legislation on biofuels', Press Release, Brussels, 6 July 2005.

EC [European Commission] (2006a) 'European Commission urges Member States to implement the Biofuels Directive', Press Release, Brussels, 4 April 2006.

EC [European Commission] (2006b) Member States reports on the implementation of Directive 2003/30/EC. Available at the web site of the European Commission – DG TREN (http://www.eu.int/comm/energy/res/legislation/biofuels_members_states_en.htm).

EC [European Commission] (2006c) 'Review of EU Biofuels Directive – Public Consultation Exercise', Brussels, April 2006.

EEA [European Environment Agency] (2006) 'Transport and Environment: Facing a Dilemma', Copenhagen, March 2006.

Ericsson, K. and Nilsson, L.J. (2006) 'Assessment of the Potential Biomass Supply in Europe Using a Resource-Focused Approach', *Biomass and Bioenergy* 30 (1), pp. 1-15.

EurObserv'ER (2005). 'Biofuels Barometer 2004', *Systemes Solaires* 167.

Furness, R. (2006). Personal communication. Department for Transport – Cleaner Fuels and Vehicles Division (Government official), 17 February 2006.

Glachant, M. (2001) 'The Need for Adaptability in EU Environmental Policy Design and Implementation', *European Environment* 11, pp. 239-249.

Godfroij, P. (2006). Personal communication. Ministry of housing, spatial planning and the environment (VROM) – Directorate General for Environmental Protection Climate Change and Industry (Government official), 17 March 2006.

Grabbe, H. (2002) 'Europeanization Goes East: Power and Uncertainty in the EU Accession Process'. Paper prepared for the ECPR Joint Sessions of Workshops, Turin, March 2002.

Gustavsson, L., Börjesson, P., Johansson, B. and Svenningsson, P. (1995) 'Reducing CO2 Emissions by Substituting Biomass for Fossil Fuel', *Energy* 20 (11), pp. 1097-1113.

Jordan, A. J. (1999) 'The Implementation of European Environmental Policy: A Political Problem Without a Political Solution?', *Government and Policy* 17 (1), pp. 69-90.

Knill, C. (1998) 'European Policies: The Impact of National Administrative Traditions on European Policy Making', *Journal of Public Policy* 18, pp. 1-28.

MEFI [French Ministry of Economy, Finance and Industry] (2005) 'Table Ronde sur les Biocarburants', Communiqué de Presse (in French), 22 November 2005.

Pelkmans, L. (2006). Personal communication. Flemish Institute for Technological Research (VITO) – Department of Energy Technology (Biofuels expert), 10 February 2006.

Steunenberg, B. (2004) 'EU Policy, Domestic Interests, and the Transposition of Directives'. Proceedings of the NIG Annual Work Conference 2004, Rotterdam, October 2004.

Tallberg, J. (2002) 'Paths to Compliance: Enforcement, Management and the European Union', *International Organization* 56, pp. 609-643.

Trier, P. (2006). Personal communication. Danish Ministry of Transport and Energy - Danish Energy Authority, Department for Energy Efficiency and Economics (Government official), 30 February 2006.

Van Walwijk, M. (2006). Personal communication (Biofuels expert). 24 February 2006.

Weber, T. (2006). Personal communication. Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (Government official), 25 April 2006.

Vedung, E. (1998) 'Policy instruments: Typologies and Theories', in Bemelmans-Videc *et al*. (ed) *Carrots, Sticks and Sermons: Policy Instruments and Their Evaluation*, Transaction Publishers, London.

VIEWLS, (2005) 'Environmental and Economic Performance of Biofuels', Volume I – Main report. Publication produced under the framework of the VIEWLS project (Clean Views on Clean Fuels), Utrecht, April 2005.

Winter, S. (1990) 'Integrating Implementation Research', in Palumbo, D. and Calista D. (ed) *Implementation and the Policy Process*, Greenwood Press, New York.

Table 1

National indicative targets of biofuels consumption and EU reference values for the years 2005, 2006 and 2010.

	2005	2006	2010		2005	2006	2010
Austria	2.5%	2.5%	5.75%	Latvia	2%	2.75%	5.75%
Belgium	2%	2.75%	5.75%	Lithuania	2%		5.75%
Cyprus	1%		n/a	Luxemburg	n/a	2.75%	5.75%
Czech Rep	0.7%		5.75%	Malta	0.3%		n/a
Denmark	0%	0.1%	n/a	the Netherlands	n/a	2%	5.75%
Estonia	n/a	2%	5.75%	Poland	0.5%	1.5%	5.75%
Finland	0.1%		n/a	Portugal	1.15%	2%	5.75%
France	2%	2%	7%	Slovakia	2%	2.5%	5.75%
Germany	2%		5.75%	Slovenia	0.65%	1.2%	5%
Greece	0.7%	2.5%	5.75%	Spain	2%		5.83%
Hungary	2%		4%	Sweden	3%		5.75%
Ireland	0.06%	1.14%	n/a	United Kingdom	0.3%		5%
Italy	1%		5%	EU Directive	2%	2.75%	5.75%

Source: EC (2006b); public documents of the European Commission; personal communications.

n/a: not adopted

Table 2

Policy instruments adopted in the EU member states.

Policy Instruments / Member States	Tax incentives	Biofuels Obligations	Production Subsidies	Investment grants for conversion plants	Research & Development	Tax incentives for FFV [c]	Biofuels Quality Standards	Biofuels Use in public fleets	Congestion & Parking Fees Reductions	Filling Stations Availability	Public Relations Activities
Austria	X	X									
Belgium	X[a]		X	X	X						
Cyprus	X[b]			X	X	X	X	X			
Czech Rep.	X[b]	X[b]	X		X		X				
Denmark					X						X
Estonia	X[b]		X								
Finland					X						
France	X				X						
Germany	X	X[a]			X						X
Greece											
Hungary						X					
Ireland	X		X		X	X[a]					
Italy	X	X[b]									
Latvia	X		X	X	X						
Lithuania	X[b]	X[a]	X								
Luxemburg	X[b]										
Malta	X							X			
Netherlands	X[a]	X[a]			X						
Poland	X				X						
Portugal	X[b]										X
Slovakia	X[b]	X[b]									
Slovenia	X	X[a]									
Spain	X				X						
Sweden	X				X	X		X	X	X	
the UK	X	X[a]		X	X			X			
EU 25	21	8	6	4	14	4	2	4	1	1	3

Source: EC (2006b); National official document.

[a] Policy instruments adopted but not executed.

[b] Policy instruments executed in the second semester of 2005 or in 2006.

[c] Flexi Fuel Vehicle.

Table 3

Arguments presented by national governments for differentiation from the EU reference value for the year 2005.

Member States / Arguments	Cyprus	the Czech Rep.	Denmark	Estonia	Finland	Greece	Ireland	Italy	Luxemburg	Malta	the Netherlands	Poland	Portugal	Slovenia	The UK	TOTAL
Agricultural potentials	X	X	X		X		X	X	X	X	X		X			10
Reduction cost of GHG emission			X		X		X					X			X	5
Decision making and investments lead-time											X	X	X		X	4
Technical suitability of vehicles and distribution systems			X	X		X	X									4
National budget limitations		X	X									X				3
Investments in advanced biofuels			X		X						X					3
Alternative use biomass			X		X									X		3
Negative impacts on environment			X				X								X	3

Source: EC (2006b).

Captions to illustrations

Fig. 1. National consumption of biofuels and EU reference values for the year 2005 in the 25 member states.

Source: EC (2006b); national official documents; own calculations.

    * 2004 values.

Fig. 2. National production of biofuels in 2002, national consumption in 2005 and EU reference values (2005)

for selected member states.

Source: EC (2006b); personal communications; EurObserv'ER, 2005.

Fig. 3. National consumption of biofuels in 2005 and EU/national targets (2005) in selected member states.

Source: EC (2006b); personal communications.

Fig. 4. National consumption of biofuels, EU reference values and national targets (2005) in selected member

states.

Source: EC (2006b); personal communications.
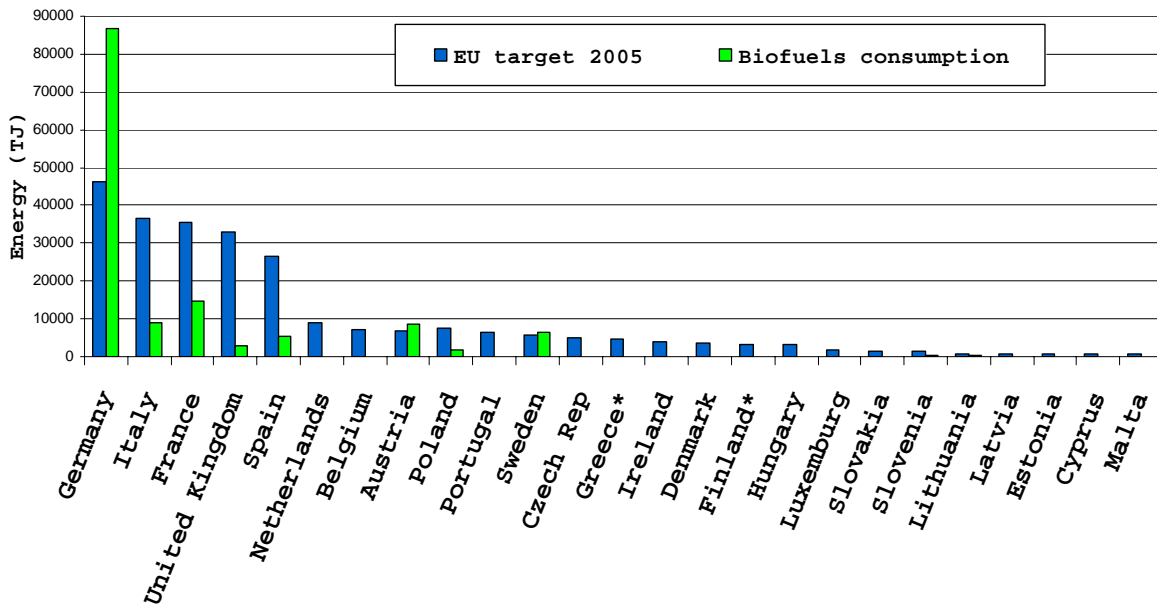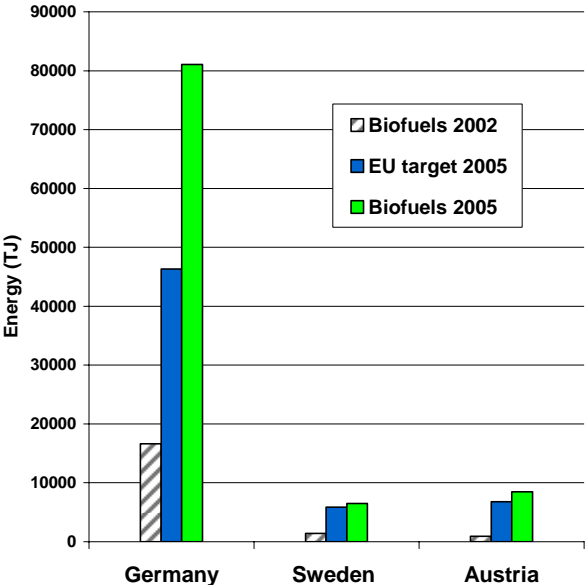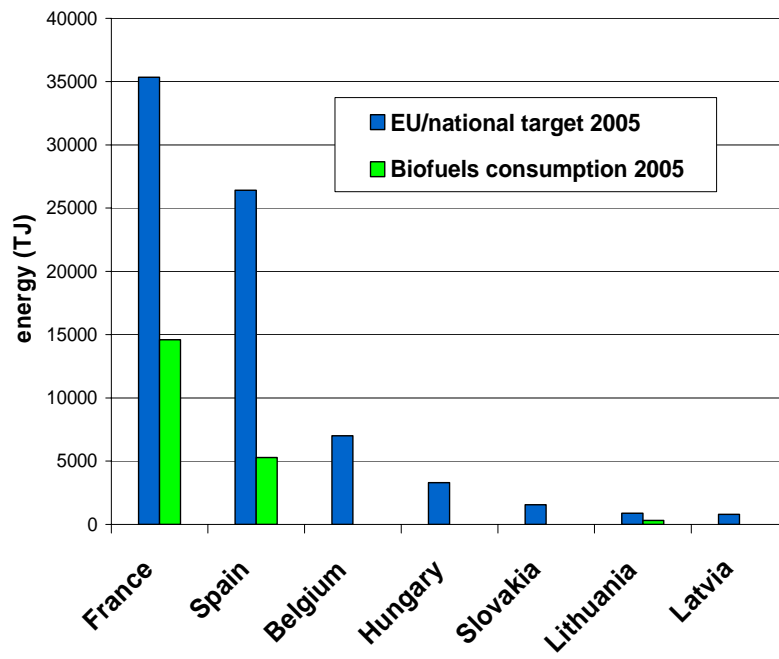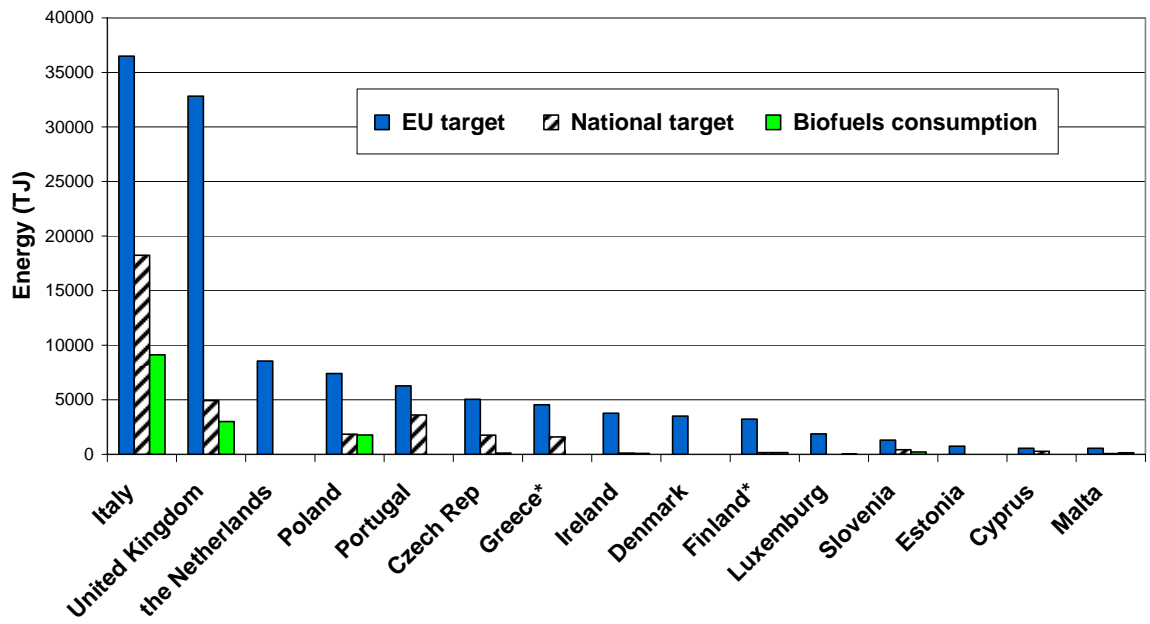
    * 2004 values.

Figure 1

Figure 2

Figure 3

Figure 4

Footnotes

[1] The difference between policy outputs (consumption of biofuels) and policy outcomes (policy objectives), often employed in policy research, is here acknowledged (for a description, see Hill and Hupe, 2002).

[2] Motivations for differentiation from EU reference values include, but are not limited to:

   – Limited national potential for the production of biomass;

   – The use of domestic biomass resources for other energy uses than transport;

   – Specific technical or climatic characteristics of the national market for transport fuels;

   – National policies that allocate comparable resources to the production of other transport fuels based on renewable energy sources.

[3] A distinction between policy measures and instruments is here made. Measures are the social or technical change provoked or avoided through the application of policy instruments. Policy instruments are "the set of techniques by which governmental authorities wield their power in attempting to ensure support and affect or prevent social change" (Vedung, 1998, p. 21).

[4] Domestic interest is used here in a broad sense to denote domestic political interests, policy objectives, driving forces, etc., that are relevant in the context of biofuels.

[5] The fuels taxation Directive (2003/96/EC) was amended in 2003 to allow MS to make use of tax incentives to support the use of biofuels.

[6] At the time of this research, all 25 MS have submitted to the EC at least one national progress report. The reports are available at http://www.eu.int/comm/energy/res/legislation/biofuels_members_states_en.htm

[7] Representatives from relevant ministries of Austria, Denmark, Germany, Malta, the Netherlands, Sweden and United Kingdom were interviewed. Experts from private research institutes and associations in Belgium, France and Spain were consulted. A representative of the DG TREN of the European Commission was also interviewed.

[8] National indicative targets for 2005 adopted in 2006 are not considered in this paper.

[9] Authors' estimate based on reported and in some cases preliminary data on consumption levels in 2005.

[10] All the real and potential rights and obligations of the EU system and its institutional framework had to be adopted by the candidates in its entirety prior to the accession date (Grabbe, 2002). In 2004, exemptions to this principle were not agreed to accession countries in regards to the Biofuels Directive.

[11] In the opinion of the experts interviewed, capped fuels tax exemptions in France and low market prices of biofuels in Spain compared to foreign markets have been the main implementation problems in these MS (Van Walwijk, 2006: Bustos, 2006).

[12] The seven MS include Denmark, Ireland, Finland, the United Kingdom, Hungary, Poland and Greece (EC, 2005).

[13] An agreement between the MS and the EC was, nevertheless, reached in 2003 when the nature of the targets of the EC proposal was changed from mandatory to referential (CEU, 2002b).