



European Biofuels Technology Platform – Support for Advanced Biofuels Stakeholders

Report on barriers to biofuels deployment

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FINAL DRAFT

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EXECUTIVE SUMMARY

Technologies for the conversion of biomass are evolving rapidly, and their deployment on commercial scale is crucial for triggering a sustainable advanced biofuels industry that would bring substantial environmental and socio-economic paybacks. Notwithstanding the many (potential) benefits, the implementation of commercial scale projects is slowed down by factors that are not only directly connected with the global crisis or national economic trends.

EBTP-SABS acknowledges the importance of identifying barriers that are hindering the realization of the potentials of advanced biofuels industry in EU28 and beyond, so to contribute to removing them through targeted recommendations and strategic advice. To this end, the Consortium carried out an assessment among representatives of different entities in several EU and non-EU Countries. Not pretending to statistical relevance, the data summarized in the present report represent quite clearly the stance and the outlook of stakeholders that look at the perspectives of the advanced biofuels industry from the point of view of governments and governmental agencies, of the Academia and of the business community.

The responses quite unequivocally show that technological barriers are being removed, or significantly mitigated; at the same time, new obstacles are jeopardizing the deployment of advanced biofuels industries. Respondents clearly indicate two main weaknesses: a frail biomass market that needs to strengthen value chains in the context of a growing competition between different end-uses and relevant variability of prices; and an uncertain framework where uncertainty of EU strategies and trends couple with inconsistencies at national level and, more generally, with the lack of coherent strategies and action plans. Unmistakably, both factors are deterring investors, so that the whole sector is facing a go-slow. On the other hand, non-technological barriers can benefit from soft measures and coordinated actions. The aim of this Report is to feed the debate on how to most effectively overcome such hurdles with the support of the EBTP.

TABLE OF CONTENT

LIST OF FIGURES AND TABLES	IV
LIST OF ABBREVIATIONS	VI
INTRODUCTION.....	1
1 METHODOLOGY	2
2 FEEDSTOCK AVAILABILITY	3
2.1 AGRICULTURAL AND FORESTRY WASTES AND RESIDUES.....	4
2.2 OTHER WASTE STREAMS.....	5
2.3 COMPETITION FOR SUSTAINABLE FEEDSTOCKS FROM BIOENERGY AND BIOPRODUCTS	6
3 REGULATORY FRAMEWORKS AND INITIATIVES TO PROMOTE SUPPLY OF SUSTAINABLE FEEDSTOCKS.....	8
4 DEMONSTRATION OF INNOVATIVE ADVANCED BIOFUELS TECHNOLOGIES.....	10
5 IMPACT OF EC POLICIES ON COMMERCIAL DEPLOYMENT OF ADVANCED BIOFUELS.....	12
6 MECHANISMS TO IMPROVE MARKET DEVELOPMENT AND STIMULATE INVESTORS' CONFIDENCE IN ADVANCED BIOFUELS.....	13
7 IMPROVING CONFIDENCE IN BIOFUELS FROM CONSUMERS AND MEDIA TO POLITICAL DECISION MAKERS AND VALUE CHAIN PARTICIPANTS	15
8 CONCLUSION	17
REFERENCES.....	VII
ANNEX	VIII

LIST OF FIGURES AND TABLES

Figure 1: Influencing factors to the biofuels deployment	2
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LIST OF ABBREVIATIONS

AP	Autonomous Province
CHP	Combined heat and power
DfT	Department for Transport
e. g.	for example
EnC	Energy Community Contracting Parties
EU	European Union
FFV	Flexible Fuel Vehicle
FQD	Fuel Quality Directive
GHG	Green House Gas
i. e.	id est
iLUC	Indirect Land Use Changes
ISCC	International Sustainability and Carbon Certification
LPU	Local Public Utility
MS	Member State
Mtoe	Million Tonnes of Oil Equivalent
NREAP	National Renewable Energy Action Plan
PPP	Private Public Partnership
RED	Renewable Energy Directive
RTFC	Renewable Transport Fuel Certificates
SME	Small and Medium Enterprises
UCO	Used cooking oil

Introduction

The European Union (EU) has set objectives on renewable energy and sustainable biofuels to tackle the challenges of climate change and energy security.

In 2013, nearly 13.6 Mtoe (Million Tonnes of Oil Equivalent) of biofuels were consumed in EU 28, totalling to 4.7 % (volume basis) of road transport fuels. This shows a downturn in comparison to 2012 where 14.6 Mtoe biofuels were consumed in the EU. Still, biofuels are expected to contribute to meeting the lion share of the EU 2020 target of 10 % renewable energies in the transport sector.

Since 2009, the European Renewable Energy Directive (RED) and the European Fuel Quality Directive (FQD) have set sustainability criteria for biofuels and objectives regarding the contribution to Green House Gas (GHG) reduction. These become particularly stringent in the amendments that the EU Energy Council agreed upon in June 2014 that reflect concerns over the sustainability and GHG reduction benefits of some biofuels.

The amendments concern particularly the following aspects:

- **Mitigation of indirect land-use change (ILUC) emissions through a threshold of 7 %** of the final consumption of energy in transport in 2020 **for conventional biofuels** to count towards the renewable energy directive target;
- **Encouragement of the transition to second and third generation ("advanced") biofuels**, by inviting EU Member States to set national targets for advanced biofuels based on a reference value of 0.5 percentage points of the 10 % target for renewable energy in transport of the RED.
- New Annex IX of the renewable energy directive (EC 2009a) contains **feedstocks for advanced biofuels that count double towards the targets**;
- **Additional incentives for advanced biofuels** by extending the tool of statistical transfers of the renewables directive to cover such advanced biofuels, the double counting of the contribution of these biofuels is extended to the overall renewables energy targets;
- **Provision of incentives to generate electricity from renewable sources** in order to reduce greenhouse gas emissions in transport. In this regard, a multiplication factor of 5 for electricity from renewable sources in electric road vehicles and of 2.5 for electrified rail transport were introduced;
- **ILUC reporting on greenhouse gas emission savings** from the use of biofuels will be carried out by the Commission on the basis of data reported by member states; for that purpose, provisional estimated ILUC factors are included in new Annexes to the renewables and fuel quality directives;

Even though the EU2020 targets are far from being met, the development of advanced biofuels capacities is slowing down. In January 2014 the European Commission presented the 2030 framework for climate and energy policies. One main change compared to the 2020 targets is that the Commission does not anymore include targets for renewable energy or the greenhouse gas intensity of fuels used in the transport sector or any other sub-sector after 2020. Previously, the Commission has already indicated, that food-based biofuels should not receive public support after 2020. The focus of policy development should be on second and third generation biofuels and other alternative, sustainable fuels, which is reflected in the 2030 decision.

This report aims at spotlighting country-specific bottlenecks hindering more active engagement of the industry to realize the potentials of advanced biofuels.

1 Methodology

A short questionnaire was sent to Governments, Line Ministries, Agencies and Associations in EU28 and Energy Community Contracting Parties (EnC) in mid-2014.

Detailed feedback was received from 14 countries: France, Netherlands, Norway, Spain, Sweden, Latvia, Germany, Greece, Hungary, Kosovo¹, Macedonia, Moldova, Poland and United Kingdom. Responses snapshot the challenges faced in developing national strategies for advanced biofuels, with particular regard to feedstock availability, technology demonstration and market development. As this report mainly builds on the input from the different national agencies it cannot provide a balanced overview across Europe.

The questionnaire consisted of six open questions (the list is provided in Annex 1 to this report), aiming at identifying main barriers to biofuels deployment in each country. The questions are based on previously identified factors which are influencing the biofuels deployment (see Figure 1). The responses highlight country-specific bottlenecks, but also challenges that are common to all and that would benefit from coordinated policies and integrated solutions.

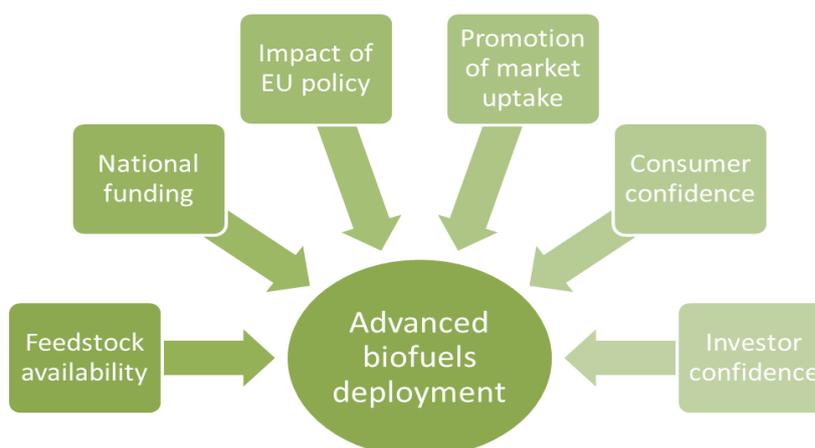


Figure 1: Influencing factors to the biofuels deployment

The questions treated the following topics from a country-specific viewpoint:

- availability of feedstocks;
- access to funding, in particular for investment in demonstration of innovative technologies;
- impact of EU policies;
- promotion of market uptake for advanced biofuels;
- improving consumers' confidence through certification and validation;
- improving the investment climate and rising the awareness of the business community, decision-makers and of the actors along the advanced biofuels value chain (suppliers, technology providers, fuel distributors)

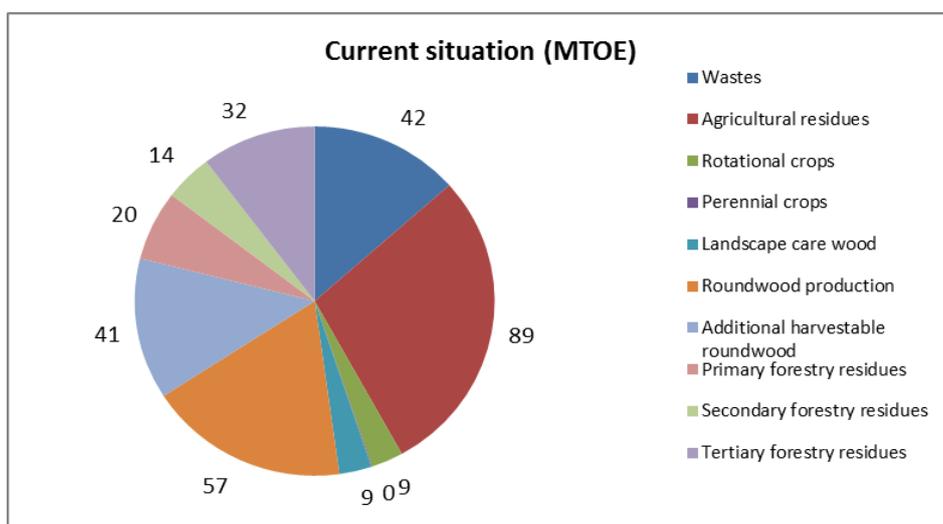
The questionnaires have been processed by the EBTP-SABS team that summarized responses in the present report following the identified topics. Key findings have been summarized on the top of each chapter. Suggestions for a way to overcome the identified hurdles are given at the end of the related paragraph.

¹ This designation is without prejudice to positions on status, and is in line with UNSC 1244 and the ICJ Opinion on the Kosovo Declaration of Independence.

2 Feedstock availability

The **Atlas of EU biomass potentials** (ELBERSEN ET AL 2012), developed in the framework of the FP7 project **Biomass Futures**, provides quantitative and spatially explicit estimates of potential biomass supply available across the EU Member States.

The Atlas shows that the physical biomass potentials totals, at present, to 314 Mtoe of bioenergy resources (see Figure 1), while this figure is expected to grow in both a 2020 and 2030 perspective (429 Mtoe in 2020 and 411 Mtoe in 2030, according to the reference scenario; 375 Mtoe in 2020 and 353 Mtoe in 2030 according to the sustainability scenario).



Source: Atlas of EU biomass potentials

Figure 2: Summary of current EU biomass potential (MTOE) over categories

In the next decades, the major growth is expected from agricultural residues, i.e. manure, straw and cuttings/prunings. Dedicated perennial crops are expected to expand most substantially in order to satisfy the demand for lignocellulosic biomass for either power, heat or advanced transport fuels.

The distribution of bioenergy resources varies among European countries, with bigger countries (Germany, France, Italy Poland) playing a leading role together with those that have relevant agricultural and forestry sectors. However, variations in the distribution of biomass production are expected, with a decrease in the production of Germany and Italy, while the production of France, Spain, Poland and Romania is likely to grow.

Nordic countries, the Baltic States and France concentrate the largest forestry potential, which is expected to remain stable. The availability of woody biomass from landscape care is expected to grow in the future.

2.1 Agricultural and forestry wastes and residues

KEY COMMENTS:

- **Availability and development of supply chains**
- **Land use and water use concerns**
- **Benchmarkability**
- **Preparedness of suppliers**

Respondents from EU 28 and EnC emphasized that feedstocks are abundantly available in their respective countries. In the case of conversion to bioethanol, for instance, most respondents see good perspectives for forestry biomass or other lignocellulosic residues that are deemed to meet sustainability criteria, as they typically do not compete with food production.

Respondents from Northern European countries (Sweden and Norway) highlight the potential of **wood waste**, logging residues (branches and tops) and low value wood. These countries already have a long tradition in the forestry industry and expertise in logistics, feedstock properties and transformation/conversion processes. Research and development on advanced biofuels in Sweden is to a high degree focusing on technologies for utilizing primarily forest-based lignocellulosic feedstocks. Pilot and demonstration plants like GoBiGas, a plant for the indirect gasification of wood fuel for the production of SNG, or the pilot plant for gasification of black liquor and ensuing production of DME in Piteå are good examples of the Swedish endeavours.

A higher interest in **agricultural residues** is registered among respondents from other countries, like Spain, Poland (wheat, rye, barley, sugar beet, and oats), Hungary (maize, wheat, sunflower, barley, sugar beet) or Macedonia, where transformation of rice straw and tobacco residues are being investigated.

- **Several EU studies and projects are ongoing (S2Biom, BERST, BiomassFuture) aiming at quantifying available residues at a higher level of geographical definition; relevant methodologies and tools are being developed and shall be available in the next years. These will allow having consistent information on the distribution and logistics of agricultural and forestry residues.**
- **Supply chains are being modelled, yet need to be further strengthened to become self-sufficient and economically viable; all categories of stakeholders shall be involved in a participatory decision-making process**
- **Bioenergy, including the possibilities offered by marginal and unutilized lands shall become a complementary topic to agricultural policies, thus allowing for rational water and land use; optimized use of residues, however, shall prevent from uncontrolled land use change reducing the attractiveness of energy crops;**
- **While the economics of 1st generation biofuels can be proven and assessed, the cost-benefits of biofuels deriving from lignocellulosic feedstocks still needs to build-up consistent commercial scale benchmarks that will come from deployment. EU and/or national financial support is helping to bridge this gap, and will remain important.**

2.2 Other waste streams

KEY COMMENTS:

- **Limited visibility vs. agricultural and forestry residues**
- **Extremely wide and dispersed chain of feedstock providers**
- **UCO and animal fat might also be perceived as a “less green” alternative by the consumer due to negative associations related to fat**

Waste streams are perceived as another promising feedstock, particularly used cooking oil (UCO), animal fats or other organic residues. These oils or fats that are purified after having been used in food processing, and are consequently no longer viable for human consumption - can be used as feedstock for the production of biodiesel for transport or heating.

Article 21(2) of the RED allows Member States to double-count biofuels produced from wastes, residues, non-food cellulosic and lignocellulosic material, towards their 10% national targets of renewable energies in the transport sector by 2020. Thus, for example in the UK, UCO derived biodiesel has been eligible to receive two Renewable Transport Fuel Certificates (RTFC) since December 2011.

Spain and Greece are currently developing collection plans in order to ensure full exploitation of the potential of UCO for biodiesel production. The supply chain of UCO is most typically characterised by many small feedstock ‘producers’ and therefore requires the establishment of local collection infrastructures.

The ‘Wasted’ report (MARLINS ET AL.2014) estimates that if all the wastes and residues, including also agricultural and forestry residues that are sustainably available in the European Union were converted only to biofuels, this could already supply 16 % of road transport fuel in 2030. Furthermore, if those wastes and residues are sourced sustainably, they can deliver GHG savings well in excess of 60 per cent, even when taking a full lifecycle approach.

- **UCO collection consortia need to be strengthened, while UCO collection needs to be supported by appropriate regulatory frameworks including a traceability system**
- **Consumers need to be reassured that transformation of waste streams is safe, economically viable and as “green” as other options**

2.3 Competition for sustainable feedstocks from bioenergy and bioproducts

KEY COMMENTS:

- **Competition between several end-use options could deter investors**
- **Competition between sectors of the Bioeconomy could trigger a “supply bubble”**
- **Lack of coherent national Bioeconomy development plans**
- **Uncertain absorption capacity of the market**
- **Feedstock producers need to be reassured that additional costs deriving from mobilizing agricultural/forestry residues will generate stable income and long-term benefits**

Forest-based feedstocks or agricultural residues do not directly compete with the production of food or feed, but could compete with other “traditional” uses or, even more evidently, with conversion pathways that are being developed by the emergent Bioeconomy sector.

In several regions of Central and South-East Europe, for example, woody biomass is still the main fuel for heating at the household level. In the current economic conjuncture, it is likely that the fuel switch, and the consequent release of biomass potentials, will be gradual.

Notwithstanding policy initiatives that might facilitate the process, unless industrial players intervene massively to channel relevant amounts of biomass to biofuel plants, it might take several years to change the consumption patterns from the current extensive individual use to basic collective use (district heating), and subsequently to advanced forms of collective utilization (Combined heating and power (CHP) and liquid biofuels). Some initiatives of this kind seem to be upcoming, yet it is likely that a great deal of biomass will be channelled to locations in the EU. Another concurrent use that is likely to be developed owing to high demand from the EU and (comparatively) lower CAPEX is that of agropellets. Biorefinery products are still to be developed at full potential.

The potential of energy crops is generally highlighted, even though uncertainty in the EU regulatory frameworks is seen as a hurdle to full-scale development. Moreover, energy crops are unlikely to meet sustainability criteria, while causing ILUC and water use changes. Great potential for the development of energy crops is identified in marginal and unutilized lands; it shall be noted, however, that utilization of these would require relevant investments in agricultural mechanization and the definition of specific policies (e.g. propriety rights). The public opinion might also hinder the utilization of marginal lands on the grounds of wildlife preservation.

- **The creation of local biomass markets will allow stabilizing prices, making biomass available for multiple end-uses; eventually, incentives schemes linked to overall GHG reduction might favour advanced transformation paths.**
- **Relevant regulatory work is needed to support biomass producers, with particular regards to contracts regulating feedstock uptake (e.g. framework contracts); the creation of public/cooperative feedstock repositories might support innovative trading options.**
- **Comprehensive national policies (biomass action plans or Bioeconomy action plans) shall define most effective and sustainable algorithms of biomass utilization in a multiannual perspective through appropriate emission targets, energy mix objectives and relevant incentives/disincentives (based on real life: useless to say biomass could be converted into anything advanced if there is no relevant industry, and it is unlikely that investments will be made in the next decade...)**
- **Industries and research institutions shall improve communication highlighting complementarity of end-use solutions; the actual mix (liquid biofuel, CHP, bioproducts) will be determined by policies and/or markets.**

3 Regulatory frameworks and initiatives to promote supply of sustainable feedstocks

KEY COMMENTS:

- **Uncertainty of EU regulations in the medium-term**
- **Lack or inconsistency of national legislation & strategies**
- **Heterogeneous and sometimes contradictory non-governmental initiatives**

Respondents have been univocal in prioritizing stable EU and national regulatory frameworks as a fundamental pillar in the construction of an advanced biofuels industry and markets; unchanging medium- to long-term perspective is particularly relevant for extensive investments required to deploy advanced biofuels technologies.

Besides a certain degree of changeability in the definition of advanced biofuels, respondents specifically indicated that the legal framework should focus on feedstock sustainability, rather than on regulating or endorsing the use of specific biomass fractions. One positive example could be that of the UK Renewable Transport Fuel Obligation that sets rules on feedstock eligibility, banning materials that have been harvested from areas of high biodiversity or peat lands, and establishes reward levels basing on feedstock origin and type (e.g. bioethanol from wheat gets one certificate per litre of blended biofuel, while bioethanol from advanced processing of biogenic wastes is double-counted).

As of mid-2014, the increase in biofuel production in EU MS seems to be generally market driven and linked to the growth in fuel demand deriving from compulsory blending. Several countries do not have binding sustainability certification; this is not the case of Hungary, where the International Sustainability and Carbon Certification (ISCC) system is compulsory for biofuels. Several other voluntary schemes are implemented by producers, an overview on the different voluntary schemes can be found as annex 2. Support to innovation and market development of biofuels is often limited to research and development, with no specific instruments targeting road freight, aviation and marine transport. Again, there are examples of good practice, such as that of Germany that established a specific funding programme to support the production of sustainable biomass. Autonomous Province (AP) of Vojvodina (Serbia) is developing solutions that shall favour the strengthening of biomass supply chains, even if mainly for combustion/CHP, namely: a Regional Biomass Action Plan complemented by an inventory of energivorous LPUs and detailed mapping of biomass availability in municipalities. The idea is to create the conditions for public or private investment into the substitution of obsolete boilers to biomass based technologies. This will of course favour combustion and CHP, rather than Advanced Biofuels; the former solutions are considered feasible in the medium term and thus politically rewarding, while Advanced Biofuels are not perceived as a priority. From the perspective of cost/benefit, the impact of Advanced Biofuels seems to be less attractive. In addition, the administration of AP Vojvodina is considering establishing a network of facilities for storage of agricultural residues that, at least for the first years of operation, shall be free of charge for farmers, thus creating the bases for local biomass trading. From many points of view, this approach seems adequate, since it (tries to) create the conditions for the utilization of agricultural residues, leaving to the market to determine the transformation path.

At the time of assessment, there are no specific initiatives in targeting the transport sector in Hungary or Greece, with the exception of gradually decreasing national subsidies for FAME in the latter country. On the other hand, in both countries financial support is made available for research, e.g. through the “Competitiveness” programme, which is co-funded by the EU and the Greek government (e.g. “SustainDiesel” (www.sustaindiesel.gr) aiming in integrating WCO in existing refineries, and

“Microalgae-By-Products” targeting in saline microalgae based technologies for biofuels and biochemicals production; both projects are industry driven and have high potential of industrial implementation).

- **The outlook on EU regulations shall be constantly adjusted, as the frameworks could further change.**
- **Bioeconomy stakeholders shall pro-actively contribute to the debate: developing sustainability certification schemes, or contributing to setting-up independent certification bodies**
- **Non-governmental initiatives shall coordinate synthesizing their objectives whenever common grounds could be found.**
- **Biomass action plans shall be developed at national / regional level, thus providing stakeholders and investors with coherent frameworks and stable perspectives.**

4 Demonstration of innovative advanced biofuels technologies

KEY COMMENTS:

- **Limited targeted national support**
- **Limited indirect support (dedicated training, incentives for GHG reduction, etc)**
- **Necessity to ensure real impact on local economies**
- **Limited absorption capacity of available EU funds in many countries**
- **Limited willingness to commit to long-term loans in an unpredictable economic conjuncture and unclear specific policy environment**

In both EU28 and EnC there is only limited access to **national funds** for the demonstration of advanced biofuels. Many countries have obsolete support schemes for the industry, focusing predominantly on facilitating export, or on the preservation of existing jobs (instead of supporting the growth of new employers). Some limitations deriving from state-aid regulations might be also deterrent.

There are positive exceptions, however: the British Department for Transport (DfT) has recently announced that in mid-2014 a £25m (around €30m) fund aimed specifically at the demonstration of advanced biofuels shall be launched. The DfT has also completed a feedstock sustainability study for advanced fuels platforms, with identification of potential feedstocks and their costs. In Sweden, support for demonstration of biofuel technology has mainly been granted on a project basis. Plants have been funded through public-private partnerships, with main financing coming from the Swedish Energy Authority and industrial partners. Only limited financial support for demonstration projects is currently offered in Greece, even though some technologies have been developed in lab-scale with promising results, demo scale projects are needed to validate the results into a more industrial relevant scale. The national investment promotion agency (Enterprise Greece), however, advertises the biomass and biofuels sector as promising and advantageous for foreign investors.

Respondents from Poland, Hungary, Macedonia, Kosovo* indicated that there is only limited support for commercial demonstration of innovative biofuel pathways, in addition to generally low investment capacity of the private sector. However, some funds at national level are made available in the form of support to innovative SMEs; moreover, it should be noted that in EnC countries significant support might be channeled through bilateral and multilateral cooperation programmers (IPA II, ENPI, H2020; ODA and bilateral credit lines; IFIs, and particularly the WeBSEFF).

Other research funding is available for advanced biofuels through the BESTF ERA-NET plus scheme. This is a bioenergy demonstrator programme with particular focus on bioenergy and advanced biofuels. Project selection can be difficult as funding agencies around the EU have different interpretations and priorities, but overall it is probably the current leading bioenergy demonstrator programme available for advanced biofuels.

Respondents expressed high hopes for the access to European funding (Era-Net Plus, NER, etc.), especially from countries like Spain or Greece, where the economic conjuncture limits significantly public spending, and consequently national funds for demo or flagship plants. Demonstration plants as well as other demonstration activities are not the priority of public support schemes in Europe.

Biofuel production in general has been supported by tax deductions, or the implementation of quota systems in accordance with the European regulations on the use of renewables energies in the transport sector. Respondents strongly agree on the fact that future development of new biofuels

technologies depend on stable political situation and unchanging legal frameworks. Political instability and policy changeability prevent investors from supporting the deployment of advanced biofuels technologies.

- **Further promotion of and awareness raising on available funding.**
- **Necessity to strengthen cooperation with investors in order to develop specific instruments for the sector.**
- **Promotion of local PPPs and innovative cooperative schemes between feedstock providers and the industry.**
- **Promote innovative forms of indirect support and instruments to strengthen the sector (e.g. guarantee fund for loans in the bioeconomy, tax incentives...)**
- **Support EU MS and EnC Countries in developing projects so to take advantage of available funding opportunities (awareness, capacity building)**

5 Impact of EC policies on commercial deployment of advanced biofuels

KEY COMMENTS:

- **Uncertainty of EU regulations and trends in the attitude towards biofuels**
- **EU policies perceived as incoherent (e.g. supporting diverse solutions for transport, or alternative uses of biomass)**
- **Sensitive implementation of EU regulations at national level taking into account different cases**

As already mentioned, the EU policy has significant influence on national policies, and consequently on the funding and development of advanced biofuels. Respondents see any uncertainty as an obstacle. Currently, two main issues are responsible for their concern: the ILUC proposal, and the 2030 proposal from the EC.

The ILUC approach relies on the assumption that the cultivation of energy crops on agricultural land may displace existing agricultural production, causing land use change in another location. This might occur in a neighbouring area or even in another country hundreds of miles away, where an area of high biodiversity (and high levels of "stored carbon") might be cleared to make more land available for growing food crops. Since 2008, there has been much debate about the assumptions made and methods used to establish the impact of Indirect Land Use Change. However, there is a consensus that land use change is very complex and affected by a wide range of factors, not only biofuels. The EC suggested in October 2012 the inclusion ILUC factors in reporting by fuel suppliers and Member States of greenhouse gas savings of biofuels and bioliquids.

Respondents from Hungary are concerned about the achievement of the 10% target for RES in transportation in 2020, because the changing legal environment in the EU can cause uncertain and unpredictable environment for the investors and the stakeholders of the biofuel market. A National Renewable Energy Action Plan (NREAP) has been drafted in Macedonia, together with a general strategy for the exploitation of RES; subordinate legislation on fuel quality is approved, as well as biodiesel standards. However, there are no studies examining the potential and socio-economic impacts of biofuel production. Kosovo* approved the NREAP which sets a 25% target for RES, with 10% biofuels by 2020; moreover, subordinate legislation has been issued defining RES targets (the adoption of similar acts regulating sustainability criteria and certification systems is envisaged in the second half of 2014). Apparently, in neither Country there is particular concern as regards the ongoing debate at EU level.

Reportedly, the uncertainty on the RED and biofuels targets is preventing further development of the liquid biofuels markets in Greece. Moreover, declining fiscal incentives is causing the biofuels (primarily FAME) production to depend on cheaper feedstocks of lower quality (imported oils, waste lipids), which leads to final products of reduced quality. Respondents suggest including more flexible approaches, allowing a larger infusion of biomass in the transportation sector. For example, the integration of liquid biomass within existing refining units is currently limited due to the lack of legislation that can compensate for bio-based or even decarbonisation credits.

- **Promote harmonization of national legislation and equal conditions for development across EU**
- **Support the promotion of bioenergy across all relevant EU policies (structural funds, agricultural policy, transport)**

6 Mechanisms to improve market development and stimulate investors' confidence in advanced biofuels

KEY COMMENTS:

- **Stable regulatory framework and standards to build investors' confidence**
- **Local schemes to support industries that foster local economies, create jobs, etc.**
- **Measure to facilitate market access of end-products, including fuel/fleet switch in Local Public Utilities (LPU)**
- **Measures to mitigate market distortions deriving from incentives and/or trade barriers**
- **Measures to promote predictability of supply, including soft measures, such as innovative contract typologies, administrative support, agreements with banks, insurances, etc.**

All the previous mentioned issues influence **investor confidence**, which is a main driver for commercial deployment of advanced biofuels in Europe. To achieve an investor friendly environment, a long-term stable policy at EU and national level is needed. The ongoing debate on sustainability needs to be settled by finding a recognised standard, which applies for all biomass sectors.

The **mechanisms to facilitate market access** are as well strongly linked to the political framework set by the EU. The increase in biofuel production in Poland, for example, is market driven and linked to the growth in fuel demand deriving from compulsory blending. Similarly, there are no specific initiatives in targeting the transport sector in Hungary or Greece, with the exception of gradually decreasing national subsidies for FAME in the latter country. Some other countries have specific initiatives targeting specific end use options. For example, the Spanish Initiative for Biofuels in Aviation (bioqueroseno.es) aims to support the production and use of bio jet fuel, also by mobilizing policymakers to develop specific policies and measures. Avinor, a company fully owned by the Norwegian Ministry of Transport that is responsible for planning, developing and operating the Norwegian airport network, has published a report on the potential for biofuels in aviation (AVINOR 2013). Norway also supports research and innovation in advanced biofuels through the ENERGIX program that is a key instrument in the implementation of the national RD&D strategy, Energi21, as well as for achieving other energy policy objectives (one of the funded projects focuses on advanced biofuels for marine transport.)

It shall be noted, however, that the economic crisis is causing a constant decrease in the consumption of transportation fuels (except for LPG) in some countries. In Italy, for example, a -6% was recorded for petrol, and -3% for diesel in 2013 on a yearly basis (the figures for 2012 are even higher). This might prevent oil companies to invest own money if not strongly compelled by the legislator, since their overall profit is shrinking (for investors might be more or less the same).

Therefore, respondents proposed that a quota system is developed based on the GHG reduction of each biofuel used, rather than on volumes. The possibility to implement such systems in the RED and FQD should be further investigated. The introduction of specific incentives for advanced biofuel production has been proposed in Sweden. The proposal foresees a price incentive for fuels from certain feedstocks (waste, cellulose, hemicelluloses, by-products) during the first 12 years, depending on actual fossil fuel prices, guaranteeing a predictable total price (on the condition that the fuel can be sold on the market). The premium should be financed by a fee from all transportation fuel suppliers to the Swedish market.

- **Stable policy framework**
- **Coherent national policies in line with EU policies**

7 Improving confidence in biofuels: consumers and media to political decision makers and value chain participants

KEY COMMENTS:

- **Food vs. Fuel dichotomy still an issue**
- **Car owners' confidence needs to be strengthened**
- **The debate shall be “streamlined” to be divulgated to a broader non-specialized audience**
- **Sustainability has to be demonstrated at each step with out-and-out transparency**
- **Policymakers must be reassured that promoting biofuels will not have a boomerang effect on their careers**

In some countries, biofuels have often a negative reputation owing to one-sided media coverage. One respondent from the Netherlands stated that the general sentiment for biofuels is not good due to ongoing debates about the sustainability of food-crop-based biofuels. The resulting indecisiveness hampers also the development of better performing biofuels in the Netherlands. Apart from the fact that the private motorist is very concerned about fuel cost and the performance and reliability of his car the consumer is also influenced by the media and the ongoing debate about 'fuel vs food'. Sustainability criteria have been established to stabilise the **consumer confidence** in advanced biofuels. A French respondent pointed out that the main interest centre of the public is mostly linked to the economic situation. Thus if the scarcity of oil cannot directly be seen it will be difficult to insert the feeling of need for biofuels into the head of the consumer.

The EU Renewable Energy Directive (RED) sets guidelines for the certification of sustainable biofuels thus conveying the message that new technologies avoid competition between food and fuel, and reduce the effects of ILUC. The EC also recognizes a number of voluntary certification schemes developed at national or sector level, such as the production standard “Bonsucro” that aims at improving environmental and social impacts of sugarcane production, the “International Sustainability & Carbon Certification System” (ISCC) developed in Germany, or the voluntary industry protocol “2BSvs” which is broadly used in France for all types of biofuels. Voluntary schemes are used for biofuels and bio-liquid production in Latvia. There is no national sustainability certification for biofuels and bioliquids in Spain, but production does comply with voluntary schemes to demonstrate compliance with the EU standards. Responses from Poland, Hungary, Macedonia, Kosovo*, Greece are heterogeneous, mainly depending on the status vis-à-vis the EU. Poland, Hungary and Greece shall comply with EU legislation. However, sustainability certification is not part of the Greek legislation, while the ISCC sustainability certification for biofuels is compulsory in Hungary. There is no certification and validation of sustainable biofuels implemented in Kosovo*, but subordinate legislation governing biofuels and compulsory blending is being drafted. The legal framework is apparently more robust in Macedonia, where several by-laws regulate biofuels, with blending rates set at 15% and quality controls entrusted to accredited laboratories. As both the road vehicle and oil industry work on a multinational scale, a common view in EU is needed.

The discussion on sustainability is based on different expectations from different stakeholders. EU and interested NGOs have recently created a hostile environment for biofuels, national policy makers have followed. The public is less aware of the difference between 1st generation and advanced biofuels, and a communications campaign would help once the policy is clearly defined. On the other side

feedstock and technology suppliers have a good level of understanding in the biofuel sector, although upstream suppliers remain cautious due to the low roll out rate of advanced power and biofuels plants. But important investors have less of an understanding of the technology platforms and will default to low risk scenarios which don't include advanced biofuels as the returns are too low. Thus, the investment incentives are rather low.

The media rises most of the time the question of the sustainability of biofuels. One respondent stated that sustainability is not reached only by communication and informing about this issue but by well adapted production processes starting by plant breeding, production, harvest, processing and downstream processing. Instruments and methods are in place to prove the sustainability. In general, the awareness and knowledge amongst investors, policy makers and the public is too low and needs to be fed with unbiased information to promote the development of advanced biofuels.

- **Promote information on the safety of biofuels from the car owners' perspective (involve producers? It has worked well with LPG and bi-fuel cars)**
- **Promote information campaigns on the positive impacts of biofuels on rural development (farmers' perspective)**
- **Reassure most committed public (hence the most ideological and difficult to tackle) that biofuels are actually sustainable to this end, maybe some third party independent certification would be of use (something like fairtrade or organic food labelling)**

8 Conclusion

The political parameters for the biofuels discussion keep changing. The impact of the removal of binding biofuels targets after 2020, and the ongoing scientific debate about ILUC cannot yet be significantly measured. It will take time for the different EU MS to react and develop national strategies for the deployment of advanced biofuels. There is also this feeling of confusion as to why support for biofuels has been discarded in Europe. Yet there are no medium-term alternatives other than imported fossil fuels. Other more significant land uses, environmental and societal issues (food production inefficiencies, job creation, food and energy security) seem to be totally ignored in the debate.

Over the last years, barriers for these biofuels' deployment have moved from the biofuels technology to policy and financing. Commercialization depends on political leadership and adequate policies, as it is recognized that innovative energy technologies are not yet cost-competitive against conventional biofuels and fossil fuels they aim at displacing. This report tried to identify the national strategies and individual hurdles to the biofuels deployment but trying to gain new insights in this debate from stakeholders is rather challenging as, right now, everyone is focused on the political debate.

Recently, there is a significant interest in electric and fuel cell vehicles, nearly disregarding the role of biofuels. The offer of electric vehicles has increased rapidly due to the CO₂ emission goals despite the fact that the average European electricity generation is quite carbon intensive, around 400 g/kWh. There are no real incentives for vehicles capable of running on biofuels therefore incentives to produce E85/FFV vehicles seem to fade away. Also, the fact that ethanol and FAME are not fully compatible with the existing or new vehicles needs to be solved from the car manufactures. This development can also be seen in the Directive on the deployment of alternative fuels infrastructure (proposal COM (2013) 18) that is currently being finalized and focuses on EV charging and gaseous fuels (LPG, CNG, LNG and H₂). The Directive mentions biofuels but does not set specific requirements for, e.g., E85 refuelling. To bring biofuels them back on the agenda, one main R&D need is to evaluate in which applications biofuels pay-off best. City cars and buses are easy to electrify whereas ocean going ships and airplanes are not. Furthermore, drop-in fuels do not induce extra infrastructure costs or vehicle costs and are good for consumer acceptance. This needs to be taken into account when it comes to future alternative fuels. As a reference, it is needed to compare the true total costs (infrastructure, vehicles, energy) for EVs and gas fuelled vehicles. A clear position on the hurdles of biofuels deployment can only be made once the political situation and ongoing debates are clear for the years to come. For the future deployment of biofuels it is important to highlight their impact on the energy security and not only on the CO₂ savings.

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ANNEX

Annex 1 - Key questions

1. What are the most promising feedstocks for advanced biofuels and bioenergy in *country*. Are specific initiatives being introduced to increase availability of sustainable feedstocks (LC, energy crops, waste streams, etc.)?
2. Is finance and/or support available for commercial demonstration of innovative biofuels technologies in *country*? Some funding options were recently outlined in the SET-Plan funding report <http://setis.ec.europa.eu/publications/jrc-setis-reports/set-plan-financial-instruments-report>. Which funding options or forms of support are of most benefit to projects in *country*?
3. Is uncertainty about revision to the Renewable Energy Directive and Fuel Quality Directive impacting on advanced biofuels projects in *country*? Would new targets for renewable energy in transport help drive future market development, or is a more flexible approach needed for advanced technologies?
4. What programmes or incentives best support innovation and market development of advanced biofuels in *country*? Are there specific initiatives in sectors such as road freight, aviation and marine transport?
5. Are systems for certification and validation of sustainable biofuels proving effective in *country* and across the EU?
6. Is there a high awareness of advanced biofuels technology among feedstock and technology suppliers, investors, policy makers and the general public in *country*. Would communication campaigns help to improve sustainability across the biofuels supply chain at the national or EU level?

Annex 2 – Overview Voluntary Scheme²

Voluntary scheme	Version recognised	Scope					Demonstrates compliance with Articles:					Updated scheme documents checked for still adequately covering the sustainability criteria for which the scheme is recognised (cf. Art. 2(1), 2nd and 3rd sentence of the respective Decision)
		Date Commission Decision	Feedstock type	Feedstock origin	Biofuel production geography	Extent of supply chain covered	17(2) GHG the rough	17(3) GHG the biodiversity value	17(4) High Carbon Stock	17(5) Peatlands	18(1) mass balance system	
International Sustainability and Carbon Certification (ISCC)		19 July 2011	Wide range of feedstocks	Global	Global	Full supply chain	Default or actual	Yes	Yes	Yes	Yes	
Bonsucro EU		19 July 2011	Sugar cane	Global	Global	Full supply chain	Default only	Yes, except 17(3)(c)	Yes	Yes	Yes	
Round Table on Responsible Soy EU RED (RTRS EU RED)		19 July 2011	Soy	Global	Global	Full supply chain	Default or actual	Yes	Yes	Yes	Yes	RTRS EU RED Compliance Requirements for Producers 3.0_ENG, available via: http://www.rtrsoy.com/eng/
Roundtable on Sustainable Biofuels EU RED (RSB EU RED)		19 July 2011	Wide range of feedstocks	Global	Global	Full supply chain	Default or actual	Yes	Yes	Yes	Yes	RSB standard for EU market access version 2.1, available via: rsb@rsb.org.uk
Biomass Biofuels voluntary scheme (2BSys)		19 July 2011	Wide range of feedstocks	Global	Global	Full supply chain	Default or actual	Yes, except 17(3)(c)	Yes	Yes	Yes	2BSys-PRO-03 Rev: V 1.0 EN, 2BSys-PRO-02 Rev: V 1.0 EN, 2BSys-PRO-01 Rev: V 1.0 EN available via: http://www.2bsys.com/
Abengoa RED Bioenergy Sustainability Assurance (BBSA)		19 July 2011	Wide range of feedstocks	Global	Global	Full supply chain	Default or actual	Yes	Yes	Yes	Yes	
Greenery Brazilian Bioethanol verification programme (Greenery)		19 July 2011	Sugar cane	Brazil	Brazil	Full supply chain	Default only	Yes, except 17(3)(c)	Yes	Yes	Yes	
Ensus Voluntary Scheme under RED for Ensus Bioethanol Production (Ensus)		23 April 2012	Feed wheat	EU	Ensus One plant	From the first feedstock delivery point to the Ensus One bioethanol storage	Actual or combination	Yes*	Yes*	Yes*	Yes	
Red Tractor Farm Assurance Combinable Crops & Sugar Beet (Red Tractor)		16 July 2012	Cereals, oilseeds, sugar beet	UK	n/a	Until the first feedstock delivery point	**	Yes	Yes	Yes	Yes	
Scottish Quality Farm Assured Combinable Crops Limited (SQC)		24 July 2012	Winter wheat, maize, oilseed rape	North Great Britain	n/a	Until the first feedstock delivery point	**	Yes	Yes	Yes	Yes	
Roundtable on Sustainable Palm Oil RED		23 November 2012	Palm oil	Global	Global	Full supply chain	Default; or actual following recognised tool	Yes	Yes	Yes	Yes	
REDcert		24 July 2012	Wide range of feedstocks	Europe	Europe	Full supply chain	Default or actual	Yes	Yes	Yes	Yes	
NTA 8080		31 July 2012	Wide range of feedstocks	Global	Global	Full supply chain	Default or actual	Yes, except 17(3)(c)	Yes	Yes	Yes	
Biorace GHG calculation tool		30 May 2013	Wide range of feedstocks	Global	Global	Supply chain not covered	Actual***	No	No	No	No	
HVO Renewable Diesel Scheme for Verification of Compliance with the RED sustainability criteria for biofuels		09 January 2014	All feedstocks suitable for HVO-type biodiesel	Global	Global	From the producer of HVO-type renewable diesel	Default or actual	Yes*	Yes*	Yes*	Yes	
Galpa Trade Assurance Scheme		03 June 2014	Wide range of feedstocks	Global	n/a	Covers chain of custody from farm gate to first processor	****	Yes*	Yes*	Yes*	Yes	
K70 INIG System		03 June 2014	Wide range of feedstocks	Europe	Europe	Full supply chain	Default or actual	Yes	Yes	Yes	Yes	
Trade Assurance Scheme for Combinable Crops		17 September 2014	Combinable crops, such as cereals, oilseeds and sugar beet	United Kingdom	n/a	Covers chain of custody from farm gate to first processor	****	Yes*	Yes*	Yes*	Yes	
Universal Feed Assurance Scheme		17 September 2014	Ingredients and compound feeds as well as combinable crops	United Kingdom	n/a	Covers chain of custody from farm gate to first processor	****	Yes*	Yes*	Yes*	Yes	

* The scheme relies for this on other recognised schemes.
 ** Only recognised for accurate data that land use change emissions (e_l) referred to in point 1 of part C of Annex V are equal to zero, and on the appropriate geographic area referred to in point 6 of part C of Annex V (NLTS-2 region).
 *** The scheme is a non-typical voluntary scheme that covers only assessment of greenhouse gas savings. Voluntary schemes using the tool need to ensure that it is applied appropriately and that adequate standards of reliability, transparency and independent auditing are met.
 **** The scheme ensures that all relevant information on GHG emissions is transferred from economic operators upstream the chain of custody to the economic operators downstream the chain of custody.

² http://ec.europa.eu/energy/renewables/biofuels/doc/sustainability_schemes/voluntary_schemes_overview.pdf