European Position Paper

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Executive Summary

In the last 2 years the BAP Driver project supported the formulation and implementation of consistent national biomass strategies in its Member States. This paper summarizes the major findings of the BAP Driver projects for European stakeholders, national policy makers and key stakeholders.

A summary of the lessons learned from member states concerning their resource assessment, bio-energy strategy, bio-energy policy implementation and policy monitoring is presented. For cost-effective support members states are advised to focus on heat policies. A checklist is presented to test designed policies with both quantitative and qualitative indicators on their effectiveness.
The renewable energy sources directive offers possibilities for collaboration between member states. (so called flexibility mechanisms). Member states for which flexibility mechanisms could be a valuable option were identified by taking a look at renewable energy share, bio-energy market and biomass potential in the member states. Waste from energy is often overlooked as an interesting option. A step-by-step approach for member states is advised as long term trust and commitment for this option is vital for its success. On the fiercely debated topic of sustainability criteria for solid biomass, BAP Driver advises not to introduce a mandatory sustainability scheme for all member states at this stage. Member states that introduce sustainability criteria should be guided by the European Commission to make the schemes as harmonized as possible. Timely evaluation of this policy by the European Commission is needed to prevent undesired side-effects of bio-energy and loss of public acceptance.

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Introduction

Successful bio-energy policies are more important than ever. The Renewable Energy Sources (RES) Directive sets very ambitious targets on renewable energy share for Member States. The complexity of the bio-energy policy field, due to its multidisciplinary nature, makes it very difficult for Member States to bring a coherent support structure in place. The European Commission encouraged the establishment of national biomass action plans in the European Biomass Action Plan in 2005. This need for uniform and high quality action plans was taken one step further with the obligation to use a template to submit national Renewable Energy Action Plans in June 2010.

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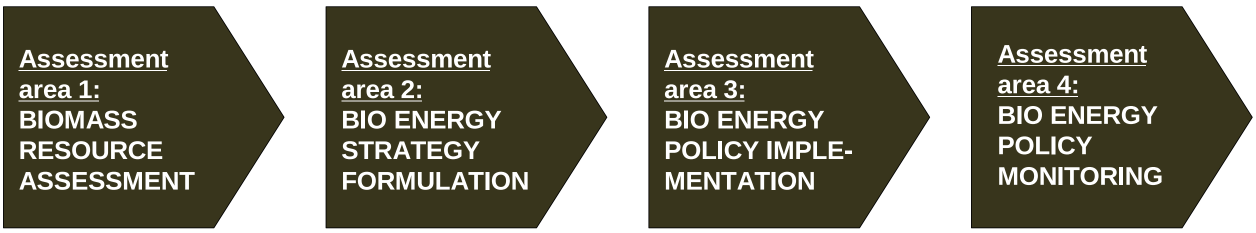
The paper starts with a summary of the results of the extensive Best Practice research that was conducted on the bio-energy strategies of 12 member states and was the fundament for the future analyses. Then the position of the BAP Driver project is described on four important topics for successful bio-energy strategies: Cooperation and Flexibility mechanisms under the RES directive, Cost-effective support of bio-energy strategies, Energy from Waste and Sustainability Criteria for solid biomass. The paper ends with the key conclusion of the overall project.

Best practices

The Best Practice Report and the Policy Guideline served the main aim of the BAP Driver Project: Identifying ways for improvement of current national policy frameworks for bio-energy in Europe, and leveraging the process of developing country-specific Biomass Action Plans.

The Best Practice Report focuses on four stages, required for setting up national biomass strategies and action plans. The Assessment of national biomass resources; the formulation of national bio-energy strategies and biomass action plans; the Implementation of national bio-energy policies and the monitoring of national bio-energy markets and policies. From these stages the following key lessons were learned:



1. **Assessment of national biomass resources:**

- Data used for assessing national biomass resources and defining bio-energy strategies must be better harmonised between different policy fields and on the EU level in order to have a sound basis for political decisions.
- However, each country is facing very different national conditions (natural resources, climate, tradition in biomass use, etc.) in their assessment approach. For instance, highly differing pre-requisites in Mediterranean and Northern European countries.
- If possible biomass resources should not “travel”, but be used locally.
- However, import of biomass is an important issue since some member states depend on it in order to reach the EU targets.
- At the same time, the import poses a great challenge due to the low energy density of biomass, and the ongoing debates about environmental problems of non-EU biomass production.

2. **Formulation of national bio-energy strategies:**

- Key success factor for any support schemes for bio-energy investments is not only the attractiveness, but also the long-term security / reliability of conditions.
- Bio-energy differs from all other RES as its processes depend on continuous supply of feedstock. In case of soaring prices for raw material a flexible support scheme would be advantageous.
- Ambitious, but realistic targets signal clear political commitment to private market actors and are a key element of effective strategies. In absence of quantifiable targets for bio-energy, and left to pursue its own policy path, countries could run the risk of entering an endless cycle of consultations, strategies, and action plans.
- Effective strategies depend on the involvement of relevant stakeholders (also on regional / local levels) in policy-definition process & ongoing amendment, e.g. by means of communication platforms.
- Bio-energy policies also must be carried out at local levels, so that an effective regionalisation of policy processes is important.
- It is important to enable the development of professional supply chains on local levels, because they are the “transmission belt” for any successful policy measure

3. **Implementation of national bio-energy policies:**

- Close involvement and information of key actors is important for effective bio-energy promotion, where usually a wide network of players is involved in the value chain.
- Long and costly administrative procedures for licensing, bureaucratic subsidy schemes and difficult grid access procedures are major market barriers, especially for small-scale installations.
- Policies are successful when they develop simultaneously support schemes for production and use of biomass.
- Policies should avoid subsidising environmentally inefficient technologies, e.g. by LCA modelling.

- Liberal, market-driven policy frameworks tend to support some low cost "technology winners" only, while other technologies are not competitive enough to succeed.

4. **Monitoring of national bio-energy markets and policies:**

- Most countries need a clear monitoring approach for all types of support programmes, being based on a consistent, balanced and long-term approach instead of single one-time measures. Preferably on national as well as regional level.
- Monitoring systems should be based on a research design that precisely define target groups, key data, data collection methods and sources, incentives for data sources to deliver data, data management/ interpretation, cost and benefits.
- However, monitoring is very demanding due to the complexity of the bio-energy sector & insufficient in most countries yet.
- Setting up a national monitoring system should be done in accordance with the minimum requirements of a possible European-wide monitoring.
- Broad acceptance is a key pre-requisite to ensure the integration of sustainability principle in developing policies and support programmes.

Cost-effective support

Decision makers are expected to use the most effective and efficient solutions in their policy formation since they need to meet the renewable energy targets at the lowest cost/benefit ratio for society. However the terms of costs and profits, assessed at a short medium or long term, cannot be easily interpreted when policies are assessed.

The Renewable Energy Directive requires MS to count the gross final energy consumption for heating/cooling, electricity and transport. In this regard, the same type of biomass converted into electricity or used by households for heating purposes will have a complete different "weight" towards the target (see figure below). Following these calculation conventions biomass used for heat will be more effective to reach the target compared to biomass used in plants producing only electricity or low efficient second generation biofuels plants, if and only if, an efficient conversion technology is used.

Contribution to the final energy consumption of 1 toe biomass

	Conversion	Contribution to gross final energy consumption	Useful final energy
1 toe biomass	Bioelectricity only	0, 3 - 0,4 toe	0, 3 - 0,4 toe*
	CHP	0,5 - 0,9 toe	0,5 - 0,9 toe
	District heating	0,8 - 0,9 toe	0,8 - 0,9 toe
	Individual heating	1 toe	0,2 – 0,9 toe**

* For electricity the gross final energy consumption corresponds to the generation of RES bioelectricity in the country without taking into account the grid losses. The useful energy includes these losses.

** For individual heating a large range or technologies exists, from low efficiency open fires to very high efficient automatic pellet boilers. Only

Therefore cost effectiveness of biomass support is strongly related with the successful operation of specific **bioheat policies** since:

- Bioheat technologies are, potentially, energy efficient (high efficiency combined heat and power is always the most efficient option) and cost-effective (due to lower fuel costs). So effective bioheat policies will offer more competitive uses for biomass to energy than electricity production, thus increasing the overall biomass cost effectiveness and mobilizing new resources (see following figure).
- Bioheat policies, usually have strong regional effects. Profits are directed to rural areas creating new jobs, while a big number of final users is involved, thus multiplying RES awareness.

Following the ideas expressed above it makes sense to optimize the use of the budgets available for bio-energy by benchmarking different policies based on several quantitative and qualitative criteria. This checklist may be used by policy makers as a provisional supporting document to the template for the national renewable action plan. It could be essential for the assessment of the cost-effectiveness of promotional policies.

Quantitative Criteria	**Qualitative Criteria**
Qn1 What is the RES contribution in final energy consumption compared to total or public funds invested? *Unit: toe RES final energy/1000 € total or public fund invested*	Ql1 Is the revision and evaluation process of the policy described?
Qn2 What is the maximum CO2-reduction compared to total or public funds invested	Ql2 What is the policy background? Have alternative

Unit: t CO2 avoided energy/1000 € total or public money invested	uses of raw material been investigated? Does the policy compete with other policies related to the use of the same raw material?
Qn3 How a support measure maximizes the replacement of conventional fuels and what is the type of fuels replaced? (oil, gas, coal, nuclear) *Unit: toe fossil replaced / 1000 € public money invested)*	Ql3 How the impacts on employment and regional development are ensured? Are there any provisions inside the measure?
Qn4 What is the value of replaced conventional fuel? (including VAT and taxes) *Unit: €replaced/ public €spent.*	Ql4 What is the impact on spatial planning? Are there any specific provisions? Is the policy affected by specific spatial planning regulations?
Qn5 What is the maximum total investment compared to public budget spent? *Unit: total €invested / public €spent*	Ql5 Are there accompanying measures regarding infrastructures, logistic…
Qn6 What is the impact on employment? *Unit: new jobs/1000 € total or public fund invested or preserved jobs /total or public fund invested)*	Ql6 Are there accompanying measures regarding the increase of public participation and awareness (information campaigns, training and certification…)?
Qn7 What is the average efficiency (or range of efficiencies) of the technologies promoted? *Unit: efficiency indicator*	Ql7 Is the funding of the measure secured? Where do the funding resources come from?
Qn8 What is the number of final consumers involved as target group directly or indirectly? *Unit: number of people per target group*	Ql8 What is the percentage of final energy that is replaced by energy produced by local resources ?

The proposed criteria where reviewed on a workshop on both their importance and "easiness to adopt" They can be useful to evaluate the National Renewable Energy Action Plans (NREAP). There has been already a link with such criteria and the NREAP template, specifically paragraph 5.3 'Assessment of impacts'. The criteria need to be used by member states as a framework to evaluate their policies. It is also a tool for EC to compare the effectiveness of policies that are implemented and facilitate the exchange of experience among them.

Flexibility Mechanisms

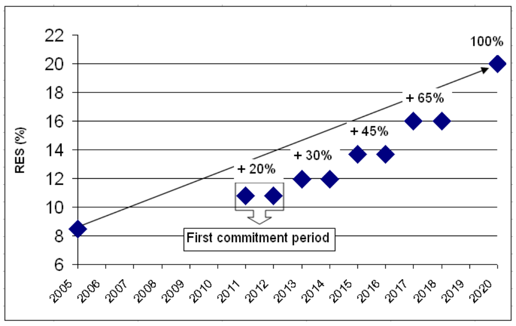
The Renewable Energy Sources (RES) Directive contains provisions for cooperation/flexibility mechanisms to assist Member States (MS) in reaching their renewable energy targets. Four mechanisms are possible :

1. Statistical transfer (Article 6)
2. Joint projects in EU27 (Article 7 + 8)
3. Joint projects with third countries (Article 9 + 10)
4. Joint support schemes (Article 11)

At this stage it is difficult to predict the flexibility mechanisms' importance for MS, but some reflections can be made:

- The trajectory indicated in Annex I of the RES Directive gives a first interim target for 2011-2012 that is "not ambitious" compared to the 2020 targets. Offers for flexibility might be higher for this first interim commitment period, while room from flexibility might decrease later on due to the relatively high RES targets. It is still questionable how far MS can offer flexibility while being unsure of reaching their target.

➢ Joint projects may offer advantages if administration efforts remained more affordable than the one for Kyoto flexibility mechanisms. They seem to be more attractive for the hosting country that will benefit from the installed infrastructure compared to the advantages for the country paying for the project.
➢ Joint support schemes require a closer collaboration and harmonization among MS and might be used e. g. among Scandinavian countries.
➢ The information available for the implementation of flexibility mechanisms in the MS does not seem to be complete and may leave many questions open.



Trajectory of the RES Directive for the EU

The potential for flexibility mechanisms is approached through three criteria:

1. The evolution of RES in the last years
2. The bio-energy development and its markets
3. The comparison of biomass use and its potential

1. The evolution of renewable energy in the last years

RES evolution: by projecting the RES share in 2000 and 2006 to the year 2012 and comparing it with the trajectory a significant RES bonus can be expected in DE and CZ and a reasonable shortfall in FR and UK.

2. Bio-energy developments and markets

In addition, other criteria can also be considered such as:

- The importance of the bio-energy industry and its know-how: large dynamic multinational (bio)energy companies can more easily catalyse project opportunities. Such companies can be found mostly in Northern Europe (Vattenfall, Poyry, Fortum, Dong, etc.) but also in central Europe (RWE, Suez/Electrabel, Essent etc.).
- Market opportunities: countries in which power plants and district heating plants are still significantly supplied by solid fossil fuels (coal, brown coal, lignite) offer opportunities for joint projects.
- Energy infrastructure: a large potential for energy infrastructure renovation can be found in Eastern European countries providing attractive investment opportunities for bio-energy projects in many of these countries.

Bio-energy industry and markets: countries with a strong bio-energy industry, especially for bioelectricity (like DE, SE, FI) have markets, technologies and know-how to offer in their own country and abroad. Countries that are still using a lot of solid fossil fuels in their power plants (like DE, PL, UK, ES, CZ) and district heating (like PL, DE, UK) have a potential to host flexibility projects.

3. Bio-energy potential

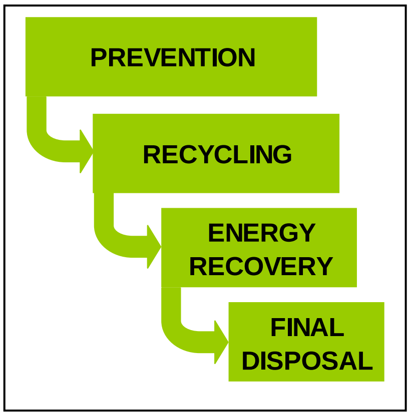
It is relevant for flexibility potentials to compare the biomass production/supply in a country and the potential for biomass. The biomass production is directly given by Eurostat (by choosing the primary production and not the gross inland consumption that is influenced by import and export). The potential has been estimated by the European Environmental Agency, taking into account environmental constraints. Table 3 shows that today 41% of the bio-energy resources are exploited in Europe. However, the situation varies a lot among countries.

Top 5 countries in which a large unexploited biomass potential exists:	PO > FR > ES > UK > IT
Top 5 countries that are already using much of their resource:	DK > NL > PT

Remarks:

- The potential depends on the evaluation method and can be evaluated using many different methods and assumptions based on technical, environmental and economic criteria. The EEA study foresees biomass resources amounting to 283 Mtoe in 2030 against 235 Mtoe in 2020.
- Imports will play an important role in the future for countries that have easy access to the sea like UK, NL, BE, SE, FI, DK. These countries can exceed their inland potential. The Netherlands and Denmark for example are already close to using 100% of their own potential according to BAPdriver calculation.

Energy from Waste



Introduction

Over the last few decades, the solid waste management systems in many OECD countries have changed significantly. In the past, landfill was the standard disposal route for waste. However, in recent times, waste management has been all about utilising the value of waste in terms of material and energy in the best way possible. The various components of the solid waste management system have been arranged into what has become known as the waste hierarchy. The waste hierarchy is what the waste management policy in most countries is based on. In the first place, it promotes prevention and material recycling. When recycling is not feasible energy recovery is the main option. Landfill is the least preferred option in the chain. This hierarchy is implemented in the EU Waste Framework Directive. However, differences in implementation are enormous.

Step-by-step approach

The development of energy-from-waste is a complex process. It requires high trust level between stakeholders and acceptance of the public. Hard lessons from the past lead to the conclusion that it is not advisable to rush too soon in a wide application to prevent the loss of acceptance from crucial stakeholders. Therefore we recommend a stage approach in developing energy from waste.

Stage 1 Utilization potential of biogas from landfill

In this phase the public acceptance for EfW technologies in general, and WtE in particular, is low and often confirmed by poorly performing, non state-of-the-art EfW facilities in a country. In general, the waste management policy will focus in the first place on proper landfilling, minimising the environmental impact and the escape of harmful greenhouse gases (particularly methane (CH_4) and nitrous oxide (N_2O)), and maximising the recovery of landfill gas(LFG). LFG is used in gas engines or upgraded to 'green' gas (bio-methane) and injected into the natural-gas grid or used locally for transportation purposes. Stage 1 also deals with material recycling, including composting. Attention is paid to the promotion of schemes for separate collection and the build-up of a proper recycling infrastructure. The extent of recycling has to be carefully considered since:

- Recycling leads to degradation of the material being recycled, demanding more and more energy and other resources
- High-end utilisation of recycled materials and/or products need to be guaranteed.

Stage 2 Production of electricity by means of combustion or digestion

Applicable to countries moving away from landfilling of combustible waste and having a well-established material recycling system.

Once proper landfilling and material recycling is in place, the emphasis can change towards EfW systems that are fuelled by non-recyclable, combustible waste. Whatever the local situation is, electricity can be produced in all cases and is thus the most common way of utilising the energy content in the waste. The main technologies are:

- biological treatment: digestion of biodegradable waste and the resulting biogas is used in gas engines

- thermal treatment: waste combustion by means of grate firing or fluidized bed systems.

The main policy leading to the growth of EfW facilities is a ban on combustible and/or digestible (?) wastes going to landfills, often part of an integrated waste management policy. The ban is sometimes enforced by a taxation system making landfilling so expensive that WtE makes economical sense. In practice, a landfill gate fee of around 100 euro/ton will be sufficient to enforce a change in the waste management system towards energy recovery.

Stage 3 Integrated CHP

This step is applicable to countries focusing on combined heating (cooling) and power applications instead of electricity-only production. Site selection is crucial for energy supply and energy demand. Supply and demand, especially when they are of the same order of magnitude, have to be brought together to make heat (cooling) delivery economically feasible. To site heat demand (district heating and cooling, heat demand in industry, heating greenhouses, etc) and heat supply by means of EfW technologies close together, the public acceptance and the trust in the technology and reliability of heat supply has to be great. In each new project, CHP has to be the starting point in the development, being as high on the agenda as the waste supply itself. Support of local authorities and stakeholders is a pre-condition for the development of successful CHP projects.

Stage 4 Innovations (towards higher energy utilization rates).
This is applicable to countries were CHP applications are common and a next step is to, possibly, increase utilisation of recovered energy. Stage 4 innovations can also occur in former stages as a demonstration project. In stage 4, innovation and high utilisation of recovered energy are main stream.

Ten lessons

During the BAP Driver workshops 10 general lessons where drawn and are summarized as follows:

1. In the countries assessed, the introduction of the Council Directive on the landfill of waste has resulted in a reduction of the amount of waste being sent to landfill and an increase in recycling and energy from waste (EfW).
2. In the waste hierarchy recycling is given higher priority than EfW – EfW must complement and not displace recycling activities
3. Drivers for the promotion of EfW (the landfill directive and the desire to reduce Co2 impacts) are the same throughout the countries assessed.
4. Barriers to EfW vary from country to country as does the rate of EfW utilization.
5. Policies can change quicker than EfW project development time, thus frustrating projects.
6. Policies need to address the tension in the market between solid recovered fuels (SRF), mechanical-biological treatment (MBT) and waste to Energy (WtE)) -
7. Political will on utilization of waste heat is often high, but doesn't always lead to subsequent market development.
8. Since waste management systems are capital investment, intensive, long-term (contract) security is crucial.
9. More consideration is required to spatial planning (ie making room for EfW) - the major underestimated policy element..
10. There is a lack of trust between the proponents of EfW and NGO's and interaction between them is often problematic

Sustainability criteria for solid biomass

During the project the renewable energy directive (2009/EC/28) was published. It focused on sustainability criteria for biofuels and bioliquids production and underlined the need to assess their possible impacts on agricultural food products. However, no sustainability criteria for solid biomass were identified in the directive. Sustainability criteria are subject to heavy discussions in every country and every session about this subject. Depending on the level of import of biomass compared to domestic supplies, countries have strong arguments pro or contra the introduction of sustainability criteria for solid biomass.

Main arguments **in favour** of the introduction of sustainability criteria for solid biomass:

- Green House Gas Emissions reductions should be guaranteed
- Sustainability criteria minimize undesired side effects of bio-energy (e.g. reduction of bio-diversity, environmental effects)

- Sustainability criteria increase the acceptance for biomass as a renewable energy source, especially when depending on large import streams.
- A certification system would also include imports of biomass and would thus promote sustainable agriculture and forestry production abroad.
- Sustainability criteria for biomass for energy are a first step towards a fully sustainable agriculture sector.

The main advocates of sustainability criteria were countries with large biomass imports and NGO's.

For more info see: Commision Corbey, Netherlands

Main arguments **against** the introduction of sustainability criteria for solid biomass:

- There are already existing mandatory sustainable criteria for agriculture and forestry in Europe. E.g. FSC, PEFC
- It is unfair to impose administrative costs to the total bio-energy sector when only a small fraction of the market has sustainability risks
- It leads to unfair competition with fossil fuel (with does not have certification schemes)
- Certification will reduce the availability of affordable biomass potential for energy purposes
- Differences in sustainability criteria will obstruct trade
- Western countries are not entitled to put their moral standards worldwide ('green imperialism')

The main opposition to sustainability criteria came from Nordic Countries, countries that mainly use domestic biomass and biomass associations. For more information see: AEBIOM.

Another issue is the way how to implement the sustainable criteria knowing that the differences of context and biomass production and use, between member states could be an obstacle to their application.

Different ways to implement sustainable criteria for solid biomass were identified:

1. sustainable criteria could be implemented through the **existing legislation** and rules on agriculture, forest, energy and environment
2. sustainable criteria could be implemented through a **mandatory scheme** elaborated in the renewable energy directive and standardised to all member states (example of the cramer criteria elaborated by the dutch government)
3. sustainable criteria could be implemented through sustainability certification scheme on a **voluntary** basis

The main conclusions of the BAP Driver project on sustainability criteria for solid biomass:

No mandatory sustainability scheme for all countries at this stage

At the moment it is too early to put a mandatory sustainability scheme into place. For Europe as a whole, the risks of not having such a scheme are perceived to be lower than the administrative costs that are associated with it.

Allow countries to make their own sustainability schemes (voluntary or mandatory)
Specific countries in Europe depend on large quantities of imported biomass to reach their renewable energy target. To prevent negative effects and lack of public acceptance for bio-energy it is vital that introduction of sustainability criteria is an option.

Harmonize schemes as much as possible
To be ready for future developments, to minimize trade barriers and to have a level playing field with bioliquids are all arguments to harmonize sustainability schemes in member states as much as possible. This can be done by mutual agreements between member states of preferably by specific instructions by the European Commission.

Analyse lessons learned from voluntary schemes
The first countries are ready to implement sustainability schemes into their support schemes (e.g. Netherlands, Germany). It is recommended to evaluate their effects and needed administrative efforts. These experiences can be used for implementation in other countries or for an effective harmonized policy in Europe.

Evaluate sustainability policy on regular basis
Ambitions for renewable energy and bio-energy in Europe are challenging. With large quantities of biomass used, it is vital to ensure the sustainability of the bio-energy sector. Therefore it is recommended to evaluate sustainability policy on a regular basis.

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All documents, and much more, available on: www.bapdriver.org