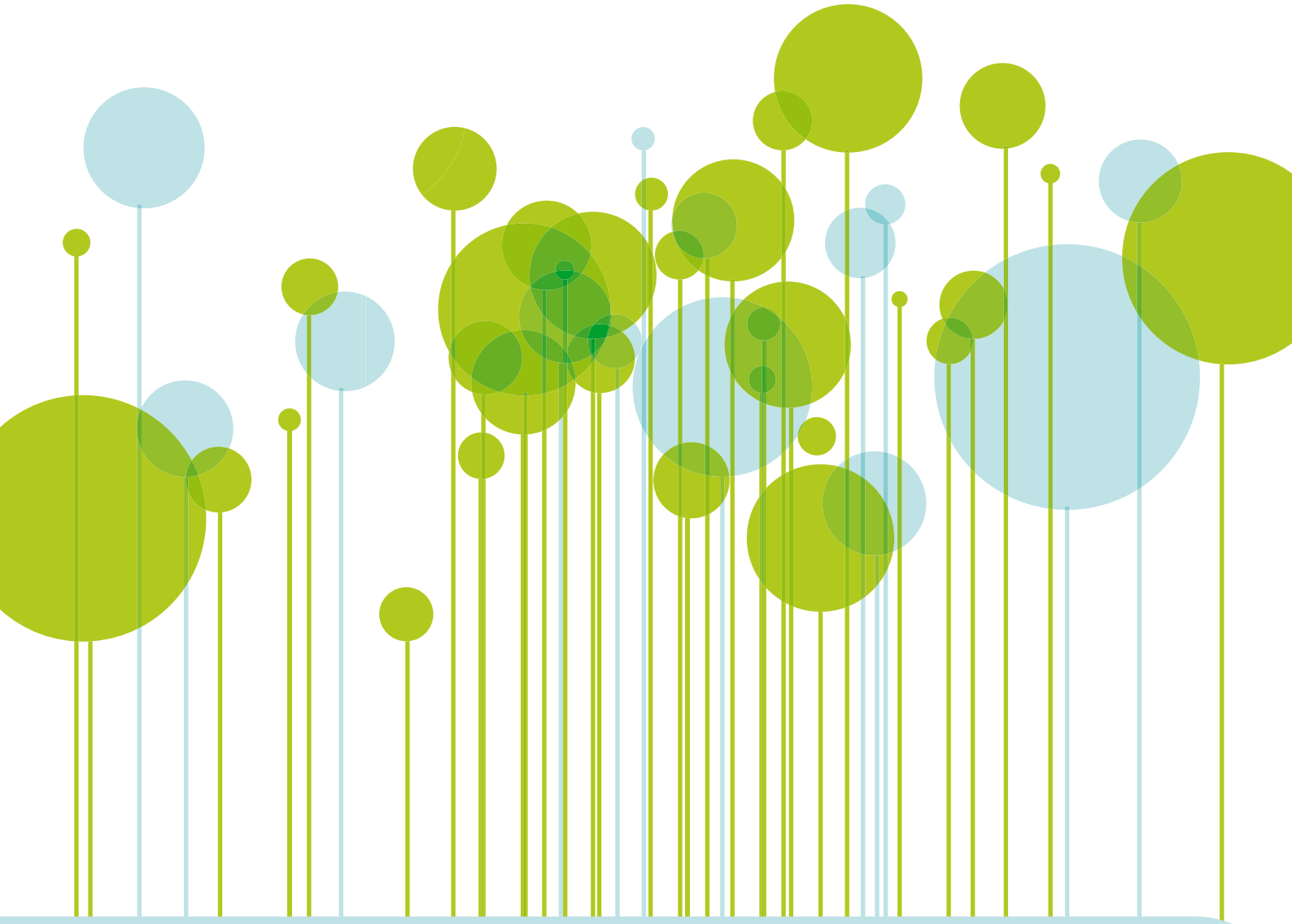
Towards national Biomass Action Plans



EUROPEAN BEST PRACTICE REPORT

Comparative assessment of national bioenergy strategies & biomass action plans in **12** EU countries

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www.bapdriver.org

Intelligent Energy Europe

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Executive Summary

BACKGROUND – THE BAP DRIVER PROJECT & THE EUROPEAN BEST PRACTICE REPORT (CHAPTER A)

This report is a key output of the EU project "BAP Driver", an initiative of energy agencies from 8 European key bioenergy nations and the European Biomass Association (AEBIOM), funded by the European Commission (EC) under the Intelligent Energy Europe (IEE) programme. The BAP Driver project aims at identifying ways for improvement of current national policy frameworks for bioenergy in Europe, and at leveraging the process of developing country-specific Biomass Action Plans (BAP).
From a strategic perspective, the general approach of this report focuses on four stages, required for setting up national biomass strategies and action plans:

- Assessment of national biomass resources;
- Formulation of national bioenergy strategies and biomass action plans;
- Implementation of national bioenergy policies;
- Monitoring of national bioenergy markets and policies.

Overall the analysis is split into three chapters corresponding to the following logical steps:

- Chapter B: Country analysis (12 individual country profiles)
- Chapter C: Benchmark analysis (comparative assessment of 12 countries)
- Chapter D: Best practice analysis (transnational conclusions across national boundaries)

COUNTRY ANALYSIS – ASSESSMENT OF 12 NATIONAL BIOENERGY STRATEGIES & BIOMASS ACTION PLANS (CHAPTER B)

Based on the information gathered via standardised questionnaires from national key actors, the extended version of the report provides comprehensive profiles of 12 individual EU countries:

1. Austria	2. Belgium	3. Finland
4. France	5. Germany	6. Greece
7. Netherlands	8. Poland	9. Romania
10. Slovenia	11. Sweden	12. United Kingdom

Each profile provides a description and critical assessment of the status quo of bioenergy policies in the respective country.

BENCHMARK ANALYSIS – COMPARISON OF 12 NATIONAL BIOENERGY STRATEGIES & BIOMASS ACTION PLANS (CHAPTER C)

In the benchmark analysis the bioenergy policies in the 12 countries were assessed against the same set of performance criteria. For each criterion one outstanding country or national system was chosen as a benchmark for the assessment of the others. Overall the following 15 assessment areas were covered and benchmark countries selected:

1. **Assessment of national biomass resources:**
1.1 Coherent biomass assessment approach (benchmark country: United Kingdom);
1.2 Application of sustainability criteria (benchmark country: the Netherlands);
1.3 Consideration of cross-country effects (benchmark country: Finland).

2. **Formulation of national bioenergy strategies and biomass action plans:**
2.1 Integrated & balanced national bioenergy strategy (benchmark country: France);
2.2 Setting of targets & priorities (benchmark country: Austria);
2.3 Status & quality of national biomass action plans (benchmark country: Romania);
2.4 Attractiveness & consistency of national policy frameworks & support schemes for bioenergy promotion (benchmark country: Germany).

3. **Implementation of national bioenergy policies**
3.1 Policy impact on actual market & industry development (benchmark country: Sweden);
3.2 Cost-effectiveness of bioenergy strategy & support schemes (benchmark country: Belgium);
3.3 Efficiency of administrative procedures (benchmark country: Germany);
3.4 Information & integration of stakeholders (benchmark country: Sweden);
3.5 Quality standards & qualification of key actors (benchmark country: Austria).

4. **Monitoring of national bioenergy markets and policies**
4.1 Effective approach to market monitoring (benchmark country: the Netherlands);
4.2 Effective approach to policy performance measurement (benchmark country: France);
4.3 Effective approach to sustainability guarantee (benchmark country: Belgium).

EUROPEAN BEST PRACTICE ANALYSIS – TRANSNATIONAL CONCLUSIONS FOR ALL EU COUNTRIES (CHAPTER D)

Based on the benchmark analysis key conclusions were drawn with regard to lessons learned, key success or risk factors, good or bad practices. Main conclusions for the main chapters of the analysis may be summarised as follows:

1. Assessment of national biomass resources
– key lessons learned:
- Data used for assessing national biomass resources and defining bioenergy 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, there are 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 bioenergy strategies and biomass action plans – key lessons learned:
- Key success factor for any support schemes for bioenergy investments is not only the attractiveness, but also the long-term security/reliability of conditions.
- Bioenergy 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.
- Bioenergy policies also must also 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 bioenergy policies
– key lessons learned:
- Close involvement and information of key actors is important for effective bioenergy 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.
- The impact of national biomass action plan processes depends on the effective involvement of all major stakeholders.
- Policies should avoid subsidising environmentally inefficient technologies.
- 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 bioenergy markets and policies
– key lessons learned:
- 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.
- 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 complexity of bioenergy 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.

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A Background – the BAP Driver project and the European best practice report

1. BACKGROUND AND OBJECTIVES OF THE BEST PRACTICE REPORT (WHY?)

1.1 Background and context of the Best Practice Report

This report is a key deliverable of the **EU project "BAP Driver"**, an initiative by energy agencies from 8 European key bioenergy nations and the European Biomass Association (AEBIOM), funded by the European Commission (EC) under the **Intelligent Energy Europe (IEE) programme**. All activities related to it are summarised in Work Package 2 "European best practice report on national biomass strategies, policies and action plans, and development of operational guideline for policy makers".
The BAP Driver project aims at identifying ways for **improvement of current national policy frameworks for bioenergy** in Europe, and at leveraging the process **of developing country-specific Biomass Action Plans (BAP)**.
To achieve these goals, BAP Driver's work programme follows **five overall steps**:

1. **Comparative assessment** of national biomass strategies and policy frameworks in 12 (8 partner + 4 additional) countries (European best practice report, including country profiles based on standardised national questionnaire);
2. **Mutual exchange, knowledge transfer and capacity building** on biomass strategies and policy options between national energy agencies and relevant key actors, both on European level (**European policy group**) and national levels (**8 national policy groups/roundtables**);
3. **Development of operational guidelines** for the development and monitoring of balanced national biomass strategies and action plans **(guideline for policy makers)**;
4. **Definition of proposals** to politicians and contribution to national policy processes for the development and monitoring of biomass strategies and action plans **(position papers, national workshops for policy makers);**
5. **Dissemination** of project outcomes to target groups, both on European and national levels (diverse **publications, website, EU dinner debate** etc.)

The best practice report is therefore designed as a **groundwork activity for all later working processes** of the BAP Driver project. At the same time, it is an important output of the entire project that is going to be disseminated to target groups across Europe.

1.2 Thematic focus of the Best Practice Report

Like the overall "BAP Driver" initiative the report thematically focuses on **political strategies for the promotion of bioenergy on the national level**, particularly by assessing existing national biomass strategies, action plans (nBAP) and programmes in the EU. Starting point are the existing policy frameworks in place: demand- and supply side measures defined by governments to improve the attractiveness and security of bioenergy investments for market actors (incl. financial institutions), and therefore to leverage the development of sustainable markets for the bioenergy industry.
The BAP Driver project and the Best Practice Report are thereby aligned to the thematic focus of important legal initiatives of the EU in recent times, in particular:

- European Biomass Action Plan (COM(2005) 628 final);
- Directive on the promotion of the use of energy from renewable sources (not yet officially published).

From a strategic perspective, the general approach of this report focuses on **four stages required for setting up national biomass strategies and action plans**:

- Assessment of national biomass resources;
- Formulation of national bioenergy strategies and biomass action plans;
- Implementation of national bioenergy policies;
- Monitoring of national bioenergy markets and policies.

1.3 Target groups (beneficiaries) of the Best Practice Report

Direct beneficiaries (= main target group)
Political decision-makers (EU, national, regional)

- **European Commission and Parliament** evaluating national policy frameworks for bioenergy and assessing the impact of the European Biomass Action Plan (BAP) and Renewables Directive(s);
- **National (regional) governments** setting national regulatory frameworks & defining national biomass action plans (nBAP), typically the ministries for economy/energy, environment and agriculture;
- **Public authorities and agencies** managing support schemes for bioenergy.

Indirect beneficiaries

- **European bioenergy investors & user groups** (demand side): financial investors, utilities, district heating operators, industrial firms, private households, etc.
- **European bioenergy industry** (supply side): agricultural/forestry/waste producers, manufacturers, system integrators, distributors, project promoters, etc.

2. CONCEPT OF THE BEST PRACTICE REPORT (WHAT?)

2.1 Overview / modules of Best Practice Report

The challenge is **to assess and compare very heterogeneous national strategies & support frameworks for bioenergy:** This is first of all due to the topic bioenergy itself. In contrary to rather new RES technologies such as wind energy or solar energy, the use of bioenergy is organically grown and deeply integrated in national energy industries. As a consequence, the national context is very different in each country, so are the political goals that have led to the respective strategy & policy framework. In addition, indicators to measure the performance of the framework are also diverse or not even clearly defined by the political decision-makers or programme managers themselves. Obviously the indicators depend on other factors and cannot be related simply and solely to the performance of a single legislation and/or support scheme.

As a result the analytical part of the best practice report follows a rather open and qualitative approach, also because

- Qualitative assessments by selected experts are generally more appropriate to capture the topic in its complexity;
- Quantitative data on national markets have already been collected (e.g. Eurostat, Boosting Bioenergy) and could be used / transferred.

Overall the analysis is split into three chapters corresponding to the following logical steps:

2.2 Concept of country analysis (Chapter B)

CHAPTER B
12 individual country profiles (COUNTRY ANALYSIS)
CHAPTER C
Comparative assessment of 12 countries (BENCHMARK ANALYSIS)
CHAPTER D
Transnational conclusions across national boundaries (BEST PRACTICE ANALYSIS)

Based on the information gathered via standardised questionnaires in "bioenergy country profiles" an individual overview is given of the situation in each country. In addition to evaluating the country information, the analytical part focuses on personal judgements of different key actors questioned in the research phase (political actors, industry representatives, market actors), as well as the opinion of external experts on the European level (e.g. members of the advisory board of the European policy group). Final outcome of this analysis are **12 separate country profiles.**
Each country profile follows the **same basic structure** than the entire analysis:

1. Assessment of national biomass resources;
2. Formulation of national bioenergy strategies and biomass action plans;
3. Implementation of national bioenergy policies;
4. Monitoring of national bioenergy markets and policies.

2.3 Concept of benchmark analysis (Chapter C)

Based on the analysis of each country their **national frameworks are assessed against the same set of performance criteria**. For each criterion one exemplary country or national system serves as a benchmark for the assessment of the others. The following **15 assessment criteria** were applied:

1. Assessment of national biomass resources:
1.1 Coherent biomass assessment approach;
1.2 Application of sustainability criteria;
1.3 Consideration of cross-country effects;

2. Formulation of national bioenergy strategies and biomass action plans:
2.1 Integrated & balanced national bioenergy strategy;
2.2 Setting of targets & priorities;
2.3 Status & quality of national biomass action plans (BAP);
2.4 Attractiveness & consistency of national policy frameworks & support schemes for bioenergy promotion;

3. Implementation of national bioenergy policies
3.1 Policy impact on actual market & industry development;
3.2 Cost-effectiveness of bioenergy strategy & support schemes;
3.3 Efficiency of administrative procedures;
3.4 Information & integration of stakeholders;
3.5 Quality standards & qualification of key actors;

4. Monitoring of national bioenergy markets and policies
4.1 Effective approach to market monitoring;
4.2 Effective approach to policy performance measurement;
4.3 Effective approach to sustainability guarantee.

The result of the benchmark analysis is a **differentiated evaluation per assessment area and benchmark criterion**. In each area a benchmark country was identified, and the main reasons for the gap between this benchmark and all other countries were analysed. It has to be stressed again that the aim is not to compare entire (very heterogeneous) systems 1:1, but to work out single aspects that are done better or worse.

2.4 CONCEPT OF EUROPEAN BEST PRACTICE ANALYSIS (CHAPTER D)

Based on the benchmark analysis **key conclusions** are drawn with regard to potential ways of improvement for bioenergy strategies & policy frameworks across the EU. Whereas country and benchmark analysis focus on the assessment of different national strategies, the final best practice analysis is designed to work out a **"red thread" of conclusions that are valid across national boundaries**, especially

- Overall **best practices** in all benchmark areas in Europe;
- Overall **success factors** for bioenergy strategies & policy frameworks in Europe;
- Overall **barriers / risk factors** for bioenergy strategies & policy frameworks in Europe.

3. CONTRIBUTORS TO THE BEST PRACTICE REPORT (WHO?)

3.1 Co-ordination – eclareon Management Consultants

eclareon – WP co-ordination & operational management
- Stephan Orthen – overall project co-ordination;
- Robert Brückmann – project manager for BAP Driver;
- Katrin Kirchert – project support.

3.2 National contributors – 12 national energy agencies

12 National Partners – collection of national market information (including questioning of national key actors)
- **Austria:** AEA (Herbert Tretter);
- **Belgium:** VITO (Ruben Guisson, Nathalie Devriendt);
- **Finland:** MOTIVA (Timo Mattää);
- **France:** ADEME (Iman Bahmani, Pascal Corté);
- **Germany:** dena (Alexandra Lermen, Michael Herr);
- **Greece:** CRES (Vassilis Kilias);
- **Netherlands:** SenterNOVEM (Kees Kwant, Frank van Erp, Matté Brijder, Har van Himbergen);
- **Poland:** KAPE (Oskar Mikucki);
- **Romania:** ISPE (Adriana Milandru, Ileana Constantinescu);
- **Slovenia:** ApE (Matias Grzimek);
- **Sweden:** Svebio (Kjell Andersson);
- **United Kingdom:** Imperial College London (Raphael B. Slade).

3.3 Special advisers – technical support of research team

AEBIOM (European Biomass Association)
- Jean-Marc Jossart (AEBIOM) – Special adviser for collection & analysis of bioenergy industry information.

B Country Analysis – assessment of 12 national bioenergy strategies & biomass action plans

NOTE:

For reasons of reader-friendliness, the following chapter which includes individual profiles of 12 EU countries, will be included only in the extended version (140 pages) of the Best Practice Report, but excluded in the short version (for printing & public dissemination). However the extended version is available for download on the project website under: **http://www.bapdriver.org**

C Benchmark Analysis – comparison of 12 national bioenergy strategies and biomass action plans

1. OVERVIEW/INTRODUCTION

In the benchmark analysis the 12 national frameworks are assessed against the same set of performance criteria. For each criterion one outstanding country or national system serves as a benchmark for the assessment of the others. The following 15 assessment criteria are applied:

ASSESSMENT AREA 1:

Assessment of national biomass resources
Performance criterion 1.1: Coherent biomass assessment approach
Performance criterion 1.2: Application of sustainability criteria
Performance criterion 1.3: Consideration of cross-country effects

ASSESSMENT AREA 2:

Formulation of national bioenergy strategies and biomass action plans
Performance criterion 2.1: Integrated & balanced national bioenergy strategy
Performance criterion 2.2: Setting of targets & priorities
Performance criterion 2.3: Status & quality of national biomass action plans (BAP)
Performance criterion 2.4: Attractiveness & consistency of national policy frameworks & support schemes for bioenergy promotion

ASSESSMENT AREA 3:

Implementation of national bioenergy policies
Performance criterion 3.1: Policy impact on actual market & industry development
Performance criterion 3.2: Cost-effectiveness of bioenergy strategy & support schemes
Performance criterion 3.3: Efficiency of administrative procedures
Performance criterion 3.4: Information & integration of stakeholders
Performance criterion 3.5: Quality standards & qualification of key actors

ASSESSMENT AREA 4:

Monitoring of national bioenergy markets and policies
Performance criterion 4.1: Effective approach to market monitoring
Performance criterion 4.2: Effective approach to policy performance measurement
Performance criterion 4.3: Effective approach to sustainability guarantee





Many types of biomass resources are potentially available for energy supply.

2. BIOMASS RESOURCE ASSESSMENT (ASSESSMENT AREA 1)

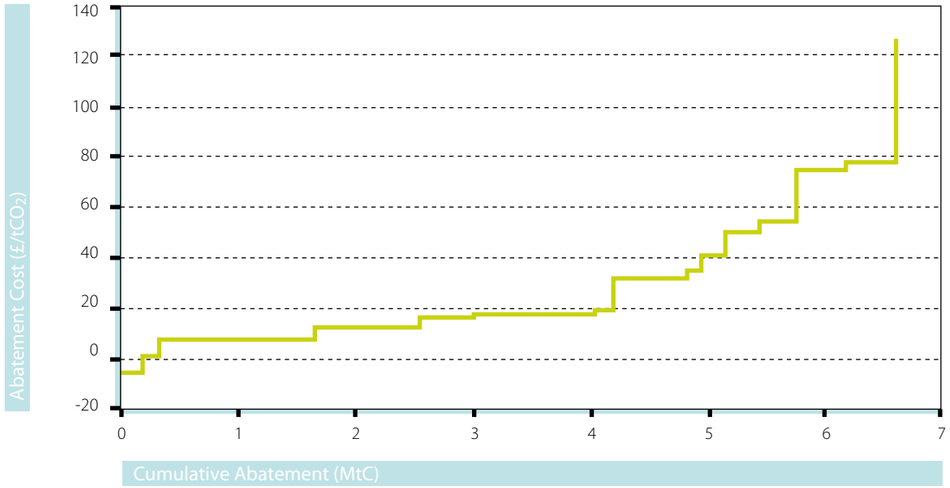
2.1 Coherent biomass assessment approach
(PERFORMANCE CRITERION 1.1)

EXPLANATION OF PERFORMANCE CRITERION:
This issue was assessed by means of the following **research questions:**

- Is there a **coherent & systematic approach** to assess the availability of national biomass resources at all?
- Is this approach based on a **sound methodology and comprehensive, reliable statistical data**?
- Does this approach consider **BOTH the physically available AND economically viable biomass potential**?
- Does this approach consider **ALL potential types of national biomass resources** (not only some of them), including
  - Wood/forestry products?
  - Agricultural products/energy crops?
  - Biogenic waste products?
  - By-products (e.g. from industrial productions)?
- Does this approach cover **BOTH the development of existing domestic resources AND the mobilisation of new resources AND the import of resources** from other countries alike?
- Is the **potential arbitration between the energetic use of biomass and alternative uses** (esp. tensions with food /feed sectors) been considered?
- Does the approach address not only the availability of original biomass resources, but also their **conversion and distribution along the value chain** up to the final use?
- Is the assessment approach applied on the national level **in line with EC requirements to ensure comparability of data across the EU** (see "non-paper on nBAP" by DG TREN)?

BENCHMARK DEFINITION: UNITED KINGDOM
The EC requires **comparable data in order to monitor the achievement of common EU targets** until 2020. At present, however there seems to be **no clear benchmark for a fully integrated assessment approach** of national biomass resources in line with this requirement. Overall the national approaches applied for biomass assessment are not optimal, so that practical guidelines from the EC are urgently needed. The **EC has provided member states with a common tool** (the "Matrix") for standardised collection on required information on nBAP, but not all have filled it in so far. There are various regulations & directives regarding EU-wide statistics pending, as well as working groups dealing with the same issue.
In this report the United Kingdom is presented as an exemplary case. In preparation of the UK Biomass Strategy in 2007 a **concerted attempt to understand the British biomass resource** base was undertaken by the Energy Technologies Unit of the UK Department of Trade and Industry in May 2007. In the **resulting working paper** "economic analysis of biomass energy" policy-makers have been informed in a comprehensive way about the potential size of the British biomass resources and how they compare with potential demands from various energy applications. The working paper **covers a broad range of biologically derived resources** including the biodegradable fractions of municipal and commercial and industrial wastes, sewage sludge, food waste, forest wood fuel, agricultural residues, wood waste and specifically grown energy crops. The availability of existing resources is compared with **potential to mobilise new resources.**
The **economic analysis** mainly considers the technical potentials, while widely neglecting factors as market and physical constraints. However, **biomass supply cost and prices are taken into account** (using general prices with price range) and economic assessments for different biomass conversion options, power/heat etc generation. The study seeks to construct **simplified marginal cost curves for biomass resources** (an illustrative example is shown below). It focuses on a limited range of representative options, covering the production of heat, power, combined heat and power and liquid bio fuels. It examines the main elements of biomass fuel chains covering collection or production and harvesting, preparation, storage, transport and final conversion to useful energy supplies.

This chart shows an illustrative CO_2 cost vs. abatement curve for CO_2 avoided by the deployment of biomass heat in the UK:



The following chart shows an illustrative CO_2 cost vs. abatement curve for CO_2 avoided by the deployment of biomass heat in the UK:
According to experts, this supply/cost chart is very useful, but it **should be more biomass-related**, rather than just addressing CO_2 emissions.
The **methodology applied is sound and comprehensive**, at least as long as data were available from established sectors such as agriculture and forestry – which was not the case in new areas such as waste. Data were not specifically collected for assessing biomass resources, but taken from existing measurements for other sectors like agriculture.
The **study's main shortcomings** are that it consists of **top down assumptions**, which were not robustly tested (e.g. supposing 5% of the land were available for energy uses). The study has further weaknesses; for example the **unclear definitions of waste, or the use of heterogeneous data** from different, sector-specific sources and data sets.
The analysis is not limited to an assessment of domestic resources, but also **takes imported biomass into account** in a simple way. Again the assumptions are top down and do not scrutinise the real development in exporting countries.
The **potential arbitration of energy with alternative uses is acknowledged**, at least with regard to bio fuels, but the debate on these potential conflicts is still at an early stage in the UK.
The approach is **not yet fully in line with EU requirements** with regard to gathering comparable data on biomass resources availability and use.

GAP ANALYSIS: DIFFERENCES BETWEEN THE UK AND OTHER COUNTRIES

- In most countries the **national approach to biomass assessment is insufficient** and not in line with EC requirements yet. Guidelines and templates from the EC are definitely needed, in order to raise the quality and harmonization of national measures. These guidelines should also give indications on how **Eurostat data may be used** to support national assessments.
- Obviously **all countries depend on detailed statistics on their domestic biomass resources**, especially in traditional sectors like forestry or agriculture. These data are typically derived from **regular inventories of forests and agricultural sites** co-ordinated by the respective authorities in charge. On the basis of these inventories, policy makers regularly ask specialists (e.g. scientific institutes, consultants) to conduct targeted **expert studies** to estimate the future potential from both existing resources and the mobilisation of new ones. At the same time, waste agencies must be better involved in supplying national biomass resource inventories.
- While inventories of forests and agricultural sites are usually very complete, this is **not the case for new areas such as waste or by-products**. In many cases **not even a clear definition** of these resources exists.
- While detailed studies on single sectors (forest, agriculture and/or waste) are undertaken in all countries, these are **usually not integrated in a coherent approach** to the assessment of national biomass resources. The results of these sectoral studies are often **fairly heterogeneous data** compiled on different assumptions that are not easily comparable. Some countries like Austria or France have developed **integrated methodologies for single sectors** (e.g. Austria's comprehensive "wood flow chart" capturing all transactions along the supply chain for wood resources), but not covering all of them alike. Another exception may be the Netherlands' "bio-based raw material platform".
- In most cases, the scientific studies **focus on assessing the physical or technical potential** for biomass use within the country, **without clear delimitation of actually available potentials according to economic or sustainability criteria**. Economic analyses are also undertaken (e.g. dynamic scenarios by specialist consultancies or energy agencies), but usually less on a national, but rather on a regional or local level (e.g. economic potential assessment of biogenic waste in single cities or urban areas). **In no case the national biomass potential is broken down to single regions** in a differentiated way yet (although first efforts into this direction are undertaken, e.g. in Austria).
- **Conflicts arising from the use of biomass resources** for energy generation **are only recently starting to be seen as a major issue** in most countries. In countries with a strong traditional wood sector the conflict between energy and pulp/paper industry is not new, as it is in virtually all countries for energy crops vs. food uses in agriculture. Like the sustainability issue in general, these sectoral conflicts rank higher than ever on the political agenda in various countries (e.g. Germany).
- **EU requirements** in general and the national BAP processes in particular **have already triggered a more integrated assessment** of resources more in a few countries (esp. in the MOE states), for instance in the form of task forces, targeted studies or new software tools (e.g. GIS-based methodology developed by CRES in Greece) However, in the majority of countries there does **not seem to be any alignment between national resource assessment and EU activities** in this field. In some cases neighbour countries (e.g. Finland and Sweden) entertain a rather informal exchange on biomass resources.

2.2 Application of sustainability criteria
(PERFORMANCE CRITERION 1.2)

Integrating social aspects within sustainability criteria is still a challenge.

Source: Istockphoto - Ricardo Azoury

EXPLANATION OF PERFORMANCE CRITERION

This issue was assessed by means of the following **research questions**:

- Are **sustainability issues** (e.g. conflicts regarding land use, bio diversity, water quality, soil quality) **considered** for the assessment of national biomass resources and design of national bioenergy policies at all?
- Have **concrete sustainability criteria been defined** to measure the impact of potential policies in this area?
- If yes, are these criteria applied with regard to **BOTH the exploitation of domestic resources AND biomass imports/exports** from/to other countries (EU member states, others)?
- Are **economic constraints** for the use of biomass resources considered in a sufficient way?

BENCHMARK DEFINITION: THE NETHERLANDS

In the Netherlands **the project group "sustainable production of biomass"**, under the chairmanship of Prof. Dr. Jacqueline Cramer, from 2006 on developed a **"testing framework for sustainable biomass"**. The main goal of this initiative is to ensure that the strong increase of biomass for energy uses (esp. large-scale production of energy crops) is not achieved at the expense at other important values for nature, environment and society. The project group **defined sustainability criteria & testable indicators of large-scale production of biomass for six relevant themes:**

- **Greenhouse gas emissions:** How much emission reduction does the use of biomass yield for a specific producer, calculated from its source up to its use, and compared with the average use of fossil fuel?
- **Competition with food and other local applications:** Does large-scale production of biomass for energy supply suppresses other use of the land, for example for the cultivation of food or wood as building material, and what are its consequences?
- **Biodiversity:** Does the local natural ecological system of land and water lose any variation in forms of life because of the large-scale cultivation of energy crops?
- **Environment:** Are there any effects of the use of pesticides and fertilizers, or are there other local effects on soil, water and air because of the large-scale production of biomass?
- **Prosperity:** Does the production of biomass contribute to the local economy?
- **Social well-being:** Does the production improve the social living conditions of the local population and employees?

The resulting testing framework puts the **emphasis on biomass for electricity and heat production and as transportation fuel**, but the framework can also be applied to biomass as raw material in chemistry. The framework is **applicable to biomass of all origins**, so coming from the Netherlands and other countries. Where possible the project group made use of existing standards for specific biomass flows and especially ensured its fit with developments on EU level.

The report is an advice, in the first instance to the Dutch government, but also to all other relevant target groups involved. In the time to come the **government will translate this testing framework into its policy** for the application of biomass in the Dutch energy supply. The government can for instance incorporate sustainability criteria into instruments supporting the use of biomass. Currently however the **operationalisation of the criteria in concrete policies is still a challenge**.

GAP ANALYSIS: DIFFERENCES BETWEEN THE NETHERLANDS AND OTHER COUNTRIES

- For most countries the **sustainability issue is quite new for the biomass sector (but not for the forestry and agricultural sectors)**. While scientific studies on the subject exist in many cases, it has not shown as a guiding principle for policy-makers yet. Only recently the **application of sustainability criteria is imposed on the political agendas**, by global developments (climate change, food crisis, etc.) on the one hand and by new EU directives on the one hand.
- As a consequence, **only some countries managed to define sound sustainability criteria** and to integrate them in an efficient way. **Promising examples** for such an integration are, aside from the Netherlands, Belgium which linked its sustainability regime with the electricity quota/green certificates system and the UK which integrated sustainability criteria into the Renewable Transport Fuel Obligation.
- In most countries, the **conservation of precious natural resources** (forests, water, soil, agricultural land) **is a high priority**, but **monitoring systems in place are not specifically related to the bioenergy**. Some of these schemes apply criteria defined on EU or even international level (e.g. forest certification schemes on the basis of WWF or FSC criteria)
- In addition, the **first bioenergy-related schemes have been developed**, but are usually **far away from actual implementation via policies yet**. In some cases **single support schemes** (e.g. subsidy programmes in Austria) **already apply sustainability criteria** to assess investment projects. In some countries (e.g. Belgium) **comprehensive certification schemes for biofuels** (e.g. wood products like pellets) **and/or biomass plants** applying sustainability factors have been launched. France has started a **lifecycle assessment study for liquid biofuels** production.
- Often **market actors** (e.g. the Swedish industry association Svebio) **are very critical** about rigid the definition and control of sustainability criteria, e.g. via certification schemes, which they see mainly as bureaucratic burdens to the free development of markets and supply chains.
- Against the background of the **pending new EU directive** that will define sustainability criteria for biofuels together with eligible schemes, it would not be sensible if national governments launched an innovative scheme for the moment.
- The **implementation of sustainability criteria in practice is always a major challenge**, for instance to define effective indicators to monitor the actual impact (e.g. how to measure prosperity effects? - here for instance criteria of the World Bank may be applied)
- **Life cycle analysis (LCA)** is considered an essential tool. LCA methods applied on national levels must be harmonised.
- Sustainability criteria should be applied to biomass production and use, but to **food production** as well.
- It is also crucial to integrate the **quality and quantity of water needed** for the growing and processing of biomass. The same applies to the inclusion of GHG emissions.
- Regarding the **impact of biomass use on prosperity and social wellbeing** (compared with fossil fuels), not only the own country, but also the importing countries must be considered.

2.3 Consideration of cross-country effects

(PERFORMANCE CRITERION 1.3)

Biomass is becoming a world-wide commodity.

EXPLANATION OF PERFORMANCE CRITERION

This issue was assessed by means of the following **research questions:**

- Is the **use of foreign biomass resources** for the national bioenergy strategy (e.g. by means of imports, trade of biomass fractions) fully considered?
- Is the **impact of national biomass use on other countries** (EU member states, others) considered?
- Are national **bioenergy policies mutually co-ordinated with neighbour countries?**

BENCHMARK DEFINITION: FINLAND

Overall cross-country effects are not effectively monitored in all EU member states, so **no clear benchmark country** could be identified. Eventually, Finland was chosen as an exemplary case, although only few lessons may be transferred to other countries.

More than most other EU member states Finland is **considering cross-country effects** in the assessment of their national biomass resource base. This is because of the **country's role in the bioenergy market between its neighbours Russia and Sweden**. However, a shortcoming of the Finnish approach is that the impact of national biomass use on other countries is not really considered. The production of wood pellets in Finland amounts to 450 000 t/a, of which approx. 75% is exported, mainly to Sweden. Regarding its stock of raw materials, 20% of domestic wood use (82 million m^3) is imported from Russia. The wood import (2006) to Finland was 20 million m^3, of which roughly the half (bark, sawdust, black liquor and industrial wood residues) is at the end a source for bioenergy and is included in total energy use figures of Finland (1485 PJ). Therefore, Finland has got to some extent the role of a **"middleman in the value-chain"** by importing the raw material (wood) from Russia, upgrading it and using and exporting the upgraded products to Sweden. The dependency on Russian resources has led Finland to take these Russian resources into account. It measured them by the use of satellite photos and other advanced technologies. In recent time however, Russia strives to do this upgrading by itself, and charges new taxes for wood exports. The solution for this feud could have a **significant impact on the coming Finnish bioenergy usage** in particular and the Finish RES policy in general. On the other hand, if the pellet use starts to grow heavily, the national production capacity might not be able to meet this demand and imports from Russia or the Baltic countries could become interesting. The trading of pellets is happening on an **open, international market** where the demand and supply set the prices and the amounts being exported or imported. In order to **limit the export** it might be necessary to increase the domestic buying capacity which could be done by increasing the taxation on competing fuels (electricity for heating and light fuel oil).

The new export tax implemented in Russia shows that it is **dangerous for a country to count too much on resources from other countries**. Targets are very ambitious for all Member States and imports should be considered after maximizing the exploitation of the national potential.

Obviously alternative scenarios would be required in Finland if imports from Russia became too expensive.

GAP ANALYSIS: DIFFERENCES BETWEEN FINLAND AND OTHER COUNTRIES

- Not surprisingly, in most cases the national **assessment studies focus purely on domestic resources**, while imports and exports are not included in the methodologies:
- An **exception from this rule can be noted in the biofuels field** (bio diesel, bio ethanol, vegetable oils) where "make or buy" decisions are far more common than in all other areas. For some countries (e.g. Slovenia) this also applies for the trade of wood, e.g. for pellet production.
- In general **countries with limited domestic resources** (e.g. the Netherlands) **have calculated their import needs more clearly** than countries with abundant biomass conditions (e.g. Sweden or France). For them issues like availability and volatile procurement market prices for imported fuels are obviously key to define their future bioenergy strategy.
- On the other hand, the (positive or negative) **impact of national biomass policies on foreign countries** in the EU or overseas, **is widely ignored** completely by policy-makers so far.
- **Foreign resources are assessed in an isolated non-dynamic way** since the growing demand of other countries is not taken into account. For a sound and realistic assessment of the importing potential a common assessment with potential competing market-players would be necessary.
- Biomass imports are an **effective tool to avoid national monopolies**.

3. BIOENERGY STRATEGY FORMULATION (ASSESSMENT AREA 2)

3.1 Integrated & balanced national bioenergy strategy (PERFORMANCE CRITERION 2.1)

Stakeholder consultations is a key factor for successful development of renewable action plans.

Source: AEBIOM

EXPLANATION OF PERFORMANCE CRITERION

This issue was assessed by means of the following **research questions:**

- Has a **fully integrated national strategy** for bioenergy promotion been defined, which balances the following areas:
  - ALL relevant energy sectors (= biomass application areas): electricity + heat + fuels/transport;
  - ALL relevant policy fields (= biomass resource areas): agriculture + forestry + waste;
  - ALL relevant policy perspectives: short-, mid- + long-term.
- Does the **strategy consistently link national targets with a clear roadmap** and programme of concrete activities to achieve them?

BENCHMARK DEFINITION: FRANCE

A **fully integrated national bioenergy strategy** as intended by the European Commission **has not been defined by any EU member state yet**, but the **French approach already reflects the main principles**. So far the national biomass strategy is mostly an aggregation rather than an integration of different policy fields influencing bioenergy, concretely energy, agricultural and environmental policies.

In 2007 a very **broad consultation process** named "Grenelle de l'Environnement" was launched by the government to re-define a coherent policy in environment with the **consensus of all stakeholders** (non-governmental institutions, unions, employers' representatives, local authorities). In this process objectives and **measures to comply with future 2020 renewable energy targets** were defined. In a second step the government will prepare a **new "Grenelle Law"** which translates the proposals into political action.

In the field of bioenergy, the proposals include the EU objectives for biofuels, electricity and heat production for 2020 and the roadmap forecasts **intermediary objectives for the year 2012**. The Grenelle process also developed forecasts on the resource side.

Moreover, the quality of the Grenelle process resulted from a **real involvement of relevant stakeholders** (such as the State, local authorities, NGO, unions, employers, experts), in a succession of various stages (discussions, national consultations, committees, working groups).

The communication was ensured through the participation of the president, internet website, many ministerial presentations, regional meetings for the public and press conferences by "Regional Prefects".

The **national biomass action plan is also under development** and will be fed by the Grenelle discussions.

GAP ANALYSIS: DIFFERENCES BETWEEN FRANCE AND OTHER COUNTRIES

- In most countries there is **no integrated bioenergy strategy, but only a "patchwork" of diverse biomass-related policies** is divided between different authorities, usually the respective Ministries for Economy/Industry/Energy, for Agriculture, for the Environment/Forestry, in some cases even for Buildings. Each of these authorities obviously pursues their individual plans & policies (e.g. national Forest Plan). It is acknowledged that this lack of coherence is a main factor for ineffective policy framework or an insufficient "push" for the bioenergy sector from the political side.
- In some cases (e.g. UK) a national biomass strategy exists, but is **far from being complete, up to date or in line with EC requirements**. Either **no binding targets** have been defined or they are not based on a sufficiently sound assessment of resources or not covering all sectors.
- In many cases (e.g. Finland, Germany) a national biomass strategy is prepared, but **depends on the formulation of overall energy and/or renewable energy plans in the first place**. In various countries (e.g. Greece) biomass is simply not the main priority in comparison to other technologies like wind or solar.
- At present **all countries have more or less started a co-ordinated effort** to start the process of developing a national bioenergy strategy, usually immediately related to the EU requirement of developing national BAP. Due to the variety of responsibilities the process involves considerable hassle.
- Experts in some countries regard the approach of **target setting as superfluous** since their relevant countries are following different political approaches. It is to see which system turns out to be most effective and whether an adapt ion will be necessary.

3.2 Setting of targets & priorities (PERFORMANCE CRITERION 2.2)

EXPLANATION OF PERFORMANCE CRITERION

This issue was assessed by means of the following **research questions:**

- How close is the country to **reaching the national renewables/biomass targets** defined on EU level until 2020? To which extent have they already been reached by 2008? How realistic is it to reach them until 2020 as foreseen?
- How **ambitious and legally binding** are national targets? Are they even more ambitious than the EU requirements?
- How far have these overall **EU targets been translated on the national level and differentiated for single bioenergy sectors** (electricity, heat, fuels/transport) and administrative levels (e.g. regions)?
- Are **resource efficiency and the use of by-products** considered in definition of targets & priorities?
- Is the definition of national targets & priorities based on a **sound methodology and reliable statistical data**?

BENCHMARK DEFINITION: AUSTRIA

According to EU targets Austria must increase its RES share in national energy mix to 34%, compared to only 23% in 2006. From the current perspective, this **target seems very ambitious** and may only be achieved by the combination of comprehensive efficiency measures and the mobilisation of new biomass resources (esp. energy crops), including imports (esp. biofuels). In addition the share of RES in national electricity mix shall be increased to 78% already in 2010, in comparison with 61% in 2006.

The energy & climate protection programme 2007-2011 of the **Austrian government has announced even more ambitious national energy targets**:

- RES share in electricity mix of 80% until 2010 auf 80% and 85% until 2020;
- RES share in energy consumption mix of 25% until 2010 and 45% until 2020;
- Biofuels share of 10% until 2010 and 20% in 2020 auf 20%;

However, these ambitious goals are **not legally binding and not very realistic** from the current perspective.

There are **considerations to formulate differentiated targets for RES-Heat**, including a split of responsibilities between the Austrian regions. **Targets regarding resource and energy efficiency aspects** are national priorities, too, like the reduction of energy intensity by 5% until 2010 and 20% until 2020.

Comprehensive data like a detailed energy balance of an energy usage analysis are collected by the Austrian statistical institute, while the national regulating authority (e-control) captures all necessary data on the electricity sector.

The next step is to work out how with the percentages of the different sectors (34% of the final energy consumption) can be reached.

GAP ANALYSIS: DIFFERENCES BETWEEN AUSTRIA AND OTHER COUNTRIES

- All countries see **EU targets until 2020 as very challenging** and not feasible without a major policy push for the mobilisation of new biomass resources.
- Many countries (e.g. UK) have **neither transposed EU targets nor formulated own national targets** yet. In some cases targets have been announced, but they are only indicative/non-binding. Sometimes there are too many single targets that are not sufficiently integrated or blurred.
- Usually overall targets are **differentiated by main sectors** (forest/wood, agriculture/crops, waste), but often biogenic by-products are not considered.
- In all countries national targets **are not broken down to single regions** (or even narrower local areas). An actual regionalisation of national commitments has not taken place yet.
- Most countries lay **high emphasis on resource and energy efficiency** in their national set of targets.
- Most countries have **not established a systematic approach to market and/or policy performance measurement** yet, that is aligned to the achievement of national biomass targets.

3.3 Status & quality of national biomass action plans (PERFORMANCE CRITERION 2.3)

EXPLANATION OF PERFORMANCE CRITERION

This issue was assessed by means of the following **research questions:**

- Has a **full-grown biomass action plan (BAP)** already been developed and/or adopted at all?
- If yes, is the BAP really up-to-date and does it **meet the requirements defined by the European Commission**?
- If not, has a **BAP process been started** at least? Who is involved in this process?
- What is the **quality of the national BAP process**, esp. with regard to other policies, active involvement of relevant stakeholders, communication or monitoring?
- Is the national BAP process rather **top-down or bottom-up**?

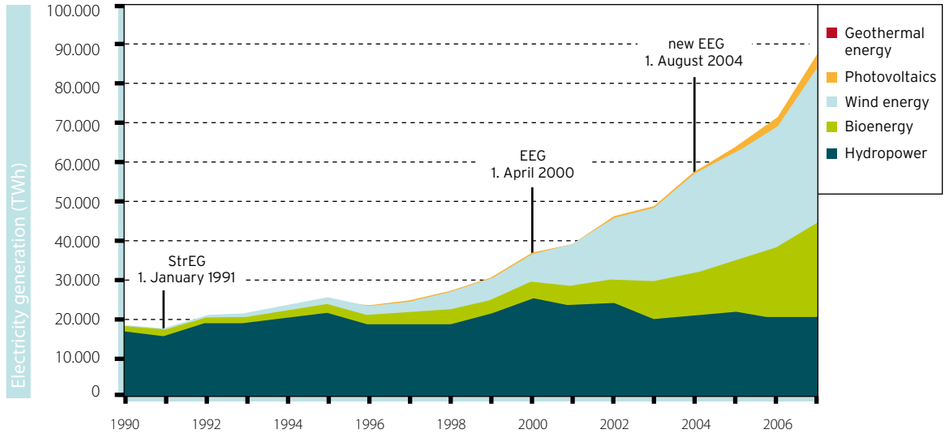
BENCHMARK DEFINITION: ROMANIA

Although by May 2008 five other EU member states (Netherlands, Estonia, UK, Ireland, Spain) have submitted a full-grown national BAP to the European Commission, Romania has been chosen for the following reasons:

- Estonia, Ireland and Spain are not participating in the BAP Driver project;
- The BAP of the Netherlands and the UK are either outdated/not up to date or not fully in line with EU requirements;

Effective Support schemes in Germany have boosted the bioelectricity markets.

Source: BMU



- Although a **Romanian BAP is not ready yet, a first draft has been developed in close alignment to EU requirements** and may therefore be considered a "model case" for other EU member states.

The proposal of the national BAP includes a **programme for implementation** of the necessary activities to achieve the national biomass objectives, which again are aligned to EU targets. It consists of a number of measures corresponding to each stage of the supply chain from raw material production to the end user. As a result, **several ministries are responsible** for developing the adequate legislation:

- the Ministry of Economy and Finance,
- the Ministry of Agriculture and Rural Development,
- the Ministry of Environment,
- the Ministry of Administration and Internal Affairs.

The BAP aims to combine political principles of competitiveness, sustainability and positive environmental, economic and social impact, by setting out a **coordinated programme** for the development of the biomass sector in Romania. It summarises the various existing activities, and provides a framework under which they will be coordinated and also supplemented by further actions.

The Romanian Biomass Action Plan has been **closely influenced by the EU Biomass Action Plan**, and shares its overall goals. The **key drivers** in the Romanian Biomass Action Plan can be summarised as follows:

- the desire for stronger yet sustainable economic growth;
- the need to reduce energy demand;
- the commitment to increase use of renewable energy sources;
- the desire to diversify energy sources, particularly focusing on domestic and sustainable resources;
- the opportunity to enhance international cooperation.

The future of biomass supply from the agricultural sector is likely to follow a pattern of development where:

- the main drivers will come from the market and will require a great deal of effort in building and maintaining healthy and profitable supply chains;
- the sector will need to look at different scales of production to encourage energy self- sufficiency;
- developments will need to take a regional view;
- the reduction in transport costs by having the processing capacity within the different rural areas will be important, as well as
- the support for small scale (on farm) production of bioenergy.

The aim of the BAP is to ensure that Romania's **biomass resources are properly supported and exploited**, and that it delivers additional economic & social benefits whilst making a **contribution to the ambitious targets** for emissions reduction. The key aims are:

- to provide a summary of the wide range of existing activities, actions and initiatives;
- to provide a focus for a strategic coordinated approach to developing biomass for energy;
- production across the heat, electricity and transport sectors;
- to identify roles and responsibilities for government, industry and public stakeholders to develop a vibrant bioenergy industry in Romania, and
- to identify future actions and gaps.

The draft of the Romanian BAP has just been finalised by a team led by ICIA Cluj-Napoca, that in the proposal phase **involved experts** from research, universities and the National Academy for Agriculture and Forestry, as well as relevant policy makers. The proposal has been sent to the Ministry of Economy and Finance, which in the next period will introduce it for approval as annex of a governmental decision. At the moment the proposal of the National BAP is exposed to a **public consultation process**. According to this debate, necessary amendments will be applied before it may be fully approved. The national BAP team organises several open debates involving all the interested key actors, such as farmers, processors, end users, local and regional administration, researchers, academic experts.

GAP ANALYSIS: DIFFERENCES BETWEEN ROMANIA AND OTHER COUNTRIES

- With the exception of the Netherlands and UK there is **no nBAP** yet. However, in the case of the Netherlands the BAP dates back to 2005 is considered **outdated and of little actual relevance** for future policies. The BAP of the UK is also not meeting EU requirements, especially it does not link binding targets to a roadmap of activities to achieve them.
- Most other countries have at least started the BAP process, usually under the co-ordination of one or several Ministries. These authorities involve relevant stakeholders and/or experts (e.g. industry associations, energy agencies, scientific institutes, consultants) in consultation processes, e.g. by means of BAP task forces or preliminary studies. In most cases the process is organised top-down by national ministries, without the necessary involvement of regional actors.
- In many cases there is little exchange of national nBAP teams and other countries, often not even with the EC (apart from participation in BAP expert meetings);
- It seems that due to the variety of actors/interests involved and the complexity of the issues most pending nBAP will probably not be completed before 2009. It also seems that in some cases the formulation of BAP is not considered a national top priority for achieving national energy and/or environmental political goals.

3.4 Attractiveness & consistency of national policy framework & support schemes for bioenergy promotion (PERFORMANCE CRITERION 2.4)

EXPLANATION OF PERFORMANCE CRITERION

This issue was assessed by means of the following **research questions:**

- Which are the **key measures** (legislation, support schemes, other promotional measures) c**hosen for the promotion of bioenergy**? Which measures are not in place yet, but currently discussed or planned? Why these measures have been chosen & others not (e.g. feed-in-tariff system, quota/green certificate system, subsidy/grant/rebate programmes, fiscal/tax incentives, awareness campaigns)?
- Do the single measures **fit together consistently**? Do the support schemes provide **sufficiently attractive conditions** for investors in terms of profitability (return on investment) and long-term security/reliability?
- How do experts **critically assess** the current policy framework & support schemes for bioenergy promotion? What are key **strengths & weaknesses** (shortcomings)? What are key **lessons learned** from the past for the future? What are **good and bad practices**, useful to be transferred to other countries?

BENCHMARK DEFINITION: GERMANY

There is certainly **not one universal policy approach** which is ideal for effective bioenergy policy promotion, but there are alternative ways that have proved successful in Europe. **In the electricity sector, there are mainly two competing models** that are characterised by specific advantages and shortcomings respectively: feed-in-tariff systems (as applied in Germany) and more market-based quota systems (as applied in Sweden, in combination with fiscal incentives). In this analysis, the German feed-in-tariff system was selected as a relevant benchmark case. The German policy framework for bioenergy promotion is centred on the following measures:

- **A feed-in-tariff system** for producers of electricity from renewables: the Renewable Energies Act (EEG). An amendment of the law has just been approved by the Federal Parliament in June 2007 and will become effective in January 2009;
- A new **biogas feed-in ordinance** (Biogaseinspeiseverordnung) from April 2008 which gives priority to biogas feed-in to the natural gas grid and eases biomethane grid access and transport procedures.
- Within the framework of the Renewable Energy Sources Act, the **Biomass Ordinance** (Biomasseverordnung), which regulates which substances and technical procedures are allowed and what environmental requirements have to be met.
- A **new RES-Heat legislation**, which introduces obligations to use renewable heating systems (either biomass or alternative technologies) for new buildings and refurbishments: the Renewable Energy Heat Act (EEWärmeG), also just approved in June 2008 to become effective in January 2009.
- An **investment support scheme for investors in small-scale biomass fuelled heating systems** (esp. pellet and log boilers): the market incentive programme (MAP); to be continued until 2012 with an increased annual budget of € 500 Millions, parts of which are intended to leverage the aforementioned EEWärmeG;
- A **soft loan scheme** by the public bank KfW, allowing investors in all types of renewable energy systems to finance up to 100% of their initial investment cost; to be continued beyond 2009;
- **Quota obligations for biofuels** plus **partial eco tax exemption for pure biofuels**; the quota for biofuels is currently under discussion. It is expected to be lowered due to technical problems of conventional car manufacturers to process biofuel blends as well as the global food crisis. The change from tax exemption to a quota system in 2007 led to a difficult market situation with up to 40% of domestic production facilities facing bankruptcy.

Despite several shortcomings the German policy framework has proven very successful in leveraging the development of diverse national bioenergy markets, as well as industry development:

- The **EEG feed-in-tariff system** is widely seen as a **model for market promotion**. For investors it offers **attractive conditions** in terms of high tariffs for a long period, usually 20 years. Moreover, it guarantees producers of RES **legal certainty** by assigning a strong legal position and by the support of the highest German and European Jurisdiction which has accepted the law and which has cleared up most legal questions in a long line of decisions. The EEG is responsible for triggering a considerable market boom in the biogas sector.
- **The investment support schemes**, especially the market incentive programme has proven **quite effective for leveraging the installation of small-scale biomass heating systems**, especially pellet boilers.
- The former general **tax exemption for biofuels has triggered enormous demand** and investments on the supply side, especially in bio diesel plants. However, the market growth came to sudden halt when the German government decided to reduce the exemption of biofuels from eco taxation and switch to a quota system, a blow of which the sector has still not recovered despite a partial correction of the measure. In this regard, the rather sudden introduction of a quota system has had counterproductive effects. This shows the very negative impact of "stop & go" effects.

In 2007 the German government decided on a **new umbrella strategy** (IEKP = integrated energy & climate protection programme), which includes **29 targeted measures** for the promotion of renewables & energy efficiency. The idea of the programme is to integrate existing as well as new measures to form a **concise strategy**. It comprises topics such as energy efficiency in buildings, CO_2 reduction of air traffic as well as biomethane feed-in.

GAP ANALYSIS: DIFFERENCES BETWEEN GERMANY AND OTHER COUNTRIES

- In all countries a **diversity of support measures** for bioenergy promotion can be noticed. Usually policy frameworks are a **patchwork of single measures** rather than following a coherent approach. Main reasons for this diverse picture are again the variety of political actors responsible for biomass-related policies, but also different historical development/traditions of bioenergy sectors. With the introduction of the IEKP Germany paved the way for a concise renewables strategy.
- It is **not possible to identify clear "winner" or "loser" policies** for bioenergy promotion. It seems that the impact of an instrument often depends less on the "what" than on the "how" it is made, concretely the implementation in the local context where biomass resources are produced and used. This is where most market actors see major shortcomings in the marketplace. A **sustainable, long-term commitment of the government to a strategy** is perhaps more relevant than details of the individual support schemes Overall some countries (e.g. UK, Sweden) seem to follow a **more market-liberal policy approach**, while in other countries (e.g. France, Germany) the philosophy is rather **"interventionist"**. Consistent policies must **comprise the entire supply chain**, so focus both on biomass mobilization (supply side) and usage (demand side) alike, in order to ensure that there will be enough resources to serve demand, and also to foster regional development. Appropriate **supply side support measures** are for instance investment subsidies, taxation for investors (like farmers). They are especially important in the early stages of market development.
- The consistency of instruments chosen is also key, so the mutual **interplay (both positive & negative)** of single measures must be considered. This again stresses the importance of an integrated policy approach. Also the stability of the policies over a long period counts in this context, because "stop & go" effects are always detrimental for young biomass industries.
- In most countries, the expert assessment of pros and cons of the national policy framework is not consistent, but multi-faceted. However, certain trends can be identified:
  - **In the bio electricity sector, fixed price feed-in-tariff systems are overall the preferred model**, because they ensure higher attractiveness, long-term security for private investors and cause at the same time lower costs for the national economy. Nevertheless, in some countries like UK, Sweden and Belgium **market-based quota systems/green certificate systems seem to work well**, at least for the most competitive bio electricity and CHP technologies. However, both Belgium and the UK **deviate from the classical market based system**. Belgium combines the quota system with a governmental obligation to purchase the quota for a minimum price which

depends on the particular technology and the UK plans to introduce for the quota system different categories for each technology thereby diverging from the former technology-blind approach.

- **Quota systems** are very cost-efficient, but have the disadvantage of being technology-blind, and promoting only the most competitive technologies. Another negative point of market-based systems (e.g. emission trade systems) is the volatile pricing of certificates, which may have a very negative impact on the industry especially under negative economic framework conditions when prices tend to slump sharply.
- **Investment subsidy schemes are widely considered a useful instrument especially in an early stage of market development**, especially because of the special characteristics of biomass technologies (high initial investment cost, low ongoing operational cost). They seem to be particularly **effective when integrated in other promotional schemes** like raising energy efficiency standards in the building sector. However, the **"stop & go" characteristics** of subsidy schemes linked to limited public budgets is seen as a major shortcoming of this kind of instrument.
- **Fiscal incentives**, usually in the form of **reduced VAT and/or exemption eco tax for biofuels**, are widely seen as a **smart instrument**.
- An important lever of market development is also **increasing environmental standards** for (conventional) energy technologies.
- Only very few countries (e.g. France) apply **centralised call for tender procedures** for large electricity or CHP plants, but the experiences made with this procedure are **not very positive**.

4. BIOENERGY POLICY IMPLEMENTATION (ASSESSMENT AREA 3)

4.1 Policy impact on actual market & industry development (PERFORMANCE CRITERION 3.1)

EXPLANATION OF PERFORMANCE CRITERION

This issue was assessed by means of the following **research questions:**

- What is the **impact of bioenergy policies in terms of market development** (% of energy mix, installation figures, etc.)? Is the market development actually the result of effective political support or merely due to favourable natural conditions?
- What is the **impact of national bioenergy policies in terms of industry & supply chain development** (employment, investments etc.), for the same reason?
- What is the **impact of policy support on other important target areas** such as rural development, reduction of greenhouse gas emissions, security of energy supply etc.?

BENCHMARK DEFINITION: SWEDEN

Sweden may certainly be considered a **benchmark for a well-developed and differentiated bioenergy market**, as well as a **competitive national industry.**

The **growth of the bioenergy market** by about 75 TWh overall since 1978 and by 3-5 TWh every year has created roughly about 20 000 jobs. Studies have shown that each added TWh bioenergy adds another 300 jobs on the labour market. It has also created a **whole sector of new companies**, mainly small and medium sized, ready to take on the expanding export market.

The **impact on rural development** is difficult to assess and has not been studied. However, most of the new jobs have been created in the rural and out-lying areas and small communities and towns. At the same time a lot of jobs have been lost in regular forestry and farming due to the on-going structural change in these areas. The **reduction of greenhouse gas emissions has been significant**. From 1990 to 2006 the green house gas emissions in Sweden were reduced by 9 percent, while GDP rose by 44 percent. At the same time the use of bioenergy rose by 73 percent. A calculation made by the industry association Svebio shows that the emissions would have increased by 21 percent if the conversion from fossil fuels to biofuels had not taken place. The **impact on security of supply has also been significant** as the biofuels are domestic and all fossil fuels are imported.

This is proof that the **policies overall have worked quite well**. At the first stage most of the growth was in conversion of oil and coal in district heating, and **expansion of district heating**. Now **growth is noted in several sectors**:

- **CHP in district heating** – producing bio-electricity and heat at the same time which gives a very efficient use of the raw material.
- **Bio-electricity** production in the forest industry using biomass (mainly black liquor and other by-products).
- **Pellets use for heating** of single homes and for other buildings.
- Production, imports and use of **biofuels in the transport sector**.

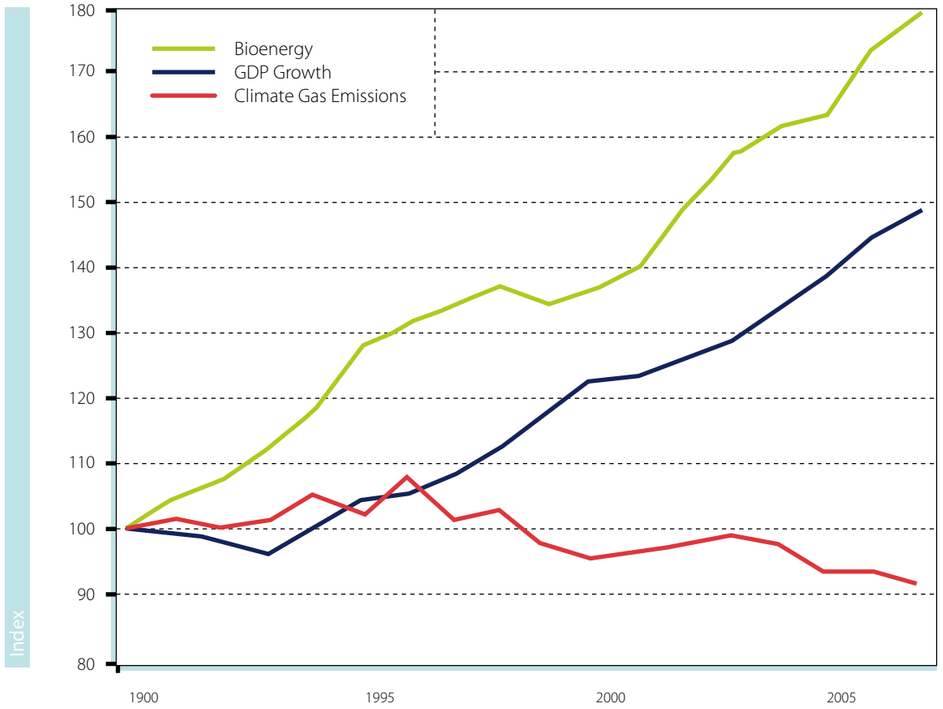
The strong growth of the Swedish bioenergy market is closely linked to strong general measures like the **carbon dioxide tax**. The strong rise in fossil fuel prices has also been important. Interest and involvement from the forestry sector and from district heating utilities have been helpful but had had lesser impact if the strong tax incentives had not been present.

The **picture of the Swedish bioenergy industry** today looks as follows:

- 480 biomass heat plants in all parts of the country (minimum heat delivery of 2 GWh heat), from small communities to big cities, using about 30 TWh of biomass (plus peat and municipal waste).
- Some of the district heating grids use more than 1 TWh of biomass per year.
- 80 bio-electricity producing units producing 10 TWh of bio-electricity/year (third largest power producer after hydro and nuclear). 40 of these are combined heat and power plants, CHPs, in district heating, 25 are in forest industry and the rest are biogas plants.
- 30 large pellets plants and 50 small production units, producing 1,7 million tonnes of pellets.
- Development of better boilers for traditional firewood. Combined systems for pellets and solar heating.
- Large use of by-products in forest industry (black liquor, bark, chips).
- Two large and several small bio-diesel plants. One large ethanol plant, now built out, and several new projects for combinates producing transport biofuels together with other fuels, heat, electricity, biogas etc.
- A large number of biogas plants.
- A diverse industry producing equipment: heat and power plants, boilers, burners, chippers, handlings equipment, pelleting equipment, biogas technology, etc.
- A new market for flexifuel cars and buses. Today more than a third of the new cars sold are flexifuel cars.
- A large import of ethanol and bio-diesel, promoting trade.

The case of Sweden shows that bioenergy and industrial development goes hand in hand.

Source: SVEBIO



GAP ANALYSIS: DIFFERENCES BETWEEN SWEDEN AND OTHER COUNTRIES

- In no other EU country biomass is established as fully competitive main technology as in Sweden. Main reasons are certainly **less favourable natural conditions** (esp. biomass resources) and a **shorter bioenergy history**.
- From the current perspective the **achievement of EU targets until 2020 seems very challenging** for most countries, at least without a major policy push.
- Most countries have **more succeeded in promoting bio electricity/CHP/biogas applications**, in some cases also biofuels, **than in biomass heating systems**. A major pull is expected in the wake of new building regulations imposing higher energetic standards in new and refurbished buildings (including installations of RES heating systems).
- The **best developed biomass resources in most countries are wood products** delivered by the forestry industry. Here supply chains from resource production to final energy use are certainly best developed. The **second most developed sector is the agriculture** (energy crops, by-products), followed by biogenic waste whose exploitation in most countries is still in a very early stage.

4.2 Cost-effectiveness of bioenergy strategy & support schemes (PERFORMANCE CRITERION 3.2)

EXPLANATION OF PERFORMANCE CRITERION

This issue was assessed by means of the following **research questions:**

- **How cost-effective is the chosen national bioenergy strategy**? What is the relation between the benefits of the support schemes on the one hand, and their cost for public budgets and/or the key actors (e.g. taxes, fees) on the other hand?
- What is the **impact of support schemes in place on market prices** for energy?
- Is there **transparency/sound information available** to assess benefits and cost of the national system at all?

BENCHMARK DEFINITION: BELGIUM (FOCUS ON FLANDERS)

FLANDERS

Belgium and specifically the region of Flanders may be seen as a good example for a support scheme for bio electricity production which **combines the attractiveness (effectiveness) of a fixed price system with the cost efficiency of a quota system**.

In 2002 a **quota system based on green certificates with special features** was introduced in the Flemish market. The owner of renewable electricity receives for the production of 1 MWh renewable electricity 1 certificate, this certificate can be sold to the energy suppliers who have the obligation of reaching a certain quota of renewable electricity out of their total amount of delivered electricity. If they do not reach their quota they are obliged to pay a penalty to the regulator for each missing certificate. The penalty is set on 125 €/MWh. The quota is increasing every year until 2010, new goals will be set till 2020 on short term. To give the market players a minimum of financial security **minimum price levels of certificates are fixed**. This means that if the prices of the certificates on the market drop, owners of installation can sell their certificates to the distribution companies who are obliged to buy them. For biomass energy this minimum price is 80 €/MWh, guaranteed for 10 years after starting up, written down in a contract with the grid operator. Important remark is that those certificates are only for installations under 70 kV grid because the regions are responsible for this part of the grid only.

If a bio-energy production installation is a CHP system, the installation can also make use of certificates, the so called **CHP-certificates**. This system is similar to that of the **renewable electricity certificates**. Important difference is that a certificate can be produced for each MWh of primary energy that is saved with the CHP installation in comparison with separated electricity and heat production.
The penalty price is 45 €/MWh primary energy saving. Also a minimum value of the certificate is foreseen on 27 €/MWh primary energy saving. An important difference with renewable electricity is the decreasing support of the system. During the first 4 years, 100% of the certificates are given to new installations, after 4 years the amount of certificates decreases following their primary energy saving ratio.
In addition, there is an **ecological investment support scheme** in place. 3 times a year a call-system is opened by the Flemish Government where companies can apply for investment support for ecological investments. Investments in renewable energy are part of the list of these ecological investments. SME's receive 40% of the extra cost in comparison to standard technology, large enterprises receive 20% of the extra cost with a maximum of € 1.75 million; The extra cost is predefined and lays on 50% for biomass electricity or cogeneration and on 80% for biomass heat production.
In addition to this, enterprises investing in renewable energy can deduct 14% of their investment of their corporate tax load, resulting in another approx. 5% of investment support.

WALLONIA

The **system in Wallonia is compatible** with the one in Brussels region and resembles the Flemish system but is based on CO_2-avoidance. In short the CWaPE grants the certificates to the green producer, who can sell the certificates to electricity suppliers who have a the obligation to provide a certain percentage of green electricity on the total amount of electricity delivered
The market value for a green certificate is above € 90, during 2006 the average price was € 91.58. Compared to the physical electricity price of € 30, this is a 300 % bonus for the clean producer.
The Walloon certificate system is **based upon avoided fossil CO_2 emissions** with respect to a reference being the combined cycle power plant firing natural gas with an efficiency of $\eta E = 55\%$. The regulatory body (CWaPE) has published a list of reference specific fossil CO_2 emissions of the whole supply chain for all fossil fuels as well as the major biomass resources.
The number of granted certificates is reduced with a factor corresponding to the relative avoidance of fossil CO_2 emissions with respect to the reference. This means that one green certificate is granted every time 456 kg of fossil CO_2 emissions are saved with respect to the reference power plant.
Within both systems the final result is similar and that the development potential of wood pellets, as a new type of fuel for generating renewable electricity, appears to be attractive for Belgium. This is mainly due to the high penalty level related to the green obligation (12,5 c€/kWh in Flanders and 10 c€/kWh in Wallonia).

GAP ANALYSIS: DIFFERENCES BETWEEN BELGIUM AND OTHER COUNTRIES

- Most countries **acknowledge shortcomings with regard to the cost-effectiveness** of the bioenergy strategies. A major reason for these symptoms is **insufficient monitoring systems** which measure cost/benefit relationships for political measures. Key questions in this context:
  - Is there any **untapped biomass potential**? Which are the barriers to tap and what is the relationship between them?
  - Are the existing **support schemes effective**? Is there a need for amendment?
  - What are the cost for the state of managing the system? What is the cost/benefit relationship for the consumers?
  - Are the existing **technologies cost-effective**? Is there a potential to improve their effectiveness?
- **Main issues identified** in this context:
  - Security of supply (for CHP plants, district heating networks);
  - Transportation cost (too high for agricultural feedstocks – need for further support);
  - Investment (or usage) cost for end consumers (need for demand-side support measures);
  - Opportunity cost issue in context of prioritisation of resources; taking into consideration alternative options in related markets; those influence prices;
  - Infrastructure problems (in certain countries like Greece or Romania): any market development will be hindered by deficient infrastructure;
  - Not effective heat promotion (tools) in the tertiary sector;
  - Lack of cost-effectiveness of small co-generation (both biomass and biogas), also cooling: high investment cost, high operational cost, little heat demand => need for better support both on demand & supply side.
- **Main measures proposed** to improve cost effectiveness of policy frameworks:
  - **Introduction of specific support mechanism for RES-heat** producers and consumers (as response to the barrier "lack of specific heat policies"). There is a need to introduce new and effective tools to stimulate the RES heat market. The support schemes need to be addressed at a European level (cover the lack of a heat directive) and implemented at a regional and local level, for instance the planning of urban areas and residential buildings.
  - **Explicit alignment of different policies** (as response to the barrier "competition of policies"): there are strong barriers based upon the competition of energy to environmental policies. There are also weak complementarities between the energy and agricultural policy. Support schemes need to be planned, evaluated and implemented taking into account all aspects.
  - **Better regionalisation of policies & tools**, lobby against harmonisation at EU level (as response to the barrier "country- or region-specific policies"): The harmonisation of policies has often been implemented in a distorted way. Biomass is a regionally identified resource. Copying and pasting legislation and rules from one level to another, often discourages its development.
  - **Stimulation of biomass markets & trading** (as response to the market barrier "limited availability of resources"): there is a need to stimulate the biomass market and trading by creating infrastructures, by provide information of what is produced, or demanded, and where, by supporting small and medium enterprises etc. Schemes need to be embedded, or related into competitiveness support measures.
  - **Long-term support and regulations**, rather than unexpected changes and stop & go effects (as response to the market barrier "lack of private investments"): the planning and implementation of long term support tools is required, especially in electricity production and biomass supply. Long term tools will create a safe ground for investments.
- **Clear definitions** of "cost-effectiveness" are widely missing. Usually the term should combine "effectiveness" (= impact) with "efficiency" (= input/output relationship);
- The monitoring of the cost-effectiveness of policies implies a **more quantitative focus of analysis** by application of statistical data (e.g. €/MWh, €/tCO_2), in order to be able to compare countries in objective terms. This links the "cost-effectiveness" issue immediately to policy monitoring (impact assessment);
- **Costs and benefits of support measures must be linked**, which of course requires quantifiable data. It is naturally very difficult to establish clear cause & effect relationships here, because everything is interlinked. In the end, not only mathematical equations, but also a good deal of qualitative interpretation is always required. Nevertheless, the baseline should be quantifiable cost though;
- Cost-effectiveness considerations should not only address purely economic, but also **environmental & socio-economic impacts**.
- **Political priorities are also an important parameter** to assess cost-effectiveness, so they need to be clearly defined beforehand.
- To measure the cost-effectiveness in a fair way, **external cost of different energy fuels must be internalized** by putting a price on carbon emissions (eco tax principle), in order to create a "level playground" for competing technologies. This will actually imply the increasing of prices for conventional energy technologies. However, policy-makers need to look at the entire supply chain downstream towards the applications (so here the subsidy or income tax incentive for investors works into the same direction), so in the end a balanced approach of both sides is required.

4.3 Efficiency of administrative procedures
(PERFORMANCE CRITERION 3.3)

EXPLANATION OF PERFORMANCE CRITERION

This issue was assessed by means of the following **research questions:**

- Are there **proportionate rules regarding the administrative processes** required to plan, implement and operate bioenergy systems (e.g. licensing, grid connection)?
- Are these processes/requirements **streamlined for small-scale installations**?
- Do bio electricity producers dispose of **priority rights for grid access** & use?

BENCHMARK DEFINITION: GERMANY

The administrative procedures for biomass projects in Germany can be considered a benchmark since they have been developed by ongoing practice over the years and provide investors with particular favourable conditions.

Example grid access

In Germany, the access to the power grid is almost completely regulated in the Renewable Energy Act (EEG):

- **Connection to the grid:** The plant operator has a legal claim against the grid operator to get an immediate and preferential connection of the plant generating electricity from renewable energy sources to the grid. Since this claim directly results from the law and not from a contract with the grid operator, the plant operator has got a legally strong position.
- **Access to the grid:** grid operators are obliged to purchase and transmit all electricity from renewable energy sources supplied by plant operators. Grid operators are not entitled to charging the plant operators for the transmission of such electricity.
- **Grid expansion:** In case of lacking grid capacity, the plant operator is entitled to demand immediate grid expansions on the part of the grid operators. The expense arising from such a grid expansion is borne by the grid operator.

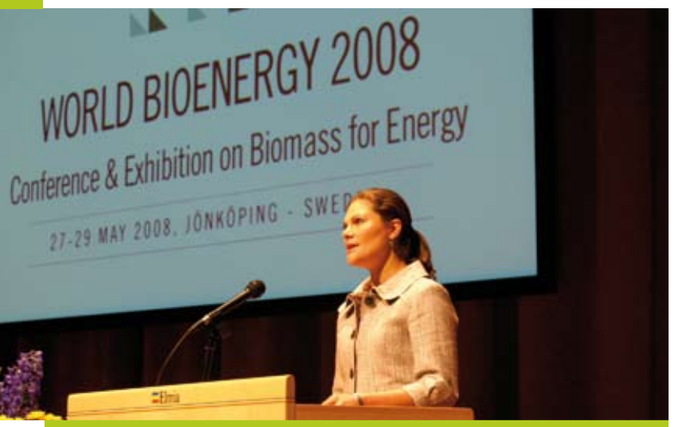
Access to the natural gas grid is regulated in the Gas Grid Access Ordinance which has recently been amended in favour of biogas feed-in. Similar to the EEG, it now provides prioritised access and transmission to biomethane. The new EEG (2009) focuses its support measures on plants of a smaller scale (up to 500 kW).

GAP ANALYSIS: DIFFERENCES BETWEEN GERMANY AND OTHER COUNTRIES

In most countries, **administrative procedures for authorisation, grid access and approval of subsidies** for biomass installations represent a **major market barrier**:

- In most countries the administrative procedures for planning, construction and/or operating bioenergy plants require a very **big hassle** ("paperwork") and long lead times of projects.
- In many countries, even **small-scale biomass installations are still treated as conventional energy production or industrial facilities**, so that the requirements are often inappropriate for this type of technology (e.g. extensive requirements to obtain building permissions or to perform environmental impact analyses). Only in some countries sector regulators have introduced RES specific technical or administrative rules or guidelines for operators.
- In most countries, administrative procedures are **longer and more complex than necessary**. Investors are often confronted with great difficulties and long lead times in application processes.
- In addition, the **handling of regulations in practice**, typically by regional or local authorities, is often not optimal. Authorities in different regions or with other responsibilities sometimes apply common regulations in a different way. Often **too many different institutions are involved** in the authorisation process. Apart from this authorities are often unfamiliar with bioenergy technology and thus overcharged with applications. This also leads to uncertainties for investors and time-consuming authorisation processes.
- Next to general administrative processes, a lack of legislation or **unfavourable conditions for grid access** and connection in nearly all European countries represent another major barrier to bio electricity market development. Especially a **strong legal position of an uncooperative grid operator** or a partial distribution of the expenses of grid expansions can severely hamper the installation of bioenergy plants.
- Due to a lack of experience **utilities or grid operators are often concerned about grid stability** and safety when biomass or CHP plants are to be connected to the grid. At the same time in countries where bio electricity is already widely applied it has been shown that connecting RES systems to the grid is technically unproblematic and safe due to clear norms.
- Again, general **codes for grid access** and use, which are **mainly designed for large, centralised production units**, are applied for small bio electricity or CHP systems alike.

4.4 Information & integration of stakeholders
(PERFORMANCE CRITERION 3.4)



Opening of the World Bioenergy 2008 by Her Majesty Crown Princess Victoria of Sweden, a good example of high level involvement in bioenergy affairs.

Source: Lennart Ljungblom, Bioenergy International

EXPLANATION OF PERFORMANCE CRITERION

This issue was assessed by means of the following **research questions**:

- How well are **relevant target groups** (e.g. professionals, consumers) **informed** on national bioenergy policies, esp. regarding the availability of public support schemes? What is the general level of awareness and acceptance of national policies among these target groups?
- Which measures are applied to **actively involve relevant stakeholders** in the processes of policy-making, implementation and monitoring (e.g. roundtables, exchange platforms)?
- How is the **regionalisation/regional implementation** of national policies ensured?

BENCHMARK DEFINITION: SWEDEN

Sweden is an exemplary case for the **effective creation of awareness and acceptance** of bioenergy among important target groups, as well as the involvement of important stakeholders in policy processes. In contrast to most other countries, bioenergy is nowadays in Sweden **part of mainstream society**, and well established. Reasons are certainly the excellent national conditions and long tradition of bioenergy use over many years, but also effective measures taken by the state to give stakeholders an important say and raise acceptance on policies.

In policy processes, the bioenergy industry represented by Svebio (Swedish Bioenergy Association) and other business organisations are regularly asked to **participate as experts on different governmental committees**. Different stakeholders are also asked to take part in **reference groups** for subsidy or research programmes. Within the forest administration the bioenergy industry is also asked to be part of regional boards.

Regarding the **regionalisation of policies**, the regional and local institutions (provinces, municipalities) are all actively working with energy issues and bioenergy is at the centre of their attention since many years, because this is the big renewable indigenous and local source of energy. Due to the **maturity of market structures**, no special measures for their involvement need to be taken any more.

GAP ANALYSIS: DIFFERENCES BETWEEN SWEDEN AND OTHER COUNTRIES

- In many European countries bioenergy (often with exception of biofuels) has an overall **positive image**. Despite this fact, that tendency is **not always reflected in actual market growth**. The main reasons are often either missing/insufficient support mechanisms or the fact that **people are unaware** of such incentives.
- In most countries levels of awareness among main target groups is **not measured properly**. As a result, an assessment can only be based on rough estimations of key actors rather than actually sound evidence.
- In addition, many people have **the prejudice that bioenergy is too expensive**. A positive image does not necessarily mean that people are willing to invest in bioenergy. **Awareness campaigns** may be a good instrument for promoting biomass support schemes, in order to enhance the investment climate for bioenergy.
- In various countries the integration of key stakeholders in policy-making processes is considered insufficient. A main problem is **top-down processes** co-ordinated by federal ministries that are not properly communicated to the regional/local levels of public administration, as well to industry players and final users.
- Successful bioenergy policies always require **strong elements of regionalisation**, ensuring the effective connection between (centralised, national) political and (decentralised, local) market players. In this process regional energy agencies and/or other authorities play a key role as intermediaries and or **"local champions" of national policies**.
- There **many examples of effective consultation of stakeholders** in policy processes, such as platforms, monitoring groups (observatories), committees (councils), etc.
- Due to **modern means of communication** (e.g. .websites), the effective information of target groups and dissemination of contents is not a major problem any more.

4.5 Quality standards & qualification of key actors (PERFORMANCE CRITERION 3.5)

Winners of "Bioheat-plumber of the year" award receive their prize from the Austrian Minister for Environment.

Source: Austrian Biomass Association

EXPLANATION OF PERFORMANCE CRITERION

This issue was assessed by means of the following **research questions**:

- Are there **national codes & standards** defined to ensure the **quality of bioenergy products, installations and professionals**? How effectively are these standards ensured in practice?
- Are there effective **training/qualification schemes** for relevant professionals (e.g. installers) in place?

BENCHMARK DEFINITION: AUSTRIA

Austria is an exemplary case for ensuring a high quality level of bioenergy installations, by means of **technical standards and qualification measures for professionals**. These are also enforced by an overall **"quality culture"** on the demand side of the market, meaning that most final users actively seek certified products and suppliers that meet certain minimum standards.

Biomass boilers sold in Austria have to comply with targeted technical and/or environmental norms (e.g. regarding emissions). The same applies to all biogenic fuels (log wood, pellets, straw, miscanthus pellets & logs). There are also established **standards for the installation of bioenergy plants.** Biomass heating system installers need to be certified. Certificates are issued very formally by the Environmental Ministry in order to motivate the professionals further. Austria was the first country which introduced strict quality standards for wood pellets. First quality standards for "other renewables" were issued recently (like for miscanthus pellets, straw pellets, etc.).

For biomass district heating systems and cogeneration plants the planning **quality is also ensured by the subsidy programmes.** Grants given by "klima:aktiv" for heating systems are linked to quality criteria, the regional subsidy agencies in charge of programme management thereby take over quality control and assurance functions. These standards already refer to **performance monitoring requirements** of plants, but also the professional quality of installer and hardware supplier.

Also in the framework of the „klima:aktiv" programme a **large variety of trainings** for professionals are offered. This training programme for instance includes courses on wood-based heating systems. In addition, **educational programmes** for planner, installers and chimney-sweepers are offered by the Austrian biomass association, and of course single companies.

The main Austrian subsidy sources "Wohnbauförderung der Länder" (provincial housing subsidy systems) and "Umweltförderung im Inland" are starting to **monitor the performance of subsidised renewable appliances** to ensure both, efficient use of public money and of the appliances (e.g. www.energiebuchhaltung.at and the new subsidy program of UFI which will be implemented at the beginning of 2009).

GAP ANALYSIS: DIFFERENCES BETWEEN AUSTRIA AND OTHER COUNTRIES

- Overall **no major differences in terms of quality standards** imposed on the national bioenergy sector were identified. All lay emphasis on the fact that ensuring quality of installations is an important pre-requisite to leading the biomass markets from early growth stage to maturity.
- In many countries minimum **technical standards existing on EU or international level** (e.g. EN, IEC norms) are simply **applied nationally**. Only in few questions national authorities have defined even more demanding standards.
- Most countries have **training and certification schemes** for professionals that are mostly organised by the industry itself or independent private organisations. The state or public educational institutions (like universities or professional academies) are usually not involved in launching such initiatives – bioenergy installations are not yet part of conventional professional education programmes.
- Only few countries are actively promoting the installation of **new qualification regimes**, as for example Finland which has build up in recent years a qualification program for heat entrepreneurs.

5. BIOENERGY POLICY MONITORING (ASSESSMENT AREA 4)

5.1 Effective approach to market monitoring
(PERFORMANCE CRITERION 4.1)

EXPLANATION OF PERFORMANCE CRITERION

This issue was assessed by means of the following **research questions:**

- Is there a **clear approach** (appropriate processes, responsible actors, sufficient budgets, etc.) to **monitor the development of national bioenergy markets** (installation figures, energy production, etc.) **and/or industries** (employment, investments, etc.)?
- What is the **quality of available market & industry data** in terms of completeness, reliability and timeliness? Are data gathered in line with EU (Eurostat) requirements?

BENCHMARK DEFINITION: THE NETHERLANDS

In terms of effective market monitoring, the Netherlands were selected as a benchmark case.

SenterNovem has developed an **instructional guideline for the calculation and monitoring of renewable energy markets** in the Netherlands. The actual monitoring using this 'monitoring protocol' is done by the Federal Bureau of Statistics and by KEMA (a commercial enterprise, specialising in business and technical consultancy, inspections and measurements, testing and certification in the energy sector).

The development of **national bioenergy markets and impacts are also systematically monitored** in the publications 'Status bioenergy in the Netherlands' and monitoring of permit grants. This information encloses installation figures, energy production, CO_2 reduction, investments etc. Parts of the figures are provided by SenterNovem, part by another partner: CertiQ. CertiQ carried out the MEP support scheme (as a predecessor of the SDE support scheme) and SenterNovem carries out the new SDE support scheme. The production of RE is ensured in the figures of the green certificates gathered by the national regulating body CertiQ. Also interviews are held with the producers for the monitoring and implementation part. This is certainly of high quality.

The monitoring data gathered is in the Netherlands are not in line with Eurostat requirements, because the **country uses its own standard**. However, the Netherlands use the substitute method for calculations and Eurostat uses the input method to retrieve their own data. As a result, Eurostat-compatible data are also available.

GAP ANALYSIS: DIFFERENCES BETWEEN THE NETHERLANDS AND OTHER COUNTRIES

- Although good monitoring practice exists for certain market areas, a **comprehensive approach to bioenergy market and industry monitoring is missing** in most countries. It therefore is very difficult to find reliable and accurate market figures at all.

- The **measures applied** for data collection, evaluation and dissemination **are very disparate** from country to country, as well as from biomass sector to sector. For example, the biodegradable part of waste is particularly heterogeneous.
- Among many key actors, there still is a **lack of knowledge and awareness for the relevance of monitoring**.
- To establish a sufficiently valid market monitoring system is often considered to be a **very difficult and complex task** whose costs exceed the benefits.
- Often monitoring is based on **one-off efforts** (e.g. surveys) rather than a long-term, self-sustainable system.
- A crucial factor for monitoring systems is the **motivation of all contributors** (e.g. collecting & delivering accurate data).
- Monitoring findings/**data are often inaccurate**. Cross-checking reliability and validity of data is often neglected.
- An obligatory **national register for bio electricity and CHP installations** delivers the most accurate and sound data basis for monitoring systems.
- Effective market monitoring requires an **continuous improvement** of methods applied and data gathered. Therefore monitoring systems should somehow be linked to a quality management approach.

5.2 Effective approach to policy performance measurement (PERFORMANCE CRITERION 4.2)

EXPLANATION OF PERFORMANCE CRITERION:
This issue was assessed by means of the following **research questions**:
- Is there a **clear approach** (appropriate processes, responsible actors, sufficient budgets, etc.) **to monitor the impact of national bioenergy policies** (achievement of targets, budget control, impact assessment, etc.)?
- Are there **clear indicators** defined to measure these impacts/policy performance?
- Is the national policy monitoring based on **sound data & statistics**? Are statistical formats, calculation & reporting methods applied in line with EU (Eurostat) requirements?
- How are results from impact assessment fed back into the policy-making process? How are they communicated to relevant stakeholders and in public?

BENCHMARK DEFINITION: FRANCE
At national level, **monitoring of the bioenergy policy is clearly ensured.** Collected data do not include the total of public funding allocated to bioenergy. For example, to national and regional funds, Federal and "Department" funds should be added but data will not be collected at national level.
There are **clear indicators defined** to measure these impacts / policy performance. **National data used are more precise than those collected by Eurostat.** These national data give sectorial use and technical information.
Results are used to adapt funding schemes and procedures to the results of previous intervention at both national and regional levels. All data collected by ADEME are published, but specific data on bioenergy are not separately collected or edited and this will not contribute to the identification of a clear national BAP for the public and for stakeholders.
In the framework of the Grenelle process the **following measures** are scheduled:
- thematic and **monitoring steering committee** will be implemented with relevant stakeholders to follow the achievement of the objectives and propose new orientations and measures for the bioenergy policies framework;
- implementation of **regional concertations** with relevant stakeholders;
- implementation of **regional observatories** to monitor the energy and GHG;
- assessment and **monitoring of biomass availability** at the national level.

GAP ANALYSIS: DIFFERENCES BETWEEN FRANCE AND OTHER COUNTRIES
- **Bioenergy policy performance monitoring interprets data from market and industry monitoring** in order to assess the chosen political measures. In order to review whether political targets are actually achieved, professional **market monitoring is therefore an essential pre-requisite**. The lack of transparent market information makes impartial political decision-making extremely difficult.
- **Politicians are often afraid of losing control** of developments if no budget limits of review dates are fixed in the underlying legislation. If there are no effective control mechanism are in place, it is hard to convince them of a strong and/or long-term commitment. Policy monitoring therefore is **compulsory for ambitious policies**.
- Only a **few countries have actually implemented a continuous and transparent approach** to bioenergy policy evaluation so far. Most measures applied in these countries are linked to the monitoring of a specific national support scheme (e.g. feed-in-system and/or subsidy scheme). As a result, policy monitoring often stops as soon as these programmes expire.
- In the majority of countries there is **no consistent approach to monitoring** the performance of single policy measures or the entire policy framework at all. The measures applied by policy makers in these countries are generally not guided by a transparent overall methodology, and the data basis used is generally insufficient in terms of depth and quality.

5.3 Effective approach to sustainability guarantee (PERFORMANCE CRITERION 4.2)

EXPLANATION OF PERFORMANCE CRITERION
This issue was assessed by means of the following **research questions:**
- Is there a **clear approach** (appropriate processes, responsible actors, sufficient budgets, etc.) **to monitor the sustainability of national policies** in place?
- Is there a **certification scheme** to guarantee sustainability?
- Is there a **system of guarantees of origin** (GoO) for bio electricity, heat & cooling already in place? Are there competent bodies & registers for these GoO, as well as procedures for their application, transfer, cancellation, etc. in place?
- Are there **legal consequences in case of disobedience** of requirements?

BENCHMARK DEFINITION: BELGIUM
Belgium was selected as a benchmark case for a sustainability guarantee approach, although it only works for countries with a green certificate system in place.
In Belgium a **certification scheme with a quality mark** was to develop to ensure that the growing demand for biomass resources originating from agriculture and forestry is managed in a sustainable way. Therefore, on behalf of the utility Electrabel, the institutions Laborelec and SGS have put in place a **certification procedure applied to each biomass production unit**. This procedure requires at least:
- the evaluation of the overall energy balance for the supply of each biomass feedstock including needed fossil energy for making the biomass suitable (drying, pelletising, etc.) and transporting it up to the power plant: please note that in the case of by-products (i.e. residues), the evaluation of supply chain energy use starts only from the point where the by-products is created;
- the full traceability of the resources that were used for manufacturing the biomass and the evidence that those resources are managed in a sustained way.

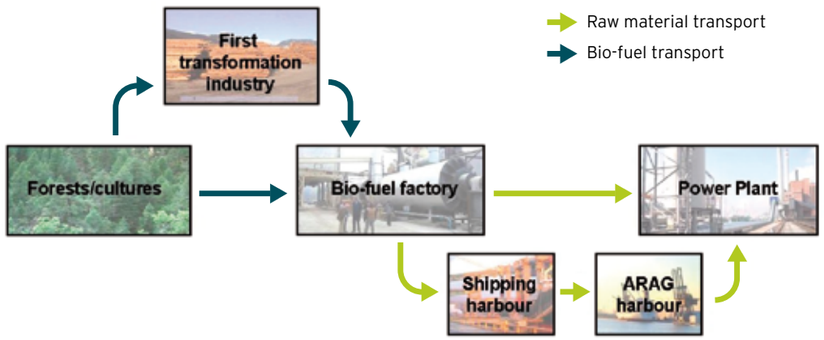
The certification procedure relies on **some key players** delivering 4 documents that can be sent under electronic form to the SPOC's:
1. The biomass producer is requested to fill in a Supplier Declaration Form (SDF) about the origin of the raw material and the energy consumption related to production and local transport.
2. The sea or fluvial transport company has to fill in a Transport Declaration Form (TDF) on the long distance transportation data.
3. SGS Belgium makes an overview of the energy use in the Energy Balance Form (EBF).
4. An independent inspection body verifies on site the SDF and prepares an Audit Inspection Report (AIR) based on a site visit as described in Inspection Procedure Form (IPR).

The certification procedure focuses on a **traceable management system** from the green power plant firing the biomass (by-)product back to the sustainable resource in the region of origin, where the biomass is gathered and made suitable for firing it in the power plant as a biomass. The certification scheme addresses the feedstock and takes not into account the efficiency or sustainability of the actual energetic valorisation of the feedstock in the power plant.

The following **critical points** by biomass experts on the scheme should be pointed out as well:
- The scheme is adopted by a large utility company to justify the use of low energy coal plants.
- This system only works for big companies.
- If import material can be treated as a whole and smaller plants may have a share it may be not so expensive after all.
- Efficiency or used technology must be added to the scheme.
- It is not needed for national biomass, only for imports
- A level playing field with fossil fuels has to be ensured.
- It is still an open question if the system is mandatory or voluntary.
- It would be a good idea to relate the criteria of this system to the existing foresty schemes.

GAP ANALYSIS: DIFFERENCES BETWEEN BELGIUM AND OTHER COUNTRIES
- In most country there are **no certification schemes** to monitor bioenergy market developments according to sustainability criteria installed whatsoever. The sustainability issue has only recently started to be discussed more intensely in the political scene.
- Some countries have a **system of guarantees of origin for green power producers**, others are planning to implement it in line with EU requirements.
- Some countries have **certification schemes installed in conventional sectors**, such as forest protection frameworks. These systems monitor the conservation of resources, as well as environmental impacts (e.g. GHG emissions, bio diversity).
- Key actors in many countries are fairly **suspicious to the introduction of sustainability monitoring schemes** because they fear the high administrative barriers to free market development. Some countries **currently hesitate to introduce new schemes** in attendance of new requirements that will be defined in the new EU renewables directive.

The supply chain of biomass used for power production can be illustrated by the next scheme:



D European Best Practice Analysis – transnational conclusions for all EU member states

1. EUROPEAN BIOMASS POLICIES – OVERALL LESSONS LEARNED

Overall conclusions that are valid across all specific assessment areas of the best practice analysis can be summarised as follows:

- **Data** used for assessing national biomass resources, defining bioenergy strategies and implementation of bioenergy policies must be better **harmonised** between different policy fields (e.g. agriculture, energy and environment), but also on EU level in order to have a sound basis for political decisions. Also certification schemes (for recognition of sustainability) and – to a certain extent - permitting procedures must be **harmonised EU-wide**, rather than creating singular systems in each single market. So far usually bioenergy policies have been developed concurrently on **national and EU levels**. There appears to have been limited interaction between the two policy processes in many countries.
- Each country needs strong long-term economic incentives in place for the different markets (heat, electricity and fuels). For market actors even more important than sufficient attractiveness of support schemes for bioenergy investments is the **security/reliability of framework conditions** over a medium/longer term.
- The **policy framework** should be designed to give renewable energies a basic chance to expand on their own and increasingly become competitive and independent from public support. If the policy framework thus manages **to create a playground for fair competition** between technologies, specific local market conditions will decide which ones are used best for different applications and segments.
- Most countries with strong bioenergy deployment are characterised by a strong **support by both policy-makers and the general public**. Broad acceptance is the prerequisite for ensuring the **integration of sustainability principles** in developing policies and support programmes. Countries should therefore strive to achieve active cooperation and mutual supportiveness between different stakeholders (government institutions, companies and consumers).
- **National BAP task forces** or steering committees require a clear status and mandate to create an impact in policy making process. Sometimes even the formation / selection process of these groups is unclear. The government must accept a leading role in the national BAP process and not leave it to expert groups "without teeth". This is a particular challenge in bioenergy policies due to its multiple aspects and spread of responsibilities between the different authorities in charge of energy, agriculture or environment. This diversity makes it especially difficult to come to a concerted policy approach.
- Usually successful **biomass policies in single sectors leverage the development in others** as well, both on the political and the market level. Some policy measures (e.g. tax incentives) are working well in all sectors.

2. BIOMASS RESOURCE ASSESSMENT (ASSESSMENT AREA 1)

2.1 Key issues

- Most experts stress the priority of using and mobilising domestic resources in comparison to biomass imports. Due to their low energy density, if possible **biomass resources should not "travel"** over long distances but be used where they are produced. The distribution network of biomass must be adapted to this need and not the other way around. However, concentrated biomass might travel like biofuels and pellets, like in the future maybe pyrolysis oil, etc.
- However, for many countries the **import of biomass** is necessary to reach the EU targets. An important challenge for them is to ensure the sustainable character of imported biomass streams without restricting and burdening the sector too much with regulations. Certain countries like the Netherlands heavily depend on imports since they have little availability of biomass resources themselves. In these cases, when taking into account the whole chain production import could be more efficient than using local resources.
- The EU policies for bioenergy promotion (as proclaimed by the EC) are often applicable in Central, Northern and Eastern regions where geographical and climatic conditions are usually favourable for biomass potential exploitation. **Biomass policy for Southern or Mediterranean regions** (including islands) should be carefully adapted in order to respect very different local conditions, and remove specific technical and non technical barriers. In **Mediterranean countries** like Greece the geographical and climatic conditions avoid the existence of rich potential, especially in forest biomass and extensive development of energy agriculture. In addition, in these countries often the agricultural sector suffers from structural weaknesses and poor international competitiveness. Due to more favourable natural conditions, other renewables like wind, solar or small hydro, rank higher on the political agenda than biomass, which may sometimes lead to certain "cannibalism" between technologies in terms of political priorities. Southern European countries and islands must count more on imports, but nevertheless they need a nBAP as well, usually with lower bioenergy targets and different policies than Northern European countries.

2.2 Key success factors

- All countries depend on **detailed and reliable statistics** on their domestic biomass resources, which do not only comprise traditional sectors like forestry and agriculture, but also others like biogenic waste and by-products. This assessment requires a **sophisticated approach** that integrates existing inventories and expert studies, as well as technical and economic assessment of resources.
- No doubt that the **volatile prices of fossil fuels** remain the principal driver of bio energies, more powerful than any single promotional scheme.
- Obviously **natural conditions** (esp. availability of abundant biomass resources) and a strong historic **tradition in bioenergy use** (e.g. dominant forest/wood-processing industries) are a major driving force, independently from political support measures. Countries that decided for an early engagement in certain biomass sectors (e.g. promotion of district heating systems for buildings for environmental reasons to improve the air quality in the cities) are now harvesting pioneer advantages.
- This also stresses the high **benefits of sharing experiences and knowledge between different countries** across Europe in this field.
- In the long run, the **optimisation of biological production** beyond the European targets of 2020 is necessary (forest production, seaweed, etc.).

2.3 Key risk factors

- So far most national bioenergy strategies and/or single support schemes do not take into account any **sustainability criteria** on biomass production and use. Environmental, economic and social impacts as well as ecological and energetic balances are not sufficiently assessed. This ignorance may entail negative effects, for instance the rejection of bioenergy by the public (due to dust emission from wood boilers, rising food prices by liquid biofuels production, etc.). Exceptions are a few countries like the Netherlands that have various platforms working on sustainability certification.
- The **variable equilibrium between offer and demand of food products** and resulting variation of prices has an impact on the interest of farmers to invest or not in biomass production for energy uses. However, overall there are enough biomass resources to produce sufficient amounts of both food and non-food products alike, so it should be demonstrated that bioenergy offers more opportunities than threats to European farmers.
- Many **market actors are very critical** about the application of sustainability criteria as intended by the EU. A lack of acceptance and involvement may limit the actual effectiveness of certification schemes.
- If **warm climatic conditions** lead to low heat demand profile, this discourages the development of bio heat applications and policies. In these countries, policies could only be more effective if cooling technologies were introduced. Despite good opportunities offered by the supporting tools, small CHP applications using agricultural and wood products (i.e. olive oil production chain, wood and agro-industry) have not been developed as expected. Specific policies are required in order to promote such applications in markets with limited heat markets. CHP units using biogas from livestock have not been developed in many countries yet.
- **Cross-country effects** (both from imports and exports of biomass resources) are hardly considered in national assessment approaches. A concentration on the use and mobilisation of domestic resources only may turn out as very short-sighted in a global market environment.

3. BIOENERGY STRATEGY & BIOMASS ACTION PLAN FORMULATION (ASSESSMENT AREA 2)

3.1 Key issues

- The definition of a **fully integrated bioenergy strategy**, balancing all relevant areas, is extremely challenging. It is only feasible by a strong political push from the highest governmental level and must be rank high on the political agenda.
- More than in any other sectors, **bioenergy policies must be carried out at local levels**, so that an effective **regionalisation of policy processes** is important. A pure top down approach initiated by federal government does not achieve the necessary levels of acceptance and implementation locally.
- **Sustainability issues and related certification schemes** are usually very complex to define and implement. It is also difficult to come to an agreement between the various stakeholders involved. Due to the large impact on the public support for biomass it is of vital importance to get to an adequate and viable **testing framework** for plants and/or producers, which applies clear sustainability criteria.

3.2 Key success factors

- A very strong plus of successful policy frameworks is a strong and **reliable commitment** of governments to the promotion of renewable and bioenergy. This commitment must be manifested in ambitious long-term targets and programmes that are well communicated to relevant target groups. Only after a **longer stable period of support policy**, a high impact in terms of development of a critical mass of biomass installations will be noticed.
- National **biomass targets** have to be defined according to the SMART (Specific, Measurable, Acceptable, Realistic, Timeframe) principle to be effective. Targets also have to be consistent with EU directives and Eurostat. A connection between separate targets for the 3 biomass sectors (electricity, heat, fuels), eventually even subsectors, must be ensured.
- An effective **integration of stakeholders in policy processes** is a key success factor. Therefore national bioenergy strategies must be **better integrated** between **different policy sectors**, but especially along the different steps of the supply chain (links between resource production, conversion, supply and use).
- A well-defined **cooperation framework between administrative levels on federal and regional levels** seems beneficial. This framework should align efforts for bioenergy promotion and regulate technical and financial issues related to them.
- It is important to enable the development of **professional supply infrastructures** on local levels, because they are the "transmission belt" for any successful policy measure. These infrastructures concern the local organisation for biomass production and supply. Especially required are engineering capabilities in sufficient number, networks of skilled installers as well as **quality standards** reassuring investors.
- The bioenergy sector is still in an early stage of market development, although the technologies and applications are already proven for a long time. Apart from short-term oriented measures for market stimulation, policy makers must not neglect the importance of **research policies** supporting the development of more efficient technologies, for instance biofuels with better CO_2 and

energy balances and the more efficient conversion of biomass to electricity (gasification, pyrolysis, etc.).
- In various countries pending **reforms of agricultural policies** may push biomass use by creating new public awareness, spreading good practices and ensuring a more favourable environment for bioenergy investments. In the same way, new **environmental policies and regulations** may promote specific types of applications (biogas, olive mill wastes etc), provided that they are harmonised with energy policy & planning.
- Main driver for a major attention to bioenergy for electricity, transport fuels, and to a lesser extent **heat, are changes of the domestic energy agenda of states**. Many countries that have widely neglected renewables in the past, now show an increasing activity in bioenergy promotion, for instance by means of consultation processes, resource assessments and feasibility studies. **Also sustainability** is increasingly becoming an integral to the energy policy debate.

3.3 Key risk factors

- It is a problem if countries do not adopt **targets with specific numerical goals**. In **absence of a quantifiable target(s)** for bio-energy, and left to pursue its own policy path, countries could run the risk entering an endless cycle of consultations, strategies, and action plans. All of which fail to commit resources or make the causal linkages between desired outcomes, the means by which they may be achieved, and the costs and benefits that they entail.
- A major barrier to market & industry development is the **lack of a coherent national strategy**. The lack of coherence is typically enforced if responsibilities for bioenergy are spread over between several ministries. It is recommendable to achieve a **country-wide consensus** on national bioenergy targets between the different actors and political levels. On the other hand, such a process is complex to organise without slowing progress, so process efficiency must be taken into account as well.
- **Unstable market conditions**, for instance manifested by a lack of unity among political parties on bioenergy strategies, or legal uncertainties in support schemes.
- The **sudden change of policies**, e.g. by correcting targets or changing support schemes, may obviously have a very negative impact on the market. Discontinuing of subsidies for new projects results in distrust of market parties.
- Often **fair competition between the fossil and renewable energies** is still not ensured, since market prices do not take into account externalities. This divergence may be regulated by means of eco taxes, from which biofuels are exempt and by imposing on fossil fuels and nuclear energy their full cost (long-term environmental costs, security cost) according to the Polluter Pays Principle
- **Call of tenders** for electricity production plants from biomass have often not proven successful, especially if massive amounts of biomass has to travel from a region to another to produce electricity. A **top-down approach** of electricity production (centralised planning by public authorities) rather than a constructive bottom up approach (driven by private entities) to develop projects that take into account local context in term of environmental, economic and social aspects is not recommendable in most cases.
- Bioenergy 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, although it entails higher insecurity for investors.
- In most countries no sufficient **support systems for renewable heating and cooling** is set up yet, therefore this sector is often lagging behind others (electricity, CHP, fuels) in growth. This is recommendable to keep the equilibrium between the three main biomass sectors.
- In many countries the proclaimed **phasing out of nuclear energy** is vague. Political statements are made and withdrawn again. This sometimes creates an uncertain climate for investments in bio-energy. However, in many countries no link between nuclear and bioenergy policy whatsoever is noticed.

4. BIOENERGY POLICY IMPLEMENTATION (ASSESSMENT AREA 3)

4.1 Key issues

- The **close involvement of key actors** is important in bioenergy, where usually a wide network of players is involved in the supply chain. Especially "critical" groups, such as agricultural associations, agro-food industry, farmers or livestock units owners need to be inside the information and planning cycles for planning and implementation of policies. The **importance of good information** cannot be stressed enough – it is required to get people to take the right decisions.
- The impact of national biomass action plan (BAP) processes depends on the effective **involvement of all major stakeholders** (government, energy and waste companies, banks and environmental organisations), for instance in the form of a BAP steering committee with and task groups. Such structures foster the sharing of information and common understanding between partial interest groups.
- Reliable and **consistent government policy**, supported by **government incentives** and financial measures that ensure **long term security for investors** have been the principal driver of bioenergy use in most countries.
- Often national bioenergy markets have a history of various **subsequent development steps**. In recent times growth is noted in several sectors: 1. CHP in district heating – producing bio-electricity and heat at the same time which gives a very efficient use of the raw material. 2. Bio-electricity production in the forest industry using biomass (mainly black liquor and other by-products). 3. Pellets use for heating of single homes and for other buildings. 4. Production, imports and use of biofuels in the transport sector.
- Ultimately, it is the **implementation of policy**, and its ability to stimulate investments that will determine the role bio-energy plays in the future energy system. Greater consideration of implementation at the same time as policy deliberation and formation is therefore an important area for improvement.
- And last but certainly not least, it is important "to walk what you talk". Government and state institutions often do not really care of following up announcement by realities.

4.2 Key success factors

- **Large-scale industrial installations** (e.g. large biomass fuelled CHP plants and/or district heating networks) require a completely different policy approach than the promotion of many **small, decentralised plants** (e.g. wood pellet boilers). The latter especially require strong regional promotion. Often the existence of an established large scale industry provides a well working infrastructure which may then result in a successful development of a small scale industry as well. Unfortunately in many countries the **support of the small scale, local industry** is not that well done like for large-scale industry at the moment.
- Policies are successful if they are based on joint willingness of relevant local actors to develop **simultaneously support schemes for production and use** of biomass. These programmes may lead to high synergies and multiple effects such as high installation figures and intense creation of enterprises.
- **Green certificate systems** may have a considerable impact on national market development if they are sufficiently stable and ensure a minimum profitability for investors.
- **Investment support schemes and fiscal incentives** can be especially effective to trigger a market in an embryonic stage of development.
- Next to public support schemes, **private financing mechanisms** can be an important leverage for wider spread market growth. Examples are different contracting and/or ESCO (energy service companies) models where a professional contractor on behalf of the end user takes over all steps of project management, from initial planning via financing to installation and operation of the plant (including ongoing fuel supply). The user only pays for the energy supplied by the contractor. These financing models are certainly a good way to make bioenergy available for almost every one. They are especially viable for medium to large scale installations > 1 MW (e.g. heating/CHP system for bigger estates using wood chips or pellets).
- **Investment subsidy programmes** are often not sufficiently budgeted, so that their impact in terms of installations is limited right from the outset. However, they are generally a useful instrument to trigger a small market in an early development stage.
- In countries widely characterised by rural areas with structural problems, bioenergy policies may be effectively leveraged by general **cohesion policies & financing tools** in place on both national and EU level. The existing cohesion funds can be a strong asset for future biomass development, since there existence is ensured in the long run.
- Investment subsidies should usually provide **well-balanced support** for investments in biomass mobilisation, use (installations) and supply chains (infrastructures) alike.
- National budgets for bioenergy promotion must be well **regionalised**, in order to promoting energy applications in agricultural and rural areas. This regionalisation is no major issue in small countries though where processes may well be organised on the federal level.
- The high volatility **prices of fossil fuels** (oil, gas, coal, etc.) products may stimulate both consumers and industry actors to risk the use of new technologies including biomass. Especially bio heat technologies will finally become more and more financially attractive as oil prices rise. Increasing energy prices are also expected to stimulate interest at the local level.
- Very important are measures for **awareness creation and education** among all stakeholders, aligned to adequate (financial and administrative) support measures.
- Successfully executed **biomass references (demonstration projects)** especially in the public sector are very important to show people how it can be done and how it can pay off. Bioenergy is more complex than other renewables like wind and solar. Communicating the benefits is a major challenge.

4.3 Key risk factors

- The complexity and **inadequate funding** of support schemes might build barriers for implementation.
- The **high initial investment cost** of bioenergy plants and the increasing **opportunity cost of land** are a major barrier. The likely result is the reduced capacities of potential investors. **Too high cost of renewable energies** can inhibit their deployment completely.
- Also long **and costly administrative procedures** for licensing are a major market barrier. Especially for small-scale installations the common procedures **for energy and/or industrial** installations must be streamlined (more transparency, shorter **lead times, less formal** hassle for small plants, non-discriminatory cost, etc.). This often also applies for subsidy schemes, which in many countries are organised in a too bureaucratic way.
- Long and costly **grid access** is another severe market barrier. A clear legal framework accelerates the access procedures significantly. The costs of necessary grid expansions should not be carried by the plant operator alone. In some countries like Germany a clear legal framework has solved the grid access issue in a fully satisfactory way.
- **Negative promotion** has much greater impact than positive one. As a result, promotional measures for bioenergy should be very carefully planned. Only sound information should be made public to avoid **negative public perception**, for instance in the context of "food vs. fuel" and land use change debates.
- Promotion has no positive impact if it is leveraged by existing regulations and control measures, and if relevant partial interests give their support. If not all stakeholders and actors are involved in the starting phases of a project this may cause grave implementation problems.
- In **densely populated regions** the general public has often reservations about several types of bioenergy projects in their neighbourhood. The NIMBY (not in my back yard) syndrome is a problem a lot of new installations have to deal with. Sometimes projects even have to be stopped because of opposition actions taken by local action committees. Awareness rising and better communication with the local public is an important action point to the future on different levels.
- Another barrier is **inappropriately high permitting/licensing requirements** before a project can start. Different authorities from different levels (municipal, district, regional, federal) and different legislative fields (energy, environment, waste, land-use, etc.) are involved in this process. A further streamlining and transparency of these procedures is important for the renewable energy sector. This is especially true in two issues: how to follow the philosophy of the "Ladder of Lansink" for biomass waste streams (also in relation with the imported biomass streams and energy crops) and how to streamline the different emission levels for bio-energy installations.
- If policies are not properly **regionalised**, projects may become "hostage" of the local politics, which may result in poor acceptance among local people and bad **publicity**. Bad practice is also unbalanced media reporting in terms of "the only good news is bad news". Almost all bad experience suffered from publicity both on TV and print media, on the other hand only few good examples are made public, not to mention disseminating positive information on the use of biomass in general.
- Bioenergy markets may suffer if politicians try to regulate and support too many aspects in detail. For instance, this may lead to **"stop-and-go-effects"** that are always harmful to the industry. Regularly the budgets reserved

for investment subsidies are too small. In addition, these programmes are mostly characterised by **"stop & go" effects**. Other forms of subsidies than such budget-linked programmes may be more effective, for instance feed-in-tariff systems (which however are no effective support scheme for the bio heat market).

- **"Oversubsidisation"** by means of too attractive schemes may trigger a short period of a "bull run" which causes an immature industry problem supplying the demand. After this period, in which many investors may already be discouraged, the public budgets may run out and the market collapse. Many producers are suddenly unable to sell their equipment and pay off their investments. As a result, it is better to rely on long-term economic incentives and let the market handle the supply, instead of introducing lots of different detailed subsidies.
- Policies should avoid **subsidising inefficient technologies**, for instance bio electricity production where the excess heat is not used for district heating or other purposes. Unprofitable bioenergy solutions can be the result of subsidies that make these kinds of investments possible. At the end of the day, all technologies must be based on clear economics, besides being environmentally sound.
- Some industry actors see a big risk that too **stringent certification rules and sustainability criteria** will hamper development of fledgling bioenergy industries. According to them, it is impossible to give "total guarantees" on all the different kinds of concerns expressed in the public debate. They believe it is better to let the industry develop and undertake parallel environmental studies and analyse development on the market. However, the risk of this strategy is that it caused bad publicity in some cases resulting in a lack of public support.
- **Liberal, market-driven policy frameworks** like in the UK tend to support only some low cost "technology winners", while others are simply not competitive enough. The policy measures proposed are developed from a starting position, that significant additional funding could not be justified, and as a result, the measures proposed are dominated by low cost and no cost measures. The disadvantage in this approach is that, whilst a range of policy instruments are in place to support bioenergy, there is no quantifiable relationship between the measures that exist and the outcomes that they are expected to achieve. It is therefore impossible to say whether the current mechanisms are sufficient or need to be extended.
- Making the case for **bioenergy specific policy measures** or for ring fenced funding is sometimes difficult. In many countries bioenergy is but one part of the renewable energy agenda, which in turn is a small component of energy policy. The argument that carbon savings should be achieved so as to minimise the cost to the tax payer is also laudable. Nevertheless, the absence of technology specific targets means that policy development for bioenergy is effectively constricted to pursuing least cost and incremental options.

5. BIOMASS ENERGY POLICY MONITORING (ASSESSMENT AREA 4)

5.1 Key issues

- In most countries there is **no clear monitoring approach** for all types of support programmes. Monitoring should be based on a consistent, balanced and long-term approach instead of single one-time measures. It should therefore
  - comprise constant market, industry, system and policy monitoring
  - address all relevant groups involved in the political decision-making process alike
  - balance expected benefits and costs
  - make use of existing data sources to minimize costs
  - provide additional market related information (e.g. employment numbers, macro-economic costs, impact on grid infrastructure, environmental impact etc.)
- Setting up a national monitoring system should be in accordance with the minimum requirements of a possible European-wide monitoring. In addition, data harmonisation and possible synergies with the data collection activities such as Eurostat should be ensured.
- Also **monitoring the results of programmes** is a very important tool to monitor the effectiveness of the bioenergy promotion. In most cases, not enough attention is given to policy monitoring by now.
- Monitoring systems should be based on a research design that precisely defines
  - Target groups
  - Key data
  - Data collection methods and sources
  - Incentives for data sources to deliver data
  - Data management and interpretation
  - Costs and benefits
- Feed-in-tariff or quota systems should be complemented by a **national plant register** in which all grid-connected installations (installed capacity, electricity produced, tariffs received) are captured. Data should directly be fed into a central database. Both plant and grid operators should be obliged to deliver data for the register. Data communication should be simple, if possible by means of an online interface.

5.2 Key success factors

- Very useful for market development is the **effective monitoring** (and structuring) of relevant information and knowledge, as well as the exchange about best practices between stakeholders.
- Ambitious policies require a **sound & accurate information basis**, so a comprehensive market monitoring system is crucial. Rather than a patchwork of one-off measures a **well-structured, long-term approach** should be defined.
- In few countries a **system of clear indicators** has been set up which offers a solid base for monitoring the realisation of policies and consequently enables wide discussions on the realisation of targets or necessary changes.

5.3 Key risk factors

- A risk factors is the **complexity** of effective monitoring. High-flying concepts may not work in practice if not properly supported and implemented by key actors, also on regional / local level.
- It is very difficult to achieve commitment from all stakeholders on the definition and control of **sustainability criteria**, and the definition of corresponding monitoring systems. As a result, the aim of the EU directive is widely not ensured that nBAP monitoring will bring sufficient info for reporting to the EC.
- Many monitoring activities do not measure the **impact of biomass policies on job creation, land use, CO_2 reduction, etc**. This is an additional area to be covered by nBAP.

Towards national Biomass Action Plans

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