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Country Studies on Political Framework and Availability of Biomass

Synthesis Report

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Author: Sybille Tempel (FFU)

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Author:
Environmental Policy Research Centre
Freie Universität Berlin
Sybille Tempel, M.A.
D-14195 Berlin

www.fu-berlin.de/ffu

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Introduction

According to the specifications of the European Commission for the Central Europe Programme INTERREG IVB, the Central European Region comprises eight countries respectively parts of these countries: Austria, Czech Republic, the southern and eastern parts of Germany (Federal States Baden-Württemberg, Bavaria, Berlin, Brandenburg, Mecklenburg-Vorpommern, Saxony, Saxony-Anhalt, Thuringia), Hungary, the western and northern regions of Italy (Emilia-Romagna, Friuli-Venezia-Giulia, Liguria, Lombardia, Piemonte, Provincia Autonoma Bolzano/Bozen, Provincia Autonoma Trento, Valle D'Aosta/Vallée D'Aoste, Veneto), Poland, Slovak Republic, Slovenia. Projects under this Programme may include additionally the western part of the Non-Member State Ukraine as an associate partner (Chernivtsi, Ivano-Frankivsk, Volyn, Lviv, Zakarpattia, and the capital Kiew). This is the case in the 4Biomass project.

The country studies delivered by the Partner Countries were intended to reveal the biomass potential in each country and the state of its exploitation. Special attention was given to its consideration and weight in the energy and environmental policies. Thus the focus of the inquiry was an investigation of the policy instruments and measures to promote sustainable biomass use with regard to meet the targets set by the European Commission for deployment of renewable energy in the European Union by the year 2020. In all Partner Countries biomass will play a major role to achieve the national targets and thus to secure achieving the overall EU goals.

In Europe 27, bioenergy is currently the most important renewable energy source for heating, cooling and electricity in the medium term. But biomass resources are limited, hence it is inevitable to produce and utilise them in a sustainable way. In addition, this forces all Member States to perceive the urge to use these resources as well as all renewable resources efficiently and to save energy wherever this is possible.

EU Commission has taken account of these needs. Directive 2009/28/EC[1] (RES Directive) requires all Member States to adopt a National Renewable Energy Action Plan (NREAP) describing i.a. national policies to develop existing biomass resources and mobilise new biomass resources for different uses. The measures to be taken to fulfill the indicative national targets as contribution to the EU overall target for 2020 (20 % renewable energy consumed in transport, electricity and heating and cooling, 20 % energy efficiency in final consumption of energy, and 10 % renewable energy in transport; EU Climate and Energy Package 2007; EC Action Plan for Energy Efficiency 2007) shall be defined.

The Directive furthermore set mandatory sustainability standards for biofuels and bioliquids which are to be incorporated in 2010 into Member States' national legislation.

The country studies elaborated by the project partners were directed to inquire which legal, financial and other policy instruments and measures have been established already to expand renewable energies and in particular bioenergy, which potential of biomass is being available in the partner countries at present, and whether there are transnational cooperation structures established and used in the Central European Region.

[1] Directive 2009/28/EC on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC, issued on 05.06.2009.

1 Availability of Biomass Resources

All Partner Countries possess a remarkable potential of biomass resources. Regarded forested land, Slovenia and Austria have the greatest shares, Hungary and Italy the lowest. In Italy, the biomass potential is concentrated only in the North and Abruzzi Regions.

Table 1 Forest and agricultural land in Partner Countries in percent

	AT	CZ	DE	HU	IT	PL	SK	SL
Forest area in %	47	34	33	21	35	30	41	63
Agricultural area in %	44	54	49	63	48	61	50	31

Biomass reserves are not confined to the potential in forests and agriculture, there exist other sources for energy generation as well – yet not all of them are in all countries utilised already:

- Wood from forests, orchards, short rotation coppice, waste wood from wood industry
- Plant products obtained from fields and pastures
- Straw and other remains as waste from agricultural production
- Lop from landscape management (parks, public grounds, roadside green)
- Waste from agricultural and food industries
- Slurry, manure, sewage sludge
- Organic municipal waste
- Organic industrial waste.

Residues from forestry, agriculture and landscape management as well as organic waste can contribute considerably to bioenergy production without any risks of competition to material use of wood or to food and fodder produced in agriculture. The cascading use of raw materials, i.e. 1. material use, 2. food and fodder, 3. energy, guarantees avoidance of these risks. For forestry this means to use logwood exclusively for material use in industry, wood residues may be used in pulp and paper industry and for energy production. A sustainable approach in exploitation of biomass resources secures reliable long-term supply without endangering environmental values.

Thus sustainable forest management formulated in the *EU Forest Strategy*[1] and in several voluntary international forest certification schemes, requires e.g. to leave a certain amount of these residues like deadwood (whole trees, branches, foliage, stumps, roots) in the woods to avoid nutrient depletion of soils and biodiversity losses. The Partner Countries respect EU Forestry Strategy and national and international Forest Certification Schemes like either *Forest Stewardship Council* (FSC) or the *Programme for the Endorsement of Forest Certification (PEFC)*[2].

Sustainable agriculture and farming seeks to avoid the industrialisation of landscapes with monocultures of plants for production of biofuels for transport or biogas. This way of farming causes severe threats to biodiversity, so e.g. losses of species in flora and fauna, depletion of soil and water quality through deployment of high amounts of pesticides and fertilisers, and in the end creates monotonous landscapes. The present development to use former crop area or greenland sheltering a variety of species for large sites of energy

[1] Good Practice Guidance on the Sustainable Mobilisation of Wood in Europe (2010). Ministerial Conference on the Protection of Forests in Europe (MCPFE), Forest Europe; EU COM DG Agriculture and Rural Development; UNECE/FAO, Timber Section.

[2] See paragraph on Certification schemes, p. 7.

plants for biofuels and biogas, presently increasingly observed in several countries (i.a. Germany, Italy), may cause land use change with negative impacts for a long period.

In fact, like in forestry, residues in agriculture offer a good sustainable potential for production of bioenergy, provided that not all remains are removed. A certain amount must be left for birds and small animals. The EU Common Agricultural Policy provides for the Member States some regulation concerning avoidance of these negative impacts but this is mandatory only for farmers receiving financial support from EU Programmes.

With the EU RES Directive 2009 sustainability standards for production and use of biofuels and bioliquids are mandatory for all Member States by January 2011[1]. Recommendations by EU Commission as to develop national sustainability systems for solid and gaseous biomass by Member States set a signal to get active in the near future.

Another highly effective bioenergy source is organic waste from households and industry in all Partner Countries, yet rather rarely used so far. Deploying it for production of biogas in combined heat and power generation processes has several advantages: No competition with food or material uses, landfills can be closed and renaturated or used for other purposes. All Partner Countries assure in their political programmes or strategies to increase the utilisation of biogenous waste for energy production.

Mobilisation of new biomass resources is a future option for all Partner Countries. They all dispose of presently unused areas like degraded, abandoned, fallowed or set aside land. Areas from former military training, industrial sites, mining area, might well used for growing energy plants. But here again, strict sustainability criteria need to be implemented and regularly monitored to achieve a well-balanced utilisation without jeopardising environmental and biodiversity values.

Table 2 Estimated technical biomass potential in Partner Countries

Technical Biomass Potential	AT	CZ	DE	HU	IT	PL	SK	SI
In PJ/a	368.3	299	1.210-1.700	100-190	24-30	926	40	19.6

Which role this potential will play in each of the Partner Countries' future energy supply policy will largely depend on the political will. How extensive and how fast it will be developed and used, and which position it will occupy in the national energy mix will be revealed in the upcooming National Renewable Action Plans (NREAPs) which all Member States are developing at present to be delivered to EU Commission by 30 June, 2010.

2 Policies to Promote Biomass/RES in CE Partner Countries

The studies show that all Partner Countries have developed national overall objectives for energy production and utilisation in general, some of them refer also to renewable energy sources (RES), in some cases objectives for development and deployment of renewable energy have been formulated separately in own documents. The main goals all Partner Countries have in common:

- Security of energy supply by reducing dependence from foreign countries
- Production and utilisation of energy supply in a sustainable and economically sound manner by a competitive domestic economy

[1] See parapgraph on Sustainability criteria, p. 6.

- Increase of both renewable energy sources and rational energy consumption to tackle climate change with saving greenhouse gas emissions.

The majority of EU Member States are forced to restructure their energy sectors still relying to a greater or lesser amount on fossil fuels, primarily hard and brown coal. Gas is imported mainly from Russia, and the Ukrainian-Russian gas conflict in early 2009 had evoked fears of potential shortcomings in the future and thus strengthened endeavours to become self-sufficient with domestic energy sources.

Renewable energies are in all Partner Countries a promising option to reduce on one side the energy dependence from foreign supply and on the other side greenhouse gas emissions, particularly carbon dioxide (CO_2). The latter is necessary to fulfill the relevant international commitments (Rio Convention and Kyoto Protocol i.a.) as well as the *Acquis communautaire* and relevant Directives of the European Union.

Biomass can play an important role in all Partner Countries not only for reason of replacing fossil fuels but also for providing additional working places – in Austria and Germany it has already become a significant economic branch generating considerable employment effects all over the country, as well in Italy, there mainly in the northern and Abruzzi regions. Hungary, Poland, Slovakia and Slovenia have a great potential of biomass but use this only in parts so far, the Czech Republic does not have as much potential available but nevertheless enough to expand exploitation considerably.

It depends on the insight and the political will of each country to which amount the available biomass potential should contribute to overall energy supply, this means, how much importance is attached to it in the national energy/RES strategies and programmes.

2.1 National Strategies and Programmes for Support of RES/Biomass in the Partner Countries

With accession to the European Union, the "new" Central European Member States are bound to implement the specifications issued by the EU Commission to be able to cope with this, they receive financial and other support enabling them to restructure and modernise their energy sectors. Negative social impacts like increasing unemployment rates have to be considered and avoided as far as possible. An advantage in modernising these centralised systems are the well developed and wide-spread district heating systems which, after modernisation, can be used for transport of heat from renewable sources. It is a difficult task for the politicians to steer the reconstruction in the direction of an economically favourable, environmentally friendly, and socially responsible energy mix developing domestic resources and reducing dependence from fossil fuels supplied from foreign countries.

2.1.1 Energy Strategy/Renewable Energy Strategy

Most of the Partner Countries have developed national strategies and programmes in the last years defining the path to a comprehensive sustainable and secure energy supply for their countries. Increase of renewable sources in general and of biomass in particular as well as energy efficiency are important issues of these documents. Only Italy has not yet issued a formal national energy strategy; instead it is relying on the National Energy Plan from 1988, amended many times since, as well as on the *Economic-Financial Programme Document 2007-2013* refering directly to promotion of sustainable use of biomass and biofuels, supporting also national chain development by exploitation of local and regional biomass resources.

2.1.2 Biomass Action Plans

In December 2005, the EU commission presented a biomass Action Plan with the aim to cope with the increasing dependence on imported energy and develop a new energy policy strengthening competitiveness, sustainable development and security of supply.

It is in this wider context of an integrated and coherent energy policy and, in particular, of promoting renewable energy sources that the EU Commission encouraged Member States to establish national biomass action plans (COM(2005)628final).

The Biomass Action Plans were supposed to identify the available biomass reserves, to quantify the biomass share in current demand and to point out the potential for utilisation. Furthermore they should describe the Member States' strategies for promoting bioenergy use in heating and cooling, electricity and transport sectors, and the instruments and measures to implement them.

The aims of the National Biomass Action Plans were to elaborate a holistic concept to significantly increase the bioenergy share in total energy supply while adhering to sustainability criteria, contributing to reduction of greenhouse gases and biodiversity conservation, and furthermore securing employment and value creation, particularly in rural regions.

Several Partner Countries have developed Biomass Action Plans accordingly:

- Austria 2006, updated in the recently issued *Energy Strategy Austria* and refering to Directive 2009/28/EC (RES targets 2020)
- Czech Republic 2009 aiming at achievement of short-term targets and decision making
- Germany 2009 describing policies to double the share of bioenergy and reach the EU 2020 target avoiding conflicts of utilisation of biomass
- Slovakia 2009 for the period until 2013.

The National Renewable Energy Action Plans (NREAPs) required by EU Commission to be finalised by 30 June 2010 will have to contain all this information on sustainable biomass/bioenergy development in the Member States.

2.1.3 Sustainable Development Strategy

The Renewed *EU Sustainable Development Strategy* was adopted by the European Council in June 2006. It requires of all EU policies to set out how the needs of present generations can be met without compromising the ability of future generations to meet their needs. This Sustainable Development Strategy deals in an integrated way with economic, environmental and social issues and lists the following key challenges:

- Climate change and clean energy
- Sustainable transport
- Sustainable consumption and production
- Conservation and management of natural resource
- Public health
- Social inclusion, demography and migration
- Global poverty and sustainable development challenges[1].

Sustainability is a fundamental issue in policy formulation in all Partner countries. All national governments avow themselves to exploit natural resources sustainably.

[1] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions COM(2009) 400, 24.07.2009: Mainstreaming sustainable development into EU policies: 2009 Review of the European Strategy for Sustainable Development.

Almost all Partner Coutries have published their own Sustainable Development Strategy as an overarching long-term goal for economic growth, social cohesion and environmental protection, to be regularly monitored and reported to the Commission:

- Austria in 2002
- Czech Republic in 2004
- Germany in 2002
- Hungary in 2007
- Italy in 2002
- Slovakia, currently being developed
- Slovenia in 2005.

Poland has not issued a National Sustainability Strategy but has formulated sustainable development as an important goal for all sectoral policies; the first time this commitment was expressed in the *State Ecological Policy 2001* (with subsequent amendments).

Only, as long as these strategic aims have not been substantiated by legal instruments, their implementation is not granted. Indeed, in many countries sustainability has not yet become a priority for decision makers. So for example in Italy the political commitment on national level seems rather weak and the national-regional cooperation not too intensive, whereas the horizontal exchange between the regions is vivid and fruitful, as the Conference of the Regional Presidents provides room for political exchange. Informal cooperation of regional SD administrators and an exchange of experience among municipalities reveal a high level of political commitment to sustainability issues at the regional and local level. A rather declarative character of the national sustainability strategy seems to apply more or less also to Hungary, Poland and Slovakia, where efforts to restructure the energy sector in direction of a more sustainable production and consumption have to be intensified.

Sustainability criteria

The ongoing discussion among experts from EU and international bodies, national politics and research during the last years, on whether or not introduce sustainability criteria for biomass and biofuels, has sharpened the perception of the topic in political arena, among environmental actors, researchers and parts of the public. With publication of the EU RES Directive of 2009, Member States are held to take up own action to implement the requirements concerning sustainable bioenergy, i.e. to incorporate sustainability criteria for biofuels and bioliquids into their national legislation (see chapter 1.2.1 Regulation – Mandatory instruments).

For the time being, the EU Commission has dispensed binding EU-wide sustainability criteria for solid and gaseous biomass used for production of electricity, heating and cooling. The Commission recommends though, that Member States introduce own national sustainability schemes for solid and gaseous biomass ensuring that these in almost all respects correspond to those defined for biofuels and bioliquids in the RES Directive 2009. This does not apply to installations ≤ 1 MW_{el} and ≤ 1 Mw_{therm} neither to waste. The recommendation implies a general prohibition of producing biomass on land converted from forest, other high carbon stock areas and highly biodiverse areas[1]. The Directive requires all Member States to incorporate the criteria for biofuels and bioliquids into their national legislation and requests them to define respective criteria for solid and gaseous biomass. To verify their compliance, certification schemes have to be introduced and verfication bodies established.

[1] Report from the Commission to the Council and the European Parliament on sustainability requirements for the use of solid and gaseous biomass sources in electricity, heating and cooling. COM(2010) 11 final. SEC(2010) 65.

Certification schemes

Certification of the sustainable use of natural resources is at present not mandatory in Europe. Nevertheless, all Partner Countries have introduced either *Forest Stewardship Council* (FSC) or the *Programme for the Endorsement of Forest Certification Schemes* (PEFC), or even both of them. Both systems contain annual audits of forests by independent verifiers, FSC being more strict in evaluation: 10 principles and 56 criteria are mandatory for receiving a FSC certificate. PEFC however certifies regions by random samples on basis of an annual forest report. Forest owners hold 50 % in decision-making body in PEFC.

Other international certification schemes are the Round Table on Sustainable Palm Oil (RSPO) and the Round Table on Responsible Soy Association (RTRS) referring only to the respective oil sorts.

Table 3 Forest certification systems in the Partner Countries

AT	CZ	DE	HU	IT	PL	SK	SL
FSC, PEFC, RSPO, RTRS	FSC, PEFC	FSC, PEFC, RSPO, RTRS, ISCC	FSC	PEFC, RSPO	National, FSC	PEFC	PEFC in prep.

As biomass and biofuels trade is increasing considerably, the discussion on certification schemes aplicable on international and global scale are high on the political agenda. Thus an internationally or at least EU-wide certification system has become inevitable. For international trade it must meet the obligations of the World Trade Organisation. To meet this demand, the German Federal Ministry of Food, Agriculture and Consumer Protection (BMELV) has supported in the last years the development of a new system, the *International Sustainability and Carbon Certification* (ISCC). This scheme guarantees that sustainability standards according to the *Sustainability Ordinances* for electricity from biomass as well as biofuels are respected in production of electricity and biofuels, as well as the relevant raw materials, and that specific GHG emissions ocurring along the value chain can be calculated. It is designed to work cost-efficient in a lean organisation and build on standardised value chains. The ISCC sytem was introduced in Germany in January 2010 and has issued first certificates in May 2010[1].

The ISCC System allows documentation of bioenergy all the way from the field or plantation along the whole production chain by mass balances and GHG balances. These are verified by independent controlers[2]. The system applies also to agriculture.

It seems that except EU regulation under the *Common Agricultural Policy (CAP)* and the *Cross Compliance* provisions which link direct payments to farmers to their respect of environmental and other requirements set at EU and national level, no further schemes are in use in most Partner Countries. If the ISCC system should be introduced by them the establishment of certification bodies will be a pre-condition.

2.1.4 Biodiversity Strategy

"During the last decades reduction and losses on biodiversity at a global scale has accelerated dramatically. Existing measures have proved to be insufficient to reverse present

[1] FNR Press Release from 07.05.2010 (http://www.nachwachsenderohstoffe.de/presseservice/pressemitteilungen/aktuelle-mitteilungen)

[2] ISCC International Sustainability and Carbon Certification: Wir starten durch. Zertifizierung von Biomasse und Bioenergie. www.iscc-project.org.

trends. The best way forward is for actors in the relevant policy areas to assume the responsibility for the impacts of their policies on biodiversity. With this strategy, the EU reinforces its leading role world-wide in the efforts to find solutions for biodiversity within the framework of the United Nations´ *Convention on Biological Diversity* (CBD)"[1].

It is consensus in Europe to protect and enhance biodiversity and to halt biodiversity losses. Thus most Member States have developed national biodiversity strategies setting out targets for protecting valuable woodland, wetland, land with high carbon stock, safeguard most important habitats and species, conserve and restore biodiversity and ecosystem services in the wider EU countryside, to reinforce compatibility of regional and territorial development with biodiversity and to substantially reduce the impact on EU biodiversity of invasive alien species and alien genotypes[2].

The increasing demand of biomass for energy might well come into conflict with these targets, particularly when forest residues like old and dry wood, crowns, branches, foliage, stumps and roots are removed entirely. This leads to nutrient depletion of soil and threatens some species of fungi and beetles, and it hinders rejuvenation of woods. In agriculture increasing areas for energy plants might compete with food and fodder production and cause a loss of fertile mould which again reduces species in flora and fauna.

All Partner Countries have approved the Convention on Biological Diversity from 1993 and ratified the Cartagena Protocol on Biosafety from 2003. Taking into consideration the objectives formulated in these documents, they set up their national biodiversity strategies:

- Austria 1995
- Czech Republic 2005
- Germany 2007
- Hungary 2004
- Italy Draft 2009, to be adopted in 2010
- Poland (without date)
- Slovakia 1997, updated in 2010
- Slovenia 2001.

The forth report of the parties revealed the needs for additional efforts to achieve, by 2010, a significant reduction in the rate of biodiversity loss at all levels.

The Global Biodiversity Outlook 3 will be formally launched in 2010, the year proclaimed as the International Year of Biodiversity. The Issue Management Group (IMG) on 2010 biodiversity targets and beyond, established under the Environmental Management Group (EMG) of the United Nations is preparing a UN system wide report that may help with formulation of future biodiversity targets by governments[3].

Particularly the food and agriculture sector contribute to pressure on biodiversity through land use change, nutrient loading and over-exploitation of wild resources. The cultivation of energy plants e.g. has considerably increased in the last years - in Germany to 2 million hectares by 2008 which equals to 17 % of agricultural land. This evokes doubts on the nature compatibility of biomass supply in these dimensions. In other Partner Countries similar developments are only in initial phase and an unsustainable production of biomass for energy can be avoided early enough.

[1] Communication of the EU Commission to the Council and to the Parliament on a European Community Biodiversity Strategy (COM (98)42) (http://ec.europa.eu/environment/docum/9842sm.htm)

[2] EU Communication (2006) 216 "Halting Biodiversity Loss by 2010 – and Beyond: Sustaining ecosystem services for human well-being".

[3] Convention on Biological Diversity: 2010 Biodiversity Target (http://www.cbd.int/2010-target/).

2.2 Support Schemes for Promotion of the Use of Energy from Biomass

In the last decade the governments of all EU Member States have increasingly introduced legal instruments and financial incentives for promotion of renewable energy. A strong impetus was the policy of EU Commission for the enhancement of low carbon energy carriers to reduce the greenhouse gas emissions in EU as fast and effectively as possible. Thus the "new" Member States had to follow this line already in the pre-accession period by starting the adoption of the *acquis communautaire*. With the prescription of concrete targets to be achieved by a fixed date, the EU Commission paved the way to accelerate action.

2.2.1 EU Targets to Promote RES Increase

In March 2007 the European Council initiated an integrated approach to climate and energy policy that aims to combat climate change and increase the EU's energy security while strengthening its competitiveness. This shall enable Europe to transform itself into a highly energy-efficient, low carbon economy. To push to this process, the Commission set targets to be met by Member States in the year 2020:

- 20 % increase of energy efficiency
- 20 % reduction of GHG emissions
- 20 % share of renewable energies in total primary energy consumption
- 10 % share of biofuels.

After approvement of the new RES Directive and the Fuel Quality Directive[1] in December 2008, the targets became binding legislation in June 2009. To facilitate the achievement of these targets, the EU Commission set national targets for all Member States.

2.2.2 EU National Targets

RES Directive 2009 sets in Article 3,1 mandatory national overall targets for Member States to ensure the common EU renewables target of 20 % by 2020. Thus they have to adjust their strategies and programmes to these requirements.

Table 4 EU national targets for RES share in final energy consumption in 2020 in % RES share in Partner countries in 2007 in %

EU total 2020: 20 %	**AT**	**CZ**	**DE**	**IT**	**HU**	**PL**	**SK**	**SL**
EU national targets 2020	34	13	18	17	13	15	14	25
RES share in 2007	15,8	6,2*	9,8	5,2**	4,8	6,8*	6,7**	8,3

* 2006 **2005

Table 2 shows that all Partner Countries have to make efforts to fulfill these requirements. However, the Partner Countries have, in accordance with RES Directive 2009 Art. 4(3), submitted to EU Commission their forecast of the expected use they will make of the cooperation mechanisms described in Articles 6 to 11 of the Directive[2].

The Country Reports reveal that all Partner Countries count on sufficient domestic potential to fulfill their respective targets by 2020. Only Italy forecasts a deficit in absolute

[1] Directive 2009/28/EC of the European Parliament and the Council, in force since 30 June 2009.

[2] Cross country cooperation allowing statistical transfers, joint projects, joint support schemes between Member States, joint projects between Member States and third countries, is intended to facilitate the achievement of national RES targets for 2020 see also p. 18-19).

terms of 1.2 Mtoe[1], demanding a statistical transfer from other Member States to meet its national target.

According to the forecasts, ten Member States out of 27 expect to have a surplus, five Member States expect to have a deficit in 2020 compared to their binding target for the share of renewable energy in their final energy consumption. The net result of all Member States' forecasts for final renewable energy consumption for 2020 indicates that the EU should exceed its 20 % target by over 0.3 percentage points[2].

2.2.3 National RES Regulation – Mandatory Policy Instruments

All CE Member States have made considerable efforts in the last years to incorporate EU obligations into their national legislation. The countries have remarkable discretion in choosing the most appropriate national mechanism to reflect EU environmental obligations. This discretion is limited in some respects by general principles of EU law. In most cases it will be necessary to adopt national legislation passed by Parliament or in some countries by Presidential or Governmental Decree[3].

The legal instrumentarium for promotion of RES seems in most Partner Countries extensive, particularly concerning electricity and transport fuels from biomass, to a slightly lesser extend for heating/cooling poduction and waste treatment.

Table 5 Most widely used legal support instruments for RES in Partner Countries

	Feed-in tariff / Premium	Quota / Green Certificates	EE / White Certificates	Purchase Obligation
Austria	X		X	
Czech Republic	X		X	X
Germany	X	X	X	X
Hungary	X			X
Italy	X	X	X	
Poland		X	X	X
Slovakia	X	X		X
Slovenia	X			

As table 3 shows, feed-in tariffs for electricity fed into the grid are legally established in the majority of Partner Countries, i.e. in Austria, Czech Republic, Germany, Hungary, Italy, Slovak Republic and Slovenia. Quota obligations for electricity are used only in Poland, together with Green Certificates. All Partner Countries have introduced quotas for blending biofuels with fossil fuels.

There are many more legal acts besides these above mentioned supporting the use of biomass, not only for electricity and transport fuels, but also for heating/cooling systems to be newly installed or refurbished in public and residential buildings, for combined heat and power (CHP) plants and for refurbishment of district heating systems based on RES and co-generation. Nevertheless, in several countries biomass for heating is used to a great amount for co-firing with coal, quite often in a relation of 30 % biomass and 70 %

[1] Summary of the Member State Forecast Documents (http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm)
[2] ibid.
[3] EU Environment: Guide to the Approximation of European Union Environmental Legislation (http://ec.europa.eu/environment/archives/guide/part1.htm)

coal which is not very suitable for reduction of CO_2 emissions. So in Slovakia, Poland, Hungary, and to some amount in Slovenia, woodchips and straw are burnt together with hard coal or lignite in huge plants feeding the produced heat into large district heating grids. As mentioned before, these grids are a heritage from the former centralised energy system in Eastern Europe. Their technical condition is often out of date causing considerable energy losses. But refurbishment of these grids will turn into advantage: Heating and cooling supply can be provided for the population of quite large areas. The necessary modernisation of the district heating grids as well as the reconstruction of the whole energy system will not only improve environmental records but will simultaneously increase economic growth of the countries.

The decision of EU Commission to set sustainability criteria for biofuels and bioliquids and demand monitoring and reporting of life cycle greenhouse gas emissions per unit of energy (Directive 2009/28/EC, Articles 17 to 22, and Directive 2009/30/EC[1] on biofuels, Article 7), requires Member States to incorporate these criteria into national legislation.

Only Germany has already implemented the directives. The *Ordinance on Sustainable Electricity Gerneration from Liquid Biomass* (Nachhaltigkeitsverordnung Biomasse Strom – BioSt-NachV) was approved on 10 June 2009 and entered into force on 24 August 2009. *The Biofuel Sustainability Ordinance* (Biokraftstoff-Nachhaltigkeitsverordnung – BioKraft-NachV), was approved by the Federal Cabinet on 16 September 2009 and entered into force on 02. November 2009.

2.2.4 Financial Support and Economic Incentives

Electricity production from renewable energy sources is financially supported by a variety of instruments. As above mentioned, feed-in tariff systems introduced in seven Partner Countries have proved most successful. Some countries have feed-in systems combined with premium/bonus, others with green certificate systems. Enterprises have to choose between them.

Table 6 Financial support of electricity from RES

Austria	Feed-in tariffs
Czech Republic	Feed-in tariffs or premium
Germany	Feed-in tariffs plus bonuses (CHP, RES, Technology Bonus)
Hungary	Feed-in tariffs
Italy	Feed-in tariffs or tradable green certificates
Poland	Quota system with tradable green certificates
Slovakia	Feed-in tariffs
Slovenia	Feed-in tariffs or bonuses

As table 4 shows, the dominant instruments for promoting the generation of electricity by renewable energy sources are feed-in tariffs and quota with green certificates.

Investment support of heating/cooling installations for households and public buildings, in villages and parts of municipalities, as well as for enterprises, is available in all Partner Countries. Grants and low-interest subsidies for small biomass heat plants and heating devices in households and as well for large CHP plants combusting biomass are provided

[1] Directive 2009/30/EC of the European Parliament and of the Council of 23. April 2009, issued on 05.06.2009.

also in all Partner Countries. In Czech Republic, Hungary, Poland, Slovakia and Slovenia grants, subsidies and low-rate interest loans for investments in renewable energy installations are provided also by the State Environmental Protection Funds which return the revenues from fees for use of the environment as well as the fines from non-compliance of environmental regulations again into environmental investments.

Tax reliefs and tax exemptions exist in all partner countries. They concern primarily biofuels, to a lesser amount electricity and heat production. In Hungary e.g. tax concessions are related to bioethanol and biodiesel, in Germany to pure biodiesel (B100) and pure vegetable oil fuel, the latter is exempted from taxation if used for agricultural purposes; blends of biofuels with fossil fuels are fully taxed. In Czech Republic e.g., an exempt from income tax concerns the revenues from operation of small scale biomass heat or power plants, biogas or hydro plants (up to 1 MW) for five years from installation.

An indirect financial support measure is the Eco Tax levied on the use of fossil fuels. Germany has introduced an Ecological Tax Reform in 1999, the Czech Republic in 2008. The same is valid for the CO_2 Tax, introduced only in Slovenia (1996, last amended in 2008).

2.2.5 Planning Instruments

Spatial Planning

At present it seems that the possible advantages and benefits of an integrated and consistent spatial planning approach taking into account not only economic, transport and settlement issues, but integrating also energy and landscape planning, are rather underestimated. Spatial planning instruments are available in all Partner Countries. They are legally binding but have often no priority compared to traffic routeing and industrial location issues. As biomass resources are in most countries concentrated in different regions, the decentralised exploitation and generation will need intensified spatial planning and coordinated activities of the respective authorities.

In countries with different administrative levels, the national government is responsible for the establishment of spatial order and the framework legislation. It sets the general direction for future development. The Federal States or Provinces establish on this basis their own Regional Plans, the local authorities develop Comprehensive or Zoning Plans for the municipalities. This is the case in Austria, Czech Republic, Germany, Italy and Poland. Particularly in Poland (gminy), Italy, (Provinces and municipalities), and Germany (Federal States and municipalitites), the lower authorities have great competences for planning the local electricity and heating systems.They are responsible for energy management drawing up energy supply plans, modernisation of grids, revitalising neglected areas, and they develop energy infrastructure with regard to energy efficiency, i.a. with promoting buildings insulation and collective transport systems. However, political actors use the scope of designing energy policy e.g. in Germany in a very different way. Whereas some regions and communities formulate own targets for expansion of biomass sources and undertake additional steps to reach them as fast as possible – for example the communities and regions which have set themselves own targets to achieve 100 % supply exclusively by renewable energy – others continue insisting on coal and nuclear power.

The awareness of the advantages of bioenergy and the necessity to produce and use biomass resources sustainably is increasing in Europe though. The recommendations of EU Commission for all Member States to introduce voluntary national sustainability criteria for solid and gaseous biomass – more or less according to the mandatory criteria for biofuels and bioliquids – encourage Member States to get active. Thus several research studies on how to achieve a more targeted spatial planning integrating energy concepts,

landscape management and nature protection obligations in a sustainable way have been conducted and show practical solutions[1].

The ongoing discussions on potential **conflicts of biomass use** for food, fodder, material and energetic use as well as on economic or non-economic use of land, i.e. using specific areas for recreation opportunities or leaving them in their natural state untouched, have sharpened the view on the needs for future political decisions.

In Austria and Germany e.g. competition of food and energy use of biomass resources is an issue on the political agenda, in Poland a recently issued ministerial decision on cereals not fulfilling the standard to be used as fuel has evoked a public debate on the ethical aspects using agricultural products for purposes other than food. In Poland as well as in Hungary the competition is ocurring between material and energy use of wood since in some cases log timber is burned together with coal. The furniture producing economy critised these procedures vigorously. In other CE countries the high availability of biomass potential seems to so far avoid conflicts of use.

Land use change for growing economically attractive plants for energetic use instead of nourishment crops, and in succession converting nature protection areas into agricultural areas, may affect emissions and sequestration potential of the major greenhouse gases. Future decisions concerning land use change definitely play a great role in the strategies for adaptation and mitigation of climate change on a global scale.

On the other side, several crops for bioenergy and raw material use have various properties and capabilities to enrich land use systems, e.g. combining short rotation coppice with fields cultivation by planting and harvesting twice per year has positive effects:

- Rising yields for farmers
- higher diversity of cultivated crops
- higher tolerance of wild growing plants
- quasi permanent ground cover and thus protection from erosion
- less evolution of soil nutrients into groundwater bodies[2].

Landscape and nature protection comes occasionally in conflict with investments, particularly on the local level. This might lead to lack of acceptance and impede RES development. Targeted land use and zoning plans regarding the needs of energy supply and securing it increasingly by RES, carefully planned transport systems as well as nature and landscape conservation should be legal tasks of municipalities and regions.

Nevertheless, in CE countries there seems at present no pressure to put the issue of land use change on the political agenda because they all dispose over a great biomass potential, and utilisation of this potential occurs not yet to a very great amount.

Mobilisation of new biomass potential to avoid conflicts on resources and land use is a favourable option which all Partner Countries could use. First steps to plant short rotation coppice as a relatively quickly available additional biomass resouce for energetic use have been made by Czech Republic, Germany, Hungary, Poland and Slovakia. However, for this purpose it is not necessary to use fertile agricultural areas, but rather degraded and marginal land can be revitalised, as in all Partner Countries brownfields and former industrial areas with low cultivation value are available. This might in some cases come into conflict with usage for installation of solar panels; in Italy degraded areas are exclusively used for solar energy. In the eastern part of Germany, some former surface mining

[1] For example, Gruehn, Dietwald (2009): Energy from Biomass – A New Challenge for Spatial Planning. Presentation on the Conference "Biomass in Future Landscapes", Berlin, March 2009.

[2] Jessel, Beate (2009): Sustainable Use of Biomass – Synergies and threats with regard to landscape and nature conservation issues. Ibid.

areas where brown coal had been exploited, are now being recultivated partly for growing energy plants, partly for forming recreation landscapes with lakes and hills offering the public in the region leasure and relaxation opportunities.

There is awareness of the advantages of increasing use of biodegradeable waste as an option to prevent burning or fermenting valuable wood or agricultural biomass, and simultaneously reduce landfills still widely used (in Poland e.g. 95 % of waste is deposed on landfills, 4.5 % is incinerated). This is an important item in the future energy programmes and plans of all Partner Countries and finds reference in all strategic documents.

Reasonable spatial planning and landscape management on regional and local levels, combined with energy concepts and transport routeing plans, will need sensitive and comprehensive policy decisions. In the future sustainable spatial development in Central Europe will afford not only spatial planning concepts of countries, regions and municipalities, but also cross-border governance with harmonisation of adequate instruments and measures. There are first efforts for a cross-border approach to use synergies in generating and increasing biomass resources (see cross-country cooperation, p. 17).

2.2.6 Indirect Support Instruments

Promotion of research, development and demonstration

There is certainly a great demand for research on how to use the countries' biomass potential optimally. New research approaches have to be explored for sustainable production of vegetable biomass from agriculture and forests and for utilisaton of organic waste. Inquiries on how to integrate energy plants cultivation like short rotation coppice sustainably and landscape-compatibly into regional planning without creating negative environmental and social impacts will be a challenge in the coming years. Just as well the construction of energy saving and cost-conscious construction of combustion and processing technology will be an ongoing task requiring combined expertise from science and industry to develop a set of common strategic goals[1]. Research is further needed on methodological trends in plant breeding, biotechnology and biomass conversion sectors.

In all Partner Countries Governments and the responsible Ministries (of Environment, Energy, Agriculture, Economy, Transport) finance research activities of universities, research institutes, and biomass competence centres, at least to a certain amount. EU Programmes help to support specific inquiries, technological developments, and demonstration projects. Transnational support particularly for capacity building training courses but also for concrete projects and bilateral cooperation projects, partly under the Joint Implementation mechanism, has been given to CE countries by international institutions.

An intra-regional exchange on research results and practical experiences with technology deployment and managing methods could, if it is conducted on a regular base, accelerate the development and increase of sustainable RES/biomass utilisation and facilitate trade activities in the CE region.

Voluntary agreements

In Germany and Italy occasionally some voluntary agreements between power supply industry and state authorities have been concluded on regional and local level, mostly by municipal energy suppliers who committed themselves to sustainable and responsible utilisation and processing of biomass in their prospected plants.

[1] This is supported by the German High Technology Strategy issued in 2009.

Awareness raising activities and consulting services

In most of the Partner Countries the Ministries of Environment, Energy, Agriculture, regularly publish printed brochures and online information according to legal obligations to grant the public free access to knowledge on new developments, legal acts, research findings and events connected with the biomass topic. Agencies financed partly by the state, and environmental non-governmental organisations conduct awareness raising campaigns on political decisions, and interest groups like biomass/biogas/biofuels associations comment and evaluate policy regulation. Experiences show, however, that only a relatively small part of the public can be reached with such campaigns.

In Austria, Germany and Italy information dissemination is not only provided by ministries on national level as described above, but is also a task of the Federal States respective the Regions and Provinces (Italy) and as well of the authorities on local level. Energy consulting services are offered by lower level administration to households, companies and municipalities.

In the Czech Republic the Government approved in 2009 an *Action Plan of State Programme of Environmental Education, Training and Edification* for the years 2010 to 2013, which foresees the estabishment of a joint network of environmental education centres and guidance consultants. In the same year the Law on Environmental Information securing easy and free access to maps and other information for citizens and public authorities was amended, i.a. for the introduction of a system of awareness raising, education and qualified consultancy.

In Hungary a rather small number of agencies, competence centres and non-profit organisations are working on raising awareness of the public. But due to mostly low budgets a wider information dissemination of biomass policy is difficult to achieve. In Poland awareness on environmental issues is still not wide-spread among the population; the efforts of official actors seem at present rather directed to communicate biogas in public arena in order to achieve the new energy policy target "one biogas plant in every commune in 2020"[1].

In Slovakia and Slovenia state financed agencies and non-governmental competence centres focusing on biomass/bioenergy spread information on technology, sorts of biomass fuels (pellets, woodchips, etc.), and financing opportunities among consumers, investors and other target groups, primarily supported by EU or international programmes. So the Global Environmental Facility (GEF) has funded in both countries project preparatory activities and seminars offering capacity building. The Slovenian Government implemented a programme for energy consulting for the citizens, promotion of consulting service provision and of investments in efficient energy use and renewable energy.

All in all, even the manyfold awareness raising activities and press releases in countries like Germany and Austria do not reach great parts of population. In Poland, Hungary, Czech Republic, Slovakia and also in Slovenia, the general public is mostly not informed on RES/biomass potential opportunities for domestic energy supply as well as on its advantages concerning the reduction of greenhouse gas emissions.

Competitions and awards

This support measure seems to have been used only by Germany. In 2008 the Ministry of Environment invited all 16 Federal States to take part in the competition "Leitstern 2008" (Lodestar) to identify best practice in increasing renewable energy, energy efficiency, energy conservation and implementation of ambitious technology and economy policies. Besides developing own promotional programmes it was stressed in the compe-

[1] Ministry of Economy, Republic of Poland (2009): Poland's Energy Policy until 2030.

tition that the Federal States as well as the regional districts and the municipalities should take the position of pioneers sharing successes with the public by sytematically and regularly provided information.

"Leitstern" Awards were submitted to Brandenburg as Best Federal State concerning Renewable Energy, to Baden-Württemberg for Renewable Heat, and to Schleswig-Holstein for Economy and Technology[1].

The German Ministry for Food, Agriculture and Consumer Protection in 2009 arranged the competition "100 % Bioenergy Regions". In the last years, a considerable number of communities and regions have themselves set a target to achieve energy supply totally by renewable sources and thus become independent of fossil fuels, some of them by setting a fix date, some without a fixed term. To stimulate and promote this bottom-up movement for energy autarchy, the Ministry chose among 210 candidate regions 25 winner regions. They received 400.000 Euro each to spend for realisation of their concepts within the following three years. One of the main concerns is to launch investments with intelligent communicative measures[2].

[1] "Leitstern 2008". BMU website, www.bmu.de, 10 November 2008.

[2] Agency for Renewable Resources (FNR), website www.fnr.de.

Biomass/RES Support Instruments – Results from Country Studies

	AT	CZ	DE	HU	IT	PL	SK	SI
Energy/RES Strategies and Programmes								
Strategy resp. Programme	x	x	x	x	x	x	x	x
Sustainable Develop. Strategy	x	x	x	x	x	x	x	x
Sustainability criteria	rec.	x	x	under dev.	x	x	x	x
Biodiversity Strategy	x	x	x	x	x	x	x	x
Further RES prom. strategies	x	x	x	x	**regional**	x		
National Biomass Action Plan	x	x	x	x	x	x	x	x
Biomass Competence Centres	x	x	x	x	x	x	x	x
RES/Biomass Legal, Political and Institutional Framework								
Legal instruments	x	x	x	x	x	x	x	x
Interministerial cooperation	x	x	x	x	x	x		x
Policy coherence	x	x	x	x	x			x
Consultation process	x	x	x	x	x	x	x	x
Cross country cooperation	x	AT DE PL SK	CZ PL UA	CZ, PL SK	x	DE HU	x	x
Certification of forests PEFC, FSC, RSPO, RTRS	all	PEFC, FSC	all, ISCC	FSC	PEFC, RSPO	Nat., FSC	x	nat., PEFC
Certification of agriculture (except EU requirements)	in prep.		ISCC, TÜV	nat.	ISO	x		nat.
RES/Biomass Economic Framework								
Financing instruments	x	x	x	x	x	x	x	x
- Feed-in tariffs	x	x	x	x	x	x	x	x
- Quota	x	x	x	x		x	x	
- Green Certificates		x		x	x	x		
- Subsidised loans	x	x	x	x	x	x	x	x
- Tax reliefs/exemptions	x	x	x	x	x	x	x	x
- CO_2 Tax	x	x	x	x	x	x	x	x
Planning instruments								
Spatial Planning	x	x	x	x	x	x	x	x
Spatial Planning, regional, local	x	x	x	x	x	x	x	
Mobilisation of new biomass potential	x	x	x	x	PV	x		no need
- Short rotation coppice		x	x	x		x	x	
- Degraded and marginal land		x	x	x	PV	x		no need
- Waste	x	x	x	x				
Competition of use (discussed)	x	x	x	x	x	x	x	x
Land use change (discussed)	x	x	x	x	no need		x	no need
Indirect support instruments								
Promotion of research	x	x	x	x	x	x	x	x
Voluntary agreements			**local**	x	**local**			
Awareness raising	x	x	x	x	x	x		x
Competitions and awards			x	x				

x = existent x = restricted or planned x = not existent

2.2.7 Policy Implementation

The successful implementation of political strategies depends on many factors playing a role in the decision-making process. An integrated approach will have to refer to cooperation of national authorities to secure a stringent and coherent policy formulation. In countries with multi-level governance systems many interacting authority structures are involved. The "vertical" dimension refers to the linkages between higher and lower levels of government, including their institutional, financial, and informational aspects. The "horizontal" dimension refers to cooperation arrangements between regions or between municipalities. It is of great importance how the political actors communicate and cooperate to enable a fully integrated bioenergy strategy which might in the future become interlinked with neighbouring countries in the Central European region.

Interministerial cooperation seems to take place in all Partner Countries. Political strategies and programmes for future development usually afford collaboration of several ministries because their competences must be respected. So e.g. in the elaboration of biomass or renewable energy plans the ministries responsible for energy, environment, agriculture, finance and transport must be involved. Long-term energy plans as well afford interministerial cooperation. Thus, in all Partner Countries political strategies are jointly developed by the respective ministries, maybe with exception of Italy where such cooperation on the national level seems rather occasionally practised, but this might be compensated by the regular and fruitful cooperation of Region Governments.

Policy coherence is in several cases rather problematic in all Partner Countries. Some coordination of instruments and measures can be stated but in other cases contradictory aims are visible. This refers primarily to different views on financing of planned measures, so e.g. decisions of ministries of environment or agriculture to support certain projects with a considerable amount of money might be thwarted by the ministry of finance, or the ministry of economy wants to preserve industry from commitments. Lack of coherence is to be stated too, if similar technology innovations are financially supported by different authorities.

But there are also successful approaches. Coherent policy formulation can be stated in Slovenia where certain ministries, agencies for RES and energy efficiency, for agricultural market development, Eco Fund, Chambers of Commerce and of Agriculture and Forest and others cooperate. The Czech Republic adopted in January 2010 a strategic framework for sustainable development to explicitly facilitate interaction and coherence of measures, targets and policies, including those which are part of already existing sectoral strategies.

Consultation of stakeholders (such as regional/local authorities, NGOs, unions, employers, experts) in preparation of political decisions is practised by all Partner Countries. In meetings, seminars, hearings the relevant actors are asked for their opinion, though not on a regular schedule.

Cross-country cooperation is in one or another way usual in all Partner Countries, in some cases legally established by bi-lateral agreements, in others rather informally practised, like e.g. business contacts; some border regions develop joint projects. Austria has cooperation contacts with Czech Republic, Hungary and Slovakia, Germany with Czech Republic and Poland[1], Hungary with Czech Republic, Poland and Slovakia (Vyšehrad

[1] German-Polish Council of Environmental Protection since 1991 i.a., German-Czech Environmental Commission since 1996.

Group for Environment Protection[1]), some of the countries collaborate with the non-member State Ukraine.

EU Commission is strongly supporting interregional cooperation, not only by financing joint reasearch projects. So e.g. the achievement of the national renewable energy targets for 2020 is facilitated considerably by RES Directive 2009/28/EC which in Articles 6 to 11 allows for cooperation of two or more Member States on all types of projects for production of electricity, heat and cooling from renewable energy sources. Private operators can participate in these projects.

Thus, the Directive allows Member States to conduct statistical transfers of a certain amount of energy from renewable sources from one Member State to another to facilitate the achievement of national targets, provided that this will not jeopardise the donator's national targets.

Furthermore, one or more Member State may cooperate with third countries on all types of joint projects for production of electricty from renewable energy sources. Such cooperation may involve private operators. Statistical transfers for fulfilling national targets will only be counted if the electricity is consumed in the Community.

Two or more Member States may decide to join or partly coordinate their national support schemes. Statistical transfers are in this case also possible under certain conditions.

As mentioned before, according to the forecasts which Member States have delivered to EU Commission at the end of 2009, the Partner Countries will not need any statistical transfers, they rather expect to have a surplus in 2020 compared to their binding target for the share in their final energy consumption. Only Italy has announced a deficit and will need transfers respectively cooperation in joint projects with third countries[2].

These forecasts are only estimations, the real commitment of the Member States will be seen in the National Renewable Energy Action Plans to be published by end of June 2010 and implemented by December of the same year.

3 Conclusions

The results of the studies show that the Central European Region disposes of a considerable amount of available biomass resources. This potential is already at present available as a regional resource delivering energy at lower investments costs compared to wind, solar and geothermal energy, particularly when used in de-central systems. In fact, it is the only renewable energy carrier which can contribute sustainably to the supply of heating/cooling, electricity, and transport. And it offers chances for economic development in rural areas, increasing employment opportunities and keeping value added within the region.

Not only in Austria, but also in Germany, Hungary, Poland, Slovakia and Slovenia, biomass is the largest expandable and mostly used renewable energy source at present. With increasing installation of off-shore wind power plants started e.g. in Germany and planned as well in Poland, which are expected to deliver great amounts of electricity in the near future. biomass may be used for heating/cooling in de-centralised small-scale co-generation systems as well as in large combustion plants generating besides electric-

[1] Environment Ministers meet annually since 1999; Fourth National Report on the Implementation of the Convention on Biological Diversity-Poland, 2009, p. 135)

[2] Switzerland, Albania, Montenegro and Tunisia. EU Commission: Summary of the Member States Forecast Documents (http://ec.europa.eu/energy/renewables/transparency_platform/transparency_platform_en.htm)

ity also heat/cooling to be distributed in modernised wide-spread district heating grids over large areas.

Political support to bioenergy development is documented in strategies, plans and programmes of all Partner Countries, though with different emphasis. The perception of bioenergy as a fast available renewable energy carrier enabling to replace fossil energy in near time is not in all countries equally pronounced, thus the position of biomass in the energy mix varies. Legal and financial promotional instruments exist in all countries (feed-in tariffs, quota, green and white certificates, priority access to grids, fiscal incentives,financial support programmes), However, all Partner Countries announced to achieve the EU 2020 targets relying on their own resources, maybe except Italy who might have to import some amount.

Austria sees in biomass the motor of its New Energy Strategy presented in March 2010 by the Ministers of Environment and Economy. It will play the central role among all biogenous energy carriers for achieving the national target of 34 % RES share as well as the greenhouse gas reduction target of 16 % by 2020. Furthermore, it is perceived to generate the best employment effects. The New Energy Strategy is directed to create positive and reliable framework conditions for the necessary investments into expansion for bioenergy avoiding stop-and-go policies[1].

The Czech Republic has set the course for diversifying its energy mix by increasing step by step the share of renewable energy and decreasing coal deployment. An important goal for the next years is reducing energy intensity of the national economy i.a. by preparing territorial energy conceptions, energy audits and activities directed towards minimising energy losses during transmission. Ensuring access to distribution networks for de-centralised production of electricity and heat from RES shall encourage investments in small energy units. An accelerated development of bioenergy (and other RES sources) is seen as crucial to meet the EU targets for 2020.

Germany has stated in the National Biomass Action Plan to extend the share of bioenergy by 2020 in a sustainable way. The utilisation of biomass must be improved concerning energy efficiency and GHG reduction potential. Estimates have shown that, in theory, the share of biomass in energy supply could be doubled by 2020. However, imported biomass is playing an increasingly important role, not only due to price developments but also for reason of competition with other uses.

Hungary expects biomass to maintain a key role in the structure of renewable energy use by 2020 but foresees a decline of it from 90 % to 70 % of total RES in favour of geothermal, wind, and solar energy, and as well of biomethane and organic waste (policy scenario). The surplus potential of biomass from agriculture in food production[2] must be used for production of biofuels for transport or traded to other countries. The energy policy to secure supply has been focused strongly on traditional fossil fuels but has turned in the last years in direction of enhancing supply from renewable sources. Thus Hungary is intensifying the development of RES and energy efficiency using national and EU promotional programmes.

Italy possesses rather limited biomass resources compared to solar, wind and geothermic opportunities. The national policy formulation does not seem to give bioenergy a prior position in the energy planning, although detailed regulation on emissions and operation of biomass and biogas plants exist. A promotional approach seems to be more usual in the energy programmes of Regions and Provinces where EU Operational and other Pro-

[1] Press Release from Gerhard Wlodkowski, President of Chamber of Agriculture, Austria. 11.03.2010 (www.agrarnet.info/netautor/napro4/appl/na_professional/?id)

[2] According to WTO negotiations, food production from agriculture must be substantially reduced.

grammes support renewable energy sources, particularly in North and in Abruzzi Region, both with great biomass potential.

Poland possesses great reserves of domestic hard coal and lignite resources, which secure independent energy supply by own potential, but must be cut down for reason of CO_2 and other emission reduction. The recently published "Energy Policy to 2030" announces i.a. the forced development of renewable resources. Very large increases are expected for wind power including off-shore installations and biomass cogeneration facilities, primarily biomethane plants utilising farm and municipal waste; energy crops production shall be increased considerably. The document advocates "for every village at least one biogas plant by 2030"[1].

Slovakia started with the Renewable Energy Law from September 2009 and the National Biomass Action Plan from December 2009 into the reconstruction of its energy sector in direction of increasing use of the considerable biomass potential. The country's energy supply is still highly dependent on imports from former Soviet Union countries and the lobby of conventional energy industry has strong influence. Lack of information on possibilities of RES development in political and industrial arenas prevented investments in new solutions in the past. In recent years though, awareness on the advantages of domestic energy supply has been steadily increasing with politicians and the public. On the one hand, biomass associations have been regularly disseminating information in schools and public administration, on the other hand the experience of gas delivery shortcomings in winter 2009 revealed the necessity to seize the opportunity to change the energy mix in favour of domestic renewable sources with help from EU financial programmes.

Slovenia has very favourable conditions for enhancing the use of biomass and becoming less dependent of energy imports. It possesses a high percentage of forest areas and arable land with a high degree of conservation of biodiversity, of variety and extent of habitats and landscape characteristics. These conditions allow for a sustainable exploitation of suitable biomass fractions without jeopardising nature values. However, current forest cutting does not achieve half the estimated annual increment leaving this energy resource still unexploited. Recently it seems that biomass deployed in CHP plants generating heat and electricity is gaining ground though. Boosting the renewable resources potential will be inevitable to achieve the EU 2020 targets.

Although policy planning and instrumentation to promote bioenergy utilisation is existent and available in all Partner Countries, the implementation, however, remains in some cases problematic and rather slow. Several barriers hinder a decisive and accelerate promotion of biomass in . Some examples:

- **Administrative**: No clear legal basis for local authorities for management infrastructure and allocation of investments; still long lead-times for investors to place their investments
- **Legislative**: No clear regulations on implementation of Programmes and Plans
- **Political**: Incoherent policy, so e.g. different promotion measures being contradictory; subsidies for fossil fuels distorting competition with RES and delaying their enhancement
- **Financial**: Allocation of revenues placed by Environmental Fund to a considerable amount to hydro power instead of biomass and wind, lack of tax preferences for import and export of technological equipment for RES systems
- **Technical**: Insufficient energy infrastructure, in particular old and limited grid systems which should be modernised and extended urgently to enable RES investments

[1] Poland's New Energy Policy to 2030 – Development of Energy Infrastucture and Promotion of Renewable Energy Sources. Presentation by Grzegorz Wiśniewski, based on Zbigniew Kamiński, March 2009.

- **Informational**: Lack of commonly available databases and information material on requirements and rules for RES investments as guidance for companies and investors; information campaigns adressing the general public and instructing on the economic, environmental and social benefits of RES deployment.

One or more of these barriers are to be found in all Partner Countries.

All EU Member States have to cope with the claims and specifications of the continuously issued new EU regulations. It will require strong efforts to reconstruct the economic and energetic systems of all countries, particularly in times of financial burden in an economic crisis torturing all European countries.

But expanding production and use of renewable energy will have convincing benefits and be worth strong efforts, since it will not only reduce greenhouse gas emissions and avoid negative environmental impacts, but function as a motor for economic investments and employment opportunities and thus lead to modernisation of economy through environmental protection.

The decision on how to compose the energy mix of the country regarding own resources and capacities, unavoidable imports from foreign countries and dependence from them connected with it, environmental and social impacts of significant changes, will strongly affect the overall development of the country. In Central Europe, the question how much importance will be attributed to renewable sources and particularly biomass within the energy mix, is decisive not only in terms of the required emissions reduction but also for economic development and employment of rural areas.

If the Partner Countries seize the chances for a courageous future-oriented development pathway using the synergies arising in transnational cooperation for a sustainable energy supply system in the whole CE region, they will be well equipped against potential energy delivery shortcomings and for competition in international or global markets.

The National Renewable Action Plans being prepared at the moment will allow detailed information on future policies for biomass and bioenergy in the Partner Countries.

4 Recommendations

Development and deployment of many bioenergy options depend on government support, at least in the short and medium term. Design and implementation of appropriate policies and support mechanisms is vital for using the environmental and social benefits as well as the economic advantages. The following recommendations address primarily policy makers in the national ministries and in authorities at lower administration levels responsible for bioenergy policy, as well as policy designers in the national, federal and communal parliaments of the 4Biomass Partner Countries.

Assessment of available biomass resources

A coherent and systematic approach to assess the availability of national biomass resources is needed. It should be based on a sound methodology and comprehensive, reliable statistical data. Both the physically available and the economically viable biomass potential should be assessed, as well as biomass imports.

Recommendations

- Collect regularly statistical data on feedstock for bioenergy from forestry, agriculture and the by-products and residues from both sectors, and as well from biogenous waste, to receive a realistic assessment of available resources. This means that sustainability criteria and biodiversity requirements formulated in the national strategies have to be considered. The statistical systems should be comparable in CE region or

even preferably in the whole EU. This is a prerequisite for possible future statisticall transfers of a certain amount of bioenergy from one Member State to another according to RES Directive 2009, Art. 6.

Biomass production

The production of biomass for energy should avoid conflicts with other utilisation purposes, i.e. ensure the cascading use of feedstock from forestry and agriculture.

Recommendations

- For Forestry: material use of all suitable wood, for energy the residues and by-products from wood industry
- For Agriculture: feedstock primarily for food and fodder, residues and by-products from food and fodder industries for energy; use of capabilities of several crops to enrich land use systems, e.g. combining short rotation coppice with fields cultivation by planting and harvesting twice per year. Expected positive effects:
  - ♦ Rising yields for farmers
  - ♦ higher diversity of cultivated crops
  - ♦ higher tolerance of wild growing plants
  - ♦ quasi permanent ground cover and thus protection from erosion
  - ♦ less evolution of soil nutrients into groundwater bodies.
- Issue management concepts for forest and landscape care
- Increase production of energy from biodegradable waste from industry and households by improving waste management structures
- Acknowledge energy from waste as a full option, complementary to recycling –
- no crops for energy
- Collect, recycle and recover biowaste separately
- Use digestate from anaerobic digestion generating biogas as fertiliser for surrounding fields (material cycle)
- Give priority to wastes and residues from forests, agriculture, landscape management, as well as from households and industry
- Landfills no longer needed can be used for fast growing energy plants

Mobilisation of new biomass potential

Recommendations

- Document degraded and abandoned land suitable for energy plants production within spatial planning procedures with support of GIS, remote sensing, land zoning
- Consider the documented degraded areas in regional and local land use planning developing integrated concepts for biomass production, energy generation, landscape conservation for recreation areas, nature protected areas
- Set aside land and greenland should be left untouched for biodiversity values as far as possible – recovery of degraded land regaining natural habitats may in some cases be more beneficial for carbon sequestration and biodiversity conservation than recultivation for energy plants, although the latter may improve soil quality by time

Conversion of biomass into bioenergy

Recommendations

- As biomass is a limited resource it should be deployed only in the most efficient way and where it grants the highest GHG reduction. Highly efficient advanced conversion technology for combined heat and power generation may secure supply for decentral small and medium sized demand predominantly in rural areas, but may also be used

in large combustion plants connected with wide-spread district heating grids distibuting heat and cold, the latter increasingly demanded, to densely populated areas. Use woody and agricultural raw materials, preferably residues, primarily in combined heat and power generation, not for biofuels for transport

- Promote the use of ligno-cellulosic materials for biofuels (2nd generation)
- Encourage switching the fuel in co-firing plants from coal-biomass mix to totally biomass firing at least in medium term

Production of biogas

Biogas as a carbon dioxide neutral energy is experiencing high increase at present in several countries. Main substrates are animal slurry and manure as well as organic waste, but also maize silage and rye whole-crop silage are used. The latter are increasingly grown in monocultures leading to depletion of biodiversity and soil fertility and creating monotonous landscapes.

Recommendations

- Ensure better integration of production units into landscapes by regional and local spacial planning, promote multi-functional use of landscapes avoiding monocultures
- Require minimum sustainability requirements by permitting procedures for proper siting of plants, e.g. sufficient arable land should surround the plants where suitable crops may be grown and fermentation residues may be spread as fertiliser without negative impacts
- Annual agricultural crops like maize should not be promoted
- Encourage biogas production from slurry, manure and organic waste, e.g. with bonus
- Promote efficient use of biogas in combined heat and power generation to use surplus heat effectively
- Promote the use of biogas mainly for electricity generation and, upgraded to methane, as fuel in transport
- Give biogas access to natural gas grids and expand these for distribution

Production of biofuels for transport

Sustainable mobility may be achieved also by deployment of biodiesel and bioethanol as blends with petroleum based fuels. However, produced by agricultural feedstocks such as rapeseed and sugar etc., they may also lead to grave land use change. Thus these biofuels should be used as blends only in a transition period.

In a long-term perspective second generation (synthetic) biofuels like Biomass to Liquid (BtL, resp. Synfuel or Sunfuel) may offer better opportunities. They have several advantages: they can be produced from a wide array of different raw materials and are ideally suited to modern engine designs, they burn efficiently and completely, and they can be sold through the existing network of filling stations.

Political support for sustainable expansion of bioenergy

In CE countries, an accelerated and intensified utilisation of the considerable biomass potential should be strongly promoted by political actors. The obvious advantages compared to e.g. the emissions producing fossil fuels or the cost-intensive nuclear power technology should be acknowledged and the energy mix adjusted accordingly.

Indeed, the fast expansion of bioenergy must be well planned and carried out in a spirit of sustainable management for the whole production and utilisation chain. Laws, provisions and support schemes have to be streamlined and reconciled with Sustainability and Biodiversity Strategies of the country.

Furthermore, it will be essential to introduce sustainability standards for solid and gaseous biomass as recommended by EU Commission. These should be mandatory for production, generation and trade. Ideally, they should be jointly developed and introduced in the countries in CE region or even in the whole EU to facilitate trade flows.

Recommendations

- Promote only bioenergy pathways which are particularly beneficial for GHG reduction regarding full life-cycle impacts
- Strengthen existing good practice promotional instruments where necessary and introduce instruments proved as successful in other countries
- Secure fast and uninterrupted implementation of promotional measures adapted to needs of business, lower administration, individual customers
- Coordinate targeted allocation of financial support to innovative initiatives, projects and technology development, with other ministries and lower administration bodies
- Remove subsidies for unsustainable energy production
- Promote integrated spatial planning – considering energy concepts, transport routeing, recreation for public, nature protection and biodiversity - leaving lower administrations like regions and municipalities sufficient scope for designing effective strategies according to their regional/municipal conditions
- Support research for an accelerated development of biomass by promoting research on methodological trends in plant breeding, biotechnology and biomass conversion sectors
- Conduct and support awareness raising campaigns for bioenergy increase in public
- Coordinate promotion of technological innovation for efficiency improvement
- Support research on development of storage facilities for renewable energy for the times of surplus supply, as well as on the development of smart grids
- Facilitate investment placing by substantially reducing lead times for permits
- Cooperate with expert colleagues in other CE countries to exchange experiences and use synergies for a joint political approach to bioenergy policy in the region

Put biomass into action!

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